PART IV
TENURE/PROMOTION APPLICATION

PART IV. ENDEAVORS (to be completed by applicant)

Use the page 4.1 appropriate to your faculty classification. See the Criteria and Guidelines for Tenure/Promotion Application, September 2013 for examples of activities. Attach statements on endeavors and supporting materials as pages numbered from p. 4.2, with name on upper right of each page.

1. Statement of Endeavors – Instructional Faculty
Recommended Length: 1-9 pages, 12 point. – Candidates for tenure and/or promotion should provide a personal statement about the unique aspects and special significance of their accomplishments and future plans in teaching, research and/or service. Statements should be directed toward readers who may not be specialists in the candidate’s field.

Indicate the page numbers of your statements of endeavors in the following categories:

Instructional activities (4.2 to 4.15__)
Research/scholarly activities (4.16 to 4.23__)
Service activities (4.24 to 4.27__)
Other (4.N/A to 4.N/A)


Teaching evaluations (4.28 to 4.152__)
Bibliography (4.153 to 4.164__)
Peer evaluations of contributions (4.165 to 4.181__)
Other: Supporting materials (please list) (4.182 to 4.261__)

Note here the final page number of your submission 4.261
STATEMENT OF ENDEAVORS

I. INTRODUCTION

The basic mission of the John A. Burns School of Medicine (JABSOM) is to teach and train high-quality physicians, biomedical scientists, and allied health workers for Hawaii and the Pacific. The school has a particular mission to provide opportunities to students from underrepresented or disadvantaged backgrounds. To meet this mission, JABSOM provides a yearlong post-baccalaureate program entitled ‘Imi Ho’ola (Hawaiian for “Those who seek to heal”). Each year, twelve students from underrepresented and disadvantaged backgrounds who were unsuccessful in seeking admission to JABSOM are selected to participate in the ‘Imi Ho’ola Post-Baccalaureate Program (IH) and upon successful completion of the program the students are guaranteed acceptance to the JABSOM as first-year medical students. The purpose of the program is to prepare students for the rigors of the medical school education they will face after completing the program.

Since its establishment in 1973, IH program was recognized as one of the most successful signature programs in JABSOM, and played a major role in accomplishing the School’s basic mission in educating quality physicians as the major pipeline for supplying primary care physicians to the underserved and disadvantaged communities of Hawaii and the Pacific islands. Of the 226 graduates of IH and JABSOM to date, eighty five percent of them practice in primary care fields. Ninety six percent of our program graduates are practicing in underserved and/or disadvantaged populations and thirty eight percent of them are Native Hawaiian (Haw. J. Med. Pub. Health 2012;329-331). The importance of the program to increase the physician workforce in underserved and disadvantaged communities becomes more evident considering that a shortage of 65,800 primary care physicians was projected by 2025 (Physician Shortages to Worsen Without Training. AAMC Website. 2010). The IH is a core program of the Department of Native Hawaiian Health (DNHH) at JABSOM, which is the only department in any US medical school dedicated to the health of an indigenous population.

In September 2001, I joined the IH at JABSOM as an assistant professor with primary responsibilities to teach the IH students a review course of biochemistry and molecular biology. In 2008, I was promoted to associate professor and my position was converted from temporary non-tenure track status to probationary tenure-track status based on the provision of Article XII of the 2003-2009 UHPA/BOR agreement (see the letter from the dean on page 4.182).

Over the past 13 years as a faculty member of JABSOM, I have devoted 80% of my time to teaching, 10% to research, and 10% to service and have played a significant role in the success of the program. The following highlights my academic endeavors in teaching, research, and service since my initial hire in 2001.

A. TEACHING (80% Efforts):

During the past 13 years, teaching has been my primary focus and I have made significant contributions to the curriculum by upgrading the curriculum to meet the needs of our IH students to not only complete their post-baccalaureate year but also to be “life-long”
learners. The courses that I have taught over the last 13 years are two 6-credit-courses (6-credit per semester/total 12 credit per year) entitled “Medical Biochemistry (NHH505 & 506)”. These two courses are one of the core subjects of the IH program. These courses are designed to help students connect basic science principles to clinical medicine. Often times, students experience difficulties in understanding how basic science findings are applied to solving various clinical problems in medicine. My experiences in translational research have helped me greatly in teaching students both the basic principles of biochemistry and molecular biology and their clinical applications via various clinical case studies. This requires extensive basic science knowledge. Initially, I used a conventional biochemistry textbook for the basic science foundation section of the courses and clinical case articles published in medical journals for the clinical application section of the courses. There was no textbook available at the time, which deals heavily with specific biochemistry topics with extensive clinical case coverage. To fill this gap, I developed a college textbook to serve as our course textbook entitled, “Essentials of Medical Biochemistry with Clinical Cases (ISBN:0120954613)” published by Elsevier Inc. in 2011. This book was developed to better aid students in establishing a firm foundation in the basic science required for the medical education they will receive after the completion of the program.

Currently, I teach a) two 6-credit medical biochemistry courses, b) two 3-credit graduate directed research courses for the University of Hawaii Molecular Biology and Biochemical Engineering masters degree program, c) a weekly one-on-one tutorial for IH program students (equivalent to a 4-credit course), and d) The United States Medical Licensing Examination (USMLE) Step 1 review sessions for medical students who are IH program graduates (equivalent to a 1-credit course). As the sole Biochemistry faculty instructor, I am particularly proud that 100% of our program graduates have passed the United States Medical Licensing Exam (USMLE) Step 1 on their first attempt for the last 10 consecutive years. It is widely accepted in academic medicine that the passing rate of this exam serves as a good indicator for the quality of instruction in basic science disciplines in medical school. In summary, I teach a total of 23-credit hours per academic year and have trained 2 Post-doctoral fellows, 3 Ph.D. students, 5 M.S. students, 5 M.D. students, and 3 high school students in my laboratory. My students’ evaluations of me are in the excellent range with an average rating of 1.24 based on a 5-point scale; 1 being the highest rating (strongly agree) and 5 being the lowest (strongly disagree)(see page 4.29-30).

B. RESEARCH (10% Efforts):

Despite my predominant teaching load (80%), I have spent 10% of my academic time on research for the past 13 years and have accomplished a number of important research goals. I have collaborated with scientists around the world such as England, France, Japan, and Mainland US, and presented my research findings in prestigious peer-reviewed scientific journals, such as Proceedings of the National Academy of Sciences of the United States of America (PNAS USA, impact factor 9.681), Clinical Chemistry (impact factor 7.905), Biochimica et Biophysica Acta (BBA, impact factor 4.947), etc. I have served as the principal investigator on 4 funded research grants. My research resulted in the publication of 32 journal articles, 5 peer-reviewed abstracts, 17 international conference presentations, and
12 invited lectures. In addition, I wrote 6 book chapters and co-authored 1 US patent publication and 1 college textbook.

According to my citation report from the Google Scholar web service, my research work has been cited 1,249 times total and 713 times since my last promotion to associate professor in 2008 (see page 4.213). H-index, which reflects impact of a scientist’s research work by indexing number of publications with citation number, is often used to quantify research output of a researcher. According to Hirsch’s article published in proceedings of the national academy of sciences of the USA (Hirsch, J.E. Vol. 102(46), p16569-72, PNAS USA 2005), *H-index of 12 is generally regarded as typical value for the promotion to associate professor and tenure at major research universities in the United States. My H-index value is 18, which is comparable value for the advancement of full professorship* according to the same article. In particular, our article published in 2003 about ischemia-modified albumin was cited 311 times, which indicates the impact of my research activities to the scientific community.

### C. SERVICE (10% Efforts)

In addition to my devotion to teaching and research, I have spent 10% of my time on service on various levels. I served on masters and doctoral thesis committees, the University of Hawaii radiation safety committee, poster session judging panels for an annual research symposium, the admissions committee, and the student standing and promotion committee, while also serving as a medical school admissions interviewer. Furthermore, I have been helping medical students as an academic advisor and a faculty mentor for 20 medical students in JABSOM’s new student mentoring program called pod-vising program. I have reviewed manuscripts for eight scientific journals and am a member of four professional organizations.

