Department of Comparative Medicine

School of Medicine
University of Washington

Master's Degree in Comparative Medicine

Year of last review -1998

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February 1, 2010

Department of Comparative Medicine
School of Medicine, University of Washington
SELF STUDY, 2010

Executive Summary

The Department of Comparative Medicine (DCM) is a small Department with a broad, complex and important mission. The central goal of the Department is to provide quality husbandry and veterinary medical care for research animals and to facilitate and advance animal-based medical research for the benefit of humans and animals. As such the DCM is not a typical academic department but bridges academics with a heavy service responsibility. The Department has three distinct training and educational missions. The first of these is a graduate and residency instructional and research training program which offers the MS degree as well as qualification for specialty boards. The second is a much larger but more focused Animal Use Training Program which we offer in conjunction with the Office of Animal Welfare to provide training in the use of animals in research. This program serves the entire UW and region (public and private). The third is a pre-doctoral (pre-DVM) program that offers veterinary students from around the nation the opportunity to participate in a clerkship training program. This program seeks to encourage veterinarians in training to consider comparative medicine/pathology and medical research as a career choice.

The future academic direction of DCM is inextricably tied to its central goal of facilitating and advancing animal-based medical research for the benefit of humans and animals. As such our ultimate responsibility will be to maintain and enhance our service mission. However like our physician counterparts whose foremost goal is to provide support and service to their patients while advancing medical science we also must maintain and enhance our academic mission. Comparative Medicine is a challenging field because it not only requires an immense complexity of knowledge related to multiple species but also because it involves the appropriate use of animals in research – never a black and white issue. Academic success in this area requires a unique personal dedication by faculty, staff and students because they must be knowledgeable and flexible in what they do and be able to appropriately balance the goals of scientific progress while ensuring the well-being and humane care of the animals used.

The DCM and its partners including the Washington National Primate Research Center and the Office of Animal Welfare are recognized around the world as places where quality training, research and service are performed. Our graduates and faculty are in demand by all levels of the public and private sectors for their expertise in this complex and hybrid discipline. We wish to insure our leadership in the field. To promote this, based on the results of our self-study, we propose to advance the following goals: 1.) Increase Graduate Training Opportunities; 2.) Define the Need and Approach for Potential PhD Program; 3.) Solidify and Expand the DCM Research Base; 4.) Identify New and/or Additional Space for DCM Faculty and Faculty Research Efforts; 6.) Develop a Master Plan for UW Animal Resources and Cost Structure; 7.) Evaluate Departmental Structure and Staffing; 8.) Establish or Fortify Regional Interactions and Affiliations. By using these issues to help lead us into the future we benefit the Department the University and our affiliated students, faculty and staff.

Self Study: Department of Comparative Medicine (DCM), School of Medicine, University of Washington, 2010

Reviewers are encouraged to find supporting information at the DCM website: http://depts.washington.edu/compmed/index

PART A – Required Background Information for Review Committee

Section I: Overview of Organization

Mission and Organizational Structure

The first veterinarian was employed by the University of Washington, School of Medicine in 1949. This was long before laboratory animal medicine existed as a veterinary specialty. In 1967 animal research related activities were aggregated into a formal departmental/divisional structure which eventually evolved in 1989 into the Department of Comparative Medicine (DCM). Currently the DCM has 9 regular departmental faculty (7 of these WOT {without tenure because of funding}) and multiple other Clinical, Acting, Emeritus, Adjunct and Affiliate faculty (Appendix C for listing). Throughout its tenure the central goal of the Department has been to provide quality husbandry and veterinary medical care for research animals and to facilitate and advance animal-based medical research for the benefit of humans and animals. As such the DCM is not a typical academic department but bridges academics with a heavy service responsibility. Our aggregate mission statement encompasses and expands upon this goal:

*The **mission** of the Department of Comparative Medicine at the University of Washington is to foster knowledge and improve the health and well being of humans and animals by advancing research and training in comparative medicine and biology. For the greater community this is accomplished by provision of diverse and accomplished service including the promotion of excellent and humane care and collegial sharing of specialized expertise. An overarching goal is to insure a collaborative working environment based on integrity and trust.*

Our aim is to accomplish this by focusing on these specific sub-goals which support our mission:

- Collegial sharing of diverse and accomplished expertise and service, including but not limited to veterinary care, animal husbandry, veterinary pathology support, veterinary surgery, animal research consultation, transgenic services, health monitoring, and support for animal protocol review and development.
- Promoting foremost quality humane care and animal welfare.
- Cultivating future leadership in science and comparative medicine.
- Upholding the highest standards of research excellence and professionalism through collaboration, integrity, and collegiality.
- Advancing multidisciplinary research.
- Fostering knowledge of whole-animal biology.
- Providing training in comparative medicine and pathology.

DCM instructional and training programs. These programs fall into three basic categories. The first of these are graduate and residency instructional and research training programs. These programs are relatively small because they focus on a highly specialized segment of expertise and individuals who require or would qualify for this type of advanced instruction. The second is a much larger but more focused Animal Use Training Program which we offer in conjunction with the Office of Animal Welfare to provide training in the use of animals in research. This program serves the entire UW and region (public and private). This training is required by federal regulatory agencies that sanction the use of animals at the UW. This is supplemented by extensive training and instructional material available within the DCM website. The third is a pre-doctoral (pre-DVM) program that offers veterinary students from around the nation the opportunity to participate in a clerkship or summer research internship. This program seeks to encourage veterinarians in training to consider comparative medicine/pathology and medical research as a career choice. This is necessary to attract potential trainees and, in a broader sense, to help address the chronic shortage of laboratory animal veterinarians and pathologists within the United States and elsewhere. Several of these programs are operated in collaboration with the Washington National Primate Research Center (WaNPRC) and the Office of Animal Welfare (OAW) at the UW. Our instructional programs are described on our website at: http://depts.washington.edu/compmed/instructional/index

- Our graduate and residency training programs offer the opportunity for graduate veterinarians and other students to earn the MS degree offered by the Department and to formally qualify for eligibility to sit for board-certification in laboratory animal medicine (American College of Laboratory Animal Medicine {ACLAM} Boards) or veterinary pathology (American College of Veterinary Pathology {ACVP} Boards). Select students may also matriculate for the PhD degree outside of the Department while continuing to be based within the Department. Following a suggestion from our previous academic review we now require that residents who do not already have a post-DVM degree to seek an MS or PhD degree. The WaNPRC and DCM reciprocate in regard to resident training and board qualification which adds important critical mass to both programs. Preparation for and achievement of board-certification by ACLAM or ACVP is challenging with a first-time pass national success rate of approximately 25%. We view success by our trainees in this category as one measure of our mentoring, training and teaching skills.

- The Animal Use Training Program (http://depts.washington.edu/auts/) is operated jointly with the Office of Animal Welfare. It offers a continuing series of animal use training sessions for UW faculty, staff, students and others, including those from the private sector. These sessions include classroom instruction, wet-labs, and web-based sessions. They include the following: a.) Laws and Regulations Training, b.) Species Specific Wet-labs, c.) Specific Pathogen Procedures Training, d.) Facility Orientation, e.) Animal Biosafety Level 2 and 3 Orientation, f.) Training for Decentralized UW Units, g.) Surgical Training, h.) Individual Instruction – for more detail see Appendix E-1.

- It has historically been a challenge to attract veterinarians into the field of Comparative Medicine. Because of this and because of a significant need for the associated expertise, there are multiple private and public employment opportunities for those trained in the discipline. The hesitancy for veterinarians to become engaged is based on several issues including the usual economic and time commitment issues facing all professionals considering advanced degrees. However, in particular, the field of Comparative Medicine is a relatively unknown entity to veterinarians in training and viewed suspiciously by some others because of the use of animals in research. To counter this and to attract more individuals into our program and field we established programs that would introduce the field to veterinary students. These programs consist of a clerkship program and a summer internship program. The clerkship program which is operated in conjunction with the WaNPRC is a 4 week program that is open to any veterinary student from any accredited School or College of Veterinary Medicine. The program consists of a series of rotations through the various services (veterinary services, pathology, primate center, etc.) and a requirement to present a seminar based on a particular experience gained during the stay. The summer internship program is an 8-12 week experience that is focused on a research project in a faculty laboratory. These programs are financially supported by the Department and the participating students and/or their institutions.

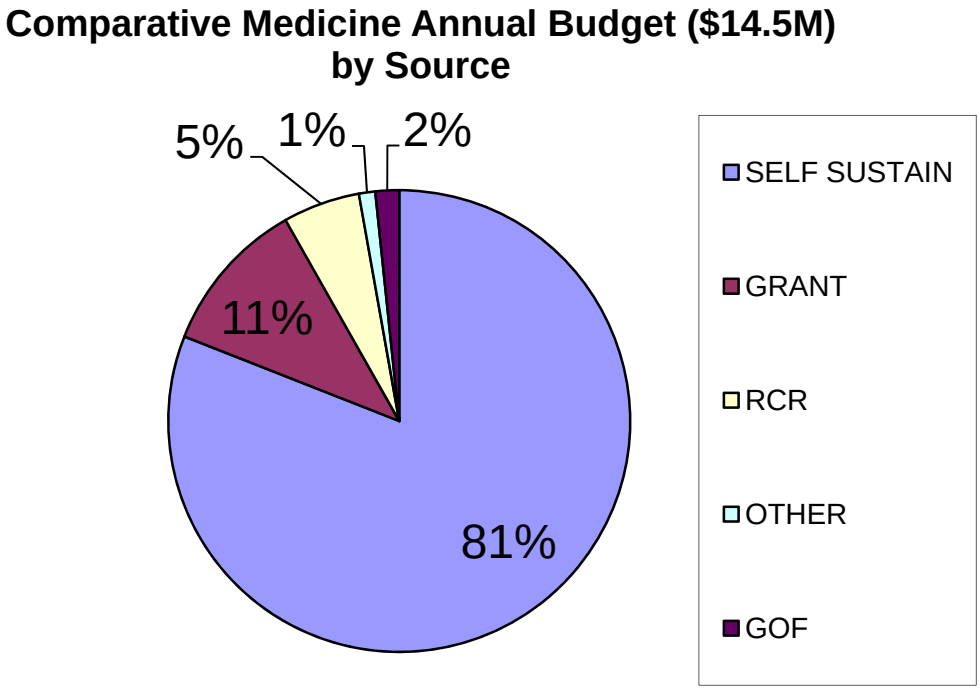
DCM Organization. As a heavily service-oriented Department the organization is distinctly weighted in that direction. The DCM organization chart is presented in Appendix A. One major change that occurred at the last Chair transition (in 2004) was an agreement to establish an Office of Animal Welfare (OAW) as a distinct entity. This office is now directed by Dr. Nona Phillips. Prior to this all functions assumed by the OAW including IACUC and Attending Veterinarian functions were contained within the DCM. This change was made because of potential perceived and real conflicts of interest that could occur if the function remained within a Department that as part of its mission performs animal-based research. In spite of this separation of powers the OAW and DCM continue to work closely on many issues including training, oversight and monitoring activities. The University Attending Veterinarian, Dr. Thea Brabb, has a faculty appointment (Clinical Associate Professor) and participates substantially within the DCM but her primary report is to the Vice Provost for Health Sciences, Ms. Kathryn Waddell. One additional major change was the appointment of a Vice Chair, Dr. Lillian Price, to assist the Chair with administrative and, particularly, clinical matters.

Shared Governance. Being a small Department issues facing the Department are routinely addressed in monthly faculty meetings. Realistically most issues and potential resolutions or approaches are defined by interested parties prior to group discussions at faculty meetings. The Chair has an open door policy which permits staff or faculty to present concerns with minimal barrier. Weekly standing meetings are held to address facilities and financial issues and plans and the Chair and Vice Chair meet weekly with the Director and Associate Director of Facilities. A Departmental problem solving process is employed (see Appendix E-2) and is expected to be utilized prior to presentation to a supervisor or ultimately the Chair. Faculty are reviewed annually by the Chair and appropriately senior faculty (Assistants review Instructors and below, Associates review Assistants and below, etc.). All facilities (and the DCM website) contain signage or guidance indicating a process to follow in the case of issues that may affect the welfare of an animal and Incident Report forms are available in all facilities to enable

anonymous reporting of any incident or concern. The Department participates in the 'Yale Survey' (an impartial financial survey of major animal facilities in the US) and sends representatives to major national meetings to assess currency with standards of operation of animal-oriented academic facilities in the US.

Budget and Resources

An overview of the annual DCM budget and its relative allocations is provided in the following pie-chart. More detailed budget information and data supporting the pie-chart is listed in Appendix B.



By far the largest component of the DCM is the self-sustaining portion. This represents funds derived from the operation of our service cost-center and is supported by animal housing per-diems and service activities including such activities as surgery, transgenic, comparative pathology and other support services (see Appendix B). Grant and contract revenues represent 11% of the budget. Appendix B also shows grant and contract expenditures over the last 3 biennia.

To plan and evaluate DCM finances the Chair and Vice-Chair meet weekly with the Departmental administrator (George Liu) and his associate (Pamela Nazari). Each week, within a month period, is focused on a different issue but the goal is to achieve an up to date understanding of the entire DCM financial state including staffing and all elements contributing to the above pie-chart. In addition as a Department within the SOM we are required to file a quarterly Meter Report with the Dean which summarizes our financial standing. In late 2009 DCM was subject to a scheduled internal (UW) audit which identified no significant financial or management issues. During the past 10 years the DCM has never operated in a deficit mode.

Departmental fund raising is primarily limited to application for grants and contracts for instance in the past 5 years approximately 160 applications (DCM only) for funding were submitted. As a Department we have had limited success with other forms of fund raising. Because of the sensitive nature of what we do (conduct and support animal-based research) it is extremely difficult to entice donors. We have had very limited success in raising some donations from faculty and former students but do not foresee this as a viable method for raising significant sums.

Section II: Teaching and Learning

Student Learning Goals and Outcomes

We believe that the most effective laboratory animal veterinarian is also a researcher themselves either as a primary investigator or a collaborator. Hence our general program objectives include the instruction of resident trainees in the principles of experimental design, statistics, data collection, the preparation of manuscripts, and the ethical principles of research, including animal experimentation. In addition we strive to challenge trainees in an intellectually rigorous environment where the virtues of inquisitive thought, collaboration, professionalism, and hard work are over-arching. Our teaching/training program consists of a clinical residency training program and a Master's of Science degree program. As part of this we also incorporate training that will qualify students for board certification. While the MS program is open to all interested parties these two programs are typically combined into one. Residents not having a MS or PhD (or equivalent) are required to obtain such a degree during their time here. (The DCM cannot award a PhD degree but options to obtain this degree are available and will be described later). While the residency training program is designed to allow students to qualify for ACLAM or ACVP boards but there is no requirement that they complete boards during their time here. The residency program may emphasize either Laboratory Animal Medicine or Comparative Pathology. Regardless all residents are required to accomplish the goals outlined in the Veterinary and Pathology Services sections below. This is required because veterinary students obtain little training in veterinary school that targets laboratory animal species, particularly rodents which represent over 90% of the species we see and which are heavily used in medical research. The resident may add supplementary rotations to address a specific need or interest.

VETERINARY SERVICES –The Veterinary Services Unit oversees veterinary care for multiple species at the UW. Rotation through this service offers opportunities to consult in surgical research projects, evaluate the impact of intercurrent diseases on research data, and recommend treatment for diseased or ill laboratory animals under the guidance of a faculty member. This rotation also provides an opportunity for trainees to meet investigators from many laboratories and explore different research interests. Our rodent facilities house in excess of 100,000 rodents, under specific pathogen free (SPF) conditions and many other species ranging from fish to pigs. The broad goal is to introduce the trainee to laboratory animal medicine, the performance of clinical and surgical services and the administration of preventive health, quality assurance and animal welfare programs. The range of animals, housing and investigator interests provides the opportunity for trainees to evaluate and treat a broad spectrum of issues of veterinary interest, e.g., transgenic and knockout mouse lines that are susceptible to opportunistic organisms like

Pneumocystis spp. and *Helicobacter* spp. Residents also have an opportunity to interact with Animal Sciences Unit Supervisors and are expected to become knowledgeable in SPF techniques and the SOP's for all phases of animal care including, breeding, identification, acquisition, and processing. There is also an understanding that residents will become familiar with and practice the high standards of professionalism expected within the SOM.

The specific objectives or learning goals of the Veterinary Services residency rotation are to learn to:

1) Develop and record a medical history.
2) Conduct a general physical examination.
3) Formulate a differential diagnosis and carry out protocol treatments.
4) Write medical orders to be approved by the faculty veterinarian.
5) Communicate with investigators about the nature of the disease, prognosis and probable impact on their research projects.
6) Recommend appropriate preventive medical measures.
7) Perform routine techniques on a variety of laboratory animal species (e.g. restraint/handling, gender determination, medication administration, venipuncture, exsanguination and euthanasia); assist in the instruction of research technicians and investigators on various techniques.
8) Review and update SOPs, quality assurance and preventive health care programs for each of the common laboratory animal species, and understand the process for addressing a disease outbreak.
9) Consult with investigators developing research protocols regarding appropriate animal models and their use.
10) Compile and present cases and conclusions in a seminar format.

PATHOLOGY SERVICE –The resident will work jointly with faculty pathologists on the gross and histopathologic assessment of cases coming through the service. There is exposure to a wide variety of species, including primarily rodents, fewer rabbits, small ruminants, pigs, dogs, cats, reptiles, amphibians and fish, both in necropsy and in gross and histologic slide conferences. The specific goal is to introduce the trainee to the practice of pathology as a diagnostic and research tool and to provide the clinical trainee with the materials for successful preparation for ACLAM boards. Those so desiring may gain much more concentrated exposure to comparative pathology with the goal of obtaining certification by the ACVP. These individuals are then "tracked" to comparative pathology increasing their responsibilities, specific objectives and goals.

The minimal objectives or learning goals are to develop an understanding and proficiency in:

1) The performance of proper necropsy technique (including cell/tissue collection and preservation; optional exposure to histologic techniques, including immmunohistochemistry, may be pursued).
2) The familiarity with the details and timing of tissue processing including trimming, embedding, sectioning and staining (hematoxylin and eosin as well as immunohistochemistry).

3) Describing gross findings so that other professionals understand the report.
4) The ability to discuss the limitations and usefulness of diagnostic pathology, outline special techniques available for solving diagnostic and research questions, correlate gross, histologic and laboratory findings on specific clinical cases and present selected cases during a departmental seminar.
5) Begin to develop an understanding of the critical role the veterinary pathologist can play in assisting the researcher in characterizing experimental complications and newly described phenotypes.

The emergence of the trainee in this setting offers many opportunities for the student to find a research laboratory, mentor, and project that is compatible with his or her interests.

SUPPLEMENTARY ROTATIONS - (Dependent upon the specific trainee interests, career goals and board qualifications) – Listed below in *italics*

Transgenic Resources Program – The Transgenic Resources Program is operated within the DCM by Dr. Warren Ladiges and Mr. Bob Hunter and is responsible for making transgenic animal models for a broad range of investigator interests at the School of Medicine and within the greater Seattle medical research community.

