INDIANA UNIVERSITY
SCHOOL OF MEDICINE
Graduate Division

Sherry F. Queener, Ph.D.
Director of the Graduate Office, IUPUI
Associate Dean of the Indiana University Graduate School

July 25, 2010

Dear Dr. Queener,

Please find attached proposals for:

- A new M.S. degree in Translational Science
- A new certificate in Translational Science
- A new Indiana University Graduate School Ph.D. Minor in Translational Science

As you know, the M.S. degree is part of the specific aims of the funded NIH Clinical and Translational Sciences Institute (CTSI) grant that is coordinated by the Indiana University School of Medicine and also includes other IUPUI schools, Indiana University Bloomington, Purdue University West Lafayette, and the University of Notre Dame. This degree therefore represents a collaborative educational effort that will offer resources to students at three Indiana universities.

The proposals have been authored by Dr. R. Mark Payne of Pediatrics and his colleagues at the CTSI.

Please let me know if I or Dr. Payne can answer any questions.

Thank you for your consideration,

S. J. Rhodes

Simon J. Rhodes, Ph.D.
Associate Dean for Graduate Studies
Indiana University School of Medicine
srhodes@iupui.edu

**Indiana University**
**New Degree Proposal**

**Title:** Master of Science in Translational Science
**Campus:** Indianapolis
**Academic Unit:** Pediatrics
**Department:** Graduate Medicine / Pediatrics

## I. Academic Features

**Goals/Objectives:**
The objective of the Translational Science Program of Indiana (TSPI) is to jointly train scientists, engineers, and physicians in the methodology of translational research. The field of translational research is defined here as the application of basic science to problems in human health and disease. The long term goal of this program is to move new discovery out of research labs into patient care to advance the health and quality of life for Indiana citizens and the nation. Using a unique model of dual mentorship from medicine and basic science, this multi-disciplinary program will prepare future academic medicine leadership in translational research by integrating training in cutting edge basic science with human health and disease.

**Target Trainee:** The proposed program is initially designed for students who have completed a terminal doctoral degree or the equivalent in a clinical science area (e.g., M.D., D.N.S, D.D.S.). Students will consist of clinical fellows and junior faculty for whom basic and translational training will enhance their ability to pursue translational research. They would enter the M.S. program with protected time for research and class work, and would be assigned dual mentorship (e.g., M.D. and Ph.D. mentorship) to oversee their training. Upon graduation, these medical scientists would be uniquely positioned to seek academic and industry careers as translational scientists, and participate in multi-disciplinary teams engaged with translational research projects. The program will initially target the M.D. fellows for training in basic sciences, and as the program rapidly matures, new training tracks will follow to incorporate additional student pools, such as currently enrolled graduate-level basic and clinical science students as well as the Ph.D. scientist or engineer.

**Target Consumer:** According to the Bureau of Labor Statistics, employers in the research and development field require new scientist employees to participate in extensive post-doctoral fellowships in order to develop the skills needed to design and conduct independent research. This program would provide our graduates with an edge by providing them with needed experience and greater knowledge base. Graduates should experience increased opportunities for advancement and employment opportunities in university, industry, or government research settings. The Bureau of Labor Statistics (http://www.bls.gov/oco/ocos309.htm) shows that of Medical Scientists:

31% are employed in scientific research and design organizations

27% are employed in educational services

13% are employed in pharmaceutical and medicine manufacturing

10% are employed in hospitals

Furthermore, this area is expected to see continued job growth due to its impact on improving human health. The Bureau expects a 40% increase in job growth in this field.

**Principal Components:** A) 30 credit hours: 23 to 27 credit core, which includes 7 – 9 credits of Mentored Basic / Translational Research; and 3 to 7 credits of electives. B) A training focus on understanding human disease at both a basic and clinical level to provide the tools needed to translate discovery into patient care.

**Rationale and Relation to Existing Programs:** In the past several years, our Clinical Investigator and Translational Education (CITE) training program (directed by Dr. Kurt Kroenke, MD) has been particularly successful in training clinician-scientists in epidemiology, clinical trials, health outcomes, and T2 (bedside to community) translational research. We believe that creating a parallel program in T1 (bench to bedside) translational research will reap similar benefits.

However, translational research has the unique requirement that new discovery must cross disciplines to be effective, i.e., a new basic discovery in a laboratory-based arena must cross into the discipline of medicine in order to reach the patient. This requires a new training paradigm in which scientists, engineers, and physicians are trained together so that each field understands the language and methodology of the others. This creates the collaborative leadership to move new discovery from bench to bedside. Thus, T1 translational research training requires its own coursework, program leadership skill set, and advisory committee structure. While many training programs have been successfully created in epidemiology, clinical trials, and outcomes research, very few have been developed with robust curricula and mentorship in T1 translational research. Indeed, the need for T1 translational research coursework and training has even been noted as a recurrent theme at the Association for Clinical Research Training (ACRT) Annual Meeting. Critical to facilitating this training is a flexible curriculum relevant to translational research, program leadership, intercampus educational collaborations, and multidisciplinary mentorship for predoctoral and postdoctoral trainees. The long term goal is to establish a training program that addresses the critical need for generating talented research scientists, engineers, and physicians who can pursue a career that lies at the interface between basic and clinical investigative medicine.

The Translational Science Program of Indiana (TSPI) is a direct result of the training mission supported by the Indiana Clinical and Translational Science Institute (CTSI). Under the CTSI umbrella, TSPI and CITE Programs form a training pathway capable of moving research from the bench (T1 research) to the community (T2 and T3 research). Thus, this fulfills a stated goal of the Indiana CTSI to develop and implement training programs for both T1 research (bench to bedside) and T2/T3 research (bedside to community). We have leveraged the CTSI to provide administrative and infrastructure support for the Translational Integrative and Training Education Program, and plan for the CTSI to incorporate support for this program with its renewals. To support this program, there is commitment from the leadership of IUSM and IUPUI, as well as the department chairs from IUSM and IUPUI. All view this program as integral to the development of a robust translational research enterprise in Indiana.

**Coherence with Campus Mission:** The current program is compatible with IUPUI's mission of promoting educational development through innovative collaborations and external partnerships. The TSPI Program is a collaboration among Indiana University School of Medicine (IUSM), Purdue University (PU), University of Notre Dame (ND), and Indiana University (IU). The current program would incorporate IU Hospital, Riley Hospital for Children, Wishard Memorial Hospital, Roudebush VA Medical Center, Methodist Hospital, and LaRue Carter Psychiatric Hospital into the training program. Additionally, the students will potentially collaborate with the ~40 research institutes on campus through mentorship or research-related projects. Finally, due to the importance of translating research findings into practice, collaborative training opportunities will be encouraged and pursued with the well-established pharmaceutical, new biotechnology, and medical device companies in Indiana including Eli Lilly, Dow, Cook, Endocyte, and Guidant. Moreover, collaborative efforts will be made through BioCrossroads, which is an academic-government-industry collaboration that facilitates interactions among investigators and industry.

**Benefits of the Program for Students, IU, and the State:** Presently, training in human disease at both a basic and clinical level is not well-addressed by traditional training programs, which leaves a nationally unmet need for translational scientists. The proposed program will fill this unmet need by offering clinical science students a new Master's Program in Translational Science specifically designed for them. The final product will be a graduate with an M.S. in Translational Science who understands human disease at both the basic and clinical level.

In addition to the direct opportunities and objectives of the Translational Integrative and Training Education Program, several indirect benefits are expected. This program will enhance the interaction between physicians in clinical departments with scientists and engineers in basic departments who are engaged in fundamental bench research focused on human disease. This program will also facilitate the interaction of scientists and engineers interested in common problems and increase the cross-pollination of ideas between scientists in basic and clinical departments. A program which achieves both the specific goals and the indirect benefits outlined above will prepare both M.D. / M.S. and Ph.D. / M.S. scientists with a better understanding of basic science and its implications on their clinical research in the area of human disease and facilitate desperately-needed translational research in all areas of medicine and science. We believe that these innovations are critically important at a time when advances in basic science can rapidly impact the diagnosis and treatment of human disease.

The M.S. program in Translational Science at IUSM is a natural outgrowth of the planning and implementation of the Indiana Clinical Translational Science Institute (CTSI) that was awarded in 2008 by the NIH. It was jointly designed by several basic and physician scientists, who have worked together on models of human disease and on training in

translational research in the Departments of Internal Medicine, Pediatrics, Biochemistry and Molecular Biology, and Physiology/Pharmacology. This group realized that historically in the best major medical centers in this country, there has been a very valued group of physicians who has worked at the interface of basic science and human health. This program has been designed to enhance the clinical training of medical students and fellows with basic sciences approaches to focus on the application of these approaches to human disease. This graduate program differs from other graduate programs on campus by offering a new pathway for clinical scientists to gain a comprehensive knowledge of clinical and basic science methodologies, as well as learn how to collaborate with other scientists and engineers in a translational research environment regardless of their specialty. An overall goal of this training program is to produce exceptional 'translational' researchers in a fashion that saves both time and expense when compared to more conventional 'translational' training routes.

**Opportunities for Degree Recipients:**
Program graduates will be professionals who are committed to conduct independent as well as collaborative research following graduation from the program. This degree will be marketed to enhance existing employment potential, particularly in translational research positions. Advising prior to application will clearly indicate that this is not an entry-level, professional degree to secure employment. The students will be clinical scientists who, as a result of this degree, will be better trained for translational research. Moreover, the completion of this degree may enhance one's competitiveness for various research positions in academic institutions, foundations, industry, or government agencies, and increase opportunities for organizational advancement within these agencies.

## II. Implementation

**Steady State Enrollment/Degree Completion Projections (year five):**

| | | |
|---|---|---|
| Headcount | 16 | (16 new-to-campus) |
| FTE | 11 | |
| Degree Recipients | 8 | |

**Steady State Expenses and Revenue Sources:**

***Expenses***

| | | |
|---|---|---|
| **Faculty** | | $0.00 |
| **Support Staff** | 1.0 FTE | $63,800.00 |
| **Supplies and Expense** (office supplies, computer, chairs, educational, postage/shipping, telephone, retreat/meeting, travel, library, recruitment) | | $16,100.00 |
| **Student Assistance** | | $87,200.00 |
| | | $167,100.00 |

***Revenue Sources***

| | |
|---|---|
| **New-to-Campus Student Fees** | $87, 200.00 |
| **Enrollment Change Funding** | $32,700.00 |
| **Reallocation** | $0.00 |

***One-time Costs*** $0.00

**COVER PAGE**

| | |
|---|---|
| INSTITUTION: | Indiana University |
| COLLEGE: | Indiana University Graduate School |
| DEPARTMENT: | Medicine / Pediatrics / Graduate Division |
| DEGREE PROGRAM TITLE: | Master of Science (M.S.) in Translational Science |
| FORM OF RECOGNITION TO BE AWARDED/DEGREE CODE: | Master of Science (M.S.) |
| SUGGESTED CIP CODE: | Molecular Medicine. 26.1401 |
| LOCATION OF PROGRAM/CAMPUS CODE: | Indianapolis |
| PROJECTED DATE OF IMPLEMENTATION: | Fall 2011 |

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DATE PROPOSAL WAS APPROVED BY
INSTITUTIONAL BOARD OF TRUSTEES: _____

_____
SIGNATURE OF AUTHORIZING
INSTITUTIONAL OFFICER

_____
DATE

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_____
DATE RECEIVED BY COMMISSION
FOR HIGHER EDUCATION

_____
COMMISSION ACTION (DATE)

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**E. TABULAR INFORMATION**

# ABSTRACT

Master's Degree in Translational Science
To be offered by
University Graduate School, Indiana University,
Indiana University – Purdue University Indianapolis

1. **Objectives:** Over the last decade, a number of disciplines, including biochemistry, immunology, cellular and molecular biology, have experienced a rapid series of bold advances. In spite of these advances, there has been a 'lag time' between discovery and application of these new findings, which creates a need for a new breed of scientist with a hybrid training of basic science and clinical medicine who can bridge this gap. The proposed M.S. degree in Translational Science addresses this critical need by providing an expedited *training program that can produce a translational scientist with an understanding of human disease at both a basic and clinical level.*

2. **Clientele to be served:** The proposed program is initially designed for students who have completed a terminal doctoral degree or the equivalent in a clinical science area (e.g., M.D., D.N.S, D.D.S.). Students will consist of clinical fellows and junior faculty for whom basic and translational training will enhance their ability to pursue translational research. They would enter the M.S. program with protected time for research and class work, and would be assigned dual mentorship (e.g., M.D. and Ph.D. mentorship) to oversee their training. Upon graduation, these medical scientists would be uniquely positioned to seek academic and industry careers as translational scientists, and participate in multi-disciplinary teams engaged with translational research projects. The program will initially target the M.D. fellows for training in basic sciences, and as the program rapidly matures, new training tracks will follow to incorporate additional student pools, such as currently enrolled graduate-level basic and clinical science students as well as the Ph.D. scientist or engineer.

3. **Curriculum:** A total of 30 semester hours is required to complete the M.S. in Translational Science.
   a. A training focus on understanding human disease at both a basic and clinical level to provide the tools needed to translate discovery into patient care.
   b. 23 to 27 credit core, which includes 7 – 9 credits of Mentored Basic / Translational Research; and 3 to 7 credits of electives. The requirements are distributed as follows:

**Core Classes for all tracks**

| *Course Title* | *Course #* | *Credits* |
|---|---|---|
| Tools & Techniques in Translational Research | GRAD G667 | 3 |
| Quantitative Aspects of Translational Research | New (Grad G678) | 3 |
| Introduction to Research Ethics **or**<br>Ethical & Policy Issues in International Research **or**<br>Responsible Conduct of Research (RCR) | GRAD G504 / G505 or<br>PHIL P555 or<br>New | 1 to 3 |
| Biostatistics I or II (or approved equivalent) | GRAD G651 or G652 | 3 |
| Techniques of Effective Grant Writing (or approved equivalent) | GRAD N802 | 3 |
| Mentored Basic Science / Translational Research | New | 7 to 9 |
| Thesis in Translational Research | New | 3 |
| Electives (graduate level coursework approved by the Program Director) | IUPUI | 3 to 7 |
| Total | | 30 |

4. **Employment possibilities:** Program graduates will be professionals who are committed to conduct independent as well as collaborative research following graduation from the program. This degree will be marketed to enhance existing employment potential, particularly in translational research positions. Advising prior to application will clearly indicate that this is not an entry-level, professional degree to secure employment. The students will be clinical scientists who, as a result of this degree, will be better trained for translational research. Moreover, the completion of this degree may enhance one's competitiveness for various research positions in academic institutions, foundations, industry, or government agencies, and increase opportunities for organizational advancement within these agencies.

## B. Program Description

### 1. The Proposed Program and Its Objectives

The overall objective is to offer a 2-year Master of Science program in Translational Science for clinical scientists, which will integrate basic science training in the field of human health and disease with dual mentorship in medicine and basic science. As one of the six specific aims listed in the Indiana Clinical and Translational Sciences Institute (ICTSI) grant (5 UL1 RR025761-02), the Translational Science Program of Indiana(TSPI) will provide the training mechanism for clinical scientists to develop an understanding of human disease at both a basic and clinical level. Additionally, the program will access available resources from Indiana University School of Medicine and the ICTSI to build upon the successful pilot program that uses basic and clinical faculty in mentorship teams to train students to conduct research in human health and disease. TSPI will offer objective-based experiences in multiple basic, clinical, and translational science arenas, including courses, projects, and workshops, so that students will understand how to comprehensively conduct research in translational manner. For example, students will learn how to utilize basic science methodologies, how to assemble a multidisciplinary team to conduct translational research, how to develop and implement a therapeutic intervention, and then develop endpoints for quantifying clinical outcome. Trainees will develop an understanding of human subject protection, and how to move a concept from the lab to a patient.

**TABLE 4: Coursework**

| *Course Title* | *Course #* | *Credits* | Ph.D. Minor | Graduate Certificate | Master's Degree Program |
|---|---|---|---|---|---|
| Tools & Techniques in Translational Research | GRAD G667 | 3 | X | X | X |
| Quantitative Aspects of Translational Research | New (GRAD G668) | 3 | X | X | X |
| Introduction to Research Ethics **or**<br>Ethical and Policy Issues in International Research **or**<br>Responsible Conduct of Research (RCR) | GRAD G504/ G505 or PHIL P555 or New | 1 to 3 | X | X | X |
| Biostatistics I or II (or approved equivalent) | GRAD G651 or G652 | 3 | X | X | X |
| Electives (Graduate level courses approved by Program Director) | GRAD XXX | 3 to 8 | X<br>Up to 3 | X<br>6 to 8 | X<br>3 to 7 |
| Techniques of Effective Grant Writing (or approved equivalent) | GRAD N802 | 3 | | | X |
| Mentored Basic Science / Translational Research | New | 7 to 9 | | | X |
| Thesis in Translational Research | New | 3 | | | X |
| **Total Required Credits** | | | | **18** | **30** |

* Note: For more detailed information regarding the Minor and Certificate programs, see respective proposals.

The TSPI program will award either a Graduate Certificate in Translational Science or an M.S. in

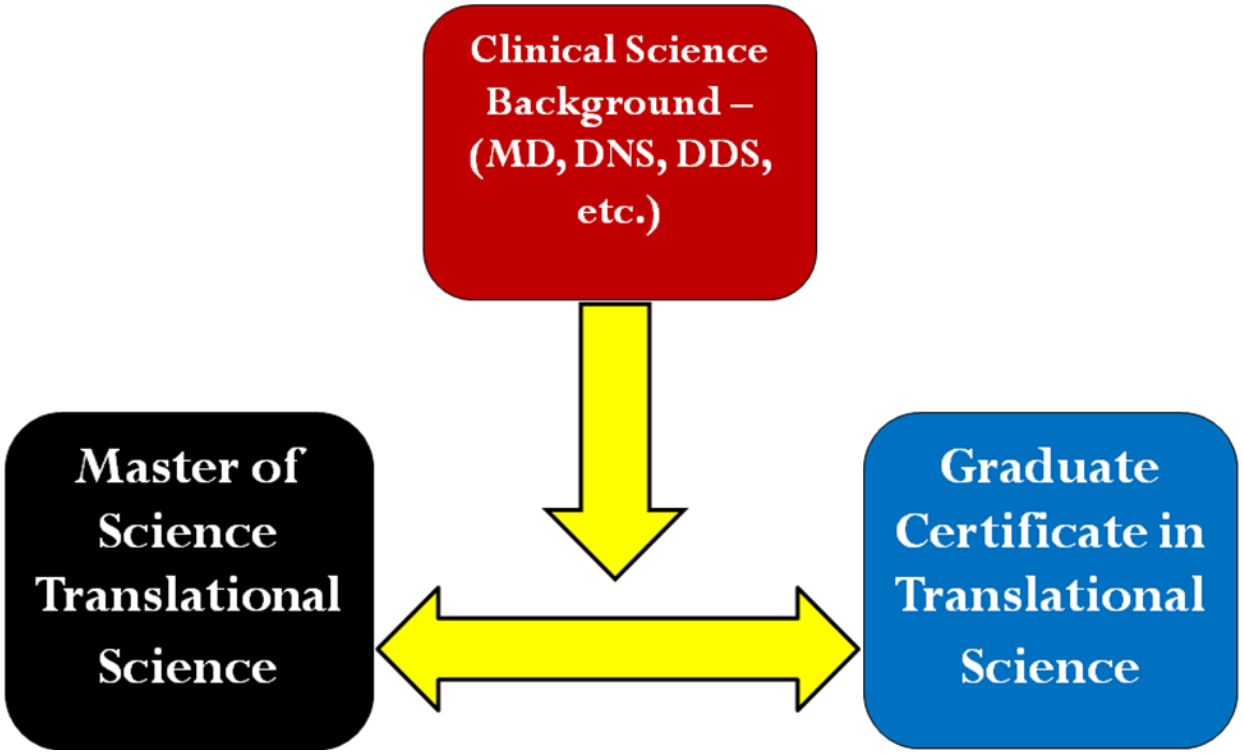
Translational Science, depending upon the student's need. The underlying philosophy of the program is that an understanding of human disease at both the basic and clinical science level is fundamental to all translational researchers. The program will allow students to incorporate more basic and clinical science training into their graduate study through a Graduate Certificate or a terminal M.S. degree in Translational Science. Additionally, the program will offer training to the population at large, but especially students from the CTSI partnering institutions. A common academic system allows students from the partnering institutions to readily assimilate components into their programs. Furthermore, individuals who have already completed their doctoral training but are interested in adding more basic or clinical science to their current knowledge base may be admitted into either program. Individuals who already possess their terminal doctoral degree would not be able to transfer in any of their coursework from their previously granted graduate-level degree. The long term goal is to establish a training program that addresses the critical need for generating talented research scientists who can pursue a career that lies at the interface between basic and clinical investigative medicine.

- **STRATEGIES for SHORT-TERM OUTCOMES: The Translational Science Program of Indiana(TSPI) will**:
  - ✓ Educate translational researchers who regularly read research literature in both basic and clinical areas, who can state the hypothesis for planned research, who can critically evaluate and choose appropriate research tools, who can explain the fundamental concepts in the discipline, and who can defend methods for analyzing data or scholarly product.
  - ✓ Educate translational research students who can apply sophisticated biochemical, molecular and engineering approaches to directly impact the understanding of the mechanisms of human disease.
  - ✓ Educate translational scientists who can move productively between basic and clinical settings as exemplified by collaborative papers.
  - ✓ Educate scientists and engineers who can act as teachers or mentors for basic and clinical colleagues.
  - ✓ Educate translational scientists and engineers who can develop novel molecular approaches to treat human disease utilizing their understanding of complex clinical problems.
  - ✓ Provide a program (involving graduate students, special courses and faculty) that will promote 'translational' research.

- **LONG-TERM OUTCOMES and IMPACT**: **The Translational Science Program of Indiana(TSPI) will accomplish**:
  - ✓ Greater awareness of basic science methodologies and how to apply them to medical problems.
  - ✓ Leadership of research teams by TSPI program graduates.
  - ✓ Ongoing partnerships and collaborations between biomedical scientists, engineers and physician

scientists.

- ✓ Greater integration of basic, translational, and clinical research.
- ✓ Improved medical practice (i.e., applications for the treatment of disease) using/applying new biological knowledge, tools, and approaches.




## 2. Admission Requirements, Student Clientele, and Financial Support

**Admissions Requirements and Procedures**

Students will be admitted through the IUPUI and University Graduate School admissions processes. Application into the Master's Degree Program includes completion of an application to the program, interview with the Program Director, verification of the admissions requirements specified below, and formal enrollment through the IUPUI and University Graduate School admissions processes.

### a. Admissions Requirements

1) Students must possess at least a bachelor's degree from an accredited institution or institution approved by the Translational Science Assessment & Advisory Board (TSPI oversight committee).
2) Students must have completed their doctorate degree or equivalent, such as M.D., D.N.S., or D.D.S.
3) Strong preference is for students who have completed training or licensure in a health care profession field (e.g., physician, dentist, pharmacist, dietician, etc.).
4) Candidates should have as an ultimate goal a clinical or translational research career: i.e., a full-time appointment to an academic faculty position with a desire to spend at least 50%

of time in research, or a research career in another setting (e.g., industry or government).

5) Transcripts will be requested according to standard procedures and all requirements of the relevant campus graduate school (e.g., prior GPA, etc.) must be satisfied. Selection of students is based on grades (GPA must be 3.0 or higher), academic accomplishment, papers submitted/published, grants submitted/awarded, clarity of career plans, and need for this combined degree training. Admissions decisions are based on individualized review of qualifications and experience. The most important criterion is the ability to demonstrate a likelihood of having a successful and productive graduate school experience in our programs.

6) Candidates should complete an application as well as supply a curriculum vitae, personal statement, a letter from primary mentor, and three letters of reference with one from their department or division head or Program Director assuring that the applicant will have adequate protected time for the program.

7) For applicants whose native language is not English and who have not received a degree from a certified American university, the applicant must submit one of the following as satisfactory proof of English proficiency:

a) TOEFL score of 600+ (paper version / PBT) or 250+ (computer-based version / CBT) or a provisional minimum of 100+ (internet-based version / KBT). IUPUI's school code for the TOEFL is 1325.

b) A grade of 6.0 or higher on the Cambridge International English Language Testing System (IELTS).

c) Successful completion of the ELS Language Centers Level 112 Master's Intensive Program.

d) Students currently residing in Indiana may take the IUPUI English as a Second Language (ELS) Placement Test. Placement at level G011 or higher is required for students who need an I-20 from IUPUI.

e) A bachelor's or higher degree from a country designated by IUPUI as predominantly native-English speaking.

f) For residents of Japan, a "First Grade" score on the STEP Eiken.

b. **Prerequisite coursework and/or degrees:** The proposed M.S. is designed for students who have completed (or are in the process of completing) their clinical doctoral degree (e.g., M.D., D.N.S., D.D.S.).

### c. Student Clientele:

The pool consists of individuals with a background in clinical sciences, such as postdoctoral fellows, and junior faculty. Most of these individuals are funded through training grants and career

awards which require at least a two-year minimum of 70 - 100% of protected time for research and formal coursework. The proposed M.S. will provide the formal training needed to prepare for a translational research career. Advising prior to application will clearly indicate to the applicant that this is **NOT** an entry-level, professional degree to secure employment. Students from IU Bloomington, IUPUI, University of Notre Dame, and Purdue University West Lafayette, who meet these criteria, will be actively recruited by announcement via the department chairs and program director, by advertising the program over campus electronic newsletters, and by faculty recommendation of students.

All entering students will be provided with a new brochure through the graduate school describing the program at the time of their matriculation. All students expressing interest will be encouraged to speak with the program director (Dr. Payne) or one of the Executive Committee members (Drs. Rhodes, Kroenke, Moe, Fife, Hetrick, or Heath) for further details. We will also provide the brochure for undergraduates visiting the school as part of our general recruiting programs, for distribution to minority-based colleges and universities during recruiting visits (to help develop a pipeline of trainees), and through our web sites.

**TABLE 5: # of Incoming Clinical Fellows (over the past 5 years)**

| Year | Average Incoming Class Size | Average % URM* | Average % Women |
|---|---|---|---|
| 2008-2009 | 161 | 26 | 71 |
| 2007-2008 | 158 | 26 | 42 |
| 2006-2007 | 159 | 26 | 39 |
| 2005-2006 | 158 | 27 | 38 |
| 2004-2005 | 95 | 22 | 35 |

* Underrepresented Minorities (URM) are Black, Hispanic, Alaska Native, American Indian, or Native Pacific Islander.

### d. Relationship of the new Minor and Graduate Certificate to this new Master Degree Program

This program offers four options of obtaining translational science training. Option 1 entails taking selected coursework through the Graduate Non-Degree program to provide specific training to supplement one's current knowledge. Option 2 provides specialized training in the form of a minor to current Ph.D. graduate students. Option 3 provides any enrolled TSPI student the opportunity to obtain a Graduate Certificate in Translational Science to bolster their graduate training both pre- and post-doctoral. Option 4 consists of enrolling in and completing the Master's degree program in Translational Science post-doctoral.

**e. Enrollment Limitations:** The program plans to limit enrollment to 20.

### f. Student Financial Support:

Initially, we anticipate that part-time students will receive limited support; therefore, they will either be able to pay their own way or may even receive financial support from their employers. Full-time students may potentially access various forms of funding:

1) Fellowship appointments through faculty with grant funding from external sources;
2) Support from campus block grants to schools designed to assist faculty with their research or with the development of grant proposals;
3) Financial support from their employers;
4) Financial support through the TSPI fee support.
5) TSPI will also seek additional grant financial support for students (e.g.: CTSA, T-32 grants, etc.)
6) Pay their own way

## 3. Proposed Curriculum

**a. Requirements:** Minimum of 30 credit hours: 23 to 27 core credit hours for the Master Degree track, including Tools and Techniques in Translational Research (G667); Quantitative Aspects of Translational Research (New); Introduction to Research Ethics or Ethical and Policy Issues in International Research or Responsible Conduct of Research (RCR) (G504 / G505 / P555 / New); Biostatistics I or II (G651, G652, or approved equivalent); Effective Techniques in Grant writing (N802 or approved equivalent); Mentored Basic Science Translational Research (New); and Thesis in Translational Research (New). Credit may be given for up to 12 hours of student's pertinent doctoral level coursework. Additional coursework (electives) is adapted to fit the needs of the student up to a total of 7 credits. These electives will be selected from the enclosed list. Additionally, in order to ensure that the students receive the most from their individualized electives, students must also receive prior approval from the Program Director on which electives are taken. Focus is on translational research training in the basic and clinical sciences for future research scientists and engineers. All required coursework is offered at the IUPUI campus.

**Completion Requirements and Procedures for Master's Degree in Translational Science**

**Total number of credits required: 30 credits**

Specific course requirements **(Core Classes)**

| | | | |
|---|---|---|---|
| ✓ | Tools and Techniques in Translational Research | (G667) | 3 credits |
| ✓ | Quantitative Aspects of Translational Research | (New – Grad G668) | 3 credits |

| | | | |
|---|---|---|---|
| ✓ | Introduction to Research Ethics or Ethical & Policy Issues in International Research or Responsible Conduct of Research (RCR) | (G504/G505/P555/New) | 1 – 3 credits |
| ✓ | Biostatistics I or II | (G651, G652, or approved equivalent.) | 3 credits |
| ✓ | Techniques of Effective Grant Writing | (N802 or approved equivalent) | 3 credits |
| ✓ | Mentored Basic Science / Translational Research | (New) | 7 – 9 credits |
| ✓ | Thesis in Translational Research | (New) | 3 credits |
| | Total Core Credits | | 23 – 27 credits |
| | Electives Credits (Graduate Level Courses – approved by the Program Director) | | 3 – 7 credits |
| | Total Credits | | 30 credits |

- Minimum GPA requirements
  - ✓ Minimum overall GPA for all courses applied to M.S. — 3.0 GPA
  - ✓ Minimum grade for any course to be applied to M.S. — B-
- Maximum number of credits that may be transferred from another institution — 12 credits
- Maximum number of credits from undergraduate level courses that may be used toward the degree — 0 credits
- Maximum time allowed for the completion of M.S. degree — 5 years
- Number of credits that can be applied both to this M.S. program and another degree or certificate program (i.e., overlapping credits) — 12 credits
- Number of credits taken prior to admission to the M.S. program that may be counted toward completion of the M.S. program — 14 credits

**TABLE 6: Core Classes for M.S. Degree**

| *Course Title* | *Course #* | *Credits* |
|---|---|---|
| Tools & Techniques in Translational Research | GRAD G667 | 3 |
| Quantitative Aspects of Translational Research | New (Grad-G668) | 3 |
| Introduction to Research Ethics **or**<br>Ethical and Policy Issues in International Research **or**<br>Responsible Conduct of Research (RCR) | GRAD G504/G505 or<br>PHIL P555 or<br>New | 1 to 3 |
| Biostatistics I or II (or approved equivalent) | GRAD G651 or G652 | 3 |
| Techniques of Effective Grant Writing (or approved | GRAD N802 | 3 |
| Mentored Basic Science / Translational Research | New | 7 to 9 |
| Thesis in Translational Research | New | 3 |
| Electives (Graduate level coursework & approved by Program Director) | IUPUI | 3 to 7 |
| Total | | 30 |

**TABLE 7: Sample Curriculum for M.S.**

| | *Course Title* | *Course #* | *Credits* |
|---|---|---|---|
| **Year 1** | **Fall** | | |
| | Responsible Conduct of Research | New | 3 |
| | Tools & Techniques in Translational Research | GRAD G667 | 3 |
| | Elective | GRAD XXX | 3 |
| | **Spring** | | |
| | Quantitative Aspects of Translational Research | New (GRAD-G668) | 3 |
| | Biostatistics I | GRAD G651 | 3 |
| | Mentored Basic Science / Translational Research | New | 3 |
| | **Summer** | | |
| | Mentored Basic Science / Translational Research | New | 3 |
| **Year 2** | **Fall** | | |
| | Mentored Basic Science / Translational Research | New | 3 |
| | Techniques of Effective Grant Writing | GRAD N802 | 3 |
| | **Spring** | | |
| | Thesis in Translational Research | New | 3 |
| | Total | | 30 |

### a. Existing Core Courses

1) **Tools and Techniques in Translational Research (G667): 3 credits.** This course is offered in the spring semester and provides the advanced student with an understanding of the basic technologies and techniques used in translational research today. Key to this training is understanding how and when to use these technologies, and how to interpret their results and pitfalls. The trainees develop an understanding

of the components for protecting human subjects, and how to move a novel concept from the lab to a patient. Finally, the student will understand how to identify and measure target endpoints in patients, and how to assemble a multi-disciplinary team to conduct translational research. The course will uses a case-based approach whereby specific technologies and problems are demonstrated in readings drawn from the textbook. This course is a new offering (initiated spring 2009) and is supported by the Indiana CTSI. **Course Director:** R. Mark Payne. Offered once in Spring 2009 and is being offered Fall 2010.

2) **Research Ethics (Responsible Conduct of Research - RCR) (G504/G505/P555): 1 - 3 credits.** All M.S. students must enroll in coursework related to RCR if they have not already done so.

a) **Introduction to Research Ethics (G504): 2 - 3 credits.** More intensive course than G505. Taught by the Department of Medical and Molecular Genetics and The IU Center for Bioethics. **Course Director:** Kimberly Quaid de Cordon. Offered 3 times in the past 3 years (every fall).

**b) Introduction to Research Ethics (G505): 1 credit.** Offered in the fall semester, G505 includes lecture and small group discussion formats and covers important issues in biomedical research, such as: 1) Scientific misconduct, 2) Conflict of interest, 3) Animal rights and welfare, 4) Ownership of data, intellectual property, and copyright management, 5) Authorship and scientific manuscripts, and 6) Informed consent and human subjects. **Course Director:** Michael J. Klemsz. Offered 3 times in the past 3 years (every fall).

**c) Ethical and Policy Issues in International Research (PHIL P555): 3 credits.** If students are contemplating international research, they may opt for this course. This course examines ethical and policy issues in the design and conduct of transnational research involving human participants. Topics discussed include: economic and political factors; study design; the role of ethics review committees; individual and group recruitment/informed consent; end of study responsibilities; national and international guidelines. **Course Director:** Eric M. Meslin. Offered 3 times in the past 3 years (every fall).

**d) Responsible Conduct of Research (New) 3 credits.** Look in New Coursework section b 4).

3) **Biostatistics I (G651 or approved equivalent): 3 credits.** G651 is an introductory level biostatistics course designed for healthcare professionals. It is the first in the G651 and G652 series on biostatistics methodology. The course covers topics such as data description and presentation techniques, probability and probability distributions, sampling distributions, statistical inferences from small and large samples, analysis of categorical data, analysis of variance, correlation and simple linear regression analysis. Upon completion of the course, students will achieve a basic understanding of the concepts and techniques of data description and statistical inferences. Students will also acquire a working knowledge of SPSS, a commonly used statistical computation program. Students will be able to understand and interpret the statistical analyses in research articles published in medical journals. **Course Director:** B. Katz. Offered 6 times in the past 3 years (spring and fall semesters).

**OR**

**Biostatistics II (G652 or approved equivalent): 3 credits.** G652 is an advanced applied biostatistics course designed for students with an interest in the health sciences. Students are expected to have completed at least one semester course of basic biostatistics. Knowledge of probability and probability distributions, concepts of estimation and hypothesis testing are assumed. Topics covered in this course include multiple linear regression, multi-factor analysis of variance, analysis of covariance, analysis of repeated measures, logistic regression model, and survival analyses. Upon completion of the course, students are expected to understand the appropriate statistical models for various outcomes and be able to interpret results using statistical techniques covered in this course. Students are also expected to conduct simple analyses using SPSS on personal computers. **Course Directors:** S. Gao & P. Monahan. Offered 3 times in the past 3 years (every fall).

4) **Techniques of Effective Grant Writing (N802 or approved equivalent): 3 credits.** This is an intensive course / workshop designed to teach fellows and graduate students how to write and review an NIH application. Trainees will write an NRSA, R03, or K-award application. This will serve as the M.S. student thesis and must be submitted for review by their committee. **Course Directors:** Paul Lysaker & Alan Breier. Offered 3 times in the past 3 years (every fall).

5) **Electives (3 – 7 credits)** Master's degree students must select graduate-level electives and receive prior approval from the Program Director. The selections will be tailored

to the student's particular research interests. Up to 12 credits may overlap with the student's current doctoral program. Electives are subject to approval by the Program Director.

**b. New Courses**

1) **Quantitative Aspects of Translational Research, (New - Grad-G668): 3 credits.** Quantitative Aspects of Translational Research is an interdisciplinary weekly seminar series offered in the spring semester. Targeted toward the advanced graduate student and clinical or research based postdoctoral fellows, it will provide a forum for both Level 1 (bench to bedside) and Level 2 (clinical studies to practice) translational researchers to work together in learning both the key concepts and principles required to develop medically relevant solutions. Through a systematic exploration of diabetes mellitus, students will be exposed to the process of learning about any disease. Lecturers will represent the multiple disciplines with a stake in dealing the various aspects of disease; thus, providing students with a better global understanding. **Course Director:** Robert Bies, Ph.D. and Jamie Dananberg, M.D.

2) **Mentored Basic Science / Translational Research (New): 7 – 9 credits.** This mandatory course requires the student to construct an organized translational research project under dual mentorship (M.D. and Ph.D.) by faculty. The capstone experience is the completion of a grant in the NIH format suitable for peer-review and presentation before one's peers. This course will be conducted in the fall, spring, and summer terms, graded by faculty, and should be in a format supporting submission to a funding organization. Students will enroll for 3 credits per semester for up to 3 semesters. **Course Director:** R. Mark Payne, M.D.

3) **Thesis in Translational Research (New): 3 credits.** This mandatory course requires the student to complete a research thesis based on their mentored basic science / translational research project. **Course Director:** R. Mark Payne, M.D.

4) **Responsible Conduct of Research (New) 3 credits.** A new course currently being developed by John Baumann, Ph.D. (Executive Director, Research Ethics, Education and Policy, Office of Vice President for Research, Indiana University) **Course Director:** John Baumann

**c. Required Courses Not Offered at IUPUI:** All required courses will be offered at the Indianapolis campus.

## 4. Form of Recognition

a. **Degree to be Awarded:** Office of Graduate Studies - Indiana University School of Medicine (IUSM) will award a Master of Science Degree in Translational Science from Indiana University.

b. **Institution's Suggested CIP Code:** Molecular Medicine. 26.1401

## 5. Program Faculty and Administrators

### a. Existing Graduate Faculty (Core Leadership Team)

1) **R. Mark Payne, M.D. (Professor in Indiana University School of Medicine)** Dr. Payne will serve as the Program Director for this training program. His research focus is on the role of mitochondrial biology in mediating heart disease in children, and on developing gene therapies for mitochondrial defects. In addition, he is an experienced physician–scientist who has created and directed a translational research graduate training program before at a previous institution. Many of the plans in the current application reflect his experience with the previous program. He will be responsible for administration of the program and represent the program to the multiple institutions involved. He will also participate in teaching, mentoring the students (both clinical and scientifically), oversee recruiting and selection of students (a key activity), and oversee placement and training of the students on the clinical rotations. Ten percent of his time is committed to the clinical treatment of children with heart disease and the remainder is committed to research. Dr. Payne has an extensive history of training graduate students and postdoctoral fellows in basic and translational research. He helped to establish and direct the Molecular Medicine Graduate Training Program at Wake Forest School of Medicine (Winston-Salem, NC), and was successful in funding it with a T32 grant from NIH (T32 GM063485-01A1. Training Program in Molecular Medicine, 2004 - 2009). This translational research training program accepted 6 - 8 students per year leading to the Ph.D. degree in Molecular Medicine, and was only the second program in the nation to become a funded Molecular Medicine program. Dr. Payne moved to IUSM in 2005. He is the director of the young investigator (postdoctoral) Translational Research training program for the Indiana Clinical Translational Science Institute, and is also the director of the Pediatric Cardiology clinical fellowship.

2) **Simon J. Rhodes, Ph.D. (Professor and Associate Dean in Indiana University School of Medicine)** Dr. Rhodes will serve as a member of the Executive

Committee for this training program. He is a Professor of Cellular & Integrative Physiology and the Associate Dean for Graduate Studies for the Indiana University School of Medicine (IUSM). His research group investigates the molecular basis of human pituitary development and he has translated this work to the clinic to facilitate the diagnosis and treatment of severe pediatric compound hormone deficiency diseases. Fifty percent of his time is committed as the IUSM Associate Dean for Graduate Studies to administering the M.S. and Ph.D. graduate programs, the M.D.-Ph.D./MSTP program, and the postdoctoral affairs office. He has excellent working relationships with all of the programs served by this proposed program: the IUSM graduate programs, the IUPUI Science, IUPUI Dental Science, and IUPUI biomedical engineering programs in Indianapolis, and the Purdue University biomedical engineering program at West Lafayette (an established partner in the M.D. / Ph.D. training program). He will participate in teaching of the students, administration of the program, and recruitment and selection of the students and minority students, and evaluation of the program. He will serve as Program Director should Dr. Payne be unable to continue.

3) **Kurt Kroenke, M.D., (Chancellor's Professor of Medicine, Director of Clinical Investigation and Translational Education (CITE) Program, Senior Scientist in Regenstrief Institute, Director of Indiana Clinical and Translational Sciences Institute (CTSI) Education Programs, and Associate Director of Education in the General Clinical Research Center)** Dr. Kroenke will serve as a member of the Executive Committee. Dr. Kroenke has directed clinical research training programs since 1988, first at the Uniformed Services University of the Health Sciences (USUHS) and, since 1997, at IU School of Medicine. Dr. Kroenke's research interests have been in the areas of common symptoms and mental disorders in primary care with a secondary interest in medical education. He has over 260 publications in peer-reviewed journals. He is a past President of the Society of General Internal Medicine (SGIM), which represents nearly 3000 academic general internists and is a key organization for physicians engaged in health services and outcomes research. He is a Board Member of the Association for Clinical Research Training (2005-2009) which promotes training directors and other leaders of clinical research training programs nationally.

**4) Hunter Heath, III, M.D. (Adjunct Professor of Medicine, Division of Endocrinology and Metabolism, Indiana University School of Medicine)** Dr.

Heath will serve as a member of the Executive Committee for this training program. He is an endocrinologist and investigator in calcium and bone metabolism, with a track record of 21 continuous years of NIH funding. Dr. Heath has published more than 100 original research reports in peer-reviewed journals. He was Head of the Endocrine Research Unit at the Mayo Clinic, and Chief, Division of Endocrinology & Metabolism, University of Utah School of Medicine before joining Eli Lilly and Company in 1996. He was Executive Director of the U.S. Medical Division, Lilly Research Laboratories, until his retirement in 2007. Currently, he operates Hunter Heath Consultancy, LLC, a biopharmaceutical research, development, and commercialization consultancy.

5) **Sharon M. Moe, M.D. (Professor of Medicine and Vice-Chair for Research in Indiana University School of Medicine)** Sharon M. Moe, M.D., is Professor of Medicine and Vice-Chair for Research in the Department of Medicine at IUSM. Dr. Moe will serve as a program Core Leader for the clinical rotations on Internal Medicine for the students, and 2% effort is requested for her release time for teaching. She will be responsible for integrating the students into the Medicine clinical rotations, and supervising their clinical immersion experience in Medicine. Her experience in translational research and training is extensive. She served as Director of the Clinical Trials Program from 1998 to 2003, and was the Associate Dean for Research Support from 2001-2005, where she oversaw research compliance for the School of Medicine. As Vice-Chair for Research she oversees the administration of extramural funding for Medicine, is responsible for mentoring junior faculty, and enabling multi-disciplinary research. She is active within the Indiana CTSI, has won awards for teaching and continues to lecture, and is active in multiple programs and committees related to clinical and translational research. She is especially active in mentoring young investigators, many who are now NIH K-awardees. Dr. Moe is the principal investigator for several ongoing clinical and basic research studies in the field of vascular calcification and bone and mineral metabolism in kidney disease. Her research is funded by the Veterans Affairs Department, NIH, and Pharmaceutical Companies. She has authored over 100 scientific manuscripts about renal osteodystrophy and vascular calcification, and serves on national committees related to kidney and bone disease.

6) **Rose Fife, M.D., M.P.H. (Associate Dean for Research, Associate Director of the Indiana CTSI, Co-Director of the IU Family Violence Institute, Barbara F. Kampen Professor of Women's Health, Professor of Medicine and**

**Biochemistry and Molecular Biology, Indiana University School of Medicine)** Dr. Fife will serve as a member of the Executive Committee. Dr. Fife is leading the new CTSI K award program supporting basic scientists in translational research projects, using a two-mentor system (one basic science mentor and one clinical mentor). She will participate in the development of the new curricula, especially as they apply to the needs of basic scientists beginning in the field of translation research. Dr. Fife has a long history of involvement in translation research, from her years as a bench researcher studying the role of metalloproteinases in cartilage and cancer, including angiogenesis and metastasis. She directed the IU Outpatient Research Facility from its inception in 1993 until 2008 and has conducted many clinical trials in rheumatoid arthritis and osteoarthritis. She also has served as President of the Central Society for Clinical Research and as Chair of the AAMC Group on Research and Development (GRAND) and is a member of its Steering Committee. She served on the AAMC Task Force II on Clinical Research, which published "Promoting Translational and Clinical Research: The Critical Role of Medical Schools and Teaching Hospitals. Washington, DC: AAMC, 2006." Dr. Fife is Associate Editor of Translational Medicine and serves on the Editorial Board of the Journal of Women's Health. She is Program Director for the Regulatory Program of the CTSI. She also is Co-Director of the IU Family Violence Institute and studies the epidemiology of family violence. She has had a T35 short-term training grant from NIA for medical and other professional students interested in studies on aging and women's health (currently being submitted for renewal). The next iteration of this T35, when funded, will include translational research exposure as one of its goals.

7) **William P. Hetrick, PhD (Professor of Psychological and Brain Sciences and of Neuroscience at Indiana University, Bloomington, Adjunct Professor of Clinical Psychology in the Department of Psychiatry, IU School of Medicine**) Dr. Hetrick will serve as a member of the Executive Committee. Dr. Hetrick is director of the Bloomington office of the Indiana Clinical Translational Science Institute (CTSI). He is heavily involved in graduate and post-graduate training, serving as a preceptor of two NIH T32 training grants. He has served regularly on NIMH predoctoral and postdoctoral fellowship review committees and is a frequent chair of the NSF Psychology Graduate Research Fellowship review panel. Dr. Hetrick's research interests focus on the biological and behavioral bases of severe mental illnesses, such as schizophrenia and bipolar disorder. He uses translational

animal models and experimental paradigms in his work, which includes studies of experimental cognitive and pharmacological interventions. He has over 60 publications in peer-reviewed journals. His teaching is focused on abnormal psychology, evidence-based practice, intervention and evaluation, and foundations of clinical psychology at both the baccalaureate and doctoral levels. He is involved in the research training of psychology, neuroscience, psychiatry, and neurology doctoral students. He won an IU Trustee's Teaching Award in 2007. With clinical cognitive neuroscience laboratories in both Bloomington and Indianapolis, appointments across departments and programs, and with heavy involvement in the administration of the Indiana CTSI, he is well positioned to aide in the implementation of this translational science education program.

## b. Program Leadership

1) **The Program Director** (Mark Payne, M.D.) will be responsible for the overall program direction and priorities, and will chair the quarterly meetings of the Executive Committee. In consultation with the Executive Committee (below), he will establish the program standards and goals, as well as the curriculum and training programs for the students. The Program Director will oversee and provide timely feedback to the students within the program and ensure effective communication of progress reports to the home departments of the trainees. He will communicate with the thesis committee chairs of the graduate students regarding their progress, and with the fellow's research committees on their progress. The Program Director will also be responsible for the fiscal management of the training program, and will prepare annual reports as required. He will be assisted in these responsibilities by the by the Executive Committee and Program Coordinator. Dr. Payne will devote 5% effort to program administration.

2) **The Program Coordinator** (Carrie Hansel) will be responsible for day to day activities and administrative support of this program. She will handle all correspondence, and communicate with the multiple faculty and clinical services required for this program. She will also handle advertising of the program, prepare applications for review, prepare data for Assessment at the end of each year, and track students after their graduation. Funds are requested to support 100% effort, and the institution is supporting 100% effort. Currently, her effort is supported by the Indiana CTSI in synergistic activities. In the future, additional administrative support will be necessary so the program committee would desire to transfer the CTSI funds

to this additional support.

3) **Communications**: Communication of Program philosophies, goals, news, and outcomes will be important given that the students and faculty will come from many departments and different campuses. Accordingly, a quarterly 1- page newsletter containing program news and updates will be developed by the Program Coordinator (Carrie Hansel) and delivered electronically to the heads and graduate program directors of all departments involved with TSPI for distribution to their faculty. Contact information for the Program will be included with each newsletter. This will also be the mechanism announcing the Programs' availability of positions (slots) every year to the 4 campuses.

4) **Executive Committee:** The Executive Committee will be composed of the Program Director (R. Mark Payne, M.D.), Drs. Simon Rhodes, Kurt Kroenke, Sharon Moe, Rose Fife, William Hetrick, and Hunter Heath, III. The members of this multi-disciplinary committee reflect strong training achievements, collaborative skills, and broad experience. This committee will be responsible for selection of trainees to enter the program, provide oversight of the trainees, provide input and advice to the Program Director on program direction and standards, and evaluation of the outcomes of the trainees as determined from the yearly surveys. These latter evaluations will be used to provide feedback to refine the program curriculum and set future program goals. The Executive Committee will also review faculty performance on a yearly basis and provide recommendations to the Program Director for recruiting new faculty, or removing faculty who are not active in the program. The Executive Committee will meet on a quarterly basis.

5) **External Review and Program Oversight:** The administrative structure and performance of the Training Program will include yearly review and oversight. A yearly report of Program activities and progress will be generated by the Executive Committee and sent for formal assessment by the Assessment and Advisory Board chaired by Dr. Trudy Banta (see evaluation plan). The Assessment and Advisory Board consists of Dr. Banta, Dr. S. Queener, Dr. Kurt Kroenke (Program Director for the Clinical Scientist Development program of the Indiana CTSI), and 2 faculty from the graduate programs. This external committee will evaluate the Program's progress and outcomes, and determine if the Program is meeting its stated goals and objectives. Their critique will be returned to the Executive Committee as a memo followed by a meeting between the program directors and the External Committee.

### c. Administration of the Program

Upon approval, the Program Director will be appointed as the chair of the Executive Committee. The Executive Committee will be composed of the Program Director (R. Mark Payne, M.D.), Drs. Simon Rhodes, Kurt Kroenke, Sharon Moe, Rose Fife, William Hetrick, and Hunter Heath, III. The members of this multi-disciplinary committee reflect strong training achievements, collaborative skills, and broad experience. This committee will be responsible for selection of trainees to enter the program, provide oversight of the trainees, provide input and advice to the Program Director on program direction and standards, and evaluation of the outcomes of the trainees as determined from the yearly surveys. These latter evaluations will be used to provide feedback to refine the program curriculum and set future program goals. The Executive Committee will also review faculty performance on a yearly basis and provide recommendations to the Program Director for recruiting new faculty, or removing faculty who are not active in the program.

### d. List of faculty and staff involved in the program

| | |
|---|---|
| Program Director | R. Mark Payne, M.D. (Professor in Indiana University School of Medicine) |
| Program Coordinator | Carrie Hansel |
| Executive Committee | Simon J. Rhodes, Ph.D. (Professor and Associate Dean in Indiana University School of Medicine) |
| | Kurt Kroenke, M.D.,(Chancellor's Professor of Medicine, Director of Clinical Investigation and Translational Education (CITE) Program, Senior Scientist in Regenstrief Institute, Director of Indiana Clinical and Translational Sciences Institute (CTSI) Education Programs, and Associate Director of Education in the General Clinical Research Center) |
| | Hunter Heath, III, M.D. (Adjunct Professor of Medicine, Division of Endocrinology and Metabolism, Indiana University School of Medicine) |
| | Sharon M. Moe, M.D. (Professor of Medicine and Vice-Chair for Research in Indiana University School of Medicine) |
| | Rose Fife, M.D., M.P.H. (Associate Dean for Research, Associate Director of the Indiana CTSI, Co-Director of the IU Family Violence Institute, Barbara F. Kampen Professor of Women's Health, Professor of Medicine and Biochemistry and Molecular Biology, Indiana University School of Medicine) |
| | William P. Hetrick, PhD (Professor of Psychological and Brain Sciences and of Neuroscience at Indiana University, Bloomington, Adjunct Professor of Clinical Psychology in the Department of Psychiatry, IU School of Medicine) |
| Additional Faculty | Jon A. Story, Ph.D. (Associate Dean of Purdue University Graduate School) |

Stephen R. Dlouhy, Ph.D. (Associate Scientist in Medical & Molecular Genetics; Associate Director of the Medical & Molecular Genetics DNA Services Laboratory; Director of the Cell Repository)

Edward Srour, Ph.D. (Robert J. and Annie S. Rohn Professor of Leukemia Research; Professor of Medicine; Professor of Pediatrics; Professor of Microbiology & Immunology; Director of Flow Cytometry Resource Facility)

Tatiana Foroud, Ph.D. P. (Michael Conneally Professor of Medical and Molecular Genetics; Director of Hereditary Genomics Division)

David A. Flockhart, M.D. / Ph.D. (Harry and Edith Gladstein Chair in Cancer Genomics; Professor of Medicine, Medical Genetics and Pharmacology; Indiana University School of Medicine & Division of Clinical Pharmacology)

Yunlong Liu, Ph.D. (Adjunct Assistant Professor of Informatics; Assistant Professor of Medical & Molecular Genetics; Adjunct Assistant Professor of Medicine - Biostatistics)

Narayanan Perumal, Ph.D. (Assistant Professor, Bioinformatics)

Ken Cornetta, M.D. (Joe C. Christian Professor & Chairman of Medical & Molecular Genetics; Professor of Medicine & Microbiology/Immunology)

Carl Garner, Ph.D. (Senior Director, Pharmaceutical Projects Management Eli Lilly and Company)

Brad Ackermann, Ph.D. (Research Fellow - Laboratory for Experimental Medicine; Translational Medicine Eli Lilly and Company)

Deborah W. Knapp, D.V.M., M.S. (Dolores L. McCall Professor of Comparative Oncology; Director of Purdue Comparative Oncology Program)

Marie Kerbesian, Ph.D. (Vice President for Technology Commercialization)

Jeremy Schieler, Ph.D. (Senior Technology Manager)

Jamie Dananberg, M.D. (Executive Director, Exploratory and Program Medical - Eli Lilly and Company)

Robert Bies, Pharm.D., Ph.D. (Associate Professor of Clinical Pharmacology; Director, Disease Modeling Program, CTSI Member; Center for Computational Biology and Bioinformatics)

## 6. Learning Resources

**a. Existing Learning Resources** Indiana University has an extensive array of learning resources and facilities that will be available to the proposed Master of Science in Translational Science in support of its educational and research mission. These include system, campus and participating school resources. State-of-the-art data, video and voice technologies are present to create a sophisticated learning environment.

Students in the Master's Degree Program of Translational Science will need access to the libraries, journals and databases on the IUPUI and IU Bloomington campuses. Additionally, students will need access to various opportunities on campus, including but not limited to: seminars, study groups, lectures, and research experiences.

Library holdings, equipment, laboratories, clinical and research facilities available: Indiana University has an extensive array of learning resources and facilities that will be available to the proposed Master of Science in Translational Science in support of its educational and research mission. These include system, campus and participating school resources. State--of-the-art data, video and voice technologies are present to create a sophisticated learning environment.