### D. SIGNIFICANCE AND FUTURE VALUE

I have been and will continue to be a productive and valuable member of the DNHH, JABSOM, and University of Hawaii at Manoa (UHM). My teaching endeavors for the past 13 years with the IH program have been fully consistent with the UHM’s commitment and core values of *diversity, fairness and equity* and also well-aligned with the mission of JABSOM in establishing a diverse learning community committed to excellence and leadership in educating current and future healthcare professionals and leaders (JABSOM Website). Therefore, my future value to the IH program, DNHH, JABSOM, and UHM lies in the continuation of my teaching endeavors. As a significant shortage of physicians in the future is predicted, and the JABSOM is the major pipeline of physician supply for our state, my unique expertise and experiences in teaching minority students from underserved and disadvantaged communities will contribute to continuous improvement in the healthcare workforce of Hawaii and the Pacific region. I will also continue to expand my high-impact international research network on mutagenesis studies of human serum albumin and studies on biomarkers for cardio-metabolic disorders, and disseminate important research findings to the scientific community through peer-reviewed journals.
In the following pages, I have elaborated more on my qualifications, expertise, and achievements as a competent teacher, a highly achieved research scholar and a participant of various academic affairs of the DNHH, JABSOM, and the UHM.

II. INSTRUCTIONAL ACTIVITIES

A. Teaching philosophy:

As a medical biochemistry instructor in the IH program, it is my duty and responsibility to increase students’ knowledge and understanding in the classroom. Students participating in IH are usually “motivated underachievers,” who are strongly motivated to pursue their dream of becoming a physician but are not yet working up to their full potential. They spend hours studying class materials and reading references. However, their exam scores usually do not reflect their efforts. In addition to their socio-economic challenges, the most common reasons for their underachievement are lack of effective study skills and independent self-learning skills, weak basic sciences background, and deficiencies in reading comprehension.

My objectives for the IH program student, as a teacher, are to improve each students’ fundamental knowledge of medical biochemistry, enhance critical thinking skills, and advance independent learning and problem solving skills. Upon completion of two 6-credit medical biochemistry courses offered during fall and spring semesters, I expect my students to achieve deeper understanding of medical biochemistry principles and their applications into medicine. Thus, they will have a firm basic science foundation ready for the rigors of medical education. In addition, students will have improved their self-confidence, critical thinking skills and problem-solving skills for independent learning required for problem-based learning courses at JABSOM.

During my undergraduate years, I observed a number of teaching approaches from different instructors. Much of what the instructors taught was information straight out of a textbook. For the majority of those courses, the performance of my classmates and myself depended largely on how many hours we spent memorizing the small details of the textbook’s content in the library. Even though simply memorizing the small details of class materials helped me to score points on exams, this approach rarely contributed to an improved global understanding of the subject matter and its real-world applications. Outstanding students eventually understand the connections between seemingly unrelated facts and the big picture. However, it is well known that this is a very inefficient and time-consuming process for learning. In my opinion, the instructor should make every effort to help students identify important connections between seemingly unrelated scientific observations and elucidate key principles that arise from these connections.

By covering the major course content of the textbook, I provide students with the information they must know. However, simply teaching course content and subject matter does not help students improve their thinking and reasoning skills. Critical thinkers should be able to generate appropriate questions, gather relevant information, analyze information gathered logically, and make conclusions based on sound reasoning. To improve students’ critical thinking and problem solving skills, I continuously motivate them to ask questions at every stage of learning as a way to teach them how to think about the course content.
I also routinely use well-known scientific investigations found in the textbook to teach students how to think and make connections in biochemistry. The major discoveries of science provide good examples of critical thinking and problem solving processes. Initially, the researcher identifies a question and establishes hypotheses based on relevant data. The hypotheses are then tested by a series of experiments from which data are generated. After carefully analyzing the data, reasonable conclusions are drawn. By educating students about investigators’ thinking and problem solving processes and how they have led to major discoveries, students learn the importance and the process of critical thinking and problem solving. As a way of encouraging students to practice critical thinking, I often provide scientific data in course exams that contradict major science discoveries and ask students to draw conclusions from the data.

To promote the development of students’ independent learning skills, I encourage them to generate questions related to lecture topics and prepare answers for the questions. One of my responsibilities as a teacher is to guide the students in their endeavors to understand and appreciate the importance of medical biochemistry and its relationship to other subjects of medicine. Students tend to be more involved and interested in classroom discussions and activities when they believe their opinion is respected and recognized by their classmates and the instructor. Motivated students actively participate in the group discussion and generate learning issues. As the instructor, I assign those learning issues to each student and ask them to prepare and lead the discussions in the following week’s class. The learning issues generated by the students reflects the depth of their knowledge in the subject matter and provides me with the opportunity to adjust what I teach to the students’ needs in the next class. Customizing my teaching to meet the students’ needs prevents them from getting bored with the lecture content and enables them to stay focused; thus, ensuring the students’ academic growth.

In general, students have different learning styles and the instructor needs to adapt his or her teaching approach to deliver effective instructions. Some students focus on the “big picture” while others are “detail-oriented”. Through active class discussions, students with different learning styles can benefit from each other. A student that focuses on the big picture can improve his or her understanding of the content through the details provided by the detail-oriented person and vice versa. They can mutually benefit from group study and peer teaching. I strongly believe that the best way to learn is by teaching others. Learning through teaching is what I do as an instructor and as a life-long learner and I know it is an effective way of learning.

To evaluate students’ progress in medical biochemistry, I employ different types of exams. Weekly quizzes, which consist of 10 multiple-choice questions, are used to encourage students to maintain steady study habits. Every week I review the weekly quiz with students in class and I provide answers to questions as well as tips on how to solve the questions. These weekly quiz reviews provide valuable training opportunities for students to improve their test-taking skills. The mid-term and final exams in each of my courses are 70% multiple-choice questions and 30% modified essay questions. Essay questions in the exams are scenario problems, which are designed to measure their ability to think critically and reason globally using broad principles learned in class.
As a teacher and a life-long learner, I find that my greatest joy stems from watching students grow academically and engage in classroom discussion without any hesitation. One of the most rewarding aspects of teaching is when I witness students’ improved self-confidence and evolution into self-directed independent learners. To help students succeed in their life goal, it is my responsibility to establish a favorable learning environment for them. Interactions between the instructor and the student are key elements in creating this kind of environment. For the IH students who come from disadvantaged backgrounds, I am able to offer more opportunities for students to express themselves. I am accessible to students and I try to participate in students’ extracurricular activities, such as field trips. Through informal contacts and interactions, students tend to become more comfortable with the instructor and it helps them to express/share their thoughts and experiences.

Students from IH program have rated me as one of the most accessible and approachable instructors in the program as evidenced by the following comments:

- "is a caring and supportive instructor. He is also very knowledgeable and approachable."
- "I am learning so much about Biochemistry and understanding in more depth now than in undergrad."
- "is a very competent instructor, very knowledgeable, and able to discuss and teach difficult concepts in a way that makes it easy to understand."
- "It was a very educational academic year & I’ll fell far more comfortable in my biochemistry background as I transition into medical school."
- "Instructor made learning environment comfortable. Instructor was approachable, made time for extra session outside class."
- "Really appreciate taking time out to answer questions & explain difficult concepts."
- "Very effective lecturer, makes lectures interesting with stories, makes time for students, caring, very good at explaining difficult concepts, overall a very good teacher."

Another great reward of teaching is the fact that I have assisted students in achieving their life goal of becoming caring physicians. Many IH graduates choose to practice medicine in underserved communities once they complete their residencies. The fact that I helped someone become a doctor and improve the health care system of an underserved community is one of the most rewarding aspects of my job. I enjoy seeing my students grow academically, strive in medical school after completion of the program, and achieve their goal of becoming a physician.

The course I currently teach in the IH program is designed to assist students who have been denied acceptance to JABSOM improve their basic science knowledge base and critical thinking and problem solving skills so that they can be prepared for the various challenges of medical education. My teaching philosophy as outlined above has been very effective in working with these students.