Office of Animal Welfare– In association with the review of over 3,000 protocol and grant documents annually, the goals of the Office of Animal Welfare rotation are to familiarize the postdoctoral fellows with the U.S. Government and the University of Washington's regulations regarding the utilization of animals in research, teaching and testing. This is becoming an increasingly complicated aspect of the work we do and advanced training in this area can be important for many career paths.

Washington National Primate Research Center (WaNPRC) – The WaNPRC is the only one of the national primate centers that is physically centered within a medical school. Residents and other students may rotate through the center under the direction of Drs. Dave Anderson (Director) and Charlotte Hotchkiss (Associate Director). Here they can gain exposure to nonhuman primate medicine and pathology. Drs. Renee Hukkanen and Bob Murnane are pathologists in the Primate Center and they participate actively in resident in training. Drs. Anne Torrence and Keith Vogel are veterinary clinicians who are also heavily involved in resident training. We are fortunate to have them as partners in our training program.

MS DEGREE – The DCM offers the opportunity for graduate students to earn an MS degree. Typically this is sought by those with a DVM or VMD degrees. The MS degree is driven by a goal of performing a hypothesis driven research project that is worthy of publication in a peer-reviewed publication. This publication is the core of the MS effort. For the MS in Comparative Medicine, trainees take the CMED courses (Appendix E-3) and Medical Biometry (BIOST 511), unless they have previously completed an equivalent course. Formal course work is limited to approximately 10% of the trainee's time in aggregate. Other courses are selected by the trainees (in consultation with their MS committee) as required by the Graduate School or as appropriate for the research project. Coursework is one component of the training experience. As important as coursework is, it does not replace hands-on research experience; hence the vast majority of the

trainee's research time is oriented in this direction. DCM faculty and trainees also participate in a weekly two-hour seminar series that rotates among the following four topics: (1) literature review, (2) clinico-pathologic conference, (3) pathology, and (4) research seminar. The research seminar is oriented around having the trainees and DCM faculty present updates on their individual research projects or practice presentations planned for national meetings which are critiqued following presentation (the past 5 years of research seminars, literature, pathology and clinic-pathologic conferences are included within AppendixE-4). Students are urged to identify a research mentor as soon as feasible since their residency period is limited to 3 years which must include all phases of training and research.

PhD OPTION – It is currently not possible to earn a PhD degree by matriculating within the DCM. Those residents wishing to obtain this degree have an option of working with a mentor in a PhD granting Department post-residency or by developing a co-operative program. We have recent experience with both. Dr. Catherine Hagan is scheduled to complete her PhD in Spring Quarter of 2010. Catherine has been working with Dr. John Neumaier in the Molecular and Cellular Biology Program. This followed residency training in DCM where she has focused efforts on the comparative pathology pathway. She recently obtained a KO1 award which will allow her to continue in DCM after completion of her PhD. Her KO1 mentor will be Dr. Tom Montine in Pathology. We have also recently had a student complete a PhD in collaboration with the Department of Microbiology and Pathology at Washington State University (WSU). This student, Dr. Bob Harrington, worked on a joint UW-WSU project studying inter-species transmission of prions. He did the majority of investigative work at the UW (it involved the heavy use of transgenic mice) but his committee was composed of UW and WSU faculty and he was awarded the PhD degree by the College of Veterinary Medicine at WSU in 2007. (Catherine Hagan also has committee members from both UW and WSU). Bob went on to accept a scientific position with the USDA but unfortunately has recently had to resign for medical reasons.

QUALIFICATION FOR BOARD CERTIFICATION – In our profession, as in many medical professions, certification by a specialty board is considered a mark of achievement nearly equivalent to an advanced degree and a requirement for many public or private positions. In some situations board certification is viewed as more desirable by potential employees than an advanced degree. The two specialty boards relevant to Comparative Medicine are laboratory animal medicine (American College of Laboratory Animal Medicine {ACLAM} Boards) and veterinary pathology (American College of Veterinary Pathology {ACVP} Boards). Qualifying to sit for examination by either of these specialty groups is challenging and passing the examinations is even more so with national first time pass rates being in the vicinity of 25%. To have a viable and competitive program we must ensure that our students can qualify to sit for board examination or they will not elect to join our program. Each of these specialty boards has different criteria for qualification and these criteria are available at the appropriate web-site http://www.aclam.org/education/training/standards.html or http://www.acvp.org/exam/scope.php These criteria are cohesive with our academic criteria and, in fact, strengthen them due to the rigor required for board success. Determination of whether an individual is qualified to sit for boards requires a formal application and acceptance process made outside of the DCM by designated ACLAM or ACVP committees.

EVALUATION - At the beginning of each quarter, students submit a report which chronicles their activities over the previous quarter. Students indicate all their activities, including courses taken, and research efforts. Other significant activities are also noted, such as teaching activities (seminars, presentations), and attendance at meetings, workshops, etc. Students are also asked to indicate whether these activities contributed in a positive or negative way to their ultimate goals. (An example is attached as Appendix E-5). We also evaluate performance in their mentored research positions, and in seminar and discussions using specifically designed forms (Appendix E-6). This provides an ongoing evaluation of the various aspects of the program from the user's perspective. Thus, if any serious impediments to students' progress in the program occur, they can be promptly corrected. Also, faculty having significant interaction with the student during the quarter, such as during laboratory rotations, are provided an evaluation form to rate the student's performance. Following receipt of this information from the students and faculty, the student's progress is discussed with the DCM faculty at regularly scheduled faculty meetings. If any negative aspects come to light, various remedial actions are also considered. Significant discussions emanating from this meeting, regarding either positive or negative responses by the faculty, are conveyed to the student in a meeting shortly thereafter. Of particular note is the recognition by the faculty that the publication efforts of some of our students need to be improved. Faculty has been encouraged to discuss this issue with trainees and address the deficiencies, if any, as required. An additional method of evaluation, and probably the most effective, involves observing how our trainees advance in the work place and their success in obtaining board certification or other tangible outcomes. This process is relatively easy for us because of the limited numbers of students that matriculate and the small size of our profession.

For formal CMED coursework, registered students are assessed by combinations of classroom participation, homework, exams and/or problem based learning sessions. Depending on the particular course these may be more or less weighted. As an example, the Biology and Diseases of Laboratory Animals course series (CMED 520/530, 521/531) has used problem based learning as a principal teaching method coupled with a final exam and homework assignments. For these courses, we evaluate students based on active, willing participation, creative thinking, accurate and timely completion of assigned work and the score on the exam. Participation in class is critical to the successful completion of the problem based coursework as we evaluate the student’s practical application of their knowledge in this setting. As previously mentioned we also have a Seminar Series that is held each Thursday from 1:30-3:30. During portions of the year some of this time is spent on lectures but generally the time is spent on Literature Review, Research Seminars (presented by trainees as well as faculty and outside guests) and Clinical and Pathology Conferences – for titles of presentations for the past 5 years please see Appendix E-4. Trainees are evaluated for their presentation skills, content and ability to respond to questions.

We require participation of residents/graduate students in teaching of classes and seminars. We provide faculty evaluation of their presentations using standardized evaluation forms and immediate feedback. These critiques are particularly useful for these individuals. In particular we expect trainees to practice presentations intended for outside audiences prior to presentation. These practice sessions are attended by faculty and students and critiques occur during and after presentations.

Instructional Effectiveness

Examples of standardized instruction evaluation forms are appended (Appendix E-6). Students and faculty are encouraged to use these evaluation forms for all classes and formal lectures. Course directors and rotation mentors also have an open discussion with students asking for frank assessment of the effectiveness of the course and areas for improvement. This has been surprisingly successful, especially when coupled with the anonymous standardized instruction evaluation forms. For example, at the completion of the most recently held CMED course (Biology and Diseases of Laboratory Animals) the students advised the course directors that handouts of the lectures would be helpful prior to class. This was accommodated in the next quarter's continuation of the course series as we found, upon assessment of the student's performance on the final exam, that the problem based learning method was not the most effective for this particular group of students. Students lacked willing participation in the problems presented in class, so in addition to providing handouts, problem based learning sets are now assigned as group homework to be reviewed in class. In response to the course director's evaluation and the students input, we have increased the ratio of material presented by the didactic rather than problem based learning method within the confines of the classroom time. These on-going improvements to increase the effectiveness of our teaching are tailored for the particular student learning style. We find that just as each individual student has their own learning style, so does a particular group of students. Our faculty is flexible in their teaching styles and the material presented is amenable to various instructional methods, increasing our ability to respond to a particular student's need or a class' request. The majority of our former trainees and students have successfully achieved specialty board certification or advanced degrees or have been employed by knowledge-based organizations. By this measure, we can say with little doubt that our combination of formal coursework, rotations and one-on-one mentoring is highly effective in training the next generation of veterinary scientists.

Teaching and Mentoring Outside the Classroom

Activities in this category involve either interactions with our trainees or interactions with the university/scientific community as a whole. Most of our training and mentoring, whether it be clinical or research oriented, occurs outside of the classroom and is one-to-one.

Research mentoring, by its nature, involves working on a project within the lab of the research mentor. We encourage students seeking advanced degrees to identify a mentor early in their tenure here to ensure adequate time to complete their project along with fulfilling residency and board requirements. For MS students lab rotations are considered based on the individual student – some students arrive with a stated goal and desire; others need rotations in DCM labs to identify a suitable project. Students seeking a PhD must comply with the unit granting the PhD in regard to lab rotations and identifying a mentor.

Mentoring in clinical veterinary medicine or pathology tends to be more group mentoring although during the first 6 months individuals tend to align with primary mentors. Once again because of our small size mentoring options are somewhat limited to those actually doing the bulk of clinical service or pathology. We don't strictly assign mentors because we feel that it is important for some level of comfort to develop between mentors and trainees prior to assignment. Much of the work that laboratory animal veterinarians do can be emotionally

charged and trainees need to have the ability to share some of their concerns with one whom they feel they can communicate with and trust. Allowing some flexibility in this regard has proven effective.

The DCM exists within the UW and the SOM because it has unique expertise to offer. This expertise can take many forms but directly or indirectly involves the use of animals or animal-based systems in research and teaching. One of the ways in which faculty and staff contribute is to offer specialized workshops or seminars with relevance to the medical/biology research community as a whole. Some of these are continuing efforts and others are individual or periodic. Recent examples of each are provided below:

- **Workshop on Quantitative Microscopy**, DCM (Frevert), University of Washington at SLU, Seattle, WA, September, 2009: In this workshop participants received instruction and hands on training of the theories behind the use of stereology and image analysis to accurately measure specific histological and/or histopathological features in an organ.

- **9th Annual Workshop on the Pathology of Mouse Models for Human Disease**, DCM (Treuting), University of Washington and Jackson Laboratory. To be held September, 2010 at SLU: Pathologic assessment of mice as models of human disease.

- **2010 ISCRM Symposium** – Stem Cells-Translation to the Clinic (yearly event co-organized by C. Ware, a DCM Professor), University of Washington, January 8, 2010 at SLU.

- **Animal Use Training Program** (in collaboration with Office of Animal Welfare): A continuing series of animal use training sessions for UW researchers as well as research groups from the private sector in the Seattle area. See http://depts.washington.edu/auts/

- **Deeb Endowed Lecture Series in Comparative Medicine** – (Iritani) A university wide lecture that is held approximately every year since 2007. Nobel laureate Peter Doherty will speak this spring. Previous speakers include Drs. Jerold Ward, Richard Palmiter and Tilahun Yilma.

- **"Everything You Ever Wanted to Know About Mice and Then Some"** A community wide all-day scientific presentation held approximately every 3 years to provide attendees instruction on the basic nomenclature, biology and reproductive physiology of mice. Presented by Dr. Kate Corning-Pritchett, Affiliate Assistant Professor DCM, and Director, Charles River.

In regard to recruitment of students into the program we have typically not had problems attracting good students. A notice on our website is essentially the only 'advertising' that we do. We can support few students so our needs are more than met by the popularity and reputation of our program as an excellent training site. Success is also directly linked to the effort that we place in sponsoring clerks during the time that they are in veterinary school. See Appendix E-7 for list of clerks. This opportunity gives both sides a chance to examine options and levels of enthusiasm. We participate in the taskforce organized by the Cellular and Molecular Biology program to enhance recruitment of under-represented minority students by committing one of

faculty (Dr. Brian Iritani) to attend a national meeting in a recruitment capacity for this program. We also contribute monetarily to support this taskforce. Under-represented minority veterinary students are unlikely to be targeted by this effort but we consider this a long-term investment. Currently one of our two residents is an under-represented minority student.

Because of the close one-to-one interaction we have with our residents/trainees there is a high likelihood of successful completion of the program. Faculty and staff within the DCM consider that one of our main goals is to serve as good role models. Our faculty work long hours meeting their clinical and academic responsibilities in a professional manner – this includes dealing with emergencies, deadlines and unexpected outcomes. Trainees, from day one, are expected to do the same and they typically do. In the past 10 years we have not had to dismiss a trainee for any reason. Formal reviews are held yearly and suggestions made for improvement when necessary. Approximately 6 months prior to leaving the program we work with trainees to prepare them for job interviews. Because of the high demand for our graduates there tend to be multiple opportunities for students although most opportunities exist outside of the Pacific Northwest.

Section III: Scholarly Impact

Faculty within the DCM are diverse in regard to professional training, responsibilities, skills and interests. This diversity is encouraged because we are fundamentally a service and collaborative-based department which functions within a large University and Medical School. To operate effectively a diversity of veterinary and comparative biomedical knowledge is essential. Each faculty member fulfills a distinct and important role and all have an expectation for scholarly activity but some place more emphasis on research and others service. Teaching and training is a critical component of both and elemental to our Departmental mission. A snapshot of all regular faculty (above level of acting) and select clinical faculty (those with substantial DCM interactions) follow (alphabetical). Three recent publications are cited for each: (A more complete compilation is appended as E-8).

David M. Anderson is a Clinical Associate Professor in the Department of Comparative Medicine. His principal responsibility is that of Director of the Washington National Primate Research Center (WaNPRC), one of eight national primate research centers supported by the National Center for Research Resources (NCRR). Anderson's research focuses on implementation and use of nonhuman primate models of AIDS with special emphasis on vaccine development. He is also working towards development of a systems biology approach to biologic investigation as well as development of information resources for the biomedical research community. As Director, Dr. Anderson oversees the WaNPRC mission to provide the appropriate environment to support outstanding biomedical research directed toward significant human health issues and nonhuman primate health and biology. Further information is available at http://www.wanprc.org/wanprc/

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3. **Anderson**, **David M**. (2008) "The non-human primate in biomedical research" (Ch. 31). In *Source Book of Models for Biomedical Research*, The Humana Press Inc., ed. P. Michael Conn [Release date Jan 08]

Dr. Thea Brabb is a Clinical Associate Professor in the Department of Comparative Medicine (DCM). Her primary research interest is mouse models of autoimmunity. She collaborates with Dr. Goverman in the Department of Immunology on maintaining and breaking tolerance to CNS antigens and Drs. Maggio-Price, Iritani, Paik, and Treuting in DCM regarding the role of infections in the development of inflammatory bowel disease and cancer. Dr. Brabb served as chair of ACLAM Career Pathways Committee, and as a member of the ASLAP Veterinary School Liason Committee, the NWABR Planning Committee, and the AALAS abstract committee. Dr. Brabb shares responsibility for the DCM teaching program, and is the director of the ACLAM Training Program. She is the University of Washington's Attending Veterinarian and in that role serves on the Institutional Animal Care and Use Committee, and Institutional Biosafety Committee.

1. Maggio-Price, L., Treuting, P., Bielefeldt-Ohmann, H., Seamons, A., Drivdahl, R., Zeng, W., Lai, L., Huycke, M., Phelps, S., **Brabb, T**., Iritani, B. 2009. Bacterial Infection of Smad3/Rag2 Double-Null Mice with Transforming Growth Factor – Dysregulation as a Model for Studying Inflammation-Associated Colon Cancer. *American Journal of Pathology* 174(1):317-29.
2. Lencioni, K.C., Seamons, A. Treuting, P., Maggio-Price, L., and **Brabb, T**. 2008. Murine Norovirus: An Intercurrent Variable in a Mouse Model of Bacteria-Induced Inflammatory Bowel Disease. *Comparative Medicine* 58(6):1-12.
3. Perchellet, A., **Brabb, T**., Goverman, JM. 2008. Cross presentation by nonhematopoietic and direct presentation by hematopoietic cells induce central tolerance to myelin basic protein. *Proc. Natl. Acad. Sci. U.S.A.* 105(37): 14040-5.

Charles W. Frevert, D.V.M., Sc.D. is an Associate Professor in the Department of Comparative Medicine. He directs the Histology and Imaging Core at South Lake Union and assists in running the UWVDL. Research interests focus on the innate immune system with the goal to better understand the mechanisms that are responsible for the successful clearance of bacteria and viruses from lungs. To further this he collaborates with Drs. Thomas Wight (Benaroya Research Institute), William Parks and Shawn Skerrett (UW), Joel Pounds (Pacific Northwest National Laboratories) and internationally with Drs. Liliana Schafer in Frankfurt, Germany and Deirdre Coombe in Perth Australia. He is the course director of CMED 592, teaches in a number of local and national workshops, and mentors Post-Doctoral Fellows in the Division of Pulmonary and Critical Care Medicine.

1. Smith LS, Kajikawa O, Elson G, Wick M, Mongovin S, Kosco-Vilbois M, Martin TR, **Frevert CW**. Effect of TLR4 Blockade on Pulmonary Inflammation Caused by Mechanical Ventilation and Bacterial Endotoxin, *Exp Lung Res*, 2008; 34(5): 225-43.

2. Gill S, Wight TN, **Frevert CW**, Proteoglycans: Key Regulators of Pulmonary Inflammation and the Innate Immune Response to Lung Infection. Anat. Rec. 2010 (In Press).
3. Tanino Y, DR Coombe, SE Gill, WC Kett, O Kajikawa, AE Proudfoot, TN Wells, WC Parks, TN Wight, TR Martin, **CW Frevert**. Kinetics of chemokine-glycosaminoglycan interactions control neutrophil migration into the airspaces of the lungs. J Immunol. 2010 (In Press).

Adeline M. Hajjar is a Research Associate Professor in the Department of Comparative Medicine. She devotes most of her time to research activities. Her research interests center around innate immunity and recognition of pathogen-associated molecular patterns via Toll-like receptors. She collaborates with several investigators within the University of Washington, including Drs. Sam Miller (Immunology), Shawn Skerrett (Medicine), D. Liggitt (DCM), and Kelly Smith (Pathology). She co-mentors an MSTP student with Dr. Smith. She also has ongoing collaborations with Dr. Bob Ernst (University of Maryland), Dr. Rachel Fernandez (University of British Columbia), and Dr. Jay Evans (GSK, Montana).