Library holdings: The libraries on the Bloomington and Indianapolis campuses will be important resources for students in graduate health programs. Ranked as 19th in the Association of Research Libraries, IU Bloomington Libraries offer access to more than 500 databases, over 4.6 million volumes and almost 70,000 journals. The IUPUI campus, meanwhile, has a new, state-of-the-art library completed in 1993. There are more than 1.3 million volumes, including access to over 36,000 periodicals and journals. As one of the most technologically-sophisticated libraries in the country, the library has two networked classrooms as well as both faculty and student networked study rooms and hundreds of individual study carrels. Students have access to several databases for bibliographic searches. Moreover, it houses the Robert Payton Philanthropic Studies Library, which has an extensive collection of references and volumes about the nonprofit or third sector. The Ruth Lilly Medical Library, located in the Medical Research Building, serves the Schools of Medicine, Nursing, and Allied Health Sciences. With state-of-the-art study facilities available 24-hours every day of the year, this library houses over 194,000 volumes. Through MEDI ARS, BRS and Dialog, students have access to over 400 databases such as Medline, CINAHL, HEALTH, CANCERLIT, and the Cochrane Library. There is a History of Medicine special collection. Individual school libraries with specialized collections in business, dentistry, law, optometry and public affairs are also available to graduate students. The IUPUI University Library has a media library room, and both the University and Medical Libraries have audiovisual materials and other special collections. The IU system's library holdings are available to all students through interlibrary loan and on-line searches. In addition, students have access to library collections in Indiana, at Big Ten Universities, and at institutions around the country.

Special Equipment & Collections: The Bloomington and Indianapolis campuses have state-of-the-art electronic technologies for instructional design and distance learning. There are facilities for special classroom set-ups and video production. The University is part of the Indiana Higher

Education Telecommunication System (IHETS), a consortium of universities in the state that provides distance learning programs at over 300 locations around Indiana. Computer laboratories on the campuses give students access to databases for bibliographic searches and to statistical packages for research. There are eighteen such learning centers on the IUPUI campus, including centers in the Ruth Lilly Medical Library, the University Library, and the business, dental, and nursing schools. Within the School of Medicine, Medical Educational Resources Program (MERP) and Medical Illustrations are additional sources of visual and electronic equipment and resources. The campuses and schools are linked by local area networks that facilitate communication and sharing of materials with people in different departments and schools.

Clinical Facilities: The State of Indiana has a population of over 6,000,000. Indiana University Medical Center acts as a primary care center for metropolitan Indianapolis with a population of about 800,000, the nation's 14th largest city. In 1997 University Medical Center comprising University Hospital with 332 beds, Riley Hospital for Children with 243 beds, and Methodist Hospital with 760 beds merged to form Clarian Health. In 2008 Clarian Health had 50,686 admissions with 319,862total patient days and 751,133 total outpatient visits. This merger more than doubled the number of beds, tripled the number of admissions and doubled the number of outpatient visits of the original Indiana University Medical Center. In addition, Wishard Hospital has 473 beds and 17,574 inpatient admissions annually, with 21 clinics handling 165,000 outpatient visits. Veterans Hospital has 176 beds, 60 nursing home beds, 5,967 inpatient admissions and 284,271 outpatient visits annually. LaRue Carter Psychiatric Hospital has 145 beds, 203 inpatient admissions and 6,250 outpatient visits per year. Clarian Health acts as the major secondary and tertiary referral center for the State of Indiana. It has the patient population and the resources to withstand changes induced by managed care to support clinical research at the highest level.

Laboratories: Indiana University – Purdue University of Indianapolis offers around 1 million square feet in research facilities and research support space. In 1992, a new wing of University Hospital, (150,000 square feet dedicated to Ambulatory Care) was opened, and the contiguous Lilly Pharmaceuticals Clinical Research Center of 82,334 sq. ft. was opened in April l998. In 1996 the Clinical Cancer Pavilion of 120,000 gross square feet contiguous with Indiana University Hospital was opened and in 1997 the Cancer Research Institute of 63,950 net square feet was completed. The Institute houses the 5 key groups that make up the laboratory research arm of the IU Cancer Center: the National Gene Vector Laboratory, the Experimental Therapeutics Program, the Adult Hematology/Oncology Research Program, and the Herman B Wells Center for Pediatric Research and the Walther Oncology Center. Also in 1997, the

Children's Cancer Center of 18,622 net square feet within the James Whitcomb Riley Hospital for Children was opened. In 2002, the campus added an additional 184,496 square footage through the Research II building as well as Biotechnology Research and Training Center. Moreover, in 2006, the campus opened the Health Information and Translational Science (HITS) building, which provided an additional 149, 062 square feet. In 2009, the campus opened an additional 261, 960 square feet of research facilities through Walther Research Hall in 2009.

Current Assets for Research:

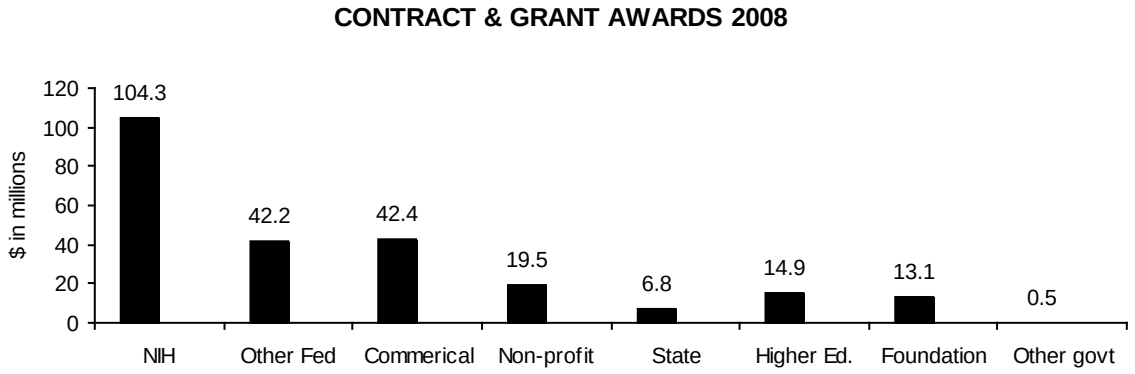
The Indiana University School of Medicine (IUSM) was established in 1903. It is currently one of the nation's largest medical schools. It is located on the 93-acre Indiana University Medical Center (IUMC) campus in Indianapolis and consists of four hospitals (University, Wishard Memorial, Roudebush Veteran's Administration, and the James Whitcomb Riley Hospital for Children). The world-renowned Regenstrief Institute for Health Care shares this campus. In 1997, the Indiana University Hospital merged with a nearby private, not-for-profit hospital (Methodist Hospital), one of the largest private hospitals in the country, to form Clarian Health Partners, Inc. The Methodist Hospital campus is approximately one mile from IUMC and is connected by a monorail system.

The medical center campus, which includes the only Schools of Medicine and Dentistry in Indiana and the largest School of Nursing in the state, is part of the larger Indiana University Purdue University at Indianapolis (IUPUI) campus. IUPUI currently has over 29,000 undergraduate and graduate students in Schools of Science, Engineering and Technology, Liberal Arts, Social Work, Law, Business, to name a few. Approximately 5,000 of the students on campus are enrolled in one of the health sciences schools. Half of the first- and second-year medical school students take their classes on the IUSM campus; the other half are located at one of other eight IUSM medical campuses around Indiana, which are located on or near satellite campuses of IU and home campuses of other universities in the state (including Purdue, Notre Dame, Ball State University, Indiana State University, and the University of Southern Indiana). All of the students spend their third and fourth years in Indianapolis. Current IUSM enrollment for all four years includes 1,251 M.D. students. In addition, 189 Ph.D., 96 M.S., 153 M.P.H., and 43 M.D./Ph.D., and 35 certificate students are enrolled in IUSM graduate programs. There are also 18 M.D./M.B.A., one M.D./M.A, and 3 M.D./M.P.H. students at IUSM.

For the year 2007-2008, Indiana IUSM received approximately $244 million in research funding ($104.3 million from NIH, $42.2 million from other federal sources), which included funding for

the only federally sponsored gene vector production and research facility, for one of three molecular hematology research centers in the country, and for a National Cancer Institute-designated Cancer Research Center (see Figure below.) There are 505 primary investigators on the IUSM campus. As indicated below, IUSM hosts 16 research centers or program projects supported by PHS/NIH or other federal funds, as well as 33 supported by non-federal funds. Currently, there are 13 T32, two T35, one T15, two R25, two HRSA, 8 F-series, and 31 K-series federally-funded training programs and grants at IUSM.

In 2000, IUSM was awarded a $105 million grant from Lilly Endowment Inc. to establish the Indiana Genomics Initiative (INGEN). This was the largest single grant ever received by the University and the largest single gift ever awarded by the Lilly Endowment. The Indiana Genomics Initiative helped develop a world-class biomedical enterprise, building on existing resources at IUSM to advance the work of the Human Genome Project. Another award of $50 million was subsequently made by the Lilly Endowment. In 2008, IUSM, in collaboration with IUPUI, IU Bloomington, University of Notre Dame, and Purdue University, received a $25M Clinical and Translational Sciences Award from NIH to establish the Indiana Clinical and Translational Sciences Institute (ICTSI).



| **TABLE 8: Research Cores**<br>**IU Cancer Center** | |
|---|---|
| Angiogenesis and Endothelial Progenitor Cell | Center for Computational Biology and Bioinformatics Service Core |
| Chemical Synthesis & Organic Drug Lead Development | Center for Structural Biology |
| Clinical Pharmacology Analytical Core | Center for Medical Genomics (Genotyping and Gene Expression Core |
| Clinical Research Office | Center for Neuroimaging |
| Flow Cytometry Resource Facility | Chemical Genomics Core Facility |
| Immunohistochemistry Core | Computational Molecular Science Facility |
| In Vivo Therapeutics | DNA Bank and Cell Repository |
| Transgenic and Knock-Out Mouse | Electron Microscopy Center |
| Tissue Procurement & Distribution Facility | Immunohistochemistry Research Laboratory |
| Translational Genomics | Indiana Center for Biological Microscopy |
| Advanced Information Technology Core | Indiana CTSI Specimen Storage Facility |
| Biochemistry Biotechnology Facility (DNA Sequencing Core) | Indiana Institute for Biomedical Imaging Sciences |
| Biostatistics | Mead Johnson Mass Spectrometry Core |
| Cancer Clinical Research | Micro Services |
| Cardiovascular Ischemia and Vasculogenesis Core | Molecular Signatures Core |
| Cardiovascular Physiology Core | Murine Cytogenetic Core |
| Cell and Protein Expression Core | Oxidative Stress and Environmental Analysis |
| Preclinical Histology Core | Quantitative Amino Acid Analysis |
| Peptide Synthesis Core | Rodent Neuropsychopharmacological Testing and Phenotyping Core |
| Proteomics Core | Vector Production Facility |

Regenstrief Institute for Health Care (RIHC): The RIHC was established in 1969 and is maintained by the philanthropic Regenstrief Foundation. The RIHC houses 43 investigators and an additional 46 investigators hold affiliated scientist positions. RIHC provides substantial in-kind support for a fellowship program that includes 12 trainees in health services research, medical informatics, and geriatrics. The Regenstrief Institute also houses two major research centers. The Diabetes Research and Training Center is one of six such federally-funded centers in the country, and the Center for Aging Research is a campus-wide multidisciplinary consortium. The Regenstrief Medical Record System (RMRS) is one of the largest general medical data systems in the world. Established in 1974,The RMRS has registered more than 6 million patients, has over 20 million dictated records, and is accessed nearly 5 million times each year. Currently, the RMRS is used at more than 40 inpatient and outpatient facilities in Indianapolis and surrounding counties and is the largest coded, continuously operated medical records system in the United States.

### b. New Learning Resources Needed

The program requires the above-mentioned faculty, an administrative support position, additional funds for supplies and expenses, office space, secure location for filing confidential student information and funds for additional financial assistance.

## 7. Program Strengths

### a. Distinctive Features & Strengths of the Program:

Currently, T1 training in human disease at both a basic and clinical level is not well-addressed by current training programs, which leaves a nationally unmet need for translational scientists. The proposed program will fill this unmet need by offering basic and clinical science students a new Masters Program in Translational Science specifically designed for them. The final product will be a graduate with an M.S. in Translational Science who understands human disease at both the basic and clinical level.

In addition to the direct opportunities and objectives of the Translational Integrative and Training Education Program, several indirect benefits are expected. This program will enhance the interaction between M.D.s in clinical departments with scientists and engineers in basic departments who are engaged in fundamental bench research focused on human disease. This program will also facilitate the interaction of scientists and engineers interested in common problems and increase the cross-pollination of ideas between scientists and engineers in basic and clinical departments. A program which achieves both the specific goals and the indirect benefits outlined above will prepare these translational scientists and engineers with a better understanding of basic and clinical science and the implications on their research in the area of human disease and facilitate desperately-needed translational research in all areas of medicine and science. We believe that these innovations are critically important at a time when advances in basic science can rapidly impact the diagnosis and treatment of human disease.

### b. Collaborative Arrangements

The program will offer training to the partnering institutions: Indiana University-Purdue University Indianapolis, Purdue University West Lafayette, University of Notre Dame, as well as the IUSM biomedical programs in Indianapolis and Bloomington. As the program grows, collaborative agreements will be established between partnering universities to allow students to readily assimilate components into their programs. The long term goal is to establish a training program that addresses the critical need for generating talented research scientists and engineers

who can pursue a career that lies at the interface between basic and clinical investigative medicine.

## C. Program Rationale

In many major academic medical centers in this country, new scientific advances have started to erase the historical divisions between basic and clinical scientists. For modern-day clinicians to understand and take advantage of these new developments, they often must spend a great deal of time at both the bedside and the bench. On the other hand, the potential to understand mechanisms of disease and have an impact on the treatment of human diseases has lured some basic scientists to move closer to their clinical counterparts. This movement into the clinical arena facilitates the challenge of viewing a complex clinical disorder through the eyes of the basic scientist. Moreover, ideas generated in a clinical setting by the basic scientist can often quickly transcend into an understanding of the role of a particular biological process in a human disease and ultimately the development of a treatment for that disease. These developments have given rise to the need for training programs that can produce a hybrid biomedical scientist who can understand human disease at both a basic and clinical level.

Fundamental changes in academic and pharmaceutical biomedical operations have dictated the need for the training of more 'translational' researchers. For example, managed care has put more pressure on those with clinical training to participate in patient care. As a result, those scientists with the most clinical insight are spending much less time carrying out basic research as it relates to clinical problems. At the same time, there has been a major emphasis by national, private and industrial granting organizations to fund basic research that has the potential to immediately impact human disease. The NIH, for example, has recognized this need and responded with several RFAs. Additionally, in the pharmaceutical and biotechnology industries, most traditional departments have now been restructured with major foci on disease areas. Thus, it is becoming increasingly important for scientists who move into these industries to be well versed in basic science methodologies as well as to have an intimate understanding of human disease. The Translational Science Program of Indiana (TSPI) has been designed to train researchers and engineers who will fill the critical niches described above in major medical centers and industry. The M.S. program in Translational Science at IUSM is a natural outgrowth of the planning and implementation of the Indiana Clinical Translational Science Institute (CTSI) that was awarded in 2008 by the NIH. It was jointly designed by several basic and physician scientists, who have worked together on models of human disease and on training in translational research in the Departments of Internal Medicine, Pediatrics, Biochemistry and Molecular Biology, and Physiology/Pharmacology. This group realized that historically in the best major medical centers in this country, there has been a very valued group of scientists and engineers who have worked at the interface of basic science and human health. This program has been designed to enhance the T1 training researchers to focus on the application of basic science approaches to human disease. This graduate program differs from other graduate programs by offering a new pathway for scientists and engineers to gain a comprehensive knowledge of clinical and basic science methodologies as well as learn how to collaborate with

other scientists in a translational research environment, regardless of their specialty. An overall goal of TSPI is to produce exceptional 'translational' researchers in a fashion that saves both time and expense when compare to more conventional translational' training routes.

## 1. Institutional Factors

### a. Compatibility with Institutional Mission

The current program is compatible with IUPUI's mission of promoting educational development through innovative collaborations and external partnerships. The Translational Science Program is a collaboration among Indiana University School of Medicine (IUSM), Purdue University (PU), University of Notre Dame, and Indiana University (IU). The current program would incorporate IU Hospital, Riley Hospital for Children, Wishard Memorial Hospital, Roudebush VA Medical Center, and LaRue Carter Psychiatric Hospital into the training program. Additionally, the students could potentially collaborate with the ~40 research institutes on campus through mentorship or research-related projects. Also, due to the importance of translating research findings into practice, collaborative efforts will be made with the established pharmaceutical, new biotechnology, and medical device companies including Eli Lilly, Dow, Cook, Endocyte, and Guidant. In addition, collaborative efforts will be made through BioCrossroads, which is an academic-government-industry collaboration that facilitates interactions among investigators and industry.

Moreover, the four units have established working relationships. This program would extend the already established collaboration between IUSM and its IUPUI neighbors in Science and Dentistry by allowing graduate students to participate in interdisciplinary programs and faculty to have joint appointments. Similarly, the Translational Science Program would build upon the collaborative program between IUSM and PU BME, which has been in place for >25 years and has led to pioneering contributions in medicine, including the development of cardiac defibrillators, a significant commercial success; discovery of a biomaterial scaffold for the regeneration of blood vessels; invention of guidance systems for clinical catheters; design of controlled release devices for drug delivery, and development of the first integrated modeling technique to design improve artificial knee joints. This joint effort also is a working academic and fiscal relationship in training M.D.-Ph.D. students: the IUSM supports the M.D. training and BME supports the physician-engineers during the Ph.D. through a common system so that support is seamless for the students.

### b. Description of Planning Process

The M.S. program in Translational Science at IUSM is a natural outgrowth of the planning and implementation of the Indiana Clinical Translational Science Institute (CTSI) that was awarded in 2008 by the NIH. It was jointly designed by several basic and physician scientists, who have worked together on models of human disease and on training in translational research in the Departments of Internal Medicine, Pediatrics, Biochemistry and Molecular Biology, and Physiology/Pharmacology.

### c. Impact on the Institution (Relationship to and Impact on Existing Programs):

In the past several years, our CITE program has been particularly successful in training clinician-scientists in epidemiology, clinical trials, health outcomes and Level 2 translational research. This includes:

- 53 junior investigators successfully receiving K-23 and other career development awards
- 108 trainees have completed or are currently enrolled in our M.S. in Clinical Research degree program; and
- 262 students have completed or are currently enrolled in CITE courses.

We believe that creating a parallel program in Level 1 translational research will reap similar benefits. We initially thought a single program in clinical research training might cover the spectrum of biomedical research education. However, we have discovered what many other programs have learned, namely that level 1 translational research training requires its own coursework, program leadership skill set, and advisory committee structure. While many training programs have been successfully created in epidemiology, clinical trials, and outcomes research, far fewer have been developed with robust curricula in Level 1 translational research. Critical to facilitating this training is a curriculum relevant to translational research, program leadership, intercampus educational collaborations, and multidisciplinary mentorship for predoctoral and postdoctoral trainees. The long term goal is to establish a T1 training program that addresses the critical need for generating talented research scientists and engineers who can pursue a career that lies at the interface between basic and clinical investigative medicine.

Additionally, the Translational Science Program joins with the Clinical Investigator and Translational Education (CITE) Program as part of the training portion of the Indiana CTSI. A clear goal of the Indiana CTSI is to develop and implement training programs for both T1 research (bench to bedside) and T2 research (bedside to community). Training programs in T2 research are already well established at IUSM, such as the M.S. program in Clinical Sciences (CITE program) directed by Dr. Kurt Kroenke. We have leveraged the CTSI to provide administrative and

infrastructure support for the Translational Science Program and plan for the CTSI to incorporate support for this program with renewals. Secondly, there is commitment from the Deans of IUSM and IUPUI, as well as the department chairs from IUSM and IUPUI to provide financial and administrative support for this program to continue. As documented in the letters of support, all view this program as integral to the development of a robust translational research enterprise in Indiana. Finally, applications will be made to foundations for grants, such as the Eli Lilly Foundation which has generously endowed IU and IUSM over the recent years.

### d. Utilization of Existing Resources

Of the required coursework, only four of the courses will need to be developed.

## 2. Student Demand (See Table 1A: Enrollment and Completion Data)

### a. Enrollment Projection

A total of 4 slots are proposed by this proposal for year 1 (tuition scholarship, stipend, and health insurance), and the program will progressively accept more students to reach a steady state of 8 students per year by the 4th year of program operation. The progression will be 4 students for year one, 6 students for year 2, and by year three, the program will reach a steady state of 8 students.

### b. Projection of Credit Hours Generated: See Table 1 in Section E

### c. Transferability

Transfer of graduate credits from other institutions will be in accordance with the regulations established by Indiana University Graduate School.

## 3. Access to Graduate and Professional Programs

This degree is not preparing students for entry into graduate or professional schools.

## 4. Demand and Employment Factors

Program graduates will be professionals who are committed to conduct independent as well as collaborative research following graduation from the program. Graduates should experience increased opportunities for organizational advancement as well as increased employment opportunities in university, industry, or government research settings. This degree will be marketed to enhance existing employment potential, particularly in translational research positions. Advising prior to application will clearly indicate that this is not an entry-level, professional degree to secure employment. The students will be clinical scientists who, as a result of this degree, will be better trained for translational research. Moreover, the

completion of this degree may enhance one's competitiveness for various research positions in academic institutions, foundations, industry, or government agencies.

According to the Bureau of Labor Statistics, employers in the research and development field require new scientist employees to participate in extensive post-doctoral fellowships in order to develop the skills needed to design and conduct independent research. This program would provide our graduates with an edge by providing them with needed experience and greater knowledge base. Graduates should experience increased opportunities for advancement and employment opportunities in university, industry, or government research settings. The Bureau of Labor Statistics (http://www.bls.gov/oco/ocos309.htm) shows that of Medical Scientists:

31% are employed in scientific research and design organizations

27% are employed in educational services

13% are employed in pharmaceutical and medicine manufacturing

10% are employed in hospitals

Furthermore, this area is expected to see continued job growth due to its impact on improving human health. The Bureau expects a 40% increase in job growth in this field.

## 5. Regional, State, and National Factors

### a. Comparable Programs Already Existing

The proposed M.S. in Translational Science would be the unique within Indiana and falls within the current NIH emphasis on catalyzing translational research through Clinical and Translational Science Awards (CTSA). As 2008 CTSA recipients, this program in Translational Science is a natural outgrowth of the planning and implementation of the Indiana Clinical Translational Science Institute (CTSI). Several other medical schools around the country have received CTSA grants from the NIH, but many of those focus primarily on the clinical component with very little integration of translational research into their curriculum. The current program incorporates training in basic and clinical sciences along with introducing students to the various components needed to conduct translational research, such as biostatistics, ethics, and research tools. Additionally, the student pool for the IU program is predominantly pre-docs, fellows, post-docs, and junior faculty supported by training grants or career awards specific to the institution. Therefore, relocation to other institutions for the requisite training is not feasible. Please view table 8 for a presentation of the ten comparable programs from around the country.

## TABLE 9: Overview of Existing Master's Degree Programs

| University | MS Degree Name | Credits Required | Length of Program | Required Course Info |
|---|---|---|---|---|
| Mayo Clinic | Clinical & Translational Science | 24 | 1 year | • CTSC 5600: Statistics in Clinical Research<br>• CTSC 5601: Utilizing Statistics in Clinical Research<br>• CTSC 5300: Intro to Clinical Epidemiology<br>• CTSC 5000: Intro to Clinical Research<br>• CTSC 5310: Clinical Epidemiology II<br>• CORE 6000: Responsible Conduct of Research<br>• CTSC 5610: Intro Statistical Methods II<br>• CTSC 5010: Clinical Research Protocol Development<br>• CTSC 5390: Advanced Applied Epidemiological Methods<br>• CTSC 5720: Clinical Trials: Design & Conduct<br>• CTSC 5020: Regulatory Issues in Clinical Research<br>• CTSC 5690:Critical Appraisal of Statistical Methods in Medical Literature<br>**Elective Courses - 7 credits required**<br>Required Workshops:<br>Write Winning Grants<br>Writing for Biomedical Publication |
| Robert Wood Johnson Medical School | Clinical & Translational Science | 30 | Incorporated with Medical School program = extra year of med school | **Required Courses - choice of 6, totaling 18 credits**<br>• Statistics in Clinical and Translational Research<br>• Clinical Trial Design<br>• Ethics and Regulations in Clinical Research<br>• Commercializing Innovation*<br>• Basic Concepts in Drug Development*<br>• Leveraging Public and Private Funds for Translational Research*<br>**Elective Courses - choice of 2, totaling 4 credits**<br>• Case Studies in Translational Research*<br>• Biomedical Informatics*<br>• Outcomes Measurements*<br>• Bioanalytical Methods in Research*<br>• Team Leadership and Project Management Workshop*<br>**Thesis Project - choice of 1, totaling 8 credits*** Topic to be determined by student and mentor |
| University of Connecticut | Clinical & Translational Science | 24 | 18 months - 3 years | • Principles of Clinical and Translational Research I<br>• Principles of Clinical and Translational Research II<br>• Principles of Clinical and Translational Research III<br>• Clinical & Translational Research Practicum (Students will also be required to complete 9 credits in research to provide them with competency in the implementation of research methods, including hypothesis formulation, research design, quantitative and qualitative methods, data analysis and computer application.<br>••• Students will sit for a general examination, and will complete a written paper and a grant proposal.<br>**Electives: Completion of one 3-credit course from elective list.** |
| University of | Clinical & | 24 | 2 years | • Methods and Technologies of CTS |

| University | MS Degree Name | Credits Required | Length of Program | Required Course Info |
|---|---|---|---|---|
| Kentucky | Translational Science | | | • Interdisciplinary Protocol Development<br>• Ethical Issues in Clinical Research<br>• Biostatistics I<br>• Seminar<br>• Mentored research.<br>**Thesis and related peer-reviewed publication**<br>**12 credits - tailored coursework from integrated CTS graduate programs.** |
| University of Pennsylvania | Translational Research | | Incorporated with Medical School program = extra year of med school | • Introductory Biostatistics<br>• Mechanisms of POR: Designing A Protocol<br>• Scientific and Ethical Conduct<br>• Analytical Measurement Course<br>**Laboratory Units: Completion of 4 lab units is required but flexible in terms of timing.** |
| University of Rochester | Clinical Translational Research | 35 | 2 years | • Introduction to Biostatistics<br>• Statistical Methods for Biomedical Applications<br>• Design of Clinical Trials<br>• Ethics in Professional Integrity – Clinical<br>• Introduction to Epidemiology<br>• Molecular Epidemiology<br>• Practical Skills in Grant Writing<br>• Introduction to Translational Research Methods<br>• Experimental Therapeutics<br>**REQUIRED WORKSHOPS:**<br>• RCTRC Lecture Series<br>• Workshop in Scientific Communication<br>**Elective (choose 3 from elective table)**<br>Master's Research Project/Paper |
| University of Vermont | MS in Clinical Translational Research | 31 | ?? Years | * Designing Clinical & Translational Research<br>* Analyzing Clinical & Translational Research<br>* Multivariate Methods for Clinical & Translational Research<br>* Conducting Clinical & Translational Research<br>* Reporting Clinical & Translational Research<br>* From Cell to Society<br>* Seminar in Clinical & Translational Research<br>* Workshop in Clinical & Translational Research<br>**Personalized Electives PLUS General Electives**<br>* Intro to Secondary Data<br>* Intro to Biomedical Informatics<br>* Applications in Biomedical & Health Informatics<br>**Journal Article Thesis; Comprehensive Exam; Dissertation Defense; Research Mentor is required; 6 credits in Research** |
| Southeastern Wisconsin | Clinical & Translational | 30 | Up to 4 years | • Introduction to Translational Research<br>• Biostatistics |

| University | MS Degree Name | Credits Required | Length of Program | Required Course Info |
|---|---|---|---|---|
| | Science | | | • Clinical Trial Design<br>• Ethics Courses<br>**12 Elective credits - tailored to specific interests and needs of each individual student.**<br>**All students also complete a 6-credit Masters Project.** |
| University of Cincinnati | Clinical & Translational Research | 45 | 2 years | • Epidemiology and Biostatistics Seminar<br>• Introduction to Biostatistics<br>• Introduction to Epidemiology<br>• Molecular Epidemiology<br>• Scientific Integrity or Ethics in Research Design<br>• Design & Management of Field Studies in Epidemiology<br>• Study Design & Analysis<br>• Clinical Research Scholars Seminar*<br>• Clinical Research Informatics<br>• Intro to Biomedical Informatics<br>• Intro to Bioinformatics<br>• Large Biological Databases<br>• Functional Genomics<br>• Intro to Functional Genomics<br>• Computational Genomics<br>• Decision Analysis & Cost-Effectiveness Analysis<br>• Data Modeling & Database Design<br>**Three (3) credits in biostatistics ****<br>• Introduction to SAS Programming **or**<br>• Statistical Analysis for Public Health Practitioners **or**<br>• Advanced Data Analysis **or**<br>• Any statistical programming course approved by your academic advisor |
| Wake Forest | Molecular Medicine | 35 | 2 years | • Biomedical Research Computing (2 hrs)<br>• Molecular Biology I & II (6 hrs)<br>• Phys/Pharm II: Basic Physiology & Pharmacology. (4-6 hrs)<br>• Biochemical Techniques (2 hrs)<br>• Applied Linear Models (3 hrs)<br>• Lab for Applied Linear Models (1 hr)<br>• Advanced Topics in Molecular Medicine Research (3 hrs)<br>• Grant Preparation<br>**Thesis Research (12 hrs)**<br>**Note: Students are required to take one of the following courses in statistics:**<br>• HSRP 730. Introduction to Statistics. (4)<br>• HES 721. Data Analysis and Interpretation. (3)<br>• PSPR 741. Quantitative Methods in Behavioral Science. (2) |
| IUPUI | Translational Science | 30 | 2 years | • Tools & Techniques in Translational Research<br>• Quantitative Aspects of Translational Research |

| University | MS Degree Name | Credits Required | Length of Program | Required Course Info |
|---|---|---|---|---|
| | | | | • Ethic Courses<br>• Biostatistics I or II(or approved equivalent)<br>• Techniques of Effective Grant Writing (or approved equivalent)<br>• Mentored Basic Science / Translational Research<br>* Thesis in Translational Research<br>**Electives** |

### b. External Agencies

There are no regional, accrediting, professional or licensing requirements that have shaped the program's curriculum or other aspects of the program.

## D. Program Implementation and Evaluation

### 1. Implementation

The School of Medicine will be able to implement the program within a semester following approval – the proposed timeline would be Fall 2011. All of the essential resources are either in place already or will be in place by that time. Upon approval, advertisement and recruitment will begin. The Executive committee will be responsible for selection of trainees to enter the program, provide oversight of the trainees, provide input and advice to the Program Director on program direction and standards, and evaluation of the outcomes of the trainees as determined from the yearly surveys.

### 2. Procedures for Program Evaluation and Assessment

#### a. Overview

The TSPI Leadership and Executive Committee (described in B, 5) will monitor each student's performance, progress, and timely completion of requirements, and monitor each student's transition to further graduate education or to a professional career. Moreover, the IU Graduate School monitors all of its programs and periodically holds extensive program reviews in cooperation with the Office of Planning and Institutional Improvement.

#### b. Procedures

1) Each student in the Master's Degree in Translational Science program will have semi-annual Program Director meetings during the summer-fall (Jul-Oct) and winter-spring (Jan-Apr) time periods. At these individual meetings, the Program Director will discuss with each student intended and completed coursework, selection of electives, and progress to date in the program. A summary of each meeting will be dictated and maintained in the student's file.

2) Students complete a course evaluation form for each course, providing an

overall rating as well as specific comments on what would further improve the course. The results are tabulated, reviewed by the Program Director, and provided to the course director.

3) Students complete an annual Translational Science Program Evaluation Form each spring, in which they will be able to rate specific aspects of the Master's Degree program and provide comments and feedback for program improvement.

### c. Assessment of Outcomes

Outcomes will be assessed largely through exams, homework assignments, and projects (or some other series of work products) in the student's courses. Each course has a specific grading policy with defined criteria in a syllabus that has been approved by the Graduate School.

Also, three major overarching competencies desired of students will be assessed. Table 9 details the general outcomes, objective findings, methods for imparting and measuring the outcomes, assessment findings, and potential improvements based upon the assessment findings.

## Table 10. Translational Science Degree Program – Assessment Plan for Three Overarching Outcomes *

| **General Outcome** | **Objective Findings** (i.e., what the student will know or be able to do) | **Method for Imparting the Skill or Knowledge** | **Method for Measuring the Skill or Knowledge** | **Assessment Findings** | **Potential Improvements Based upon Findings** |
|---|---|---|---|---|---|
| Competency in Human Subjects Protection for Clinical Research | Research and Sponsored Programs (R&SP) core knowledge for Clinical Investigators | 1. In-class: Research Ethics (G504)<br>2. Out-of-class: R&SP on-line course | 1. Exam & home-work in G504.<br>2. Score on R&SP on-line test | 1. Score ≥ 80% on final exam in G504<br>2. Score ≥ 85% on R&SP test | • Revise content of G504<br>• Require attendance at IRB session |
| Practical Application of Research Skills | Lead or collaborate in writing manuscript, preparing abstract, collaborating on research project, and completing a research thesis. | 1. In-class: Tools & Techniques in Translational Research (G667), Advanced Tools & Techniques in Translational Research (New), Thesis in Translational Research (New), Mentored Basic Science / Translational Research (New), and Biostatistics I or II (G651, G652, or approved equivalent)<br>2. Out-of-class: working with mentor or research collaborator | Submit to program director either:<br>• Manuscript<br>• Abstract submitted to scientific meeting<br>• Letter from collaborator verifying work on project<br>• Thesis | At least 75% of participants complete one of the three benchmarks (manuscript, abstract, or research project collaboration) | • Interview students who don't complete one of the 3 benchmarks to determine barriers<br>• Inventory IUPUI clinical research opportunities |
| Critical Evaluation of a Translational Research Project | Demonstrate ability to assess research hypotheses, study design, patient sampling, outcome measures, and statistical analysis | 1. In-class: evaluate research project presentation by classmate<br>2. Out-of-class: evaluate protocol on IRB, SRC, or PDT | 1. Oral or written evaluation of a classmate's presentation<br><br>2. Oral or written evaluation of IRB, SRC or PDT protocol | Student correctly assesses at least 2 of following: hypotheses, study design, sampling, outcome measures, and/or analysis | • Revise content of (G667 and / or New) Advanced Tools & Techniques in Translational Research<br>• Provide practicum experience in PDT to address deficiencies |

* Abbreviations: IRB = Institutional Review Board. SRC == Scientific Review Council. GCRC = General Clinical Research Center

**E. Tabular Information** (included, following this page, in hard copies of this document)

Table 1: Enrollment and Completion Data
Table 2A: Total Direct Costs and Sources of Program Revenues
Table 2B: Detail on Incremental Direct Program Costs
Table 3: New Academic Degree Program Proposal Summary

## Tabular Information

Campus: Indiana University-Purdue University Indianapolis
Program: Master of Science in Translational Science
Date: 26 February 2010

## TABLE 1: PROGRAM ENROLLMENTS AND COMPLETIONS

Annual Totals by Fiscal Year (Use SIS Definitions)

| | Year 1 2011-12 | Year 2 2012-13 | Year 3 2013-14 | Year 4 2014-15 | Year 5 2015-16 |
|---|---|---|---|---|---|
| A. Program Credit Hours Generated | | | | | |
| 1. Existing Courses | 60 | 114 | 156 | 168 | 168 |
| 2. New Courses | 20 | 54 | 76 | 88 | 88 |
| Total | 80 | 168 | 232 | 256 | 256 |
| B. Full-time Equivalents (FTEs) | | | | | |
| 1. Generated by Full-time Students | 3 | 7 | 10 | 11 | 11 |
| 2. Generated by Part-time Students | 0 | 0 | 0 | 0 | 0 |
| Total | 3 | 7 | 10 | 11 | 11 |
| 3. On-Campus Transfers | 0 | 0 | 0 | 0 | 0 |
| 4. New-to-Campus | 3 | 7 | 10 | 11 | 11 |
| C. Program Majors (Headcounts) | | | | | |
| 1. Full-time Students | 4 | 10 | 14 | 16 | 16 |
| 2. Part-time Students | 0 | 0 | 0 | 0 | 0 |
| Total | 4 | 10 | 14 | 16 | 16 |
| 3. On-Campus Transfers | 0 | 0 | 0 | 0 | 0 |
| 4. New-to-Campus | 4 | 10 | 14 | 16 | 16 |
| 5. In-State | 4 | 9 | 12 | 14 | 14 |
| 6. Out-of-State | 0 | 1 | 2 | 2 | 2 |
| D. Program Completions | | 4 | 6 | 8 | 8 |

## Tabular Information

Campus: Indiana University-Purdue University Indianapolis
Program: Master of Science in Translational Science
Date: 26 February 2010

## TABLE 2A: TOTAL DIRECT PROGRAM COSTS AND SOURCES OF PROGRAM REVENUE

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FTE | 2011-12 | FTE | 2012-13 | FTE | 2013-14 | FTE | 2014-15 | FTE | 2015-16 |
| A. Total Direct Program Costs | | | | | | | | | | |
| 1. Existing Departmental Faculty Resources | 0.0 | $ 0 | 0.0 | $ 0 | 0.0 | $ 0 | 0.0 | $ 0 | 0.0 | $ 0 |
| 2. Other Existing Resources | | 0 | | 0 | | 0 | | 0 | | 0 |
| 3. Incremental Resources (Table 2B) | | $45,300 | | $105,000 | | $160,600 | | $167,100 | | $167,100 |
| TOTAL | | $ 45,300 | | $ 105,000 | | $ 160,600 | | $ 167,100 | | $ 167,100 |
| B. Sources of Program Revenue | | | | | | | | | | |
| 1. Reallocation | | $ 0 | | $ 0 | | $ 0 | | $ 0 | | $ 0 |
| 2. New-to-Campus Student Fees | | 21,800 | | 56,700 | | 80,700 | | 87,200 | | 87,200 |
| 3. Other (Non-State) | | 11,800 | | 21,600 | | 50,700 | | 47,200 | | 47,200 |
| 4. New State Appropriations | | | | | | | | | | |
| a. Enrollment Change Funding | | 11,700 | | 21,600 | | 29,200 | | 32,700 | | 32,700 |
| b. Other State Funds | | 0 | | 0 | | 0 | | 0 | | 0 |
| TOTAL | | $ 45,300 | | $ 105,000 | | $ 160,600 | | $ 167,100 | | $ 167,100 |

## Tabular Information

Campus: Indiana University-Purdue University Indianapolis
Program: Master of Science in Translational Science
Date: 26 February 2010

## TABLE 2B: DETAIL ON INCREMENTAL OR OUT-OF-POCKET DIRECT PROGRAM COSTS

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FTE | 2011-12 | FTE | 2012-13 | FTE | 2013-14 | FTE | 2014-15 | FTE | 2015-16 |
| 1. Personnel Services | | | | | | | | | | |
| a. Faculty | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 |
| b. Support Staff | 0.0 | 0 | 0.5 | 31,900 | 1.0 | 63,800 | 1.0 | 63,800 | 1.0 | 63,800 |
| c. Graduate Teaching Assistants | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 |
| Total Personnel Services | | 0 | | 31,900 | | 63,800 | | 63,800 | | 63,800 |
| 2. Supplies and Expense | | | | | | | | | | |
| a. General Supplies and Expense | | 9,500 | | 9,500 | | 9,600 | | 9,600 | | 9,600 |
| b. Recruiting | | 12,500 | | 5,400 | | 5,000 | | 5,000 | | 5,000 |
| c. Travel | | 1,500 | | 1,500 | | 1,500 | | 1,500 | | 1,500 |
| d. Library Acquisitions | | 0 | | 0 | | 0 | | 0 | | 0 |
| Total Supplies and Expense | | 23,500 | | 16,400 | | 16,100 | | 16,100 | | 16,100 |
| 3. Equipment | | | | | | | | | | |
| a. New Equipment Necessary for Program | | | | | | | | | | |
| b. Routine Replacement | | | | | | | | | | |
| Total Equipment | | 0 | | 0 | | 0 | | 0 | | 0 |
| 4. Facilities | | 0 | | 0 | | 0 | | 0 | | 0 |
| 5. Student Assistance | | | | | | | | | | |
| a. Graduate Fee Scholarships | | 0 | | 0 | | 0 | | 0 | | 0 |
| b. Fellowships | | 21,800 | | 56,700 | | 80,700 | | 87,200 | | 87,200 |
| Total Student Assistance | | 21,800 | | 56,700 | | 80,700 | | 0 | | 0 |
| Total Incremental Direct Costs | | $ 45,300 | | $ 105,000 | | $ 160,600 | | $ 167,100 | | $ 167,100 |

## Tabular Information

## TABLE 3: NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

26 February 2010

I. Prepared by Institution

Institution/Locatior Indiana University-Purdue University Indianapoli
Program Master of Science in Translational Science
Proposed CIP Cod 261401
Base Budget Year: 2009-10

| | Year 1 2011-12 | Year 2 2012-13 | Year 3 2013-14 | Year 4 2014-15 | Year 5 2015-16 |
|---|---|---|---|---|---|
| Enrollment Projections (Headcount) | 4 | 10 | 14 | 16 | 16 |
| Enrollment Projections (FTE) | 3 | 7 | 10 | 11 | 11 |
| Degree Completion Projection | 0 | 4 | 6 | 8 | 8 |
| New State Funds Requested (Actual) | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| New State Funds Requested (Increases) | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |

II. Prepared by Commission for Higher Education

| | | | | | |
|---|---|---|---|---|---|
| New State Funds to be Considered for Recommendation (Actual) | $ | $ | $ | $ | $ |
| New State Funds to be Considered for Recommendation (Increases) | $ | $ | $ | $ | $ |

CHE Code:

Comment:

Campus Code:
County Code:
Degree Level:
CIP Code:

# Appendices

## Appendix A. Faculty Accomplishments

This appendix contains the *curriculum vitae* of those members of the graduate faculty who will participate in the proposed M.S. program.

# RONALD MARK PAYNE, M.D.

## CURRICULUM VITAE

**ADDRESS**: R. Mark Payne, M.D.
Professor of Pediatrics (Cardiology) with Tenure
Riley Hospital for Children
Wells Center for Pediatric Research
Indiana University School of Medicine
1044 West Walnut Street, R4 402
Indianapolis, IN 46202

E-mail: rpayne@iupui.edu
Phone: 317-278-6239
Cell: 317-409-7619

**EDUCATION**:

### Undergraduate

8/73-5/77 B.S., Washington and Lee University, Lexington, Virginia

### Graduate

8/79-6/83 M.D., University of Texas Medical School at Houston

### Postgraduate

6/83-7/84 Pediatric Intern, Children's Hospital at Washington University Medical Center, St. Louis, Missouri

7/84-6/86 Pediatric Resident, Children's Hospital at Washington University Medical Center, St. Louis, Missouri

7/86-6/87 Chief Resident in Pediatrics, Dr. James P. Keating, Children's Hospital at Washington University Medical School, St. Louis, Missouri

7/87-6/89 Fellow in Pediatric Cardiology, Children's Hospital at Washington University Medical Center, St. Louis, Missouri

7/89-6/92 Research Fellow (Molecular Biology), Dr. Arnold W. Strauss, Washington University Medical Center, St. Louis, Missouri

## ACADEMIC POSITIONS/EMPLOYMENT:

6/83-7/86 Assistant in Pediatrics (House staff), Washington University School of Medicine

7/86-6/91 Assistant in Pediatrics (Pediatric Fellow), Washington University School of Medicine

7/91-6/93 Instructor in Pediatrics, Washington University School of Medicine

| | |
|---|---|
| 7/93-1/97 | Assistant Professor of Pediatrics, Washington University School of Medicine |
| 2/97-6/99 | Assistant Professor of Pediatrics, Wake Forest University School of Medicine |
| 7/99-6/05 | Associate Professor of Pediatrics, Wake Forest University School of Medicine |
| 7/05- | Adjunct Associate Professor of Pediatrics, and Associate, Institute of Regenerative Medicine, Wake Forest University School of Medicine |
| 7/05- | Professor of Pediatrics with Tenure, Indiana University School of Medicine |
| 2/06- | Professor (Associate), Department of Medical and Molecular Genetics, Indiana University School of Medicine |

**ACADEMIC TITLE AND RESPONSIBILITIES:**

Professor of Pediatrics (Cardiology), and Medical and Molecular Genetics, Indiana University- Purdue University Indianapolis and Riley Hospital for Children

**TEACHING TITLE:**

Professor of Pediatrics

**UNIVERSITY AND HOSPITAL APPOINTMENTS AND COMMITTEES:**

| | |
|---|---|
| 7/91-1/97 | Hospital Privileges, Barnes Hospital, St. Louis, MO |
| 7/91-1/97 | Hospital Privileges, Jewish Hospital, St. Louis, MO |
| 7/91-1/97 | Hospital Privileges, St. Louis Children's Hospital, St. Louis, MO |
| 2/97-6/05 | Hospital Privileges, North Carolina Baptist Hospital, Winston-Salem, NC |
| 7/98-6/05 | Hospital Privileges, Forsyth Memorial Hospital, Winston-Salem, NC |
| 7/05- | Hospital Privileges, Riley Hospital for Children, Indianapolis, IN |

**COMMITTEE APPOINTMENTS AND DIRECTORSHIP:**

**University of Texas Medical School at Houston**

| | |
|---|---|
| 1980-81 | Research Coordinator for Developing Occupational Environmental Health Program between University of Texas Medical School at Houston, University of Texas School of Public Health, and Baylor Medical School |

**Washington University School of Medicine**

| | |
|---|---|
| 1986-87 | Critical Care Committee |
| | Medical Records Committee |
| | Utilization and Review Committee |
| | Infectious Disease Committee |
| | Transport Committee |
| 1991-97 | Division of Pediatric Cardiology, Quality Assurance Committee |

**Wake Forest University School of Medicine**

| | |
|---|---|
| 1997 | Research Administrative Coordinator Task Force |
| 1997 | Co-Chair, Research Administrative Coordinator Working Group |
| 1997-05 | Director, Pediatric Cardiac Catheterization Laboratory |
| 1998-03 | General Clinical Research Center Advisory Committee (Standing Committee) |
| 1999-01 | Executive Committee for Molecular Medicine Program |
| 2000-05 | Cardiovascular Marketing Subcommittee |
| 2001-05 | Chair, Molecular Medicine Executive Committee |
| 2001-05 | Director, Graduate Program in Molecular Medicine |
| 2001-05 | Research Advisory Committee (Standing Committee) |
| 2003-05 | Cardiac Cath Lab Review and Administration |
| 2003-05 | Graduate School Biomedical Sciences (Standing Committee) |
| 2003-05 | Intramural Research Support Committee (Standing Committee) |
| 2004-05 | Graduate School Council (Standing Committee) |

**Indiana University School of Medicine**

| | |
|---|---|
| 2005- | Protocol Development Team |
| 2006- | Institutional Review Board (Standing Committee) |
| 2006- | Fellowship Director, Pediatric Cardiology |
| 2006- | Program Director, Morris Green Scholarship Program |
| 2007- | Chair, Radiation Safety Committee (Standing Committee) |
| 2007- | Chair, Radioactive Drug Research Committee (Standing Committee) |
| 2007- | M.D./Ph.D. Executive Committee |
| 2008- | IU Clinical and Translational Science Award Postdoctoral Committee and Executive Committee |

## MEDICAL LICENSURE AND BOARD CERTIFICATION:

| | |
|---|---|
| 1983 | Federal Licensure Examination |
| 1983 | Texas License G5466 (active) |
| 1985 | Missouri License R4F35 (expired) |
| 1997 | North Carolina License 97-00358 (active) |
| 2006 | Indiana License 01061704A (active) |
| 1983 | Advanced Cardiac Life Support |
| 1986 | Advanced Trauma Life Support |
| 1988 | Pediatric Advanced Life Support |
| 1990 | Pediatric Advanced Life Support, Instructor |
| 2006 | Basic Life Support, re-certification |
| 2006 | Pediatric Advanced Life Support, re-certification |
| 1988 | Diplomat of the American Board of Pediatrics: 6/1/88, 12/19/95, 12/16/02 |
| 1996 | Diplomat, Sub-Board of Pediatric Cardiology: 8/13/96, 4/5/04 |

**HONORS AND AWARDS:**

| | |
|---|---|
| 1980-81 | President, Medical School Student Body |
| 1980-82 | President, Sophomore and Junior Medical School Classes |
| 1987 | Recipient: Antonio Hernandez Memorial Fellowship in Pediatric Cardiology |
| 1997 | Fellow, American College of Cardiology |
| 1999 | American Heart Association, Established Investigator Award |
| 2006 | Fellow, American Academy of Pediatrics |

**PROFESSIONAL SOCIETIES AND ORGANIZATIONS:**

| | |
|---|---|
| 1992- | American Heart Association, CV Disease in the Young Council |
| 1993- | American Association for the Advancement of Science |
| 1994- | American Society for Biochemistry and Molecular Biology |
| 1995- | American Physiological Society |
| 1995- | American Heart Association, Basic Science Council |
| 1997- | Fellow, American College of Cardiology |
| 1998- | Society for Pediatric Research |
| 2006- | Fellow, American Academy of Pediatrics |

**EDITORIAL AND REVIEW RESPONSIBILITIES:**

| | |
|---|---|
| 1995- | Reviewer: The American Journal of Physiology |
| 1996- | Reviewer: The Journal of Molecular and Cellular Cardiology |
| 2002-06 | American Heart Association, Molecular Signaling Study Section (MAT5, 2002-06, Chair |

2005-06), Mid-Atlantic Heart Association

2005-09 National Institutes of Health, BRT-A Study Section

2007 NIH, Reviewer BRT-6, Special Emphasis Panel K12 applications

2007 NIH, Reviewer Special Emphasis Panel K99/R00 applications

2009 -10 Chair, National Institutes of Health, BRT-A Study Section

**RESEARCH SUPPORT:**

Governmental:

1990-92 1 F32HL08332-01. NRSA Postdoctoral Individual Fellowship Award, National Institutes of Health: "Regulation of Mitochondrial Creatine Kinase." R. M. Payne, Principal Investigator.

1996-98 1 R03 AG14223-01. "Age and Disease Associated Changes in Creatine Kinase." $50,000. R. M. Payne, Principal Investigator.

1999-02 R01 DK55765-01. "GTP-Binding Proteins in Mitochondrial Protein Import." $459,735. R. M. Payne, Principal Investigator.

1999-02 3 R01 DK55765-01S1. "GTP-Binding Proteins in Mitochondrial Protein Import." Minority Student supplement, $82,690. R. M. Payne, Principal Investigator.

2001-03 1 R43 HL68362-01. SODm for Management of Ischemic Heart Disease. $261,230. D. Salvemini, Principal Investigator; RM Payne, Co-Investigator.

2001-05 K30 HL-04164 Education in patient-oriented research. $925,925. Principal Investigator: C.E. McCall (Payne: Co-Investigator). June 1, 1999 – May 31, 2004.

2003-07 R01 DK67763-01. Non-viral delivery of proteins to mitochondria. $1,015,011. RM Payne, Principal Investigator. Dec. 1, 2003 – Nov. 30, 2007.

2004-09 T32 GM063485-01A1. Training Program in Molecular Medicine. RM Payne, Principal Investigator. July 1, 2004 - June 30, 2009. Note: grant transferred to Dr. Linda McPhail effective July 2005.

2006-08 R21 NS052198-01. TAT-mediated delivery of Frataxin for Friedreich's Ataxia. RM Payne, Principal Investigator, May 2, 2006 – April 30, 2009.

2007-08 1 R13 HL088918-01 - The Scientific Basis of Heart Failure in the Young. $10,000 Conference grant. RM Payne, Principal Investigator, May 1, 2007 – April 30, 2008.

2007-2012 1 P01 HL085098-02. Genesis and Treatment of Heart Failure in the Young. (Loren J Field, PI). RM Payne Co-I on Project 2, 'Regulation of Cardiomyocyte Survival', (L. Wei, Co-I with Payne), July 1, 2007 – March 30, 2012.

2007-2012 P30 DK079312-02. Center for Advanced Renal Microscopic Analysis. (Molitoris, PI). RM Payne Pilot PI for P&FP Study 1a, July 2007-June 2012.

2008-2013 UL1RR025761-01. Indiana Clinical and Translational Sciences Institute. (Anantha Shekhar, PI). RM Payne Co-I, May 1, 2008 – April 30, 2013.

2008-2013 KL2RR025760-01. Indiana Clinical and Translational Sciences Institute – K12 Program. (Anantha Shekhar, PI). RM Payne Mentor, May 1, 2008 – April 30, 2013.

2008-2013 TL1RR025759-01. Indiana Clinical and Translational Sciences Institute – T32 Program. (Anantha Shekhar, PI). RM Payne Mentor, May 1, 2008 – April 30, 2013.

Non-governmental:

1988-89 Fleur-de-Lis Grant: St. Louis University Hospital. "Epidemiology and clinical findings of tricuspid valve prolapse in children." R. M. Payne, Principal Investigator.

1989-90 American Heart Association, Fellowship Award (Missouri Chapter): "Regulation and Expression of Rat Heart Mitochondrial Creatine Kinase."
R. M. Payne, Principal Investigator.

1990-91 American Heart Association, Fellowship Award (Missouri Chapter): "Characterization of Expression and Regulation of Rat Mitochondrial Creatine Kinase." R. M. Payne, Principal Investigator.

1993-94 Washington University Medical School institutional grant: "Isolation and Characterization of Mitochondrial Import Receptors." $10,000. R. M. Payne, Principal Investigator.

1992-97 Clinician Scientist Award, American Heart Assoc., National Chapter, "Regulation and Function of Mitochondrial Creatine Kinase" $246,000. R. M. Payne, Principal Investigator.

1995-97 Grant in Aid, American Heart Association, National Chapter, Regulation and Function of Mitochondrial Creatine Kinase." $30,000. R. M. Payne, Principal Investigator.

1996-97 Eagle's Award, "Regulation and Function of Mitochondrial Creatine Kinase," $5,000. R. M. Payne, Principal Investigator.

1999-02 Established Investigator Award, American Heart Association. "GTP-Binding Proteins in Mitochondrial Protein Import." $300,000. R. M. Payne, Principal Investigator . Note: this award was returned to the AHA effective August 1, 1999, in order to accept the NIH award (R01 DK55765-01).

2001-02 Wake Forest University School of Medicine Intramural Research Support Award. "The Effect of Ischemia-Reperfusion Injury on Cardiac Mitochondria." $12,500. R. M. Payne, Principal Investigator.

2001-03 Wake Forest University School of Medicine Intramural Research Support Award. "Therapeutic Targeting of Proteins to Mitochondria." $15,000. R. M. Payne, Principal Investigator.

2003-05 Friedreich's Ataxia Research Association (FARA) and Muscular Dystrophy Association (MDA). Novel Therapy for Friedreich's Ataxia. $146,000. RM Payne, Principal Investigator.

2008-09 Federacion Espanola De Ataxia. Use of TAT-Frataxin to reverse the phenotype of Friedreich's Ataxia. $30,000. RM Payne, Principal Investigator.

2008-10 American Heart Association Grant In Aid. Use of TAT-Frataxin to reverse the cardiomyopathy of Friedreich's Ataxia. $150,000. RM Payne, Principal Investigator.

2009-11 Shire Human Genetics, Inc., Sponsored Research Agreement: TAT-Frataxin as therapy for Friedreich's Ataxia. $535,000. RM Payne, Principal Investigator.

2009-10 Novartis Pharmaceuticals Corporation, Clinical Trial Agreement (investigator initiated): A Phase II Study of Gleevec (imatinib mesylate, NSC 716051 formerly ST1571) in Children with Pulmonary Hypertension. $259,126. RM Payne, Principal Investigator.