B. Teaching Courses:
- Teaching in 'Imi Ho‘ola Post-Baccalaureate Program, JABSOM, and UH manoa: (6 Credits/Fall, 6 Credits/Spring)
<table>
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<tr>
<th>Courses for Fall &amp; Spring Semesters</th>
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<tr>
<td>01/2007 – present</td>
<td>NHHS06: Medical Biochemistry II, 6 credits offered in Spring Semester, 6-hour lecture/week, small group &amp; one-on-one tutorials</td>
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<tr>
<td>08/2007 – present</td>
<td>NHH 505: Medical Biochemistry I, 6 credits offered in Fall Semester, 6-hour lecture/week, small group &amp; one-on-one tutorials</td>
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<tr>
<td>08/2001 – 12/2006</td>
<td>BIOM 405: Review of Premedical Chemistry I, 4 credits offered in Fall, 4-hour lecture/week, small group &amp; one-on-one tutorials</td>
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<tr>
<td>01/2002 – 05/2006</td>
<td>BIOM 406: Review of Premedical Chemistry II, 4 credits offered in Spring, 4-hour lecture/week, small group &amp; one-on-one tutorials</td>
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<tr>
<td>Lectures</td>
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<tr>
<td>Aug 5, 2013</td>
<td>Course Orientation for Medical Biochemistry Exam, 1-hour exam and exam review</td>
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<tr>
<td>Jul 29, 2013</td>
<td>Course Orientation for Medical Biochemistry, 3-hour lecture</td>
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<tr>
<td>Jan 19, 2013</td>
<td>MD3 Lecture-Fibrillar Proteins: Collagen Synthesis and Assembly</td>
</tr>
<tr>
<td>Aug 3, 2012</td>
<td>Course Orientation for Medical Biochemistry Exam, 1-hour exam and exam review</td>
</tr>
<tr>
<td>Jul 27, 2012</td>
<td>Course Orientation for Medical Biochemistry, 2-hour lecture</td>
</tr>
<tr>
<td>Jan 13, 2012</td>
<td>MD3 Lecture-Fibrillar Proteins: Collagen Synthesis and Assembly</td>
</tr>
<tr>
<td>Aug 5, 2011</td>
<td>Course Orientation for Medical Biochemistry Exam, 1-hour exam and exam review</td>
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<tr>
<td>Jul 29, 2011</td>
<td>Course Orientation for Medical Biochemistry, 2-hour lecture</td>
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<tr>
<td>Jan 19, 2011</td>
<td>MD3 Lecture-Fibrillar Proteins: Collagen Synthesis and Assembly</td>
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<tr>
<td>Aug 6, 2010</td>
<td>Course Orientation for Medical Biochemistry Exam, 1-hour exam and exam review</td>
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<tr>
<td>Jul 30, 2010</td>
<td>Course Orientation for Medical Biochemistry, 2-hour lecture</td>
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<tr>
<td>Feb 23, 2010</td>
<td>USMLE Biochemistry Review #4 for 2nd year medical students, 2-hour lecture</td>
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<td>Feb 9, 2010</td>
<td>USMLE Biochemistry Review #3 for 2nd year medical students, 2-hour lecture</td>
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<tr>
<td>Jan 26, 2010</td>
<td>USMLE Biochemistry Review #2 for 2nd year medical students, 2-hour lecture</td>
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<tr>
<td>Jan 20, 2010</td>
<td>MD3 Lecture-Osteogenesis Imperfecta-Collagen Biosynthesis, 1-hour lecture</td>
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<tr>
<td>Jan 19, 2010</td>
<td>USMLE Biochemistry Review #1 for 2nd year medical students, 2-hour lecture</td>
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<tr>
<td>Aug 13, 2009</td>
<td>Course Orientation for Medical Biochemistry Exam, 1-hour exam and exam review</td>
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<td>Aug 11, 2009</td>
<td>Course Orientation for Medical Biochemistry, 2-hour lecture</td>
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<tr>
<td>Jan 21, 2009</td>
<td>MD3 Lecture-Fibrillar Proteins: Collagen Synthesis and Assembly</td>
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<td>Aug 12, 2008</td>
<td>Course Orientation for Medical Biochemistry Exam, 1-hour exam and exam review</td>
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<td>Aug 8, 2008</td>
<td>Course Orientation for Medical Biochemistry, 2-hour lecture</td>
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<tr>
<td>Jan 30, 2008</td>
<td>MD3 Lecture- Osteogenesis Imperfecta, 1-hour lecture</td>
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</table>
Sep 11, 2007  Molecular biology and bioengineering (MBBE) program Graduate Seminar- Regulation of albumin gene expression, 1-hour lecture
July 26, 2007  PowerPoint Orientation, 2-hour lecture
July 24, 2007  Course Orientation for Medical Biochemistry Exam, 1-hour exam and exam review
July 20, 2007  Course Orientation for Medical Biochemistry, 2-hour lecture
Jan 17, 2007  Basic Biochemistry 441- RNA Structure & Synthesis, 1 hour lecture
Feb 7, 2007  Basic Biochemistry 441- Fibrous Proteins, 1 hour lecture
July 27, 2006  PowerPoint Orientation, 2-hour lecture
July 25, 2006  Course Orientation for Medical Biochemistry Exam, 1-hour exam and exam review
July 20, 2006  Course Orientation for Medical Biochemistry, 2-hour lecture
July 15, 2005  PowerPoint Orientation, 2-hour lecture

-  **Teaching in graduate programs: (3 Credits/Fall, 3 Credits/Spring)**

  **Courses for Fall & Spring Semesters**

  08/2005 – present  Directed Research 699- Molecular biology and bioengineering graduate program, 6 credits offered in Fall & Spring semesters

  08/2004 – 05/2005  Directed Research 699- Physiology graduate program, 6 credits offered in Fall & Spring semesters

  **Lecture**

  Dec 03, 2008  Physiology 613 Lecture- Recombinant serum albumin and FDH mutation, 2-hour lecture

  Jan 16, 2008  Medical Physiology 618 Lecture- Endocrine control mechanisms, 2-hour lecture

  Sep 11, 2007  Molecular biology and bioengineering (MBBE) program Graduate Seminar- Regulation of albumin gene expression, 1-hour lecture

  **Graduate Student Advisor**

  08/2012 – present  JABSOM POD Mentoring Program Faculty mentor for 20 JABSOM medical students

  08/2012 – present  M.S. Student advisor and thesis committee chair for 1 MBBE graduate program student

  08/2004 – present  M.D. Student advisor for 5 JABSOM students (‘Imi Ho’ola program graduates)

  08/2009 – 12/2011  M.S. Student advisor and thesis committee chair for 1 MBBE graduate program student

  08/2007 – 05/2011  Ph.D. Student advisor and dissertation committee chair for 1 MBBE graduate program student

  08/2004 – 08/2012  M.D. Student advisor for 5 JABSOM students

  08/2005 – 08/2007  M.S. Student advisor and thesis committee chair for 1 MBBE graduate program student

  **C. Course Development and Innovation (NHH505 for Fall/NHH506 for Spring)**

  4.9
I have developed a course “Medical Biochemistry (NHH505 for fall semester/ NHH506 for spring semester)” as one of the core subjects in the ‘Imi Ho’ola program. NHH505 and NHH506 are biochemistry review courses, intended to provide solid background knowledge of biochemistry and molecular biology for the students of IH program. General principles of biochemistry and molecular biology as well as its clinical correlations to certain medical conditions are presented in class. Even though it is impossible to memorize all the details of biochemical processes, students are expected to learn to make connections of basic biochemical facts and apply general principles of biochemistry to understand/solve real world clinical cases.

The original courses I developed had two major sections. The first section of the course deals mainly with an understanding of major biochemical pathways and their alterations found in diseases. For this purpose I used a textbook, entitled “Medical Biochemistry, 4th edition, Academic Press” until I developed my own course textbook with my mentor Dr. Bhagavan, who is an emeritus professor of JABSOM. The second section of the course deals with clinical cases relevant to the first section of the course. In this section, published medical cases with detailed information regarding diagnosis and treatment of certain diseases linked to the biochemical principle discussed in the first section of the course are presented and discussed extensively. For this section, extensive knowledge on clinical biochemistry is required to direct classroom discussions. My experiences with translational research over the years have helped me to gain expertise in teaching clinically relevant cases in class. For the past 13 years I have worked closely with clinicians in deciphering biochemical aspects of various clinical conditions as described in my research endeavor sections. As evidenced by my teaching reviews, students seem to enjoy the course and are happy with its format as reflected by students’ comments listed in the evidence of teaching effectiveness section.