1. **Hajjar AM**, Harowicz H, Liggitt HD, Fink PJ, Wilson CB, Skerrett SJ. An essential role for non-bone marrow-derived cells in control of *Pseudomonas aeruginosa* pneumonia. *Am J Respir Cell Mol Biol* 33:470-475, 2005.
2. Skerrett SJ, Wilson CB, Liggitt HD, **Hajjar AM**. Redundant Toll-like receptor signaling in the pulmonary host response to *Pseudomonas aeruginosa*. *Am J Physiol Lung Cell Mol Physiol*, 292:L312-L322, 2007.
3. Kanistanon D, **Hajjar AM**, Pelletier MR, Gallagher LA, Kalhorn T, Shaffer SA, Goodlett DR, Rohmer L, Brittnacher MJ, Skerrett SJ, Ernst RK. A *Francisella* mutant in Lipid A carbohydrate modification elicits protective immunity. *PLoS Pathog* Feb 8 4(2):e24, 2008.

Brian M. Iritani is an Associate Professor of Comparative Medicine. He is a member of the Molecular and Cellular Biology (MCB) Graduate Program, and FHCRC/UW Cancer Consortium. Brian serves on the UW Minority recruitment committee. Brian is Course Director for the CMED Weekly Research Conference and the "Regulatory Medicine" course for post-doctoral fellows; Directs the Clerkship program for Senior Veterinary Students (~5-10 students/yr.) and a new 2-week Laboratory Animal Medicine training program for 3rd year Veterinary Students from the Western University of Health Sciences Pomona, CA. Brian is currently the thesis advisor for one Master's student and has one Post-doctoral Fellow in his laboratory. Brian runs an NIH-funded laboratory which focuses on understanding the molecular mechanisms behind the development, function, and transformation of lymphocytes. He maintains collaborations with Lillian Maggio-Price, Denny Liggitt, Piper Treuting, Jisun Paik (DCM); Alanna Ruddell, Bob Eisenman, David Hockenbury (FHCRC); Peter Rabinovitch, Elina Minami, David Rawlings (UW); Mark Appleby, Fred Ramsdell (Biotech) and others. In 2008, Brian was awarded an Investigator Award in Mouse Pathobiology from the NIH (2008-2013).

1. Habib, T., Park, H., Tsang, M., de Alboran, I., Nicks, A., Wilson, L., Knoepfler, P., Andrews, S., Rawlings., D., Eisenman, R.N., and **B.M. Iritani.** (2007) Myc Stimulates B Cell Development and Amplifies Calcium Signaling. *The Journal of Cell Biology,*179(4):717-731.

2. Park,H., Staehling-Hampton, K., Brunkow, M.E., Habib, T., Appleby, M., Zhang,Y., Ramsdell, F., Freie, B., Tsang, M., Liggitt, H.D., Carlson, G., and **B.M. Iritani** (2008). A point mutation in the murine *Hem1* gene reveals an essential role for Hematopoietic Protein 1 in lymphopoiesis and innate immunity. *The Journal of Experimental Medicine,* 205:2899-2913. "Rearranging the cytoskeleton", *Nature Reviews Immunology* (2008).
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Warren C. Ladiges is a Professor in the Department of Comparative Medicine, and is involved in research and mentoring, and also has service responsibility for the Department's Transgenic and Mouse Physiology Resource Labs. He has experience in directing large NIH grants including the Comparative Mouse Genomics Center grant. He supports an active group of scientists in his laboratory including one junior faculty person, two postdoctoral fellows, two graduate students, three research scientists, and four undergraduate students. His biology of aging research focuses on studying specific signaling pathways including protein kinase A, oxidative stress and DNA damage response associated with aging, metabolism and cancer. During 2009, his group was the first to publish data showing that depletion of protein kinase A subunit genes in mice delays aging and aging-related disease conditions. He actively collaborates with Drs. Treuting, Liggitt and Wiley in his department and numerous other scientists in the UW Departments of Pathology, Biochemistry and Environmental Health. His outside collaborations include groups at the University of Texas at San Antonio, University of Cincinnati, USC, MD Anderson Cancer Center, and Albert Einstein College of Medicine.

1. Treuting PM, Linford NJ, Knoblaugh SE, Emond MJ, Morton JF, Martin GM, Rabinovitch PS, **Ladiges WC**. Reduction of age-associated pathology in old mice by overexpression of catalase in mitochondria. J Gerontol A Biol Sci 2008 Aug;63(8):813-22.
2. Enns L, Morton J, Treuting P, Emond M, Wold N, McKnight GS, Rabinovitch P, **Ladiges W**. Disruption of protein kinase A in mice enhances healthy aging. PLoS One, 2009, Jun 18;4(6):e5963.
3. Enns L, Morton J, Mangalindan R, McNight S, Schwartz M, Kaberlein M, Kennedy B, Rabinovitch P, **Ladiges W**. Disruption of the PKA catalytic β subunit attenuates age-related metabolic dysfunction. J Gerontol BS, 2009, Dec, 64 (12):1221-1231.

H. Denny Liggitt is a Professor and Chairman of DCM. As Chair he has primary administrative responsibility for the Department. This includes providing for daily operations as well as leadership and direction for all Departmental functions. He is a board-certified veterinary pathologist with an interest/expertise in rodent pathology, gene-therapy, and translational medicine. He has a collaborative research program with investigators at WSU which is focused on prion biology. He is an advisor to the ITHS, Cystic Fibrosis Foundation and other entities. He collaborates with numerous individuals within DCM (including Drs. Frevert, Iritani, Maggio-Price, Ladiges, Treuting, Hukkanen, Hajjar and others), the SOM (including Drs. Skerrett, Langdale, Goverman, Chamberlain, Rawlings, West, Ho and others), and such sites as WSU (Knowles, O'Rourke) and others (Debs – CPMRC, San Francisco).

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2. Morris AE, **Liggitt HD**, Hawn TR, Skerrett SJ. The role of toll-like receptor 5 in the innate immune response to acute P. aeruginosa pneumonia. Am J Physiol Lung Cell Mol Physiol. 297(*6): L1112-9,* 2009.
3. Gregorevic P, Schultz BR, Blankinship MJ, Meznarich NAK, Doremus C, Finn E, Allen JM, Kuhr CS, Haldorson JB, **Liggitt, HD**, Chamberlain JS. Evaluation of methodologies to enhance rAAV6-*mediated gen*e transfer to canine musculature. Molecular Therapy 17:1427-1433, 2009.

Lillian Maggio-Price is a Professor in the Department of Comparative Medicine. Dr. Maggio-Price has held the positions of Chief of Veterinary Services and in 2004 was appointed Vice Chair of the department. She performs and directs veterinary clinical care for university research animals and provides clinical guidance and instruction to post-doctoral trainees and clerks who rotate through the departmental Veterinary Services Unit. Dr. Maggio-Price has an active research program that focuses on mouse models of inflammatory bowel disease and inflammation associated colon carcinogenesis. Her laboratory group performs and collaborates on studies with Amgen Corporation in Seattle testing out new biologics for inflammatory diseases. As Vice Chair, she also plays a critical role in facility design and operations, and assists the Chairman in overall running of the Department. In 2007 Dr. Maggio-Price was awarded the Nathan Brewer Award for Scientific Achievement.

1. **Maggio-Price, L.**, Treuting, P., Zeng, W., Tsang, M. Bielefeldt-Ohmann and and Iritani, B.M. Helicobacter Infection Is Required for Inflammation and Colon Cancer in Smad3 Deficient Mice. *Cancer Research* 66(2):1-11, 2006.
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3. **Maggio-Price, L.**, Treuting, P., Bielefeldt-Ohmann, H., Seamons, A., Drivdahl, R., Zeng, W., Lai, L., Huycke, M., Phelps, S., Brabb, T., Iritani, B. Bacterial Infection of Smad3/Rag2 Double-Null Mice with Transforming Growth Factor – Dysregulation as a Model for Studying Inflammation-Associated Colon Cancer. *American Journal of Pathology* 174:317-329, 2009.

George E. Sanders is a Lecturer (50% time) and Aquatic Animal Program Director in the Department of Comparative Medicine. His other time is spent as Veterinary Medical Officer, Western Fisheries Research Division. He has principal responsibilities in leading the campus-wide Aquatic Animal Program as the Associate Attending Veterinarian for Fish and Amphibians. These tasks involve the provision of clinical veterinary care, diagnostic services, husbandry infrastructure and systems design, maintenance, and modification. He collaborates with the Office of Animal Welfare regarding IACUC protocol review, site visitation and inspection, policy development, and training instruction. His research interests include the development and refinement of infectious disease models, aquatic animal disease diagnostics, aquatic animal husbandry and care refinements. He collaborates with research groups at the University of Washington, Western Fisheries Research Center, and other national labs.

1. Lawrence, C., **G.E. Sanders**, Z. Varga, D. Baumann, A. Freeman, B. Baur, and M. Francis. 2009. Regulatory Compliance and the Zebrafish. ZEBRAFISH. Vol. 6(4): 453 – 456.
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3. Pritchett, K and **G.E. Sanders**. 2007 Epistylididae ectoparasites in a colony of African clawed frogs *(Xenopus laevis*). Journal of the American Association for Laboratory Animal Science. 46 (2):86-91

Piper M. Treuting is an Assistant Professor in the Department of Comparative Medicine and veterinary pathologist. Her service responsibilities are as Chief of Pathology Services, Co-director of the University of Washington Veterinary Diagnostic Laboratory, Histology and Imaging Core and Comparative Pathology Program. Teaching efforts include directing the anatomic pathology courses and rotations and co-directing the biology and diseases of laboratory animal courses. She teaches informally via pathology rounds, slide review, necropsies and daily interactions with the clinical residents, clerks and undergraduate research students. She mentors select residents with an interest in veterinary pathology in preparation for the certifying exam. Her overarching research focuses on the pathology of genetically modified mice used in three thematic areas: aging, inflammation and cancer. She collaborates with numerous research groups including: in aging, the laboratories of Drs. Warren Ladiges (DCM), Peter Rabinovitch (Pathology) and George Martin (Pathology); in inflammation and cancer, the laboratories of Drs. Maggio-Price (DCM), Bielefeldt-Ohmann (University of Queensland, AU), Willis/Maxwell (Amgen), Preston and Albertson (Pathology), Fausto and Campbell (Pathology), Rudensky (Sloan-Kettering Institute) and Aderem (Institute for Systems Biology).

1. **Treuting PM**, Albertson TM, Preston BD. Case Series: Acute Tumor Lysis Syndrome in Mutator Mice with Disseminated Lymphoblastic Lymphoma. Toxicol Pathol, in press.
2. Chaudhry A, Rudra D, **Treuting P**, Samstein RM, Liang Y, Kas A, Rudensky AY. CD4+ regulatory T cells control TH17 responses in a Stat3-dependent manner. Science. 2009 Nov 13;326(5955):986-91. Epub 2009 Oct 1.
4. **Treuting PM**, Linford NJ, Knoblaugh SE, Emond MJ, Morton JF, Martin GM, Rabinovitch PS, Ladiges WC. Reduction of age-associated pathology in old mice by overexpression of catalase in mitochondria. J Gerontol A Biol Sci Med Sci. 2008 Aug;63(8):813-22.

Carol B. Ware is a Professor in the Department of Comparative Medicine and an Adjunct Professor in Oral Biology. Her principal responsibility is as Director of the Ellison Stem Cell Core. She is an Associate Director of the Institute for Stem Cell and Regenerative Medicine (ISCRM). Dr. Ware co-teaches CONJ530 "Directing Stem Cells Toward Regenerative Medicine" (https://depts.washington.edu/iscrm/education/conj530course.php) with Dr. Hannele Ruohola-Baker (Biochemistry), co-organizes an annual ISCRM symposium with Dr. Ruohola-Baker and organizes weekly research updates by ISCRM investigators and a monthly "Stem Cell Club". Descriptions can be found at: https://depts.washington.edu/iscrm/. Dr. Ware is on current graduate (PhD) committees for several students. Dr. Ware's research centers on the definition, characterization and manipulation of embryonic stem cell pluripotency. Much of this research provides a foundation of understanding how to facilitate endpoint tissue differentiation

and has led to collaborations with several laboratories within and outside the University of Washington in wide-ranging fields. Current active projects involve directing cells to enter alternative pluripotent stages through epigenetic manipulation, cell line characterization through xenogeneic chimera generation and culture condition impact on induced pluripotent stem cell generation.

1. **Ware CB**, Wang L, Mecham BH, Forough R, Nelson AM, Dauphin DS, Buckingham B, Bar M, Lim R, Askari B, Gartler SM, Shen L, Issa J-P, Tewari M, Lamba DA, Pavlidis P, Duan Z and Blau CA (2009) Histone deacetylase inhibition elicits an evolutionarily conserved self-renewal program in embryonic stem cells. *Cell Stem Cell* **4**:359-369.
2. Hall LL, Byron M, Butler J, Becker KA, Nelson A, Amit M, Itskovitz-Eldor J, Stein J, Stein G, **Ware C** and Lawrence JB (2008) X-inactivation reveals epigenetic anomalies in most hESC but identifies sublines that initiate as expected. *J Cell. Physiol* **216**:445-452.
3. **Ware CB**, Nelson AM and Blau CA (2006) A comparison of NIH-Approved Human ES cell Lines. *Stem Cells* **24**:2677-2684.

Ida M. Washington is a Clinical Associate Professor in the Department of Comparative Medicine. She has principal responsibilities as a clinical veterinarian and mentor to senior residents in the department, which involves oversight of diagnosis and treatment of clinical cases when on clinical duty, sharing on-call duty, and teaching classes to residents and to researchers in basic laboratory animal skills. She also serves as Associate Attending Veterinarian and a member of the IACUC, which involves reviewing animal use protocols, performing semiannual site visits, and advising investigators as needed regarding appropriate animal procedures. Her research interests include embryology, teratology, heart development, and reproductive toxicology. She currently collaborates with Dr. David Dichek in the Department of Cardiology characterizing developmental cardiovascular defects in the tgfbr2 knockout mouse. She has served as Treasurer and Council member for the Teratology Society since 2004, and a member of the Biomedical and Behavioral Research Review Committee, NIH, since 2006.

1. **Washington IM**. Veterinary Embryology and Teratology. Cherry Tree Press, Weybridge VT, 2000 (revised 2007).
2. Lipinski RJ, Hutson PR, Hannam PW, Nydza RJ, **Washington IM**, Moore RW, Girdaukas GG, Peterson RE, Bushman W. (2008) Dose- and route-dependent teratogenicity, toxicity, and pharmacokinetic profiles of the hedgehog signaling antagonist cyclopamine in the mouse. Toxicol Sci 104:189-197.
3. **Washington IM**, Sesti C, Jaffe M, Frutkin A, Chin MT, Dichek D. (2009) Cardiovascular defects in mouse embryos lacking tgfbr2 in cells expressing SM22a. Birth Defects Res, Part A, 85: 414. #33.

Students who have matriculated within our program have impacted the field in many ways. They hold significant positions in many academic and private institutions (see Appendix E-9) and have published papers and presented findings which have advanced the field of Comparative Medicine in incremental ways. Sometimes this progress is recognized by an award, for instance just this year one of our former trainees, Dr. Claire Hankenson was presented the 2009 Pravin N Bhatt Young Investigator Award presented by the American Association for Laboratory Animal Science. Three of our trainees (Baskin, Harrington and Hagan) were recipients of NIH 'K'

awards which allowed them to pursue advanced studies. Other times it is recognized as a promotion in the private sector such as that of Kathleen Pritchett-Corning to Director of Research and Professional Services at Charles River or a first university appointment such as that of Karen Lencioni (Chase) as Senior Clinical Veterinarian at the California Institute of Technology. However, with rare exception, each of our trainees have contributed to the advancement of laboratory animal medicine and pathology by assuming challenging positions and carrying them out effectively and professionally in many different ways.

By its very nature of being a department composed of specialists in animal biology and veterinary medicine existing within a school of human-oriented medicine the DCM must be a highly collaborative enterprise in order to survive let alone thrive. We, or our faculty/staff, offer and operate multiple centers providing specific services and expertise to the UW and Seattle area scientific community. This includes expertise in veterinary medicine, transgenic technology, stem cell biology, comparative pathology, animal husbandry, maintenance of specific pathogen free animals, experimental surgery, preclinical drug development, breeding management, mouse immunology, biology and physiology and others. This skill set directly impacts the scholarly output not only of our faculty and students (as noted by a review of publications and CV's) but also enables the quality use of animals for scholarly efforts placed by the investigators whom we serve whether they be individual or collaborative.

Section IV: Future Directions

The future academic direction of DCM is inextricably tied to its central goal of facilitating and advancing animal-based medical research for the benefit of humans and animals. As such our ultimate responsibility will be to maintain and enhance our service mission. However like our physician counterparts whose foremost goal is to provide support and service to their patients while advancing medical science we also must maintain and enhance our academic mission. While multiple challenges await the Department we are in a phase of development which calls for maturation and adaptation to a changing biomedical landscape rather than radical change. This involves facing challenges and converting some of them into opportunities. Several of our plans for the future have been addressed in Part B (Unit Defined Questions) of this report so there may be some redundancy. Perhaps the clearest way to define where we are headed is to define goals – some major, some minor. Sometimes these goals are inseparable from challenges or opportunities and sometimes individual goals overlap but that is not an unusual situation.

Goals and Opportunities:

Increase Graduate Training Opportunities: The research community has steadily increased its use of highly complex animal models many of which involve skilled veterinary medical support such as using surgical models or requiring specific pathology expertise. In order to meet this trend, we must appropriately train additional veterinarians. Therefore our immediate goal, initiated in early 2010, is to increase the numbers of resident training slots and hence numbers of MS candidates (it is required that residents without an advanced degree matriculate for an MS or other degree). The rationale and approach we will use to do this is our response to Core Question B in Part B of this document. There is currently a significant shortage of laboratory animal veterinarians and pathologists in the US and around the world (as confirmed by recent

surveys from ACLAM and ACVP). Concurrent with this is an increasing level of sophistication and skill that we and our client base expect when it comes to the specialized biomedical knowledge and veterinary medical expertise of those providing support. To address these issues our faculty believe that it is highly important to increase the number of residents in training within our program. Options for adding increased residents are limited. Obviously we must fund this change without impacting the cost center budget nor significantly eroding other existing funds. While funding from private organizations may be a possibility we do not consider this dependable enough to build a program around. Funding for advanced research training is available through NIH 'K' awards however traditionally NIH has not funded laboratory animal residency programs. At the time this document is written there is a strong likelihood that there may be some future funding for this purpose. However, based on the recently completed, NIH-funded nonhuman primate residency program support for this is unlikely to be of significant duration and the level of support (number of positions) is speculative. Regardless our intention would be to compete for these positions. We believe that the best long-term strategy to dependably increase resident training numbers is to support the suggestion proposed in core question B. and adjust the resident:veterinary technician ratio closer to 1:1 from the current level of 1:4. This change, which would be gradually introduced, would 1.) Have a minimal impact on cost (veterinary technicians and residents have comparable salaries), 2.) would improve the overall level of veterinary medical knowledge within the program, 3.) would increase the critical mass in our training and graduate programs and 4.) would ultimately address the need for veterinarians with training in laboratory animal medicine and pathology that currently exists. As a related but separate goal we will also encourage non-DVM students to consider our MS program. This has traditionally been a challenge because of our lack of visibility but we are attempting to counter this by encouraging those familiar with the program, such as technicians, hourly students nearing graduation and others with links to the Department to make application. Another possibility for expanding graduate training opportunities is to consider establishment of a PhD program – this is addressed in the next goal.