2009-2010 Kyle Bryant Translational Research Award (sponsored by Friedreich's Ataxia Research Alliance and National Ataxia Foundation). Optimizing delivery of frataxin using cell penetrant peptides. $120,000. RM Payne, Principal Investigator.

## PATENTS

2003 U.S. Application 60/514,892, filed October 22, 2003. *Non-viral Delivery of Compounds to Mitochondria*. **Payne, R.M**.

## CURRENT AND PAST TRAINEES

| **TRAINING RECORD** | | | | | |
|---|---|---|---|---|---|
| Faculty Member | Trainee (Undergrad/EICS/PREP/ Predoc/Postdoc/Med Student) | Training Period | Type of Degree Awarded, Institution, & Date | Title of Research Project | Current Position or Source or Support |
| **R. Mark Payne, M.D.** | | | | | |
| **Past Trainees** | | | | | |
| Postdoctoral | M. Johnson, M.D. (Cardiology Fellow) | 1992-1996 | M.D., Washington University | Clinical Cardiovascular Sciences | Assistant Professor of Pediatrics, Director, Pediatric Cardiology Training Program, Washington, Univ. School of Medicine |
| Postdoctoral | M. L. Clabby, M.D. (Cardiology fellow) | 1993-1996 | M.D., Washington University | Clinical Cardiovascular Sciences | Assistant Professor of Pediatrics Emory Univ. School of Medicine Atlanta, GA |
| Postdoctoral | M. Thomure, M.D. Post-doctoral Research Fellow | 1994-1995 | M.D., St. Louis University. Washington University. | Creatine Kinase Expression by 3'-UTR Sequences | Assistant Professor, OB/Gyn, St. Louis University |
| Postdoctoral | M. Vranicar, M.D. (Cardiology Fellow) | 1995-1997 | M.D., Washington University | Clinical Cardiovascular Sciences | Assistant Professor of Pediatrics University of Kentucky Medical |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Center<br>Lexington, KY |
| Predoctoral | J. M. Cheng, M.D., Ph.D.<br>Pre-doctoral student | 1995-1997 | M.D./Ph.D., Washington University | Regulation of Creatine Kinase by 3'-UTR Sequences | Univ. Penn. Internal Med. Resident |
| Postdoctoral | K.S. Crowley, Ph.D.<br>Post-doctoral Fellow | 1996-1999 | Ph.D., University of Oklahoma. Washington University, and WFUSM | Ribosome Binding to Mitochondria | Pharmacia Corporation, St. Louis, MO |
| Predoctoral | R. Boyce<br>(Pre-medical student) | 1997 | Undergraduate summer student, WFUSM | Identification of GTP-Binding Proteins in Mitochondria | Undergraduate, Davidson College, NC |
| Predoctoral | K. Peachman, Ph.D.<br>Pre-doctoral thesis committee | 1997-2000 | Ph.D., Wake Forest University, 05-2000 | Mitochondria in Eosinophils and Neutrophils and Their Role in Anti-inflammatory Induced Apoptosis but not in Respiration | Post-doctoral fellow, Walter Reed Medical Center, Washington, DC |
| Predoctoral | C. Clay, Ph.D.<br>Pre-doctoral thesis Committee | 1998-2002 | Ph.D., Molecular Medicine, WFUSM, 05-2002 | Role of Peroxisome Proliferators Activated Receptor $\gamma$ and 15Deoxy$\Delta^{12,14}$ Prostaglandin $J_2$ in the Growth and Survival of Breast Cancer Cells | Senior Medical Writer, Complete Healthcare Communications, Inc.<br>Chadds Ford, PA |
| Predoctoral | *J. Galvez, Ph.D.<br>Thesis advisor, and Principal Investigator | 1998-2004 | B.S., University of Florida, 1998. Ph.D., Pharmacology, WFUSM, 4-2004 | Superoxide Dismutase Mimetics Protect Mitochondria During Ischemia and Reperfusion | United States Patent Office, Washington, DC |
| Predoctoral | J. MacKenzie, Ph.D.<br>Thesis advisor, and Principal Investigator | 1999-2004 | B.S., M.S., Western Univ. Ph.D., Molecular Medicine, WFUSM, 4-2004 | Ribosome-Mitochondria Interactions: Evidence of A Ribosome Receptor on Mammalian Mitochondria | Assistant Professor, Oswego State University, Oswego, New York |
| Predoctoral | *R. Jacinto, Ph.D.<br>Pre-doctoral thesis committee | 1999-2004 | Ph.D., M.B.A., Molecular Medicine WFUSM 3-2004 | Toll Receptors in Inflammation | Product Manager, Process Chroma-tography. Bio-Rad Laboratories |
| Predoctoral | Victoria Del Gaizo, Ph.D.<br>Thesis advisor, and Principal Investigator | 2000-2004 | B.S., James Madison, VA Ph.D., Molecular Medicine, WFUSM, 4-2004 | Targeting Proteins to Mitochondria Using Protein Transduction Domains | Post-doctoral Research Fellow, Medical Oncology Dana-Farber Cancer Institute, Harvard, |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Boston, MA |
| Predoctoral | N. Rajapakse, Ph.D. Pre-doc, thesis committee | 2001-2004 | Ph.D., Molecular Medicine, WFUSM, 1-2004 | Neuroprotective Effects of Diazoxide Against Ischemia-Reperfusion Brain Injury | Post-doctoral research fellowship, NIH (EPA), Research Triangle, NC, |
| Predoctoral | L. Jing, M.D./Ph.D. Pre-doctoral candidate, Molecular Medicine (Thesis committee) | 2002-2005 | B.S., M.D., China Ph.D., Molecular Medicine, WFUSM, 5-2005. | Role of RGS5 in the Vessel Wall. | NIH R01 HL057557 (Randall Geary, PI) |
| Predoctoral | Patrick Rowe, B.S. Pre-doctoral candidate, Molecular Medicine (Thesis committee) | 2004-07 (Wake Forest) | B.S., Pennsylvania (Ph.D. awarded 2007). | The Role of Mitochondrial Iron in Hyperglycemia-Induced Endothelial Dysfunction. | NIH NHLBI T32HL007115 (Janice Wagner, PI), WFUSM |
| Predoctoral | Manisha Nautiyal (Thesis committee) | 2003-2008 (Wake Forest) | M.S., India (chemistry) (Ph.D. awarded 11-2008) | A Protein in Search of Function: NIPSNP1 in Mitochondrial Branched-Chain Amino Acid Metabolon, Brain, and Apoptosis. | NIH T32 GM063485, and individual AHA student fellowship. |

| | | | | | |
|---|---|---|---|---|---|
| Postdoctoral | Marta V. Thakkar, M.D., M.S. Master's defense committee chair, Clinical Epidemiology and Health Services Research. | 2003-2005 | M.D., 1998, Wayne State Univ. School of Medicine, Detroit, MI. | High Blood 17-Hydroxyprogesterone and the Risk of Bronchopulmonary Dysplasia in Very Low Birth Weight Infants. | Private Practice, Illinois |
| Postdoctoral | J. Jason Hoth, M.D. Post-doctoral fellow (Surgery), Pre-M.S. candidate, Molecular Medicine, (Thesis advisor and PI) | 2003-06 | M.D., Louisiana State Univ. | Inflammatory Response to Lung Contusion. | Institutional Funding and Thoracic Society post-doctoral fellowship award |
| Postdoctoral | Edward C. Kirkpatrick, D.O. (Pediatric Cardiology Fellow) | 2005–07 | D.O., 6-1999, Chicago College of Osteopath | Clinical Cardiovascular Sciences | Cardiology Faculty, Univ. Wisconsin, Milwaukee |
| Postdoctoral | Matthew T. Bramlet, M.D. (Pediatric Cardiology Fellow) | 2006 – 09 | M.D., 5-2003, Southern Illinois University | Clinical Cardiovascular Sciences | Pediatric Cardiology Fellow |
| | | | | | |
| **Present Trainees** | | | | | |
| Predoctoral (Ph.D. candidate) | Deqiang Li, M.D. (Thesis committee) | 2006 – present | M.D., China Medical University, 1998 | The Role of BMP10 in Cardioprotection | NIH R01 HD70259 (Weinian Shou, PI) |
| Predoctoral (Ph.D. candidate) | Gregory Wagner | 2009 – present | B.S., DePauw University, 2008 | Changes in Mitochondrial Function in | NIH P01 HL085098-02 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | Friedreich's Ataxia | |
| Predoctoral (Ph.D. Candidate) | Kyle Martin | 2009 – present | B.S., Ohio State Univ. 2008 | Function of Gigaxonin in Giant Axonal Neuropathy | Institutional funds |
| Predoctoral (M.D./Ph.D. Candidate) | Vijay K. Ramanan | 2009 – present | B.S., Notre Dame | Apoptosis in Heart | Institutional funds |
| Postdoctoral | Piyush M. Viyas, Ph.D. (mentor) | 2006 – present | Ph.D., University of Iowa, 2006 | TAT-mediated Delivery of Frataxin for Friedreich's Ataxia | NIH R21 NS052198-01. |
| Postdoctoral | Jayanagendra P. Rayapureddi, Ph.D. (mentor) | 2006 – present | Ph.D., Visva-Bharati University, Santiniketan, WB, India, 2001 | Non-viral Delivery of Proteins to Mitochondria | NIH R01 DK67763-01. |

* indicates minority trainee

**BIBLIOGRAPHY:**

Peer reviewed manuscripts:

1. **Payne RM**, Martin TC, Bower RJ, Canter CE. Management and follow-up of arterial thrombosis in the neonatal period. *J Pediatr*. 1989; 114: 853-858.

2. **Payne RM**, Haas RC, Strauss AW. Structural characterization and tissue-specific expression of the mRNAs encoding isoenzymes from two rat mitochondrial creatine kinase genes. *Biochim Biophys Acta*. 1991; 1089: 352-361.

3. Lewis W, Papoian T, Gonzalez B, Louie H, Kelly DP, **Payne RM**, Grody WW. Mitochondrial, ultrastructural, and molecular changes induced by zidovudine in rat hearts. *Laboratory Investigation*. 1991; 65: 228-236.

4. Su C-Y, **Payne RM**, Strauss AW, Dillmann WH. Selective reduction of creatine kinase subunit mRNAs in muscle of diabetic rats. *Am J Physiol.* 1992; 263: E310-E316.

5. **Payne RM**, Friedman DL, Grant JW, Perryman B, Strauss AW: Creatine kinase isoenzymes are highly regulated during pregnancy in rat uterus and placenta. *Am J Physiol*. 1993; 265: E624-E635.

6. **Payne RM**, Sims HF, Jennens M, Lowe ME. Differential expression of rat pancreatic lipase mRNAs and two pancreatic lipase related protein mRNAs during development. *Am J Physiol.* 1994; 266: G914-G921.

7. **Payne RM**, Strauss AW: Developmental expression of ubiquitous and sarcomeric mitochondrial creatine kinase mRNAs. *Biochim Biophys Acta.* 1994; 1219: 33-38.

8. O'Shea DL, Gast MJ, Murdock GL, **Payne RM**, Strauss AW. Expression of Engineered Human 17b-Estradiol Dehydrogenase in a Prokaryotic System. *J Soc Gynecol Invest.* 1994; 1: 143-149.

9. **Payne RM**, Strauss AW: Expression of the mitochondrial creatine kinase genes. *Mol Cell Biochem*. 1994; 133/134: 235-243.

10. **Payne RM**, Johnson MC, Grant JW, Strauss AW. Towards a Molecular Understanding of Congenital Heart Disease. *Circulation*. 1995; 91: 494-504.

11. Johnson MC, **Payne RM**, Grant JW, Strauss AW. The Genetic Basis of Paediatric Heart Disease.

*Annals of Medicine.* 1995; 27: 289-300.

12. Thomure MF, Gast MJ, Srivastava N, **Payne RM**: Regulation of creatine kinase isoenzymes in human placenta during early, mid, and late gestation. *J Soc Gyn Invest.*, 1996; 3: 322-327.

13. Aksenov MY, Aksenova MV, **Payne RM**, Smith CD, Markesbery WR, Carney JM. The Expression of Creatine Kinase Isoenzymes in Neocortex of Patients with Neurodegenerative Disorders I: Alzheimer's and Pick's Disease. *Experimental Neurology.* 1997; 146: 458-465.

14. Hoang CD, Zhang J, **Payne RM**, Apple FS. Post-Infarction Left Ventricular Remodeling Induces Changes in Creatine Kinase mRNA and Protein Subunit Levels in Porcine Myocardium. *Am. J. of Pathology.* 1997; 151: 257-264.

15. Mendeloff EN, Huddleston CB, **Payne RM**. Unusual Cause of Pulmonary Hypertension and Congestive Heart Failure in a Newborn. *Ann Thoracic Surg.* 1997; 64:1174-1177.

16. Qin W, Khuchua Z, Cheng J, Boero J, **Payne RM**, and Strauss AW. Molecular Characterization of the Creatine Kinases and some Historical Perspectives. *Mol Cell Biochem*. 1998; 184: 153-167.

17. Baorto E, **Payne RM**, Slater LN, Lopez F, Relman DA, Min K-W, St. Geme III JW. Culture-Negative Endocarditis caused by *Bartonella henselae*. *J Pediatrics.* 1998; 132: 1051-1054.

18. Crowley KS, and **Payne RM**. Ribosome Binding to Mitochondria is Regulated by GTP and the Transit Peptide. *J Biol Chem*. 1998; 273: 17278-17285.

19. Qin W, Khuchua Z, Boero J, **Payne RM**, Strauss AW. Expression of a Mitochondrial Creatine Kinase in Oxidative Myofibers of heart and Skeletal Muscle in Mice. *Histochem J.* 1999; 31: 357-65.

20. Aksenova MV, Aksenov MY, **Payne RM**, Trojanowski JQ, Schmidt ML, Carney JM, Butterfield DA, Markesbery WR. Oxidation of Cytosolic Proteins and Expression of Creatine Kinase BB in Frontal Lobe in Different Neurodegenerative Disorders. *Dementia & Geriatric Cognitive Disorders*. 1999; 10: 158-165.

21. Khuchua ZA, Qin W, Boero J, Cheng J, **Payne RM**, Saks VA, Strauss AW. Octamer Formation and Coupling of Cardiac Sarcomeric Mitochondrial Creatine Kinase is Mediated by Charged N-terminal Residues. *J Biol Chem*. 1998; 273: 22990-22996.

22. Brian CA, **Payne RM**, Hundley WG, Link KM, Warner JG. Pulmonary Arteriovenous Malformation. Circulation. 1999; 100: e29-e30.

23. **Payne RM**, Bensky AS, Hines MH. Division of venous collateral after Glenn Shunt by Minimally Invasive Surgery. *The Annals of Thoracic Surgery*. 2000; 70: 973-975.

24. Rajapakse N, Shimizu K, **Payne M**, Busija D. Isolation and characterization of intact mitochondria from neonatal brain. *Brain Research Protocols.* 2001; 8: 176-183.

25. Shimizu K, Rajapakase N, Horiguchi T, **Payne RM**, Busija DW. Protective effect of a new nonpeptidyl mimetic of SOD, M40401, against focal cerebral ischemia in the rat. *Brain Research*. 2003; 963: 8-14.

26. Del Gaizo V, **Payne RM**. A Novel TAT-Mitochondrial Signal Sequence Fusion Protein is Processed, Stays in Mitochondria, and Crosses the Placenta. *Molecular Therapy*. 2003; 7:720-730.

27. Shimizu K, Rajapakse N, Horiguchi T, **Payne RM**, Busija DW. Neuroprotection against hypoxia-ischemia in neonatal rat brain by novel superoxide dismutase mimetics. *Neuroscience Letters.* 2003; 346: 41-44.

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29. Hines MH, Raines KH, **Payne RM**, Covitz W, Cnota JF, Smith TE, O'Brien JJ, Ririe DG. Video-assisted ductal ligation in premature infants. *Ann Thorac Surg.* 2003; 76: 1417-20.

30. MacKenzie JA, **Payne RM**. Ribosome specifically bind to mammalian mitochondria via protease-sensitive proteins on the outer membrane. *J Biol Chem.* 2004; 276: 9803-9810.

31. Moore VDG, **Payne RM**. TAT fusion protein transduction causes membrane inversion. *J Biol Chem.* 2004; 279: 32541-32544.

32. Ibdah JA, **Payne RM**. Novel Therapeutic Approaches to Mitochondrial Disease. *Letters in Drug Design & Discovery.* 2004; 1: 308-313.

33. Fahey FH, Gage HD, Buchheimer N, Smith HC, Harkness BA, Williams RC, Bounds MC, Mercier J, Robbins MEC, **Payne RM**, Morton KA, Mach RH. Evaluation of the quantitative capability of a high-resolution positron emission tomography scanner for small animal imaging. *Journal of Computer Assisted Tomography.* 2004; 28(6): 842-848.

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35. Grace BE, Cnota JF, Hines MH, **Payne RM**, Ririe DG. Traumatic coronary artery fistula in a child. *Circulation*. 2005; 111: e272-273.

36. Stitzel JD, Gayzik FS, Hoth J, Mercier J, Gage HD, Morton KA, Duma SM, **Payne RM**. Development of a Finite Element-Based Injury Metric for Pulmonary Contusion Part I: Model Development and Validation. *Stapp Car Crash Journal.* 2005; 49: 271-289.

37. MacKenzie JA, **Payne RM**. Preparation of Ribosomes Loaded with Truncated Nascent Proteins to Study Ribosome Binding to Mammalian Mitochondria. *Mitochondrion*. 2006; 6(2): 67-75.

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41. Zhu W, Shou W, **Payne RM**, Caldwell RL, Field LJ. A mouse model of doxorubicin-induced heart failure. *Ped Res*. 2008, Nov; 64(5): 488-94.

42. Zhu W, Soonpaa MH, Chen H, Shey W, Liechty EA, Caldwell RL, Shou W, **Payne RM**, Field LJ. Acute Doxorubicin Cardiotoxicity is Associated with p53-Induced Inhibition of the Mammalian Target of Rapamycin Pathway. *Circulation.* 2009, Jan 6; 119(1): 99-106.

43. Zhang W, Chan RJ, Chen H, Yang Z, He Y, Zhang X, Luo Y, Yin F, Moh A, Miller LC, **Payne RM**, Zhang ZY, Fu XY, Shou W. Negative regulation of Stat3 by activating PTPN11 mutants contributes to the pathogenesis of Noonan syndrome and JMML. *J Biol Chem.* 2009 Aug 14; 284(33):22353-63.

## INVITED REVIEWS, BOOK CHAPTERS, EDITORIALS AND SYMPOSIA:

1. **Payne RM,** Polmar SH**.** Aids in Childhood. Co-chaired symposia at: St. Louis Children's Hospital; March, 1987; Washington University Medical Center.
2. **Payne RM**, Strauss AW. Expression of the mitochondrial creatine kinase genes. In Saks VA, Ventura-Clapier R, eds. *Cellular Bioenergetics: Role of Coupled Creatine Kinases*. The Netherlands: Kluwer Academic Publishers; 1994.
3. **Payne RM.** Mitochondrial Biogenesis and Function. In: Gluckman PD, Heymann MA, eds. *Pediatrics & Perinatology: The Scientific Basis*. London: Edward Arnold Ltd.; 1996, 80-91.
4. **Payne RM.** Polymorphisms in Heart Disease. In: Miller MS, ed. *Genetic Polymorphisms and Susceptibility to Disease*. London: Taylor & Francis Ltd.; 2000, 175-205.
5. Galvez JJ, **Payne RM**. The Role of Superoxide in Heart Disease. In: Salvemini D, Cuzzocrea S, eds. *Therapeutic applications of superoxide dismutase and its mimetics*. Austin: Landes Bioscience; 2004.
6. Visa PM, **Payne RM**. TAT opens the door. *Molecular Therapy*. 2008; 16(4): 647-48.
7. Rector RS, **Payne RM**, Ibdah JA. Mitochondrial trifunctional protein defects: clinical implications and therapeutic approaches. *Adv Drug Deli Rev.* 2008, Oct – Nov; 60(13 – 14): 1488-96.

## INVITED PRESENTATIONS AND LECTURES:

1. **Payne RM.** Regulation of creatine kinase expression by the 3'- untranslated region. Department of Pharmacology, University of Kentucky School of Medicine; 1996; Lexington, KY.
2. **Payne RM.** Genetic counseling in Congenital Heart Disease. American Heart Association 69th Scientific Session; November, 1996.
3. **Payne RM.** Evaluation of cardiac disease in the newborn. Invited presentation at: North Carolina Pediatric Society Annual Meeting; 1997; Asheville, NC.
4. **Payne RM.** Evaluation and management of Congenital Heart Disease in the cardiac cath lab. Invited presentation at: Institute Jantung Negara (National Heart Institute); 1998; Kuala Lumpur, Malaysia.
5. **Payne RM.** The Post-operative congenital heart patient: when to re-evaluate. Invited presentation at: Institute Jantung Negara (National Heart Institute); 1998; Kuala Lumpur, Malaysia.
6. **Payne RM.** Evaluation and management of Congenital Heart Disease. Invited presentation at: Bangkok Children's Hospital; 1998; Bangkok, Thailand.
7. **Payne RM.** Re-evaluation of the post-operative congenital heart patient. Invited presentation at: Bangkok Children's Hospital; 1998; Bangkok, Thailand.
8. **Payne RM.** The role of mitochondria in ischemia/reperfusion injury. The University of Virginia, Cardiovascular Research Center; 2001; Charlottesville, VA.
9. **Payne RM**. Closing ASD's and PFO's in the cath lab: state of the art. Wake Forest Univ. School of Medicine, CME conference; 2002; Winston-Salem, NC.
10. **Payne RM.** PFO closure for Cryptogenic Stroke. The North Carolina Stroke Association; Sept. 2002; Greensboro, NC.

11. **Payne RM.** Superoxide dismutase mimetics: novel small molecules as anti-inflammatory agents. 6th World Congress on Trauma, Shock, Inflammation, and Sepsis; March 2004; Munich, Germany.

12. **Payne RM.** Targeting mitochondria using protein transduction domains: gene therapy without the gene. Visiting Professor, Division of Cardiovascular Research; 2004; Cincinnati, OH.

**ABSTRACTS:**

1. Martin TC, **Payne RM**, Canter CE, Cain CE. Repetitive monomorphic ventricular tachycardia (RMVT) in childhood. *APS/SPR;* Spring, 1988; Washington, D.C.

2. **Payne RM**, Martin TC, Bower RJ, Canter CE. Management and follow-up of arterial thrombosis in the neonatal period. APS/SPR; Spring, 1988; Washington, D.C.

3. **Payne RM**, Jureidini SB, Nouri S, Appleton RS. Echographic diagnosis of tricuspid valve prolapse in children. American Heart Association, 61st session; 1988.

4. **Payne RM**, Canter CE, Guitierrez FR, Vannier MW. Noninvasive diagnosis of right-sided cardiac conduit obstruction by combined magnetic resonance imaging and continuous wave doppler echocardiography. SPR, *Pediatric Research*. 1989;25:29A.

5. **Payne RM**, Canter CE, Strauss AW, Spray TL. Management of hypoplastic left heart syndrome in a regional center. Midwest Pediatric Cardiology Society; 1989; Kansas City, MO.

6. **Payne RM**, Haas RC, Roman D, Grant J, Strauss AW. Tissue-specific expression of rat mitochondrial creatine kinase (MtCK) is regulated by two separate nuclear genes. AHA 62nd session. *Circulation*. 1989; 80: II-604.

7. Klein SC, Haas R, **Payne M**, Strauss AW. Comparison of the two human mitochondrial creatine kinase genes. ASCI; 1990.

8. **Payne RM**, Strauss AW. Developmental expression of sarcomeric and ubiquitous mitochondrial creatine kinase is tissue-specific. AFCR. *Clinical Research*. May, 1991; 39(2): 286A.

9. **Payne RM**, Grant JW, Strauss AW. Ubiquitous mitochondrial creatine kinase and BB-creatine kinase are coordinately regulated in pregnant rat uterus and placenta. AFCR. *Clinical Research*. May, 1991; 39(2): 449A.

10. Grant JW, Jeddeloh J, **Payne RM**, Spray TL, Church SL. Isolation and characterization of a human myosin light chain-2 gene. SPR. *Pediatric Research*. 1992; 31(4) part 2: 19A.

11. Cheng JM, **Payne RM**, Strauss AW. 3' untranslated regions of B-creatine kinase and ubiquitous mitochondrial creatine kinase bind proteins in a tissue-specific manner. Presented at AHA. *Circulation*. 1994; 90(4) part 2: I-634.

12. Cheng JM, **Payne RM**, Strauss AW. Developmental and tissue-specific binding of the 3' untranslated regions of creatine kinase mRNAs. Presented at: American Heart Association: Scientific conference on the molecular, cellular, and functional aspects of cardiovascular development, 1995; and American Heart Association Scientific Sessions; Nov. 1995 ;Anaheim, CA.

13. **Payne RM**. Identification and partial characterization of a 54 kDa GTP-binding protein in rat mitochondrial membranes. Presented at: American Society for Biochemistry and Molecular Biology;

New Orleans. *FASEB J.* 1996; 10: A1491.

14. **Payne RM**. Identification and characterization of a 54 kDa GTP-binding protein in mitochondrial membranes of heart, brain, and liver. Presented at: American Heart Association conference on the molecular biology of the normal, hypertrophied, and failing heart; 1996; Salt Lake, UT.
15. Khuchua ZA, Qin W, Cheng J, **Payne M**, Strauss AW. Sarcomeric mitochondrial creatine kinase is coupled to cardiac oxidative phosphorylation through inner membrane binding mediated by positively-charged N-terminal residues. Presented at: American Heart Association 69th Scientific Conference; November 1996. *Circulation*. 1996; 94: I-124.

16. *Crowley KS, **Payne RM**. A novel pathway for protein import into mitochondria. Presented: *Recipient of Basic Science Fellowship Award for this research, Society for Pediatric Research, New Orleans; May 1998. *Pediatric Research.* 1998; 43(4): 19A.

17. Crowley KS, **Payne RM**. Characterization of Ribosome-Mitochondria Binding. Presented at: American Society of Biochemistry and Molecular Biology; May 1998; Washington, D.C. *FASEB J*. 1998; 12(8): A1371.

18. **Payne RM**, Crowley KS. Ribosomes targeting mitochondria interact with a GTP-binding protein in the membranes. Presented at: Experimental Biology, April 1999; Washington, D.C. *FASEB J.* 1999; 13(5):A1038.

19. **Payne RM**, Crowley KS, Brown-Augustine M. Ribosomes targeting mitochondria interact with a novel GTP-binding protein in the mitochondrial membranes. Presented at: Society of Pediatric Research "Mouse Models and Basic Mechanisms of Cardiac Disease Platform;" April 1999; San Francisco. *Pediatric Research.* 1999; 45(4): 28A.

20. **Payne RM**, Galvez, J. Ischemia-Reperfusion injury causes loss of cardiac mitochondria. Presented at: Society of Pediatric Research; May 2000; Boston, MA. *Pediatric Research***.** 2000; 47(4): 47A.

21. Shimizu K, Rajapakse N, **Payne RM**, Salvemini D, Busija DW. Protective effect of a superoxide dismutase (SOD) mimic, M40401, against transient focal cerebral ischemia in rats. *FASEB J.* 2001; 15(5) part I: A427.

22. Shimizu K, Rajapakse N, **Payne RM**, Salvemini D, Busija DW. Hypoxic-Ischemic brain damage in the immature rat is reduced by nonpeptidyl superoxide dismutase (SOD) mimics. *FASEB J*. 2001; 15(5) part I: A427.

23. Rajapakse CN, Shimizu K, **Payne RM**, and Busija DW. Isolation of functional mitochondria from neonatal rat brain. *FASEB J***.** 2001; 15(5), part I: A130.

24. *MacKenzie J, **Payne RM**. A Novel Mechanism for Protein Targeting to Mammalian Mitochondria. *FASEB J***.** 2001; 15(5) part II: A881. *Note: Winner of ASBMB Student Travel Award for this research.

25. **Payne RM**, Galvez J, Miller A. Cardiac stunning in the insulin resistant rat. *FASEB J*. 2001; 15(5) part II: A1139.

26. Galvez JJ, Salvemini D, **Payne RM**. M40403 is protective against cardiac ischemia-reperfusion injury. *FASEB J*. 2001; 15(5), part I: A569.

27. **Payne RM**, Rajapakse N, Shimizu K, Salvemini D, Busija D. MnSOD mimetics decrease brain injury from hypoxic/ischemic stress in neonatal rat pups. *Pediatric Research.* 2001; 49(4) part 2: 368A.

28. **Payne RM**, Galvez J, Salvemini D. A novel MnSOD mimetic decreases cardiac damage following ischemia/reperfusion injury. *Pediatric Research.* 2001; 49(4) part 2: 259A.

29. MacKenzie JA, **Payne RM**. Evidence of a ribosome receptor in mammalian mitochondria. *FASEB J.* 2002; 16(4) part I: A163.

30. Del Gaizo VB, **Payne RM**. Delivery of proteins to mitochondria using the Transactivator of transcription (TAT) protein transduction domain. *FASEB J.* 2002; 16(4) part I: A422.

31. **Payne RM**, MacKenzie JA. Evidence of a Novel Receptor Mediating Ribosome Binding to Mitochondria. *Pediatric Research.* 2002; 51(4), part 2:36A.

32. Aschner JL, Basehore MJ, Foster SL, Fike CD, Salvemini D, **Payne RM**. Heat shock protein 90 (HSP90): endothelial nitric oxide synthase (eNOS) interactions influence pulmonary vascular reactivity by altering the balance between nitric oxide (NO) and superoxide ($O_2^{\cdot}$) generation. *Pediatric Research*. 2002; 51(4) part 2:469A.

33. MacKenzie J, **Payne RM**. Ribosomes bind to mitochondria by a protease sensitive receptor. Presented at: Keystone Symposia: Mitochondria and Pathogenesis; April 6 – 11, 2002.

34. Del Gaizo V, and **Payne RM**. Targeting exogenous proteins to mitochondria using TAT. *Pediatric Research*. 2003; 53(4) part 2: 34A.

35. **Payne M**, Gage D, Mercier J, Morton K. Use of MicroPET to define infarction in rat heart. *Pediatric Research*. 2003; 53(4) part 2:1965.

36. **Payne RM**, Mercier JA, Gage HD, Buchheimer NC, Smith HC, Fahey FH, Mach RH, Morton KA. [$^{18}$F]-FDG PET scan defines infarct size and location in rat heart in acute and long-term settings. Society of Nuclear Medicine 50$^{th}$ Annual Meeting; June 2003.

37. Gage HD, Fahey FH, Buchheimer NC, Smith HC, Bounds MC, Morton KA, Robbins M, **Payne RM**, Mach RH. The impact of measured attenuation correction on PET imaging of the rat using the microPET. Society of Nuclear Medicine 50$^{th}$ Annual Meeting; June 2003.

38. **Payne RM**, Mercier J. Rapid ventricular pacing induces cardiovascular collapse and whole-body ischemia in the rat. AHA Scientific Sessions 2003. *Circulation.* 2003; 108(17): IV-1045.

39. Gage HD, Mercier J, Buchheimer NC, Smith HC, Morton KA, **Payne RM**. Lung inflammation volume measurement using $^{18}$F-FDG and microPET in rodents. Academy of Molecular Imaging; 2004.

40. *Del Gaizo V, **Payne RM**. TAT fusion proteins cause membrane inversion during transduction. Pediatric Research, May, 2004. *Note: abstract won SPR Student Research Award.

41. **Payne RM**. Non-viral delivery of proteins to mitochondria. NIH, NIBIB grantees meeting; October 2004; Washington, DC.

42. **Payne RM**. TAT-mediated delivery of gene products to mitochondria. Gordon Conference, Oxidant Stress and Disease; March 2005; Ventura, CA.

43. **Payne RM**, Del Gaizo Moore, V, MacKenzie, JA, Mercier, J. TAT-Mediated Delivery of Proteins to Mitochondria. NIH, NIBIB grantees meeting; October 2005; Washington, DC.

44. Wang, Q, Tomamichel, W, Del Gaizo Moore, V, **Payne RM**. Targeting proteins to mitochondrial using TAT. Protein Engineering Summit; May 2005; Boston, MA.

45. Rayapureddi J, Tomamichel W, Wang Q, **Payne RM**. Non-viral delivery of therapeutic proteins to mitochondria for fatty acid oxidation defects. NIH, NIBIB grantees meeting; October 2006; Washington, DC.

46. **Payne RM**, Wang Q, and Tomamichel W. Non-viral delivery of Frataxin to mitochondria for Friedreich's Ataxia. Friedreich's Ataxia Research Alliance, NIH; March 2006; Washington, DC.

47. Vyas PM, Tomamichel W, Wang Q, and **Payne RM**. Non-viral protein replacement therapy for Friedreich's Ataxia. Society of Pediatric Research; May 2008; Honolulu, HI.

48. *Vyas PM, Rayapureddi JP, Tomamichel W, Wang Q, **Payne RM**. TAT conjugated Frataxin as a nonviral therapeutic delivery system for Friedreich's Ataxia. American Heart Association, Basic Cardiovascular Sciences conference; 2008; Keystone, CO. *Note: abstract won AHA travel award for Dr. Vyas.

49. Rayapureddi JP, Tomamichel W, **Payne RM**. TAT-Mediated protein transduction in mitochondria: regulation by sodium channel blockers. American Heart Association, Basic Cardiovascular Sciences conference; 2008; Keystone, CO.

# BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

| NAME | POSITION TITLE |
|---|---|
| **Rhodes, Simon James** | Professor of Cellular & Integrative Physiology, Associate Dean for Graduate Studies |
| eRA COMMONS USER NAME (credential, e.g., agency login) srhodes | |

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | MM/YY | FIELD OF STUDY |
|---|---|---|---|
| University of Sheffield, England, U.K. | B.Sc. (Hons) | 1984 | Biochemistry |
| Purdue University, West Lafayette, Indiana. | Ph.D. | 1991 | Biochem./Mol. Biology |
| University of California, San Diego, California. | Postdoct. | 1991-94 | Molecular Medicine |

**A. Personal Statement**

My role in this proposal is to act as the PI and to lead the organizing team to ensure that all aspects of the proposed activities are successfully accomplished. I am proud of my local and national service towards improving diversity in scientific training and in the scientific workforce. Since I joined the Indiana University School of Medicine (IUSM) as the Associate Dean for Graduate Studies in 2005, we have initiated many programs to improve the diversity of our matriculating graduate student population and to retain underrepresented minority (URM) students in our programs (please see proposal text). For example, our last recruited Ph.D. class was 19.5% URM students compared to past rates of ~2%. I also serve on the Minority Affairs Committee of the national Endocrine Society. In this role, I have served as a mentor for underrepresented students and postdocs for 9 years. I have also help organize career development and mentoring events at the annual Endocrine Society national meetings, I have represented the Society at meetings such as SACNAS, and I have made three week-long visits to institutions predominantly serving underrepresented groups to give short courses on endocrinology, graduate school opportunities, and careers in science.

My role as the Associate Dean for Graduate Studies positions me well to coordinate the activities required for this program. This role gives me responsibility for our ten biomedical science Ph.D. programs and our postdoctoral training programs. Since 2007, we have operated an open enrollment program, the Indiana University School of Medicine Biomedical Gateway (IBMG) that serves as a common entry point for the ten doctoral programs. This has especially helped students with an interest in areas such as cancer biology because students have the freedom to do research rotations with any faculty at the School that have openings. For students who wish to pursue cancer research, this permits them to do research rotations with cancer research faculty without restrictions of Department associations. The School has outstanding cancer biologists in many basic and clinical Departments and this freedom of choice has encouraged cancer-focused research careers for many of our students. In addition, we have entirely updated our graduate curriculum without restrictions of

Departmental "ownership" of courses. This enabled the generation of many new courses with the best teachers and featuring optimal collaborations between faculty from different Departments. Graduate training at the IUSM also involves significant required coursework in research ethics. For both graduate and postdoctoral training we also strongly believe that in addition to training in bench skills, our trainees should be optimally prepared for productive careers in other ways. We have established an Office of Postdoctoral Affairs and this office, in collaboration with the Graduate Office, offers a series of career development workshops. Recent and upcoming events include: *Careers in Academia, Careers in Industry, Careers in Government, Grant writing, The academic job search, Writing and submitting scientific articles, Learning from your environment and planning ahead, Lab finances, Writing your research statement & teaching philosophy, Animal research, Project management, Interviewing for success, Managing your mentor relationship, Presentation skills for scientists, Professional networking, Salary and benefit negotiation, Lab management, Research ethics and integrity, and Human subject research.* In addition, the campus has a very successful *Preparing Future Faculty* (PFF) program that offers additional career development activities and opportunities. The IUSM has a strong training environment for postdoctoral fellows. It has been listed as one of the top campuses of all North American research institutions for postdoctoral training by *The Scientist* for the last three years.

I also am proud of my research and my record of training graduate students and postdocs and of the productive careers in biomedical research that my trainees have achieved. My lab group has a strong record of training URM students and women. Our laboratory works on the molecular mechanisms that govern pituitary hormone-secreting cell type specification and we have applied our work to pituitary tumor biology and to pediatric hormone deficiency diseases. We have established collaborations with physician colleagues in Indiana and around the world and this has allowed us to translate our basic science findings to the clinic by redefining the molecular basis of several diseases and to generate diagnostic and genetic counseling tools that are in use in the clinic.

**B. Positions and Honors**

**Positions and Employment**

| | |
|---|---|
| 1994-1995 | Assistant Research Endocrinologist, Medicine, University of California, San Diego, La Jolla, CA |
| 1995-2001 | Assistant Professor, Biology, Indiana University-Purdue University Indianapolis (IUPUI) |
| 2001-2004 | Associate Professor, Biology, Indiana University-Purdue University Indianapolis |
| 2004-2005 | Professor, Biology, Indiana University-Purdue University Indianapolis |
| 1995-present | Member, Indiana University Cancer Center, Indiana University School of Medicine |
| 2000-present | Member, Indiana University Center for Regenerative Biology and Medicine |
| 2003-present | Member, Stark Neuroscience Research Institute, Indiana University School of Medicine |

| | |
|---|---|
| 2005-present | Adjunct Professor, Biology, Indiana University-Purdue University Indianapolis |
| 2005-present | Professor, Biochemistry and Molecular Biology, Indiana University School of Medicine |
| 2005-present | Professor, Cellular and Integrative Physiology, Indiana University School of Medicine |
| 2005-present | Associate Dean for Graduate Studies, Indiana University School of Medicine |

***Honors***

| | |
|---|---|
| 1989-1990 | National Cancer Institute Center Student Fellowship |
| 1991-1993 | American Cancer Society Postdoctoral Fellowship |
| 1994-1997 | Special Fellowship of the Leukemia Society of America |
| 1997 | Indiana University Teaching Excellence Recognition Award |
| 1998 | Outstanding Faculty Award, Indiana University-Purdue University Indianapolis |
| 2001 | Indiana University Trustees Teaching Excellence Award |
| 2000, 2001, 2004 | Endocrine Society Minority Affairs Shortcourse Faculty |

**Professional Activities and Memberships**

| | |
|---|---|
| 1997, 1998 | Co-organizer and Chair, Midwest Developmental Biology Meeting |
| 2000-present | Endocrine Society Minority Affairs Mentor |
| 2001 | Ad hoc review of grants for Wellcome Trust, U.K. |
| 2002 | Ad hoc review of grants for NSF and USDA |
| 2002 | Ad hoc review of grants for NIH/NIDDK |
| 2002 | NIH Biochemical Endocrinology (BCE) Study Section |
| 2003 | Ad hoc review of grants for NSF |
| 2003, 2004, 2005 | Ad hoc review of grants for Canadian Institutes of Health Research |
| 2004 | Co-organizer, Midwest Molecular Endocrinology Meeting |
| 2006 | Member, grant review panel, National Space Biomedical Research Institute (NSBRI), Education and Public Outreach |

| | |
|---|---|
| 2006 | Chair, grant review panel, National Space Biomedical Research Institute (NASA) |
| 2007 | Grant review, French National Panel on Rare Diseases. |
| 2008 | Grant review, United States- Israel Binational Science Foundation. |
| 2007-present | Member, Minority Affairs Committee, Endocrine Society. |
| 2008 | Chair, grant review panel, National Space Biomedical Research Institute (NASA) |
| 2009 | Chair, grant review panel, National Space Biomedical Research Institute (NASA) |

**C. Selected Peer-reviewed Publications (of 68 total, in chronological order)**

1. Parker, G.E., West, B.E., Witzmann, F.A., and Rhodes, S.J. (2005). Serine/threonine/tyrosine phosphorylation of the LHX3 LIM-homeodomain transcription factor. *J. Cell. Biochem.* 94, 67-80.

2. Yaden, B., Garcia, M., Smith, T., and Rhodes, S.J. (2006). Two promoters mediate transcription from the human *LHX3* gene: involvement of nuclear factor I and specificity protein 1. *Endocrinology* 147, 324-337.

3. Granger, A., Bleux, C., Kottler, M.-L., Rhodes, S.J., Counis, R., and Laverrière, J.-N. (2006). The LIM-homeodomain proteins Isl-1 and Lhx3 act with steroidogenic factor-1 to enhance gonadotrope-specific activity of the gonadotropin-releasing hormone receptor gene promoter. *Mol. Endocrinol.*, 20: 2093-2108.

4. Bhangoo, A.P.S., Hunter, C.S., Savage, J.J., Anhalt H, Pavlakis S, Walvoord E.C., Ten, S., and Rhodes, S.J. (2006). A novel *LHX3* mutation presenting as combined pituitary hormonal deficiency. *J. Clin. Endocrinol. Metab.* 91, 747-753.

5. Durán-Prado, M., Bucharles, C., Gonzalez, B.J., Vázquez-Martínez, R., Martínez-Fuentes, A.J., García-Navarro, S., Rhodes, S.J. Vaudry, H., Malagón, M.M., and Castaño, J.P. (2007). Porcine somatostatin receptor 2 displays typical pharmacological sst2 features but unique dynamics of homodimerization and internalization. *Endocrinology* 148: 411-421. Epub 2006 Oct 19.

6. Vasiliev, O., Rhodes, S.J., and Beebe, D.C. (2007). Identification and expression of Hop, an atypical homeobox gene expressed late in lens fiber cell terminal differentiation. *Molecular Vision* 13: 114-124.

7. Mullen, R.D., Colvin, S.C., Hunter, C.H., Savage, J.J., Walvoord, E.C., Bhangoo, A.P.S., Ten, T., Weigel, J., Pfäffle, R.W., and Rhodes, S.J. (2007). Roles of the LHX3 and LHX4 LIM-homeodomain factors in pituitary development. *Mol. Cell. Endocrinol.*, 265-266: 190-195.

8. Savage, J.J., Mullen, R.D., Sloop, K.W., Colvin, S.C., Camper, S.A., Franklin, C.L., and Rhodes, S.J. (2007). Transgenic mice expressing LHX3 transcription factor isoforms in the pituitary: effects on the gonadotrope axis and sex-specific reproductive disease. *J. Cell. Physiol.*, 212: 105-117.

9. Pfäffle, R., Savage, J., Hunter, C., Palme, C., Ahlmann, M., Kumar, P., Bellone, J., Schönau, E., Korsch, E., Brämswig, J., Stobbe, H., Blum, W., and Rhodes, S.J. (2007). Four novel mutations of the *LHX3* gene cause combined pituitary hormone deficiencies with or without limited neck rotation. *J. Clin. Endo. Metab.*, 92: 1909-1919.

10. Ward, R.M., Cho, M.-C., Esposito, C., Lyons, R.H., Cheng, J.-F., Rubin, E.M., Rhodes, S.J, Raetzman, L.T., Smith, T.P.L., and Camper, S.A. (2007). Comparative genomics reveal functional transcriptional control sequences in the *Prop1* gene. *Mamm. Genome* 18(6-7):521-37. Epub 2007 Jun 8. PMCID1998882.

11. Savage, J.J., Hunter, C.S., Jacob, T., Clark-Sturm, S.L., Pfäffle, R., and Rhodes, S.J. (2007). Mutations in the *LHX3* gene cause dysregulation of pituitary and neural target genes that reflect patient phenotypes. *Gene* 400(1-2):44-51. Epub 2007 Jun 7. PMCID2045125.

12. Pfäffle, R.W., Hunter, C.H., Savage, J.J., Duran-Prado, M., Mullen, R.D., Neeb., Z.P., Stobbe, H.M., Eiholzer, E., Haddad, N., Hesse, V., Blum, W.F., Weigel, J., and Rhodes, S.J. (2008). Three novel classes of missense mutations within the *LHX4* gene cause autosomal dominantly inherited forms of hypopituitarism with variable hormonal deficiencies. *J. Clin. Endocrinol. Metab.*, 93(3):1062-1071. PMCID2266965.

13. Kelberman, D., Turton, J., Woods, K.S., Mehta, A., Al-Kawari, M., Greening, J., Swift, P., Otonkoski, T., Bitner-Glindicz, M., Rhodes, S.J., and Dattani, MT. (2009). Molecular analysis of novel *PROP1* mutations associated with combined pituitary hormone deficiency. *Clinical Endocrinology*, 70(1):96-103. PMC Journal – In Process.

14. Colvin., S.C., Mullen, R.D., Pfäffle, R.W., and Rhodes, S.J. (2009). LHX3 and LHX4 transcription factors in pituitary development and disease. *Pediatric Endocrinology Reviews*, Suppl 2:283-90. PMC Journal – In Process.

15. Sehgal, R., Sheibani, N., Rhodes, S.J., and Belecky Adams, T.L. (2009). BMP7 and SHH regulate *Pax2* in mouse retinal astrocytes by relieving TLX repression. *Dev Biol.* 332(2):429-443. PMC Journal – In Process.

**D. Research Support**

**Ongoing Research Support**

R01 HD42024 Rhodes (PI)
4/01/02–3/31/13
NIH/NICHD
Role of LHX3 protein isoforms in pituitary development.
The major goals of this project are to investigate the role of the LHX3 transcription factor in pituitary development and to apply this knowledge to pediatric hormone-deficiency diseases.
Role: PI.

0742475 Marrs (PI)
2008–2013
NSF
The GK-12 Urban Educators Program at IUPUI.
This is an award to the IUPUI School of Science and the IU School of Medicine to fund student fellowships for graduate students who work in the Indianapolis Public Schools, improving science education for these schools that predominantly serve underrepresented and low income students.
Role: Co-investigator with K. Marrs, P. Crowell, A. Gavrin, L. Tedesco.

UL1RR025761-01 Shekhar (PI)
05/1/08 – 4/30/13
NIH NCRR
Indiana Clinical and Translational Sciences Institute
To establish a new institute that facilitates clinical and translational biomedical research across the state of Indiana. This is an institute established by the CTSA to Indiana and Purdue Universities.
Role: Co-I and Educational committee of Translational Research Education program.

KL2RR025760-01 Shekhar (PI)
05/1/08 – 4/30/13
NIH NCRR
Indiana Clinical and Translational Sciences Institute – K12 Program
To establish a new training and career development program providing mentoring programs and individual K08, K23, and K30 equivalent awards to junior investigators in clinical and translational biomedical research within the Indiana CTSI.
Role: Mentor

TL1RR025759-01 Shekhar (PI)
05/1/08 – 4/30/13
NIH NCRR
Indiana Clinical and Translational Sciences Institute – T32 Program
To establish a new training program providing mentoring programs and individual training fellowships to pre- and post-doctoral candidates in clinical and translational research programs within the Indiana CTSI.
Role: Mentor

# Kurt Kroenke, M.D., MACP
**February 2009**

**EDUCATION:**

| | |
|---|---|
| 1969-1973 | Valparaiso University, Valparaiso, IN: B.S. (Chemistry) |
| 1973-1977 | Washington University School of Medicine, St. Louis, MO; MD |
| 1977-1980 | Residency (Internal Medicine), Tripler Army Medical Center, Honolulu, HI |

**ACADEMIC APPOINTMENTS:**

| | |
|---|---|
| 1981-1983 | Clinical Instructor in Medicine, Emory University School of Medicine, Atlanta, GA |
| 1983-1988 | Clinical Assistant Professor of Medicine, University of Texas, San Antonio, TX |
| 1988-1989 | Clinical Associate Professor of Medicine, University of Texas, San Antonio, TX |
| 1989-1996 | Associate Professor of Medicine, Uniformed Services University of the Health Sciences, Bethesda, MD |
| 1996-1997 | Professor of Medicine, Uniformed Services University, Bethesda, MD |
| 1997- Present | Professor of Medicine, Indiana University School of Medicine, Indianapolis, IN |

**HOSPITAL APPOINTMENTS:**

| | |
|---|---|
| 1980-1983 | Martin Army Community Hospital, Fort Benning (Columbus), Georgia |
| 1983-1988 | Brooke Army Medical Center, San Antonio, Texas |
| 1988-1997 | Walter Reed Army Medical Center, Washington, DC |
| 1997- Present | Wishard Memorial Hospital, Indianapolis, Indiana |

**OTHER APPOINTMENTS:**

| | |
|---|---|
| 1982-1983 | Chief, Internal Medicine Clinic, Martin Army Hospital, Fort Benning, GA |
| 1984-1986 | Chief, Internal Medicine Clinic, Brooke Army Medical Center, San Antonio, TX |
| 1986-1987 | Chief, General Medicine Service, Brooke Army Medical Center, San Antonio, TX |
| 1987-1988 | Assistant Chief, Department of Medicine, Brooke Army Medical Center, San Antonio, TX |
| 1989-1997 | Director, Fellowship Program in General Internal Medicine Uniformed Services University of the Health Sciences, Bethesda, MD |
| 1994-1997 | Chief, General Medicine Division, Uniformed Services University, Bethesda, MD |
| 1997-Present | Director of Fellowship Training, Regenstrief Institute and Division of General Internal Medicine |
| 1997-Present | Research Scientist, Regenstrief Institute |
| 2000-Present | Director, K-30 Clinical Investigator Training Enhancement (CITE) Program and Master of Science in Clinical Research degree Program |
| 2002-Present | Associate Director of Education, General Clinical Research Center, Indiana University |
| 2004-2007 | Associate Director for Faculty Development and Training, VA Center of Excellence for Implementing Evidence-Based Practice, Roudebush VAMC, Indianapolis, IN (non-paid) |
| 2008-Present | Director, Indiana Clinical and Translational Sciences Institute (CTSI) Education Programs |

| | |
|---|---|
| 2010-Present | Chancellor's Professor of Medicine, Indiana University, IUPUI Campus |

**SPECIALITY BOARDS:**

| | |
|---|---|
| 1980 | Diplomate, American Board of Internal Medicine |

**LICENSURE/CERTIFICATION:**

| | | |
|---|---|---|
| 1981 | Georgia | Medical license # 22243 (now inactive) |
| 1984 | Texas | Medical license # G6198 (now inactive) |
| 1989 | District of Columbia | Medical license # 17991 (now inactive) |
| 1997 | Indiana | Medical license # 01047267 |

**PROFESSIONAL ORGANIZATIONS:**

Society of General Internal Medicine

| | |
|---|---|
| 1990 | Program Co-Chair, National Meeting |
| 1991-1993 | Finance Committee |
| 1993-1996 | Ethics Committee |
| 1993-1996 | National Council Member |
| 1996-1999 | Education Committee |
| 1996-1999 | Co-Leader, Clinician-Educator Task Force |
| 1997 | Abstract Selection Committee, Psychosocial Abstracts Co-Chair |
| 1997 | Glaser Award Committee |
| 1998 | Abstract Selection Committee, Medical Education Abstracts Co-Chair |
| 1999 | Abstract Selection Committee, Medical Education Abstracts Chair |
| 1997-2000 | Treasurer and National Council |
| 2000-2003 | President-Elect (00-01), President (01-02), & Immediate Past-President (02-03) |
| 2002-2003 | Chair, Nominations Committee |
| 2002-2005 | Development Committee |
| 2002-2005 | Executive Committee – Hartford Foundation-SGIM Geriatrics Initiative |

American College of Physicians

| | |
|---|---|
| 1991-present | Invited Faculty Member, 72nd- through 79th, 81st-88th Annual Meetings |
| 1995-1997 | Medical Knowledge Self-Assessment Program (MKSAP XI) Writing Group |
| 1998-2000 | Program Chair, National Meeting for year 2000 (81st) Annual Scientific Meeting |
| 1998-2002 | Education Committee |
| 1999-2000 | Chair, Work Group on Revisions to the ACP Annual Meeting |
| 2000-2002 | Program Chair, 2002 (83rd) Annual Scientific National Meeting for year 2002 |
| 2004-2006 | Chair, MKSAP 14, General Medicine/Primary Care Writing Committee |
| 2007-2009 | Chair, MKSAP 15, General Medicine/Primary Care Writing Committee |

Association of Specialty Professors

2003-2006 Council Member

Association of Clinical Research Training

2005-2006 Board Member

2006-2009 President-Elect, President-Elect, Immediate Past-President

Institute of Medicine

1999-2000 Institute of Medicine Panel on Musculoskeletal Disorders in the Workplace

2006-2007 Institute of Medicine Committee on Veterans' Compensation for Post Traumatic Stress Disorder

2008-2011 Institute of Medicine Board on Military and Veterans Health

Other

1993-1995 American Psychiatric Association DSM-IV Primary Care Work Group Member

1997-1999 National Board of Medical Examiners Step 1 Behavioral Medicine Task Force

1997-2007 MacArthur Foundation Depression & Primary Care Initiative Steering Committee

2000-2001 Veterans Administration and Department of Defense Guideline Development Work Group for Fibromyalgia and Chronic Fatigue Syndrome

2002-2006 National Institute of Mental Health Services Research Study Section

2008-Present Department of Defense Health Board – Psychological Health Subcommittee

2008-2012 American Psychiatric Association DSM-V Somatoform Work Group Advisor

Editorial Boards

1988-1990 Journal of General Internal Medicine

2003-present Journal of Clinical Psychiatry – Primary Care Companion

2004-present Psychosomatics

2005-present General Hospital Psychiatry

2005-present Archives of Internal Medicine

**HONORS and AWARDS:**

Professional

1986 Fellow (elected), American College of Physicians (FACP)

1998 American College of Physicians Laureate Award, Army Region

2001 Distinguished Alumnus Award, Valparaiso University

2002 Master (elected), American College of Physicians (MACP)

2003 Indiana University IUPUI Prestigious External Award Recognition (PEAR)

| | |
|---|---|
| 2008 | Academy of Psychosomatic Medicine Research Award |
| 2009 | American Psychosomatic Society Donald Oken Fellowship Award |
| 2009 | Selected as Chancellor's Professor, Indiana University, IUPUI Campus |

Teaching

| | |
|---|---|
| 1980 | Outstanding Teacher Award, Family Practice Residency, Martin Army Hospital |
| 1981 | Outstanding Teacher Award, Family Practice Residency, Martin Army Hospital |
| 1986 | Outstanding Teacher Award, Internal Medicine Residency, Brooke Army Med Ctr |
| 1987 | Excellence in Research Education Award, South-Central Regional Research Consortium, San Antonio, TX |
| 1998 | Teaching Excellence Recognition Award, Indiana University School of Medicine |
| 2001 | Teacher of the Year, IU Division of General Internal Medicine and Geriatrics |
| 2003 | Indiana University IUPUI Trustee Teaching Award |
| 2004 | Outstanding Fellow Teacher Award, Department of Medicine |

Military

| | |
|---|---|
| 1983 | Army Commendation Medal |
| 1988 | Meritorious Service Medal |
| 1989 | Order of Military Medical Merit |
| 1996 | "A" Proficiency Designator (for academic excellence) |
| 1997 | Meritorious Service Medal |
| 1997 | Department of Defense Superior Service Medal |

**TEACHING ASSIGNMENTS:**

**(1) Clinical Teaching**

| | |
|---|---|
| 1989-1997 | Director, General Internal Medicine Fellowship Program, Uniformed Services University (involved mentoring 3 fellows' research projects per year; teaching 72 hours of seminars per year) |
| 1989-1997 | Director, General Medicine Consultation Teaching Service, Walter Reed Army Medical Center, Washington, DC |
| 1991-1996 | Instructor, Introduction to Clinical Medicine (36 hr/year; student groups of 8) |
| 1994-1996 | Discussion Leader, Human Context Course (30 hr/year, student groups of 10) |
| 1989-1997 | Attending, General Medicine Inpatient Service, Walter Reed (1 month/year) |
| 1989-1997 | Attending, General Medicine Consultation Service, Walter Reed (2 months/year) |
| 1989-Present | Clinic Preceptor for residents/students (1/2 day per week, 40 weeks per year) |
| 1996-1997 | Co-Director, Senior Resident Teaching Rotation, Walter Reed Army Medical Center (5 hrs of teaching per month) |
| 1990-1997 | Lecturer, Internal Medicine Ambulatory Rotation (2 hours lectures per month) |
| 1998-2001 | Evidence-based teaching module in two 4th-year medical student rotations [total teaching time per year = 30 hours] |

1997-Present Attending, General Medicine Inpatient Service, Wishard Hospital (2 months/yr)

**(2) Graduate Courses**

2000-present Course Director, Clinical Research Methods, G660 (3 credit course)

2000-present Course Director, Clinical Trials course, G661 (3 credit course)

2000-present Course Director, Mentored Clinical Research, G664 (variable credits)

**(3) Invited Presentations**

**(3a) Named/Endowed Lectureships**

1. **Kroenke K.** Symptoms and science: practical lessons from primary care research. James Hammarsten Guest Professor Lecture; Feb 12, 1997; University of Oklahoma Health Sciences Center, Oklahoma City OK.
2. **Kroenke K.** Recent Advances in the Evaluation and Management of Depression. Timothy W. & Katherine Altorfer Swain Endowed Lectureship in Community Health; March 7, 2002; University of Illinois College of Medicine, Peoria, IL.
3. **Kroenke K.** Management of Depression in Primary Care. Louis S. Perry and Janet B. Perry 8th Annual Lectureship in Internal Medicine; October 29-30, 2003; University of Utah School of Medicine, Salt Lake City, UT.
4. **Kroenke K.** Common Symptoms and Complaints. 2004 Massachusetts Chapter Endowed Lecture, American College of Physicians Annual Session; April 22, 2004; New Orleans, LA.
5. **Kroenke K.** Depression in Medical Patients: Recognition and Management. Thomas M. Durant 20th Annual Grand Rounds, Department of Medicine; Nov 3, 2004; Temple University, Philadelphia, PA.
6. **Kroenke K.** Symptoms and Science. Malcolm C. Grow Memorial Lecture, American College of Physicians Air Force Region/Society of Air Force Physicians Meeting; March 9, 2005; Dayton, OH.
7. **Kroenke K.** Symptoms and Science. Leon Kassel Lecture in General Internal Medicine, Sinai Hospital; May 26, 2005; Baltimore, MD.
8. **Kroenke K.** Symptoms and Science. 9th Frank De Trana Lectureship in General Internal Medicine, University of Illinois at Chicago; November 1, 2005; Chicago, IL.
9. **Kroenke K.** Symptoms and Science: Practical Lessons from Clinical Research. 9th Annual O. Roger Hollan Visiting Professor, University of Texas at San Antonio Health Science Center; February 22, 2006; San Antonio, TX.
10. **Kroenke K.** Symptoms: Treatable or Untreatable. Sidney Watson Smith Lecture; May 26, 2006; Royal College of Physicians of Edinburgh, Scotland.
11. **Kroenke K.** 12 Tips on Managing Unexplained Symptoms. Distinguished Leaders in Medicine Series, Dalhousie University; Mar 8-9, 2007; Halifax, Nova Scotia.
12. **Kroenke K.** Symptoms: Treatable or Untreatable. Distinguished Leaders in Medicine Series, Dalhousie University; Mar 8-9, 2007; Halifax, Nova Scotia.
13. **Kroenke K.** Bedside Teaching: Preservation and Pruning. C.A. Hedberg Visiting Professor, Lutheran General Hospital; Oct 23-24, 2007; Chicago, IL.
14. **Kroenke K.** Symptoms: Treatable or Untreatable. C.A. Hedberg Visiting Professor, Lutheran General Hospital; Oct 23-24, 2007; Chicago, IL.
15. **Kroenke K.** Academy of Psychosomatic Medicine 2009 Visiting Professor, Cambridge Health Alliance; February 2010; Boston, MS.