Unfortunately, there was no textbook available at the time to cover the material of the course in an appropriate and systematic format. I used the most recent review articles published in the New England Journal of Medicine, Lancet, Journal of American Medical Association, Clinical Chemistry, etc. These review articles correspond to each lecture topic covered in the first section of the class and involve 800 pages of reading for each semester of the course. Both the Fall and Spring semesters involve five hours of lecture/week for the first section and one hour of discussion/week for the second section. Based on my teaching experience with using medical journal review articles, I have developed clinical case profiles suitable for each chapters of the textbook, which helped me greatly in writing the new textbook below.

Although the course textbook, Medical Biochemistry 4th edition was known for its good coverage of general medical biochemistry principles, it didn’t include relevant clinical case discussions directly related to specific basic science topics discussed in class. I felt that a biochemistry textbook with actual clinical case discussions would better help our students in understanding how scientific findings from the lab are used to solve medical problems at the bedside. I worked with Dr. N.V. Bhagavan, who previously published textbooks on medical biochemistry, to develop a new textbook with clinical case discussions with an aim of developing a textbook suitable specifically for the students of the IH program and in 2011 we completed a textbook, entitled “Essentials of Medical Biochemistry with Clinical Cases.”
published by Elsevier, Inc. (Refer to the figure included). This new textbook contains 38 chapters of biochemistry principles including molecular biology, physiology, pharmacology and endocrinology and also includes an independent chapter mainly dealing with clinical cases discussed in the main text. I have used the new textbook for the IH program and during the fall and spring semesters, almost all the chapters in the textbook are covered in the classroom. The textbook I co-authored with Dr. Bhagavan has been used by other instructors in the field and one reviewer on Amazon.com webpage stated the reason for the adoption in his course as follows: “We adopted the Bhagavan text because it is the most comprehensive and authoritative text on the market and is suitable for our students who have already had at least one semester of biochemistry prior to acceptance in medical school...” (http://www.amazon.com/dp/B004H1TQE4/ref=rdr_kindle_ext_tmb). Also, the publisher decided to publish the 2nd edition of the book after extensive expert reviews of the book and we are now working actively on the preparation of the 2nd edition with the goal of publishing it by January 2015. The extensive reviews of this new textbook are provided in supporting material section (see pages 4.183-4.189).

To enhance teaching efficiency and students’ learning, I have continuously tried to improve the curriculum by modifying and adding new components based on students’ and peer evaluation of the courses. It has been recognized and suggested by the instructor and program graduates that the laboratory component of medical biochemistry is needed to help students understand and learn better about new molecular diagnostic principles and methods available to the physician in practice. After a thorough planning and with help of our program director and department chair, we will begin offering a medical biochemistry laboratory course to the program’s students starting the spring semester of 2014. Through the laboratory course, the program’s students will experience the advanced diagnostic techniques routinely used in a pathology laboratory.

D. Evidence of Teaching Effectiveness

The courses of Imi Ho’ola program are offered through the University of Hawaii Outreach College since the program is a post-baccalaureate premedical program. The outreach college has been administering and collecting course evaluations directly from the students enrolled in the course until 2011. These evaluations are completely confidential and anonymous. The summary of the evaluations is provided to the course instructor after the course ends. The UH outreach college discontinued the evaluation service in 2011. The following is a summary
of my teaching evaluations for the courses NHH 505 and NHH 506 from 2007 to 2011. For the summary of teaching evaluations from 2001 to 2011, please refer to Table 1 in teaching evaluation section on page 4.28.

Summary of Teaching Evaluations for NHH505/506 by Outreach College
1= Strongly Agree, 2=Agree, 3= Slightly Agree, 4= Disagree, 5= Strongly Disagree

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<tbody>
<tr>
<td>The course is well organized.</td>
<td>2.24</td>
<td>1.14</td>
<td>1.13</td>
<td>1.44</td>
<td>1.6</td>
<td>1.51</td>
</tr>
<tr>
<td>Content of the course was interesting and challenging.</td>
<td>1.59</td>
<td>1.14</td>
<td>1</td>
<td>1.19</td>
<td>1.2</td>
<td>1.224</td>
</tr>
<tr>
<td>Course requirement/Objectives were clearly spelled out.</td>
<td>1.54</td>
<td>1.14</td>
<td>1.13</td>
<td>1.32</td>
<td>1.4</td>
<td>1.306</td>
</tr>
<tr>
<td>Exams tested students for course understanding, not memory ability.</td>
<td>2.32</td>
<td>1.14</td>
<td>1.13</td>
<td>1.79</td>
<td>2</td>
<td>1.676</td>
</tr>
<tr>
<td>Textbooks, outside readings and class assignments were very relevant to understanding, not memory ability.</td>
<td>1.75</td>
<td>1.14</td>
<td>1.13</td>
<td>1.63</td>
<td>1.6</td>
<td>1.45</td>
</tr>
<tr>
<td>Grading in course was fair and impartial.</td>
<td>1.63</td>
<td>1.14</td>
<td>1</td>
<td>1.3</td>
<td>1.4</td>
<td>1.294</td>
</tr>
<tr>
<td>Instructor’s class preparation was of high caliber.</td>
<td>1.94</td>
<td>1.14</td>
<td>1</td>
<td>1.19</td>
<td>1.2</td>
<td>1.294</td>
</tr>
<tr>
<td>Instructor showed ability to explain difficult concepts.</td>
<td>1.9</td>
<td>1.29</td>
<td>1</td>
<td>1.42</td>
<td>1.4</td>
<td>1.402</td>
</tr>
<tr>
<td>Instructor demonstrated mastery of subject matter.</td>
<td>1.54</td>
<td>1.17</td>
<td>1</td>
<td>1.07</td>
<td>1</td>
<td>1.156</td>
</tr>
<tr>
<td>Instructor was skillful in stimulating student-student and student-instructor interaction in class</td>
<td>2.09</td>
<td>1.14</td>
<td>1.13</td>
<td>1.63</td>
<td>1.8</td>
<td>1.558</td>
</tr>
<tr>
<td>Instructor created a desire to learn among the students.</td>
<td>2</td>
<td>1.14</td>
<td>1</td>
<td>1.4</td>
<td>1.8</td>
<td>1.468</td>
</tr>
<tr>
<td>Instructor was tolerant of differences of ideas; engaged in healthy exchange of ideas with students.</td>
<td>1.69</td>
<td>1.14</td>
<td>1</td>
<td>1.18</td>
<td>1.2</td>
<td>1.242</td>
</tr>
<tr>
<td>I have learned much new vocabulary and facts in the field.</td>
<td>1.25</td>
<td>1.14</td>
<td>1</td>
<td>1.24</td>
<td>1.2</td>
<td>1.166</td>
</tr>
<tr>
<td>I have learned skills and techniques that will be very useful in my occupation/profession or personal life.</td>
<td>1.25</td>
<td>1.14</td>
<td>1.13</td>
<td>1.4</td>
<td>1.4</td>
<td>1.264</td>
</tr>
<tr>
<td>I have gained in self-understanding; I understand better my abilities and limitations.</td>
<td>1.44</td>
<td>1.14</td>
<td>1.13</td>
<td>1.29</td>
<td>1.6</td>
<td>1.32</td>
</tr>
<tr>
<td>I am better prepared to confront and solve problems as a result of the course.</td>
<td>1.5</td>
<td>1.14</td>
<td>1</td>
<td>1.29</td>
<td>1.4</td>
<td>1.266</td>
</tr>
<tr>
<td>My highest expectations of the course were</td>
<td>1.94</td>
<td>1.14</td>
<td>1</td>
<td>1.53</td>
<td>1.6</td>
<td>1.442</td>
</tr>
</tbody>
</table>
realized.

OVERALL, the educational worth of this course is superior in comparison with other comparable courses I have taken.