Define Need and Approach for Potential PhD Program: In growing our research program it would be advantageous, but not necessarily essential, to be able to award the PhD degree. If we hope to re-establish a T-32 NIH Research Training Program it would, most likely, be essential. Embarking on this path is not a decision that is easily made but should be seriously considered. This was also the basis of one of our Unit Defined Questions (question D in Part B) and our response to this question is provided here: The loss of our NIH sponsored T-32 training program was a bitter-sweet event caused very likely by a clear shift by NIH away from medical school affiliated training programs to those centered in veterinary schools and contributed to by our lack of a department-centered PhD program. As it was constructed our T-32 program required funded students to spend one year (funded by internal funds) learning basic laboratory animal medical skills then transferring for the 3-year NIH funded portions of the T-32 to the mentorship of one of our faculty for an MS degree or someone in a PhD granting department for completion of their studies. Clearly obtaining an MS degree was not considered sufficient for someone training to be a competitive research scientist. It was also not in the overall long-term interests of the Department to have our post-DVM students essentially leave the Department after 1 year of clinical training – essentially a net loss to us. We have determined that if DCM is to compete in the future for a T-32 style training program and, more importantly, if we are to attract faculty who wish to train PhD students by routes other than the current MCB interdisciplinary PhD

program we must develop a plan for either a stand-alone PhD program or work with a partner or partners to develop a comparative biomedical based interdisciplinary PhD program. This conclusion, prompted by consideration of our core question (Part B), has only recently been determined so significant strategizing and planning remains. However one scenario, discussed preliminarily with Dr. Dave Anderson, Director of the Washington National Primate Research Center (WaNPRC) might be to partner with the WaNPRC and other potential regional entities to offer an interdisciplinary program in comparative biology and medicine relevant to emerging needs in translational medicine (preclinical development) and other areas dependent upon examining similarities and differences between animals and humans. We have some experience in collaborating with WSU in PhD training and expansion of this interaction might also be considered. Because of the complexity and importance of this decision we will develop a group of faculty from within and outside the DCM to 1.) make a thoughtful decision on the practicality of such an approach and 2.) either dismiss it or advance it to a planning phase. The goal will be to complete this by mid-2011.

Solidify and Expand the DCM Research Base: The DCM at the UW is recognized by peer institutions as being one of a few Departments of Comparative Medicine (embedded with a medical school) that has a significant research program. We want to maintain and expand its reputation in this regard. It is part of our academic mission to advance our research activities and we hope to expand them in an orderly manner. Several faculty have developed significant research programs in spite of the fact that they must split their time with heavy service commitments. A goal is to be able to provide the opportunity for some of these faculty or new faculty to devote the majority (70-80% or more) of their time to research and research mentoring. We were fortunate to have Dr. Lynn Hajjar join the Department in late 2009. Dr. Hajjar is a Research Associate Professor who brings with her significant funding and a core expertise in innate immunity and infectious disease. Lynn can serve as a model for future recruits, as well as current trainees who wish to develop a career that is dominated by research. We have also in past few years added faculty who are not veterinarians (PhD faculty) with a goal of expanding our emphasis on animal biology similar to the way that Carol Ware, PhD has done in her research focused on stem cell biology. There is no single nor simple path to achieve this goal but maintaining and enhancing a culture of research success is essential. Effort must be ongoing and supported by appropriate recruitments, providing research faculty the opportunity and support to perform individual or collaborative research and the ability to seek funding for such. Leveraging efforts by expanding the scope of interactions to include institutions or private entities outside of UW may help but must be developed from the bottom up. The impact of developing a PhD program on expanding the research base also needs to be evaluated. In addition a critical element to increasing our research effectiveness is to find additional suitable space – the topic of the next goal.

Identify New and/or Additional Space for DCM Faculty and Faculty Research Efforts: If we are to maintain, let alone expand, our academic (or clinical) mission we must identify additional, suitable space. The core space assigned to DCM for faculty, trainee and staff offices and operations and research laboratories is on the first floor of the T-wing. It is old, poorly ventilated with marginal electrical power capacity and both labs and offices are crowded with no additional capacity available. Some staff have been moved to abandoned animal rooms for the lack of other space to provide them. An exception to this are the few faculty and staff involved

in the operation of the Histology and Imaging Core and the Stem Cell Core both of which are housed at SLU. This is a serious issue which, if not addressed, will 'trump' all others. The SOM is aware of this situation and we have had discussions focused on potential resolutions. Without adequate space retention of talented individuals, let alone expansion of faculty research, training programs and supporting staff is not feasible. Opportunities may become available associated with a proposed expansion of SLU and we must be prepared, with the support of the SOM and UW leadership, to take advantage of this excellent opportunity.

Develop a Master Plan for UW Animal Resources and Cost Structure: As indicated at the beginning of this section 'the future academic direction of DCM is inextricably tied to its central goal of facilitating and advancing animal-based medical research for the benefit of humans and animals'. A major part of this comes associated with identifying, operating and maintaining the 8 separate centralized vivaria scattered across the campus and city as well as assuring the health of all other animals within the UW system. As the UW and SOM continue to grow and expand the complexity of this expansion exceeds the capacity of a single organization (DCM) to anticipate and, in isolation, plan for it. It should also be noted that the nature of animal research changes as technologies become more sophisticated. For instance, recently there has been a spike in demand for animal suites devoted to imaging, behavior and physiologic analysis, metabolic testing and other space-rich demands – something not anticipated 10 or 15 years ago. While this animal facilities issue is not directly tied to the academic program of DCM it does impact it much like expanding a hospital (e.g. adding additional beds, surgical or diagnostic centers, etc.) would impact training and academic development in a teaching hospital. Furthermore since DCM is responsible for all animal health issues within the UW system there needs to be an understanding of potential future directions for growth or emphasis that extends beyond the SOM. Without some cohesive understanding of projected growth, emphasis and timing DCM is left to plan, to some degree, in the dark. To counter this it has been proposed that an Animal Resources Master Plan be developed in collaboration with UW Capital Projects, representatives from DCM, SOM and other interested parties (to be identified). This proposal is currently being advanced for funding consideration and we should know its fate shortly.

Related to this is the growing expense of maintaining animals for research. This is complicated not only by the growing complexity of regulations, which inevitably drive expenses up, but also labor issues (benefits costs, unionization, etc.) other unfunded mandates and animal housing issues. In particular at the UW is the great cost added by having multiple independent facilities scattered around the campus and city. There is limited capacity of investigative groups to continue to afford the cost of maintaining animals. The ability to absorb costs or pass them directly on to investigators budgets is not unlimited. Once again while this is not directly an academic issue it never-the-less has a huge impact on our academic mission considering that approximately 80% of the DCM budget is derived from per diem expenses and these animals, much like humans in a teaching hospital, are the focus of our training and research effort. Because of this we are developing, internally, methods for monitoring facility efficiencies and cost containment but this topic reaches beyond that and should be part of the proposed UW Animal Resources Master Plan as well.

Evaluate Departmental Structure and Staffing: The DCM is currently staffed with a mature faculty. Several of these faculty are likely to relinquish leadership positions and/or partially or

completely retire within the next 5 years. While presenting a challenge it also provides an opportunity for assessment and planning. In addition the field of comparative medicine, like other areas of biology and medicine is also changing and maturing. The added complexity of the field is driving more specialization and focus. It is rapidly becoming impossible, at least as a promotion-dependent faculty member in an academic environment, to thrive by being the equivalent of a 'general practitioner' of laboratory animal medicine or pathology. These and other changes may eventually drive the need to change the departmental structure, alter hiring and appointment practices, or stimulate other changes. For instance the DCM for the first time in 2009 hired its first fulltime clinical veterinarian into a professional staff position. Some institutions with large comparative medicine departments (Yale University is one example) have begun to address this by altering departmental organization to reflect a divergence in clinical and research responsibilities and reporting structures. In this manner, for instance, there is a strong clinical head and a strong research head reporting to the Chair. Evaluation should not stop with the faculty organization. The added challenges of facility design, operations and finances should also be considered as part of a department-wide structural assessment. While Yale (or similar) model may not be ideal for UWDCM it is one of many paths that could be considered. The conclusion may be that no significant change is necessary but this should be an active and not a passive decision. An ideal time to consider these changes comes at a time of impending leadership change, near retirement or re-assignment of faculty effort. Obviously this exercise would need the support of the SOM and Provost for it to have translatable meaning. This effort should be initiated within the next 12 months and should consider several organizational structures as represented by leading institutions in the field. The goal should be to answer a fairly simple question – Do we have an organizational structure that optimally supports and guides the operation and growth of the DCM for the next 10 years?

Establish or Fortify Regional Interactions and Affiliations: Within the Pacific Northwest there has been a growing presence of expertise and interest in issues that can broadly be placed in the area of comparative medicine. This includes the presence of comparative scientists, many of whom are veterinarians, in the private as well as public sectors. For instance 20 years ago when the author of this report (dl) arrived at the UWDCM as veterinary pathologist he was one of 2 pathologists working in the field of laboratory animal pathology in the Seattle area. Currently within the Seattle area there are more than 20 laboratory animal pathologists (most of these in the private sector) and the growth is even more dramatic with clinical laboratory animal veterinarians. In addition programs (non-laboratory animal related but comparative in nature) within WSU and the University of Alaska (UA) have also flourished. We have been able to establish some collaborative interactions with colleagues within the Seattle area (and have trained many of them). We have also been able, on an individual basis, to establish strong ties with some groups at WSU and there is recent interest from colleagues at UA in establishing a joint program but there are other opportunities as well. For instance we have recently established a funded veterinary student clerkship training program with College of Veterinary Medicine at Western University of Health Sciences. By establishing or fortifying interactions with regional groups we can leverage the talent and interests of a diverse group of scientists both veterinarians and non-veterinarians.

As the only full-spectrum regional program embedded within a School of Medicine we are also in a good position to promote a relatively new concept being advanced by the AMA and AVMA

called One Health/One Medicine (http://www.onehealthinitiative.com/). This is an effort to expand interdisciplinary collaborations in all aspects of health care and knowledge for humans and animals including research, public health and other aspects. To promote this concept it is obviously essential for those doing principally animal-based research to interact and collaborate as well. Enhancing local and regional interactions also promotes the concept of translational medicine. One of the drivers for the influx of laboratory animal oriented biologists, veterinary clinicians and pathologists into the area is due to the rise of biotechnology companies who depend upon these individuals for pre-clinical development efforts. Closer interactions with these groups can provide significant training opportunities, research funding and, ultimately, jobs. We have current interactions with scientists from Amgen, Applied Precision, Zymogenetics and non-profit organizations including FHCRC, Virginia Mason, Allen Brain Institute and Institute for Systems Biology, PNNL and others. Our goal will be to strategically expand our regional interactions by developing collaborative projects that enhance training and research.

Summary: The DCM and its partners including the WaNPRC and the OAW are recognized around the world as places where quality training, research and service are performed. Our graduates and faculty are in demand by all levels of the public and private sectors for their expertise in this complex and hybrid discipline. Comparative Medicine is a challenging field because it not only requires an immense complexity of knowledge related to multiple species but also because it involves the appropriate use of animals in research – never a black and white issue. Academic success in this area requires a rather unique personal dedication of faculty, staff and students because they must be knowledgeable and flexible in what they do and be able to appropriately balance the goals of scientific progress while ensuring the well-being and humane care of the animals used. Our goal is to be productive, advance the field and enhance the quality of our program by evolving and being willing to change as required.

PART B
UNIT-DEFINED QUESTIONS

Core Questions and Responses:

A. How does our Department compare academically with similar comparative medicine departments/divisions located in comparably sized state-supported Schools or Colleges of Medicine?

Response: Because of the limited number and great diversity of comparable programs it is a challenge to make meaningful comparisons. However, below are listed some residency training programs in large public institutions that bear some similarities with our own.

University of Michigan – this is a well established 3-year residency training program at a large institution that satisfies eligibility requirements for ACLAM boards. The first year is primarily clinical training, 2nd year is 10% clinical effort with the remainder for research, 3rd year is spent primarily in research. Program offers a Ph.D. to trainees

Ohio State University – (veterinary school and medical school in the same institution) this is a relatively new 2-year program started in 2005 which did not grant a degree. However, residents starting in 2010 would be the first to be enrolled in the Masters Program and it is intended to have all future residents receive a Masters degree. The program satisfies eligibility requirements for ACLAM boards.

University of Missouri (veterinary school and medical school in the same institution) – this is a well established program at a university with a veterinary and medical school. There is one year of clinical/residency training followed by 2-4 years with research as primary activity. Students who wish to obtain a Masters or PhD are specifically recruited for that career goal. Currently the ratio of PhD:Masters is approximately 70:30 in students going through the program in recent years. Program satisfies eligibility requirements for ACLAM boards.

Pennsylvania State College of Medicine, Hershey Medical Center – this is a 2-year program that is research oriented with the requirement of a Masters degree with a major in laboratory animal medicine. A PhD is generally not granted but is possible via funding from an outside department. The program satisfies eligibility requirements for ACLAM boards.

University of California, Davis (veterinary school and medical school in the same institution) – this is a 29-month residency with the 1st year spent in core clinical training that includes pathology training and primate center rotations; a traditional residency or primate medicine track can be elected. Months 12-29 are spent in a mentored research project, Mouse Biology Program, nontraditional laboratory animal species or additional nonhuman primate medicine. Submission of research studies is required before completing residency but a Masters or PhD is not required. Approximately 25% of students pursue a PhD that is funded through mentors' laboratories. Traditional residency track is funded partly by UC Davis and partly by the Campus Vet Funds. The Primate track is funded by the CNRPC (California National Research Primate Center) via a NCRR Training Grant.

B. There is a significant shortage of laboratory animal veterinarians and pathologists in both the public and private sectors. To respond to this we are considering a major programmatic change that would enable us to train more veterinarians in comparative medicine. Currently we have a resident (trainee):veterinary technician ratio of 1:4. To allow us to train additional veterinarians we are proposing to gradually shift this ratio to 1:1 (approximately) using an iterative process. This would substantially increase our pool of post-DVM residents/trainees at minimal additional cost. Trainees would cover services formerly provided by veterinary technicians. These trainees would be required to complete a minimum of an MS degree which would be driven by an original research project. Is this a viable model for enhancing both our training/research function as well as service function?

   - Response: Please see Part A, Section IV Future Directions under the heading of: **Increase Graduate Training Opportunities** for our response to this question.

C. The Department has very limited funding to support teaching or training activities. Should we seek to obtain funding for training activities from private local or national biotechnology

or pharmaceutical industries and if so how can we sustain this? Is this consistent with the mission and goals of the university as they perceive our role?

Response: We have examined this option and do not consider it, at this time, to be a reliable and dependable funding source for training purposes. The economic downturn has reinforced this understanding by forcing many private firms to pull-back many existing funding opportunities. In addition in informal discussions we have had with some large biotech companies it is clear that they are reluctant to fund individuals who would be unencumbered in regard to where they would work following completion of the program. Even so under the proper scenario we would be receptive to this type of trainee funding mechanism if it works to the best interest of both parties. As this document is written we are in negotiation with a large public/private consortium in Singapore to possibly fund one student (tuition, housing, travel, salary) for 3 years with the understanding that this student would return upon completion of the program. It should be understood that seeking funds for training purposes from private organizations is distinct from seeking funding for research purposes. We are actively pursuing this opportunity as illustrated by our interactions with such companies as Amgen and Applied Precision.

D. How can we best accommodate to a shift in funding priorities for training programs by NIH away from comparative medicine programs affiliated with medical schools to those affiliated with veterinary schools? Is the loss of our training program a liability given that we do not have a PhD program and trainees must seek this degree outside of the department? Should we institute a PhD program to be more competitive?

- Response: Please see Part A, Section IV Future Directions under the heading of: **Define Need and Approach for Potential PhD Program** for our response to this question.

E. One focus of the Department is to provide specialty centers of support that further our service and research support goals that relate to the university as a whole. These include such units as the transgenic mouse unit colony management, histology and imaging core (HIC) and the soon to be established mouse physiology resource laboratory. We also have faculty who operate non-departmental centered units such as the Institute for Stem Cell and Regenerative Medicine Stem Cell Core. What are the strengths and weaknesses of this approach and how can we leverage this effort academically?

Response: At our core the DCM exists in the SOM and UW to provide service and collaborative expertise relevant to the use of animals in research. We obviously do this by operating a large and geographically scattered set of vivaria and medical/surgical support structures. However we also put great effort into establishing and maintaining, directly or indirectly, other centers of expertise. This animal-centric expertise increases our utility and critical mass, provides a unique training opportunity, enhances collaboration, and provides a funding stimulus for our faculty and the large group of investigators that they support. It also serves the community since these centers are open to use by all public and private entities within region and world. In developing these centers it is essential that they 1.) develop organically based on real need and 2.) they are self-sustaining within a short period of time. The principal weaknesses associated with establishing these centers are the added budgeting

and operational complexity, the risk of failure (quantitative or qualitative) and lost opportunity associated with operating a marginal unit and the potential dilution of resources. These potential weaknesses can be managed but it requires unflinching determination to monitor operations and to cease operation of failing centers. As a Department that provides a unique set of services and expertise we must assume, but manage, these risks.

F. We have a very diverse faculty when it comes to research activities and expertise. Much of this is driven by the need to provide a broad range of expertise to the research community which we serve. However this does complicate having a departmental research and teaching focus. Is this a strength or liability and should we continue to encourage skill and research interest diversity?

   Response: Over the year's faculty within the DCM have struggled with this issue. However as the complexity of research and demands of keeping up to date on an every broadening range of information evolves it has become apparent that encouraging scientific diversity within our faculty is essential. It is essential because we must be able to provide a broad range of expertise to an ever expanding knowledge base and clientele. Overly focusing expertise would constrain this breadth of knowledge even though it does, to some degree, diminish a central research theme for the Department. This diversity of interest and expertise does, on the positive side, lead to greater collaborative interaction with other Departments and groups. Several of our specialty centers such as the Histology and Imaging Core, Transgenic Resources Core and Stem Cell and Regenerative Medicine Stem Cell Core are the direct result of interdepartmental collaborative efforts. The same can be said for numerous publications and grants hence we consider this diversity a particular strength to be encouraged.

G. Because veterinarians are heavily involved in preclinical aspects of drug discovery and development we are seeking to expand our involvement in translational medicine efforts within the SOM and Environmental Health. Are these efforts well spent and what should be the focus of these efforts?