**(3b) Other Invited Presentations**

***Not Listed: 40+ Grand Rounds or Invited Presentations at Military and Indiana Institutions)***

1. Workshop, 11th Annual SGIM Meeting, Washington DC, 29 Apr 1988
   • The Attending Physician: Roles, Obstacles, and Methods

2. Workshops, 12th Annual SGIM Meeting, Washington DC, 27-28 Apr 1989
   • Teaching on the Wards
   • Teaching in the Classroom

3. Workshops, 13th Annual SGIM Meeting, Washington DC, 3-4 May 1990
   • Controversies in Medical Consultation: Preoperative HIV Testing
   • Chronic Fatigue: Organic and Psychosocial Aspects

4. Faculty, American College of Physicians (ACP) 72nd Meeting, New Orleans, Apr 1991
   • Chronic Fatigue Syndrome (panel discussion--plenary session)

5. Workshop, 14th Annual SGIM Meeting, Seattle WA, 3 May 1991
   • Attending Rounds: Obstacles and Opportunities

6. Precourse Director, 14th Annual SGIM Meeting, Seattle WA, 1 May 1991 (full-day course)
   • Common Symptoms in Primary Care

7. Visiting Professor, University of Wisconsin Medical School, Milwaukee WI, 23-24 May 1991
   • Common Symptoms in Primary Care

8. Keynote Speaker at conference, "Panic Disorder: Medical Utilization, Somatization, and Treatment," Seattle WA, 31 May 1991
   • Common Complaints in Primary Care

9. Faculty, American College of Physicians (ACP) 73rd Annual Meeting, San Diego CA, 24 Mar 1992
   • Dizziness (in Common Problems in Primary Care Precourse)

10. Visiting Professor, Cook County Hospital, Chicago IL, 29 May 1992
    • Common Symptoms in Primary Care
    • Attending Rounds workshop

11. Invited Presentation, NIMH Workshop on Assessment of Psychopathology in Physical Illness, Bethesda MD, 21-22 Sept 1992
    • Assessing Somatoform Disorders in the Physically Ill

12. Invited Presentation, Primary Care Course, Las Vegas NV, 29 Oct 1992
    • Chronic Fatigue: Clinical Update

13. Visiting Professor, University of Washington, Seattle WA, 17-18 Nov 1992
    • Attending Rounds Workshops

14. Faculty, American College of Physicians (ACP) 74th Annual Meeting, Washington DC, 1-3 Apr 1993
    • Dizziness (in Common Problems in Primary Care Precourse)
    • Chronic Fatigue Syndrome (panel discussion)

15. Workshops, 16th Annual SGIM Meeting, Washington DC, 29-30 Apr 1993
    • Diagnosis of Psychiatric Disorders in Primary Care
    • The Dizzy Patient: A Primary Care Approach

16. Invited Workshop, Georgetown University Department of Medicine, Washington DC, 12 Jun 1993
    • Teaching Residents How to Teach

17. Ambulatory Grand Rounds, George Washington University Medical Center, Washington DC, 14 Jul 1993

• The Dizzy Patient: A Primary Care Approach

18. Invited Presentation, NIMH Symposium, "Comorbidity of Mental, Addictive, and Physical Disorders: Issues in Primary Care Practice," New York NY, 18 Sep 1993
    • Physical Symptoms and Mental Illness

19. Visiting Professor, Hennepin County Hospital, Minneapolis MN, 15-17 Feb 1994
    • Psychiatric Disorders in Primary Care
    • CPC (on Delirium patient)
    • Attending Rounds workshop
    • Dizziness workshop

20. Visiting Professor, Wayne State University School of Medicine, Detroit MI, 15 Apr 1994
    • Fatigue in Primary Care
    • Attending Rounds workshop

21. Precourse Director, American College of Physicians (ACP) 75th Annual Meeting, Miami Beach FL, 19-20 Apr 1994
    • Common Problems in Primary Care

22. Workshops, 17th Annual SGIM Meeting, Washington DC, 29-30 Apr 1994
    • Improving Your Teaching Delivery
    • Depression Screening in Primary Care

23. Invited Presentation, "Primary Care Update," Riverside Methodist Hospital, Columbus OH, 6 May 1994
    • Fatigue in Primary Care

24. Symposium Presentation, 147th Annual Meeting of the American Psychiatric Association, Philadelphia PA, 25 May 1994
    • Physical Symptoms, Mental Disorders and Impairment

25. Visiting Professor, University of Wisconsin, Madison WI, 29 Jul 1994
    • Common Symptoms in Primary Care

26. Visiting Professor, University of Florida, Gainesville FL, 9-10 Feb 1995
    • Improving Your Clinical Teaching (plenary lecture)
    • Attending Rounds and Ambulatory Teaching (workshops)

27. Visiting Professor, Michigan State University, Lansing MI, 27 Apr 1995
    • Common Symptoms in Primary Care Faculty, American College of Physicians (ACP) 75th Annual Meeting, Atlanta GA, 16-19 Mar 1995
    • Dizziness (in Common Problems in Primary Care Mini-course)
    • Meet-the-Professor: Preoperative Evaluation
    • Clinical Skills Workshop: The Dizzy Patient

28. Workshops, 18th Annual SGIM Meeting, Washington DC, 5-6 May 1995
    • Chronic Medications in the Perioperative Period
    • Bedside Teaching

29. Visiting Professor, Kaiser-Permanente Medical Center, Los Angeles CA, 13 June 1995
    • Common Symptoms in Primary Care

30. Faculty, Women Veterans Health Conference, Scottsdale AZ, 30-31 Aug 1995
    • Chronic Fatigue Syndrome (workshop)
    • Somatoform Disorders (workshop)

31. Visiting Professor, Michigan State University, East Lansing MI, 6-7 Feb 1996
    • Faculty Development Workshops on Clinical Teaching

32. Keynote Speaker, 6th Annual Internal Medicine Primary Care Symposium, Texas Tech University Health Sciences Center, Amarillo TX, 29-30 Mar 1996
    • Evaluating Patients with Unexplained Physical Complaints

33. Faculty, American College of Physicians (ACP) 76th Annual Meeting, San Francisco CA, 24-28 Apr 1996
    • Dizziness in Primary Care
    • Identifying Mental Disorders in Primary Care

34. Invited Presentations, 19th Annual SGIM Meeting, Washington DC, 2-4 May 1996
    • Meet-the-Professor (Depression)
    • Dizziness in Primary Care

35. Symposium Presentation, 149th Annual American Psychiatric Assoc. Mtg, New York NY, 6 May 1996
    • Multisomatoform Disorder: A New Somatoform Diagnosis for Primary Care

36. Faculty, Women Veterans Health Conference, Baltimore MD, 18 Sept 1996
    • Detection and Management of Somatoform Disorders (workshop)

37. Faculty, American College of Physicians (ACP) 77th Annual Meeting, Philadelphia PA, 24 Mar 1997
    • Identifying and Treating Mental Disorders in Primary Care

38. Presentations and Workshops, 20th Annual SGIM Meeting, Washington DC, 1-3 May 1997
    • Precourse Director: "Career Development for Clinician-Educators"
    • Conducting Research as a Clinician Educator (workshop)
    • Creative Options in Small Group Teaching (workshop)

39. Visiting Professor, Hennepin County Hospital, Minneapolis MN, 30 Oct 1997
    • Depression in Primary Care

40. Grand Rounds, Henry Ford Hospital Department of Psychiatry, Detroit MI, 26 Feb 1998
    • Mental Disorders in Primary Care: Recognition and Patient Satisfaction

41. Faculty, “Internal Medicine Seminar: Advances & Changing Trends,” Orlando FL, 16-17 Mar 1998
    • Evaluating the Dizzy Patient
    • Depression: A Clinical Update
    • Medical Evaluation of the Patient Undergoing Surgery

42. Visiting Professor, University of Alabama, Birmingham and Tuscaloosa AL, 16-17 Apr 1998
    • The Difficult Patient in Primary Care

43. Faculty, American College of Physicians (ACP) 78th Annual Meeting, San Diego CA, 2-3 Apr 1998
    • Managing Depression and Anxiety

44. Presentations and Workshops, 21st Annual SGIM Meeting, Chicago IL, 23-25 Apr 1998
    • What Should We Be Teaching General Internal Medicine Fellows? (workshop)
    • Help! I’m on Service Again: Strategies for Effective Rounds (workshop)

45. Plenary Speaker, Conference on Federally Sponsored Gulf War Veterans’ Illnesses Research, Washington DC, 17 Jun 1998
    • Epidemiology of Common Symptoms

46. Invited Presentation, Seventh Annual Primary Care Update, Columbus OH, 16 Oct 1998
    • Depression in Primary Care

47. Invited Presentation, Hartford Foundation Geriatric Education Retreat, Jasper Canada, 9 Aug 1999
    • Dementia

48. Visiting Professor, University of Kansas School of Medicine at Wichita, Wichita KS, 9 Sep 1999
    • Improving Your Clinical Teaching

49. Panelist, American Journal of Managed Care Symposium on Improving Depression Treatment in Managed Care, Dallas TX, 2 Oct 1999

50. Invited Workshop, Association of Professors of Medicine Faculty Development Conference, Tampa FL, 4-5 Dec 1999
    • Practical Tips for Self-Directed Learning

51. Faculty, Military Medical Surgical Conference, Sonthofen Germany, 27-29 March 2000
    • Evaluating the Dizzy Patient
    • Common Symptoms in Primary Care
    • Medical Evaluation Preoperatively
    • Somatization and the Difficult Patient

52. Invited Workshop, Association of Professors of Medicine Faculty Development Conference, Denver CO, 20 Jun 2000
    • Practical Tips for Self-Directed Learning

53. Invited Presentation, Behavioral Health Conference, Washington DC, 23 Sept 2000
    • Screening for Mental Disorders in Primary Care

54. Invited Workshop, Association of Professors of Medicine Faculty Development Conference, San Diego CA, 2 Dec 2000
    • Practical Tips for Self-Directed Learning

55. Visiting Professor, University of Illinois School of Medicine at Peoria, Peoria IL, 28 February 2001
    • Symptoms and Science: Practical Lessons from Primary Care
    • Clinical Research: Starting Blocks, Hurdles, and Finish Lines

56. Visiting Professor, Medical College of Wisconsin, Milwaukee WI, 22-23 March 2001
    • Symptoms and Science: Practical Lessons from Primary Care
    • Inpatient Attending in the 21st Century• Questionnaire Design

57. Faculty, American College of Physicians (ACP) 81st Annual Meeting, Atlanta GA, 27-30 Mar 2001
    • Dizziness in Primary Care
    • Undifferentiated Symptoms: A Practical Approach

58. Invited Plenary Presentation, Association for Applied Psychophysiology and Biofeedback 32nd Annual Meeting, Raleigh NC, 1 April 2001
    • Symptoms and Science: Frontiers in Primary Care Research

59. Invited Presentations, 24th Annual SGIM Meeting, San Diego CA, 3-5 May 2001
    • Meet-the-Professor (Depression)

60. Invited Presentation: Training Generalist Internists in Geriatrics: Planning for Sustained Improvement The First National Conference (SGIM and Hartford Foundation), Baltimore MD, 9-10 July 2001
    • How Should America Invest in the Geriatric Training of Generalist Physicians?

61. Invited Presentation, Hartford Foundation Geriatric Education Retreat, Jasper Canada, 8 Aug 2001
    • Integration of Geriatrics into General Internal Medicine – Generalist Perspective

62. Invited Presentation, 2001 Army Region Scientific Meeting, San Antonio TX, 15-17 November 2001
    • Symptoms and Science – Lessons from Primary Care

63. Invited Presentation, International Congress on Somatoform Disorders, Marburg Germany, 24 Feb 2002
    • The PHQ-15: A New Measure for Evaluating Somatic Symptom Severity

64. Invited Presentation, University of Heidelberg, Heidelberg Germany, 25 Feb 2002
    • Symptoms and Science: Lessons from Primary Care Research

65. Visiting Professor, University of Illinois College of Medicine, Peoria IL, 7 March 2002
    • Grand Rounds, Dept of Pediatrics -- Clinical Research: Starting Blocks, Hurdles and Finish Lines
    • Grand Rounds, Dept of Family Practice -- Depression: Evaluation and Treatment

66. Invited Presentation, Scottish Health Ministry, Edinburgh Scotland, 11 Mar 2002
    • Symptoms and Science: Lessons from Primary Care

67. Keynote Address, Royal College of Psychiatrists, Section of Liaison Psychiatry Annual Residential Conference, Chester England, 13 Mar 2002
    • Advances in Care of the Somatizing Patient

68. Invited Presentation, American Psychosomatic Society (16th) Symposium, Barcelona Spain, 16 Mar 2002
    • Pharmacological Treatment of the Somatizing Patient

69. Visiting Professor, Good Samaritan Regional Medical Center, Phoenix AZ, 28-29 Mar 2002
    • Interdisciplinary Conference: Studies and Discussion of the Difficult Patient
    • Grand Rounds: Symptoms and Science

70. Faculty, American College of Physicians (ACP) 82nd Annual Meeting, Philadelphia PA, 9 Apr 2002
    • Advances in Antidepressant Therapy
    • Closing Session: Moderator and Speaker

71. Presidential Address, Society of General Internal Medicine 25th Annual Meeting, Atlanta GA, 3 May 2002
    • Remember, Welcome, Anticipate

72. Faculty, 17th Annual Family Practice Seminar: Update and Review, Hilton Head SC, 5-6 July 2002
    • Evaluating the Dizzy Patient
    • Depression 2002: A Clinical Update
    • Medical Evaluation of the Patient Undergoing Surgery

73. Invited Presentation, Academy of Psychosomatic Medicine Meeting, Tucson AZ, 21 Nov 2002
    • Reclassifying Somatoform Disorders (panel presentation)
    • Depression and Pain (panel presentation)

74. Invited Presentation, American Psychosomatic Society (APS) 61st Annual Scientific Meeting, Phoenix AZ, 6 March 2003
    • Biopsychosocial Management of Irritable Bowel Syndrome and Other Functional GI Disorders

75. Faculty, American College of Physicians (ACP) 83rd Annual Meeting, San Diego, CA, 3-5 April 2003
    • Advances in Antidepressant Therapy • Closing Session

76. Visiting Professor, UCLA and West Los Angeles VA, Los Angeles, CA, 22-23 April 2003.
    • Evaluating and Managing Common Symptoms: A Workshop
    • Grand Rounds: Evaluating the Dizzy Patient

77. Invited Presentations, SGIM 26th Annual Meeting, Vancouver, British Columbia, 30 April – 3 May 2003.
    • Meet the Professor (Investigating Symptoms: Soft Yet Salient Research)
    • Mentoring over Time and Distance: Creating a New SGIM Mentorship Program (panelist)

78. Invited Presentation, Ball Memorial Hospital Dept. of Research 8th Annual Research Symposium, Muncie, IN, 6 May 2003
    • Symptoms and Science, Lessons from Primary Care Research

79. Invited Panelist, Medical Crossfire Education Program on “The Road to Remission: Achieving the Goal in Depression and

Anxiety Disorders" (panelist) New York, NY, 13-14 May 2003

80. Visiting Professor, Mayo Clinic, Rochester, MN, 20-21 May 2003.
    • Depression in Primary Care
    • Medical Grand Rounds: Symptoms and Science

81. Invited Presentation, Albert J. Silverman Research Conference University of Michigan, Ann Arbor, MI, 27-28 May 2003
    • Depression and Physical Symptoms: The Interface

82. Invited Presentation, Sixth Annual Mental Health Symposium "Exploring the Mind/Body Connection" Indiana University School of Medicine, Indianapolis, IN, 30 May 2003
    • Depression in Primary Care

83. Visiting Professor, University of California San Francisco Grand Rounds, San Francisco, CA, 24-26 September 2003
    • Primary Care Grand Rounds: Depression in Primary Care

84. Visiting Professor, University of Iowa, Dept. of Psychiatry, Iowa city, IA, 20-21 October 2003
    • Somatoform Disorders: Emerging Issues in Evaluation and Management
    • Grand Rounds: Depression in Medical Patients

85. Invited Presentation, Mechanisms and Treatment of Cancer-Related Symptoms Presentation: University of Texas MD Anderson Cancer Center, Houston, TX, 20-24 Feb 2004.
    • Methodological Challenges in Symptoms Research

86. Visiting Professor, Division of General Internal Medicine, Boston University, Boston, MA, 25-26, 2004.
    • Primary Care Grand Rounds: Symptoms and Science

87. Faculty, American College of Physicians (ACP) 84th Annual Meeting, New Orleans, LA, 21-24 Apr 2004
    • Advances in Antidepressant Therapy
    • Meet the Professor: Common Symptoms and Complaints
    • Update in General Internal Medicine

88. Invited Presentation, SGIM, 27th Annual Meeting, Chicago, IL, 12-15 May 2004
    • Meet the Professor (Common Symptoms in Primary Care)
    • Putting the Fun Back into Bedside Teaching (precourse faculty)
    • Update in General Internal Medicine

89. Co-Chair, DMAA (Disease Management Association of America) 1st Annual Integrated Healthcare Leadership Summit: Co-Morbid Depression and Chronic Illness, Washington, DC, 7-8 June, 2004.
    • The Role of the Primary Care Clinician in Depression (plenary presentation)
    • Advances in Depression Screening (workshop)
    • Depression Screening and Training: Co-morbidities, Stigma, and Resistance (precourse)

90. Visiting Professor, St. Joseph Hospital, Fort Wayne, Indiana, 15 September, 2004

91. Visiting Professor, Tripler Dept. of Medicine, GME Faculty Development Program Presentation, Honolulu, Hawaii, 21-26 September 2004
    • Improving Clinical Teaching
    • Beside Teaching in the 21st Century
    • Clinical Research: Starting Blocks, Hurdles and Finish Lines

92. Invited Presentation, Disease Management Association of America (DMAA) Leadership Conference, Orlando, FL, 20-23 October 2004
    • Depression: The Role of Primary Care
    • Hardball with Dr. Kurt Kroenke: Integration – Threat or Opportunity

93. Invited Presentation, ADAA Meeting, Chantilly, VA, 25-27 October, 2004
    • Anxiety Disorders in Primary Care: Lessons Learned from Depression

94. Invited Presentation, APM Meeting, Fort Meyers, FL, 19-21 Nov 2004.
    •Workshop: Psyche, Soma & Depression (Levenson)
        o Physical Symptoms in Medical Patients (Kroenke)
    •Symposium: Successful Models of Integrated Care (Huyse)
        o Integrated Care in an Internal medicine Outpatient Clinic (Kroenke)

95. SGIM Meeting "Increasing Education and Research Capacity in Internal Medicine to Improve Care for Older Americans: A National Meeting to Assess Where We Are and Identify Next Steps, Dallas, Texas, 29 Nov-1 Dec 2004

96. Invited Presentation, 12th Annual Symposium about Current Issues and Controversies in Psychiatry: Comorbidity, Barcelona, Spain, 14-15 April 2005
    • Medically unexplained somatic symptoms and psychiatric comorbidity

97. Faculty, American College of Physicians (ACP) 86th Annual Meeting, Philadelphia, PA, 6-8 April 2006
    • Panelist: Advances in Therapy for the Practicing Internist (PRE607)

98. Visiting Professor, Zucker Hillside Hospital Grand Rounds, New York, April 9, 2006
    • Somatization in Medical Patients – New Approaches to Classification and Management

99. Invited Presentation, Functional / Somatoform Disorders – Concepts and Management Conference, Heidelberg, Germany, May 18-20, 2006
    • A New approach to somatoform disorders

100. Invited Presentation, Royal College of Physicians of Edinburgh Symptoms: With and Without Disease Conference, Edinburgh, May 26, 2006
    • Symptoms: Treatable or Untreatable

101. Invited Presentation, American Psychiatric Association's Somatic Presentation of Mental Disorders Conference, Beijing, China, September 3-10, 2006.
    • Evidence for specific treatments for subcategories of somatoform disorders?

102. Invited Presentation, APM Annual Meeting, Tucson, AZ, 15-19 Nov 2006
    • Workshop: The Consultant and the Mind/Body Interface
    • Symposium: Plenary Symposium Somatization Diagnostic Issues and DSM-V.

103. Invited Presentation, ACP Meeting, San Diego, CA, 18-21 April 2007
    • Precourse: Advances in Therapy for the Practicing Internist

104. Invited Presentation, University of Rochester, 8-9 May 2007
    • Psychiatry Grand Rounds: Depression and Pain: A Double Hurt

105. Invited Presentation, Psychosomatics in the 21st Century, Maastricht, Netherlands, 5-9 June 2007
    • Treatment of Somatoform Disorders and Unexplained Somatic Symptoms

106. Invited Presentation, University of Iowa, Iowa City, IA, 22-23 August 2007
    • Grand Rounds. Depression and Pain: A Double Hurt
    • Medicine and Psychiatry Conference: Unexplained Physical Symptoms in Primary Care

107. Invited Presentation, Spanish Society of Psychiatry Annual Meeting, Santiago, Spain, 26 Sept 2007
    • Somatic Symptoms in Depression: A Double Hurt

108. Invited Presentations, APM Annual Meeting, Amelia Island, FL, 14-18 Nov 2007
    • Mind and Body Symptoms: New Findings from Both Sides of the Atlantic

• Symposium: Comprehensive Care for the Cancer Patient: Preliminary INCPAD Findings
• Symposium: In DSM V, Should Factitious Disorders and Somatoform Disorders by United?

109. Invited Presentation, Medical Colloquy Talk, Las Vegas, NV, 7 Dec 2007
• Efficient and Effective Care of Depression in Medical Settings

110. Invited Presentation, University of Edinburgh Mental Health Network, Scotland, 26-29 February 2008
• Depression and Pain: A Double Hurt
•Symptoms-Based Research in Cancer: The INCPAD Trial and Lessons Learned

111. Invited Presentations, Pri-Med Updates Meetings •Houston, TX, 8 March 2008 "Demystifying Fibromyalgia – A Primary Care Primer"
•Dearborn, MI, 12 March 2008 "Fibromyalgia: How Treatment is Evolving"
• San Francisco, CA, 20 March 2008 "Fibromyalgia: How Treatment is Evolving"
• Rosemont, IL, 25 April 2008 "Demystifying Fibromyalgia – A Primary Care Primer"
• Chicago, IL, 11 June 2008 "Fibromyalgia: How Treatment is Evolving"

112. Visiting Professor, University of Hamburg, Germany, 18-20 April 2008
• Diagnosis and Treatment of Somatoform Disorders

113. Invited Presentation, APA Annual Meeting, Washington, DC, 3-8 May 2008
• Symposium 14 – Differential Response to Treatment for Somatoform Disorders Subtypes

114. Visiting Professor, Grand Rounds at Stony Brook Department of Psychiatry, New York, 13 May, 2008
• Update on Somatoform Disorders and Unexplained Symptoms

115. Invited Panelist, ACP Annual Meeting, Washington, DC, 14-17 May 2008
• Precourse: Advances in Therapy: "Update on Depression"

116. Invited Presentation, CME Enterprise
• Chicago, IL, 5 June 2008 "Dispelling Myths Evidence Based Treatment of Fibromyalgia"
• Detroit, MI, 19 June 2008 "Dispelling Myths Evidence Based Treatment of Fibromyalgia"

117. Keynote Presentation, COMPASS Annual Scientific Meeting, Edinburgh, Scotland, 16-18 June 2008
• Improving Symptom Care in Cancer and Non-cancer Patients: Practical Clinical Trials

118. Invited Presentations, Pri-Med Updates Meetings
• New York, 3 Oct 2008 "Demystifying Fibromyalgia: A Primary Care Primer"
• New Orleans, 23 Oct 2008 "Fibromyalgia: Dispelling Myths, Improving Management"
• Boston, MA, 8 Nov 2008 "Demystifying Fibromyalgia: A Primary Care Primer"
• Houston, TX, 22 Nov 2008 "Fibromyalgia: Simplifying Diagnosis and Treatment"

119. Invited Presentations, APM Annual Meeting, Miami, FL, 20-22 Nov 2008
• 2008 APM Research Award Presentation: "Treating Somatic Symptoms"
• Symposium: "Comorbid Depression and Chronic Medical Illness: Lessons from 4 Trials"

**(4) Research Mentorship** (*Currently Mentoring)

1989-97 General Internal Medicine Fellows, Uniformed Services University

| | | |
|---|---|---|
| Brian Birdwell, M.D. | Deb Omori, M.D. | Pat Hennessey, M.D., M.P.H |
| Dale Vincent, M.D., M.P.H. | Frank Landry, M.D., M.P.H | Richard Marple, M.D., M.P.H |
| Michael Roy, M.D., M.P.H | David Jones, M.D., M.P.H | William Reed, M.D., M.P.H |
| Lisa Inouye, M.D., M.P.H | Jeffrey Jackson, M.D., M.P.H | Donald Mondragon, M.D., M.P.H |
| Patrick O'Malley, M.D. | Robert Gibbons, M.D., M.P.H | James Santoro, M.D. |

| | | |
|---|---|---|
| 1997- | Indiana University Research Fellows | |
| Melanie Johannsen, M.D. | Jeegar Jailawa, M.D. | Gail Casper, Ph.D. |
| Marc Rosenman, M.D. | Sachin Dave, M.D. | Teri Greco, M.D. |
| John Sidle, M.D. | Matthew Bair, M.D. | Shelagh Fraser, M.D. |
| Linda Brown, Ph.D. candidate* | Julie Otte, R.N., Ph.D.* | Shelley Johns, PsyD* |

| | |
|---|---|
| 1997- | Indiana University Junior Faculty |
| Jaya Rao, M.D., M.S. | Linda Williams, M.D. |
| Caroline Carney Doebbeling, M.D., MSc | Dennis Ang, M.D.* |
| Erin Krebs, M.D., M.P.H. * | Dawana Stubbs, M.D.* |

**UNIVERSITY SERVICE:**

**University Committee Service:**

**a. Departmental**

| | |
|---|---|
| 2001 - Present | Executive Committee, Division of General Internal Medicine & Geriatrics |
| 2003 - Present | Teaching Awards Committee, Department of Medicine |
| 2004-2005 | Director, Search Committee for VA Center of Excellence |
| 2006-2007 | Search Committee for Chief, Division of General Internal Medicine & Geriatrics |
| 2007- Present | Department of Medicine Promotions and Tenure Committee |

**b. School**

| | |
|---|---|
| 2002 - 2003 | Chair, Search Committee for Director of Health Services Research |
| 2003 - 2004 | Clinical Research Strategic Planning Committee |
| 2004 - 2005 | Member, Search Committee for Associate Dean for Clinical Research |

**c. Campus**

| | |
|---|---|
| 2002 - 2004 | IUPUI Faculty Council |
| 2003 - 2005 | Institutional Review Board (IRB-05) Member |

# GRANTS and AWARDS:

## Current Support:

**"Telecare Management of Pain and Depression in Cancer."** (R01CA115369-01) Principal investigator: Kurt Kroenke, M.D.. Support: 20%. Direct Costs: $1, 650,000. Source of Funding: PHS (NCI)
Dates: Jul 2005 – Dec 2009.

**"Training in Research for Behavioral Oncology and Cancer Control Program"** (R25 CA117865). Principal Investigator: Victoria Champion, DNS. Support: 10%. Direct Costs: $1, 850,000. Source of Funding: PHS (NCI).
Dates: Sep 2006 through Aug 2011.

**"Indiana Clinical and Translational Sciences Institute (**UL1RR025761-01) Principal Investigator: Anantha Shekhar, M.D.. Support: 35%. Total Budget $21, 168,775. Source of Funding: PHS (NCRR).

Dates: 05/1/08 – 4/30/13. Role: Co-Investigator

**"Indiana Clinical and Translational Sciences Institute – K12 Program"** (KL2RR025760-01). Principal Investigator: Anantha Shekhar, M.D. Total Budget: $2,716,155. Source of Funding: PHS (NCCR)
Dates: 05/1/08 – 4/30/13. Role: Director

"**Stepped Care to Optimize Pain care Effectiveness (SCOPE)**" (IIR-07-119-3). Principal Investigator: Kurt Kroenke, MD.
Direct Costs: $900,000. Source of Funding: VA HSR&D
Dates: 11/01/09 – 10/01/13 Role: Principal Investigator

## Completed:

**"Development of a Primary Care Evaluation of Mental Disorders System (PRIME-MD).** Principal Investigator, Robert Spitzer, M.D.. Support: None for Dr. Kroenke's salary. Direct costs: $400,000 (approximate). Sources of Funding: Industry (Pfizer). Dates: Nov 1991 through October 1993.

**"Faculty Development in General Internal Medicine and General Pediatrics."** (PHS D28 PE55009) Principal Investigator: Kurt Kroenke, M.D.. Support: 20%. Direct Costs: $410,000. Sources of Funding: HRSA. Dates: July 1,1997 through June 30, 2000

**"ARTIST Study: A Randomized Trial Investigating SSRI Treatment Effectiveness."** Principal Investigator: Kurt Kroenke, M.D.. Support: 25%. Total Costs: $1,279,137 [IU portion = $291,180]. Sources of Funding: Industry (Eli Lilly). Dates: December 1, 1998 through November 30, 2000.

**"Faculty Development in General Internal Medicine and General Pediatrics."** (PHS D14 HP00074-01) Principal Investigator: Kurt Kroenke, M.D.. Support: 20%. Direct Costs: $432,788. Sources of Funding: HRSA. Dates: July 1,2000 through June 30, 2003

**"National Research Service Award in Primary Care Medicine."** (T32 PE15001-11) Principal Investigator: Kurt Kroenke, M.D.. Support: None for Dr. Kroenke's salary. Direct Costs: $ 724,259. Sources of Funding: HRSA. Dates: July 1, 1998 through June 30, 2003.

**"Collaborative Case Management for Late Life Depression."** Principal Investigator: Christopher Callahan, M.D.. Support: 10%. Total Costs: $1,189,000. Source of Funding: John A. Hartford Foundation. Dates: February 1, 1999 through January 31, 2003.

**"Identification of Clinically Relevant Changes in HRQoL Measures."** (R01 HS10234). Principal Investigator: Fredric Wolinsky, Ph.D.. [Kurt Kroenke is Site Principal Investigator]. Support: 15%. Direct Costs: $523,763. Sources of Funding: PHS (AHRQ). Dates: October 1999 through September 2003.

**"Can Interactive Voice Response Improve Patient-Centered Outcomes?"** Principal Investigator: James Tulsky, M.D.. Support: 10%. Total Costs: $750,000. Source of Funding: Veterans Administration HSR&D. Dates: Oct 1, 2000 through September 30, 2003.

**"A Randomized, Double-Blind, Placebo-Controlled, Pilot Study of Venlafaxine Extended-Release in Depressed and Anxious Patients with Multiple, Unexplained Somatic Symptoms in Primary Care"** Principal Investigator: Kurt Kroenke, M.D.. Support: 25%. Source of funding: Wyeth. Dates: July 2003 through June 2004.

**"Comparing antidepressants: Observational Study in Managed Outpatient Settings (COSMOS)."** Principal Investigator: Kurt Kroenke, M.D.. Support: 20%. Source of Funding: Industry (Eli Lilly). Dates: November 2003 – August 2004.

**"Clinical Investigator Training Enhancement: CITE Program" (**1 K30 HL04520-01). Principal Investigator: Kurt Kroenke, M.D.. Support: 30%. Total Costs: $980,000. Sources of Funding: PHS (NHLBI). Dates: November 2000 through October 2005.

**"A Randomized Trial of Treatment for Post-stroke Depression."** Principal Investigator: Linda Williams, M.D.. [Kurt Kroenke is Co-Principal Investigator]. Support: 15%. Direct Costs: $975,138. Source of Funding: PHS (NINDS). Dates: November 1, 2000 through October 31, 2004.

**"Improving Drug Use for Patients with Hypertension."** (1 R01 HL69399-01). Principal Investigator: Mick Murray, Pharm.D., M.P.H. Support: 5%. Direct Costs: $2,059,637. Source of funding: PHS (NHLBI). Dates: October 2001 through September 2005.

**"Recognizing and Monitoring Anxiety with a Simple Questionnaire."** Principal Investigator: Robert Spitzer, M.D.. Support: 15%. Direct Costs: $266,352. Source of funding. Pfizer, Inc. Dates: Oct 2004 – Jan 2006.

**"Indiana University General Clinical Research Center (GCRC)"** Principal Investigator: Craig Brater, M.D.. Support: 5%. Source of Funding: PHS (NCRR). Dates: Oct 2004 through May 2008.

**"Clinical Investigator Training Enhancement Program-CITE"** (K30 RR022283-06) Principal Investigator: Kurt Kroenke, M.D.. Support: 30%. Direct Costs: $1,420,000. Source of Funding: PHS (NCRR). Dates: Sep 2005- May 2008.

**"Indiana University Center for the Assessment, Mechanisms, and Management of Pain (IU-CAMMP)."** Principal Investigator: Kurt Kroenke, M.D.. Source of Funding: IUPUI Signature Center of Excellence award. Amount of Award: $300,000. Dates: Apr 2007 – Mar 2010.

**"Development and Validation of Remission Tool":** Principal Investigator: Donald Nease, M.D.. Fixed service subcontract to Indiana University: $89,440. Source of Funding: Eli Lilly. Dates: Oct 2006 through Dec 2007.

"**Stepped Care for Depression and Musculoskeletal Pain**" (R01 MH071268-01). Principal Investigator: Kurt Kroenke, M.D.. Support: 25%. Direct Costs: $1,991,109. Source of Funding: PHS (NIMH) Dates: July 2004 through June 2008.

## PUBLICATIONS

### PEER-REVIEWED JOURNALS

1. Kliks MM, **Kroenke K**, Hardman JM. Eosinophilic radiculomyeloencephalitis: an Angiostrongyliasis outbreak in American Samoa related to ingestion of Achatina fulica snails. **Am J Trop Med Hygiene** 1982;31:114-22.
2. **Kroenke K**. The lecture: where it wavers. **Am J Med** 1984;77:393-396.
3. **Kroenke K**, Cuadrado R. Esophageal stricture following esophagitis in a patient with herpes zoster. **Milit Med** 1984;149;479-481.
4. **Kroenke K.** Orthostatic hypotension. **West J Med** 1985;143:253-255. PMCID: PMC1306301.
5. **Kroenke K**. Polypharmacy: causes, consequences, and cure. **Am J Med** 1985;79:149-152.
6. **Kroenke K.** The case presentation: stumbling blocks and stepping stones. **Am J Med** 1985;179:605-608.
7. **Kroenke K.** Book reviews in medical journals. **Bull Med Library Assoc** 1986;74:1-5, PMCID:PMC227756.
8. **Kroenke K**, Hanley JF, Copley JB, et al. The admission urinalysis: its impact on patient care. **J Gen Intern Med** 1986;1238-1242.
9. **Kroenke K**, Carpenter JL. Using filing cards to document and computerize procedures performed by internal medicine residents. **J Med Educ** 1986;61:326-328.
10. Cargill V, Cohen D, **Kroenke K**, Neuhauser D. Ongoing patient randomization: an innovation in medical care research. **Health Services Research** 1986;21:663-678. PMCID:PMC1068980.
11. **Kroenke K**. Ambulatory care: practice imperfect. **Am J Med** 1986;80:339-342.
12. **Kroenke K**, Hanley JF, Copley JB, Matthews JI, Davis CE, Foulks CJ, Carpenter JL. Improving house staff ordering of three

common laboratory tests: reduction in test ordering need not result in underutilization. **Med Care** 1987;24:928-35.

13. **Kroenke K**, Wood DR, Hanley JF. The value of serum magnesium determinations in hypertensive patients on diuretics. **Arch Intern Med** 1987;147:1553-1556.
14. Pinholt EM, **Kroenke K**, Hanley JF, Kussman MJ, Twyman PL, Carpenter JL. Functional assessment of the elderly: a comparison of standard instruments with clinical judgment. **Arch Intern Med** 1987;147;484-88.
15. **Kroenke K**, Pinholt EM, Hanley JF, Carpenter JL. Paramedical consultations: the role of nonphysician health care providers in the care of hospitalized patients. **Milit Med** 1987;152:342-344.
16. **Kroenke K**. Preoperative evaluation: the assessment and management of surgical risk. **J Gen Intern Med** 1987;2:257-269.
17. **Kroenke K**, Corrie D. Urinary incontinence. **West J Med** 1987;1146:623-626. PMCID: PMC1307436.
18. **Kroenke K**. The 10-minute talk. **Am J Med** 1987;83:329-330.
19. **Kroenke K**. Poster sessions. **Am J Med 1987**;83:1129-30.
20. **Kroenke K**. Accepting illness: reflections on an essay by Montaigne. **Pharos** 1987(Fall):27-29.
21. Lawrence VA, **Kroenke K**. The unproven utility of the preoperative urinalysis: clinical use. **Arch Intern Med** 1988;148:1370-73.
22. **Kroenke K**, Wood DR, Mangelsdorff AD, Meier NJ, Powell JB. Chronic fatigue in primary care: prevalence, patient characteristics, and outcome. **JAMA** 1988;260:929-934.
23. Wood DR, **Kroenke K**. Laboratory testing in a hypertension clinic: a reappraisal. **J Am Osteopathic Assoc** 1988;88:365-370.
24. **Kroenke K**, Mangelsdorff AD. Common symptoms in ambulatory care: incidence, evaluation, therapy and outcome. **Am J Med** 1989;86:262-266.
25. **Kroenke K**, Omori DM, Simmons JO, Meier NJ, Wood DR. The safety of phenylpropanolamine in patients with stable hypertension. **Ann Intern Med** 1989;111:1043-1044.
26. **Kroenke K**. Chronic fatigue: frequency, etiology, evaluation, and management. **Comprehensive Therapy** 1989;14:3-7.
27. **Kroenke K**, Pinholt EM. Reducing polypharmacy in the elderly: a controlled trial of physician feedback. **J Am Geriatric Soc** 1990;38:31-36.
28. **Kroenke K**, Simmons JO, Copley JB, Smith C. Attending rounds: a survey of physician attitudes. **J Gen Intern Med** 1990;5:229-233.
29. **Kroenke K**, Arrington ME, Mangelsdorff AD. The prevalence of symptoms in medical outpatients and the adequacy of therapy. **Arch Intern Med** 1990;150:1685-1689.
30. **Kroenke K**. A practical approach to hyperlipidemia. **J US Army Med Department** pp 27-32, Mar/Apr, 1990.
31. Omori DM, Potyk RP, **Kroenke K**. The adverse effect of hospitalization on drug regimens. **Arch Intern Med** 1991;151:1562-1564.
32. **Kroenke K**. Chronic fatigue syndrome: is it real? **Postgrad Med** 1991;89:44-55.
33. **Kroenke K**. Evangelistic medicine. **Pharos** 1991(Spring):26-28.
34. **Kroenke K**. Handouts: making the lecture portable. **Med Teacher** 1991;13:199-203.
35. **Kroenke K**, Lucas CA, Rosenberg ML, Scherokman B, Herbers JE, Wehrle PA, Boggi JO. Causes of persistent dizziness: a prospective study of 100 patients in ambulatory care. **Ann Intern Med** 1992;117:898-904.
36. **Kroenke K**, Lawrence VA, Theroux JF, Tuley MR. Operative risk in patients with severe pulmonary disease. **Arch Intern Med** 1992;152;967-71.
37. **Kroenke K**. Attending rounds: guidelines for teaching on the wards. **J Gen Intern** Med 1992;7:68-75.
38. **Kroenke K**. Symptoms in medical patients: an untended field. **Am J Med** 1992 (Suppl 1A):3S-6S.
39. **Kroenke K**, Price RK. Symptoms in the community: prevalence, classification, and psychiatric comorbidity. **Arch Intern**

**Med** 1993;153:2474-2480.

40. **Kroenke K**, Lucas CA, Rosenberg ML, Scherokman B. Psychiatric disorders and functional impairment in patients with persistent dizziness. **J Gen Intern Med** 1993;8:530-535.

41. **Kroenke K**. Somatization in primary care: an inclusive approach to the symptomatic patient. **APS (Am Pain Soc) Journal** 1993;2:150-153.

42. Birdwell B, Herbers JE, **Kroenke K**. Evaluating chest pain: the patient's presentation style alters the physician's diagnostic approach. **Arch Intern Med** 1993;153:1991-1995.

43. **Kroenke K**, Lawrence VA, Theroux JF, Tuley MR, Hilsenbeck S. Postoperative complications after thoracic and major abdominal surgery in patients with and without obstructive lung disease. **Chest** 1993;104:1445-1451.

44. Lawrence VA, Gafni A, **Kroenke K**. Preoperative HIV testing: is it less expensive than barrier precautions. **J Clin Epidemiol** 1993;46:1219-27.

45. Lawrence VA, Gafni, **Kroenke K**. Evidence-based vs. emotion-based medical decision-making: routine preoperative HIV testing vs. barrier precautions**. J Clin Epidemiol** 1993;46:1233-1236.

46. Spitzer RL, Williams JBW, **Kroenke K**, Linzer M, deGruy FV, Hahn SR, Brody D, Johnson JG. Utility of a new procedure for diagnosing mental disorders in primary care: The PRIME-MD 1000 study. **JAMA** 1994;272:1749-1756.

47. **Kroenke K**, Spitzer RL, Williams JBW, Linzer M, Hahn SR, deGruy FV, Brody D. Physical symptoms in primary care: predictors of psychiatric disorders and functional impairment. **Arch Fam Med** 1994;3:774-779.

48. **Kroenke K**, Lucas C, Rosenberg ML, Scherokman B, Herbers JE. One-year outcome in patients with a chief complaint of dizziness. **J Gen Intern Med** 1994;9:684-689.

49. Landry FJ, Pangaro L, **Kroenke K**, Lucey C, Herbers J. A controlled trial of a seminar to improve medical student attitudes, knowledge and use of the medical literature. **J Gen Intern Med** 1994;9:436-439.

50. Marple RL, Pangaro L, **Kroenke K**. Third year medical student attitudes toward internal medicine. **Arch Intern Med** 1994;154:2459-2464.

51. Engel CC, **Kroenke K**, Katon WJ. Mental health services in Army primary care: the need for a collaborative health care agenda. **Milit Med** 1994;159:203-209.

52. Roy MJ, **Kroenke K**, Herbers JE. When the physician leaves the patient: predictors of satisfaction with the transfer of care in a primary care clinic. **J Gen Intern Med** 1995;10:206-210.

53. Spitzer RL, **Kroenke K**, Linzer M, Hahn SR, Williams JBW, deGruy FV, Brody D, Davies M. Health-related quality of life in primary care patients with mental disorders: results from the PRIME-MD 1000 study. **JAMA** 1995;274:1511-1517.

54. Williams JBW, Spitzer RL, **Kroenke K**, Hahn SR, deGruy FV, Lazev A. Gender differences in depression in primary care. **Am J Obstet Gynecol** 1995;173:654-659.

55. Johnson JG, Spitzer RL, Williams JBW, **Kroenke K**, Linzer M, Brody D, deGruy F, Hahn S. Psychiatric comorbidity, health status, and functional impairment associated with alcohol abuse and dependence in primary care patients: findings of the PRIME-MD 1000 study. **J Consult Clin Psychology** 1995;63:133-140.

56. **Kroenke K**. Dizziness in primary care [editorial]. **West J Med** 1995;162:73-74. PMCID: PMC1022607.

57. Ways M, **Kroenke K**, Umali J, Buchwald D. Morning report: a survey of resident attitudes. **Arch Intern Med** 1995;155:1433-1437.

58. **Kroenke K**. Conducting research as a busy clinician-teacher or trainee: starting blocks, hurdles, and finish lines. **J Gen Intern Med** 1996;11:360-365.

59. Jones DL, **Kroenke K**, Landry FJ, Tomich DJ, Ferrel RJ. Cost savings using a stepped-care prescribing protocol for nonsteroidal anti-inflammatory drugs. **JAMA** 1996;275:926-930.

60. Hahn SR, **Kroenke K**, Spitzer RL, Brody D, Williams JBW, Linzer M, deGruy FV. The difficult patient in primary care: prevalence, psychopathology and functional impairment. **J Gen Intern Med** 1996;11:1-8.

61. Linzer M, Spitzer R, **Kroenke K**, Williams JB, Hahn S, Brody D, deGruy F. Gender, quality of life and mental disorders in

primary care: results from the PRIME-MD 1000 study. **Am J Med** 1996;101:526-533.

62. Ways M, **Kroenke K**, Umali J, Buchwald D. Housestaff attitudes about work rounds [letter reporting original research]. **Acad Med** 1996;71:108-109.

63. **Kroenke K**, Spitzer RL, deGruy FV, Hahn SR, Linzer M, Williams JBW, Brody D, Davies M. Multisomatoform Disorder: an alternative to undifferentiated somatoform disorder for the somatizing patient in primary care. **Arch Gen Psychiatry** 1997;54:352-358.

64. **Kroenke K**. Discovering depression in medical patients: reasonable expectations [editorial]. **Ann Intern Med** 1997;126:463-465.

65. **Kroenke K**, Jackson JL, Chamberlin J. Depressive and anxiety disorders in patients presenting with physical complaints: clinical predictors and outcome. **Am J Med** 1997;103:339-347.

66. Marple RL, **Kroenke K**, Lucey CR, Wilder J, Lucas CA. Concerns and expectations in patients presenting with physical complaints: frequency, physician perceptions and actions, and 2-week outcome. **Arch Intern Med** 1997;157:1482-1488.

67. **Kroenke K**, Hoffman RM, Einstadter D. A rational approach to the dizzy patient**. J Clin Outcomes Management** 1997;433-441.

68. **Kroenke K**. Symptoms and science: the frontiers of primary care research [editorial]. **J Gen Intern Med** 1997;12:509-510. PMCID: PMC1497150.

69. O'Malley PG, Omori DM, Landry F, Jackson J, **Kroenke K**. A prospective study to assess the effect of ambulatory teaching on patient satisfaction. **Acad Med** 1997;72:1015-1017.

70. Landry FJ, **Kroenke K**, Lucas C, Reeder J. Increasing the use of advance directives in medical outpatients. **J Gen Intern Med** 1997;12:412-415. PMCID: PMC1497131.

71. **Kroenke K**, Omori DM, Landry FJ, Lucey CR. Bedside teaching. **South Med J** 1997;90:1069-1074.

72. Jackson JL, **Kroenke K**. Patient satisfaction and quality of care. **Milit Med** 1997;162:273-277.

73. Branch WT, **Kroenke K**, Levinson W. The clinician-educator -- present and future roles. **J Gen Intern Med** 1997;12 (suppl 2):S1-S4.

74. Parisek RA, Battafarano DF, Marple RL, Carpenter M, **Kroenke K**. How well do internists diagnose common musculoskeletal complaints? The effects of rheumatology training and clinical experience on diagnostic accuracy and costs using case vignettes. **J Clin Rheumatol** 1997;3:16-23.

75. **Kroenke K**, Spitzer RL, deGruy FV, Swindle R. A symptom checklist to screen for somatoform disorders in primary care. **Psychosomatics** 1998;39:263-272.

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H. Heath III, Principal Investigator: Pathogenesis of Hypercalcemia, R01-DK-38855-07-11, USPHS, NIH, NIDDK, $649,493 for 4 years, 7/92-6/96, 35% effort (transferred to Mark F. Leppert, Ph.D. upon my departure from Utah).

**Note:** Previous holder of eight other NIH research awards as P.I. since 1976 (two held for ten years each). Held continuous NIH support for 21 years.

H. Heath III, Principal investigator: Tiludronate treatment of established osteoporosis, Sterling Winthrop Co. (Sanofi), $402,502 for 4 years, 1992-1996 (transferred to T.P. Knecht, M.D., Ph.D. 1996).

H. Heath III, Principal investigator: A randomized, double-blind, placebo-controlled, multicenter, parallel group study to determine the efficacy and safety of risedronate in treatment of osteopenic postmenopausal women. Proctor and Gamble Pharmaceuticals, Inc., $500,000 for 3 years, 1994-1997 (project terminated early, March, 1996 as company decision).

H. Heath III, Principal investigator: A long-term comparison of raloxifene HCl and placebo in the prevention of osteoporosis in postmenopausal women, Lilly Research Laboratories, original budget $1.4 million for 4 years, 1994-98 (transferred to T.P. Knecht, M.D., Ph.D. upon my departure from Utah).

H. Heath III, Principal investigator: Double-blind, placebo-controlled, randomized multicenter study on the efficacy and safety of ibandronate (BM 21.0955) during 3 years' treatment in patients with postmenopausal osteoporosis using an intermittent (every 3 months) i.v. injection regimen of 1 mg. Boehringer Mannheim Pharmaceuticals Corp., budgeted for approx. $400,000 for four years, 1995-99 (transferred to T.P. Knecht, M.D., Ph.D. upon my departure from Utah).

**Professional certification**
American Board of Internal Medicine (Internal Medicine) June 2l, l972; recertified, October 25, 1980.
American Board of Internal Medicine (Endocrinology), October l6, l973.

**Active medical licensure**
Arizona
Indiana
Missouri
Utah

(Licenses allowed to lapse because of no need for them: Wisconsin, Washington DC, Minnesota, California)

**Honors and extramural activities**

Invited commenter, Cosmos Bone Workshop, NASA, Ames Research Center, Moffett Field, CA, March 8-9, 1979.

Member, editorial board, the Journal of Clinical Endocrinology and Metabolism, 1980-1983

Member, publications committee of the Endocrine Society, 1983-1986.

Member, editorial board, American Journal of Physiology (Endocrinology and Metabolism), 1982-1985

Program chairman, 1982 Meeting of the American Society for Bone and Mineral Research, San Francisco, CA.

Chairman, education committee of the American Society for Bone and Mineral Research, 1982-1985

Member, endocrinology and metabolism subspecialty council, Central Society for Clinical Research, 1984-86

Elected councilor, American Society for Bone and Mineral Research, 1985-1988.

Invited speaker, Gordon Conference on Bones and Teeth, Meriden, NH, July 1985.

Member, editorial board, Annals of Internal Medicine, 1985-1988.

Member, Diabetes, Digestive, and Kidney Diseases Special Grants Review Committee (DDK-B) of NIH, 1986-1988.

Member, editorial board, Journal of Bone and Mineral Research, 1986-1991.

Member, Federal Aviation Administration administrator's select panel of physicians to review performance of the federal air surgeon's office, 1986-1987

President's award for aeromedical advisory service, Experimental Aircraft Association, Oshkosh, Wisconsin, 1987

Member, planning committee, NIH consensus development conference on asymptomatic primary hyperparathyroidism, Bethesda, MD, 1991. J.T. Potts, chairman

Who's Who in the Midwest, Marquis Who's Who, 23rd ed., 1992-93

Co-founder, Utah Bone and Mineral Society, December, 1991

Member, advisory medical panel, The Paget Foundation, NY, NY, 1992-96

Contributor, endocrinology questions, American Board of Internal Medicine Recertification Program, 1993

House staff teaching award, University of Utah Department of Internal Medicine, 1992- 93

Member, Board of Directors, American Diabetes Association, Utah Affiliate, 1993-94; Chairman, Research Committee, 1993-94

Who's Who in the West, Marquis Who's Who, 24th ed., 1994-95

House staff teaching award, University of Utah Department of Internal Medicine, 1993-94

Who's Who in Frontiers of Science and Technology, Marquis Who's Who, 1st ed.