Examples of Students’ Comments on teaching taken from the UH outreach college course evaluations (see more students comments on supporting materials section 4.28 -4.152)

- Dr. Ha is very smart, informative, friendly and fun! He makes learning fun. He is fair and enthusiastic about biochem. He makes us want to learn and give us breaks when needed.
- Dr. Ha is very supportive & encouraging to all of us. He knows the subject matter is difficult & dry, but he really tries to make his long lectures enjoyable. His sincerity, genuine concern & sharing of his personal life really made me want to do well in this course – for him (as appreciation) even though it was very difficult to understand for me. Thank you!
- Explained difficult concepts with “catchy” or funny analogies. Available in his office to discuss problems with students. Suggested reading material to complement the outlines he passed out in class. Genuinely concerned about welfare and learning quality of his students. Excellent instructor and fair.
- Dr. Ha is always willing and available to answer questions as well as provide extra sessions to help facilitate learning. He is genuinely concerned for the students’ welfare and fosters a very positive & nurturing study environment.
- Instructor made learning environment comfortable. Instructor was approachable, made time for extra session outside of class.
- Good sharing of personal experience and professional experience used to support topics covered in class. Very approachable and friendly.
- Patient with students, willing to explain/repeat, tricky questions make us think, cool video clips/media, makes easy to learn because condensed version of material
- Knows material well, integrates old material good for our long-term education, encourages outside/clinical knowledge, good slides with lots of case-map-style
- Personable, easy to communicate with, very knowledgeable in his field, incorporates tangible anecdotes to supplement information.
- Very helpful, always available, very patient, plethora of information, good sense of humor.
- Knowledgeable, good application to real world, lots of examples, makes class interesting.

D. Graduate Student Teaching Philosophy
For the last 13 years, I have been actively involved in graduate student teaching in our laboratory and trained a total two post-doctoral fellows, three Ph.D., five M.S. students, five M.D. students, three undergraduate student, and three high school students in our
laboratory. The following is a list of students I have trained in our laboratory and their research projects:

- Ph.D., Manager, Samsung Pharmaceutical Inc. (worked as a post-doctoral fellow from September 2003 to May 2005): “Utility of Serum Fatty Acid Concentrations as a Marker for Acute Myocardial Infarction and Their Potential Role in the Formation of Ischemia-Modified Albumin”
- Ph.D., Post-doctoral fellow, Harvard University (graduated in August 2004): “Studies of Human Serum Albumin-Ligand Interactions using Site-Directed Mutants and Recombinant Fragments of the Protein”
- Ph.D., Assistant Professor, University of Hawaii (graduated in December 2004, continued to work with us as post-doctoral fellow and junior researcher): “The Role of Human Serum Albumin and Its Structural Variants in Coronary Heart Disease”
- Ph.D., M.S., Biochemistry Lecturer, University of Kabianga, Kenya (Completed M.S. in August 2007 and earned Ph.D. degree in December 2010): “Effects of Fatty Acids on Albumin-Mediated Cholesterol Efflux from Endothelial Cells and on the Growth of Hamster Pancreatic β-cells”
- D.D.S., M.S., General Dentist, Hawaii Family Dental Centers (graduated in May 2003): “Evaluation of Human Serum Albumin Cobalt-Binding Assay for the Assessment of Myocardial Ischemia and Myocardial Infarction”
- M.D., M.S., Resident Physician, University of New Mexico School of Medicine (graduated in May 2005): “Literature Studies on the Relationship between the Level of Human Serum Albumin and Incidence of Cardiovascular Diseases”
- M.S., Ph.D. student, Department of Entomology, University of Hawaii (Graduated December 2011): “The Expression of Recombinant Human Serum Albumin in Pichia pastoris”
- Graduate Student, MBBE graduate program, University of Hawaii (current MS student, expect to graduate in May 2014): “Studies on Ligand Binding to Glycated Human Serum Albumin”

Also, I have trained three undergraduate students, three high school senior students, and five M.D. students during summer sessions. Two of the high school senior students I mentored during summer sessions were participants of National Institute of Diabetes and Digestive and Kidney Diseases NIDDK) Short-Term Education Program for Underrepresented Persons (STEP-UP).

As a researcher in Biochemistry, it is my goal to contribute to the scientific community and the public with the discovery of new knowledge in the field of my research interests. I believe the ultimate success of graduate students depends upon their ability to think critically, independently, and thoroughly. However, as a graduate student advisor, I also have the responsibility to lead graduate students’ research projects into producing useful results and new information constructive to other researchers in the field. I am responsible to provide a certain amount of basic training and structure during the degree process. The major difference between graduate student training and other course teaching is that
graduate training solely relies on one-on-one training and that training is tailored to fit the 
need of individual graduate student.

Major objectives of my graduate student teaching are that at the completion of training, 
students should be able to independently establish hypotheses through literature study. In 
addition, students should be able to design a research project to test their hypothesis using 
various techniques learned in the lab. Students also should exhibit abilities in problem 
solving skills when they encounter obstacles/difficulties in research and make informed 
decisions about approaches to overcome the problems. To achieve these goals, students 
must be strongly self-motivated and self-directed. I continuously ask students to generate 
questions regarding their research project and direct them to find answers themselves. 
Once a week all laboratory members meet as a group, discuss challenges in their research, 
hear others’ creative ideas, and seek help from other members of the group. 
Communication between researchers is an important element in research.

Typical research projects for graduate students in our lab have a clearly defined start and 
end point so that the students can easily measure their progress toward the completion of 
their degree program. As a graduate student advisor, I provide training for students to 
design and implement a variety of up-to-date research techniques unique to the students’ 
specific project. At the completion of the research project, each student is expected to 
develop basic laboratory skills as well as problem solving skills. Most importantly their 
experiences on their research projects help them to build confidence and expertise, which 
provide a solid foundation for their future career in their field of study. I believe my 
philosophy of graduate education has greatly contributed to the success of graduate 
students trained in our lab.

E. Other Teaching Activities

*Weekly one-on-one tutorials (equivalent to 2-credit course per semester/total 4 credits per 
year)*

For Imi Ho‘ola program students presenting borderline achievements in quizzes, midterm, 
and final exams (below 69.9% Score), I offer weekly one-on-one or small group (2-5 students 
group) tutorial sessions. During these sessions, I review course materials and spend more 
time with students to ascertain that students understand the major concepts of class topics, 
master the principle theory, and learn to interpret key information. I believe the one-on-one 
and smaller group tutorials help students enhance further their learning efficiency. As a 
tutor, I meet once a week for about two hours per session.

*USMLE Step 1 Test Review Sessions (equivalent to 1-credit course)*

For the second year medical students who are graduates of IH program, I provide four 
review sessions for the preparation of the United States Medical Licensing Examination 
(USMLE) Step 1 test. Each session last two hours and I provide tips on standardized test 
taking strategies. Partly due to my efforts in their exam preparation, all of the second year 
alumni of the IH program passed the exam for the last ten consecutive years. The exam is 
the first part of three licensing exams that are mandatory for medical students to be licensed 
medical doctors in the US and it tests medical students’ abilities to apply important concepts

4.15
of basic sciences to the clinical sciences. The test score of the USMLE step 1 exam is the most widely used factor in selecting residency applicants for residency programs across the US. Also, the average step 1 test score of a medical school is used as one of the indicators to assess the quality of medical education offered in the school.

III. RESEARCH/SCHOLARLY ACTIVITIES

Despite the fact that my faculty position with Department of Native Hawaiian Health requires a major time commitment to student teaching, I have spent 10% of my time on research for the past 13 years. With support from the program director and department chair, I have accomplished a number of research goals, collaborated with scientists around the world, and reported my research findings in prestigious peer-reviewed scientific journals and in international meetings and conferences.

A. Research goals

I believe nearly all diseases have biochemical foundations and are manifestations of molecular abnormalities and/or flawed biochemical processes. My research goal is to produce research outcomes that advance our understanding of certain disease processes, which involve human serum albumin (HSA) and apply research results to predict or diagnose certain diseases.

My major research interests have focused on the study of HSA and its interactions with ligands by using recombinant HSA proteins. Although HSA is one of the most extensively studied proteins in the history of protein chemistry, its interactions with various physiologically important ligands are still not well understood. This is due to the limitations of various traditional research techniques used in the study of HSA/ligand interactions. Specifically, previous techniques have been unable to provide specific information on which amino acid residues interact with which functional group of ligands to provide the free energy of protein binding. By using an in vitro protein expression system, I have developed a site-directed mutagenesis/protein expression system that allows us to synthesize HSA mutant protein species with specific amino acid substitutions. These novel mutant proteins are used to decipher the roles of specific amino acids of HSA in ligands binding interactions.