   Response: The ultimate path that translational medicine takes within this academic setting remains to be determined. Implementing a culture oriented around what a few years ago was a distant concept takes time and iterative advancement. It is too soon to determine how the concept of translational medicine will ultimately evolve at the UW. In spite of this veterinarians have traditionally been significantly involved in the preclinical phase of drug and device development – the vast majority of this in the private sector. One of the chief 'consumers' of our trainees and graduates is the pharmaceutical/biotechnology sector. As such we must be involved, and are already involved to some degree in UW and other local translational efforts. For instance we recently partnered with the Department of Radiology to submit a grant under the ITHS to establish a small animal imaging center. This could expand significantly depending upon how the entire translational medicine mission evolves internally. We have already had calls to develop good laboratory practices (GLP) compliant capabilities in our facilities and pathology group. Currently this is completely unrealistic although not out of the question in the future. Members of our faculty are working with the ITHS and affiliated groups to move the process along and we consider this to be part of our

mission. We have been fortunate to receive some translational-focused research funding from biotech oriented groups including Amgen, Applied Precision and others. It will be important to enhance our collaborations with translational groups as they evolve since this will be a career choice for many of our trainees.

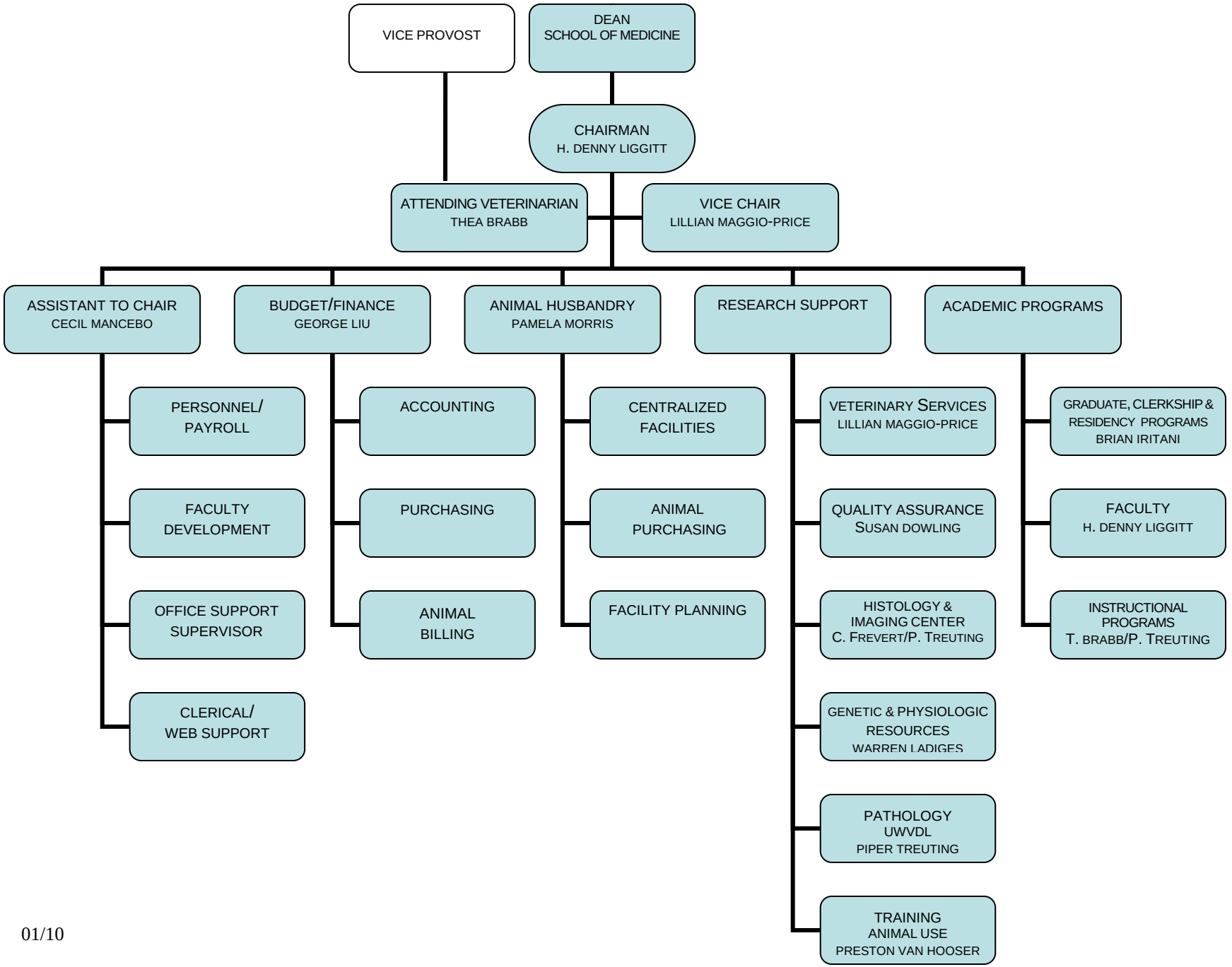
H. DCM faculty members have extremely high service loads due to a significant increase in the degree and sophistication of animal use over the past 15 years, with minimal increase in FTE's. Additionally 3-4 key faculty are within 5 years of retirement age. This service load significantly reduces the ability of faculty to compete for research funds, publish, gain promotion etc. Without research funds DCM faculty cannot support training of students in research. It will be essential that DCM faculty FTE's are increased in proportion to the increase in animal use and specialty services to allow sufficient 'academic' time for training faculty to be competitive for research dollars. How can the DCM accommodate increasing service loads and diversity, while providing adequate protected research time for faculty to obtain research funding?

Response: This question is not unique to comparative medicine nor is the answer simple. It is even more challenging at a time when federal and private support for medical research is wavering and the added burden of increased regulations and unfunded or under-funded mandates are growing. It is essential to maintain a view and attitude that is not constrained by the near-term. Support for biomedical research has traditionally been a gradually escalating sine-wave and there is no reason to believe that this will change. To prosper we must preserve the FTE's that we have and, within reason, add additional without risking quality. This will require significant management and entrepreneurial efforts that are not risk adverse. It will also require students and faculty to be flexible in defining their service, research and teaching commitments. It may also require a restructuring of the Department to facilitate a more strict delineation of service and research arms (addressed in Section IV). Most importantly it will require leadership which supports a strong academic mission that is cohesive with, and not antagonistic to, a strong service mission.

I. The DCM is more representative of a clinical department than a basic science department although it is officially listed as a basic science department. Should our academic promotion guidelines be more clearly defined into clinical/teaching and research/teaching tracks similar to clinical departments? What are the advantages and disadvantages of this approach over the current approach where we have broadly stated promotion criteria?

Response: The DCM is a small Department with a broad mission. It bridges basic science and clinical veterinary medicine and does so by depending upon a faculty with diverse expertise. Current promotion guidelines offer considerable leeway in how faculty can bridge this vast expanse of knowledge and expectations and still qualify for promotion and advancement. This flexibility is diminished when the clinical/teaching or research/teaching tracks are implemented. Until the DCM has the luxury of faculty numbers, funding, focused responsibilities and an organizational structure consistent with this added complexity to allow a more rigid delineation of roles and responsibilities would be problematic. Currently it is in its best interests to maintain the current promotion guidelines but to clearly define and enforce the responsibilities and expectations of faculty.

University of Washington
Department of Comparative Medicine
Organizational Chart



Appendix A

01/10

Appendix B: Comparative Medicine Budget Summary (FY 2004 - 2009)

	State	RCR	Research Grants & Contracts	Other	Self-Sustaining	Total
FY04 + FY05	736,751	1,006,374	3,485,918	151,562	16,252,764	21,633,369
FY06 + FY07	953,361	1,152,962	3,765,855	59,593	19,934,187	25,865,958
FY08 + FY09	722,401	1,566,593	3,148,134	90,037	23,508,914	29,036,079

State
GOF: UW General Operating Fund
DOF: Department Operating Fund - Attending Veterinarian support

RCR
Research Cost Recovery

Research
All departmental federal, state, private, internal UW research grants & contract awards

Other
Gifts, endowments, and interest earned from existing endowments
Royalty income

Self Sustaining
Animal Resources (Vivarium) operating funds
Capital Equipment reserve budget

Yearly Expenditures from Outside Support
(direct costs only: source OSP)

FY04	1,819,042
FY05	2,609,244
FY06	1,902,299
FY07	1,899,560
FY08	2,040,953
FY09	1,597,958
FY10 est	2,512,687

Appendix C

Department of Comparative Medicine (DCM)
Information about Faculty

Name	Faculty Rank at DCM	Appointment Type	Affiliation	Area of Interest
REGULAR FACULTY				
Frevert, Charles DVM, PhD	Associate Professor	Regular, without tenure	DCM - home department, Adjunct Associate Professor, Medicine	Lung biology, comparative pathology, innate immunity, extracellular matrix, proteoglycan, lung infections, zoonotic disease.
Hajjar, Adeline DVM, PhD	Research Associate Professor	Regular, without tenure	DCM - home department	Innate immunity, infectious diseases.
Iritani, Brian DVM, PhD	Associate Professor	Regular, without tenure	DCM - home department	Developmental immunology, cell signaling and molecular basis of cancer.
Ladiges, Warren DVM, MS, DACLAM	Professor	Regular, with tenure	DCM - home department	Molecular immunology of autoimmune disease, transgenic mouse models of aging.
Liggitt, Denny DVM, PhD, DACVP	Professor	Regular, with tenure	DCM - home department	Translational medicine, comparative pathology.
Maggio-Price, Lillian VMD, PhD	Professor	Regular, without tenure	DCM - home department	Mouse model of inflammatory bowel disease and inflammation associated colon cancer.
Sanders, George DVM, MS, Fish Pathologist (AFS/FSH)	Part-Time Lecturer	Regular, without tenure	DCM - home department	Diseases of fish and amphibians.
Treuting, Piper DVM, MS, DACVP	Assistant Professor	Regular, without tenure	DCM - home department	Pathology of genetically-engineered mice.
Ware, Carol PhD	Professor	Regular, without tenure	DCM - home department, Adjunct Professor, Oral Biology	Stem cell biology.
ACTING FACULTY				
Hagan, Catherine DVM	Acting Instructor	Regular, Annual	DCM - home department	Neuro-pathology, neuro-regulation.
Moralejo, Daniel DVM, PhD	Acting Assistant Professor	Regular, Annual	DCM - home department	Type 1 diabetes in BB rats and type 2 diabetes in OLETF rats.
Paik, Jisun PhD	Acting Assistant Professor	Regular, Annual	DCM - home department	Vitamin A and retinoid biology as it relates to carcinogenesis.

Department of Comparative Medicine (DCM)
Information about Faculty

Name	Faculty Rank at DCM	Appointment Type	Affiliation	Area of Interest
Park, Heon PhD	Acting Instructor	Regular, Annual	DCM - home department	Mouse immunology focuses on T and B cell biology related to autoimmune diseases and immunodeficiency.
Pettan-Brewer, Christina DVM, MS	Acting Instructor Senior Fellow	Regular, Annual	DCM - home department	Pathology, aging and aging related diseases, transgenic animals as models to human diseases, molecular genetics of cancer: polymorphisms and epigenetics mechanisms.
Wiley, Jesse PhD, MS	Acting Assistant Professor	Regular, Annual	DCM - home department	Effects of Familial Alzheimer's Disease upon APP signaling.

CLINICAL FACULTY

Anderson, David DVM	Clinical Associate Professor	Annual, WOS, Courtesy	WaNPRC – home department	Primate biology and medicine.
Brabb, Thea DVM, PhD, DACLAM	Clinical Associate Professor	Regular, Annual	DCM - home department, reports to Vice Provost for Health Sciences	Autoimmunity and T cell homeostasis.
Harrington, Robert DVM, PhD	Clinical Instructor	Annual, WOS, Courtesy	DCM - home department	Prion diseases.
Hukkanen, Renee DVM, MS, DACVP	Clinical Instructor	Annual, WOS, Courtesy	WaNPRC – home department	Primate pathology.
Kelley, Stephen DVM, MS, DACLAM	Clinical Associate Professor	Annual, WOS, Courtesy	DCM - home department	Clinical medicine of laboratory animals.
Koszdin, Kari DVM, MS, DACLAM	Clinical Assistant Professor	Annual, WOS, Courtesy	VA Puget Sound Health Care System - home department	Clinical medicine of laboratory animals.
Murnane, Robert DVM, PhD, DACVP	Clinical Associate Professor	Annual, WOS, Courtesy	WaNPRC – home department	Primate pathology.
Pekow, Cynthia DVM, MS, DACLAM	Clinical Associate Professor	Annual, WOS, Courtesy	VA Puget Sound Health Care System - home department	Clinical medicine of laboratory animals.
Washington, Ida DVM, MA, PhD	Clinical Associate Professor	Regular, Annual	DCM - home department	Laboratory animal medicine, cell biology, embryology, teratology.

EMERITUS FACULTY

Appendix C

Department of Comparative Medicine (DCM)
Information about Faculty

Name	Faculty Rank at DCM	Appointment Type	Affiliation	Area of Interest
Dennis, Melvin DVM, DACLAM	Emeritus Professor	TFA, WOS	DCM - home department	Comparative medicine, including animal models and experimental surgery.
DiGiacomo, Ronald VMD, MPH	Emeritus Professor	TFA, WOS	Epidemiology - home department	Epidemiology and zoonoses.
Rausch, Robert DVM, PhD, MS	Emeritus Professor	TFA, WOS	Pathobiology - home department	Zoonotic diseases, with emphasis on epidemiology and parasite-host interactions
Van Hoosier, Gerald DVM, DACLAM	Emeritus Professor	TFA, WOS	DCM - home department	Laboratory animal medicine with emphasis on effects of intercurrent infection on mouse phenotypes.
ADJUNCT FACULTY				
Wolf, Norman DVM PhD	Adjunct Professor	Courtesy	Pathology - home department	Hematopoietic stem cell dynamics and transplantation in radiation biology
AFFILIATE FACULTY				
Baskin-Granillo, Carole DVM, MS	Affiliate Assistant Professor	Courtesy	Science Foundation Arizona, Phoenix, AZ	Influenza.
Buetow, Bernard DVM, PhD, DACVP	Affiliate Assistant Professor	Courtesy	Wyeth Research, Chazy, NY	Cardiovascular pathology.
Burich, Andrew DVM, MS, DACLAM	Affiliate Instructor	Courtesy	Benaroya Research Institute at Virginia Mason, Seattle, WA	Clinical medicine of laboratory animals.
Graham, Jennifer DVM, DABVP-Avian, DACZM	Affiliate Assistant Professor	Courtesy	Avian and Exotic Animal Medicine, Angell Animal Medical Center, Boston, MA	Avian and zoological medicine.
Hargis, Ann DCM, MS, DACVP	Affiliate Associate Professor	Courtesy	Dermato Diagnostics, Edmonds, WA	Dermato-pathology.
Jerome, Christopher BVetMed, PhD, MRCVS	Affiliate Associate Professor	Courtesy	Think Bone Consulting, Inc., Langley, WA	Bone biology/pathology

Appendix C

Department of Comparative Medicine (DCM)
Information about Faculty

Name	Faculty Rank at DCM	Appointment Type	Affiliation	Area of Interest
Knowles, Donald DVM, PhD, DACVP	Affiliate Professor	Courtesy	Washington State University, Pullman, WA	Mechanisms of infectious diseases of domestic animals.
Kramer, Robert DVM	Affiliate Assistant Professor	Courtesy	Veterinary Radiology, Montlake Terrace, WA	Veterinary radiology.
Mison, Michael DVM	Affiliate Assistant Professor	Courtesy	Seattle Veterinary Specialists, Kirkland, WA	Veterinary surgery.
O'Hara, Todd DVM, PhD, MS	Affiliate Associate Professor	Courtesy	University of Alaska - Fairbanks	Diseases and biology of arctic animals.
Pritchett, Kathleen DVM, DACLAM	Affiliate Instructor	Courtesy	Charles River Lab, Wilmington, MA	Biology and husbandry of mice.
Runstadler, Jonathan DVM, PhD, MS	Affiliate Assistant Professor	Courtesy	University of Alaska - Fairbanks	Comparative virology.
Waggie, Kimberly DVM, MS, DACLAM, DACVP	Affiliate Associate Professor	Courtesy	Zymogenetics, Seattle, WA	Comparative pathology and toxicology.

Existing Program Review: HEC Board Summary

Name of Unit: Department of Comparative Medicine (DCM)
Name of School: School of Medicine
Degree title: MS
Year of last review: 1998
Current Date: February, 2010

A. Documentation of Continuing Need

There is currently a significant shortage of laboratory animal veterinarians and pathologists in the US and around the world (as confirmed by recent surveys from the American College of Laboratory Animal Medicine {ACLAM} and the American College of Veterinary Pathology {ACVP}). At the same time there is a growth in demand for these skills due to retirement of a large cohort of individuals with this training and a rise in need due to an increase in demand from the academic, pharmaceutical, biotechnology and device communities which depend heavily upon animal research. The NIH-driven emergence of translational medicine, where there is an emphasis on moving findings from the lab into the clinic, is also driving this need. Concurrent with this is an increasing level of sophistication and skill that we and our client base expect when it comes to the specialized biomedical knowledge and veterinary medical expertise of those providing support. Additionally the increased rules and regulations promulgated by government and private institutions to ensure the proper use of animals is also fueling the need for veterinarians trained in regulatory aspects of laboratory animal medicine.

The traditional training ground for specialists in Comparative Medicine are Schools of Medicine or research institutes rather than Colleges of Veterinary Medicine except in rare instances where a medical school and veterinary school are co-housed within a single university (and even then units tend to be separate). This is primarily because most of the emphasis in laboratory animal medicine is on the use of rodent species (rats and mice) for medical research. Veterinary schools lack this emphasis, focusing more on pet and domestic livestock species, and hence lack the wherewithal to provide appropriate training. The DCM and its partners at the UW including the Washington National Primate Research Center (WaNPRC) and the Office of Animal Welfare (OAW) are recognized around the world as places where quality training, research and service are performed. We also provide a critical service within the UW system by facilitating animal-based research as well as providing training and other academic support and enterprise. Our graduates and faculty are in demand by all levels of the public and private sectors for their expertise in this complex and hybrid discipline. Comparative Medicine is a challenging field because it not only requires an immense complexity of knowledge related to multiple species but also because it involves the appropriate use of animals in research – never a black and white issue. Academic success in this area requires a rather unique personal dedication of faculty, staff and students because they must be knowledgeable and flexible in what they do and be able to appropriately balance the goals of scientific progress while ensuring the well-being and humane care of the animals used. Our goal is to be productive, advance the field and enhance the quality of our program by evolving and being willing to change as required.