Lead speaker, US FDA Endocrine/Metabolic Drug Review Panel on osteoporosis drugs, Bethesda, MD, November 17, 1994

Invited plenary speaker, The parathyroid calcium receptor: new handle on diagnosis and treatment of parathyroid disease; The Endocrine Society annual meeting, 1995

Who's Who in the West, Marquis Who's Who, 25th ed., 1995-96

Who's Who in Science and Engineering, Marquis Who's Who, 1995-present

President, Advances in Mineral Metabolism, Inc., 1986-1989; member, board of directors, 1986-1990; secretary-treasurer, 1993-1996

Chairman, Experimental Aircraft Association aeromedical advisory committee, 1987-1989; member, 1987-2003 and co-chairman, 1993-95

Member, Board of Directors, Arthritis Foundation, Utah Affiliate, 1993-1996

Consultant on calcium metabolism drug development; chairman, clinical advisory council, NPS Pharmaceuticals, Inc., Salt Lake City, Utah, 1991-1996

Consultant on genetics of osteoporosis, Myriad Genetics, Inc., Salt Lake City, Utah, 1995-1996

Contributor, endocrinology questions, American Board of Internal Medicine Certification and Recertification Programs, 1995-96

House staff teaching award, University of Utah Dept. of Internal Medicine, 1994-95

Special member, Orthopedics Initial Review Group, NIH, NIDDK, Bethesda, MD, October, 1995

Category leader, metabolic bone disease, and member, scientific program committee, 18th annual meeting of the American Society for Bone and Mineral Research, Seattle, WA, September 7-11, 1996

Who's Who in Medicine and Healthcare, 1st ed., Marquis Who's Who, 1996-97; 2nd ed., 1997-98, 2006-7

Quality Advocate Award, Eli Lilly and Company, October, 1997, 1998

Member, *ad hoc* committee on conflicts of interest, chaired by Dr. E. Siris, reporting to board of directors. American Society for Bone and Mineral Research, 1998

Chair, site visit team evaluating performance of Research Immunometrics Core Laboratory (Geo. Klee, PI), Mayo Clinic and Foundation, Rochester, MN, Dec. 1998

Member, Board of Directors, Arthritis Foundation, Indiana Affiliate, 1996

Member, Corporate Liaison Board, The Endocrine Society, Bethesda, MD, 1999-2001

Member, Publications Committee, The Endocrine Society, Bethesda, MD, 2001-2006; Vice Chair, 2002-2005; chair, New Initiatives Subcommittee, 2005-2006; Member, Clinical Content Task Force for JCEM, 2007

Member, Advisory Committee to Tomorrow’s Indiana area, Indiana State Museum, 2002- 2005

Member, Clinical Research Committee, American Association of Clinical Endocrinologists, 2002-2007

Who’s Who in America, Marquis Who’s Who, 2003-2007

Member, Committee on Governance Affairs, The Endocrine Society, June 2007-present

Member, Finance Committee, American Society for Bone and Mineral Research, Sept. 2007-present

Member, Publications Oversight Committee, American Society for Bone and Mineral Research, 2009-present

**Academic institutional service prior to joining Indiana University**

Chairman, search committee for chairperson, Department of Pathology, University of Utah School of Medicine, 1992-3; successful recruitment in <1 year

Member, internal medicine residency selection committee, University of Utah School of Medicine, 1993-1996

Member, internal medicine/pediatrics joint residency task force, University of Utah School of Medicine, 1994-95

Training program reviewer for Division of Geriatrics, Human Development, and Aging, University of Utah School of Medicine, 1994

Director, Bone Mineral Densitometry Laboratory, University of Utah Medical Center, Salt Lake City, UT, 1992-1996

University of Utah representative to joint Utah Medical Association/Utah Hospital Association Patient Protection Act Task Force, 1995

Member, Department of Radiology chair search committee, October, 1995-1996

Technical consultant, Associated Regional and University Pathologists, Inc. (clinical pathology arm of University of Utah School of Medicine), Salt Lake City, Utah, 1991-1996

Volunteer attending, endocrine clinic, The Wishard Hospital, Indiana University Medical Center, Indianapolis, IN, 1997-2002; Roudebush VA Medical Center, Indianapolis, Indiana, 2003-present (Indiana University affiliate)

**Professional organizations**

American Association of Clinical Endocrinologists (charter member, 1992)

American College of Physicians (Fellow, 1977)

American Medical Association (1976-present)

American Society for Bone and Mineral Research (charter member, 1977-present)

American Society for Clinical Investigation (1982-2002)

The Endocrine Society (1973-present)

**Military service**

Captain, U.S. Army Reserve (Active), 1970-1972; Major, U.S. Army Reserve (Active), 1972-1974

**Non-professional interests**

Sport aviation and aeromedical certification issues

Aviation and nature photography & journalism

Travel in the US West

**Publications in Peer-Reviewed Journals**

1. **Heath H III**, Earll JM, Schaaf M, Piechocki JT, Li TK. Serum ionized calcium during bed rest in fracture patients and normal men. *Metabolism.* 1972; 2l: 633-640.

2. **Heath H III.** Plasma gonadotropins in germinal cell aplasia (Sertoli cell-only syndrome). *J Urol.* 1973; l09:847-849.

3. **Heath H III,** Bergevin P. Adrenal insufficiency resulting from metastasis of non-functional adrenocortical carcinoma. *Med Ann DC.* 1973; 42:545-547.

4. **Heath H III**, Colwell NW, Ammerman S, Earll JM. Measurement of achilles reflex time with a new instrument and quantification of factors causing variation. Mil. Med. 139:547-549, l974

5. **Heath H III,** Lee RB, Dimond RC, Wartofsky L. Conjugated estrogen therapy and tests of thyroid function. *Ann Int Med.* l974; 8l: 35l – 354.

6. Sizemore GW, **Heath H III.** Immunochemical heterogeneity of calcitonin in human plasma. *J Clin Invest.* 1975; 55:llll-lll8.

7. **Heath H III**, Sizemore GW, Carney JA. Preoperative diagnosis of occult parathyroid hyperplasia by calcium infusion in patients with multiple endocrine neoplasia, type 2a. *J Clin Endocrinol Metab.* 1976; 43:428-435.

8. Sizemore GW, Carney JA, **Heath H III.** Epidemiology of medullary thyroid carcinoma. *Surg Clin N Amer*. 1977; 57:633-645.

9. **Heath H III,** Sizemore GW. Plasma calcitonin in normal man: differences between men and women. *J Clin Invest.* 1977; 60:ll35-ll40.

10. Schedl HP, **Heath H III,** Wenger J. Serum calcitonin and parathyroid hormone in experimental diabetes: effects of insulin treatment. *Endocrinol*.1978; l03:l368-l373.

11. **Heath H III,** DiBella FP. Reduced-volume radioimmunoassays for parathyrin and calcitonin in serum for use in pediatric and small animal studies. *Clin Chem*. 1978; 24:l833-l835.

12. Owyang C, **Heath H III**, Sizemore GW, Go VLW. Comparison of the effects of pentagastrin and meal-stimulated gastrin on plasma calcitonin in normal man. *Am J Digest Dis*. 1978; 23:l084-l088.

13. **Heath H III,** Sizemore GW. Immunochemical heterogeneity of calcitonin in tumor, tumor venous effluent and peripheral blood of patients with medullary thyroid carcinoma. *J Lab Clin Med.* 1979; 93:390-40l.

14. Lambert PW, **Heath H III**, Sizemore GW. Pre- and post-operative studies of plasma calcitonin in primary hyperparathyroidism. *J Clin Invest.* 1979; 63:602-608.

15. **Heath H III,** Edis AJ. Pheochromocytoma associated with hypercalcemia and ectopic secretion of calcitonin. *Ann Int Med*. 1979; 91:208-210.

16. **Heath H III**, Lambert P.W., Service, F.J. and Arnaud, S.B.: Calcium homeostasis in diabetes mellitus. J. Clin. Endocrinol. Metab. 49:462-466, l979

17. Klementschitsch, P., Kaplan, E.L., North, P. and **Heath, H. III**: A gastric factor, calcitonin, and the hypocalcemia induced by gastrointestinal hormones. Endocrinol. 105:1243-1247, 1979

18. Austin, L.A., **Heath, H. III** and Go, V.L.W.: Regulation of calcitonin secretion in normal man by changes of serum calcium within the physiologic range. J. Clin. Invest. 64:1721-1724, 1979

19. **Heath, H. III**, Hodgson, S.F. and Kennedy, M.: Primary hyperparathyroidism: incidence, morbidity and potential economic impact in a community. New Engl. J. Med. 302:189-193,1980

20. **Heath, H. III**, Weller, R.E. and Mundy, G.R.: Canine lymphosarcoma: a model for study of the hypercalcemia of cancer. Calc. Tiss. Int. 30:127-133, 1980

21. Carney, J.A., Roth, S.I., **Heath, H. III**, Sizemore, G.W. and Hayles, A.B.: The parathyroid glands in multiple endocrine neoplasia, type 2b. Am. J. Pathol., 99:387-398, 1980

22. Long, G.G., Clemmons, R.M. and **Heath, H. III**: Metastatic canine medullary thyroid carcinoma. Vet. Pathol., 17:323-330, 1980

23. **Heath, H. III**, Melton, L.J., Chu, C.-P.: Diabetes mellitus and risk of skeletal fracture. N. Engl. J. Med. 303:567-570, 1980

24. **Heath, H. III**: Provocative tests of parathyroid and C-cell function in adrenalectomized and chemically-sympathectomized rats. Endocrinol. 107:977-981, 1980

25. Robinson, M.F., Hayles, A.B. and **Heath, H. III**: Failure of cimetidine to affect calcium homeostasis in familial primary hyperparathyroidism (multiple endocrine neoplasia, type 1). J. Clin. Endocrinol. Metab. 51:912-914, 1980

26. Seeman, E., Kumar, R., Hunder, G.G., **Heath, H. III** and Riggs, B.L.: Production, degradation and circulating levels of 1,25-dihydroxyvitamin D in health and in chronic glucocorticoid excess. J. Clin. Invest. 66:664-669, 1980

27. Fogt, E.J., Eddy, A.R., Jr., Clemens, A.H., Fox, J. and **Heath, H. III**: Use of electrochemical sensors for on-line monitoring of ionized calcium, potassium, and glucose in whole blood of living dogs. Clin. Chem. 26:1425-1429, 1980

28. Van Den Berg, C.J., Smith, L.H., Wilson, D.M., Kumar, R., and **Heath, H. III**: Orthophosphate decreases urine calcium excretion and serum 1,25-dihydroxyvitamin D levels in idiopathic hypercalciuria. J. Clin. Endocrinol. Metab. 51: 998-1001, 1980

29. **Heath, H. III**, and Purnell, D.C.: Urinary cyclic 3',5'-adenosine monophosphate responses to exogenous and endogenous parathyroid hormone in familial benign hypercalcemia and primary hyperparathyroidism. J. Lab. Clin. Med. 96:974-984, 1980

30. Lee, C.H., Kaplan, E.L., Sugimoto, J. and **Heath, H. III**: A portal factor influences serum calcium homeostasis. Ann. Surg. 192: 459-464, 1980

31. Fox, J. and **Heath, H. III**: Parathyroid hormone does not increase nephrogenous cyclic AMP excretion by the dog. Endocrinol. 107: 2124-2126, 1980

32. Fox, J. and **Heath, H. III**: Retarded growth rate caused by glucocorticoid treatment or dietary restriction: associated changes in duodenal, jejunal and ileal calcium absorption in the chick. Endocrinol. 108: 1138-1141, 1981

33. Fox, J. and **Heath, H. III**: The "calcium clamp": effect of constant hypocalcemia on parathyroid hormone concentration. Am. J. Physiol. 240:E649-E655, 1981

34. Abboud, H.E., Zimmerman, D., Edis, A.J., **Heath, H. III** and Dousa, T.P.: Histamine and human parathyroid adenoma: effect on adenosine cyclic 3',5'-monophosphate accumulation in vitro. J. Clin. Endocrinol. Metab. 53:276-281, 1981

35. Fox, J., Offord, K.P., **Heath, H. III**: Episodic secretion of parathyroid hormone in the dog. Am. J. Physiol. 241:E171-E177, 1981

36. Fox, J. and **Heath, H. III**: Parathyroid, renal and skeletal effects of prolonged induced hypocalcemia in the dog. Am. J. Physiol. 242: E287-E291, 1982

37. **Heath, H. III** and Sizemore, G.W.: Selected method in clinical chemistry: calcitonin radioimmunoassay. Clin. Chem. 28:1219-1226, 1982

38. Robinson, M.F., Johnson, W.J. and **Heath, H. III**: Cimetidine treatment of azotemic secondary hyperparathyroidism. J. Clin. Endocrinol. Metab. 54: 1206-1209, 1982

39. Robinson, M.F., Body, J.-J., Offord, K.P., and **Heath, H. III**: Variation of plasma immunoreactive parathyroid hormone and calcitonin

in normal and hyperparathyroid man during daylight hours. J. Clin. Endocrinol. Metab. 55:538-544, 1982

40. Peterson, M.E., Randolph, J.F., Zaki, F.A., and **Heath, H. III**: Multiple endocrine neoplasia in a dog. J. Am. Vet. Med. Assoc. 180:1476-1478, 1982

41. Body, J.-J., Cryer, P.E., Offord, K.P., and **Heath, H. III**: Epinephrine is a hypophosphatemic hormone in man. Physiological effects of circulating epinephrine on plasma calcium, magnesium, phosphorus, parathyroid hormone, and calcitonin. J. Clin. Invest. 71:572-578, 1983

42. Epstein, S., **Heath, H. III**, and Bell, N.H.: Lack of influence of isoproterenol, propranolol, and dopamine on immunoreactive parathyroid hormone and calcitonin in normal man. Calcif. Tiss. Int. 35:32-36, 1983

43. Lufkin, E.G., Kumar, R., and **Heath, H. III**: Hyperphosphatemic tumoral calcinosis: effects of phosphate depletion on vitamin D metabolism, and of acute hypocalcemia on parathyroid hormone secretion and action. J. Clin. Endocrinol. Metab. 56:1319-1322, 1983

44. Schultz, T.D., Fox, J., **Heath, H. III**, and Kumar, R.: Do tissues other than the kidney produce 1,25-dihydroxyvitamin $D^3$ in vivo? A re-examination. Proc. Natl. Acad. Sci., U.S.A. 80:1746-1750, 1983

45. Fox, J., Scott, M., Nissenson, R.A. and **Heath, H. III**: Effect of plasma calcium concentration on the metabolic clearance rate of parathyroid hormone in the dog. J. Lab. Clin. Med. 102: 70-77, 1983

46. Law, W.M., Jr., Nissenson, R.A., Klee, G.G. and **Heath, H. III**: Preparation of synthetic bovine parathyroid hormone fragment 1-34 for parenteral use in human studies. J. Clin. Endocrinol. Metab. 56:1335-1337, 1983

47. Law, W.M Jr., Hodgson, S.F., and **Heath, H. III**: Autosomal recessive inheritance of familial hyperparathyroidism. N. Engl. J. Med. 309:650-653, 1983

48. Body, J.-J., and **Heath, H. III**: Estimates of circulating monomeric calcitonin: physiologic studies in normal and thyroidectomized man. J. Clin. Endocrinol. Metab. 57:897-903, 1983

49. Law, W.M., Jr., and **Heath, H. III**: Rapid development of renal resistance to low doses of synthetic bovine parathyroid hormone fragment 1-34. Dissociation of urinary cyclic AMP, phosphaturic and calciuric responses. J. Clin. Invest. 72:1106-1113, 1983

50. Fox, J. and **Heath, H. III**: Effect of plasma calcium concentration on the metabolic clearance rate of calcitonin in the dog. Horm. Metab. Res. 16:46-49, 1984

51. Law, W.M., Jr., James, E.M., Charboneau, J.W., Purnell, D.C., and **Heath, H. III**: High resolution parathyroid ultrasonography in familial hypocalciuric hypercalcemia (familial benign hypercalcemia). Mayo Clin. Proc. 59:153-155, 1984

52. Law, W.M., Jr. and **Heath, H. III**: Time- and dose-related biphasic effects of synthetic bovine parathyroid hormone fragment 1-34 on urinary cation excretion. J. Clin. Endocrinol. Metab. 58:606-608, 1984

53. Law, W.M., Jr., Bollman, S., Kumar, R., and **Heath, H. III**: Vitamin D metabolism in familial benign hypercalcemia (hypocalciuric hypercalcemia) differs from that in primary hyperparathyroidism. J. Clin. Endocrinol. Metab. 58:744-747, 1984

54. Body, J.-J. and **Heath, H. III**: Nonspecific increases in plasma immunoreactive calcitonin in healthy individuals: discrimination from medullary thyroid carcinoma by new extraction technique. Clin. Chem. 30:511-514, 1984

55. Law, W.M., Jr., Carney, J.A. and **Heath, H. III**: The parathyroid glands in familial benign hypercalcemia/hypocalciuric hypercalcemia. Am. J. Med. 76: 1021-1026, 1984

56. Tsai, K.-S., **Heath, H. III**, Kumar, R. and Riggs, B.L.: Impaired vitamin D metabolism with aging in women: possible role in pathogenesis of senile osteoporosis. J. Clin. Invest. 73:1668-1672, 1984

57. Law, W.M., Jr. and **Heath, H. III**: Increased renal responses to exogenous parathyroid hormone in postsurgical hypoparathyroidism. J. Clin. Endocrinol. Metab. 59:394-397, 1984

58. Law, W.M., Jr., Wahner, H.W., and **Heath, H. III**: Bone mineral density and skeletal fractures in familial benign hypercalcemia (hypocalciuric hypercalcemia). Mayo Clin. Proc. 59:811-815, 1984

59. Law, W.M., Jr., and **Heath, H. III**: Familial benign hypercalcemia (hypocalciuric hypercalcemia): clinical and pathogenetic studies in 21 families. Ann. Int. Med. 102:511-519, 1985

60. **Heath, H. III**, Fox, J., Fryer, M., Laakso, K.: Electrical and chemical stimulation of cervical sympathetic nerves in the dog does not affect secretion of parathyroid hormone. Endocrinol. 116:1979-1982, 1985

61. Tiegs, R.D., Body, J.J., Wahner, H.W., Barta, J., Riggs, B.L., and **Heath, H. III**: Calcitonin secretion in postmenopausal osteoporosis. New Engl. J. Med. 312:1097-1100, 1985

62. Calvo, M.S., Fryer, M.J., Laakso, K.J., Nissenson, R.A., Price, P.A., Murray, T.M. and **Heath, H. III**: Structural requirements for parathyroid hormone action in mature bone. Effects on release of cAMP and bone gamma-carboxy glutamic acid-containing protein from perfused rat hindquarters. J. Clin. Invest. 76: 2348-2354, 1985

63. Fryer, M.J., Fritz, S.R., **Heath, H. III**: Cyclic 3',5'-adenosine monophosphate accumulation in cultured neonatal human dermal fibroblasts exposed to parathyroid hormone and prostaglandin $E_2$. Mayo Clin. Proc. 61:263-267, 1986

64. Tiegs, R.D., Body, J.J., Barta, J.M., and **Heath, H. III**: Secretion and metabolism of monomeric human calcitonin: effects of age, sex, and thyroid damage. J. Bone Min. Res. 1:339-349, 1986

65. Tiegs, R.D., Body, J.J., Barta, J.M. and **Heath, H. III**: Plasma calcitonin in primary hyperparathyroidism: failure of C-cell response to sustained hypercalcemia. J. Clin. Endocrinol. Metab. 63:785-788, 1986

66. Lufkin, E.G., Kao, P.C., and **Heath, H. III**: Parathyroid hormone radioimmunoassays in the differential diagnosis of hypercalcemia due to primary hyperparathyroidism or malignancy. Ann. Int. Med. 106:559-560, 1987

67. Gharib, H., Kao, P.C., **Heath, H. III**: Determination of silica-purified plasma calcitonin for the detection and management of medullary thyroid carcinoma: comparison of two provocative tests. Mayo Clin. Proc. 62:373-378, 1987

68. Forero, M.S., Klein, R.F., Nissenson, R.A., Nelson, K., **Heath, H. III**, Arnaud, C.D., Riggs, B.L.: Effect of age on circulating immunoreactive and bioactive parathyroid hormone levels in women. J. Bone Min. Res. 2:363-366, 1987

69. Hurley, D.L., Tiegs, R.D., Wahner, H.W. and **Heath, H. III**: Axial and appendicular bone mineral density in patients with chronic calcitonin deficiency and calcitonin excess. N. Engl. J. Med. 317:537-541, 1987

70. Rajala, M.M., and **Heath, H. III**: Distribution of serum calcium values in patients with familial benign hypercalcemia (hypocalciuric hypercalcemia). Evidence for a discrete genetic defect. J. Clin. Endocrinol. Metab. 65:1039-1041, 1987

71. Hurley, D.L., Katz, H.H., Tiegs, R.D., Calvo, M.S., Barta, J.R. and **Heath, H. III**: Co-secretion of calcitonin gene products: studies with a $C_{18}$ cartridge extraction method for human plasma PDN-21 (Katacalcin). J. Clin. Endocrinol. Metab. 66:640-644, 1988

72. Kempe, T., Chow, F., Fass, D.N. and **Heath, H. III**: [Homoserine$^{21}$]-salmon calcitonin I: Fully active analogue of calcitonin synthesized by recombinant DNA techniques. Bio/Technology 6:190-192, 1988

73. Calvo, M.S., and **Heath, H. III**: Acute effects of oral phosphate salt ingestion on serum phosphorus, serum ionized calcium, and parathyroid hormone in young adults. Am. J. Clin. Nutr. 47:1025-1029, 1988

74. Calvo, M.S., Kumar, R., and **Heath, H. III**: Elevated secretion and action of serum parathyroid hormone in young adults consuming high phosphorus, low calcium diets assembled from common foods. J. Clin. Endocrinol. Metab. 66:823-829, 1988

75. Donahue, H.J., Fryer, M.F., Eriksen, E.F., and **Heath, H. III**: Differential effects of parathyroid hormone and its analogues on cytosolic calcium ion and cAMP levels in cultured rat osteoblast-like cells. J. Biol. Chem. 263:13522-13527, 1988

76. Mallette, L.E., Kirkland, J.L., Gagel, R. F., Law, W.M., Jr., and **Heath, H. III**: Synthetic human parathyroid hormone-(1-34) for the study of pseudohypoparathyroidism. J. Clin. Endocrinol. Metab. 67:964-972, 1988

77. Hurley, D.L., Tiegs, R.D., Barta, J., Laakso, K., and **Heath, H. III**: Effects of oral contraceptive and estrogen administration on plasma calcitonin in pre- and postmenopausal women. J. Bone Mineral Res. 4:89-95, 1989

78. Tiegs, R.D., and **Heath, H. III**: Effects of altered calcium intake on diurnal and calcium-stimulated plasma calcitonin in normal women. J. Bone Min. Res. 4:407-412, 1989

79. Donahue, H.J., Penniston, J.T., and **Heath, H. III**: Kinetics of erythrocyte plasma membrane ($Ca^{++}$-$Mg^{++}$)-ATPase in familial benign hypercalcemia. J. Clin. Endocrinol. Metab. 68:893-898, 1989

80. Donahue, H.J., Fryer, M.J., **Heath, H. III**: Structure-function relationships for full length recombinant parathyroid hormone-related peptide and its amino-terminal fragments: effects on cytosolic calcium ion mobilization and adenylate cyclase activation in rat osteoblast-like cells. Endocrinology 126:1471-1477, 1989

81. Bailey, J.W., **Heath, H. III**, Miles, J.M.: Calcium, magnesium, and phosphorus metabolism in dogs given intravenous triacetin. Am. J. Clin. Nutr. 49:385-388, 1989

82. Beard, C.M., **Heath, H. III**, O'Fallon, W.M., Anderson, J.A., Earle, J.D., Melton, L.J. III: Therapeutic radiation and hyperparathyroidism: A case-control study in Rochester, MN. Arch. Intern. Med. 149:1887-1890, 1989

83. Calvo, M.S., Kumar, R., and **Heath, H. III**: Persistent elevation in parathyroid hormone secretion and action in young women after four weeks of ingesting high phosphorus, low calcium diets. J. Clin. Endocrinol. Metab. 70:1334-1340, 1990

84. Kao P.C., Klee G.G., Taylor, R.L., **Heath, H. III**: Parathyroid hormone-related peptide in plasma of patients having hypercalcemia associated with malignancy. Mayo Clin. Proc. 65:1399-1407, 1990

85. Beyer, H.S., Parfitt, A.M., Shih, M.S., Anderson, Q. and **Heath, H. III**: Idiopathic acquired diffuse osteosclerosis in a young woman. J. Bone Min. Res. 5:1257-1263, 1990

86. Bidwell, J.P., Fryer, M.J., Firek, A.F., Donahue, H.J., **Heath, H. III**: Desensitization of rat osteoblast-like cells (ROS 17/2.8) to parathyroid hormone uncouples the cAMP and cytosolic ionized calcium response limbs. Endocrinolology 128:1021-1028, 1990

87. Rajala, M.M., Klee, G.G., and **Heath, H. III**: Calcium regulation of parathyroid and C-cell function in familial benign hypercalcemia. J. Bone Min. Res. 6:117-124, 1991

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89. Firek, A.F., Kao, P.C., **Heath, H. III**: Plasma intact parathyroid hormone (PTH) and PTH-related peptide in familial benign hypercalcemia: greater responsiveness to endogenous PTH than in primary hyperparathyroidism. J. Clin. Endocrinol. Metab. 72:541-546, 1991

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**Reviews, Editorials, Book Chapters, and Symposium Proceedings**

1. **Heath, H. III**, Schaaf, M., Wray, H.L., Monchik, J.M. and Earll, J.M.: Parathyroid activity and immobilization-induced changes in calcium metabolism. In: Clinical Aspects of Metabolic Bone Disease, B. Frame, A.M. Parfitt and H. Duncan, Eds. International Congress Series, #270, Excerpta Medica, Amsterdam, l973, pp. 257-260

2. **Heath, H. III**: Parathyroid hormone, calcitonin and vitamin D. Dept. of Defense Publication, Present Concepts in Internal Medicine, 7:335-342, l974

3. **Heath, H. III**: The parathyroid hormone radioimmunoassay: panacea or Pandora's box? Dept. of Defense Publication, Present Concepts in Internal Medicine, 7:343-350, l974

4. **Heath, H. III** and Arnaud, C.D.: Parathyroid hormone and calcitonin. In: Immunodiagnosis of Cancer, R.B. Herberman and K.P. McIntire, eds. Marcel-Dekker, New York, Part I, l979, pp. 409-420

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6. **Heath, H. III**: Biogenic amines and the secretion of parathyroid hormone and calcitonin. Endocrine Reviews 1:319-338, 1980

7. Austin, L.A. and **Heath, H. III**: Medical Progress. Calcitonin: Physiology and Pathophysiology. N. Engl. J. Med. 304: 269-278, 1981

8. Sizemore, G.W. and **Heath, H. III**: Calcitonin and medullary carcinoma of the thyroid gland. In: Current Problems in Cancer, Symposium on Biological Markers 6:11-23, 1981

9. Hodgson, S.F. and **Heath, H. III**: Asymptomatic primary hyperparathyroidism: treat or follow? (Editorial). Mayo Clin. Proc. 56:521-522, 1981

10. **Heath, H. III** and Purnell, D.C.:. Asymptomatic hypercalcemia and primary hyperparathyroidism. In: Butterworths International Medical Reviews. Clinical Endocrinology 2, Calcium Disorders. D. Heath and S.J. Marx, eds. Butterworth and Co. Publishers, London, 1982, pp. 189-216

11. Fox, J. and **Heath, H. III**: Plasma and intestinal 1,25-dihydroxyvitamin D levels in glucocorticoid-treated and growth retarded chicks. In: Vitamin D: Chemical, Biochemical and Clinical Endocrinology of Calcium Metabolism. Proceedings of the 5th Workshop on

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14. **Heath, H. III**, Law, W.M., Carney, J.A., Kumar, R., James, E.M., Charboneau, J.W. and Purnell, D.C.: Familial benign hypercalcemia- hypocalciuric hypercalcemia: epidemiologic, pathogenetic and histopathologic explorations in 21 families. In: Endocrine Control of Bone and Calcium Metabolism, D.V. Cohn, T. Fujita, J.T. Potts, R.V. Talmage, eds., Elsevier Science Publishers., Volume 8a, Proceedings of the Eighth International Conference on Calcium Regulating Hormones, Kobe-Kyoto-Niigata-Osaka-Tokyo, Japan, October 16-24, 1983

15. **Heath, H. III**, Body, J.-J., and Fox, J.: Radioimmunoassay of calcitonin in normal human plasma: problems, perspectives, and prospects. Biomed. Pharmacother. 38:241-245, 1984

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17. **Heath, H. III**: Tests of parathyroid function: utility and limitations. ENDO 2:1-10, 1984. (Educational publication of the Am. Assoc. for Clin. Chem.)

18. **Heath, H. III**: Therapeutic Decision-Making in Asymptomatic Hypercalcemia and Primary Hyperparathyroidism. In: Endocrinology, ICS 655, F. Labrie and L. Proulx, eds., Excerpta Medica, Amsterdam, 1984, pp. 875-877

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26. Eastell, R., **Heath, H. III**, Kumar, R., and Riggs, B.L.: Hormonal factors: PTH, vitamin D, and calcitonin. In: Osteoporosis. Etiology, Diagnosis, and Management, B.L. Riggs and L.J. Melton III (eds.), Raven Press, New York, 1988, pp. 373-388

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29. **Heath, H. III** and Tiegs, R.D.: Secretion, metabolism, and action of endogenous calcitonin in human beings. In: Osteoporosis. Physiological Basis, Assessment, and Treatment. A Steenbock Symposium, H.F. DeLuca and R. Mazess, eds., Elsevier, New York,

1990, pp. 241-246

30. Carter, W.B. and **Heath, H. III**: Clinically useful calcitonin assays. Trends in Endocrinology and Metabolism 1: 288-291, 1990

31. Khosla, S. and **Heath, H. III**: Familial hyperparathyroid syndromes. In: Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism, first ed., M.J. Favus, ed., American Society for Bone and Mineral Research, Kelseyville, CA, 1990, pp. 111-113

32. **Heath, H. III**: The clinical spectrum of primary hyperparathyroidism: evolution with changes in medical practice and technology. J. Bone Min. Res. 6 (Suppl. 2):S63-S70, 1991

33. Heath H III: Metabolic bone disease and clinically-related disorders (book review). Clin. Nuclear Med. 16:606-607, 1991

34. Heath H III: Primary hyperparathyroidism: Recent advances in pathogenesis, treatment and management. In: Advances in Internal Medicine, Vol. 37, Mosby Year Book, St. Louis, 1992, pp. 275-293

35. Eastell, R.E., **Heath, H. III**: The hypocalcemic states: their differential diagnosis and management. In: Disorders of Bone and Mineral Metabolism., F.L. Coe and M.J. Favus, eds., 1st ed., Raven Press, New York, 1992, pp. 571-585

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37. Odell, W.D., Jr., **Heath, H. III**: Osteoporosis-- pathophysiology, prevention, diagnosis, and treatment. Disease-a-Month, R.C. Bone (ed.), Mosby Year Books, St. Louis, 39: 789-868, 1993

38. Szabo, J., Khosla, S., **Heath, H. III**: Familial hyperparathyroid syndromes. In: Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism, second ed. M.J. Favus, ed. Raven Press, New York, 1993, pp. 164-166

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40. **Heath, H. III**: The parathyroids: basic and clinical concepts (book review). New Engl. J. Med. 331:954, 1994

41. Reber, P.M., and **Heath, H. III**: Hypocalcemic emergencies. Med. Clin. N. Am. 79: 93-106, 1995

42. **Heath, H. III**: In memoriam. Frank H. Tyler, M.D., January 5, 1916-September 7, 1994. J. Clin. Endocrinol. Metab. 80: 852-853, 1995

43. Khosla, S., Hassoun, A., **Heath, H. III**: Osteosclerosis in intravenous drug abusers. The Endocrinologist 5:339-343, 1995

44. Nemeth, E.F., **Heath, H. III**: The calcium receptor and familial benign hypocalciuric hypercalcemia. Curr. Opin. Endocrinol. Diab. 2: 556-561, 1995

45. **Heath, H. III**: Primary hyperparathyroidism, hyperparathyroid bone disease, and osteoporosis. In Osteoporosis. R. Marcus, D. Feldman (eds.), Academic Press, 1996, pp. 885-897.

46. **Heath, H. III**: The familial benign hypocalciuric hypercalcemias. In: Principles of Bone Biology, J.P. Bilezikian, L.G. Raisz, G. Rodan (eds.), Academic Press, San Diego, 1996, pp 769-782

47. **Heath, H. III**, Hobbs, M.R.: Familial hyperparathyroid syndromes. In: Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism, third ed. M.J. Favus, et al., eds. Lippincott-Raven Publishers, NY, NY, 1996, pp. 187-189

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50. El-Hajj Fuleihan, G., **Heath, H. III**: Familial benign hypocalciuric hypercalcemia and neonatal severe hyperparathyroidism. In: The Parathyroids. Basic and Clinical Concepts, 2nd ed. J.P. Bilezikian, R. Marcus, M.A. Levine, eds. Academic Press, San Diego, CA, 2001, pp. 607-623

51. Fitzpatrick, L.A., **Heath, H. III**: Primary hyperparathyroidism, hyperparathyroid bone disease, and osteoporosis. In: Osteoporosis, 2nd ed. R. Marcus, D. Feldman, and J. Kelsey, eds. Academic Press, in press, 2001

52. Krishnan, V., Heath, H., Bryant, H.U.: Mechanism of action of estrogens and selective estrogen Receptor modulators. In*:* Vitamin and Hormones 60: 123-147, 2001

53. Marcus, R., Wong, M., **Heath, H. III**, Stock, J.L. Antiresorptive treatment of postmenopausal osteoporosis: comparison of study designs and outcomes in large clinical trials with fracture as an endpoint. Endocrine Rev 23:16-37, 2002

**Aviation-related publications**

1. **Heath, H. III**: The education of an innocent. Aviation, health, and aeromedical certification from a physician-pilot's point of view. Sport Aviation 36(no.8):43-45, 1987

2. **Heath, H. III**: Aviation medical certification... New faces at FAA, new faces at EAA. Sport Aviation 37(no.2):33-34, 1988

3. **Heath, H. III**: EAA aeromedical advisory panel meets with federal air surgeon and NTSB chairman in Washington. Sport Aviation 37(no.7):32-33, 1988

4. **Heath, H. III**: Disqualifying medical conditions and the private pilot: diabetes mellitus. Part I. Sport Aviation 37(no.9):61,1988; Conclusion. 37(no.10):40, 1988

5. **Heath, H. III**: Drug testing for private pilots... a proposal whose time has come or an unconstitutional abomination? Sport Aviation 38(no.5):61-62, 1989

6. **Heath, H. III**: Disqualifying medical conditions and the pilot: the doctor gets grounded. Sport Aviation 38(no.2):40,66, 1989

7. **Heath, H. III**: Why not eliminate the third-class flight medical examination? One reader's view. Sport Aviation 38(no.9):63-64, 1989

8. **Heath, H. III**: Flying while impaired, or "fools rush in where angels fear to tread." Sport Aviation 39(no.2):63,69, 1990

9. **Heath, H. III**: Thyroid disease and the sport pilot. Sport Aviation 39(no.9):64-65, 1990

10. **Heath, H. III**: Alcohol and the sport pilot. There are folks out there paying attention to what we say and do! Sport Aviation 39(no.11):73-74, 1990

11. **Heath, H. III**: The diabetes issue and other aeromedical happenings. Sport Aviation 42:90-91, 1993

12. **Heath, H. III**: Kidney stones and the sport pilot. Between a rock and a hard place. Sport Aviation 43(no.12):115-116, 1994

13. Heath, H.III: Notes from the federal air surgeon's bulletin. Sport Aviation 44(no.2): 86-87, 1995

14. **Heath, H. III**: Insulin-requiring diabetes mellitus: legal flight at last? Sport Aviation 46(no.2):104-105, 1997

15. **Heath, H. III**: Insulin-requiring diabetes. Sport Aviation 46(no.10): 108-109, 1997

16. **Heath, H. III**: Importance of a guest ride. Soaring 70 (no. 3): 5, 2006

**CURRICULUM VITAE**

# SHARON M. MOE, M.D., F.A.C.P., F.A.H.A., F.A.S.N.

***11/12/2010***

*EDUCATION*

**Undergraduate**
University of Illinois at Urbana-Champaign
Urbana, IL
8/80 to 1/82 Degree: B.S.

Illinois State University
Normal, IL
8/78 to 6/80

**Graduate**
University of Illinois College of Medicine at Chicago
Chicago, IL
8/82 to 6/86 Degree: M.D.

Postdoctoral
Research Fellow: 7/90 to 6/92
Department of Medicine, Section of Nephrology
University of Chicago, Chicago, IL

Clinical Fellow: 7/89 to 7/90
Department of Medicine, Section of Nephrology
University of Chicago, Chicago, IL

**Intern and Resident** 6/86 to 6/89
Department of Internal Medicine
Loyola University Medical Center, Maywood, IL

**ACADEMIC APPOINTMENTS**
**(Indiana University School of Medicine)**

Current:

Professor of Medicine (with tenure): 5/2005 to present

Vice Chair for Research: 2/1/05 to present

Past:

Associate Professor of Medicine: (with tenure) 7/2001 to 5/2005

Associate Dean for Research Support: 7/2003 to 2/1/05

Assistant Dean for Research Support: 7/2001 to 7/2003

Chief of Nephrology, Wishard Memorial Hospital: *1/98 to 2/2005*

Assistant Professor of Medicine: 7/95 to 6/2001

Clinical Assistant Professor of Medicine: 7/92 to 6/95

Member Graduate Faculty Indiana University Graduate School 2/2003 to present

Director, Wishard Memorial Hospital Acute Dialysis Unit: 1/98 to 6/2001

Staff Physician

Indiana University Hospital (1992 to present)

Wishard Memorial Hospital (1992 to present)

Richard L. Roudebush Medical Center (Consultant 1992-1995; staff physician 1995 to present)

Kindred Hospital of Indianapolis (1993 to present)

**PROFESSIONAL CONSULTANTSHIPS**

Genzyme RenaGel Physician Advisory Board, Jan 1998 to present

Amgen, Inc. Consultant, 1998 to present

Cytochroma, Inc. Advisory Board, 2005- 2007

Ineos, Advisory Board, 2007-present

Litholink Advisory Board, 2007- present

Diasorin Advisory Board, 2008-present

**SPECIALTY BOARD STATUS**

National Board of Medical Examiners, 1986

American Board of Internal Medicine, 1989

American Board of Internal Medicine, Subspecialty in Nephrology, 1992, 2002

**LICENSURE AND CERTIFICATIONS**

State of Indiana # 920415 (current)

State of Illinois #036-076622 (inactive)

**PROFESSIONAL ORGANIZATIONS**

American Society Nephrology

- Member, Post-Graduate Education Committee 1997 to 2000
- Member, Media Relations Task Force 2001 to 2003
- Fellow, 2005
- Member, Nominating Committee 2006
- Editorial Board, Journal of the American Society of Nephrology 2004-2006
- Reviewer, American Society of Nephrology Annual Meeting Abstracts, 1998, 2000, 2004, 2006, 2008
- Abstract session coordinator 2008
- Councilor 2008-2016 (President Elect for 2016) National Kidney Foundation
- Member, National Kidney Foundation Kidney Disease Outcome Quality Initiative (KDOQI), Bone and Mineral Disease Working Group, 2001 to 2003

- Annual Scientific Meeting Planning Committee 1999 and 2000, Co-Chair 2004, Chair 2005 Kidney Disease Improving Global Outcomes (KDIGO)
- Co-Chair, National Kidney Foundation Global Mineral and Bone Initiative 2003 to present
- Member, Executive Committee KDIGO (Kidney Disease Improving Global Outcomes)- 2004 to 2007
- Co-Chair, KDIGO Mineral and Bone Clinical Practice Guidelines, 2006- present International Society of Nephrology
- Councilor, representing U.S.A.- 2005-2007 Women in Nephrology
- Co-Director, Professional Development Symposium, 2000-2002
- Counselor, 2003-2006 National Kidney Foundation of Indiana
- Member, Board of Directors, 2000 to present
- Annual Gala Planning Committee, 1998-present
- Member, Medical Advisory Board American Heart Association
- Executive Committee of the Council on the Kidney in Cardiovascular Disease (Counselor at large) 2002-2004
- Member, Kidney Council, 1998
- Fellow 2003

American College of Physicians, 1989 to present; fellow 2002

American Society for Bone and Mineral Research

**EDITORIAL BOARDS**

- American Journal of Kidney Diseases- Associate Editor, 2002-2004
- Advances in Renal Replacement Therapy- Editorial Board, 2003-2008
- Journal of the American Society of Nephrology, 2004-2006
- American Journal of Nephrology- 2007 to present
- Clinical Journal of American Society of Nephrology- 2008- present

**STUDY SECTIONS/NIH COMMITTEES**

- Member, National Institute of Health, Protein production, structure, and function study section, SSS2, CSR, 1998, 1999
- “Experience Reviewer Reserve” NIH-NIDDK, 2003-present
- External Advisory committee, NIDDK HALT-PKD, 2005 to current
- DSMB, NIDDK HALT-PKD, 2005 to current
- Ad Hoc reviewer, NIH- NIAMS Loan Repayment, 2006
- Ad Hoc reviewer, NIH- ZRG1 MOSS-B, skeletal biology, NIAMS, 2006
- Ad Hoc reviewer, NIH- ZRG1- RUS-A, R21 NIDDK, 2006
- Ad hoc reviewer NIH-ZRG1-MOSS-L, skeletal biology, NIAMS, 2007
- Ad hoc reviewer NIH-ZDK1-GRB-B, NIDDK, 2007
- Ad hoc reviewer NIH-SBDD, NIAMS, 2007
- Ad hoc reviewer NIH-ZRG1-RUS A, 2007 and 2008(Chair)

- Ad hoc reviewer NIH-ZHL1 CSR-N 01 R13s 2008
- NIDDK Central Repository Sample Request Review Panel 2009- present

**LEADERSHIP IN SYMPOSIUMS/WORKSHOPS, ORGANIZING COMMITTEES**

- Indiana University Faculty Clinical Research Training Seminar, annual seminar, organizer/moderator, 1998-present
- Indiana University Research Coordinator Education Program, a bi-annual program, organizing committee, 1999-present
- National Institutes of Health, NIDDK, "Planning a Career in Clinical Research," organizing committee 2000, 2004
- National Kidney Foundation Annual Scientific Meeting Planning Committee, 1999, 2000
- American Society of Nephrology Professional Development Seminar co-moderator/organizer 1998-2001, moderator 2002
- Indiana University Annual Grant Writing Symposium, organizer, 2001 to present
- Accountability in Clinical Research: Balancing Risk and Benefit, national meeting by National Patient Safety Foundation, April 24-26, 2002, Indianapolis, IN-organizing committee
- National Kidney Foundation KDOQI (Kidney Disease Outcome Quality Initiative) Bone and Mineral Working Group, Member, 2001-2003
- National Kidney Foundation Controversies in Bone and Mineral Metabolism International Conference, 2003, co-moderator, Washington, DC
- American Society of Nephrology Annual Scientific Meeting Program Committee, 2003 meeting
- KDIGO, Diagnosis, Classification, and Evaluation International meeting, September, 2005 Madrid, Spain, Co-chair
- National Kidney Foundation (NKF) Annual Scientific Meeting Planning Committee Co-Chair 2004- Chicago, IL, Chair 2005- Washington DC
- Session chair/organizer, American Society for Bone and Mineral Research Annual Scientific Meeting, 2005
- KDIGO: International Clinical Practice Guidelines for Mineral and Bone Disease, Co-chair, 2006- present
- International Society of Nephrology: Nexus meeting: Bone and the Kidney, scientific planning committee for October 2006, meeting in Copenhagen Denmark

**HONORS AND AWARDS**

- Volunteer Service Award, National Kidney Foundation of Indiana, 1998
- Travel Award Recipient XII Annual Meeting of the International Council on Calcium Regulating Hormones, Melbourne, Australia, February 14-19, 1995
- Travel Award Recipient XI Annual Meeting of the International Council on Calcium Regulating Hormones, Florence, Italy, 1992
- Chairman's Award, National Kidney Foundation, 2001, for Outstanding Contribution to Research Goals of NKF Indiana
- Outstanding Young Investigator, Department of Medicine, 2001
- Outstanding Nephrology Teacher, Department of Medicine, Division of Nephrology, 2003 (voted on by trainees)
- Endowed Lecture Recipient, Royal College of Physicians, Edinburgh, Scotland, 2004
- Trustee Teaching Award, Indiana University School of Medicine, 2003-04 (voted on by medical students)
- Elected to **American Society for Clinical Investigation (ASCI), 2005**
- National Kidney Foundation Gareb Eknoyan Award for exceptional contributions to key initiatives of NKF such as the Kidney Disease Outcomes Quality Initiative (KDOQI) 2009

**PATENTS:**

Pending review #11/771658 "Methods for treating Cystic Kidney Diseases"

**INVITED LECTURES AT INTERNATIONAL AND NATIONAL MEETINGS AND VISITING PROFESSORSHIPS**

November 3, 1995: "Renal Osteodystrophy: Do We Need a Different Approach in Women?" a lecture at the National Kidney Foundation 45th Annual Scientific Meeting, San Diego, CA

November 4, 1996: "Literature Review in Dialysis- Renal Osteodystrophy," a lecture for a symposium at the American Society of Nephrology 29th Annual Meeting, New Orleans, LA

August 25, 1997: "Calcium and Phosphorus Metabolism," a lecture for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 26, 1997: "Renal Osteodystrophy," a lecture for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 31, 1998: "Calcium and Phosphorus Metabolism," a lecture for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 31, 1998: "Disorders of Calcium and Phosphorus," a workshop for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

September 1, 1998: "Diagnosis of Bone Disease-Radiology and Biopsy," a workshop for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

September 1, 1998: "Renal Osteodystrophy," a lecture for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

October 24, 1998: "ESRD Osteodystrophy," a lecture for the American Society of Nephrology Annual Meeting Postgraduate Education Course: The Principles and Practice of Hemodialysis: Reviews, Updates and Demonstrations

October 27, 1998: "Literature Update: Renal Osteodystrophy and Divalent Ion Metabolism- □-2-microglobulin Amyloidosis," a lecture for Clinical Nephrology Symposia at the American Society of Nephrology Annual Meeting

May 1, 1999: "Recent Advances in Bone disease Therapies," National Kidney Foundation Eight Annual Clinical Nephrology Meeting, Washington DC

August 29, 1999: "Renal Osteodystrophy," a lecture for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 30, 1999: "Calcium and Phosphorus Metabolism," a lecture for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 30, 1999: "Disorders of Calcium and Phosphorus," a workshop for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 31, 1999: "Diagnosis of Bone Disease-Radiology and Biopsy," a workshop for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

September 15, 1999: "Gender Difference in Bone Diseases in Patients with Renal Failure," NIH special symposium entitled "Women and Renal Disease," Bethesda, MD

November 6, 1999, Moderator, Clinical Nephrology Symposium:
"Renal Osteodystrophy: New Insights into Pathogenesis and Treatment," 32nd Annual Meeting of the American Society of Nephrology, Miami Beach, FL

November 6, 1999: "The Calcium X Phosphorus Product and the Relationship to Soft Tissue Calcification," 32nd Annual Meeting of the American Society of Nephrology, Miami Beach, FL

April 14, 2000: "Calciphylaxis," at the National Kidney Foundation Annual Meeting, Atlanta, GA

April 14, 2000: Clinical-pathologic conference "Renal Osteodystrophy," Session Moderator at the National Kidney Foundation Annual Meeting, Atlanta, GA

April 14, 2000: "Clinical Bone Disease," Session Moderator at the National Kidney Foundation Annual Meeting, Atlanta, GA

April 14, 2000: "Advances in PTH and Vitamin D Metabolism," Session Moderator at the National Kidney Foundation Annual Meeting, Atlanta, GA

August 28, 2000: "Renal Osteodystrophy," a lecture for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 28, 2000: "Calcium and Phosphorus Metabolism," a lecture for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 29, 2000: "Disorders of Calcium and Phosphorus," a workshop for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

August 29, 2000: "Diagnosis of Bone Disease-Radiology and Biopsy," a workshop for the American Society of Nephrology Annual Board Review Course, San Francisco, CA

September 9, 2000: "Institutional Review Boards," at the NIH/NIDDK symposium on Training for a Career in Clinical Research, Bethesda, MD

October 4, 2000: "Funding Opportunities," at the Professional Development Seminar, held as a pre-course at the American Society of Nephrology 33rd Annual Meeting, Toronto, Canada

October 6, 2000: "Vascular Calcification," at the American Society of Nephrology 33rd Annual Meeting, Toronto, Canada

April 21, 2001: "Bones, Hormones and ESRD," at the National Kidney Foundation Annual Scientific Meeting, Orlando, FL

June 29, 2001: "Current Issues in the Management of Secondary Hyperparathyroidism/Bone Disease," at the IX Congress of the International Society for Peritoneal Dialysis, Montreal, Canada

August 28, 2001: "Renal Osteodystrophy," a lecture for the American Society of Nephrology Annual Board Review Course, Chicago, IL

August 27, 2001: "Calcium and Phosphorus Metabolism," a lecture for the American Society of Nephrology Annual Board Review Course, Chicago, IL

August 28, 2001: "Disorders of Calcium and Phosphorus," a workshop for the American Society of Nephrology Annual Board Review Course, Chicago, IL

August 28, 2001: "Diagnosis of Bone Disease-Radiology and Biopsy," a workshop for the American Society of Nephrology Annual Board Review Course, Chicago, IL

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| September 8-9, 2001: | "IRB" and "Planning for a Research Career," for the NIH-NIDDK symposium "Preparing for a Clinical Research Career in Nephrology," Bethesda, MD |
| October 13, 2001: | "Funding Your Research," for the Professional Development Seminar at the American Society of Nephrology Annual Scientific Meeting, San Francisco, CA |
| October 14, 2001: | "Osteoporosis," for an evening symposium entitled "Updates in Renal Osteodystrophy" at the American Society of Nephrology 34th Annual Meeting, San Francisco, CA |
| October 15, 2001: | "Vascular Calcification," at the American Society of Nephrology 34th Annual Meeting, San Francisco, CA |
| November 30, 2001: | "Vascular Calcification in Dialysis," at the 14th Annual Berliner Dialyseseminar, Berlin, Germany |
| March 18, 2002: | "Vascular Cell Impersonation of Osteoblasts," at the Canadian Society of Nephrology, Ottawa, Canada |
| March 30, 2002: | "Vascular Calcification," at the 11th International Congress on Nutrition and Metabolism in Renal Disease, Nagoya, Japan |
| October 31, 2002: | Coordinated and moderated Professional Development Pre-Course for the American Society of Nephrology Annual Scientific Meeting |
| October 31, 2002: | "Funding Your Research," at the Professional Development Symposium |
| November 2, 2002: | "Basic Science of Dystrophic Calcification," at the American Society of Nephrology Annual Scientific Meeting |
| November 2, 2002: | "Bone and Mineral Metabolism K/DOQI," at the American Society of Nephrology Annual Scientific Meeting |
| November 3, 2002: | Moderated "Debates in Renal Failure-Renal Osteodystrophy," at the American Society of Nephrology Annual Scientific Meeting |
| April 3, 2003: | "Management of Hyperparathyroidism in CKD," at Symposium "Improving Outcomes in Anemia in Secondary Hyperparathyroidism," at the National Kidney Foundation Annual Clinical Meetings, Dallas, Texas |
| April 4, 2003: | "Review of the New K/DOQI Guidelines for Managing Bone and Mineral Metabolism and Dyslipidemias in CKD; Disciplinary Team Approach, as part of a symposium "Practical Applications of the New K/DOQI Clinical Practice Guidelines," National Kidney Foundation Annual Clinical Meetings, Dallas, Texas |
| April 5, 2003: | "Controlling Serum Phosphorus, K/DOQI Guidelines 3, 4, and 5," at the National Kidney Foundation Annual Clinical Meetings, Dallas, Texas |
| April 5, 2003: | "The Future of Bone Disease Management," National Kidney Foundation Annual Clinical Meetings, Dallas, Texas |
| April 5, 2003: | "Cellular Mechanisms of Vascular Calcification," at symposium "Modern Management of Hyperphosphatemia," at the National Kidney Foundation Annual Clinical Meetings, Dallas, Texas |
| June 9, 2003: | "K/DOQI Guidelines and Bone Disease Management," World Congress of Nephrology, Berlin, Germany |
| June 9, 2003: | "Calciphylaxis and cardiovascular Risk," World Congress of Nephrology, Berlin, Germany |

June 10, 2003: "New Insights in Bone Biology and Bone Disease; the Roles of Hormones, Growth Factors and Cytokines," World Congress of Nephrology, Berlin, Germany

November 13, 2003: "Renal Osteodystrophy in the Course "Peritoneal Dialysis" at the 36th Annual American Society of Nephrology, San Diego, California

November 14, 2003: "Vitamin D and the Prevention of Morbidity and Mortality in Dialysis Patients-"Overview of Vitamin D Biology" at the 36th Annual American Society of Nephrology Annual Meeting, San Diego, California

April 28, 2004: "Renal Osteodystrophy" at the 2004 National Kidney Foundation Clinical Meetings, Chicago, IL

April 29, 2004: "Review of Current Therapeutic Strategies and Treatment Goals – NKF K/DOQI" at the 2004 National Kidney Foundation Clinical Meetings, Chicago, IL

May 1, 2004: "Vascular Calcification" at the 2004 National Kidney Foundation Clinical Meetings, Chicago, IL

May 2, 2004: "Pathophysiology of Renal Osteodystrophy" at the 2004 National Kidney Foundation Clinical Meetings, Chicago, IL

June 1, 2004: "Uremic Vascular Calcification" endowed lecture at the Renal Medicine Symposium, the Royal College of Physicians of Edinburgh, Edinburgh, Scotland

June 10, 2004: "Vascular Calcification" for Network 9 Annual Professional Meeting, Chicago, IL

July 10-11, 2004: "Preparing for a Career in Clinical Research in Kidney and Urologic Diseases" National Institutes of Health / NIDDK, committee planning member and speaker

September 17-18, 2004: "The relationship between vascular calcification and renal osteodystrophy" and "Update and new insights from the K/DOQI guidelines" at the National conference on Vascular Calcification," Toronto, Canada

October 28, 2004: "Vascular calcification and calciphylaxis" as part of the post graduate education course on complication of dialysis at the American Society of Nephrology Annual Scientific Meeting

October 29, 2004: Moderator for session "Atherosclerosis: a different disease in CKD than in the general population" at the American Society of Nephrology Annual Scientific Meeting

October 30, 2004: "Preventing complication of Mineral and Metal Accumulation in a Closed System" at the American Society of Nephrology Annual Scientific Meeting

October 31, 2004: "Medical Cross-fire: An expert panel debates key clinical issues in managing bone and mineral metabolism in CKD" at the American Society of Nephrology Annual Scientific Meeting

January 21, 2005: "Inflammation and Vascular Calcification" at the VIIth International conference on Dialysis, New Orleans, LA

February 3, 2005: "Renal Osteodystrophy" at the Royal Free College of Medicine, London, UK

February 4, 2005: "Cellular Mechanisms of Vascular Calcification" at the 5th International Workshop on Structure and Function of Large Arteries, Paris, France

February 28, 2005: "Vascular Calcification" at the 25th Annual Dialysis Conference, Tampa FL

March 1, 2005: "Secondary Hyperparathyroidism" at the 25th Annual Dialysis Conference, Tampa FL

March 1, 2005: "PTH assays and Calcimimetics" at the at the 25th Annual Dialysis Conference, Tampa FL

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| May 4, 2005: | "Cases in Mineral Metabolism," at the NKF Annual Scientific Meeting, Washington DC |
| May 5, 2005: | "Do the K/DOQI targets matter?" at the NKF Annual Scientific Meeting, Washington DC |
| May 7, 2005: | "Evidence Based Practice of Nephrology: Global Bone and Mineral Initiative," NKF Annual Scientific Meeting, Washington DC |
| June 28, 2005: | "Treating secondary hyperparathyroidism," World Congress of Nephrology, Singapore |
| October 11, 2005: | Visiting Professor and "Vascular calcification" at Evanston Healthcare Northwestern, Evanston, IL |
| November 8, 2005: | "Vascular calcification and Cardiovascular disease" American Society of Neph Annual Meeting, Philadelphia PA |
| November 8, 2005: | "Practical and Ethical Issues of Pharmaceutical Trials" American Society of Neph Annual Meeting, Philadelphia PA |
| November 8, 2005: | "Funding Opportunities and Goals" American Society of Neph Annual Meeting, Philadelphia PA |
| November 9, 2005: | "Vascular calcification and calciphylaxis" American Society of Neph Annual Meeting, Philadelphia PA |
| November 10, 2005: | "Medical Crossfire" American Society of Neph Annual Meeting, Philadelphia PA |
| December 13-14, 2005: | Guest speaker at NKF Symposium and Visiting Professor at Temple University, Philadelphia, PA |
| January 25, 2006: | "Treatment of CKD-Mineral and Bone Disorder" for the Japanese Society for Kidney Bone Disease, Tokyo, Japan |
| April 19, 2006: | "Treatment of secondary hyperparathyroidism," National Kidney Foundation Annual Scientific Meeting, Chicago, IL |
| September 29, 2006: | "Treatment of CKD-MBD" New York City Annual Dialysis Conference, New York New York |
| October 10, 2006: | "The new renal osteodystrophy- CKD-MBD" International Society of Nephrology, The Bone and Kidney meeting, Copenhagen Denmark |
| November 14, 2006: | "Finding Funding Opportunities" American Society of Nephrology Annual Meeting, Professional Development Course, San Diego, CA |
| November 14, 2006: | "KDIGO-CKD-MBD" American Society of Nephrology Annual Meeting, Clinical Pre-Course, San Diego, CA |
| November 14, 2006: | "Vascular Calcification as a Cardiovascular Risk Factor" American Society of Nephrology Annual Meeting, San Diego, CA |
| November 14, 2006: | "Treating vascular calcification and renal osteodystrophy" American Society of Nephrology Annual Meeting, San Diego, CA |
| November 14, 2006: | "Treating secondary hyperparathyroidism" American Society of Nephrology Annual Meeting, San Diego, CA |
| December 5, 2006: | "Vitamin D and cardiovascular mortality in CKD" American Society for Bone and Mineral Research satellite symposium on vitamin D, Washington DC |

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| January 5, 2007: | Visiting Professor and "CKD-MBD: Consequences and Treatment" at the University of Kentucky, Louisville |
| January 15, 2007: | "CKD-MBD: Consequences and Treatment" in Toronto, Canada |
| February 20, 2007: | "Pathogenesis of Secondary Hyperparathyroidism" and "Mechanisms of Vascular Calcification" International Dialysis Conference in Denver, CO |
| April 23-27, 2007: | "Vascular Calcification and CKD-MBD," "Treatment Strategies for CKD-MBD," "Calcium and Phosphorus Metabolism: Impact on Mortality in CKD," and "Treating the New Renal Osteodystrophy CKD-MBD" World Congress of Nephrology, Rio de Janeiro, Brazil |
| May 9, 2007: | "Bone Vascular Link" at Eli Lilly Pharmaceutical in Indianapolis, IN |
| May 12, 2007: | "CKD for Primary Care Physicians" and "Bone and Mineral CKD Stages 3 and 4" at Loyola University in Chicago, IL |
| October 31-November 5, 2007: | "CKD and CVD from the Vascular Viewpoint: Merging Basic and Clinical Sciences to Optimize Treatment," "Maintenance Dialysis: Principles, Practical Aspects, and Case-Based Workshops," and "Professional Development Seminar: Early and Mid-Career Components" American Society of Nephrology Annual Meeting, San Francisco, CA |
| November 1, 2007: | "Vascular Calcification/Vitamin D" American Society of Nephrology Annual Meeting, San Francisco, CA |
| November 1, 2007: | "Vascular Calcification, Calciphylaxis, and New Developments in Metabolic Bone Disease" American Society of Nephrology Annual Meeting, San Francisco, CA |
| November 1, 2007: | "Funding Opportunities and Goals" American Society of Nephrology Annual Meeting, San Francisco, CA |
| November 1, 2007: | "How to Prepare a Winning Presentation" American Society of Nephrology Annual Meeting, San Francisco, CA |
| November 2, 2007: | "Pre-ESRD and Mineral Metabolism" American Society of Nephrology Annual Meeting, San Francisco, CA |
| November 2, 2007: | "Secondary Hyperparathyroidism in End Stage Renal Disease" American Society of Nephrology Annual Meeting, San Francisco, CA |
| November 2, 2007: | "The Impact of Declining GFR on Metabolism" American Society of Nephrology Annual Meeting, San Francisco, CA |
| December 12, 2008 | "Mineral and Bone Complications of CKD" for the Indiana Endocrine Society, Indianapolis, IN |
| November 5, 2008: | "Funding Opportunities and Goals" American Society of Nephrology Annual Meeting, Philadelphia, PA |
| November 5, 2008: | "How to Prepare a Winning Presentation" American Society of Nephrology Annual Meeting, Philadelphia, PA |
| November 5, 2008: | "Vascular calcification and mineral metabolism" American Society of Nephrology Annual Meeting, Philadelphia, PA |
| November 7, 2008; | "KDIGO guidelines on CKD:MBD" American Society of Nephrology Annual Meeting |
| March 28, 2009: | "Career choice in Nephrology"- moderator of panel discussion |

April 23-24, 2009: Renal Grand Rounds at Cleveland Clinic and Case Western, Cleveland, OH "Vascular Calcification and CKd-MBD"

**UNIVERSITY ADMINISTRATIVE SERVICE**

Associate Director, Renal Fellowship Program, July 1994 to January 1998

Director, Department of Medicine Clinical Trials Program, September 1997 to 2006, a program designed to facilitate clinical research and to market the physicians of the Department of Medicine.