Information on HSA/ligand binding interactions carries important scientific value since nearly all drugs introduced into the circulation bind to HSA and this binding affects the pharmacokinetics of drugs. In
addition, drugs introduced into the circulation compete for the same binding sites on HSA and this competition affects drugs’ metabolism since only free fraction of drugs in blood is responsible for drug action. For example, our studies have shown that the major thyroid hormone in the blood, thyroxine binds to HSA with moderate binding affinity and elevated free fatty acids replace thyroxine from its binding sites on HSA. Through international collaborations involving researchers in England and Boston, we showed that fatty acid binding to HSA plays a significant role in delivering thyroid hormone for the first time and our research findings resulted in two publications in one of the most prestigious journals in the field, PNAS USA (See Figure above of HSA loaded with 7 fatty acids, see page 4.251 for the published article). The two PNAS USA articles have been cited more than 200 times by other researchers to date.

In addition, detailed information regarding drug/drug interaction and drug/HSA interaction can help in the development of drugs with more efficacious pharmacokinetics. Many endogenous ligands also bind to HSA and these binding interactions are important in regulation of many physiologically important processes. Currently, we are working on research projects to study the interaction of HSA with ligands of cardiovascular importance.

**B. Quality and Impact Assessment of My Research Activities**

To assess the quality of a faculty member’s research endeavors and the impact of his/her research work in the field, it is important to evaluate how many times the faculty member’s research publications have been cited by other scientists’ work, as well as how many articles were published in high-impact journals. To evaluate the research outcome of faculty effectively, the $h$ index, which is defined as the number of publications with the number of citation, is often used to characterize the scientific value of a researcher as proposed by Hirsch in his article published in PNAS USA (Hirsch, J.E. Vol. 102(46), p16569-72, PNAS USA 2005). In the article it was suggested, “for faculty at major research universities, $h \approx 12$ might be a typical value for advancement to tenure (associate professor) and that $h \approx 18$ might be a typical value for the advancement to full professor”.

According to the Google Scholar Citation report on my publications (see the complete Google scholar report on supporting materials section on page 4.213), my $h$ index for my publication total is 18 and $h$ index for my publication since my last promotion to associate professor in 2008 is 15. My research publications are cited 1249 times total and 713 times since 2008. The most cited publication is the article about the HSA cobalt binding assay for the assessment of myocardial infarction, which was cited 311 times so far. Also, the second and third most cited articles are about fatty acid binding and thyroxine hormone binding to HSA, which were cited 109 and 101 times, respectively. These citation results reflect my stature as an established researcher in the field of human serum albumin and its mutant studies. In addition, I have been invited to give lectures and presentations on my research works on site-directed mutagenesis of human serum albumin at major international conferences. Also, I was asked to chair a session during an international conference (see supporting materials section on page 4.198). Therefore, the citations report and invitations to international conferences provide in my estimation sufficient proof that I have been and will continue to be a productive member of the scientific community. I would like to emphasize that many of my investigations are in translational research and I work with
collaborators around the world to accomplish my research goals as evidenced by my research outputs.

C. Current Research Projects

Research on the effects of HSA complexed with non-esterified fatty acids on Pancreatic beta cell viability and insulin secretion:

More than 30 different non-esterified fatty acids are found in serum, and elevated plasma levels of non-esterified fatty acids (NEFAs) in obese subjects are linked to pancreatic beta-cell dysfunction. However, the molecular mechanism of how chronic exposure of beta-cells to high levels of NEFA leads to type 2 diabetes is not clearly established. Our previous study has shown that the saturated fatty acids (SFAs), palmitate (C16:0) and stearate (C18:0), induced significant cell death (Cytotoxic), whereas the monounsaturated fatty acids (MUFAs), palmitoleate (C16:1) and oleate (C18:1), caused minimal changes in pancreatic β-cell viability (Cytoprotective). We hypothesized that changes in the serum levels of certain NEFA, not total NEFA levels are more important in initiating beta-cell dysfunctions. The vast majority (99.9%) of serum NEFAs are complexed with human serum albumin (HSA), which is the main carrier of NEFA and the principal protein in the blood. Only a small fraction of less than 0.1% of NEFAs is available for transport across the cell membrane and for intracellular metabolic functions. We are currently studying the role of unbound free NEFA transport across the cell membrane by using recombinant HSA and radiolabeled NEFAs in the viability of β cells and insulin secretion. Since commercially available HSA is known to have structural heterogeneities, we plan to use structurally homogeneous recombinant HSA and its structural variants as NEFA carrier. An expected outcome of this study will be the characterization of NEFA transport into the β-cells and assess new information that might lead us to devise better treatment to prevent beta cell dysfunction through diet modification.

Serum free fatty acid levels in the assessment of cardiovascular complications in Diabetes Mellitus

Traditionally successful treatment strategies for diabetes mellitus is generally based upon achieving a targeted glycemic control. Current medical practices utilize hemoglobin A1c (HgbA1c) levels as a measure of time-averaged glycemic exposure in the assessment of treatment and complications of diabetes including cardiovascular, retinal and renal systems. However, HgbA1c does not capture transient fluctuations which lead to proinflammatory conditions and it also does not assess for the frequency of glycemic excursions. Furthermore, HgbA1c levels reveal racial variability and are affected by changes in erythrocyte survival. Thus, in search of new serum markers in monitoring metabolic including cardiovascular abnormalities of diabetes, we have chosen to quantitate total serum free fatty acids (FFA) and their profiles. Previous studies have shown that elevated total serum FFAs are involved in the pathogenesis of diabetes mellitus. In our double-blinded patient-based study, we plan to measure serum FFA levels along with their individual profiles and correlate with clinical data including ethnic variability. This study also proposes to use quantitation of ischemia-modified albumin which has been used in the assessment of myocardial ischemia and serum
fructosamine. It is our goal that our collaborative study with clinicians at Kaiser permanente moanalua clinic will provide new metabolic serum markers for designing and implementing treatment strategies for diabetes.

**Epigenetics and Cardiovascular disease in Native Hawaiians**

This project in the process of securing grant funding is a collaborative research working closely with two investigators in our department, Drs. David Kawika Liu and Alika Maunakea. The specific aims of this study are to (1) To survey, educate, and recruit participants from the NHOPI and Caucasian communities in Epigenetic research for collection of biospecimens. (2) To generate genome-wide profiles of functionally relevant histone modifications of purified CD14/CD16+ monocytes in three main groups of individuals: disease-free but at risk NH, NH subjects with disease, and similar groups of Caucasians. (3) To identify and validate aberrant Epigenomic signatures in monocytes associated with cardiovascular disease. The focus of the first step is on education, to differentiate epigenetics from traditional genetics, and to provide assurances to the Native Hawaiian community that the data collected will be used to benefit the Native Hawaiian community. This aspect is particularly important given prior experiences with genetic research which have left a legacy of distrust about genetics research within the Native Hawaiian community. The second and third steps will provide data to understand if there are epigenetic mechanisms which may be responsible for some of the inequities in the prevalence of CVD among Native Hawaiians. The study may produce some innovative epigenetic testing for early signs of CVD, which in turn could offer secondary prevention options to individuals with these characteristics.

The aim of these ongoing research projects is to elucidate the disease causing mechanism of diabetes and cardiovascular diseases by examining important biochemical contributors and epigenetic modifications. Since diabetes and heart diseases are the most common chronic conditions in the Native Hawaiian and Pacific Peoples, it is important to study the disease causing process and develop management strategies. My studies may lead to the development of better prevention and treatment measures.

**D. Completed Research Projects**

I have extensive research experiences working on translational research linking basic sciences with clinical medicine. These experiences helped me greatly in offering much more efficient teaching in medical biochemistry to the Imi Ho’ola programs students and furthermore played a significant role in developing a course textbook, “Essentials of Medical Biochemistry with Clinical Cases”. The following is a list of clinical studies in which I have played a major role and the results are published in peer-reviewed journals:

1. Digoxin, a cardiac glycoside for the treatment of congestive heart failure, interactions with human serum albumin: Studies involved the estimation of the effects of HSA mutations on the pharmacokinetics of digoxin in human body. The results of this study were published in *J. Bioc. Mol. Biol. and Biop.* 1999;2: 201.
2. Bilirubin, a toxic metabolite of heme and HSA study: We studied bilirubin binding to HSA and showed that HSA has a dynamic, unusually flexible high binding affinity site for bilirubin enabling HSA's role as detoxification agents. The results of this study were published in *J Biol Chem.* 2000 Jul 14;275(28):20985-95.