B. Assessment Information

We believe that the most effective laboratory animal veterinarian is also a researcher themselves either as a primary investigator or a collaborator. Hence our general program objectives include the instruction of resident trainees in the principles of experimental design, statistics, data collection, the preparation of manuscripts, and the ethical principles of research, including animal experimentation. In addition we strive to challenge trainees in an intellectually rigorous environment where the virtues of inquisitive thought, collaboration, professionalism, and hard work are over-arching. Our teaching/training program consists of a clinical residency training program and a Master's of Science degree program. As part of this we also incorporate training that will qualify students for board certification. While the MS program is open to all interested parties these two programs are typically combined into one. Residents not having a MS or PhD (or equivalent) are required to obtain such a degree during their time here. (The DCM cannot award a PhD degree but options to obtain this degree are available and will be described later). While the residency training program is designed to allow students to qualify for ACLAM or ACVP boards but there is no requirement that they complete boards during their time here. The residency program may emphasize either Laboratory Animal Medicine or Comparative Pathology. Regardless all residents are required to accomplish the goals outlined in the Veterinary and Pathology Services sections below. This is required because veterinary students obtain little training in veterinary school that targets laboratory animal species, particularly rodents which represent over 90% of the species we see and which are heavily used in medical research. The resident may add supplementary rotations to address a specific need or interest.

VETERINARY SERVICES –The Veterinary Services Unit oversees veterinary care for multiple species at the UW. Rotation through this service offers opportunities to consult in surgical research projects, evaluate the impact of intercurrent diseases on research data, and recommend treatment for diseased or ill laboratory animals under the guidance of a faculty member. This rotation also provides an opportunity for trainees to meet investigators from many laboratories and explore different research interests. Our rodent facilities house in excess of 100,000 rodents, under specific pathogen free (SPF) conditions and many other species ranging from fish to pigs. The broad goal is to introduce the trainee to laboratory animal medicine, the performance of clinical and surgical services and the administration of preventive health, quality assurance and animal welfare programs. There is also an understanding that residents will become familiar with and practice the high standards of professionalism expected within the SOM.

PATHOLOGY SERVICE –The resident will work jointly with faculty pathologists on the gross and histopathologic assessment of cases coming through the service. There is exposure to a wide variety of species, including primarily rodents, fewer rabbits, small ruminants, pigs, dogs, cats, reptiles, amphibians and fish, both in necropsy and in gross and histologic slide conferences. The specific goal is to introduce the trainee to the practice of pathology as a diagnostic and research tool and to provide the clinical trainee with the materials for successful preparation for ACLAM boards. Those so desiring may gain much more concentrated exposure to comparative pathology with the goal of obtaining certification by the ACVP. These individuals are then "tracked" to comparative pathology increasing their responsibilities, specific objectives and
The emergence of the trainee in this setting offers many opportunities for the student to find a research laboratory, mentor, and project that is compatible with his or her interests.

SUPPLEMENTARY ROTATIONS – LISTED BELOW (Dependent upon the specific trainee interests, career goals and board qualifications)

TRANSGENIC RESOURCES PROGRAM – The Transgenic Resources Program is responsible for making transgenic mouse models for a broad range of investigator interests at the School of Medicine and within the greater Seattle medical research community.

OFFICE OF ANIMAL WELFARE –The goals of the Office of Animal Welfare rotation are to familiarize the postdoctoral fellows with the U.S. Government and the University of Washington's regulations regarding the utilization of animals in research, teaching and testing. This is becoming an increasingly complicated aspect of the work we do and advanced training in this area can be important for many career paths.

WASHINGTON NATIONAL PRIMATE RESEARCH CENTER (WaNPRC) – The WaNPRC is the only one of the national primate centers that is physically centered within a medical school. Here residents can gain exposure to nonhuman primate medicine and pathology. We are fortunate to have them as partners in our training program.

DEGREE AND CERTIFICATION PROGRAMS:

MS DEGREE – The DCM offers the opportunity for graduate students to earn an MS degree. Typically this is sought by those with a DVM or VMD degrees. The MS degree is driven by a goal of performing a hypothesis driven research project that is worthy of publication in a peer-reviewed publication.

PhD OPTION – It is currently not possible to earn a PhD degree by matriculating within the DCM. Those residents wishing to obtain this degree have an option of working with a mentor in a PhD granting Department post-residency or by developing a co-operative program. We are considering the possibility of establishing this degree path.

QUALIFICATION FOR BOARD CERTIFICATION – In our profession, as in many medical professions, certification by a specialty board is considered a mark of achievement nearly equivalent to an advanced degree and a requirement for many public or private positions. In some situations board certification is viewed as more desirable by potential employees than an advanced degree. The two specialty boards relevant to Comparative Medicine are laboratory animal medicine (American College of Laboratory Animal Medicine {ACLAM} Boards) and veterinary pathology (American College of Veterinary Pathology {ACVP} Boards). Each of these specialty boards has different criteria for qualification and these criteria are available at the appropriate web-site http://www.aclam.org/education/training/standards.html or http://www.acvp.org/exam/scope.php. These criteria are cohesive with our academic criteria and, in fact, strengthen them due to the rigor required for board success.

EVALUATION - At the beginning of each quarter, students submit a report which chronicles their activities over the previous quarter. Students indicate all their activities, including courses taken, and research efforts. Other significant activities are also noted, such as teaching activities (seminars, presentations), and attendance at meetings, workshops, etc. Students are also asked to

indicate whether these activities contributed in a positive or negative way to their ultimate goals. We also evaluate performance in their mentored research positions, and in seminar and discussions using specifically designed forms. This provides an ongoing evaluation of the various aspects of the program from the user's perspective. Thus, if any serious impediments to students' progress in the program occur, they can be promptly corrected. Also, faculty having significant interaction with the student during the quarter, such as during laboratory rotations, are provided an evaluation form to rate the student's performance. Following receipt of this information from the students and faculty, the student's progress is discussed with the DCM faculty at regularly scheduled faculty meetings. If any negative aspects come to light, various remedial actions are also considered. Significant discussions emanating from this meeting, regarding either positive or negative responses by the faculty, are conveyed to the student in a meeting shortly thereafter.

For formal CMED coursework, registered students are assessed by combinations of classroom participation, homework, exams and/or problem based learning sessions. Depending on the particular course these may be more or less weighted. As an example, the Biology and Diseases of Laboratory Animals course series (CMED 520/530, 521/531) has used problem based learning as a principal teaching method coupled with a final exam and homework assignments. For these courses, we evaluate students based on active, willing participation, creative thinking, accurate and timely completion of assigned work and the score on the exam. Participation in class is critical to the successful completion of the problem based coursework as we evaluate the student's practical application of their knowledge in this setting. We also have a Seminar Series that is held each Thursday from 1:30-3:30. During portions of the year some of this time is spent on lectures but generally the time is spent on Literature Review, Research Seminars (presented by trainees as well as faculty and outside guests) and Clinical and Pathology Conferences. We require participation of residents/graduate students in teaching of classes and seminars. We provide faculty evaluation of their presentations using standardized evaluation forms and immediate feedback.

Instructional Effectiveness

Students and faculty are encouraged to use these evaluation forms for all classes and formal lectures. Course directors and rotation mentors also have an open discussion with students asking for frank assessment of the effectiveness of the course and areas for improvement. This has been surprisingly successful, especially when coupled with the anonymous standardized instruction evaluation forms. For example, at the completion of the most recently held CMED course (Biology and Diseases of Laboratory Animals) the students advised the course directors that handouts of the lectures would be helpful prior to class. This was accommodated in the next quarter's continuation of the course series as we found, upon assessment of the student's performance on the final exam, that the problem based learning method was not the most effective for this particular group of students. Students lacked willing participation in the problems presented in class, so in addition to providing handouts, problem based learning sets are now assigned as group homework to be reviewed in class. In response to the course director's evaluation and the students input, we have increased the ratio of material presented by the didactic rather than problem based learning method within the confines of the classroom time. These on-going improvements to increase the effectiveness of our teaching are tailored for

the particular student learning style. The majority of our former trainees and students have successfully achieved specialty board certification or advanced degrees or have been employed by knowledge-based organizations. By this measure, we can say with little doubt that our combination of formal coursework, rotations and one-on-one mentoring is highly effective in training the next generation of veterinary scientists.

Teaching and Mentoring Outside the Classroom

Activities in this category involve either interactions with our trainees or interactions with the university/scientific community as a whole. Most of our training and mentoring, whether it be clinical or research oriented, occurs outside of the classroom and is one-to-one.
Research mentoring, by its nature, involves working on a project within the lab of the research mentor. We encourage students seeking advanced degrees to identify a mentor early in their tenure here to ensure adequate time to complete their project along with fulfilling residency and board requirements.
Mentoring in clinical veterinary medicine or pathology tends to be more group mentoring although during the first 6 months individuals tend to align with primary mentors. We don't strictly assign mentors because we feel that it is important for some level of comfort to develop between mentors and trainees prior to assignment. Much of the work that laboratory animal veterinarians do can be emotionally charged and trainees need to have the ability to share some of their concerns with one whom they feel they can communicate with and trust. Allowing some flexibility in this regard has proven effective.

The DCM exists within the UW and the SOM because it has unique expertise to offer. This expertise can take many forms but directly or indirectly involves the use of animals or animal-based systems in research and teaching. One of the ways in which faculty and staff contribute is to offer specialized workshops or seminars with relevance to the medical/biology research community as a whole. Some of these are continuing efforts and others are individual or periodic. Recent examples of each are provided below:

Workshop on Quantitative Microscopy, DCM (Frevert), University of Washington at SLU, Seattle, WA, September, 2009: In this workshop participants received instruction and hands on training of the theories behind the use of stereology and image analysis to accurately measure specific histological and/or histopathological features in an organ.

9th Annual Workshop on the Pathology of Mouse Models for Human Disease, DCM (Treuting), University of Washington and Jackson Laboratory. To be held September, 2010 at SLU: Pathologic assessment of mice as models of human disease.

2010 ISCRM Symposium – Stem Cells-Translation to the Clinic (yearly event co-organized by C. Ware, a DCM Professor), University of Washington, January 8, 2010 at SLU.

Animal Use Training Program (in collaboration with Office of Animal Welfare): A continuing series of animal use training sessions for UW researchers as well as research groups from the private sector in the Seattle area. See http://depts.washington.edu/auts/.

Deeb Endowed Lecture Series in Comparative Medicine – (Iritani) A university wide lecture that is held approximately every year since 2007. Nobel laureate Peter Doherty will speak this spring. Previous speakers include Drs. Jerold Ward, Richard Palmiter and Tilahun Yilma.

"Everything You Ever Wanted to Know About Mice and Then Some" A community wide all-day scientific presentation held approximately every 3 years to provide attendees instruction on the basic nomenclature, biology and reproductive physiology of mice. Presented by Dr. Kate Corning-Pritchett, Affiliate Assistant Professor DCM, Director, Charles River.

Because of the close one-to-one interaction we have with our residents/trainees there is a high likelihood of successful completion of the program. Faculty and staff within the DCM consider that one of our main goals is to serve as good role models. Our faculty work long hours meeting their clinical and academic responsibilities in a professional manner – this includes dealing with emergencies, deadlines and unexpected outcomes. Trainees, from day one, are expected to do the same and they typically do. In the past 10 years we have not had to dismiss a trainee for any reason. Formal reviews are held yearly and suggestions made for improvement when necessary. Approximately 6 months prior to leaving the program we work with trainees to prepare them for job interviews. Because of the high demand for our graduates there tend to be multiple opportunities for students.

C. Plans for Improvement

The future academic direction of DCM is inextricably tied to its central goal of facilitating and advancing animal-based medical research for the benefit of humans and animals. As such our ultimate responsibility will be to maintain and enhance our service mission. However like our physician counterparts whose foremost goal is to provide support and service to their patients while advancing medical science we also must maintain and enhance our academic mission. While multiple challenges await the Department we are in a phase of development which calls for maturation and adaptation to a changing biomedical landscape rather than radical change. This involves facing challenges and converting some of them into opportunities. Perhaps the clearest way to define where we are headed is to define goals – some major, some minor. Sometimes these goals are inseparable from challenges or opportunities and sometimes individual goals overlap but that is not an unusual situation. Our goals are to:

Increase Graduate Training Opportunities: The research community has steadily increased its use of highly complex animal models many of which involve skilled veterinary medical support such as using surgical models or requiring specific pathology expertise. In order to meet this trend, we must supply additional appropriately trained veterinarians. Therefore our immediate goal, initiated in early 2010, is to increase the numbers of resident training slots and hence numbers of MS candidates (it is required that residents without an advanced degree matriculate for an MS or other degree). We will also encourage non-DVM students to consider our MS program. This has traditionally been a challenge because of our lack of visibility but we are attempting to counter this by encouraging those familiar with the program, such as technicians, hourly students nearing graduation and others with links to the Department to make application. Another possibility for expanding graduate training opportunities is to consider establishment of a PhD program – this is addressed in the next goal.

Define Need and Approach for Potential PhD Program: In growing our research program it would be advantageous to be able to award the PhD degree. Embarking on this path is not a decision that is easily made but should be seriously considered. We have determined that if DCM is to compete in the future for a research training program and, more importantly, if we are to attract faculty who wish to train PhD students by routes other than the current MCB interdisciplinary PhD program, we must develop a plan for either a stand-alone PhD program or work with a partner or partners to develop a comparative biomedical based interdisciplinary PhD program. This conclusion has only recently been determined so significant strategizing and planning remains. However one scenario might be to partner with the WaNPRC and other potential regional entities to offer an interdisciplinary program in comparative biology and medicine relevant to emerging needs in translational medicine (preclinical development) and other areas dependent upon examining similarities and differences between animals and humans. We have some experience in collaborating with WSU in PhD training and expansion of this interaction might also be considered. Because of the complexity and importance of this decision we will develop a group of faculty from within and outside the DCM to 1.) make a thoughtful decision on the practicality of such an approach and 2.) either dismiss it or advance it to a planning phase.

Solidify and Expand the DCM Research Base: The DCM at the UW is recognized by peer institutions as being one of a few Departments of Comparative Medicine (embedded with a medical school) that has a significant research program. We want to maintain and expand its reputation in this regard. It is part of our academic mission to advance our research activities and we hope to expand them in an orderly manner. Several faculty have developed significant research programs in spite of the fact that they must split their time with heavy service commitments. A goal is to be able to provide the opportunity for some of these faculty or new faculty to devote the majority (70-80% or more) of their time to research and research mentoring. Leveraging efforts by expanding the scope of interactions to include institutions or private entities outside of UW may help but must be developed from the bottom up. The impact of developing a PhD program on expanding the research base also needs to be evaluated. In addition a critical element to increasing our research effectiveness is to find additional suitable space – the topic of the next goal.

Identify New and/or Additional Space for DCM Faculty and Faculty Research Efforts: If we are to maintain, let alone expand, our academic (or clinical) mission we must identify additional, suitable space. The core space assigned to DCM for faculty, trainee and staff offices and operations and research laboratories is on the first floor of the T-wing. It is old, poorly ventilated with marginal electrical power capacity and both labs and offices are crowded with no additional capacity available. Without adequate space retention of talented individuals, let alone expansion of faculty research, training programs and supporting staff is not feasible. Opportunities may become available associated with a proposed expansion of SLU and we must be prepared, with the support of the SOM and UW leadership, to take advantage of this excellent opportunity.

Develop a Master Plan for UW Animal Resources and Cost Structure: As indicated at the beginning of this section 'the future academic direction of DCM is inextricably tied to its central goal of facilitating and advancing animal-based medical research for the benefit of humans and

animals'. As the UW and SOM continue to grow and expand the complexity of this expansion exceeds the capacity of a single organization (DCM) to anticipate and plan for it. While this animal facilities issue is not directly tied to the academic program of DCM it does impact it much like expanding a hospital (e.g. adding additional beds, surgical or diagnostic centers, etc.) would impact training and academic development in a teaching hospital. Furthermore since DCM is responsible for all animal health issues within the UW system there needs to be an understanding of potential future directions for growth or emphasis that extends beyond the SOM. Without some cohesive understanding of projected growth, emphasis and timing DCM is left to plan, to some degree, in the dark. To counter this it has been proposed that an Animal Resources Master Plan be developed in collaboration with UW Capital Projects, representatives from DCM, SOM and other interested parties (to be identified). This proposal is currently being advanced for funding consideration and we should know its fate shortly.

Related to this is the growing expense of maintaining animals for research. This is complicated not only by the growing complexity of regulations, which inevitably drive expenses up, but also labor issues (benefits costs, unionization, etc.) other unfunded mandates and animal housing issues. There is limited capacity of investigative groups to continue to afford the cost of maintaining animals. Once again while this is not directly an academic issue it never-the-less has a huge impact on our academic mission considering that approximately 80% of the DCM budget is derived from per diem expenses and these animals, much like humans in a teaching hospital, are the focus of our training and research effort. Because of this we are developing, internally, methods for monitoring facility efficiencies and cost containment but this topic reaches beyond that and should be part of the proposed UW Animal Resources Master Plan as well.

Evaluate Departmental Structure and Staffing: The DCM is currently staffed with a mature faculty. Several of these faculty are likely to relinquish leadership positions and/or partially or completely retire within the next 5 years. While presenting a challenge it also provides an opportunity for assessment and planning. In addition the field of comparative medicine, like other areas of biology and medicine, is also changing and maturing. The added complexity of the field is driving more specialization and focus. It is rapidly becoming impossible, at least as a promotion-dependent faculty member in an academic environment, to thrive by being the equivalent of a 'general practitioner' of laboratory animal medicine or pathology. These and other changes may eventually drive the need to change the departmental structure, alter hiring and appointment practices, or stimulate other changes. Evaluation should not stop with the faculty organization. The added challenges of facility design, operations and finances should also be considered as part of a department-wide structural assessment. The conclusion may be that no significant change is necessary but this should be an active and not a passive decision. An ideal time to consider these changes comes at a time of impending leadership change, near retirement or re-assignment of faculty effort. Obviously this exercise would need the support of the SOM and Provost for it to have translatable meaning. The goal should be to answer a fairly simple question – Do we have an organizational structure that optimally supports and guides the operation and growth of the DCM for the next 10 years?

Establish or Fortify Regional Interactions and Affiliations: Within the Pacific Northwest there has been a growing presence of expertise and interest in issues that can broadly be placed

in the area of comparative medicine. This includes the presence of comparative scientists, many of whom are veterinarians, in the private as well as public sectors. For instance 20 years ago when the author of this report arrived at the UWDCM as veterinary pathologist he was one of 2 pathologists working in the field of laboratory animal pathology in the Seattle region. Currently within the Seattle area there are more than 20 laboratory animal pathologists (most of these in the private sector) and the growth is even more dramatic with clinical laboratory animal veterinarians. In addition programs (non-laboratory animal related but comparative in nature) within WSU and the University of Alaska (UA) have also flourished. We have been able to establish some collaborative interactions with colleagues within the Seattle area (and have trained many of them) and beyond. By establishing or fortifying interactions with regional groups we can leverage the talent and interests of a diverse group of scientists both veterinarians and non-veterinarians.