Associate Dean for Research Support, Indiana University School of Medicine: Assistant Dean 2001 to 2003, Associate Dean 2003 to 2/2005. Oversee research education and compliance for the School of Medicine.

Vice-Chair for Research, Department of Medicine February 2005- present. Oversee research administrative staff for pre award and post award processing and account management. Review and approve all new research faculty appointment packages and review all research faculty annually. Oversee bridge funding appropriations. Coordinate housestaff/fellow research competition. Work with other Vice Chairs as executive advisory board to the Chairman of Medicine. Research funding has increased from 65 to 9 8 million in total awards over the last 4 years.

**UNIVERSITY COMMITTEE SERVICE**

- Chairperson, Animal Use Subcommittee, Roudebush Veterans Administration Hospital (Member 1995-1996; Chairperson 1997-2000), successfully converted probationary to approved status by AALAC for Animal Program at the VA
- Chairperson, Medicine Clinics Research Committee, 1998-2002. Wishard Hospital Committee that oversees clinical research efforts at Wishard Hospital
- Member, Indiana University Human Subjects Research Training and Education Task Force, 1999- 2002.

  Committee that has developed and oversees web based testing on human subject's protection
- Medical Director, Wishard Memorial Hospital Clinical Research Unit, 1999-2001
- Member, Institutional General Clinical Research Center Advisory Committee, 1996-1998
- Member, Institutional Review Board, Exempt/Expedited Review Committee, 2000-2007, Chair 2005-2007
- Member, Search and Screen Committee, Chief of Radiology at Roudebush VAMC, 1999-2000
- Member, Search and Screen Committee, Department of Medicine Chair, 2000
- Member, Task Force on Human Subjects Protection, 2000- 2005
- Member, Task Force on HIPAA Implementation, 2001- 2004
- Member, Search and Screen Committee, School of Medicine Compliance Officer, 2003
- Chairperson, IUPUI Human Subjects Research Committee, 2002-2004
- Member, School of Medicine Task Force for Strategic Plan for Clinical Research, 2003-2004
- Member, School of Medicine 3D design for research committee, 2203-2004
- Member, Department of Radiology Research Advisory Committee 2005
- Member, School of Medicine Research Task Force, 2005-2006
- Member, Clarian Transplant Institute Planning Committee, 2006 to present
- Member, Department of Medicine Promotion and Tenure Committee, 2006 to present

- Member, GI Chief search and screen committee, 2006 to present
- Chair, General Clinical Research Center Medical Advisory Committee, 2007- 2008
- Member, Task Force for Evaluation of Industry-Academic Relations 2007- present
- Member, Task Force for Development of the Office of Research Ethics, Education, and Policy, 2007- 2008
- Member, Search and Screen Committee for Cancer Center Director 2008 to present.
- Chair, Indiana CTSI CRC PCIR Advisory Committee 2008- to present
- Chair, Indiana CTSI Adult protocol development team 2008- present
- Member, Search and Screen Committee for Indiana University Vice President for Research 2009

## GRANTS, FELLOWSHIPS, AND AWARDS

### Current

4/1/01 to 3/31/11: Principal Investigator, National Institutes of Health K-24 (Mentoring Award), $511,827 total costs. "Musculoskeletal Disorders in Dialysis Patients"

10/1/07 to 12/31/11: Principal Investigator, Veterans Administration Merit Award $500,000 total costs. "The mechanism of uremia induced vascular calcification" (Third consecutive Va Merit Award)

05/1/08 – 4/30/13: Co-Investigator; Principal Investigator, "Indiana Clinical and Translational Sciences Institute," on Section "Patient Clinical Interaction Resources." Total costs $9,684,531.

7/1/07 to 6/30/10: Principal Investigator, Genzyme Renal Innovations Program (GRIP) $150,000 total costs. "The role of vitamin D in immune function in patients with CKD stages 3 and 4."

11/1/07 to 12/31/09: Principal Investigator, Genzyme, $264,717 total costs. "The evaluation of the pathophysiology of CKD-MBD in a naturally occurring rodent model of CKD."

7/1/08 to 6/30/09: Principal Investigator, Shire $95,058 total costs "Effect of Dietary Protein Source on Phosphaturia, PTH and FGF23 in Patients with CKD 3 and 4"

7/1/08 to 12/31/09: Principal Investigator, Amgen $131,078, "The evaluation of calcimimetics for the prevention and treatment of cystic kidney disease in rodent models of CKD"

7/1/08 to 12/31/09: Co-Investigator (R. Bacallao Principal Investigator), Amgen $ 131,671 "The evaluation of calcimimetics in the development of renal cysts"

**Current Grants as Mentor:**
7/1/03 to 6/30/08: Faculty Mentor (Principal Investigator Neal Chen, Ph.D.) National Institutes of Health K-01 Award, "The Role of Cbfa1 in Vascular Calcification in Diabetes"

7/1/05 to 6/3/10: Faculty Mentor (Principal Investigator: Allon Friedman, M.D.), National Institutes of Health, K23 Award, "The Role of Obesity in CKD"

12/1/06 to 11/30/07: Faculty Mentor (Principal Investigator: Brian Decker, M.D.), GCRC CREFF award $20,000 "Drug dosing in daily dialysis" and National Kidney Foundation of Indiana $15,000

**Pending:**
NIH- "Bisphosphonates as a treatment for Chronic Kidney Disease Mineral Bone Disorder" (Principal Investigator) NIH R01 submission 2/09, 28% percentile, revision planned October 2009

NIH- "A comparative efficacy study of doxercalciferol vs. cholecalciferol in CKD Stages 3 and 4, submission 6/09 (Principal Investigator of multi center trial)

Howard Hughes Medical Institute- "2009 Med Intro Grad Initiative" training grant (2% effort), Principal Investigator Ronald Mark Payne

**Past Investigator Initiated:**

10/1/03 to 9/30/07: Principle Investigator, Veterans Administration Merit Review, $678,500 total costs, "The role of Cbfa1 in Vascular Calcification and Osteoporosis in ESRD"

10/1/03 to 6/30/07: Co-Investigator, (Principal Investigator Neal Chen, Ph.D.) Genzyme Therapeutics, $200,000 total cost, "The Role of Fetuin and BMP-2 in Vascular Calcification in CKD-V Patients"

3/01/06 to 6/30/08t: Principal Investigator, National Kidney Foundation of Indiana $10,000 (supplemented with K24 award) "A randomized trial of cholecalciferol versus doxercalciferol for the treatment of secondary hyperparathyroidism in CKD stages 3 and 4."

06/01/04 to 09/30/07: Principal Investigator, Genzyme $221,856 total costs "Prevention of bone disease and vascular calcification with sevelamer in a naturally occurring rodent model of polycystic kidney disease"

06/01/04 to 05/30/07: Principal Investigator, Amgen $132,682 total costs "Prevention of bone disease and vascular calcification with cinacalcet in a naturally occurring rodent model of polycystic kidney disease"

02/02/04 to 02/01/05: Principal Investigator Abbott Laboratories $26,400 total costs, "The role of calcitriol and paricalcitol in vascular calcification.

03/01/00 to 2/28/05: Principal Investigator, National Institutes of Health K-24 Award, $521,097 total costs "Musculoskeletal Disorders in Dialysis Patients"

7/1/01 to 6/30/03: Principal Investigator, American Heart Association Midwest Affiliate Research Award $110,000 total costs "Phosphorus induces bone protein expression in vascular smooth muscle cells"

4/1/98 to 3/31/03: Principal Investigator, Veterans Administration Merit Review, $349,000 total amount "Synovial Fibroblasts and Adhesion Molecules in Dialysis Amyloidosis"

2/1/01 to 1/31/02: Principal Investigator, National Kidney Foundation of Indiana, $10,000 total costs "The natural history of coronary artery calcification in renal transplant recipients"

12/1/00 to 11/31/02: Co-Investigator, Diabetes and Research Training Center D/F grant $48,000 total costs "Role of phosphorus in vascular calcification in diabetes." Neal Chen, Ph.D., PI

12/1/98 to 1/1/01: Principal Investigator of Investigator Initiated study from Abbott Laboratories, "An evaluation of the effects of Zemplar supplementation on immune system parameters in hemodialysis patients with low parathyroid hormone levels," $120,000 total costs

3/15/95 to 2/29/00: Principal Investigator, National Institutes of Health K-08 Clinical Investigator Award, $490,835 total costs "The role of synoviocytes in $\beta_2$-microglobulin amyloidosis"

1/1/95 to 12/31/97: Principal Investigator, American Diabetes Association, $98,980 total costs, "The role of glycated proteins in diabetic bone disease"

2/95 to 1/96: Principal Investigator, National Kidney Foundation of Indiana Grant, $1,800 total costs, "The effect of glycated proteins on the pathogenesis of adynamic bone disease"

4/93 to 6/30/95: Principal Investigator, Indiana University Biomedical Research Grant, $11,000 total costs "The evaluation of the frequency and route of optimal calcitriol administration for secondary hyperparathyroidism in patients receiving continuous ambulatory peritoneal dialysis"

**Pharmaceutical sponsored Multi-Center Trials:**
01/01/06-1/1/07 Principal Investigator, Genzyme $97,780 "A randomized, parallel, open-label study to compare once per day sevelamer carbonate powder dosing with three times per day sevelamer hydrochloride table dosing in CKD patients on hemodialysis"

5/3/03 to 2006: Principal Investigator, Abbott Laboratories "A Phase IV, prospective, randomized, active-controlled, double-blind, double-dummy, multi-center study to evaluate the survival benefits of Zemplar relative to Calcijex in subjects with stage V chronic kidney disease on hemodialysis." $50,000 total costs

5/1/04 to2006: A Phase IIIb, multi-center, 2 cohort, randomized study, with an open label run-in and a long term extension phase, assessing an extended dose range of lanthanum carbonate in end stage renal disease subjects receiving hemodialysis. $35,000 total costs

5/1/05 to 2006: A double-blind, cross-over design study of sevelamer hydrochloride (Renagel®) and sevelamer carbonate in chronic kidney disease patients on hemodialysis (Genzyme Protocol No. GD3-163-201), $50,000 total costs

2/1/01 to 8/2002: Principal Investigator, Amgen, Inc. $56,400 total costs (Wishard Foundation) "A randomized, double-blind placebo controlled study to assess the safety and efficacy of a calcimimetic agent (AMG073) in subjects with secondary hyperparathyroidism of chronic renal insufficiency"

1/1/02 to 8/1/02: Principal Investigator, Abbot Laboratories, Inc., $47,418 total costs, "A phase III, prospective, placebo controlled, double blind, randomized, multi-center study to evaluate the safety and efficacy of Zemplar capsules in reducing serum intact parathyroid hormone levels in end stage renal disease subjects on peritoneal dialysis"

09/01/02 to 12/31/03: Principal Investigator, Geltex Pharmaceuticals/MedPace $57,020 total costs "A randomized, open label, parallel design study of sevelamer hydrochloride (renagel) in chronic kidney disease patients"

12/14/01 to 12/31/02: Principal Investigator, Amgen, Inc, $23,813 total costs, "A phase III study to assess the efficacy and safety of an oral calcimimetic agent (AMG 073) in secondary hyperparathyroidism of end stage renal disease treated with hemodialysis"

9/1/00 to 7/1/04: Principal Investigator, Amgen, Inc., "A multi-center, open label extension study to assess the long-term safety and efficacy of an oral calcimimetic agent (AMG 073) in secondary hyperparathyroidism of end-stage renal disease $38,750 total costs

6/29/00 to 6/30/03: Principal Investigator, Amgen, Inc., $28,139 total costs, "A multi-center, open label extension study to assess the long term safety and efficacy or an oral calcimimetic agent in secondary hyperparathyroidism of end stage renal disease"

6/23/99 to 9/30/00: Principal Investigator: Amgen, Inc., "A double-blind, randomized, placebo-controlled, multi-center study to assess the safety and efficacy of an oral calcimimetic agent (AMG073) in secondary hyperparathyroidism of end-stage renal disease (ESRD). $108,563 total costs

6/15/99 to 3/31/00: Principal Investigator: Amgen, Inc. "A double-blind, multi-center trial to evaluate bone histomorphometry of ESRD subjects treated with AMG073 or placebo" $17,055 total costs

7/1/99 to 6/30/00: Principal Investigator of Investigator Initiated study from Geltex Pharmaceuticals, "Sevelamer hydrochloride as a treatment for CAPD patients with low-turnover bone disease" $72,882 total costs

8/92 to 12/93: Co-Investigator, Baxter Healthcare Corporation, $66,822 total costs "Dianeal with 1.1 % Amino acids in malnourished continuous ambulatory peritoneal dialysis (CAPD) patients, Phase III trial." Dr. Richard Hamburger, Principal Investigator

**Past Grants (Faculty Sponsor)**

7/1/04 to 6/30/07: Faculty Mentor (Principal Investigator: Anupama Mohanram, M.D.) American Diabetes Association Junior Faculty Award "Anemia in CKD"

2/1/05 to 1/31/06: Faculty Mentor, (Principal Investigator is Nephrology Trainee: Rob LaClair, M.D.), National Kidney Foundation of Indiana, $12,000 "Fetuin-a levels in hemodialysis patients: a longitudinal and comparison study"

2/1/00 to 1/31/01: National Kidney Foundation of Indiana Grant, $7,883 total costs, "Vascular calcification of ESRD." Dr. Sadiq Ahmed, Nephrology Fellow, Principal Investigator

1/1/99 to 12/31/99: National Kidney Foundation of Indiana Grant, $2,500 total costs, "Increased expression of adhesion molecules ICAM-1 and VCAM-1 by beta-2-microglobulin in dialysis related amyloidosis. Dr. Majd Jaradat, Nephrology Fellow, Principal Investigator

2/94 to 1/95: National Kidney Foundation of Indiana Grant, $1,350 total costs, "The effect of metabolic acidosis on the ability of calcitriol to correct the parathyroid hormone set point in hemodialysis patients." Dr. Rosemary Ouseph, Nephrology Fellow, Principal Investigator

2/94 to 11/94: National Kidney Foundation of Indiana Grant, $7,500 total costs, "The relationship between renal phosphate threshold and calcitriol levels in well-functioning renal allografts immediately post transplant." Dr. Barbara Haehner, Nephrology Fellow, Principal Investigator. Money returned due to time commitment of Dr. Haehner's primary work in the lab of Dr. Craig Brater and inability to complete project with funds granted.

**PUBLICATIONS**

***Manuscripts (peer reviewed publications)***

1) Sprague SM, **Moe SM**. Safety and efficacy of long-term treatment of secondary hyperparathyroidism by low-dose intravenous calcitriol. *Am J Kidney Dis.* 1992; 19:532-9.

2) **Moe SM**, Sprague SM. Beta 2-microglobulin induces calcium efflux from cultured neonatal mouse calvariae. *Am J Physiol.*. 1992; 263:F540-5.

3) **Moe SM**, Barrett SA, Sprague SM. $\beta_2$ microglobulin stimulates osteoclastic mediated bone mineral dissolution from neonatal mouse calvariae. In: DV Cohn, C Gennari, AH Tashijan, Jr., eds. *Calcium Regulating Hormones and Bone Metabolism*. Amsterdam: Elsevier Science Publishers, 1992.

4) **Moe SM**, Baron JM, Coventry S, Dolan C, Umans JG. Glomerular disease and urinary Sezary cells in cutaneous T-cell lymphomas. *Am J Kidney Dis* 1993; 21:545-7.

1) **Moe SM**, Yu BO, Sprague SM. Maintenance of bone mass in patients receiving dialytic therapy. *Am J Kidney Dis.* 1993; 22:300-7.

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3) **Moe SM**, Hack BK, Cummings SA, Sprague SM. Role of IL-1 beta and prostaglandins in beta 2-microglobulin-induced bone mineral dissolution. *Kidney Int* 1995; 47:587-91.

4) Ouseph R, Leiser JD, **Moe SM**. Calcitriol and the parathyroid hormone-ionized calcium curve: a comparison of methodologic approaches. *J A Soc Neph* 1996; 7:497-505.

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6) **Moe SM**, Bailey AM. A coculture model of synoviocytes and bone for the evaluation of potential arthritis therapies. *J Pharmacol Toxicol Methods.* 1999; 41:127-34.

7) Brophy DF, Sowinski KM, Kraus MA, **Moe SM**, Klaunig JE, Mueller BA. Small and middle molecular weight solute clearance in nocturnal intermittent peritoneal dialysis. *Perit Dial Int* 1999; 19:534-9.

8) **Moe SM**, Singh GK, Bailey AM. Beta2-microglobulin induces MMP-1 but not TIMP-1 expression in human synovial fibroblasts. *Kidney Int* 2000; 57:2023-34.

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10) Jaradat MI, Schnizlein-Bick CT, Singh GK, **Moe SM.** $\beta_2$-Microglobulin increases the expression of vascular cell adhesion molecule on human synovial fibroblasts. *Kidney Int*. 2001; 59:1951-9.

11) Ahmed S, O'Neill KD, Hood AF, Evan AP, **Moe SM**. Calciphylaxis is associated with hyperphosphatemia and increased osteopontin expression by vascular smooth muscle cells. *Am J Kid Dis*. 2001; 37:1267-76.

12) **Moe SM**, Zekonis M, Harezlak J, Ambrosius WT, Gassensmith CM, Murphy CL, Russell RR, Batiuk TD. A placebo-controlled trial to evaluate immunomodulatory effects of paricalcitol. *Am J Kidney Dis*. 2001; 38:792-802.

13) Chen NX, O'Neill KD, Niwa T, **Moe SM**. Signal transduction of beta2m-induced expression of VCAM-1 and COX-2 in synovial fibroblasts. *Kidney International*. 2002; 61(2):414-24.

14) **Moe SM**, O'Neill KD, Duan D, Ahmed S, Chen XN, Leapman SB, Fineberg N, Kopecky KK. Medial artery calcification in ESRD patients is associated with deposition of bone matrix proteins. *Kidney International*. 2002; 61(2):638-47.

15) Russell R, Brookshire MA, Zekonis M, **Moe SM**. Distal calcific uremic arteriolopathy in a hemodialysis patient responds to lowering of Ca x P product and aggressive wound care. *Clinical Neph*. 2002; 58(4):238-243.

16) O'Neill KD, Chen NX, Wang, M, Cocklin, R, **Moe SM**. Cellular uptake of B2M and AGE-B2M in synovial fibroblasts and macrophages. *Neph Dial Transplant*. 2003:18:46-53-8.

17) Chen NX, O'Neill KD, Duan D, **Moe SM**. Phosphorus and uremic serum upregulate osteopontin expression in vascular smooth muscle cells. *Kidney Int* 2002; 62(5):1724-31.

18) Lindberg JS, **Moe SM**, Goodman WG, Coburn JW, Sprague SM, Lui W, Blaisdell PW, Brenner RM, Turner SA, Martin KJ. The calcimimetic AMG 073 reduces parathyroid hormone and calcium x phosphorus in secondary hyperparathyroidism. *Kidney Int*. 2003; 63(1):248-254.

19) Reslerova M, **Moe SM**. Vascular calcification in dialysis patients: pathogenesis and consequences. *American Journal of Kidney Diseases*. 2003; 41(3, Suppl 1):S96-S99.

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21) **Moe SM**, O'Neill KD, Fineberg N, Persohn S, Ahmed S, Garrett P, Meyer C. Assessment of vascular calcification in ESRD patients using spiral CT. *Neph Dial Transplan.* 2003; 18:1152-1158.

22) Cocklin RR, Zhang Y, Bidasee KR, O'Neill KD, Chen NX, **Moe SM**, Wang M. Identity and localization of advanced glycation end products on human B2-microglobulin using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry. *Analytical Biochemistry*. 2003; 15:322-325.

23) **Moe SM,** Chen NX. Calciphylaxis and vascular calcification: a continuum of extra-skeletal osteogenesis. *Pediatric Neph* 2003; 18:969-975.

24) **Moe SM**, Drüeke, T. Management of secondary hyperparathyroidism: the importance and the challenge of controlling parathyroid hormone levels without elevating calcium, phosphorus, and calcium-phosphorus product. *Am J Neph*. 2003; 23:369-379.

25) Kays, MB, Overholser BR, Mueller BA, **Moe SM**, Sowinski KM. Effects of sevelamer hydrochloride and calcium and acetate on the oral bioavailability of ciprofloxacin. *Am J Kidney Dis.* 2003; 42:1253-1259.

26) **Moe SM**. Calcific uremic arteriolopathy: a new look at an old disorder. *NEPHSAP*, 2004; 3:77-83.

27) Block GA, Martin KJ, deFrancisco ALM, Turner SA, Avram MM, Suranyi MG, Hercz G, Cunningham J, Abu-Alfa AK, Messa P, Coyne DW, Locatelli F, Cohen RM, Evenpoel P, **Moe SM**, Fournier A, Braun J, McCary LC, Zani VJ, Olson KA, Drueke TB, Goodman WG. Cinacalcet Hydrochloride for secondary hyperparathyroidism in patients receiving hemodialysis. *NEJM* 2004; 350:1520-1529.

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29) **Moe SM**, O'Neill KD, Reselerova M, Fineberg N, Persohn S, Meyer CA. Natural history of vascular calcification in dialysis and transplant patients. *Nephrol Dial Transplant.* 2004; 19:2387-93

30) **Moe SM,** Chen NX. The pathophysiology of vascular calcification in chronic kidney disease. *Circ Res* 2004; 95:560-567

31) **Moe SM.** Uraemic vascular calcification. *Journal of the Royal College of Physicians Edinburgh*. 2004; 34:280-286

32) **Moe SM,** Chertow GM, Coburn JW, Quarles LD, Goodman WG, Block GA, Drüeke TB, Cunningham J, Sherrard DJ, McCary LC, Olson MS, Turner SA, Martin KJ. Achieving NKF-K/DOQI bone metabolism and disease treatment goals with cinacalcet HCI *Kidney Int* 2005; 67:760-771

33) **Moe SM.** Disorders of calcium (Ca), phosphorus (P), and magnesium (Mg): core curriculum in nephrology. *Am J Kidney Dis.* 2005: 45:213-8

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41) **Moe SM**, Chertow, GM. The Case against Calcium-Based Phosphate Binders. *Clin J Am Soc Nephrol* 2006 1:697-703

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46) Fadem SZ, **Moe SM.** Management of Chronic Kidney Disease – Mineral Bone Disorder. *Advances Chronic Kidney Dis*, 14(1):44-53, 2007

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51) LaClair R, O'Neill K, Ofner S, Sosa MJ, Labarre Ca, **Moe SM**. Precision of Biomarkers to Define Chronic Inflammation in Chronic Kidney Disease. *J Amer Society of Nephrology* 2008 May 28; 28(5):808-812.

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53) Joly D, Drueke TB, Houillier P, Lawson-body E, Martin KJ, Massart C, **Moe SM,** Monge M, Souberbielle JC. Variation in serum and plasma PTH levels in second-generation assays in hemodialysis patient sectional study. *Am J Kidney Dis* 2008 June; 51(6):987-995.

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63) Kidney Disease: Improving Global Outcomes (KDIGO) CKD-MBD Work Group: KDIGO clinical practice guidelines for the prevention, diagnosis, evaluation, and treatment of Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD). (Work Group: **Moe SM**, Drüeke TB, Block GA, Cannata-Andía JB, Elder GJ, Fukagawa M, Jorgetti V, Ketteler M, Langman CB, Levin A, MacLeod AM, McCann L, McCullough PA, Ott SM, Wang AY, Weisinger JR, Wheeler DC, Persson R, Earley A, Moorthi R, Uhlig K.) Kidney Int Suppl. 2009 Aug; (113):S1-130.

64) Stokes JB, Haupt A, Molitoris BA, Kokemueller P, Ibrahim T, ASN Committee on Corporate Relations, **ASN Council.** ASN policy on managing conflicts of interest. J Am Soc Nephrol 2009 Sep; 20(9):1853-9

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**Textbooks**

1) Sprague SM, **Moe SM**. Neurologic accompaniments of renal failure. In: PJ Vinken, GW Bruyn, HB Klawans, eds. *Handbook of Clinical Neurology*. Amsterdam: North Holland Publishing Co. 1993; 19(63):503-521.

2) Associate Editor, Mineral Metabolism, Yearbook of Nephrology 1999. Editor Steve Schwab, Mosby, Inc. St Louis, MO, 1999.

3) Associate Editor, Mineral Metabolism, Yearbook of Nephrology 2000. Editor Steve Schwab, Mosby, Inc. St Louis, MO, 2000.

4) **Moe SM**. Disorders of Phosphorus Metabolism: In Handbook of Internal Medicine, for Palm Pilots. Robert Alpern, Editor. PocketMedicine.com, Inc., released 2001.

5) **Moe SM**. Calcium, Phosphorus, and Vitamin D Metabolism in renal diseases and chronic renal failure. In Nutritional Management of Renal Diseases, 2nd Edition. Edited by JD Kopple and SG Massry, October 2003.

6) Linberg JS, **Moe SM**. Co-Editor, Seminars in Nephrology, Special Edition on Mineral Metabolism, January 2004.

7) Chen, XC, **Moe, SM.** *Actualités Néphrologiques Jean Hamburger*. Uremic vascular calcification. Edited by P. Lesavre, T. Drüeke, C. Legendre, P. Niaudet. Flammarioin Médecine-Sciences, Paris, France, 2004.

8) **Moe SM**. Renal Osteodystrophy. In Chronic Kidney Disease: Dialysis and Transplantation, 2nd edition. Edited by BJG Pereira, M Sayegh, P Blake. Elsevier Saunders, Philadelphia, PA, 2004

9) **Moe SM** Management of hyperphosphatemia in Chronic Kidney Disease, in Handbook of mineral disorders, Ed by C Hsu, in press

10) Drueke TM, **Moe SM**, Langman C "Treatment of Renal Osteodystrophy" in Disorder of Bone and Mineral Disease published by KDIGO, 2006

11) **Moe SM**. Disorders of Phosphorus Metabolism: In Handbook of Internal Medicine, for Palm Pilots. Robert Alpern, Editor. PocketMedicine.com, Inc., in revision, 2006.

12) **Moe, SM**, Fadem, SF. Advances in Chronic Kidney Disease: journal guest editor "CKD-MBD," January 2007

13) **Moe SM**, Sprague SM. Pathogenesis of CKD-MBD and Renal Osteodystrophy in *The Kidney*, ed. B. Brenner, 2008

14) **Moe SM**, Saifullah A "Disorders of Calcium and Phosphorus," in the Primer of Kidney Diseases, National Kidney Foundation. 5th Edition. Edited by Author Greenburg, M.D.. Elsevier Saunders, Philadelphia, PA, 2009

15) **Moe SM** "Treatment of CKD-MBD" In Chronic Kidney Disease: Dialysis and Transplantation: Companion to Brenner and Rector's The Kidney. 3rd edition. Edited by Himmelfarb, J and Sayegh M. Elsevier Saunders, Philadelphia, PA, 2010 (in press)

**Invited Reviews/Editorials:**

1) **Moe SM**, Sprague SM. Evaluating and treating renal osteodystrophy. *Clinical Comment*. 1991; 7:5-8.

2) Sprague SM, **Moe SM**. The clinical manifestations and pathophysiology of $\beta_2$-microglobulin amyloidosis. *Sem Nephrol*. 1996; 9:360-369.

3) **Moe SM**. Dialysis Amyloid. In: C van Ypersele, T Drueke, eds. *Amyloid*. 1997; 4:142. (book review)

4) **Moe SM**. The treatment of steroid-induced bone loss in transplantation. *Current Opinion in Nephrology and Hypertension*. 1997; 6:544-549.

5) **Moe SM**. Questions in Dialysis-The use of oral bisphosphonates in advanced renal failure. *Semi Dial* 1998; 11(5):318.

6) Lindberg JS, **Moe SM**. Osteoporosis in ESRD. *Semin Nephrol*. 1999; 19:115-122.

7) Lindberg JS, **Moe SM**, Stehman-Breen C. Osteoporosis in ESRD. *Dial Transplant*. 2000; 21:37-42.

8) **Moe SM**, Chen NX. The role of the synovium in $\beta_2$-microglobulin amyloidosis. *Semin Dial*. 2001; 14:127-130.

9) Jaradat M, **Moe SM**. The interaction of $\beta_2$-microglobulin with dialysis membranes. *Semin Dial*. 2001; 14:131-134.

10) **Moe, SM**. Current issues in the management of secondary hyperparathyroidism/bone disease. *Perit Dial Int*. 2001; 21:S241-S246.

11) **Moe, SM**. The impact of HIPAA on human subjects research. *Dialysis Times*. 2002; 9(3):2-8.

12) **Moe, SM**, Chen, NX. Vascular calcification in end stage renal disease. *Clinical Calcium*. 2002; 12(10):51- 56.

13) Chen, NX, **Moe, SM.** Arterial calcification in diabetes. *Cur Diab Rep*. 2003; 3(1): 28-32.

14) Chen, NX, **Moe, SM**. Vascular calcification in chronic kidney disease. *Semin Neph*. 2004, 24:61-68.

15) **Moe, SM**, Drüeke, T. Controversies in bone and mineral metabolism in CKD: a bridge to improving healthcare outcomes and quality of life. *Am J Kidney Dis.* 2004; 3:552-7.

16) Drüeke, T, **Moe, SM**. Disturbances of bone and mineral metabolism in chronic kidney disease: an international initiative to improve diagnosis and treatment. *Neph Dial Transplant*. 2004; 19(3):534-536

17) **Moe, SM.** Cinacalcet hydrochloride. Guest commentary for *Drugs*. 2004, In press.

18) **Moe, SM**. Uremic vasculopathy. *Semin Neph* 2004; 24(5): 413-416

19) **Moe SM**, Chen NX. Vascular calcification. *Nephrology Round, Harvard University*. 2004,

20) Leapman, SB, **Moe, SM**. Protecting the Patient: Human Subjects and Medical Research. *Research Ethics and Medical Education Virtual Mentor, American Medical Association.* November 2004 HTTP://www.ama-assn.org/ama/pub/category/13260.html,

21) **Moe SM**, Chen NX. Inflammation and vascular calcification. *Blood Purif* 2005; 23: 64-71

22) Chertow GM, **Moe SM**. Calcification or Classification? *J Am Soc Neph*. 2005; 16:293-96

23) Wolisi GO, **Moe SM.** The role of vitamin D in vascular calcification. *Semin Neph* 2005; 18:307-14.

24) **Moe SM.** Vascular calcification: Hardening of the evidence. *Kidney Int*. 2006 Nov; 70(9):1535-7.

25) Chen NX, **Moe SM**. Uremic vascular calcification. *J Investig Med*. 54(7):380-4, 2006

26) **Moe SM**: Treating CKD-MBD. *Therapeutic Apheresis*, 2007

27) **Moe SM.** Vitamin D, cardiovascular disease, and survival in CKD. *J Bone Miner Res*, 2007 Dec; 22 Suppl 2:V95-99.

28) **Moe SM**, Drueke T: Improving Global Outcomes in Mineral and Bone Disorders. *Clin J Amer Soc Neph*, 3:S127-30, 2008

29) Moe SM: Vascular Calcification: The three-hit model. *J Amer Soc Neph*, 2009 Jun; 20(6):1162-4.

30) Zidehsarai M, **Moe SM** CKD-MBD*:* Have We Got the Assays Right? Nephrology 2009 Jun; 14(4):374-82.

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EDUCATION

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| 1967-1971 | Barnard College, New York, NY, B.A. |
| 1971-1975 | Johns Hopkins University School of Medicine, Baltimore, Maryland, M.D. |
| 2004-2006 | Rollins School of Public Health, Emory University, Atlanta, GA, M.P.H. |

POSTGRADUATE EDUCATION

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|---|---|
| Internship, Internal Medicine | Johns Hopkins, Baltimore, Maryland, 1975-1976 |
| Residency, Internal Medicine | Johns Hopkins, Baltimore, Maryland, 1976-1978 |
| Fellowship in Gastroenterology | University of Maryland School of Medicine, Baltimore, Maryland, 1978-1979 |
| Fellowship in Rheumatology | Senior Fellow, University of Washington School of Medicine, Seattle, Washington, 1979-1981 |

EXPERIENCE

| | |
|---|---|
| Assistant Professor of Medicine | Division of Rheumatology, Department of Indiana University School of Medicine, 1981-1986 |
| Chief of Rheumatology | Wishard Memorial Hospital, 1984-1992 |
| Assistant Professor of Biochemistry | Department of Biochemistry, Indiana University School of Medicine, 1985-1986 |
| Associate Professor of Medicine and Biochemistry and Molecular Biology (with tenure) | Departments of Medicine and Biochemistry, Indiana University School of Medicine, 1986-1993 |
| Associate Director | Indiana University Specialized Center of Research in Osteoarthritis, 1987-1992 |

| | |
|---|---|
| Member | Graduate Faculties, Indiana University, 1989- present |
| Assistant Dean for Research | Indiana University School of Medicine, 1990 – 2001 |
| Professor of Medicine and Biochemistry and Molecular Biology (with tenure) | Departments of Medicine & Biochemistry & Molecular Biology, Indiana University School of Medicine, 1993- present |
| Director | Indiana University Outpatient Clinical Research Facility, 1993-2008 |
| Founding Director | IU National Center of Excellence in Women's Health, Indiana University School of Medicine, 1997-2008 |
| Barbara F. Kampen Professor of Women's Health | IU School of Medicine, 2001-present |
| Associate Dean for Research | IU School of Medicine, 2001-present |
| Co-Director | IU Family Violence Institute, an IUPUI Signature Center, 2006-present |
| Associate Director | Indiana Clinical and Translational Sciences Institute, 2008-present |
| HONORS | Phi Beta Kappa, Barnard College |
| | B.A., *Magna Cum Laude*, Barnard College |
| | Sigma Xi |
| | Alpha Omega Alpha |
| | Allied Corporation Investigator in Osteoarthritis, 1986-1989 |
| | Governor's Voluntary Action Program, Community Service Award, Indiana, 1992 |
| | IUPUI Commission on Women Award, 1998 |
| | Boundary Spanning Award, Indiana University School of Nursing, 2004 |
| | Nominee, 2006 Hoosier Health Heroes, 2006 |
| | Recipient, 2006 Glenn W. Irwin, Jr., M.D. Research Scholar Award, IUPUI, 2006 |
| | Recipient, First Dr. Kathleen Galbraith Legacy Leadership Award, 2008 |
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Associate Editor — Translational Medicine (formerly Journal of Laboratory and Clinical Medicine), 2001 - present

Associate Editor — AAMC MedEdPORTAL, 2008-present

Member — Editorial Advisory Board, *J Lab Clin Med*, 1994-2001; *Journal of Women's Health Research*, 2001-present

PROFESSIONAL ACTIVITIES

Fellow, American College of Physicians

Member, American Society for Biochemistry and Molecular Biology

Central Society for Clinical Research

- Member, Program Committee, 1989
- Rheumatology Councilor, 1993-1995
- Councilor, 1997-present
- Secretary-Treasurer, 2002-2003
- Vice-President, 2003-2004
- President-Elect, 2004-2005
- President, 2005-2006
- Past President, 2006-2007

American Federation for Clinical Research

- Secretary-Treasurer, 1990-1993
- Chairperson, Sections Committee, 1990-1993
- Chairperson, Publications Committee,1990-1993
- Member, National Council, 1988-1993
- Secretary-Treasurer, Midwest Section, 1988-1990
- Councilor, Midwest Section, 1986-1988
- Senator, Midwest Section, 1983-1986
- Member, Board of Trustees, AFCR Foundation
- Secretary-Treasurer, 1990-1993

Fellow, American College of Rheumatology

Chairperson, Cartilage Study Group, 1987-1989

Member, Program Committee, Midwest Region, 1989-90

Member, National Program Committee, 1991

Member, American Association for the Advancement of Science

Member, American Society for Cell Biology

Member, American Association for Cancer Research

Member, American Medical Women's Association,1995-2004

Member, AMWA, Career Leadership Development Committee, 2002-2004

Member, Publications Committee, 2002-2004

Women's Liaison Officer, Association of American Medical Colleges, 1992-present

Member, Board of Directors, Arthritis Foundation, Indiana Chapter, 1987-1994, 1998-2005

Chair, Medical & Scientific Committee, 1990 – 1993

Member, National Arthritis Foundation Biomedical Research Grants Subcommittee, 1989-1993

Reviewer,

Acad Medicine,

Arthritis and Rheumatism,

Journal of Clinical Investigation,

Journal of Laboratory and Clinical Medicine,

Connective Tissue Research,

Journal of Rheumatology,

Biochimica et Biophysica Acta,

Biochemical Pharmacology,

Biochemistry and Cell Biology,

Clinical Cancer Research,

J Amer Public Health Assoc,

J Women's Health Research

Member, NIAMS Site Visit Team, 1987

Member, NIA Ad Hoc Study Section, 1988

Reviewer, VA Merit Review, 1989, 1993-2005

Member, NIAMS Ad Hoc Study Section, 1989, 1991

Reviewer, Medical Research Council of Canada, 1990-91

Chair, NIA Ad Hoc Study Section, 1991, 1992

Member, NIOSH Site Visit Team, 1991

Member, NIH SBIR Ad Hoc Study Section, 1991, 1998

Member, National Advisory Council for Nursing Research, NIH, 1992-1996

Member, Special NIH Task Force on Strategic Planning, 1992

Member, NCI Ad Hoc Study Section, 1995

Member, NIAMS Site Visit Team, 1996

Member, General Clinical Research Centers Review Committee, NCRR, NIH, 1997-2001

Member, Internal Advisory Committee, Indiana University Cancer Center, 1994-2002

Member, Admissions Committee, Indiana University School of Medicine, 1995-1999

Member, Executive Committee, Indiana University School of Medicine, 1990- present

Chair, Committee on Conflict of Interest, Indiana University School of Medicine, 1995-2007

Member, Search and Screen Committee for Director of Technology Transfer, Indiana University, 1995-1996

Member, Advisory Committee, Laboratory Animal Resource Center, Indiana University School of Medicine, 1995-present

Dean's Office Liaison, LARC, 1995-present

Member, Search and Screen Committee for Dean, Indiana University School of Dentistry, 1996

Member, Board of Trustees, Indianapolis Museum of Art, 1992-present

Member, Steering Committee, Indiana Repertory Theater, Repertory Society 1993-1998

Member, Women and Health Research and Policy Team, IUPUI, 1995-1998

Member, Indiana State Department of Health Subcommittee on Health Care Professional Distribution, 1996-2005

Member, Committee on Educational and Professional Development, Indiana University School of Medicine, 1996-2000

Member, Department of Medicine Promotion and Tenure Committee, Indiana University School of Medicine, 1996-2005

Member, Indianapolis Veterans Administration Research and Development Committee, 1996-1998

Member, Technology Transfer Advisory Committee, Indiana University, 1997-2002

Member, Indiana University General Clinical Research Center Executive Committee, 1997-2002

Member, Indiana University General Clinical Research Center Scientific Advisory Committee, 1997-2002

Member, Search and Screen Committee for Vice-Chancellor for Research and Graduate Students, IUPUI, 1997-1998

Member, Indiana State Department of Health Advisory Committee for Indiana Osteoporosis Prevention Initiative, 1997-2005

Member, Board of Directors, Ovar’Coming Together, 1998-1999

Dean’s Office Liaison, Radiation Safety Committee, 1998-2000

Member, Advisory Board, Indiana State Department of Health Office of Women's Health, 1998-2005

Member, Self-Assessment Subcommittee, American College of Rheumatology, 2000-2001

Member, Steering Committee, AAMC Group on Research Advancement and Development (GRAND Group), 2001-present
Chair-Elect, 2004-2006
Chair, 2006-2007
Past Chair, 2007-2008

Member, AAMC Forum on Conflict of Interest in Research, 2007-present

Member, IUPUI Committee on Ethics in Research, 2001-2005

Member, IUSM Teacher-Learner Advocacy Committee, 2001-2003

Member, Arthritis Steering Committee, Indiana State Department of Health, 2002-2005

Member, External Advisory Committee, University of Puerto Rico RCMI, San Juan, 2002-2008

Participant, NCRR Strategic Planning Forum, NIH, 2003

Founding Member, Association of Academic Women's Health Programs, 2003-present

Grant reviewer, Susan G. Komen Foundation, Cell Biology Study Section, 2000-2003

Chair, Search and Screen Committee for Director of IUSM Laboratory Animal Research Center, 2004-2005

Member, Second AAMC Task Force on Clinical Research, 2004-present

Member, Panel for NIH State-of-the-Science on Management of Menopause-Related Symptoms, March, 2005

Member, Search and Screen Committee for Associate Dean for Clinical Research, IUSM, 2004-2005

Member, Scientific Advisory Committee, Research! America, 2005-present

Member, Search and Screen Committee for Program Director for IU General Clinical Research Center, 2005-2006

Member, Committee on Conflict of Interest and Ethics, American College of Rheumatology, 2006-present

Member, Search and Screen Committee for Chair of OB/Gyn, 2006-2007

Member, Special Emphasis Panel, NCRR CTSA Grant Review, 5/2007, 2/2009

Co-Chair, IUPUI Conflict of Interest Committee, 2008-present

PATENTS

"Novel Cancer Treatment Utilizing Tetracyclines," patent number 08/431,751, 1997.