3. Warfarin, an anticoagulant and HSA study: In this study we investigated the various drugs and amino acid mutation effects on warfarin interactions with serum albumin using fluorescence, site-directed mutagenesis, and equilibrium dialysis. The results of this study were published in *J Biomed Sci.* 2000 Mar-Apr;7(2):114-21, *Chem Biol Interact.* 2000 Feb 1;124(3):161-72, & *Proteins.* 2002 May 1;47(2):116-25.

4. Prostaglandin (PG) interconversion study: We showed that HSA stabilizes and modulates many arachidonic acid metabolites. Our study by using site-directed mutant proteins showed that the catalytic breakdown of HSA-bound 15-keto-PGE2 to 15-keto-PGB2 results from two specific processes, which are modulated by specific amino acid residues of HSA. The results of this study were published in *Protein Sci.* 2002 Mar;11(3):538-45.

5. Evaluation of human serum albumin cobalt binding assay for the assessment of myocardial ischemia and myocardial infarction: In this study, we showed that the cobalt-albumin binding test may serve as a useful diagnostic tool in emergency facilities for the assessment of myocardial ischemia. We also showed that the cobalt-albumin binding was a poor discriminator between ischemic individuals with and without myocardial infarction. This study was published in *Clin Chem.* 2003 Apr;49(4):581-5 and has been cited 309 times so far.

6. HSA and its structural variants mediate cholesterol efflux from cultured endothelial cells: We used the human EA.hy926 endothelial cell line as the model system to investigate the effect of human serum albumin (HSA) and its structural variants on cholesterol efflux. This study provided evidence for the role of HSA in cholesterol efflux and showed that the substitution of specific amino acid residues in subdomains of 2A and 3A may be important structural determinants in ability to bind to cholesterol. This study was published in *Biochim Biophys Acta.* 2003 May 12;1640(1-2):119-28.

7. Site-directed mutagenesis study of the role of histidine residues in the neutral-to-basic transition of human serum albumin: We studied the role of histidine residues located in domain I in the neutral-to-basic (N-B) transition of HSA. We synthesized 12 histidine mutant HSA proteins to monitor the effects of mutations on the N-B transition. We found that histidines at locations 9, 67, 105, 128, and 146 contributed to the transition significantly, while histidine at 39 appeared to have virtually no contribution to the transition. Based on the X-ray crystallographic structure, it is suggested that electrostatic interactions are the principal factor in determining the histidine pK shifts. The results of this study were published in *Biochim Biophys Acta.* 2005 June 20;1724(1-2):37-48.
8. Fatty acids bound to HSA and its structural variants modulate apolipoprotein B secretion in HepG2 Cells: In this study, we showed that some mutant forms of HSA might potentially bind fatty acids with a much higher binding affinity and thus deprive fatty acids available for lipoprotein assembly in hepatocytes. Our data suggested that certain HSA polymorphic forms might be protective against the development of coronary heart disease. This study was published in *Biochim Biophys Acta.* 2006 Jul;1761(7):717-724.

9. Human serum albumin levels and cardiovascular risk factors. In this study, we used data from the Honolulu Heart Program’s fourth examination (1991-93) to investigate the relationship between low levels of serum albumin and the incidence of coronary heart disease. We showed that serum albumin levels are significantly associated with several traditional cardiovascular risk factors, particularly serum lipid levels. This study was published in *Hawaii Medical Journal.* 2007 Jun;66(6):148-152.

10. Effects of Statin treatments on Human Serum Albumin secretion and Synthesis in HepG2 Cells. In this study, we showed that the pleiotropic effects of statin on albumin synthesis and secretion. Our data suggest that statins not only lower cholesterol synthesis by inhibiting the enzyme HMG-CoA reductase but also increase albumin secretion from the liver, thereby increase cholesterol delivery to the liver. This study was published in *J. of Biomed Sci.* 2009 Mar 11;16:32.

11. A Neonatal Death due to Medium Chain Acyl-CoA Dehydrogenase Deficiency: Utilization of the Neonatal Metabolic Screen in a Functional Approach to Sudden Unexplained Infant Death. In this study, we reported a clinical case in which a neonatal death was due to medium –chain acyl-CoA dehydrogenase deficiency. This study was published in *American Journal of Forensic Medicine and Pathology.* 2009 Sep; 30(3):284-286.

12. Nitric Oxide, an important biological signaling molecule, and HSA study: In this study we showed that by nitrosating HSA mutants Trp-214 is the primary nitrosation target in HSA and HSA plays major role in NO metabolism. The results of this study were published in *J Biomed Sci.* 2002 Jan-Feb;9(1):47-58 & *PLoS ONE.* 2010 Dec;5(12):e14400.

13. Utility of Serum Free Fatty Acids Concentrations as Marker for Acute Myocardial Infarction and their potential role in the Formation of Ischemia Modified Albumin. In this study, we reported that stronger statistically significant correlations between free fatty acids and ischemia modified albumin and there is a potential role for measurement of total free fatty acid and specific fatty acids in acute coronary syndrome. This work was published in *Clinical Chemistry.* 2009 Aug; 55(8): 1588-1590 and also a US patent was published in 2011.

13. Familial Dysalbuminemic Hyperthyroxinemia (FDH) and thyroxine study: Our lab identified and confirmed by site-directed mutagenesis and novel gene expression system that FDH is caused by a single point mutation on the genomic DNA. Also, we developed a new diagnostic method to detect FDH using simple blood test. The results of this study were published in *Biochem Biophys Res Commun.* 1995 Sep 25;214(3):1121-9, *J Biol Chem.* 1996 Aug
The central theme of my research is to understand the effects of human serum albumin in health and disease. My main research focus is on the investigations of the pathophysiologic mechanism of cardio-metabolic disorders such as diabetes and heart disease by using site-directed mutagenesis and in vitro protein expression system. My research accomplishments have placed me as an expert in albumin study nationally and internationally. This recognition has led me to establish an international collaborative research network in albumin studies. Furthermore, the afore-mentioned studies played an important role in equipping me with extensive knowledge and hands-on experiences on medical biochemistry from basic science laboratory to clinical science practices, all of which proved to be valuable assets in teaching medical biochemistry and writing the textbook, essentials of medical biochemistry with clinical cases.

E. Research Grants

a. Funded grants
1. Author and Principal Investigator (100% effort on the grant preparation)
   Hawaii community foundation
   Title: Effects of Non-Esterified free fatty acids on albumin-mediated cholesterol efflux
   Support period: 09/01/2007 to 08/03/2009
   Awarded grant amount: $50,000.00
2. Sponsor (20% effort on the grant preparation)
   Pre-doctoral Fellowship Award
   American Heart Association
   Title: Effects of Non-Esterified Free Fatty Acids and Albumin mutants on Cholesterol Efflux
   Support Period: 01/01/2009 to 12/31/2010
   Awarded amount: $50,000.00
3. Author and Principal Investigator (100% effort on the grant preparation)
   Hawaii Community Foundation
   Title: Studies on the myocardial ischemia induced modifications of albumin by using site-directed mutagenesis and novel protein expression system.
Awarded amount: $50,000.00
4. Author and Principal Investigator (100% effort on the grant preparation)
   Hawaii EXPORT center PILOT grant
   Title: Serum albumin’s effects on free fatty acid stimulated insulin secretion from cultured pancreatic beta-cells
   Support Period: 07/01/04 to 09/15/2007
   Awarded amount: $80,000.00

b. Pending
   1. Author and Principal Investigator (100% effort on the grant preparation)
      American Diabetes Association Core Research Basic Science Award
      Title: Effects of Human serum albumin complexed with Non-Esterified Fatty Acids on Pancreatic Beta Cell Viability and Insulin Secretion.
      Support Period: 01/01/2014 to 12/31/2016
      Requested award amount: $319,561.00

F. Patent

   This patent has significant economic potential as a marker for aiding physicians in the diagnosis, prognosis, and management of cardiovascular diseases. Currently, UH OTTED office is actively seeking business partnerships for commercialization of the invention.

   In summary, my research activities are focused on the studies of cardiovascular metabolic disorders such as diabetes, heart disease, strokes, etc. The major goals of my studies are to examine:
   1. The roles of serum albumin and fatty acids in the development of diabetes mellitus,
   2. The possibility of using serum fatty acid concentrations as an indicator for the prediction of diabetes complications,
   3. The epigenetic modifications in genomes purified from monocytes to understand the mechanism responsible for the higher incidence of diabetes and heart disease among native Hawaiian and Pacific peoples.
   My studies might provide new information regarding how the serum markers influence the development of diabetes and its cardiovascular complications. Then, the information could lead to the development of better treatment options for diabetes and its cardiovascular complications.