Enhancing local and regional interactions also promotes the concept of translational medicine. One of the drivers for the influx of laboratory animal oriented biologists, veterinary clinicians and pathologists into the area is due to the rise of biotechnology companies who depend upon these individuals for pre-clinical development efforts. Closer interactions with these groups can provide significant training opportunities, research funding and, ultimately, jobs. We have current interactions with scientists from Amgen, Applied Precision, Zymogenetics and non-profit organizations including FHCRC, Virginia Mason, Allen Brain Institute and Institute for Systems Biology, PNNL and others. Our goal will be to strategically expand our regional interactions by developing collaborative projects that enhance training and research.

Website - For additional information and a detailed look at DCM please refer to our website: http://depts.washington.edu/compmed/index

Number of instructional faculty and students enrolled over last three years. (12 mo. Enrollments)

	2006-2007	2007-2008	2008-2009	Total (3 years)
FTE Instructional Faculty*	2.0	2.0	1	5
FTE Graduate Teaching Assistants	0	0	0	0
Degree Program	MS	MS	MS	MS
Headcount of enrolled students	4	3	2	9
Number of degrees granted**	1	1	1	3

*Based on our small program this number represents an aggregate FTE (0.5/MS student) of activities directly related to MS degree teaching/mentoring (out of 9 total regular FTE faculty). Does not include Animal Use and Training Program staff or activities or mentoring for ACVP or ACLAM board certification.

**During this period we also funded and contributed to the instruction/training of post-DVM graduate training for one MPH student who graduated from the UW School of Public Health and one PhD student who will complete her degree in 2010 from the UW MCB Program. An additional PhD student performed his research within the DCM but in a collaborative program with WSU where he received his PhD.

Appendix E

Appendix E-1 (Animal Use Training Program)

Appendix E-2 (DCM Problem Solving)

Appendix E-3 (Master's Program Requirements & Courses)

Appendix E-4 (CMED Conferences)

Appendix E-5 (Sample - Postdoc Quarterly Activity Report)

Appendix E-6 (Evaluation Forms)

Appendix E-7 (Clerkship Program for Veterinary Students)

Appendix E-8 (Publications – Faculty & Postdocs)

Appendix E-9 (Post-DVM Trainees/Residents)

Academic Review - Department of Comparative Medicine
Animal Use Training Program (in collaboration with Office of Animal Welfare (OAW))

The Animal Use Training Program offers a continuing series of animal use training sessions for University of Washington (UW) researchers, including faculty, research staff, volunteers, visiting scientists as well as research groups from the private sector in the greater Seattle area. Animal use training sessions include the following:

Laws and Regulations Training

Training on the laws and regulations pertinent to the use of vertebrate animals in research, teaching and testing, is offered via a web module with a required exam. To be approved to work with live vertebrate animals at the UW, personnel must have completed the laws and regulations training module (with a score of 100%) within the past 5 years. This requirement applies to personnel working at all facilities (Washington National Primate Research Center (WaNPRC), Department of Comparative Medicine (DCM) centralized and decentralized locations), at field stations or other field locations, etc., on any UW Institutional Animal Care and Use (IACUC) protocol. The requirement also applies to WaNPRC and DCM animal technicians.

The training covers many topics. Chapters include, among others:

> ***Alternatives*** - This chapter provides links to numerous web sites for help with alternatives and database searches. In particular the chapter also covers the 3 R's as described by Russell and Burch:
>
> - replacement - replacing animals with non-animal alternatives or less sentient species
> - reduction - limiting or minimizing the number of animals used
> - refinement - limiting or minimizing animal pain and distress
>
> ***Avoiding Unnecessary Duplication*** - This chapter provides information and a link to a web site for additional information and help on this topic.
>
> ***Misuse/Mistreatment of Animals, or Non-Compliance*** - This chapter provides training on how to report deficiencies in animal care and treatment, and on the rights of persons making reports.
>
> ***Federal Mandates*** - This chapter provides information on the Animal Welfare Act and PHS Policy, including links to web sites for further information.

In the last calendar year, **1218** people have taken and passed the UW Laws and Regulations web module exam. In 2008, **1342** people completed this course and passed the exam.

Species Specific Laboratories (e.g., Mouse, Rabbit, Rat)

The Animal Use Training Program offers a series of two-hour web/lab sessions on mice and rats. The first part of the course is completed via a web module, with exam, and is a prerequisite for attending the accompanying laboratory session. The laboratory sessions feature hands-on instruction and detailed handouts are also provided. Course content includes:

- the basic needs of the species

- proper techniques for humane handling, care and restraint including recognition of normal and abnormal physical and behavioral changes, gender determination, blood vessel access and administration of medication
- proper pre-procedural and post-procedural care
- discussion of appropriate methods of anesthesia, analgesia, euthanasia and aseptic techniques necessary for survival surgery

Species-specific laboratory sessions are offered multiple times per month for mice and rats. For example, in the last calendar year, there were approximately **56 mouse labs** and **24 rat labs**. For species such as rabbits, pigs, dogs and frogs, 2-hour in-person sessions are offered on an "as-needed basis".

In the last calendar year, **499** people participated in the mouse and rat species-specific training web module and exam. There were **299** individuals that attended the mouse wet lab session and **81** individuals that attended the rat wet lab session.

Specific Pathogen Free Procedures Training

The Specific Pathogen Free (SPF) Procedures training is designed to provide personnel with the knowledge necessary to work within DCM SPF animal facilities housing rodents. As such, it is required for rodent users who house animals in DCM vivaria. It is required prior to initial entry authorization and it must be repeated annually for continued access. This course is offered via a web module with a required exam.

The first time an individual takes the SPF procedures course it is followed by a facility orientation to the particular facility in which the individual will work.

In the last calendar year, **1306** people have taken and passed the online Specific Pathogen Free (SPF) Procedures web module exam.

Facility Orientation

A facility orientation is a prerequisite for proximity card activation to any DCM vivarium. Sessions are held inside the vivarium and provide personnel with instruction on the proper facility and animal room entry procedures, as well as the location of important resources. All personnel (rodent and non-rodent users) must complete the orientation one time for each animal facility to which they need access. Separate sessions are offered for the various vivaria.

In the last calendar year, approximately **84** individuals completed the 6th floor facility orientation, **108** completed the Brotman facility orientation, **168** individuals completed the Foege facility orientation, **36** individuals completed the HR&T facility orientation, **72** individuals completed the K-wing facility orientation and **48** individuals completed the T-wing facility orientation.

Animal Biosafety Level 2 and 3 Facility Orientation

This course is required of all personnel working in an Animal Biosafety Level 2 or 3 (ABSL-2, ABSL-3) DCM facility. The session covers procedures for entering the facility, entering the animal rooms, and working within the facility. Regulations and safety precautions relating to the facility are covered.

In the last calendar year, **72** people completed the ABSL-2 course and **12** people completed the ABSL-3 course.

Decentralized Animal Care and Records Training (for non-aquatic species)

This course is required for individuals who will be providing care for non-aquatic animals (e.g., mice, rats, birds) that are not housed in DCM Centralized facilities. Training is provided on the basic requirements for maintaining animals and providing daily care for them. The session includes instruction on husbandry, records requirements, and sick animal reporting requirements and procedures. Standardized daily care logs and other forms are provided. All personnel providing primary care for non-aquatic animals in DCM Decentralized facilities are required to complete this session.

In the last calendar year, **108** people completed this course.

Decentralized Sick Rodent Recognition

This course, in addition to the Decentralized Animal Care and Records course, is required for individuals who will be providing care for rodent species that are not housed in DCM Centralized facilities. Training is provided on the recognition of pain, illness, and injury in rodent species. The course provides detailed examples and discussion of commonly occurring rodent injuries and illnesses. Attendees learn techniques for evaluation of pain and illness in rodent species and they are instructed on the procedures for reporting sick animals to veterinary services.

In calendar year 2009, **108** people completed this course.

Decentralized Aquatics Training

This course provides training on the basic requirements for maintaining aquatic animals and providing daily care for them. The session includes instruction on husbandry, records requirements, and sick animal reporting requirements and procedures. Standardized daily care logs and other forms are provided. This course also covers sick animal recognition and evaluation of pain, illness, and injury in aquatic species. All personnel providing primary care for aquatic animals in DCM Decentralized facilities are required to complete this session.

In calendar year 2009, **60** people completed this course.

Surgery I

Surgery I is the first session of a two-part series designed to provide instruction on the basic tenets of surgical techniques in research animals. Attendees learn proper operating room conduct including preparation of the animal, preparation of the surgical personnel, and handling of instruments and equipment. A foundation of knowledge on anesthesia, analgesia, and surgical monitoring is provided. Use of aseptic technique is stressed, and discussion of surgical pack preparation and instrument sterilization methods is included. The session includes a hands-on lab providing attendees the opportunity to practice the techniques learned in the class.

In the last calendar year, approximately **48** people completed this course.

Surgery II

Surgery II is the second part of the surgery training series. This session expands on the knowledge of aseptic technique learned in Surgery I and puts it into practice. Attendees learn to identify and handle a variety of surgical instruments and also learn about wound closure materials (sutures, staples, etc.). Students learn the advantages and disadvantages of various closure techniques, including practice of a variety of suture patterns and knots. Emphasis is placed on proper use of the various techniques for achieving homeostasis. The session includes a hands-on lab giving attendees the opportunity to practice incisions, dissection, and closure techniques.

In the last calendar year, approximately **50** people completed this course.

Certifications

Certification is required for certain procedures such as orbital bleeding and injections, euthanasia by cervical dislocation in rodents, and other physical forms of euthanasia such as penetrating captive bolt and decapitation (depending on the animal's age and whether the animal is anesthetized). The determination of which procedures require certification is based on humane concerns that the animals not be unduly stressed or frightened. Aspects of human emotion are also considered. Certifications are offered during regular species-specific classes, or by appointment with the Instructor or a designee of the Attending Veterinarian.

In the last calendar year, approximately **502** people were certified for certain procedures such as physical methods of euthanasia, orbital bleeding or injection techniques.

Individual Instruction

Individual instruction is provided to animal technicians and researchers in a variety of situations. In some cases, instruction in a particular technique may be requested by the researcher. In other cases, the Veterinary Services unit may identify a situation in need of individual instruction as a result of their surveillance of the animal colony.

Study-Specific Training

For all species, investigators also train their personnel for study-specific procedures. Instruction can also be provided by Veterinary Services at the Principal Investigator's request. Investigators can also contact the IACUC staff for help identifying other experts at the University who can provide assistance or training for specific procedures.

SOLVING PROBLEMS WITH DCM CO-WORKERS

- First attempt to solve the problem yourself.
- If you can't solve the problem, take it to your supervisor with suggested solutions.
- If you can't resolve the problem with your supervisor, agree with him or her on a clear definition of the problem and take it to his or her supervisor with suggested solutions.
- It is all right to seek the advice of others in solving problems but complaining horizontally to your peers and others in the organization, will not solve the problem. It will only undermine your effectiveness and the effectiveness of the organization as a whole. Take the problem and proposed solutions to the person who can help you solve it.

UW REQUIREMENTS FOR MASTER'S DEGREE

http://www.grad.washington.edu/policies/masters/requirements.shtml

Master's Degree Requirements

A student must satisfy the requirements for the degree that are in force at the time the degree is to be awarded.

1. At least 36 credits must be completed.
   - All courses numbered 400-799 that are numerically graded 2.7 and above, or have a grade of Satisfactory or Credit ('S' or 'CR') count toward the 36 credit total. 498 'Special Topics' and 499 are not counted in the 36 credit total.
   - Courses graded less than 2.7 do not count towards the 36 credit total.
   - At least 18 credits must be in courses numbered 500 and above.
   - 18 credits must be numerically graded in department approved 400-level courses accepted as part of the major and in 500-level courses. This excludes 498 and 499 and transfer credits.
   - No more than 6 graduate level quarter credits can be transferred from other academic institutions to count toward the 36 credit total.
   - No more than 12 UW Graduate Non-matriculated credits can be applied to the 36 credit total.
   - No more than 12 credits derived from any combination of UW Graduate Non-matriculated credits and transfer credits can be applied to the 36 credit total.
   - If a student repeats a non-repeatable class, only one set of credits counts toward the 36 credit total.

2. A minimum cumulative GPA (grade point average) of 3.00 is required for a graduate degree at the University.

3. The Master's Degree Request must be filed.
   - If the Master's Degree Request is filed during weeks ten and eleven it is not accepted. The system is closed.
   - In summer quarter, the Master's Degree Request is filed in weeks eight and nine is not accepted. The system is closed.

4. Must complete all degree requirements within six years.
   - The timeframe/clock begins on the first day of the quarter that the Graduate Student uses a course to satisfy degree requirements when he/she is coded as either a Graduate Non-Matriculated student (Department Code with class 6) or as a Graduate Student (Department code with class 8) in the department to which he/she is admitted.
   - UW Graduate Non-matriculated credits used towards the 36 course credit total are counted in the six years.
   - Quarters spent On-Leave and out of status are counted in the six years.

5. Must maintain registration through the end of the quarter in which the degree is conferred or, if eligible, pay the Graduate Registration Waiver Fee within 14 days following the last day of the quarter in which all degree requirements were met.

6. Thesis track students are required to take a minimum of 9 thesis credits in their 36 credit total.

7. Thesis Track students are required to submit two copies of an acceptably formatted thesis to the Graduate School by 5 pm on the last day of the quarter.

CMED REQUIREMENTS

DVM TRAINEES:

Required Rotations/Coursework

The following may be taken for graded credit for those post-docs interested in obtaining an advance degree and account for 13 of the 18 UW-required graded credits. Additional graded credits may be obtained via CMED electives or coursework in other departments.

a) CMED 520/521 and 530/531 Veterinary Services/ Medicine Rotation and Course (4 credit hours) BRABB; 520/530 offered Fall Quarter
b) CMED 590 Selected Topics: Regulatory Medicine Course (2 credit hours) IRITANI; offered Winter Quarter
c) CMED 512 Pathology Rotation (2 credit hours) TREUTING
d) CMED 514 Research Updates (credits TBD) IRITANI
e) BIOST 511 Course (4 credit hours) or equivalent
f) CMED 590 Selected Topics RHMP (1 credit hour) DOWLING

Electives

g) CMED 540 Animal Models (1 credit hour each)
    i. Transgenics Rotation WARE
    ii. Primate Center Rotation KELLY
h) CMED 590 Selected Topics (2 credit hours each) by permission of instructor
    i. AFIP weekly sessions
    ii. Research lab rotations
    iii. Manuscript preparation and publication
    iv. Special topics on individual basis
    v. Repeat of any of the above required rotation

NON-DVM TRAINEE GRADUATE STUDENTS

The following may be taken for graded credit for those graduate students interested in obtaining an advance degree and account for 10 of the 18 UW-required graded credits. Additional graded credits must be obtained via graded coursework in other departments.

a) CMED 520/521 and 530/531 Veterinary Services/ Medicine Course (4 credit hours) BRABB; 520/530 offered Fall Quarter
b) CMED 590 Selected Topics: Regulatory Medicine Course (2 credit hours) IRITANI; offered Winter Quarter 2006
c) CMED 514 Research Updates (credits TBD) IRITANI
d) BIOST 511 Course (4 credit hours) or equivalent

Electives

e) CMED 590 Selected Topics (2 credit hours each) by permission of instructor
    i. AFIP weekly sessions
    ii. Research lab rotations
    iii. Manuscript preparation and publication
    iv. Special topics on individual basis

CMED 520/521 and CMED 530/531: Biology and Diseases of Laboratory Animal Medicine

Goals:

1. Be familiar with the biology of:
    a. primary species (mice, rats, rabbits)
    b. secondary species (gerbils, hamsters, ferrets, Xenopus, zebrafish, chickens, and pigeons)
    c. review special breeds or unusual diseases in common species (dog, pig, cat, sheep and goats)

2. Be able to provide appropriate differentials diagnosis lists, appropriate diagnostics and treatment plans for common/important/zoonotic diseases in the primary and secondary species.

Required reading:

1. Biology chapters from the following:
   CRC Press Series: The Laboratory Mouse, The Laboratory Rat, The Laboratory Hamster and Gerbil, The Laboratory Guinea Pig, The Laboratory Rabbit, The Laboratory Swine

2. Chapters 3, 4, 5, 6, 7, 9, and 13 in Laboratory Animal Medicine, Fox, J.G., L.C. Anderson, F.M.Loew, F.W. Quimby. Academic Press. 2002.

3. Percy and Barthold, Pathology of Laboratory Animals – with an emphasis on the differential diagnoses outlined for each species and condition. Pathology will be covered in a different course.

4. Schultz, T.W. and D. A. Dawson. 2003. Housing and husbandry of Xenopus for oocyte production. Lab Animal 32 (2):34.

5. Casebolt, D.B., D. J. Speare, and B. S. Horney. 1998. Care and use of fish as laboratory animals: current state of knowledge. LAS 48(2):124.

Participate in daily clinical care of above species with discussion of various clinical issues at rounds.

Participate in one quarter of biology/diseases didactic classes (1hrs/week) focused on the common diseases of primary and secondary species including rodents, rabbits, fish and amphibians.

Grading for NIH Trainees (4 graded credits):

1. Case Report (s) either (25%):
    a. one oral case report and one publication
    b. two oral case reports
2. Exams (15%) written exam at end of the quarters covering biology and medicine of lab animals with an emphasis on rats, mice and rabbits.
3. VS rotation (50%)
4. Didactic class participation (10%)

Grading for Graduate Students (4 graded credits):

1. Research presentation (25%)
2. Lab animal medicine problem/topic presentation (25%)
3. Class participation (25%)
4. Exams (25%)

CMED 512 Pathology Rotation

GRADE: 25% Present case(s) during Thursday conference at end of rotation
25% Attendance, daily performance- see requirements below
50% Exam based primarily on the text and lectures and practical in tissue identification.

TEXT: Pathology of Laboratory Rodents & Rabbits by Percy and Barthold

REQUIREMENTS/GOALS:

Non- pathology track:

Become proficient at a rodent necropsy
After the first month of training, take over necropsy duty with supervision from the duty pathologist
Be able to describe gross findings so that other professionals would understand
Write gross reports, morphological descriptions
Properly sample tissues
Become familiar with the details and timing of trimming, embedding, sectioning, staining

Pathology track:

All of the above plus
Become proficient at necropsy regardless of species
Write histological descriptions, diagnoses for cases assigned
Attend AFIP sessions
Present CMED Thursday path conferences 1 X per quarter, if available

CMED 540 Animal Models/Transgenics – 1 credit

The post-doc assigned to Transgenic Resources for the quarter will observe the daily activity of the facility by working/viewing with the facility personnel during embryo collection, injection and transfer. In addition, familiarity with husbandry issues unique to transgenics should be attained. However, the extent that these techniques are explored and absorbed will depend on individual goals. Credit will be given following the presentation of a paper selected for transgenic interest; such as, novel transgenic technique, research relevant to early embryology or research relevant to ES cell culture. This literature review will be presented to the Transgenic Resources personnel. Consequently, it should add to the knowledge base and be explained at a level appropriate to the audience. The grade will be given based on the choice of the paper for presentation, apparent understanding of the material being presented and ability to transmit this understanding.

CMED 590 Selected Topics RHMP- 1 credit

Goals, objectives and grading to be determined.
Rotation in conjunction with IACUC.