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Reviewed Papers

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2. RD Spitz, DF Keren, JK Boitnott, WC Maddrey. Hepatic Necrosis: Etiology and Prognosis. Amer J Digest Dis 23:1076-1078, 1978

3. JM May, R Spitz, E Yourtee, WB Greenough III. S. Aureus Endocarditis: A Review and Plea for Early Surgery. Virginia Med 106:829-835, 1979

4. RD Leff, MA Aldo-Benson, RS Fife. Tophaceous Gout in a Patient with Sickle Cell-Thalassemia: Case Report and Review of the Literature. Arthritis Rheum 26:928-929, 1983

5. KH Fife, RS Fife, MB Kleiman, MLV French. Incorrect Typing of Herpes Simplex Virus Isolates by Direct Immunofluorescence. J Infect Dis 148:338, 1983

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7. RS Fife, SD Williams, S Eyanson. Dermatomyositis Associated with Treated Testicular Carcinoma. J Rheumatol 11:397-398, 1984

8. RS Fife, KD Brandt. Identification of a High-Molecular-Weight (>400,000) Protein in Hyaline Cartilage. Biochim Biophys Acta 802:506-514, 1984

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10. RS Fife, B Caterson, SL Myers. Identification of Link Proteins in Canine Synovial Cell Cultures and Canine Articular Cartilage. J Cell Biol 100:1050-1055, 1985

11. RS Fife. Identification of Link Proteins and a 116,000-Dalton Matrix Protein in Canine Meniscal Cartilage. Arch Biochem Biophys 240:682-688, 1985

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51. ML Ranney, W Odero, MJ Mello, M Waxman, RS Fife. Injuries from interpersonal violence presenting to a rural health center in Western Kenya: Characteristics and correlates. Injury Prevention 15:36-40, 2009

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54. RS Fife, KA Lane, D Cox. Demographics of intimate partner violence in a Web-based survey of women. (In preparation), 2009

Abstracts

M.S. Proposal – Translational Science

1. RS Fife, LJ D'Anniballe, KD Brandt. Link Protein (LP) and Cartilage Matrix Protein (CMP) in Atrophic Canine Cartilage. Clin Res 30:805A, 1982

2. RS Fife, LJ D'Anniballe, KD Brandt. Cartilage Matrix Protein in Articular Cartilage. Trans 29th Annual Meeting, Orthop Res Soc 8:145, 1983

3. RS Fife, LJ D'Anniballe, KD Brandt. Characterization of a Matrix Protein (MP) in Articular Cartilage. Arthritis Rheum 26 (Suppl):S41, 1983

4. RS Fife, S Eyanson, MA Aldo-Benson, MT Stack, RB Jones. Reiter's Syndrome and Chlamydial Infection. Clin Res 31:802A, 1983

5. RS Fife, MJ Palmoski, KD Brandt. Synthesis of Non-Collagenous Proteins in Canine Articular Cartilage In Vitro. Trans 30th Annual Meeting, Orthop Res Soc 9:65, 1984

6. RS Fife, GL Hook, KD Brandt. Immunologic and Quantitative Studies of the 400-Kilodalton (Kd) Protein in Hyaline Cartilage. Clin Res 32:463A, 1984

7. RS Fife, GL Hook, SL Myers. Identification of Link Protein in Synovial Cell Cultures. Arthritis Rheum 27(Suppl):S24, 1984

8. R Fife, G Hook, K Brandt. Immunohistologic Localization of the 116-Kilodalton Protein in Bovine and Canine Articular Cartilage. Arthritis Rheum 27(Suppl):S79, 1984

9. R Fife, G Hook. Identification of Link Proteins and a 116K Glycoprotein in Meniscal Cartilage. Clin Res 32:757A, 1984

10. RS Fife, SL Myers, GL Hook, B Caterson. Characterization of Link Proteins in a Related 70K Protein in Synovial Cell Cultures and Articular Cartilage. Clin Res 32:757A, 1984

11. RS Fife, GL Hook. Non-Collagenous Proteins in Meniscal Cartilage. Trans 31st Annual Meeting, Orthop Res Soc 10:45, 1985

12. RS Fife, SL Myers. Evidence for Absence of Proteoglycan Aggregates in Synovial Cell Cultures. Fed Proc 44:1789, 1985

13. RS Fife, GL Hook, KD Brandt. Link Proteins in Atrophic Canine Articular Cartilage. Clin Res 33:591A, 1985

14. RS Fife, GL Hook. Vitreous Contains a Cartilage-Related Protein. Clin Res 33:505A, 1985

15. RS Fife, SL Myers. Interactions of Proteoglycans Synthesized by Cultured Canine Synovial Cells. Clin Res 33:505A, 1985

16. RS Fife, GL Hook, KD Brandt. Metabolism of the 550-Kilodalton Protein in Organ Cultures of Canine Articular Cartilage. Clin Res 33:840A, 1985

17. RS Fife, GL Hook, GN Smith Jr. Evidence for the Interaction of a 550-Kilodalton Cartilage Protein with Collagen. Clin Res 33:840A, 1985

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19. RS Fife. Changes in a 550-Kilodalton Cartilage Protein in Canine Osteoarthritis. Clin Res 34:616A, 1986

20. RS Fife, SL Myers. Evidence that a 70-Kilodalton Protein Serves as a Precursor of Link Protein in Synovial Cells. Clin Res 34:616A, 1986

21. RS Fife. Immunologic and Quantitative Studies of a 550-Kilodalton Protein in Osteoarthritis. Arthritis Rheum 29(Suppl):S12, 1986

22. RS Fife, GN Smith Jr. Localization of a 550,000-Dalton Cartilage Matrix Protein in Embryonic Cartilage and Eye. Arthritis Rheum 29(Suppl):S12, 1986

23. RS Fife, JD Board, KD Brandt. Changes in Cartilage Matrix Glycoprotein in Serum and Synovial Fluid of Dogs with Experimental Osteoarthritis. Clin Res 34:920A, 1986

24. RS Fife, JD Board, KD Brandt. Cartilage Matrix Glycoprotein may be a Serum Marker for Canine Osteoarthritis. Trans 33rd Annual Meeting, Orthop Res Soc 12:306, 1987

25. RS Fife. Identification of Cartilage Matrix Glycoprotein in Synovial Fluid from Osteoarthritic Human Joints. Clin Res 35:562A, 1987

26. RS Fife, PA Conrad, MR Sherman, JD Board. Identification of Link Protein (LP) in Liver. Clin Res 35:408A, 1987

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28. RS Fife, JD Board, M Sherman. Synthesis and Localization of Cartilage Matrix Glycoprotein in Chondrocyte Cultures. Arthritis Rheum 30(Suppl):S76, 1987

29. RS Fife, MR Sherman, JD Board. Cartilage Matrix Glycoprotein is not Disulfide-Bonded in Immature Canine Cartilage. Arthritis Rheum 30(Suppl):S76, 1987

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31. SL Myers, S Stack, RS Fife. Cartilage Link Protein Antibody Immunolocates 57-62 kDa Proteins Associated with Synovial Dermatan and Chondroitin Sulfate. Arthritis Rheum 31(Suppl):R26, 1987

32. RS Fife, SL Myers, MR Sherman. Link Proteins Purified from Synovial Cell Cultures. Trans 34th Annual Meeting, Orthop Res Soc 13:168, 1988

33. RS Fife, MH Doran, MR Sherman, M Mundy, S DeAtley. Presence of Cartilage Matrix Glycoprotein (CMGP) in Serum in Human Osteoarthritis. Clin Res 36:532A, 1988

34. RS Fife, KD Brandt, M Albrecht. Proteoglycan (PG) Depletion due to Cartilage Atrophy does not Release Cartilage Matrix Glycoprotein (CMGP) into Serum. Arthritis Rheum 31:S71, 1988

35. KA Kovalow-St John, RS Fife, KD Brandt, MR Sherman. Factors Affecting Release of Cartilage Matrix Glycoprotein (CMGP) from Cartilage In Vitro. Arthritis Rheum 31:S71, 1988

36. MH Doran, RS Fife. Cartilage Matrix Glycoprotein (CMGP) in Normal and Osteoarthritic Canine Menisci. Clin Res 36:842A, 1988

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38. RS Fife, SL Myers. Link Protein (LP) and Glycosaminoglycans (GAGs) in Synovium from Normal and Osteoarthritic Canine Knees. Clin Res 37:506A, 1989

39. RS Fife, SL Myers, KD Brandt, J Ehlich, D Shelbourne. Failure to Detect "Early" Osteoarthritis (OA) of the Knee by a Screening Test for Cartilage Matrix Glycoprotein in Serum. Arthritis Rheum 32(Suppl):S107, 1989

40. KA Kovalow-St. John, RS Fife, KD Brandt. Effect of Proteoglycan (PG) Depletion on Release of Cartilage Matrix Glycoprotein (CMGP) from Cartilage. Arthritis Rheum 32(Suppl):S140, 1989

41. SL Myers, RS Fife. The Glycosaminoglycan Composition of Synovium from Normal and Osteoarthritic Canine Knees. Arthritis Rheum 32(Suppl):S107, 1989

42. RS Fife, KD King, C Proctor. Cartilage Matrix Glycoprotein (CMGP) in Chondrocyte Membranes. Clin Res 37:905A, 1989

43. RS Fife, KD King, C Proctor. Cartilage Matrix Glycoprotein is a Chondrocyte Membrane Protein. Trans 36th Annual Meeting, Orthop Res Soc 15:299, 1990

44. RS Fife, SL Myers. Relationship of Link Protein (LP) and an Immunologically Related 70K Protein in Synovial Cells (SC). Clin Res 38:577A, 1990

45. R Fife, K Brandt, E Braunstein, B Katz, K Shelbourne, L Kalasinski, S Ryan. Relationship between Cartilage Damage and Radiographic Joint Space Narrowing (JSN) in Early Osteoarthritis (OA) of the Knee. Arthritis Rheum, 33(Suppl):S117, 1990

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47. R Fife, K King, C Proctor, K Brandt, S Ryan. Quantitative Assay for a Cartilage Matrix Glycoprotein (CMGP). Clin Res 39:180A, 1991

48. RS Fife, JD Bradley, KD Brandt, S Ryan, K King, C Proctor, S Mazzuca. Quantitation of Cartilage Matrix Glycoprotein (CMGP) in Serum from Humans with Osteoarthritis (OA). Arthritis Rheum 34(Suppl):S86, 1991

49. RS Fife, JW Rachow, LM Ryan. Cartilage Matrix Glycoprotein in Plasma (CMGPP) and Synovial Fluid (CMGPS): Retention in Synovial Fluids Containing Basic Calcium Phosphate (BCP) Crystals. Arthritis Rheum 34(Suppl):S106, 1991

50. RS Fife, D Houser, C Proctor, B Kluve-Beckerman, J Liepnieks, I Masuda, DJ McCarty, LM Ryan. Cartilage Matrix Glycoprotein (CMGP) is a Chondrocyte Membrane-Associated Protein with Sequence Homology to Ceruloplasmin (CP). Clin Res 40:360A, 1992

51. RS Fife, D Houser, C Proctor. Changes in Chondrocyte Protein Synthesis in the Presence of Excess Copper and Antibodies to Ceruloplasmin (CP) and a CP-like Cartilage Glycoprotein (CMGP). Osteoarthritis and Cartilage 1:29, 1992

52. RS Fife, D Houser, C Proctor. Labeling of Cartilage Matrix Glycoprotein (CMGP) by $^{67}$Cu in chondrocyte cultures. Clin Res 41:370A, 1993

53. RS Fife, GW Sledge Jr, J Dunn, C Proctor, D Houser. Effects of a Synthetic Tetracycline (TCN) on Breast Cancer Cell Growth and In Vitro Invasiveness. Clin Res 41:647A, 1993

54. RS Fife, D Houser, C Proctor. Studies of copper binding and enzyme activity of a 550-KD cartilage protein (CMGP). Arthritis Rheum (In press), 1993

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65. RS Fife, GW Sledge, B Zerler, T Parsley. Inhibition of Cell Proliferation and Angiogenesis by a Chemically Modified Tetracycline (CMT), COL-3, *In Vitro*. Beatson International Cancer Conference, Glasgow, Scotland, 1999

66. AF Hood, AD Zerr, JH Fife, JJ Nocon, RS Fife. Teaching Medical Students about Domestic Violence. J Women's Health and Gender-Based Med 8:710, 1999

67. L Moreland, W Chase, R Fife, J Hillson, T Greco, J Korn, M Weisman. rhIL-11 RA Study Group, K King, D Lyons, R Gugliotti. Phase I/II Study Evaluating the Safety and Potential Efficacy of Recombinant Interleukin-11 in Patients with Refractory Rheumatoid Arthritis. Arthritis Rheum 42: S171, 1999

68. RS Fife, LM Knapp. Inhibition of HeLa Cells by Anti-Tumor Agents. 18th International Papillomavirus Conference, Barcelona, 2000

69. RS Fife. Conflicts Surrounding Formation of Independent Companies by Faculty Members. First NIH/AAAS/AAMC Conference on Research Integrity, Washington, DC, 2000

70. B Stott, RE Carr, RS Fife. Effect of a Selective Cyclooxygenase (COX)-2 Inhibitor on Human Breast and Prostate Cancer Cells. Proc Amer Assoc Cancer Res 42:105, 2001

71. RS Fife, RE Carr. Effects of Nitric Oxide Synthase Inhibition on Cancer Cell Proliferation and Nitric Oxide Concentration. J Invest Med, Sept, 2002

72. DS Cox, AD Cox, KH Fife, RS Fife, RM Mays, LA Sturm. The Effect of Graphical Presentation of HPV Risk Information on Mother's Attitudes and Intention toward HPV Vaccination for Daughters: An Experiment. 17th ISSTDR meeting, July, 2007

73. GD Zimet GD, JW Burrage, DS Cox, AD Cox, RM Mays, Fife RS, Fife KH. Perceptions of the CDC Revised Recommendations for HIV Testing among Women Attending Community Health Clinics. 17th ISSTDR meeting, July, 2007

74. W Odero, M Ranney, M Waxman, T Simiyu, KA Lane, RS Fife. Relationship between alcohol and domestic violence in Mosoriot, Kenya. Safety 2008 meeting, March, 2008

75. RS Fife, A Laskey, D Litzelman, D Griffith, D Stubbs, S Pais, G Westmoreland. New course for medical students on family violence. Acad on Violence and Abuse 2009 Conference, April, 2009

**Books, Chapters, and Invited Papers**

1. WR Bell, E Zerhouni, R Spitz. Clinicopathologic Conference: Paroxysmal Nocturnal Hemoglobinuria. Johns Hopkins Med J 142:218-223, 1978

2. KD Brandt, RS Fife. The Diagnosis of Osteoarthritis. Medical Student 9:4-7, 1983

3. RS Fife. Rheumatoid Arthritis: Diagnosis and Management. J Indiana St Med Assoc 76:747-752, 1983

4. RS Fife. Book Review: Collagen in Health and Disease. Clin Rheum in Practice 2:130, 1984

5. KD Brandt, RS Fife. Ageing in Relation to the Pathogenesis of Osteoarthritis in the Elderly. Clin in Rheum Dis 12:117-130, 1986

6. RS Fife. Studies of a 550,000-dalton Cartilage Matrix Glycoprotein. Ryumachi 30:469-472, 1990

7. RS Fife. Cartilage Matrix Glycoprotein as a Possible Marker of Osteoarthritis. J Rheumatol 18 (Suppl 27):30-31, 1991

8. RS Fife. A Short History of Osteoarthritis. In Osteoarthritis: Diagnosis and Management. Edited by RW Moskowitz, DS Howell, VM Goldberg, HJ Mankin. Second Edition. Philadelphia: WB Saunders Co, pp. 11-14, 1992

9. RS Fife, KD Brandt. Experimental Therapy in Osteoarthritis. In Osteoarthritis: Diagnosis and Management. Edited by RW Moskowitz, DS Howell, VM Goldberg, HJ Mankin. Second Edition. Philadelphia: WB Saunders Co, pp. 511-526, 1992

10. RS Fife. Imaging, Arthroscopy and "Markers." In Current Opinion in Rheumatology. 4:560-565, 1992

11. RS Fife, KD Brandt. Extracellular Matrix of Cartilage: Glycoproteins. In Cartilage Degradation: Basic and Clinical Aspects. Edited by JF Woessner, DS Howell. New York: Marcel Dekker, Inc., pp. 139-158, 1993

12. RS Fife. Osteoarthritis. In Principles of Geriatric Medicine and Gerontology. Edited by WR Hazzard, EL Bierman, JP Blass, WH Ettinger Jr, JB Halter. Third Edition. New York: McGraw-Hill, Inc., pp. 981-986, 1993

13. RS Fife. Osteoarthritis and Related Syndromes. In Current Practice of Medicine, Rheumatology Volume. Vol. 2. Edited by RC Bone. Philadelphia: Current Science, pp. VI:15.1-15.4, 1996

14. RS Fife. Osteoarthritis in Elderly Women. In Textbook of Women's Health. Edited by L Wallis. Boston: Little, Brown and Co., pp. 439-443, 1997

15. RS Fife. Osteoarthritis. In Primer of Rheumatic Diseases. Edited by RL Wortmann. Atlanta: Arthritis Foundation, pp. 216-218, 1997

16. J Cargan, MA Casey, N Goldstein, RS Fife, FA Jaffer, RD Sharma, LH Kircik, JK Min, DE Pitchford, IE Chen. The Best Test Preparation for the USMLE Step 1 United States Medical Licensing Examination. Piscataway, NJ: Research and Education Association, 1998

17. RS Fife, FA Jaffer, CL Levitz, G Rana-Mukkavilli, TM Worner, JK Min, IE Chen. The Best Test Preparation for the USMLE Step 2 United States Medical Licensing Examination. Piscataway, NJ: Research and Education Association, 1998

18. RS Fife, J Min, D Monasebian, G Rana-Mukkavilli, V Shah, V Tarakchyan, TM Worner. The Best Test Preparation for the USMLE Step 3 United States Medical Licensing Examination Piscataway, NJ: Research and Education Association, 1999

19. RS Fife. New Treatment Options in Rheumatology. Medical Crossfire 1:43, 1999

20. RS Fife. HIV/STDs in Minority Women: Educational and Medical Interventions to Alter the Spread. Curr Women's Health Rep 2:203-207, 2002

21. RS Fife. Comprehensive Approach to Women's Health in the United States. Proc Second International Symposium on Maternal and Child Health, pp. 9-15, 2004. Tokyo, Japan

22. AAMC Task Force II on Clinical Research. Promoting Translational and Clinical Research: The Critical Role of Medical Schools and Teaching Hospitals. Washington, DC: AAMC, 2006 (Gabbe SG, Riordan MC, Brimhall DC, Alpern RJ, Brass LF, Carey RM, Dang CV, Desnick RJ, Fife RS, Gibbons GH, Henney J, Holmes EW, Katen-Bahensky D, Klibanski A, Licter AS, Marsh MH, Moldow CF, Orringer EP, Rudick RA, Schnitzer TJ, Sellick K, Williams RS)

23. RS Fife. The Indiana University Family Violence Institute. Indianapolis Medical Society Bulletin. 97:8, 2008

24. RS Fife, S Schrager, Eds. ACP Handbook of Women's Health. Philadelphia: ACP Press, 2009

25. RS Fife, S Schrager, Eds. Family Violence: What Health Care Providers Need to Know. Johnson and Bartlett Publishers (in preparation), 2010

# CURRICULUM VITAE

# WILLIAM PAUL HETRICK

***PROFESSIONAL ADDRESS PERSONAL ADDRESS & INFORMATION***

Indiana University
Department of Psychology
1101 East Tenth Street
Bloomington, IN 47405-7007
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(812) 339-3928

***Spouse***: Carol A. Hetrick
***Children***: Alexandra & Gabrielle

**EDUCATION**

1999 **Doctor of Philosophy, Department of Psychology, The Ohio State University**, Columbus, OH
- Clinical Psychology
- *Clinical Internship*: HARVARD MEDICAL SCHOOL/MCLEAN HOSPITAL, Belmont, MA.

1993 **Master of Arts, Department of Psychology, California State University**, Fullerton, CA
- Experimental Psychology

1987 **Bachelor of Arts, Point Loma Nazarene College**, San Diego, CA
- Psychology
- Certificate in Computer Science

**POSITIONS**

2009-p **Professor**, Department of Psychological and Brain Sciences, Indiana University, Bloomington, IN
2009-p **Professor**, Program in Neuroscience, Indiana Univ., Bloomington, IN
2009-p **Adjunct Professor of Psychology** Department of Psychiatry, Indiana Univ., School of Medicine, Indianapolis, IN
2005-2009 **Associate Professor**, Department of Psychological and Brain Sciences, Indiana University, Bloomington, IN
2005-2009 **Associate Professor**, Program in Neuroscience, Indiana Univ., Bloomington, IN
2006-2009 **Associate Professor of Psychology** Department of Psychiatry, Indiana Univ., School of Medicine, Indianapolis, IN
1999-2005 **Assistant Professor**, Department of Psychology, Indiana Univ., Bloomington, IN
2001-2005 **Assistant Professor**, Program in Neural Science, Indiana Univ., Bloomington, IN
1998-1999 **Clinical Fellow**, Department of Psychiatry, Harvard University Medical School, Cambridge, MA
1997-1998 **Graduate Teaching Associate**, Department of Psychology, The Ohio State University, Columbus, OH
1997 **Psychologist Trainee**, Veterans Affairs Medical Center, Chillicothe, Ohio
1996-1997 **Graduate Course Assistant**, Department of Psychology, The Ohio State University, Columbus, OH

1995-96 **Graduate Research Associate**, Office for Disability Services, The Ohio State University, Columbus, OH

1990-95 **Staff Research Associate II**, Department of Psychiatry and Human Behavior, University of California, Irvine

1990-95 **Laboratory Manager**, Neurophysiology Laboratory, Fairview Developmental Center, Costa Mesa, CA

1989-93 **Graduate Research Assistant**, Neurophysiology Laboratory, Fairview Developmental Center & State Developmental Research Institutes, Costa Mesa, CA

1988-89 **Lecturer**, Department of Psychology, Point Loma Nazarene College, San Diego, CA

1987-89 **Graduate Teaching Assistant**, Department of Psychology, California State University, Fullerton, CA

**HONORS**

2002 NARSAD Young Investigator Award
2004 NARSAD Young Investigator Award
2007 Trustee Teaching Award, Indiana University, Bloomington
2008 Alumnus of the Year, Point Loma Nazarene College, San Diego, CA

**GRANTS**

**Graduate Student Alumni Research Award** (1998 - 1999). The Ohio State University Graduate School. *$1435* competitive dissertation funding award.

**ERP gating and temporal variability in schizophrenia** (1996 - 1999). National Institute of Mental Health small grant program. *$49,000*. Investigator. (Principal investigator: Julie Patterson).

**Research Training Grant in Clinical Science** (1999-2003). National Institute of Mental Health (T32 MH17146). *$174,000/yr.* Core faculty member. (Principal investigator: Richard McFall).

**Gamma Synchronization in Schizophrenia Spectrum Disorders** (2001). National Institute of Mental Health (R03-MH63112-01). *$25,000.* Investigator. (P.I.: Brian F. O'Donnell).

**Visual processing in schizophrenia and schizotypal personality disorder** (2001-2004). National Institute of Mental Health (RO1 MH62150-01). *$125,000/yr*. Investigator. (Principal investigator: Brian F. O'Donnell).

**Evaluation of preparation free EEG/evoked potential technology** (2002-2005). This is a subcontract to a National Institutes of Health Small Business Innovative Research Grant Program, National Institute of Neurological Diseases and Stroke to Jim O'Halloran, Ph.D., NeuroComp Systems, Newport Beach, CA and University of California, Irvine, titled, "Preparation free EEG/evoked potential technology." Direct costs (Hetrick's subcontract): $24,000.

**Examination of Neural Timing Circuits in Schizophrenia** (2002-2004). National Alliance for Research on Schizophrenia and Depression (NARSAD) Young Investigator Award. $60,000 direct costs. Principal Investigator: Hetrick.

**Alcohol Pharmacodynamics and Familial Risk for Alcoholism** (2002-2007). National Institute of Alcohol Abuse and Alcoholism. The present project is the Human Genetics Research Component of the Indiana Alcohol Research Center (P60 AA07611-16, David Crabb P.I). (P.I.: Sean O'Connor). Direct Costs for component: $836,837; Direct cost for entire center: $1,447,904. Investigator.

**ERPs in schizophrenia and alcohol dependence** (2003-2004). National Institute of Mental Health (R03 MH066149-01A1). $50,000 direct costs. Principal Investigator: Hetrick.

**Neural Integration of Visual Memory in Schizophrenia** (2003-2004). National Institute of Mental Health Pre-doctoral Research Service Award (F31-MH068933-01). $29,078 direct costs. Awarded to my graduate student Colleen Brenner.

**Examination of temporal architecture dysfunction in schizophrenia** (2004-2006). National Alliance for Research on Schizophrenia and Depression (NARSAD). $60,000 direct costs. Principal Investigator: Hetrick.

**Research Training Grant in Clinical Science** (2004-2009). National Institute of Mental Health (T32 MH17146). *$297,305/yr.* Core faculty member. (Principal investigator: Richard McFall).

**Components of attentional control in schizophrenia** (2004-2006). National Institute of Mental Health Pre-doctoral Research Service Award (F31 MH070186-01). $60,000 direct costs. Awarded to my graduate student Paul Kieffaber.

**Neurobehavioral correlates of bipolar disorder.** (2004-2007). National Institute of Mental Health (R21MH071876-01). $125,000/year direct costs. Principal investigator: Brian F. O'Donnell. Investigator: Hetrick.

**Effects of RG1068 (Secretin) on Information Processing in Refractory Schizophrenia** (2005-2006). Repligen Corporation (a biopharmaceutical company). $66,125/year direct costs. Principal investigator: Anantha Shekhar. Investigator: Hetrick.

**Visual processing in schizophrenia and schizotypal personality disorder** (2005-2010). National Institute of Mental Health (RO1 MH62150-01). *$175,000/yr*. Investigator. (Principal investigator: Brian F. O'Donnell).

**Sensory Processing Deficits in Cannabis Use** (2005-2007). National Institute of Drug Abuse (R03 DA019630-01). $50,000/yr. Investigator. (Principal investigator: Patrick Skosnik, postdoc, IUB).

**Cerebellar timing dysfunction in schizophrenia** (5/5/2006-4/30/2011). National Institute of Mental Health (R01 MH074983-01). $1,125,000 direct costs. Principal investigator: Hetrick. Co-Principal investigator: Joseph E. Steinmetz, University of Kansas.

**EEG Neuroimaging System for Clinical Neuroscience Studies of Brain Dysfunction** (2006-2007). Faculty Research Support Program, Indiana University. $45,000 direct costs. Principal investigator: Hetrick. Co-investigator: Brian F. O'Donnell.

**Data Acquisition System for Extracellular Electrophysiology and Classical Eyeblink Conditioning: A Multi-laboratory Translational Clinical Research Initiative** (2007-2008). Faculty Research Support Program, Indiana University. $40,000 direct costs. Principal investigator: Cara Wellman. Co-investigators: William P. Hetrick, Brian F. O'Donnell, Jo Anne Tracy, and Patrick Skosnik.

**Investigation of Neural Timing Circuits in Bipolar Disorder using Eyeblink Conditioning Methodology** (2007-2009). NARSAD: National Alliance for Research on Schizophrenia and Depression. $60,000 direct costs. Principal Investigator: Amanda R. Bolbecker. Mentors: William P. Hetrick, Brian F. O'Donnell. Collaborators: Anantha Shekhar, Jo Anne Tracy.

**The Effect of Cannabis Use on Human Cerebellar Function** (2007-2009). National Institute of Drug Abuse (R21 DA023097-01). $275,000 direct costs. Principal investigator: Patrick Skosnik. Hetrick is an investigator.

**Integrative Predoctoral Training in Drug Abuse Research at Indiana University**. (2008-2013). National Institute on Drug Abuse (T32 DA024628-01). $922,898 direct costs. Program director: George Rebec. Core mentors/preceptors: Brown, Finn, **Hetrick**, Mackie, Newman, O'Donnell, Pessoa, Sari, Skosnik, Timberlake, Walker, Wellman.

**Translational Evaluation of Secretin's Effects on Cerebellar Function** (2009-2010). Clinical Translational Research Pilot Grant funded by NIH U54 Clinical Translation Science Award to Indiana University (Anantha Shekhar, P.I.). Direct costs for pilot project: $75,000. Hetrick is PI. Charles Goodlet is Co-PI. Amanda Bolbecker is investigator.

## TEACHING & ADVISEMENT

M.S. Proposal – Translational Science

**Instructor:**

**Introduction to Clinical Science** (Core Graduate course in Clinical Science Prog.). (8/04-P)

• Instructor, Department of Psychology, Indiana University

**Evidence-based Psychotherapy** (upper division undergrad. topics course) (1/03 - p)

• Instructor, Department of Psychology, Indiana University

• *Duties*: Full teaching responsibility, including developing syllabus, lectures, and examinations. Enrollment: ~30 per academic semester.

**Abnormal Psychology** (upper division undergrad. course) (8/99 - p)

• Instructor, Department of Psychology, Indiana University

• *Duties*: Full teaching responsibility, including developing syllabus, lectures, and examinations. Enrollment: ~90 per academic semester. Taught each semester.

**Intervention and Evaluation** (graduate course) (2000 - 2003)

• Instructor, Department of Psychology, Indiana University

• *Duties*: Full teaching responsibility, including developing syllabus, lectures, and examinations. Enrollment: ~6 per academic semester. Taught once per year.

**Psychopathology and Psychotherapy-I** (upper division undergrad. course) (9/97 - 6/98)

• Instructor, Department of Psychology, Ohio State University

• *Duties*: Full teaching responsibility, including developing syllabus, lectures, and examinations. Taught three consecutive 12 week sections. Enrollment: ~70 per academic quarter.

**Physiological Psychology** (upper division undergraduate) (9/88 - 12/88)

• Instructor, Point Loma Nazarene College, San Diego, Calif.

• *Duties*: **Full teaching responsibility**, including developing syllabus, laboratory assignments, lectures, and examinations. Taught one 12 week section. Enrollment: 13.

**Advisement:**

**Invited panelist at the Inaugural Undergraduate Research Colloquium**

• Department of Psychology, The Ohio State University. April 16, 1998.

• *Topic*: "Perspectives on the undergraduate research experience."

**Research Mentor in the Indiana University STARS Program** for science-oriented undergraduates (2000- p)

• Sarah Brown, Biology and Psychology major (2000-2003).

• Pritha Gupta, Biology major (2001-2002).

• Kathleen Ames, Psychology major (2001-2004).

• Emily Kappenman, Psychology major (2002-2005).

• Crystal Metha, Psychology and Biology major (2002-2005.

• Lee Russell, Psychology (2005-2007)

• Emily Cahill, Psychology (2006-p)

**Mentor in the Indiana University FASE Program** for high-risk undergraduates (2000- 2001)

• Peggy Moneymaker, Psychology major (2000- 2001).

**Research Mentor in the Beckman Scholars Program**, Beckman Foundation, Irvine, CA, for science-oriented undergraduates.

• Sarah Brown, Biology and Psychology major (2002-2003).

**Research Mentor in the National Institute of Health IMSD Program (MEDIC-B Summer Research Program)**, Indiana University, Bloomington.

• Krystle Bartley from Xavier University, New Orleans (2003).

• Kirsten Cuellar from Indiana University, Bloomington (2004).

**Research Mentor in the McNair Summer Research Opportunity Program**, Indiana University, Bloomington (2003).

• Arter Biggs from Grambling State University, Grambling, Louisiana (2003).

**Research Mentor in the Howard Hughes Medical Institute Integrated Freshman Learning Experience Program**, Indiana University, Bloomington

• Tom Pottanat (2004)
• Philip Tishbein (2005)
• Lee Russell (2006)
• Adeel Chaudhry (2007)
• Jaycee Bigham (2007)

**STUDENT RESEARCH SUPERVISION & STUDENT AWARDS**

2000 Chad Robert Edwards (undergraduate). **Honors Thesis Award** ($1000) for an Honors Thesis completed in my laboratory: *Pre-pulse inhibition and P50 gating in sensory processing sensitivity*.

Sarah Brown. **Undergraduate Research and Creative Activity Partnership Award** ($1500) from Indiana University to complete a study of eye blink conditioning in schizophrenia in my laboratory. Joe Steinmetz, co-mentor.

Sarah Brown. **Honors College Undergraduate Grant** ($600) from Indiana University to study eye blink conditioning in schizophrenia spectrum disorders.

2001 Lauren Lee Mary Rae. **Undergraduate Honors Thesis** completed in my laboratory: *Acoustic human startle response: The relationship between psychosis proneness and prepulse inhibition.*

Jenna Godfrey. **Honors College Undergraduate Grant** ($600) to study perceptual anomalies in community psychiatric patients.

Paul D. Kieffaber (Graduate student). **President's Summer Fellowship** to study the psychophysiology of attention shifting in my laboratory. The award includes a $1500 fellowship, five $500 awards for summer research trainees, and $900 for lab supplies.

Paul D. Kieffaber. **Grant In Aid of Research** award ($500) from Sigma Xi to study neuropsychological correlates of attention switching.

Paul D. Kieffaber. **fMRI and Neuroinformatics Summer Workshop Fellowship** from Dartmouth College, New Hampshire. The award includes a travel stipend, boarding expenses, and 2-day workshop.

Paul D. Kieffaber. **Graduate Research Fellowship** ($2500) from the IU Neuroscience Clinical Research Center to study working memory and functional brain connectivity in schizophrenics with fMRI.

Christine Carroll (Graduate student). **Scottish Rite Graduate Research Fellowship** ($15,000/year) to study alcohol dependence in schizophrenia.

Jenna Godfrey. **Undergraduate Research and Creative Activity Partnership Award** ($1500) to study attention and perception in schizophrenia.

Colleen Brenner (Graduate student). **Grant In Aid of Research** award ($400) from Sigma Xi to study neural integration during working memory in schizophrenia patients.

Ryan Hamilton. **Honors College Undergraduate Grant** ($526) to study affective modulation of P50 sensory gating.

Kailie Stout. **Honors College Undergraduate Grant** ($600) to study affective modulation of the acoustic startle response.

2002 Sarah M. Brown (Undergraduate student). **Beckman Scholar Award** ($17,600). This prestigious fellowship covers one academic year and two summers of research on neural timing mechanisms in schizophrenia, plus money for research supplies and travel to conferences.

Christine Carroll (Graduate student). **President's Summer Fellowship** to study steadystate and intermittent dual-click methods of assessing cortical event-related potential suppression. The award included a $1500 fellowship, five $500 summer stipends for undergraduate research trainees, and $934 for lab supplies.

Jenna Godfrey. **Undergraduate Honors Thesis** completed in my laboratory: *Perceptual Anomalies in Community Sample of Healthy Adults*.

Ryan Hamilton. **Undergraduate Honors Thesis** completed in my laboratory: *Do Affective States Modulate P50 Sensory Gating?*

Christine Carroll (Graduate student). **Graduate Student Poster Award** ($300) at the 42nd Annual Meeting of the Society for Psychophysiological Research, Washington D.C., October 2 - 6: "P50 Sensory gating in bipolar disorder."

Paul D. Kieffaber (Graduate Student). **Graduate Student Poster Award** ($300) at the 42nd Annual Meeting of the Society for Psychophysiological Research, Washington D.C., October 2 - 6: "ERP correlates of Attention Shifting."

Colleen Brenner (Graduate Student). **Graduate and Professional Student Organization Research Award** ($400) at Indiana University, Bloomington to study neural integration of visual memory in schizophrenia.

2003 Nicole R. Merritt (Graduate student). **Social Science Research Council Sexuality Dissertation Fellowship** ($28,000). This 12-month fellowship supports research on information processing deficits associated with sexual dysfunction.

Nicole R. Merritt (Graduate student). **Indiana University President's Summer Undergraduate Research Initiative Award** to study information processing deficits in sexual dysfunction. The award included a $1500 fellowship, five $500 summer stipends for undergraduate research trainees, and $934 for lab supplies.

Emily Kappenman (Undergraduate student). **Undergraduate Research and Creative Activity Partnership Award** ($1500) to complete an electroencephalographic study of attention switching in my laboratory. John Kruschke, co-mentor.

Emily Kappenman (Undergraduate student). **Honors College Research Grant** ($1750) to study highlighting, Kamin blocking, and illusory correlation in Schizotypal Personality Disorder and healthy controls. John Kruschke, co-mentor.

Sarah M. Brown. **Sigma Xi Undergraduate Research Award** from Indiana University Chapter for distinction in research.

Sarah M. Brown. **Biology Undergraduate Research Award** ($1000) from Indiana University Department of Biology for distinction in research.

Emily Kappenman (Undergraduate student). **Howard Hughes Medical Institute Capstone Independent Research Opportunities Program Award** ($3000) to complete an electroencephalographic study of attention switching. John Kruschke, co-mentor.

Colleen Brenner (Graduate Student). **Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral Fellow Award**. National Institutes of Mental Health Pre-doctoral National Research Service Award ($29,078) to study neural integration of visual memory in schizophrenia.

2004 Kathleen M. Ames. **Undergraduate Honors Thesis** completed in my laboratory: *Differential effects of affective modulation on orbicularis and post-auricular indices of the acoustic startle response*.

Paul Kieffaber. **Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral Fellow Award.** National Institute of Mental Health Pre-doctoral Research Service Award (F31 MH070186-01). Title: Components of attentional control in schizophrenia. $60,000 direct costs.

Thomas Pottanat (Undergraduate). **Herman B. Wells Scholarship**. Indiana University.

2005 Emily Kappenman (Undergraduate student). **Cantor Undergraduate Research Award** ($500). Department of Psychological and Brain Science, Indiana University.

Daniel I. Shapiro (Undergraduate student). **Honors College Research Award.** Indiana University.

Daniel I. Shapiro (Undergraduate student). **Undergraduate Honors Thesis** completed in my lab. *Affect modulation of the post-auricular response*. Indiana University.

Jason Johannesen (Graduate student). **Smadar Levin Award**, for most outstanding poster presentation by a graduate student. Annual Meeting of the Society for Research in Psychopathology.

Susan Roepke (Undergraduate student). **Howard Hughes Medical Institute Capstone Independent Research Opportunities Program Award** ($800) to complete an electroencephalographic study of temporal determinants of attention.

2006 Susan Roepke. **Undergraduate Honors Thesis** completed in my laboratory: *Temporal determinants of attention: Timing effects on pitch judgment*.

Susan Roepke (Undergraduate student). **Excellence in Research Award** from the Department of Psychological and Brain Sciences.

Nicole Prause (Graduate student). **Society for Sex Therapy and Research (SSTAR) Student Research Award** for research project titled, "Attention and emotional responses to sexual stimuli and their relationship to sexual desire."

Adam Steinmetz (Undergraduate student). **Howard Hughes Medical Institute Capstone Independent Research Opportunities Program Award** ($800; Fall semester) to study the ISI shift procedure in human eye-blink conditioning.

2007 Adam Steinmetz (Undergraduate student). **Howard Hughes Medical Institute Capstone Independent Research Opportunities Program Spring Semester Award** ($500) to study the ISI shift procedure in human eye-blink conditioning.

Chad Edwards (Graduate student). **The International Cannabinoid Research Society Travel Award** ($1100) to attend the Society's annual meeting in Manoir St-Sauveur, St-Sauveur, Canada, June 26 to July 1, 2007.

Amanda Bolbecker (Postdoctoral student). **NARSAD: National Alliance for Research on Schizophrenia and Depression Young Investigator Award**. ($60,000). Title: Investigation of Neural Timing Circuits in Bipolar Disorder using Eyeblink Conditioning Methodology.

Colleen Brenner (Graduate student). **Irving J. Saltzman Award for Outstanding Graduate Achievement**, Department of Psychological & Brain Sciences, I.U.

Adam Steinmetz (Undergraduate student). **Howard Hughes Medical Institute Capstone Independent Research Opportunities Program Summer Award** ($3500) to study the differential effects of auditory versus visual conditioning stimuli on human eye-blink conditioning in healthy young adults.

Emily Cahill (Undergraduate student). **Indiana University Science, Technology and Research Scholars (STARS) Summer Research Stipend** ($3500) to study temporal components of attention.

Adam Steinmetz (Undergraduate student). **Hutton Honors College Travel Grant** ($500) to present poster at the Annual Meeting of The Pavlovian Society in Austin, TX, October, 2007. Poster is titled, "Bidirectional ISI shift in auditory delay eyeblink conditioning in healthy humans."

2008 Adam Steinmetz (Undergraduate student). **Undergraduate Honors Thesis** completed in my laboratory: *Comparison of Auditory and Visual Stimuli in Delay Eyeblink Conditioning*.

Paul D. Kieffaber (Graduate student). **Irving J. Saltzman Award for Outstanding Graduate Achievement**, Department of Psychological & Brain Sciences, I.U.

2009 Molly Erickson (Graduate student). **Graduate Research Fellowship** (3 yr award). National Science Foundation.

Jerillyn Kent (Graduate student). **Graduate Research Fellowship** (3 yr award). National Science Foundation.

## PUBLICATIONS

Note: ***asterisks*** indicate advisee under my direct supervision

1. **Hetrick, W.P.**, Isenhart, R.C., Taylor, D.V., & Sandman, C.A. (1991). ODAP: A standalone program for observational data acquisition. *Behavior Research Methods, Instruments, & Computers, 23*, 66-71.

2. Taylor, D.V., **Hetrick, W.P.**, Neri, C.L., Touchette, P., Barron, J.L., & Sandman, C.A. (1991). Effect of Naltrexone upon self-injurious behavior, learning and activity: A case study. *Pharmacology, Biochemistry, & Behavior, 40*, 79-82.

3. Taylor, D.V., Sandman, C.A., Touchette, P., **Hetrick, W.P.**, Barron, J.L. (1993). Naltrexone improves learning and attention in self-injurious individuals with developmental disabilities. *Journal of Developmental and Physical Disabilities, 5*, 29-42.

4. Taylor, D.V., Rush, D., **Hetrick, W.P.**, Barron, J., & Sandman, C.A. (1993). Self-injurious behavior within the menstrual cycle of developmentally delayed women. *American Journal on Mental Retardation, 97*, 659-664.

5. **Hetrick, W.P.**, *Krutzik, M.N., Taylor, D.V., Sandman, C.A., Rusu, L., & Martinazzi, V.P. (1993). Naltrexone has no hepatotoxic effects in a self-injurious patient with chronic hepatitis. *Journal of Clinical Psychopharmacology, 13*, 453-454.

6. Sandman, C.A., **Hetrick, W.P.**, Taylor, D.V., Barron, J.L., Touchette, P., Lott, I., Crinella, F., & Martinazzi, V. (1993). Naltrexone reduces self-injury and improves learning. *Experimental and Clinical Psychopharmacology, 1*, 242-258.

7. *Gibson, A.K., **Hetrick, W.P.**, Taylor, D.V., Sandman, C.A., & Touchette, P. (1995). Relating the efficacy of naltrexone in treating self-injurious behavior to the Motivation Assessment Scale. *Journal of Developmental and Physical Disabilities, 7*, 215-220.

8. Sandman, C.A. & **Hetrick, W.P**. (1995). Opiate mechanisms in self-injury. *Mental Retardation and Developmental Disabilities Research Reviews, 1*, 130-136.

9. **Hetrick, W.P.**, Sandman, C.A., Bunney, Jr., W.E., Jin, Y., Potkin, S.G., & White, M.H. (1996). Gender differences in the gating of the auditory evoked potential in normal subjects. *Biological Psychiatry, 39*, 51-58.

10. Akbarian, S., Sucher, N.J., Bradley, D., Tafazolli, A., Trinh, D., **Hetrick, W.P.**, Potkin, S.G., Sandman, C.A., Bunney, W.E. Jr. & Jones, E.G. (1996). Selective alterations in gene expression for NMDA receptor subunits in prefrontal cortex of schizophrenics. *Journal of Neuroscience, 16*, 19-30.

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*** - Denotes advisee under my direct supervision.**

**MANUSCRIPTS UNDER REVIEW OR REVISION**

*****Prause, N., Ames, K., Stout, K., Kiefabber, P.D., & **Hetrick, W.P.** Distinct affective modulation of the post-auricular as compared to the eyeblink component of the startle response.

Kieffaber, P.D., Kruschke, J. K., & **Hetrick, W.P.** Contrasting the Attentional and Intentional Components of Context Processing: A model of control and conflict in Task-set switching.

*** - Denotes advisee under my direct supervision.**

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Akbarian, S., Kim, J.J., Potkin, S.G., Hagman, J.O., Tafazzoli, A., Bunney, Jr., W.E., & Jones, E.G. (1995). Gene expression for glutamic acid decarboxylase is reduced without loss of neurons in prefrontal cortex of schizophrenics. *Archives of General Psychiatry, 52*, 258-266.

**POSTER PRESENTATIONS AT SCIENTIFIC MEETINGS**

Note: ***asterisks*** indicate advisees under my direct supervision

1. **Hetrick, W.P.**, Taylor, D.V., Tournay, A., Kelley, M.J., Chicz-DeMet, A., & Sandman, C.A. (1990, February). Plasma B-endorphin concentration in neuro-developmentally delayed patients after an episode of self-injurious behavior. A poster session presented at the Eleventh Annual Winter Neuropeptide Conference, Breckenridge, CO.

2. Taylor, D.V., **Hetrick, W.P.**, Touchette, P., Barron, J.L., & Sandman, C.A. (1990, February). Treatment of self-injurious behavior using opiate blockers: A case study. A poster session presented at the Eleventh Annual Winter Neuropeptide Conference, Breckenridge, Colorado.

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41. *****Brown, S.M., *Kieffaber, P.D., *Vohs, J.L., Shekhar, A., Steinmetz, J.E., & **Hetrick, W.P.** (2003, July). Eye-blink conditioning deficits indicate timing and cerebellar deficits in schizophrenia. Presented at the Annual Meeting of the Beckman Foundation Scholars in Irvine, CA.

42. *****Prause, N., Janssen, E., & **Hetrick, W. P.** (2003). The role of attention and affective response to sexual cues in the experience of sexual desire and sexual arousal. Presented at the Annual Meeting of the International Academy of Sex Research, Bloomington, IN.

43. *****Kappenman, E.S., Kruschke, J., & **Hetrick, W.P.** (2003). Inverse Base-Rates and Illusory Correlations in Schizotypal Personality Disorder. Presented at the 18th Annual Meeting of the Society for Research in Psychopathology, Toronto, Canada.

44. *****Ames, K.A., *Merritt, N.P., *Stout, K., & **Hetrick, W.P.** (2003). Differential effects of affective modulation on orbicularis and post-auricular indices of startle. Presented at the 43nd Annual Meeting of the Society for Psychophysiological Research in Chicago, I.L.

45. *****Carroll, C.A., *Hamilton, R.A., & **Hetrick, W.P.** (2003). Affect modulation of the auditory P50 evoked response. Presented at the 43nd Annual Meeting of the Society for Psychophysiological Research in Chicago, I.L.

46. Krishnan, G.P., Vohs, J.L., **Hetrick, W.P.**, Shekhar, A., & O'Donnell, B.F. (2003). Visual steady state potentials in schizophrenia. Presented at the 43nd Annual Meeting of the Society for Psychophysiological Research in Chicago, I.L.

47. O'Donnell, B.F., **Hetrick, W.P.**, Vohs, J.L., Carroll, C.A., Krishnan, G.P., & Shekhar, A. (2003). Auditory steady state ERP deficits in bipolar disorder. Presented at the 43nd Annual Meeting of the Society for Psychophysiological Research in Chicago, I.L.

48. *****Prause, N., Janssen, E., & **Hetrick, W.P.** (2003). The role of attention and affective response to sexual cues in the experience of sexual desire and arousal. Presented at the 43nd Annual Meeting of the Society for Psychophysiological Research in Chicago, I.L.

49. Vohs, J.L., O'Donnell, B.F., **Hetrick, W.P.**, Carroll, C.A., Blevins, V.L., & Shekhar, A. (2003). P300 abnormalities in bipolar disorder and schizophrenia. Presented at the 43nd Annual Meeting of the Society for Psychophysiological Research in Chicago, I.L.

50. **Hetrick, W.P.**, *Brown, S.M., *Mehta, C., O'Donnell, B.F., Shekhar, A. & Steinmetz, J.E. (2004). Examination of neural timing circuits with eye-blink conditioning methodology in medicated and unmedicated patients with schizophrenia. Presented at the 59th Annual Meeting of the Society of Biological Psychiatry in New York, NY.

51. **Hetrick, W.P.**, *Mehta, C., *Brown, S.M., *Carroll, C.A., O'Donnell, B.F., Shekhar, A., Steinmetz, J.E. (2004). Eye-blink conditioning deficits indicate functional cerebellar deficits in bipolar disorder. Presented at the 59th Annual Meeting of the Society of Biological Psychiatry in New York, NY.

52. *****Brenner, C.A., B.F. O'Donnell, & **Hetrick, W.P.** (2004). Memory induced gamma band activation. Presented at the 59th Annual Meeting of the Society of Biological Psychiatry in New York, NY.

53. **Hetrick, W.P.**, *Brown, S.M., Tracy, J., *Mehta, C., O'Donnell, B.F., Shekhar, A., Steinmetz, J.E. (2004). Examination of neural timing circuits in schizophrenia with eye-blink conditioning methodology. Presented at the 44th Annual Meeting of the Society for Psychophysiological Research in Santa Fe, New Mexico.

54. *****Vohs, J.L., *Bodkins, M., *Bismark, A., O'Donnell, B.F., Shekhar, A., & **Hetrick, W.P.** (2004). Auditory and visual p300 in schizophrenia. Presented at the 44th Annual Meeting of the Society for Psychophysiological Research in Santa Fe, New Mexico.

55. *Kieffaber, P.D. & **Hetrick, W.P.** (2004). ERP correlates of set switching and switch costs. Presented at the 44th Annual Meeting of the Society for Psychophysiological Research in Santa Fe, New Mexico.

56. *****Johannesen, J.K., *Kieffaber, P.D., *Vohs, J.L., Evans, J.D., & **Hetrick, W.P.** (2004). Sensory gating as a function of schizophrenia subtype. Presented at the 19th Annual Meeting of the Society for Research in Psychopathology, St. Louis, MO.

57. *****Vohs, J.L., Bodkins, M., Bismark, A., O'Donnell, B.F., Shekhar, A., Hetrick, W.P. (2004). An electrophysiological examination of the comorbidity of schizophrenia and alcohol dependence. Presented at the 19th Annual Meeting of the Society for Research in Psychopathology, St. Louis, MO.

58. Bismark, A.W., O'Donnell, B.F., Bodkins, M.D., **Hetrick, W.P.**, Johannesen, J.K., Shekhar, A. (2005). 40 Hertz Auditory EEG entrainment in patients with schizophrenia, schizotypal personality disorder, and healthy controls. Presented at the 60th Annual Meeting of the Society of Biological Psychiatry in Atlanta, GA.

59. *****Edwards, C.R., Newman, S., *Bismark, A.W., *Pottanat, T., O'Donnell, B.F., Shekhar, A., Steinmetz, J.E., **Hetrick, W.P.** (2005). Cerebellum Volume and Eyeblink Conditioning Deficits in Schizophrenia. Presented at the 60th Annual Meeting of the Society of Biological Psychiatry in Atlanta, GA.

60. *Bodkins, M.D., **Hetrick, W.P.**, *Bismark, A.W., *Johannesen, J.K., *Vohs, J.L., O'Donnell, B.F., & Shekhar, A. (2005). Neuropsychological correlates of P50 among unmedicated schizophrenic patients. Presented at the 60th Annual Meeting of the Society of Biological Psychiatry in Atlanta, GA.

61. *****Johannesen, J.K., *Bismark, A.W., *Bodkins, M.D., Shekhar, A., O'Donnell, B.F., **Hetrick, W.P.** (2005). Phenomenological and Psychophysiological Indices of Sensory Processing Deficits in Schizophrenia. Presented at the 60th Annual Meeting of the Society of Biological Psychiatry in Atlanta, GA.

62. Bodkins, M.D., O'Donnell, B.F., **Hetrick, W.P.**, Bismark, A.W., Vohs, J.L., Shekhar, A. (2005). Schizotypal Personality Characteristics and Neuropsychological Performance. Presented at the 60th Annual Meeting of the Society of Biological Psychiatry in Atlanta, GA.

63. *****Edwards, C.R., Newman, S., *Bismark, A., O'Donnell, B.F., Shekhar, A., Steinmetz, J.E., **Hetrick, W.P.** (2006). Cerebellum volume and eyeblink conditioning in schizophrenia. Presented at the 61th Annual Meeting of the Society of Biological Psychiatry in Toronto, Ontario, Canada.

64. O'Donnell, B.F., Bodkins, M., Vohs, J.L., Bismark, A., **Hetrick, W.P.**, Skosnik, P.D., Shekhar, A. (2006). Auditory event-related potentials and EEG entrainment in bipolar disorder. Presented at the 61th Annual Meeting of the Society of Biological Psychiatry in Toronto, Ontario, Canada.

65. *****Bolbecker, A.R., *Mehta, C., *Bodkins, M., *Edwards, C.R., O'Donnell, B.F., Shekhar, A., **Hetrick, W.P.** (2006). Impaired eyeblink conditioning in mixed episode bipolar subjects. Presented at the 61th Annual Meeting of the Society of Biological Psychiatry in Toronto, Ontario, Canada.

66. *****Brenner, C.A., *Johannesen, J., *Bodkins, M., *Boggs, J., Shekhar, A., O'Donnell, B.F., **Hetrick, W.P.** (2006). Presented at the 61th Annual Meeting of the Society of Biological Psychiatry in Toronto, Ontario, Canada.

67. *****Prause, N., Janssen, E., & **Hetrick, W.P.** (2006, July). Attention and emotional responses to sexual stimuli and their relationship to sexual desire. Poster session presented at the annual meeting of the International Academy of Sex Research, Amsterdam, Netherlands.

68. *****Mehta, C., *Bolbecker, A., Shekhar, A., O'Donnell, B.F., **Hetrick, W.P.** (2006, October). Eyeblink conditioning deficits indicate cerebellar timing abnormalities in schizophrenia. Poster presented at the 20th Annual Meeting of the Society for Research in Psychopathology, San Diego, CA.

69. *****Boggs, J., *Brenner, C., *Johannesen, J., Shekhar, A., O'Donnell, B.F., **Hetrick, W.P.** (2006, October). Affect modulated startle in schizophrenia. Poster presented at the 20th Annual Meeting of the Society for Research in Psychopathology, San Diego, CA.

70. *****Bolbecker, A., *Mehta, C., O'Donnell, B.F., Shekhar, A., **Hetrick, W.P.**, (2006, October). Bipolar mood state influences acquisition and timing of cerebellar-dependent eye-blink conditioning. Poster presented at the 20th Annual Meeting of the Society for Research in Psychopathology, San Diego, CA.

71. *****Bolbecker, A., *Mehta, C., *Edwards, C.R., *Johannesen, J.K., *Bodkins, M.D., Shekhar, A., O'Donnell, B.F., **Hetrick, W.P.** (2006, October). Eyeblink conditioning deficits indicate cerebellar timing abnormalities in bipolar disorder. Poster presented at the 46th Annual Meeting of the Society for Psychophysiological Research, Vancouver, British Columbia, Canada.

72. *****Brenner, C.A., O'Donnell, B.F., **Hetrick, W.P.**, (2006, October). Deficits in the memory phase of a visual spatial delayed match-to-sample task in schizophrenia. Poster presented at the 46th Annual Meeting of the Society for Psychophysiological Research, Vancouver, British Columbia, Canada.

73. Bodkins, M.D., Johannesen, J.K., **Hetrick, W.P.**, Brenner, C.A., Shekhar, A., O'Donnell, B.F. (2006, October). Auditory P300 abnormalities in bipolar disorder: Effect of clinical phase. Poster presented at the 46th Annual Meeting of the Society for Psychophysiological Research, Vancouver, British Columbia, Canada.

74. *****Edwards, C.A., Skosnik, P.D., Steffen, A., O'Donnell, B.F., & **Hetrick, W.P.**, (2006, October). Chronic cannabis use impairs acquisition and timing of the conditioned eyeblink response. Poster presented at the 46th Annual Meeting of the Society for Psychophysiological Research, Vancouver, British Columbia, Canada.

75. *****Steinmetz, A.B., *Edwards, C.R., Steinmetz, J.E., & **Hetrick, W.P.**, (2006, October). ISI shift in auditory delay eye blink conditioning in healthy humans. Poster presented at the 46th Annual Meeting of the Society for Psychophysiological Research, Vancouver, British Columbia, Canada.

76. *Johannesen, J.K., O'Donnell, B.F., Shekhar, A., & **Hetrick, W.P.** (2007, March). P300 ERP Generation is Affected by Distinct Psychophysiological Processes in Schizophrenia and Bipolar Disorder. Poster presented at the Annual Meeting of the International Congress on Schizophrenia Research, Colorado Springs, Colorado.

77. *Brenner, C.A., Gholston, M., **Hetrick, W.P.**, Shekhar, A., Nurnberger, J., Boggs, J., & O'Donnell, B.F. (2007, May 17). Predictors of mood episodes in euthymic patients with bipolar disorder. Poster presented at the 62nd Annual Meeting of the Society of Biological Psychiatry, San Diego, CA.

78. *Brenner, C.A., Krishnan, G.P., *Boggs, J., Nurnberger, J., Shekhar, A., **Hetrick, W.P.** & O'Donnell, B.F. (2007, May 17). Frequency composition of resting EEG in schizophrenia and bipolar disorder. Poster presented at the 62nd Annual Meeting of the Society of Biological Psychiatry, San Diego, CA.

79. **Hetrick, W.P.**, Bolbecker, A., Johannesen, J.K., Brenner, C.A., Bodkins, M., Frazer, A., O'Donnell, B.F., & Shekhar, A. (2007, May 17). Sectretin improves cerebellar-dependent motor learning in schizophrenia. Poster presented at the 62nd Annual Meeting of the Society of Biological Psychiatry, San Diego, CA.

80. Krishnan, G.P., Paul, B., Vohs, J.L., Hetrick, W.P., Shekhar, A., Bodkins, M., **Hetrick, W.P.** & O'Donnell, B.F. (2007, May 17). Abnormal event-related oscillations in schizophrenia. Poster presented at the 62nd Annual Meeting of the Society of Biological Psychiatry, San Diego, CA.

81. *Kieffaber, PD., O'Donnell, B.F., Shekhar, A., & **Hetrick, W.P.** (2007, October 4). Attentional and intentional switching: Determining the nature of context processing deficits in schizophrenia. Poster presented at the 21th Annual Meeting of the Society for Research in Psychopathology, Iowa City, IA.

82. *Cahill, E.E., *Edwards, C.R., O'Donnell, B.F., & **Hetrick, W.P.** (2007, October 4). Sensorimotor Gating in Schizophrenia and Bipolar Disorder. Poster presented at the 21th Annual Meeting of the Society for Research in Psychopathology, Iowa City, IA.

83. *Johannesen, J.K., O'Donnell, B.F., Shekhar, A., & **Hetrick, W.P.** (2007, October 4). P300 ERP Generation is Affected by Distinct Neuronal Processes in Schizophrenia and Bipolar Disorder. Poster presented at the 21th Annual Meeting of the Society for Research in Psychopathology, Iowa City, IA.

84. *Steinmetz, A.B., Skosnik, P.D., *Edwards, C. R., Steinmetz, J.E., & **Hetrick, W.P.** (2007, October). Bidirectional ISI Shift in Auditory Delay Eyeblink Conditioning in Healthy Humans. Poster presented at the Annual Meeting of the Pavlovian Society, Austin, TX.

85. *Tracy, J., Skosnik, P.D., **Hetrick, W.P.** & Wellman, C.L., (2007, October). Effect of Cannabinoids on Cerebellar Mediated Learning and Memory. Poster presented at the Annual Meeting of the Pavlovian Society, Austin, Texas.

86. *Skosnik, P.D., *Edwards, C.R., *Steinmetz, A.B., *Vollmer, J.M., *Campbell, C.D., O'Donnell, B.F., Steinmetz, J.E., and **Hetrick, W.P.** (2007, October). Differential Impairment in Delay Versus Trace Eyeblink Conditioning in Cannabis Users: Evidence For Cannabinoid Modulation of Cerebellar-

Dependent Learning. Poster presented at the Annual Meeting of the Pavlovian Society, Austin, TX, U.S.A.

87. *Edwards, C.R., *Skosnik, P.D., *Steinmetz, A.B., O'Donnell, B.F., and **Hetrick, W.P.** (2008, May). Sensory gating impairments in heavy cannabis users are associated with low frequency ERP abnormalities. Poster presented at the Annual Meeting of the Society of Biological Psychiatry, Washington, DC, U.S.A.

88. *Bolbecker, A., *****Mehta, C., *Edwards, C.R., Boggs, J., Shekhar, A., O'Donnell, B.F., **Hetrick, W.P.** (2008, May). Eyeblink conditioning deficits temporal processing abnormalities in schizophrenia. Poster presented at the Annual Meeting of the Society of Biological Psychiatry, Washington, DC, U.S.A.

89. *Johannesen, J.K., Shekhar, A., O'Donnell, B.F., & **Hetrick, W.P.** (2008, May). **Diagnostic specificity of auditory ERPs as endophenotypes for schizophrenia: Are we picking the right peaks?** Poster presented at the Annual Meeting of the Society of Biological Psychiatry, Washington, DC, U.S.A.

90. *Steinmetz, A.B., Steinmetz, J.E., **Hetrick, W.P.** (2008, September). **Comparison of auditory and visual stimuli in delay eyeblink conditioning.** Poster presented at the Annual Meeting of the Pavlovian Society, Weehawken, NJ.

91. *Erickson, M. & **Hetrick, W.P.** (2008, October). **Contributions of Dynamic Attentional Processes to Mechanisms of Temporal Representation: A Mismatch Negativity Study**. Poster presented at the Annual Meeting of the Society for Psychophysiological Research, Austin, TX.

92. Rass, O., Krishnan, G.P., Brenner, C.A., **Hetrick, W.P.**, Shekhar, A., O'Donnell, B.F. (2008, October) **Auditory Steady State Response in Bipolar Disorder: Relation to Clinical State, Medication Status, and Substance Disorders.** Poster presented at the Annual Meeting of the Society for Psychophysiological Research, Austin, TX.

93. *Edwards, C.R., Skosnik, P., *Steinmetz, A., O'Donnell, B.F., & **Hetrick, W.P.** (2008, October). **Altered High Frequency Cortical Oscillations in Cannabis Users during a dual-click Task: Relevance to Translational Research**. Poster presented at the Annual Meeting of the Society for Research in Psychopathology, Pittsburgh, PA.

94. *Erickson, M. & **Hetrick, W.P.** (2008, October). Different latent factors moderate perceptual anomalies in schizophrenia compared to healthy controls. Poster presented at the Annual Meeting of the Society for Research in Psychopathology, Pittsburgh, PA.

*** - Denotes advisee under my supervision.**

**INVITED ADDRESSES, ORAL PRESENTATIONS, & SYMPOSIA**

1. **Hetrick, W.P. Is there an auditory gating deficit in autism?** (January 19, 1993). Academic Lecture Series, Department of Psychiatry and Human Behavior, University of California, Irvine.

2. Hetrick, W.P. **Opiate Mechanisms in self-injurious behavior.** (November 19, 1994). Alumni Lectures, Department of Psychology, Point Loma Nazarene College, San Diego, CA.

3. **Hetrick, W.P.**, Sandman, C.A., & McCubbin, J.A. **Opiate Blockers: Pharmacological actions.** (June 16, 1995). International Consensus Conference on Psychopharmacology, The Ohio State University, Columbus, OH.

4. **Hetrick, W.P. Assessment of the Putative Phenomenological Correlates of Sensory Gating in Schizophrenia.** (April 19, 1997) Eleventh Annual Graduate Research Forum, Council of Graduate Students, The Ohio State University, Columbus, OH.