   These research projects are well-aligned with the mission of DNHH, “committed to optimal health and wellness for all Native Hawaiian people through research” and JABSOM, “conducting research and translating discoveries into practice”.

4.23
IV. SERVICE ACTIVITIES

Although my academic endeavors heavily focused on teaching and research activities, I have participated many service activities on various levels. The following list highlights my service activities since my initial hire in 2001.

**Committee Service:**
I contributed to the graduate program of UHM in educating and training researchers by participating in many thesis and dissertation committees. As a graduate faculty of Department of Molecular Biosciences & Bioengineering (MBBE), CTHAR and Department of Physiology, JABSOM, I served as graduate degree committee chair/member for many graduate students.

- M.S. Thesis Advisor and committee chair for 1 MBBE graduate student, 2009 – present.
- Ph.D. Student Advisor and committee chair for 1 MBBE graduate student, 2007 – 2011.
- M.S. Committee member for 1 MBBE graduate student, 2006 – 2007.
- Ph.D. Committee member for 2 MBBE graduate students, 2005 – 2007.
- M.S. Committee member for 1 Physiology graduate student, 2004 – 2005.

**JABSOM Service:**
I am a member of many committees at the JABSOM and provided my professional services to select as an interviewer and as a member of admissions committee, guide as a member of Student Standing and Promotion Committee, and advocate as an academic advisor for many students enrolled in IH program and JABSOM.

- Member, admission’s committee for JABSOM applicants to 2008 – 2010 Entering Class.
- Academic Advisor for 5 JABSOM medical students, 2004-present.
- Member, ‘Imi Ho’ola Student Standing and Promotion Committee (IH-SSPC), 2001 - present.
- Poster Session Judge. Annual John A. Burns School of Medicine (JABSOM) Biomedical Sciences Symposium, 2002-present.
- Annual ‘Imi Ho’ola Program field trip to Kalaupapa on the island of Molokai, a leprosy settlement, 2002 – present.
  - Visit & entertain patients at the Kalaupapa clinic.
- Interviewer for JABSOM Applicants to 2007 Entering Class.

**Professional Societies:**
I am a member of various professional organizations and actively participated in the organizations’ activities.
• Treasurer, Hawaii Biochemists, Molecular Biologists, Biophysicists Group, 2002 – present.
• Regular Member, American Society for Biochemistry and Molecular Biology (ASBMB), 2001 – present.
• Federation of Asian and Oceanian Biochemists and Molecular Biologists (FAOBBM), 1997 – present.
• Regular Member, American Biochemistry Course Directors’ Association (ABCD), 2013 – present.

**Peer Reviewer Service:**
As a researcher in the field of proteomics and clinical biochemistry, I provided my expert opinion as a manuscript reviewer in selecting quality research reports to be published in the following peer-reviewed journals:

- Clinical Biochemistry, European Journal of Biochemistry, Clinical Chemistry, Biochemical Journal, Biochemistry, & Journal of Photochemistry and Photobiology A: Chemistry, Experimental and Molecular Medicine, Food and Chemical Toxicology.

**Public Service:**
As a faculty member of a public university, I have volunteered in the following events:

- Judge, The Mid-Pacific Institute Debate Qualifying Tournament, Mid-Pacific Institute, February 16th, 2013.
- Annual ‘Imi Ho’ola Program Kalaupapa Service Learning Project for Kalaupapa residents and community, Kalaupapa, Molokai, April 2001 to present (during spring break each year).
- Matson Ka Ipu Aina Beach Clean up, Sandy Beach, January 2011, 2012 & 2013.
- Judge, The Debate Qualifying Tournament for High School Students, Iolani School, February 18th, 2011.

**V. IMPACT AND VALUE STATEMENT**

My academic endeavors with JABSOM, and in particular the ‘Imi Ho’ola program, since my initial hire have contributed directly to the mission of the John A. Burns School of Medicine and the University of Hawaii in training and teaching high quality physicians, biomedical scientists, and allied health workers for Hawaii and the Pacific region. I have demonstrated a high level of competence as a teacher during my probationary period and
have contributed to all levels of the department’s instructional program as well as other departments’ in JABSOM (office of medical education; department of anatomy, biochemistry, and physiology) and other UH college’s (department of molecular biosciences and bioengineering, College of Tropical Agriculture and Human Resources) instructional programs as evidenced by my teaching evaluations, letters of support, and other supporting materials. I have also demonstrated a high level of scholarly achievement as evidenced by the number of research articles I authored, my textbook publications, invited lectures, Google scholar citation report, a published US patent, etc.

For the past 13 years, I have worked with students of the ‘Imi Ho’ola program, who come from economically and geographically disadvantaged backgrounds, in lectures as well as in one-on-one tutorials. Over the years, I have accumulated a vast amount of experience dealing with many different types of students who oftentimes have learning issues spanning from learning inflexibility to learning disabilities. My teaching endeavors with students at various levels equipped me with unique qualifications and experiences, which enable me to efficiently help the minority, non-traditional program students improve/solidify their basic science foundation and prepare well for the rigors of a medical education. My 13 years of experiences in teaching the IH students combined with clinical knowledge obtained from extensive collaborations with clinicians in translational studies are my unique and extraordinary qualification, which is regarded as a rare expertise to find among biochemists around world.

This year we celebrated the 40th anniversary of the program’s establishment, and the program served as a pipeline to supply good healthcare professionals to the rural underserved community in Hawaii and the Pacific. To date, the program has produced 234 physicians, most of whom practice at socially and economically disadvantaged areas in Hawaii and other pacific islands. The IH program has played a significant role in achieving the JABSOM’s mission and also has been recognized as one of the most successful post-baccalaureate programs in the nation. Medical biochemistry courses (NHH 505/506, 12 credits) are recognized by the program graduates as key courses of the IH program along with medical biology and contributed greatly to the success of the program over the years. Generally, the basic science foundation of a medical student is reflected on passing step 1 of the US medical licensing examination (USMLE) and the score of the USMLE step 1 serves as a good indicator of a student’s chance for successful residency matching before graduation. Traditionally, the USMLE step 1 exam taken during the 2nd year of medical school was a major challenge for our program students and before I joined the program as the biochemistry instructor, in one year six out of nine IH program graduates failed the exam on their first attempt. Although passing the exam requires a broad spectrum of knowledge of different disciplines, medical biochemistry lays a strong foundation to build a clinical knowledge needed for the understanding of health and illness. Our program graduates are known to have a solid biochemistry background and have never failed the step 1 test of the US medical licensing exam (USMLE) on their first attempt for the last 10 consecutive years.
Also, for my research endeavors, I have worked hard to establish an international reputation as an expert on Human serum albumin and its mutant proteins. Since our research group is the only one in the world that has produced many genetically engineered recombinant HSA protein variants, we have received a large number of requests for these proteins from researchers around the world. We have provided these proteins and training to many researchers as part of structured collaborations, which provide recognition of our research team and the University of Hawaii in this field of study. In my view, these international research collaborations add to the prestige and reputation of the University of Hawaii and assist us in establishing an internationally recognized research team for HSA research. My research works have been cited 1,249 times by others in the field, which reflects my impact and value to the scientific community in general.

In summary, my teaching, research, and the service endeavors I have accomplished over the past 13 years have well demonstrated my impact and value to the ‘Imi Ho’ola program, the Department of Native Hawaiian Health, the School of Medicine, and the University of Hawaii. My endeavors with teaching the minority students of the IH program are fully consistent with the University of Hawaii’s commitment and core values of diversity, fairness and equity and also well-aligned with the mission of John A. Burns School of Medicine in establishing a diverse learning community committed to excellence and leadership in educating current and future healthcare professionals and leaders. Also, my research endeavors focusing on HSA and its relevance to various human diseases are closely aligned with the mission of the University, “striving to improve quality of life in the region through collaborative partnerships that support in education, health care,... and technological advancement” and the mission of the JABSOM, “conducting research and translating discoveries into practice, fostering multidisciplinary collaboration, and pursuing alliances unique to Hawaii and the Asia-Pacific region”. As a tenured faculty, I will be continuing my efforts to be a productive and valuable member of my department, the school and the university.