5-11. **Hetrick, W.P. The Sensory Gating Hypothesis in Schizophrenia: There's more and less than meets the eye.**
- December 14, 1998. Michigan State University, Department of Psychology
- January 11, 1999. Florida State University, Department of psychology
- January 20, 1999. University of Pennsylvania, Department of Psychology
- January 26, 1999. SUNY-Buffalo, Department of Psychology
- February 11, 1999. Indiana University, Department of Psychology
- February 15, 1999. Rutgers University, Department of Psychology
- February 17, 1999. University of Maryland, Baltimore County, Dept. of Psychology

12. **Hetrick, W.P. The sensory gating hypothesis in schizophrenia: Hypokrisia, Dialipsis, & Occlusion.** (February 4, 2000). Grand Rounds, Department of Psychiatry, Indiana University School of Medicine, Indianapolis.

13. **Hetrick, W.P. Psychophysiological studies of schizophrenia: Accumulating evidence for a "fragmented phrene."** (June 24, 2001). Intensive Weekend Workshop, Indiana Consortium for Mental Health Services Research, Indianapolis, IN.

14. *****Zirnheld, P.J., **Hetrick, W.P.**, Carroll, C.A., O'Donnell, B.F., & Shekhar, A. **Impact of haloperidol on measures of attention and learning in healthy normals.** (May 2002). A paper presented at the Annual Meeting of the Society of Biological Psychiatry, Philadelphia, PA.

15. **Hetrick, W.P. Sensory gating from phenomenology to psychophysiology.** (September, 2002). Presentation at the symposium, "Sensory gating: Empirical, theoretical, and methodological advances," chaired by W.P. Hetrick. Other speakers were Brett A. Clementz and Patricia White. Annual Meeting of EEG and Clinical Neuroscience Society in Baltimore, MA.

16. **Hetrick, W.P.** (April, 2003). **Dysfunction of temporal architecture in schizophrenia**. Clinical Science Colloquium Series, Department of Psychology, Indiana University, Bloomington.

17. **Hetrick, W.P. Dysfunction of temporal architecture in schizophrenia**. (June 19, 2003). In-service for high school social science teachers from the State of Indiana who participate in the Advanced College Preparation Program. Indiana University, Bloomington.

18. **Hetrick, W.P. Dysfunction of temporal architecture in schizophrenia: A mechanism for the fragmented phrene?** (June 19, 2003). Presentation to undergraduate Medic-B Scholars participating in an intensity summer research program. Indiana University, Bloomington.

19. **Hetrick, W.P.**, Brown, S.M., Kieffaber, P.D., Vohs, J.L., Carroll, C.A., O'Donnell, B.F., Shekhar, A., & Steinmetz, J.E. (September 26, 2003). **Eyeblink Conditioning Deficits Indicate Timing Abnormalities in Schizophrenia.** Presentation at the symposium, "Classical Conditioning in Experimental Psychopathology," chaired by W.P. Hetrick. Other speakers were Richard McFall, Teresa Treat, and Lonnie Sears. Annual Meeting of the Pavlovian Society, Bloomington, IN.

20. **Hetrick, W.P.**, Brown, S.M., Carroll, C.A., O'Donnell, B.F., Shekhar, A., & Steinmetz, J.E. (October 18, 2003). **Eye-blink conditioning deficits indicate timing abnormalities in schizophrenia.** Presentation at the symposium, "Temporal architecture dysfunction in schizophrenia," chaired by W.P. Hetrick. Other speakers were Stuart Steinhauer, Martin Paulus, and Michael Green (discussant). Annual Meeting of the Society for Research in Psychopathology, Toronto, Canada.

21. **Hetrick, W.P.** (October 24, 2003). **A Temporal Processing Account of Cognitive Disorganization in Schizophrenia.** Brain and Cognitive Science Colloquium Series, Department of Psychology, University of Southern Illinois, Carbondale.

22. **Hetrick, W.P.**, O'Donnell, B.F., Shekhar, A., Steinmetz, J.E. (May 28, 2004). **A Temporal Processing Account of Cognitive Disorganization in Schizophrenia.** "Hot Topics Talk" selected for presentation at the Annual Meeting of the American Psychological Society, Chicago, IL.

23. **Hetrick, W.P. Differential effects of emotional modulation on post-auricular and orbicularis indices of the acoustic startle response.** (October 22, 2004). Presentation at the symposium, "Emotional modulation of the post-auricular reflex," chaired by Stephen Benning. Other speakers were Julian G. Simmons, Edward M. Bernat, and Christopher Patrick (discussant). Annual meeting of the Society for Psychophysiological Research, Santa Fe, New Mexico.

24. **Hetrick, W.P. Intra-subject Temporal Response Processing Dysfunction in Schizophrenia** (May 27, 2005). Presentation at the symposium, "One man's noise is another man's signal: The utility of within-subject variability," chaired by W. P. Hetrick. Other speakers were David G. Thomas, David A. Walsh, and Martin P. Paulus (discussant). Annual Meeting of the American Psychological Society, Los Angeles, CA.

25. **Hetrick, W.P. Electrophysiological endophenotypes in the comorbidity of schizophrenia and alcohol dependence** (March 2, 2006). Invited address at the inaugural meeting of the National Conference on Dual Diagnosis, Indianapolis, Indiana.

26. **Hetrick, W.P. Effects of RG1068 (Secretin) on Information Processing in Schizophrenia**. (August 8, 2006). Presentation at Repligen Corporation, Waltham, MA.

27. **Hetrick, W.P. Information processing in schizophrenia: Timing is everything** (September 15, 2006). Grand Rounds Presentation, Department of Psychiatry, Indiana University Medical School, Indianapolis.

28. **Hetrick, W.P. Information processing in schizophrenia: From sensory processing to higher cognition.** (November 10, 2006). Annual Fall Meeting of the Indiana Psychological Association, Indianapolis, Indiana.

29. **Hetrick, W.P. Temporal processing and the "lesser brain" in schizophrenia.** (November 9, 2007). Clinical Area Colloquium Series, The Ohio State University, Columbus, Ohio.

30. **Hetrick, W.P. Studies of temporal architecture dysfunction in schizophrenia** (March 12-14, 2008). Merrill Conference Series: Neurobehavioral Approaches to the Study of Clinical Disorders (J. E. Steinmetz, organizer). Tempe, AZ.

31. **Hetrick, W.P.** The Neuroscience Clinical Research Center at Larue Carter Memorial Hospital. (April 30, 2008). Larue D. Carter Memorial Hospital Consumer Education Series, Indianapolis, IN.

**32.** **Hetrick, W.P. Clinical translational studies of schizophrenia.** (May 16, 2008). Afternoon keynote address at the Annual Indiana Mental Health Symposium. Indianapolis, Indiana.

**33.** Prause, N.R. & **Hetrick, W.P.** (2008, October). **Higher Sexual Arousability is Related to Lower Attention to Sex Stimuli.** Presentation during symposium titled "Modulation of Attention in Sexual Cue Processing," chaired by N.R. Prause. Annual Meeting of the Society for Research in Psychophysiology, Austin, TX.

**34.** **Hetrick, W.P. Human Eye-blink Conditioning: Development & Testing of a fMRI-compatible infrared blink detection system.** (October 20, 2008). Indiana University Neuroimaging Group, IU Bloomington, IN.

35. **Hetrick, W.P. Clinical Cognitive Neuroscience: Experimental psychopathology, Clinical science, & Translational Research.** (November 20, 2008). Point Loma Nazarene University, San Diego, CA.

## AD HOC EDITORIAL WORK

***Aging, Neuropsychology, and Cognition*** (2006-2007)
***American Journal of Psychiatry*** (2004-p)
***Archives of General Psychiatry*** (2002-p)
***Behavioral Neuroscience*** (2007-p)
***Behavior Research Methods, Instruments & Computers*** (1996-p)
***Biological Psychiatry*** (2001- p)
***Bipolar Disorders*** (2008-p)
***Cerebral Cortex*** (2005-p)
***Clinical Neurophysiology*** (2001-p)
***Cognitive, Affective, and Behavioral Neuroscience*** *(2008-p)*
***Cortex*** *(2007)*
***European Journal of Neuroscience*** (2003-p)
***International Journal of Psychophysiology*** (2007)
***Journal of Abnormal Psychology*** (2002-p)
***Neuropsychopharmacology*** (2001- p)
***Psychophysiology*** (2002-p)
**Schizophrenia Research** (2004-p)

## GRANT REVIEW PANELS

M.S. Proposal – Translational Science

**Member, Psychology Panel, National Science Foundation Graduate Fellowships**, Washington, DC. (2000, 2001, 2002, 2007).

**Chairman, Psychology Panel, National Science Foundation Graduate Fellowships**, Washington, DC. (2003, 2004, 2008, 2009).

**Ad hoc member, NIMH Special Emphasis Panel. ZMH1 ERB-L 01 S: Mental Health Centers for Intervention Development and Applied Research (CIDAR)**. Bethesda, MD (October 2006).

**Ad hoc member, NIMH Special Emphasis Panel. ZMH1-ERB-S-04: Interdisciplinary Developmental Science Centers for Mental Health (IDSC): Centers (P50 & P20)**. Teleconference (July 2007).

**Ad hoc member, NIMH Special Emphasis Panel. ZMH1 ERB C-01: Mental Health Centers for Intervention Development and Applied Research (CIDAR)**. Bethesda, MD (October 2007).

**Ad hoc member, NIMH Psychopathology, Developmental Disabilities, Stress & Aging Fellowship Study Section (F12B).** Washington, D.C. (March, 2008).

**Ad hoc member, NIMH Special Emphasis Panel. ZMH1 ERB Z-04: Cognition and Schizophrenia Panel**. Crystal City, VA (June 11, 2008).

**Ad hoc member, NIMH Special Emphasis Panel. ZMH1 ERB Z-05: Neurocognition and Emotion in Schizophrenia**. Crystal City, VA (June 11, 2008).

**Ad hoc member, Spinal Cord and Brain Injury Fund (ISCBIRF) Grant Program, State of Indiana**. Indianapolis, IN (October 8, 2008).

**Ad hoc member, NIMH Psychopathology, Developmental Disabilities, Stress & Aging Fellowship Study Section (F12B).** Washington, D.C. (November, 2008).

***OTHER SERVICE***

- Member, Program Committee, 2006 Annual Meeting of the Society for Psychophysiological Research, Vancouver, Canada.
- Chair, Program Committee, 2007 Twenty-first Annual Meeting of the Society for Research in Psychopathology, Iowa City, IA.
- Member, Program Committee, 2008 Twenty-second Annual Meeting of the Society for Research in Psychopathology, Pittsburgh, PA.
- Chair, Program Committee, 2009 Fifteenth International Congress on Event-Related Potentials of the Brain, Bloomington, IN.

***PROFESSIONAL ORGANIZATIONS***

- **Society for Research in Psychopathology** (member)
- Chair of program committee in 2007
- Member of program committee in 2008
- **Society for Psychophysiological Research** (member)
- Member of program committee in 2006
- **American Psychological Society** (member)
- **Society for Biological Psychiatry** (member

# Appendix B. Supporting Letters

(See attached)

SCHOOL OF MEDICINE
INDIANA UNIVERSITY
Office of the Dean

July 19, 2010

TO: Indiana Commission for Higher Education
Indiana University Trustees
Indiana University – Purdue University of Indianapolis Graduate Committee
Indiana University Bloomington Academic Leadership Committee

RE: R. Mark Payne, M.D.
Professor of Pediatrics (Cardiology)

On behalf of the Indiana University School of Medicine (IUSM), R. Mark Payne, M.D., Professor of Pediatrics in IUSM's Department of Pediatrics, has prepared a proposal for the Translational Science Program of Indiana (TSPI). The Translational Science Program of Indiana (TSPI) is designed to allow physicians and medical students in training to integrate translational research into their training utilizing the wealth of resources available through IUSM and the Indiana Clinical and Translational Sciences Institute (ICTSI).

As Dean of the IUSM and on behalf of its basic and clinical sciences faculty and departmental chairs, I enthusiastically support this proposal. Specifics of the program are detailed in the proposal itself, but the long-term goal is to establish a training program to address the critical need for generating translational research scientists who are able to operate at the interface between basic and clinical investigative medicine. Operationally, the program will be open to all interested 4th year medical students, fellows, junior faculty, and ultimately all life sciences graduate students, including those of the IUSM in Indianapolis and Bloomington, at Indiana University - Purdue Indianapolis (IUPUI), and at Purdue University in West Lafayette. TSPI students will be able to choose from options ranging from coursework, a minor, a graduate certificate in molecular medicine, or a Master of Science in Translational Science.

This program builds upon existing collaborative relationships with Purdue (i.e., the M.D. / Ph.D. program) and IUPUI (interdisciplinary cross-campus Ph.D. programs in medical neuroscience, biophysics, and biomolecular imaging). The TSPI fits well with the developing strengths of the CTSI, and represents a University commitment to develop translational training programs as detailed in the CTSI application. The IUSM is committed to the long-term success of the TSPI and will commit necessary faculty and staff time to develop and maintain the program. Because an understanding of translational medicine is fundamental to all life sciences researchers, including both physicians and basic scientists, it is clear that the TSPI program will provide a common academic system which will allow students and trainees to move forward with careers in translational science. Therefore, I urge you to give this proposal your utmost consideration.

Sincerely,

D. Craig Brater, M.D.
Dean and Walter J. Daly Professor

Fairbanks Hall, Suite 6200 340 West Tenth Street Indianapolis, IN 46202-3082 (317) 278-3048 medicine.iu.edu

PURDUE UNIVERSITY

WELDON SCHOOL OF
BIOMEDICAL ENGINEERING

June 1, 2010

TO: Indiana Commission for Higher Education
Indiana University Trustees
Indiana University – Purdue University of Indianapolis Graduate Committee
Indiana University Bloomington Academic Leadership Committee

RE: R. Mark Payne, M.D.
Professor of Pediatrics (Cardiology)

**Review Committee**,

The Weldon School of Biomedical Engineering at Purdue University is pleased to be a contributing partner to the Translational Science Program of Indiana (TSPI) described in this proposal being submitted by Dr. Payne. We were immediately supportive of this new proposal given the successes of our previous and ongoing collaborations with the Indiana University School of Medicine (IUSM), especially around our Medical Scientist Training Program (MSTP) and the new Indiana Clinical and Translational Sciences Institute (CTSI). The proximity of our campuses, the many strong research collaborations, and the fact that many of our faculty and students already utilize the Indianapolis campus as a critical base, make this an extremely feasible curricular complement. The curricular program will be greatly facilitated also by the extant mechanisms for efficient communication and educational delivery between the two campuses which currently serve our two joint doctoral programs.

The translational and cross-disciplinary nature of the research and educational programs of the Weldon School require that our graduate students have direct and repeated exposure to clinical mentors, collaborators, and medical educational training. At the inception of our doctoral program we established a requirement for such clinical exposure. We are very excited that the TSPI program will offer biomedical engineers the opportunity to train side-by-side with biomedical scientists and physician scientists in very objective-based experiences, including projects and workshops. The multiple clinical and translational arenas proposed will match well with the diversity of interests of our biomedical engineering students. We are convinced that in order for our students to become the next generation of leaders in translating medical devices and technologies, they absolutely need to understand how to comprehensively conduct research in clinical settings. This must include learning how to participate in multi-disciplinary teams, how to develop and implement effective therapeutic interventions, and how to collaboratively establish quantitative endpoints for clinical outcomes, which are all components of this program.

We have a long-term commitment to this proposed program's success and will provide resources in support of our students participating in this program if needed. We believe strongly that our students will benefit enormously from the training offered in the TSPI program. This integrated and additional training will not only make our exceptional engineers uniquely able to contribute to

MJIS Building ■ 206 South Martin Jischke Dr. ■ West Lafayette, IN 47907-2032
(765) 494-2998 ■ Fax: (765) 494-0902 ■ www.purdue.edu/BME

critical clinical programs in their career, but will greatly impact their research focus even during their graduate studies.

As Head of the Weldon School, I assure you that the curricular program described in this proposal has our full and enthusiastic support. We are confident that the implementation will be successful and that the educational outcomes of the all of the schools involved will be very positively impacted.

Sincerely,

George R. Wodicka

George R. Wodicka
Professor and Head

MJIS Building ■ 206 South Martin Jischke Dr. ■ West Lafayette, IN 47907-2032
(765) 494-2998 ■ Fax: (765) 494-0902 ■ www.purdue.edu/BME

**DEPARTMENT OF PSYCHOLOGICAL AND BRAIN SCIENCES**

INDIANA UNIVERSITY
Bloomington

June 1, 2010

TO: Indiana Commission for Higher Education
Indiana University Trustees
Indiana University – Purdue University of Indianapolis Graduate Committee
Indiana University Bloomington Academic Leadership Committee

RE: R. Mark Payne, M.D., Professor of Pediatrics (Cardiology)
Translational Science Program of Indiana

This letter is to confirm the interest of the Indiana University Bloomington in your proposed the Translational Science Program of Indiana (TSPI) which is to provide graduate training for basic and clinical investigators. IU Bloomington has a strong interest in clinical translational science, especially pre- and postdoctoral training opportunities in this area because translational research is an increasingly important avenue for scientific discovery and transfer of basic knowledge to human care. Your program will permit us to provide cutting-edge training to our current students as well as attract new translational scientists.

Investigators at Indiana University Bloomington are consistently funded by NIH/NCI, NIH/NIDR, and foundation/industry support. Translational investigator training has been a significant challenge. To date, it has been provided primarily by individual instruction and mentoring by experienced translational investigators, and by scientists serving as secondary investigators in controlled trials to develop both experience and credibility. These junior investigators also attended existing graduate courses in biostatistics and clinical research methodologies. However, more extensive training in translational tools and techniques, research ethics, grantsmanship, manuscript writing, and scientific presentations was not possible and was acquired only through experience—often incidental experiences.

Thus, the existence of the proposed Translational Science Training Program will not only provide a much more intensive and complete background for junior translational investigators, but it will also provide a much higher quality of training in a much more efficient manner. As a result we anticipate that some of our research-oriented graduate students in the basic sciences and applied science will take advantage of this program to prepare for a career in translational research. Postdoctoral students and research scientists might also appreciate the opportunity to specialize in this exciting area. Therefore, we strongly support the proposed program and hope that it will be given favorable consideration.

Sincerely,

William P. Hetrick, Ph.D.
Professor of Psychological and Brian Sciences, Neuroscience, and of Psychiatry
Director, Bloomington Office of the Indiana Clinical Translational Science Institute

1101 E. Tenth Street Bloomington, IN 47405-7007 (812) 855-2012 fax (812) 855-4691

INDIANA UNIVERSITY

June 23, 2010

TO: Indiana Commission for Higher Education
Indiana University Trustees
Indiana University – Purdue University of Indianapolis Graduate Committee
Indiana University Bloomington Academic Leadership Committee

RE: R. Mark Payne, M.D.
Professor of Pediatrics (Cardiology)

As the leaders of the Ph.D. programs at IU School of Medicine, the Basic Science Council has reviewed and discussed the new graduate proposal entitled, "*The Translational Science Program of Indiana (TSPI).*" We are in strong support of this new graduate program. If approved, this program would broadly benefit the life science graduate students in our programs at Indiana and Purdue University campuses. The design of the program will allow Ph.D. students in the life sciences to participate. The TSPI program will permit these students to choose from mentored training experiences ranging from coursework to improve their knowledge of clinical and translational science in to completing interactive clinical experiences in order to earn a Ph.D. degree minor or a graduate certificate in Translational Science.

We believe this program fills a critical need in our training programs by increasing the clinical understanding and improving training of our doctoral students in a multi-disciplinary setting. We anticipate the students will bring this knowledge to their research projects. The program will thereby improve the quality and clinical relevance of research performed in our various units, promote basic/clinical student and faculty interactions, promote collaborative research between the Departments, the Schools, and the Universities, and most importantly will produce students that will be leaders in future translational research teams. We look forward to working with Dr. Payne on this new and exciting training program.

Sincerely,

Michael R. Vasko, Ph.D.
Chair, Basic Science Council
Paul Stark Professor of Pharmacology

INDIANA UNIVERSITY

July 20, 2010

TO: Indiana Commission for Higher Education
Indiana University Trustees
Indiana University – Purdue University of Indianapolis Graduate Committee
Indiana University Bloomington Academic Leadership Committee

RE: R. Mark Payne, M.D.
Professor of Pediatrics (Cardiology)

Dear Review Committee,

As the Chair of the Department of Internal Medicine, I am writing to express my strong support of the training program entitled, the Translational Science Program of Indiana (TSPI), submitted by Dr. Payne. This translational research program will blend in beautifully with the Indiana CTSI, extending earlier educational offerings in translational research, and represents a training commitment within the original Indiana CTSI. If approved, this program will broadly benefit the many medical and life sciences students in our programs at the Indiana and Purdue University campuses, including physicians in training.

I am supportive of this program, which will provide an avenue for interdisciplinary collaboration between clinical and basic scientists. The program will bolster the basic science background of physicians who want to work in translational research, while providing a clinical immersion experience for Ph.D. graduate students in our departments. We fully support this concept and will work with Dr. Payne to help structure appropriate, supervised rotations for the students. We will also help to identify appropriate faculty to provide clinical mentorship for the students.

This is an important and exciting program that will increase collaborations between our multiple departments, campuses, and faculty in ways that advance translational research both here, and nationally. By awarding a Minor, a Graduate Certificate, or a Master of Science degree in Translational Science to these students, the value of their dual degrees and training will be markedly increased. This will continue to maintain high quality students in our programs and provide leaders in future translational research programs. We look forward to beginning work on this program.

Sincerely,

David W. Crabb, MD
John B. Hickam Professor
of Medicine
Chair, Dept. of Medicine

INDIANA UNIVERSITY

July 20, 2010

TO: Indiana Commission for Higher Education
Indiana University Trustees
Indiana University – Purdue University of Indianapolis Graduate Committee
Indiana University Bloomington Academic Leadership Committee

RE: R. Mark Payne, M.D.
Professor of Pediatrics (Cardiology)

Dear Review Committee,

As the Chairs of the Departments of Pediatrics and Radiology, we are writing to express our strong support of the training program entitled, the Translational Science Program of Indiana (TSPI), submitted by Dr. Payne. This translational research program will blend in beautifully with the Indiana CTSI and represents a training commitment within the original Indiana CTSI. If approved, this program will broadly benefit the many medical and life sciences students in our programs at the Indiana and Purdue University campuses, including physicians in training.

We are excited that the program will provide an avenue for interdisciplinary collaboration between clinical and basic scientists. The program will bolster the basic science background of physicians who want to work in translational research, while providing a clinical immersion experience for Ph.D. graduate students in our departments. We fully support this concept and will work with Dr. Payne to help structure appropriate, supervised rotations for the students. We will also help to identify appropriate faculty to provide clinical mentorship for the students.

This is an important and exciting program that will increase collaborations between our multiple departments, campuses, and faculty in ways that advance translational research both here, and nationally. By awarding a Minor, a Graduate Certificate, or a Master of Science degree in Translational Science to these students, the value of their dual degrees and training will be markedly increased. This will continue to maintain high quality students in our programs and provide leaders in future translational research programs. We look forward to beginning work on this program.

Sincerely,

Valerie P. Jackson, MD
Eugene C. Klatte Professor
of Radiology
Chair, Dept. of Radiology

D. Wade Clapp, MD
Richard L. Schreiner Professor
of Pediatrics
Chair, Dept. of Pediatrics

INDIANA UNIVERSITY
INDIANA CLINICAL AND TRANSLATIONAL SCIENCES INSTITUTE
School of Medicine

July 8, 2010

TO: Indiana Commission for Higher Education
Indiana University Trustees
Indiana University – Purdue University of Indianapolis Graduate Committee
Indiana University Bloomington Academic Leadership Committee

RE: R. Mark Payne, M.D.
Professor of Pediatrics (Cardiology)
Translational Science Program of Indiana

On behalf of the Indiana Clinical and Translational Sciences Institute (ICTSI), R. Mark Payne, M.D., Professor of Pediatrics in IUSM's Department of Pediatrics, has prepared a proposal for Master's Degree in Translational Science Program. The Translational Science Program of Indiana (TSPI) is designed to allow for cross-pollination of ideas between scientists in basic and clinical research by utilizing the wealth of resources available through IUSM and the Indiana Clinical and Translational Sciences Institute (ICTSI); thus, providing the foundation for translational research. As one of the specific aims listed on our CTSA grant, the TSPI provides the means of training future translational researchers for our state. Furthermore, by opening the program to all interested 4th year medical students, fellows, junior faculty as well as all life sciences graduate students, collaborative research opportunities will open among the partnering institutions (Indiana University – Purdue University of Indianapolis, Indiana School of Medicine, Indiana University Bloomington, and Purdue University) in addition to other entities within the region as they join the ICTSI.

In an effort to make the training more accessible to individuals at various stages of their careers, TSPI students will be able to choose from options ranging from coursework, a minor, a graduate certificate in Translational Science, or a Master of Science in Translational Science. Building upon existing collaborative relationships among Purdue University, Indiana University, IUPUI, and several public and private organizations, the Translational Science program will produce scientists and physicians who are able to operate at the interface between basic and clinical investigative medicine. As the Associate Dean for Translational Research, I enthusiastically write in support of this proposal.

ICTSI is committed to the long-term success of the TSPI and will commit necessary resources, faculty and staff time to develop and maintain the program. Because an understanding of basic science and clinical medicine is essential to translational research, we believe the TSPI will provide a common academic system that will allow both physician and basic scientists to advance their careers in translational science. Therefore, I urge you to give this proposal your utmost consideration.

Sincerely,

Anantha Shekhar

Anantha Shekhar, MD, PhD
Director, Indiana CTSI
Associate Dean for Translational Research
Raymond E. Houk Professor of Psychiatry
Professor of Pharmacology and Neurobiology
Indiana University School of Medicine

## Informational Material

# Appendix C. Informational Material

(See attached)

**Executive Summary**
**Matrix**
**Cert Curriculum Trans Sci 110510 -** Comparison of Certificate in Translational Research and Certificate in Clinical Research
**Minor Curriculum Trans Sci 110510** - Comparison of Minor in Translational Research and Minor in Life Sciences
**Comparison MS Trans Sci MS Clin Res 111210 -** Comparison of MS in Translational Research and MS in Clinical Research

## Objective:

The objective of the Translational Science Program of Indiana (TSPI) is to jointly train physicians and basic scientists in the methodology of translational research. The field of translational research is defined here as the application of basic science to problems in human health and disease. The long term goal of this program is to move new discovery out of research labs into patient care to advance the health and quality of life for Indiana citizens and the nation.

The vision of the TSPI is to offer a 2-year Master of Science (MS degree) program in Translational Science for both basic and clinical scientists. Initially, this program will focus on developing this training track for the clinician scientist. This program will integrate training in cutting edge basic science with human health and disease using a unique model of dual mentorship from both medicine and basic science. This training program is one of the six specific aims listed in the Indiana Clinical and Translational Sciences Institute (ICTSI) grant (5 UL1 RR025761-02). Thus, the TSPI will provide the training mechanism for physicians and scientists to develop an understanding of human disease at both a basic and clinical level. Because the ICTSI is a state-wide program centered in the School of Medicine, the program will access available resources from Indiana University School of Medicine, as well as Purdue, Bloomington, and IUPUI to provide cross-disciplinary training for physicians and scientists at multiple locations.

## Training Tracks at a glance:

**Track 1:** will focus on the **clinical scientist's** needs to develop a career path in translational research, and will emphasize course and laboratory work in basic science.

**Track 2:** will focus on the needs of the **basic scientist** and will offer objective-based training in clinical science and health, along with coursework in basic and translational science areas.

**Overlapping Coursework** between physicians and scientists emphasizes teamwork and collaboration. For example, trainees will learn how to utilize basic science methodologies, how to assemble a multidisciplinary team to conduct translational research, how to develop and implement a therapeutic intervention, and then develop endpoints for quantifying clinical outcome.

## Goals:

1. To give physicians (MD) more foundational basic science training and laboratory experience. This will provide them with the tools to integrate with their expertise in human disease. They are expected to utilize this training to develop leadership skills in research and treatment strategies which are pertinent to patient needs.
2. To provide basic scientists (PhD) more training and understanding of human health and disease. This will allow them to apply their expertise in basic investigation to problems of human health, and integrate the scientist into the healthcare team in medicine.
3. To provide both physicians and scientists in training with a common set of experiences and language to facilitate & expedite the translation of research findings into practical treatments. Ultimately, the TSPI seeks to impart an understanding of team research that is

vital to translational research and key to solving problems of human disease and health today.

**Student Body:**

The proposed MS program is designed for two pools of students:

**Physician pool:** individuals with a background in clinical sciences (e.g., physicians). Those trainees enter during their fellowship training, or early junior faculty status. They would enter the MS program with protected time for research and class work, and would be assigned dual mentorship (MD and PhD mentorship) to oversee their training.

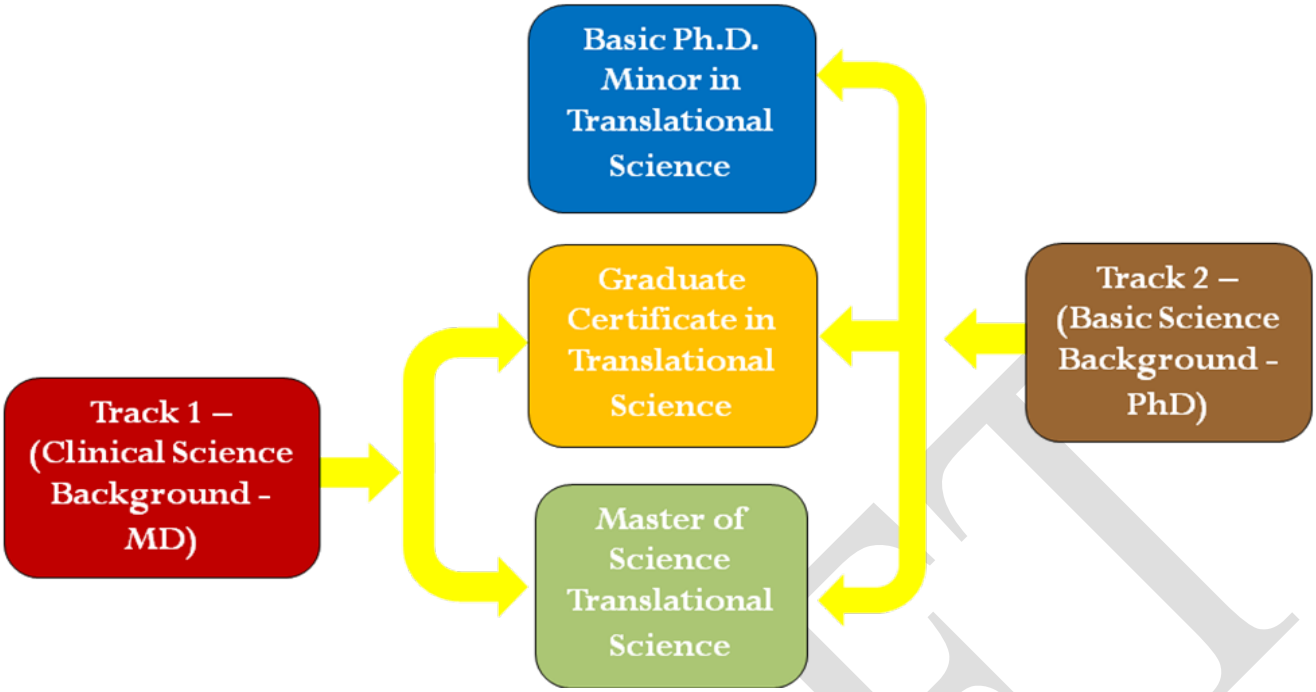
**Scientist pool:** individuals with a basic science background (e.g., PhD scientists). It is anticipated that they would enter the MS training program during their 2nd or 3rd year of graduate school, and complete the requirements for the MS degree by the time they graduate with their PhD. As with the clinical scientists above, the PhD students will also have dual mentorship consisting of a clinician and a basic scientist.

**Program Structure:**

- Two year training program.
- Dual degree awarded at graduation (MS/MD or MS/PhD, for example).
- Shared classes and training encourages both MD and PhD trainees to develop a common experience and understanding enhancing teamwork and collaboration.
- Clinician scientists are expected to spend ~75% protected time during this training period for research and class work.
- The program will seek to enroll 4 – 6 MD trainees per year, and 6 – 12 PhD students per year at steady state.

**Measurement of Outcome:**

The outcome of program training will be determined by monitoring career development of trainees after graduation by the TSPI. Positions achieved, awards, grant funding, collaborative research, and manuscripts published will be tracked. In addition, graduates of the program will be surveyed 3 years following graduation for feedback to refine the program's direction and content. An executive committee will oversee program direction and content, and monitor outcome metrics.




**The TSPI offers multiple options:**

**Clinicians** may pursue the MS degree in Translational Science over 2 years (MS/MD). If this is not feasible, they may opt for a reduced course load leading to a Certificate in Translational Research (1 year).

**Scientists** in training may pursue a MS degree in Translational Science, which is awarded at the time of graduation from their PhD program (MS/PhD). They may also pursue a Certificate in Translational Science, or a Minor in Translational Research, which have much reduced course loads.

**Special Features of this Training Program:**

There are multiple features in this program that are unique and place it at the leading edge of translational research training in the United States, today:

1. Integration of clinician and basic scientist training to develop and encourage collaboration and team work.

2. Dual mentorship for both clinician and basic scientist trainee to include both MD and PhD mentors.

3. Incorporation of basic scientists into clinical health care team (rotations) to enhance disease understanding and exchange of knowledge between clinician and scientist.

4. Emphasis on survival skills for both MD and PhD trainee.

## Curriculum

| *Course Title* | *Course #* | *Credits* | Minor | Cert | MS Program | |
|---|---|---|---|---|---|---|
| | | | | | Track 1 - Clinical background | Track 2 - Basic background |
| Tools & Techniques in Translational Research | GRAD G667 | 3 | X | X | X | X |
| Advanced Tools & Techniques in Translational Research | New | 3 | X | X | X | X |
| Introduction to Research Ethics **or** Ethical and Policy Issues in International Research **or** Responsible Conduct of Research (RCR) | GRAD G504/ G505 **or** PHIL P555 **or** New | 1 to 3 | X | X | X | X |
| Biostatistics I or II(or approved equivalent) | GRAD G651 or G652 | 3 | X | X | X | X |
| Electives | GRAD XXX | 1 to 8 | Up to 3 | X (6 – 8) | X (3 – 7) | X (4 – 6) |
| Techniques of Effective Grant Writing (or approved equivalent) | GRAD N802 | 3 | | | X | X |
| Mentored Basic Science / Translational Research | New | 6 | | | X | |
| Thesis in Translational Research | New | 3 | | | X | |
| Clinical Rotations for Scientists / Engineers | New | 9 | | | | X |
| Clinical Research Methods | GRAD G660 | 3 | | | | X |
| Total Required Credits | | | 12 | 18 | 30 | 30 |

**Graduate Expectations:**

- Graduates will be professionals committed to conducting independent and collaborative translational research.
- Graduates should experience increased opportunities for advancement and employment opportunities in university, industry, or government research settings.
- Graduates should enhance the impact and national profile of Indiana University School of Medicine by their research, discoveries, and advances in human health and patient care.

| Which Research Program would cover this? | Research Phase | Definition | Type of Research | Examples |
|---|---|---|---|---|
| **Translational Science** | $T_0$ | Identification of opportunities & approaches to health problem. | Basic research question | Are there specific gene mutations associated with breast cancer? |
| **Translational Science** | $T_1$ | Discovery of candidate health application | Phase I & II clinical trials; observational studies | Is there an association between BRCA mutations and breast cancer? |
| **Clinical Research** | $T_2$ | Health application to evidence-based practice guidelines | Phase III clinical trials; observational studies; evidence synthesis & guidelines development | What is the positive predictive value of BRCA mutations in at-risk women? |
| **Clinical Research** | $T_3$ | Practice guidelines to health practices | Dissemination research; implementation research; diffusion research Phase IV trials | What proportion of women who meet the family history criteria are tested for BRCA and what are the barriers to testing? |
| **Clinical Research** | $T_4$ | Practice to population health impact | Outcomes research (includes many disciplines); population monitoring of morbidity, mortality, benefits, and risks studies | Does BRCA testing in asymptomatic women reduce breast cancer incidence or improve outcomes? |

Adapted from Khruory et al. (2007). The continuum of translation research in genomic medicine: How can we accelerate the appropriate integration of human genomic discoveries into health care and disease prevention? Genet Med, 9 (10), 665-674. (http://www.iths.org/about/translational)

# Comparison of Cert. in Translational Research and Cert. in Clinical Research

## Curriculum

| *Course Title* | *Course #* | *Credits* | Certificate in Clinical Research | Certificate in Translational Science |
|---|---|---|---|---|
| Tools & Techniques in Translational Research | GRAD G667 | 3 | | X |
| Quantitative Aspects of Translational Research | GRAD G668 (New) | 3 | | X |
| Introduction to Research Ethics **or** Ethical and Policy Issues in International Research | GRAD G504 **or** PHIL P555 | 2 to 3 | X | X |
| Electives (must be approved by the Program Director) | GRAD XXX | 5 to 8 | X (5 – 6) | X (6 – 8) |
| Biostatistics I or II (or approved equivalent) | GRAD G651 or G652 | 3 | X (Students may take this **OR** Clinical Trials) | X |
| Clinical Trials | GRAD 661 | 3 | | |
| Clinical Research Methods | GRAD G660 | 3 | X | |
| Total Required Credits | | | 14 – 15 | 18 |

# Comparison of Cert. in Translational Research and Cert. in Clinical Research

## Course Descriptions

## Requirements for both certificates degrees

**Research Ethics (Responsible Conduct of Research - RCR)** (G504/ P555): 2 - 3 credits. All M.S. students must enroll in coursework related to RCR if they have not already done so.

1. Introduction to Research Ethics (G504): 2 - 3 credits. More intensive course than G505. Taught by the Department of Medical and Molecular Genetics and The IU Center for Bioethics. Course Director: Kimberly Quaid de Cordon. Offered 3 times in the past 3 years (every fall).
2. Ethical and Policy Issues in International Research (PHIL P555): 3 credits. If students are contemplating international research, they may opt for this course. This course examines ethical and policy issues in the design and conduct of transnational research involving human participants. Topics discussed include: economic and political factors; study design; the role of ethics review committees; individual and group recruitment/informed consent; end of study responsibilities; national and international guidelines. Course Director: Eric M. Meslin. Offered 3 times in the past 3 years (every fall).

**Electives** (5 – 8 credits)

Example electives include graduate level courses in more advanced biostatistics, epidemiology, clinical pharmacology, genetics, molecular biology, and computer sciences. However, enrollees may select electives from the entire offering of graduate courses at both Indiana University and Purdue University at Indianapolis as well as IU at Bloomington. Must be approved by Program Director.

## Requirements for Certificate in Translational Science

**Tools and Techniques in Translational Research (G667): 3 credits.** This course is offered in the spring semester and provides the advanced student with an understanding of the basic technologies and techniques used in translational research today. Key to this training is understanding how and when to use these technologies, and how to interpret their results and pitfalls. The trainees develop an understanding of the components for protecting human subjects, and how to move a novel concept from the lab to a patient. Finally, the student will understand how to identify and measure target endpoints in patients, and how to assemble a multi-disciplinary team to conduct translational research. The course will uses a case-based approach whereby specific technologies and problems are demonstrated in readings drawn from the textbook. This course is a new offering (initiated spring 2009) and is supported by the Indiana CTSI. **Course Director:** R. Mark Payne. Offered once in Spring 2009 and is being offered Fall 2010.

**Quantitative Aspects of Translational Research, (New - Grad-G668): 3 credits.** Quantitative Aspects of Translational Research is an interdisciplinary weekly seminar series offered in the spring semester. Targeted toward the advanced graduate student and clinical or research based postdoctoral fellows, it will provide a forum for both Level 1 (bench to bedside) and Level 2 (clinical studies to practice) translational researchers to work together in learning both the key concepts and principles required to develop medically relevant solutions. Through a systematic exploration of diabetes mellitus, students will be exposed to the process of learning about any disease. Lecturers will represent the multiple disciplines with a stake in dealing the various aspects of disease; thus, providing students with a better global understanding. **Course Director:** Robert Bies, Ph.D. and Jamie Dananberg, M.D.

**Biostatistics I** (G651 or approved equivalent): 3 credits. G651 is an introductory level biostatistics course designed for healthcare professionals. It is the first in the G651 and G652 series on biostatistics methodology. The course covers topics such as data description and presentation techniques, probability and probability distributions, sampling distributions, statistical inferences

from small and large samples, analysis of categorical data, analysis of variance, correlation and simple linear regression analysis. Upon completion of the course, students will achieve a basic understanding of the concepts and techniques of data description and statistical inferences. Students will also acquire a working knowledge of SPSS, a commonly used statistical computation program. Students will be able to understand and interpret the statistical analyses in research articles published in medical journals. Course Director: B. Katz. Offered 6 times in the past 3 years (spring and fall semesters).

**OR**

**Biostatistics II** (G652 or approved equivalent): 3 credits. G652 is an advanced applied biostatistics course designed for students with an interest in the health sciences. Students are expected to have completed at least one semester course of basic biostatistics. Knowledge of probability and probability distributions, concepts of estimation and hypothesis testing are assumed. Topics covered in this course include multiple linear regression, multi-factor analysis of variance, analysis of covariance, analysis of repeated measures, logistic regression model, and survival analyses. Upon completion of the course, students are expected to understand the appropriate statistical models for various outcomes and be able to interpret results using statistical techniques covered in this course. Course Directors: S. Gao & P. Monahan. Offered 3 times in the past 3 years (every fall).

## Requirements for Certificate in Clinical Research

Clinical Research Methods (3 credits)

This course covers the major types of study design (other than clinical trials) used in clinical research, including cohort, case-control, cross-sectional, survey, and secondary database studies. Fundamental themes in clinical research – and how to appropriately investigate them –are also addressed, such as diagnostic tests, therapy, etiology, and prognosis. Other topics include questionnaire design, meta-analysis, economic analysis, health status measurement, qualitative research, computerized searching, and health services and outcomes research.

**Biostatistics I** (G651 or approved equivalent): 3 credits. G651 is an introductory level biostatistics course designed for healthcare professionals. It is the first in the G651 and G652 series on biostatistics methodology. The course covers topics such as data description and presentation techniques, probability and probability distributions, sampling distributions, statistical inferences from small and large samples, analysis of categorical data, analysis of variance, correlation and simple linear regression analysis. Upon completion of the course, students will achieve a basic understanding of the concepts and techniques of data description and statistical inferences. Students will also acquire a working knowledge of SPSS, a commonly used statistical computation program. Students will be able to understand and interpret the statistical analyses in research articles published in medical journals. Course Director: B. Katz. Offered 6 times in the past 3 years (spring and fall semesters).

**OR**

**Clinical Trials** (3 credits)

This course covers core topics in conducting clinical trials, including design, recruitment, informed consent, randomization, blinding, data collection and analysis, safety monitoring, study closeout, and alternative designs such as cross-over and nonrandomized trials. Also, regulatory and special topics are covered including drug trials phase I through IV, patenting and other legal issues, institutional review boards, cancer trials, cells and human tissue, and trials involving special populations.

# Comparison of Minor in Translational Research and Minor in Life Sciences

## Curriculum

| *Course Title* | *Course #* | *Credits* | Graduate Minor in Life Sciences | Ph.D. Minor in Translational Science |
|---|---|---|---|---|
| Tools & Techniques in Translational Research | GRAD G667 | 3 | | X |
| Quantitative Aspects of Translational Research | GRAD G668 (New) | 3 | | X |
| Introduction to Research Ethics **or** Ethical and Policy Issues in International Research | GRAD G504 **or** PHIL P555 | 2 to 3 | | X |
| Biostatistics I or II (or approved equivalent) | GRAD G651 or G652 | 3 | | X |
| Electives (must be approved by the Program Director) | GRAD XXX | Up to 12 | X (3 if Ph.D. program doesn't require G715, G716, & G717; 12 if Ph.D. program requires them) | Up to 3 |
| Biomedical Science I – Biochemical Basis of Biological Processes | GRAD G715 | 3 | X | |
| Biomedical Science II – Molecular Biology & Genetics | GRAD G716 | 3 | X | |
| Biomedical Science III - Cellular Basis of Systems Biology | GRAD G717 | 3 | X | |
| Total Required Credits | | | 12 | 12 |

# Comparison of Minor in Translational Research and Minor in Life Sciences

# Course Descriptions

## Requirements for both Minors

**Electives** (Up to 12 credits)
Example electives include graduate level courses in more advanced biostatistics, epidemiology, clinical pharmacology, genetics, molecular biology, and computer sciences. However, enrollees may select electives from the entire offering of graduate courses at both Indiana University and Purdue University at Indianapolis as well as IU at Bloomington. Must be approved by Program Director.

## Requirements for Ph.D. Minor in Translational Science

**Tools and Techniques in Translational Research (G667): 3 credits.** This course is offered in the spring semester and provides the advanced student with an understanding of the basic technologies and techniques used in translational research today. Key to this training is understanding how and when to use these technologies, and how to interpret their results and pitfalls. The trainees develop an understanding of the components for protecting human subjects, and how to move a novel concept from the lab to a patient. Finally, the student will understand how to identify and measure target endpoints in patients, and how to assemble a multi-disciplinary team to conduct translational research. The course will uses a case-based approach whereby specific technologies and problems are demonstrated in readings drawn from the textbook. This course is a new offering (initiated spring 2009) and is supported by the Indiana CTSI. **Course Director:** R. Mark Payne. Offered once in Spring 2009 and is being offered Fall 2010.

**Quantitative Aspects of Translational Research, (New - Grad-G668): 3 credits.** Quantitative Aspects of Translational Research is an interdisciplinary weekly seminar series offered in the spring semester. Targeted toward the advanced graduate student and clinical or research based postdoctoral fellows, it will provide a forum for both Level 1 (bench to bedside) and Level 2 (clinical studies to practice) translational researchers to work together in learning both the key concepts and principles required to develop medically relevant solutions. Through a systematic exploration of diabetes mellitus, students will be exposed to the process of learning about any disease. Lecturers will represent the multiple disciplines with a stake in dealing the various aspects of disease; thus, providing students with a better global understanding. **Course Director:** Robert Bies, Ph.D. and Jamie Dananberg, M.D.

**Biostatistics I** (G651 or approved equivalent): 3 credits. G651 is an introductory level biostatistics course designed for healthcare professionals. It is the first in the G651 and G652 series on biostatistics methodology. The course covers topics such as data description and presentation techniques, probability and probability distributions, sampling distributions, statistical inferences from small and large samples, analysis of categorical data, analysis of variance, correlation and simple linear regression analysis. Upon completion of the course, students will achieve a basic understanding of the concepts and techniques of data description and statistical inferences. Students will also acquire a working knowledge of SPSS, a commonly used statistical computation program. Students will be able to understand and interpret the statistical analyses in research articles published in medical journals. Course Director: B. Katz. Offered 6 times in the past 3 years (spring and fall semesters).

**OR**

**Biostatistics II** (G652 or approved equivalent): 3 credits. G652 is an advanced applied biostatistics course designed for students with an interest in the health sciences. Students are expected to have completed at least one semester course of basic biostatistics. Knowledge of probability and probability distributions, concepts of estimation and hypothesis testing are assumed. Topics covered in this course include multiple linear regression, multi-factor analysis of variance, analysis

of covariance, analysis of repeated measures, logistic regression model, and survival analyses. Upon completion of the course, students are expected to understand the appropriate statistical models for various outcomes and be able to interpret results using statistical techniques covered in this course. Course Directors: S. Gao & P. Monahan. Offered 3 times in the past 3 years (every fall).

**Research Ethics (Responsible Conduct of Research - RCR)** (G504/ P555): 2 - 3 credits. All M.S. students must enroll in coursework related to RCR if they have not already done so.

1. Introduction to Research Ethics (G504): 2 - 3 credits. More intensive course than G505. Taught by the Department of Medical and Molecular Genetics and The IU Center for Bioethics. Course Director: Kimberly Quaid de Cordon. Offered 3 times in the past 3 years (every fall).
2. Ethical and Policy Issues in International Research (PHIL P555): 3 credits. If students are contemplating international research, they may opt for this course. This course examines ethical and policy issues in the design and conduct of transnational research involving human participants. Topics discussed include: economic and political factors; study design; the role of ethics review committees; individual and group recruitment/informed consent; end of study responsibilities; national and international guidelines. Course Director: Eric M. Meslin. Offered 3 times in the past 3 years (every fall).

## Requirements for Graduate Minor in Life Sciences

**Biomedical Science I – Biochemical Basis of Biological Processes (IBMG - GRAD G715): 3 credits**
Textbook: Biochemistry 6th edition, by Berg, Tymoczko and Stryer. One of three biomedical science courses intended for incoming doctoral graduate students in the School of Medicine or other graduate students. Covers molecular and metabolic aspects of cellular function. The course will explore topics in the biochemical basis of biological systems, including biological macromolecules, protein ligand interactions, cell-signaling, and metabolic processes. Course Director: T. Hurley.

**Biomedical Science II - Molecular Biology and Genetics (IBMG - GRAD G716): 3 credits** Second of three biomedical science courses intended for incoming doctoral graduate students in the School of Medicine or other graduate students. Topics covered include DNA structure and replication, recombination and repair, genomics and processes of inheritance, gene expression, eukaryotic systems, and molecular genetics and disease. Course Directors: D. Gilley & R. Wek.

**Biomedical Science III - Cellular Basis of Systems Biology (IBMG - GRAD G716): 3 credits** Third of a group of three biomedical science core courses intended for incoming doctoral graduate students in the School of Medicine or other graduate students. Organization and function of cells, tissues and physiologic systems using disease examples. Topics include neurophysiology, musculoskeletal, renal, cardiovascular, gastrointestinal, endocrine and pulmonary systems, and cancer. Course Director: J. Bidwell & F. Pavalko.

# Comparison of MS in Translational Research and MS in Clinical Research

## Curriculum

| *Course Title* | *Course #* | *Credits* | MS in Clinical Research | MS in Translational Science | |
|---|---|---|---|---|---|
| | | | | Track 1 - Clinical background | Track 2 -Basic background |
| Tools & Techniques in Translational Research | GRAD G667 | 3 | | X | X |
| Quantitative Aspects of Translational Research | GRAD G668 (New) | 3 | | X | X |
| Introduction to Research Ethics **or** Ethical and Policy Issues in International Research | GRAD G504 **or** PHIL P555 | 2 to 3 | X | X | X |
| Biostatistics I or II (or approved equivalent) | GRAD G651 or G652 | 3 | X | X | X |
| Electives (must be approved by the Program Director) | GRAD XXX | 3 to 7 | X (4 to 6) | X (3 to 7) | X (4 to 6) |
| Techniques of Effective Grant Writing (or approved equivalent) | GRAD N802 | 3 | X | X | X |
| Mentored Basic Science / Translational Research | New | 7 to 9 | | X | |
| Thesis in Translational Research | New | 3 | | X | |
| Clinical Rotations for Scientists / Engineers | New | 9 | | | X |
| Mentored Clinical Research | GRAD 664 | 7 to 9 | X | | |
| Clinical Research Methods | GRAD G660 | 3 | X | | X |
| Clinical Trials | GRAD 661 | 3 | X | | |
| Research Communication | GRAD 655 | 2 | X | | |
| Total Required Credits | | | 30 | 30 | 30 |

# Comparison of MS in Translational Research and MS in Clinical Research

# Course Descriptions

## Requirements for all 3 MS degrees

**Research Ethics (Responsible Conduct of Research - RCR)** (G504/ P555): 2 - 3 credits. All M.S. students must enroll in coursework related to RCR if they have not already done so.

1. Introduction to Research Ethics (G504): 2 - 3 credits. More intensive course than G505. Taught by the Department of Medical and Molecular Genetics and The IU Center for Bioethics. Course Director: Kimberly Quaid de Cordon. Offered 3 times in the past 3 years (every fall).
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**Techniques of Effective Grant Writing (N802 or approved equivalent): 3 credits**. This is an intensive course / workshop designed to teach fellows and graduate students how to write and review an NIH application. Trainees will write an NRSA, R03, or K-award application. This will serve as the M.S. student thesis and must be submitted for review by their committee. Course Directors: Paul Lysaker & Alan Breier. Offered 3 times in the past 3 years (every fall).

**Electives** (3-7 credits)

Example electives include graduate level courses in more advanced biostatistics, epidemiology, clinical pharmacology, genetics, molecular biology, and computer sciences. However, enrollees may select electives from the entire offering of graduate courses at both Indiana University and Purdue University at Indianapolis as well as IU at Bloomington. Must be approved by Program Director.

## Requirements for both MS in Translational Science Degrees

# Comparison of MS in Translational Research and MS in Clinical Research

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## Requirements for MS in Translational Science for people with clinical background (i.e. MD) - Proposed

**Mentored Basic Science / Translational Research (New): 7 – 9 credits.** This mandatory course requires the student to construct an organized translational research project under dual mentorship (M.D. and Ph.D.) by faculty. The capstone experience is the completion of a grant in the NIH format suitable for peer-review and presentation before one's peers. This course will be conducted in the fall, spring, and summer terms, graded by faculty, and should be in a format supporting submission to a funding organization. Students will enroll for 3 credits per semester for up to 3 semesters. **Course Director:** R. Mark Payne, M.D.

**Thesis in Translational Research (New): 3 credits.** This mandatory course requires the student to complete a research thesis based on their mentored basic science / translational research project. **Course Director:** R. Mark Payne, M.D.

## Requirement for MS in Translational Science for people with Basic Science background (i.e. Ph.D.) – Proposed

**Clinical Rotations for Translational Scientists and Engineers (New): 9 credits** Students rotate in pairs through all rotations, and an effort is made to only have 2 students on each rotation at a time to maintain a high quality experience. These courses serve to both introduce the students to clinical medicine, and acclimatize them to the language and environment of hospital-based and out-patient medical care. Designed as practicums, these courses are particularly aimed at non-clinician scientists intending to conduct translational research.

# Comparison of MS in Translational Research and MS in Clinical Research

## Requirements for MS in Clinical Research

Clinical Research Methods (3 credits)

This course covers the major types of study design (other than clinical trials) used in clinical research, including cohort, case-control, cross-sectional, survey, and secondary database studies. Fundamental themes in clinical research – and how to appropriately investigate them –are also addressed, such as diagnostic tests, therapy, etiology, and prognosis. Other topics include questionnaire design, meta-analysis, economic analysis, health status measurement, qualitative research, computerized searching, and health services and outcomes research.

Clinical Trials (3 credits)

This course covers core topics in conducting clinical trials, including design, recruitment, informed consent, randomization, blinding, data collection and analysis, safety monitoring, study closeout, and alternative designs such as cross-over and nonrandomized trials. Also, regulatory and special topics are covered including drug trials phase I through IV, patenting and other legal issues, institutional review boards, cancer trials, cells and human tissue, and trials involving special populations

Research Communication (2 credits)

This course combines a core didactic set of classes on the key elements of scientific writing along with the requirement for completion of a paper to be submitted for publication in a peer-reviewed journal. Two secondary skills are also covered. Manuscript review is addressed, including co-review of a manuscript with a mentor or other faculty scientist. The principles of presenting research at scientific meetings are also covered, including preparing an abstract, an oral presentation, and a poster.

Mentored Clinical Research (7-9 credits)

This is an organized research project in the form of an organized scientific contribution or comprehensive analysis conducted under the mentorship of a faculty scientist from the individual CITE enrollee's core discipline. The capstone experience is submission of an abstract to a scientific meeting, defense of one's research before an Advisory Committee, and completion of a first-authored paper deemed suitable for publication in a scientific journal.

## Reviewers for Translational Science proposal

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