CMED 590 Animal Care and Use Regulations in Biomedical Research

Goals: The goals of this Course are to familiarize the veterinary fellows with the U.S. Government and the University of Washington's regulations regarding the utilization of vertebrate animals in research, teaching and testing. The fellows should have a basic understanding of:

- the governing bodies – Office of Lab Animal Welfare (OLAW), U.S.D.A.
- the key components of an animal care and use program
- Institutional Animal Care and Use Committee (IACUC) functions
- Animal care and use protocols: how they are reviewed and monitored
- the roles of the Attending Veterinarian
- what constitutes adequate veterinary care
- personnel qualifications and training
- occupational health and safety issues
- what constitutes adequate animal housing and management
- AAALAC and their functions
- enviromental enrichment issues
- what is reportable to OLAW, USDA, and AAALAC

Grading: 50% participation in class and discussions
50% final exam

Resources:

- The Guide for the Care and Use of Laboratory Animals, NRC press
- Animal Welfare Act and Animal Welfare Regulations, USDA and APHIS, 2002
- Public Health Policy on Humane Care and Use of Laboratory Animals, OLAW-NIH, 2002
- Institutional Animal Care and Use Committee Guidebook, ARENA and OLAW, 2002
- 2000 Report of the AVMA Panel on Euthanasia

Course Directors:

- Brian Iritani, D.V.M., Ph.D.
  - Office: T-146 HSB
  - Phone: 221-3932

- Nona Phillips, Ph.D.
  - Office: T-252
  - Phone: 543-3818

"Animal Care and Use Regulations in Biomedical Research"
Tuesdays at 2:30-3:20 & Thursdays at 3:30-4:20
Room T-149
(Approximately 5-10 Post-graduate Veterinary Fellows)

		Dates
(1)	**History and overview of animal use regulations:** Cindy Pekow	3/29
(2)	**Key components of an Animal Care Program:** Mel Dennis • Attending Veterinarian Role: Mel Dennis • When and how to stop a protocol	3/31
(3)	**How do you review a protocol?** Nona Phillips • Designated versus full-committee review • Handling Significant Changes	4/5
(4)	**How to effectively run an IACUC:** Susanna Cunningham • What constitutes an effective Institutional official - • How to Handle Challenging PIs - Susanna Cunningham • IACUC Responses to non-compliances	4/7
(5)	**Example protocol review discussion:** Nona Phillips, Kari Koszdin, &/or Virginia Batterson	4/12
(6)	**Protocol monitoring and humane endpoints:** Brian Iritani	4/14
(7)	**Personnel qualifications and training:** Kelli Robson/Cindy Pekow	4/19
(8)	**Example protocol review discussion:** Nona Phillips, Kari Koszdin, &/or Virginia Batterson	4/21
(9)	**Biosafety issues in research facilities:** Bruce Whitney	4/26
(10)	**Lab safety issues in research facilities:** Stuart Cordts	4/28
(11)	**What is AAALAC and what do we do? -** Steve Kelley	5/3
(12)	**Challenges of running an IACUC in industry:** Sally Thompson Iritani	5/5
(13)	**Effective environmental enrichment of non-human primates and other species:** Carolyn Crockett and Brian Iritani	5/10
(14)	**Specific regulations regarding utilization of non-human primates in biomedical research:** Steve Kelley	5/12
(15)	**Judgment Calls: Decisions regarding clinical judgments and unexpected outcomes:** Thea Brabb, Amy Louton and Vet Services	5/17
(16)	**What is reportable to OLAW, AAALAC, and USDA?** Mel Dennis & Nona Phillips	5/19
(17)	**Semiannual program and facilities review:** Nona Phillips and Brian Iritani	5/24
(18)	**Occupational Health Program:** JoAnn Kauffman	5/26
(19)	**Public information: How do we stay ahead of the game?** Susan Adler	5/31
(20)	**Open**	6/2
(21)	**Finals**	6/9

Department of Comparative Medicine
Fall Quarter 2010
C MED 592
Selected Topics: Comparative Pathology for Scientists

Time/Location: Monday and Wednesdays from 3:30 PM to 5:00 PM in T***
Course Director: Charles W. Frevert, DVM, ScD (Office hours by appointment)
Piper M. Treuting, DVM, MS, DACVP

COURSE FACULTY (proposed)

Name	Institution
Thea Brabb, DVM, PhD	University of Washington
Suzie Dintzis, MD, PhD	University of Washington
Charles Frevert, DVM, ScD	University of Washington
Christopher Jerome B.Vet.Med., Ph.D.	Think Bone Consulting
Brian Iritani DVM, PhD	University of Washington
Sue Knoblaugh, DVM	FHCRC
Diana Jordan, MD	University of Washington
Denny Liggitt, DVM, PhD	University of Washington
Lillian Maggio-Price, DVM, PhD	University of Washington
Joel Pounds, PhD	PNNL[1], Richland, WA
Piper Treuting, DVM, MS	University of Washington
Kim Waggie, DVM, PhD	Zymogenetics, Seattle, WA
Ida Washington, DVM, PhD	University of Washington

[1]Pacific Northwest National Laboratory

COURSE PURPOSE

CMED 592 provides students with an introduction to comparative histology and pathology as it applies to development of mouse models of human disease. This course introduces students to comparisons of the histology of the major organs systems in mice and humans and will provide an introduction to histopathology. Not all organ systems will be covered in each class with different systems emphasized in following classes. Classes will concentrate on histological similarities or differences between mice and humans but will cover relevant elements of physiology, pathophysiology and pathological changes in major organ systems. In addition, students will receive a background in the use of genomics, proteomics, and metabolomics in animal studies, and important species differences that need to be taken into consideration for translational research. To insure subject matter expertise, the faculty is composed of veterinary and guest human pathologists and basic scientists from academia, industry, and national laboratories.

COURSE LEARNING OBJECTES

At the completion of the course it is expected that the student should:

- Know what samples to take and the proper techniques for sample collection during the course of a study and at necropsy.
- Have a basic understanding of the comparative histology of major organs in mice and humans. More important, the student will have a solid understanding on how these two species differ.

- Have a basic understanding on the use of genomics, proteomics, and metabolomics in animal studies and how to apply this to translational research. This includes understanding the limitations of Omics, the considerations for study design when using Omics, and the appropriate ways to analyze data collected from animals studies.
- Understand the limitations of animal models as a tool to study human disease.

COURSE REQUIREMENTS

Pre-requisites: It is expected that students will have a basic understanding of anatomy and physiology prior to taking this class.

Recommended Text:

1. Kumar, V., A. K. Abbas, N. Fausto, S. L. Robbins, and R. S. Cotran. 2005. *Robbins and Cotran pathologic basis of disease*. Elsevier Saunders, Philadelphia.
2. Percy, D. H., and S. W. Barthold. 2007. *Pathology of laboratory rodents and rabbits*. Blackwell Pub., Ames, Iowa.

In addition, for each organ system the faculty member may recommend specific references, books, or resources related to their lecture.

Attendance: Because this is taught as a problem-based learning (PBL) course attendance and participation is important.

Assignments: 3 take home problem sets.

GRADING

Determination off Student Grades
Students will be graded on the following: 1) Participation in class, 2) Three take home problem sets, and 3) Final Exam – Take home problem set.

Grade Weighting

1. Class Participation: 20%
2. Take home problem sets: 60%
3. Take home final exam: 20%

Course Grading Criteria (Grading scale 0 to 4)

3.9 - 4.0	Superior performance in all aspects of the course with work exemplifying the highest quality.
3.5 - 3.8	Superior performance in most aspects of the course; high quality work in the remainder.
3.2 - 3.0	High quality performance in all or most aspects of the course.
2.9 – 2.8	Satisfactory performance in the course
<2.8	Substandard performance in most of the course

Disability Notice. If you would like to request academic accommodations due to a disability, please contact Disabled Student Services, 448 Schmitz, 543-8924 (V/TDD). If you have a letter from Disabled Student Services indicating you have a disability that requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need for class.

CMED 592: Schedule of Lectures (Subject to Change)

Lectures = 1.5 hours each Monday and Wednesday Afternoons from 3:30 to 5:00 PM

Week #1	Fall 2010	**Lecture 1**	Introduction
		Lecture 2	Necropsy Laboratory 1. Necropsy demonstration 2. Proper sample collection
Week #2		**Lecture 3**	Hematopoietic/lymphoid system
		Lecture 4	Nervous System – Central
Week #3		**Lecture 5**	Nervous System - Peripheral
		Lecture 6	Special Senses – Ear and Eye
Week #4		**Lecture 7**	Cutaneous
		Lecture 8	Liver
Week #5		**Lecture 9**	Upper GI
		Lecture 10	Lower GI
Week #6		**Lecture 11**	Pancreas
		Lecture 12	Respiratory
Week #7		**Lecture 13**	Cardiovascular
		Lecture 14	Reproductive System – Male
Week #8		**Lecture 15**	Reproductive System - Female
		Lecture 16	Skeletal
Week #9		**Lecture 17**	Endocrinology/Development/Teratology
		Lecture 18	Mouse phenotyping
Week #10		**Lecture 19**	Proteomics and metabolomics in animal models of human disease
		Lecture 20	Statistical Analysis of “Omics” Data Sets
Week #11		**Final Exam**	**Take home exam**

Department of Comparative Medicine
CMED Conferences
Literature Review, Clinico-Pathologic, Anatomic Pathology & Research
2005-2010

Date	Course/Seminar Title	Instructor/Presenter
1. LITERATURE REVIEW		
Winter Quarter 2010		
2/4/10	CMED 516: Literature Review: *"CD36 ligands promote sterile inflammation through assembly of a Toll-like receptor 4 and 6 heterodimer"*	Chuck Frevert
Autumn Quarter 2009		
10/1/09	CMED 516 - Literature Review: *"Science Discovers: Dogs are Smart! Dogs as the New-Now-It-Model for Evolutionary Social Cognition"*	Catherine Hagan
12/3/09	CMED 516 - Literature Review: *"Differential Expression of Glucose Transporters in Rabbit Placenta: Effect of Hypercholesterolemia in Dams"*	Ida Washington
Spring Quarter 2009		
4/30/09	CMED 516 - Literature Review*: "Therapeutic efficacy of IL-15 combined with ananti-CD40 antibody in murine models of colon cancer"*	Heon Park
5/14/09	CMED 516 - Literature Review: *"MRSA heads up"*	Gerald Van Hoosier
Winter Quarter 2009		
1/8/09	CMED 516 - Literature Review*: "Recent observations on species and strain differences: impact on research"*	Denny Liggitt
1/22/09	MED 516 - Literature Review: *"Monocyte subpopulations and their differentiation patterns during infection"*	Chuck Frevert
2/5/09	CMED 516 - Literature Review: *"Deacetylase Inhibition Elicits an Evolutionarily Conserved Self-Renewal Program in Embryonic Stem Cells"*	Carol Ware
2/5/09	CMED 516 - Literature Review: *"Mechanisms of macrophage activation in obesity-induced insulin resistance"*	Jisun Paik
3/5/09	Literature Review: *"Lifespan extension in genetically modified mice"*	Warren Ladiges
Autumn Quarter 2008		
10/2/09	CMED 516 - Literature Review: *"Cell Reprogramming: Eliminating the Middleman"*	Denise Newsom
10/16/08	CMED 516 - Literature Review: *"Pop! Goes the mouse: Preliminary Evaluation of a New Murine Model for Pelvic Organ Prolapse."*	Maia Chan
10/30/08	CMED 516 - Literature Review*: "Making insulin-deficient type 1 diabetic rodent thrive without insulin"*	Daniel Moralejo
Spring Quarter 2008		
4/10/08	CMED 516 - Literature Review*: "Nanotechnology: The Next Big Thing or Much Ado About Nothing?"*	Denise Newsom
4/24/08	CMED 516 - Literature Review*: "Feed a cold, starve a fever...and cancer: how starvation protects normal but not cancer cells against high-dose chemotherapy"*	Catherine Hagan
5/8/08	CMED 516 - Literature Review: *"Maternal nutrient supplementation counteracts bisphenol A-induced DNA hypomethylation in early development"*	

Department of Comparative Medicine
CMED Conferences
Literature Review, Clinico-Pathologic, Anatomic Pathology & Research
2005-2010

Date	Course/Seminar Title	Instructor/Presenter
5/22/08	CMED 516 - Literature Review: *"The Thrill of Victory and the Agony of Gene Therapy"*	Patrick Hanley
Winter Quarter 2008		
1/24/08	CMED 516 - Literature Review: *"Cytokine Storm" in the Phase I Trial of Monoclonal Antibody TGN1412: Better Understanding the Causes to Improve PreClinical Testing of Immunotherapeutics.*	Denny Liggitt
3/6/08	CMED 516 - Literature Review*: "Food Intake and Body weight in F344 rats with a genetic deletion in the CCK1 receptor gene"*	Daniel Moralejo
Autumn Quarter 2007		
10/4/07	CMED 516 - Literature Review: *Phytoestrogens & TRAMPS*	Molly Lucas
11/8/07	CMED 516 - Literature Review: *"Rabies post-exposure reporting completeness"*	Patrick Hanley
11/29/07	CMED 516 - Literature Review: *"Rabies post-exposure reporting completeness"*	Catherine Hagan
Spring Quarter2007 - No Literature Review		
Winter Quarter 2007		
1/4/07	CMED 516 - Literature Review: *"An Unwelcome Discovery"*	Denny Liggitt
Autumn Quarter 2006		
9/28/06	CMED 516 - Literature Review: *"Canine TVT is Cell Cover Article "The Leading Edge"(?)*	Catherine Hagan
11/2/06	CMED 516 - Literature Review: *"The Canary That Taught an Old Dogma New Trick"*	Tim Myshrall
Spring Quarter 2006		
3/30/06	CMED 516 - Literature Review: *"Pharmacologically Regulated Cell Therapy"*	Karen Chase
4/13/06	CMED 516 - Literature Review: *"Integrated Analysis of Protein Composition, Tissue Diversity, and Gene Regulation in Mouse Mitochondria"*	
4/27/06	CMED 516 - Literature Review: *"From Stem Cells to Viable Autologous Semilunar Heart Valve"*	Molly Lucas
5/4/06	CMED 516 - Literature Review: *"Suspected transmission of methicillin-resistant Staphylococcus aureus between domestic pets and humans in veterinary clinics and in the household".*	Patrick Hanley
5/18/06	CMED 516 - Literature Review: *"Evidence for a Functional Second Thymus in Mice".*	Denny Liggitt
Winter Quarter 2006 - No Literature Review		
Autumn Quarter 2005		
9/22/05	Video and Discussion: *"Wearing Masks - The Potential for Drug Addiction ..."*	Gerald Van Hoosier
9/29/05	CMED 516 - Literature Review: *"Pig stem cells to be used to grow human organs?"*	Barry Rickman
10/13/05	CMED 516 - Literature Review: *"Some stuff about TUFs: Transcripts of unknown function in the genome."*	Catherine Hagan
12/8/05	CMED 516 - Literature Review	Trainees, R. Harrington

Department of Comparative Medicine
CMED Conferences
Literature Review, Clinico-Pathologic, Anatomic Pathology & Research
2005-2010

Date	Course/Seminar Title	Instructor/Presenter

2. CLINICO-PATHOLOGIC CONFERENCE

Winter Quarter 2010

1/28/10	CMED 518: Clinico-Pathologic Conference: *"Opportunistic Streptococcal Infections in Mice"*	Thea Brabb Andrew Burich

Autumn Quarter 2009

10/8/09	CMED 518 - Clinico-Pathologic Conference: *"Ferret Findings and Mouse Mysteries"*	Maia Chan

Spring Quarter 2009

4/2/09	Special Seminar: "Zoonotic Diseases as Bioterrorism Agents"	Natasha Close, MPH WA State Department of Health
4/23/09	CMED 518 - Clinico-Pathologic Conference*: "Dynamic MRI of contrast agent kinetics in atherosclerosis: A window on plaque inflammation?"*	Bill Kerwin Research Associate Professor, Radiology
4/30/09	CMED 518 - Clinico-Pathologic Conference: *"OIs and GEMs: The Perfect Opportunity for Infections"*	Denise Newsom
5/14/09	CMED 518 - Clinico-Pathologic Conference: *"Pharmacokinetics of Intrathecal Drug Delivery"*	Sean Flack Assistant Professor, Anesthesiology
6/4/09	*Special Seminar: "From Cells to Mice to Humans: Bromelain as a Treatment for Colitis"*	Dr. Laura Hale Duke University
6/4/09	*Special Seminar: "Chance Favors the Prepared Mind: Investigations of Alopecia in Mice"*	Dr. Laura Hale Duke University

Winter Quarter 2009

1/15/09	CMED 518 - Clinico-Pathologic Conference: *"Why a SPF campus for rodent housing?"*	Thea Brabb
1/29/09	CMED 518 - Clinico-Pathologic Conference*: "Pig Problems and Other Assorted Cases"*	Maia Chan
2/5/09	CMED 518 - Clinico-Pathologic Conference: *"SLU II: The newest kid in the block"*	Denise Newsom
2/26/09	CMED 518 - Clinico-Pathologic Conference: *"Two Interesting cases: A failure to Detumesce and Interesting Skin Lesions"*	Kathy Roellich (WaNPRC)
3/3/09	Special Seminar: *"Veterinary Ethics"*	Larry Carbone UCSF
3/12/09	Clinico-Pathologic Conference: *"Case of monkey tuberculosis"*	Bob Murnane

Autumn Quarter 2008

9/25/08	CMED 518 - Clinico-Pathologic Conference: *"Blood Gases in Veterinary Medicine: Principles and Interpretation"*	Maia Chan
10/9/08	CMED 518 - Clinico-Pathologic Conference*: "Eosinophilia in the lymphopenic (Gimap5) BB rat"*	Daniel Moralejo
10/23/08	CMED 518 - Clinico-Pathologic Conference: *"Ferret Findings and Mouse Mysteries"*	Denise Newsom
10/23/08	CMED 518 - Clinico-Pathologic Conference: *"MHP clinical cases"*	Annie Torrence

Department of Comparative Medicine
CMED Conferences
Literature Review, Clinico-Pathologic, Anatomic Pathology & Research
2005-2010

Date	Course/Seminar Title	Instructor/Presenter
Spring Quarter 2008		
4/3/08	CMED 518 - Clinico-Pathologic Conference*: "Series of events in the Ossabaw pigs, the four sisters and Kashi"*	Daniel Moralejo
5/15/08	CMED 518 - Clinico-Pathologic Conference*: " Rodent Models of Post-Traumatic Stress Disorder"*	Cindy Pekow
6/5/08	CMED 518 - Clinico-Pathologic Conference: *"Lymphoma in Transgenic Mice"*	Thea Brabb & Andrew Burich
Winter Quarter 2008		
1/22/08	Special Seminar: *"Death-associated protein kinase: a possible regulatory role in secretory activity."*	Andrew Jeffcoat U of Wisconsin, candidate for Clinical Veterinarian Position
1/31/08	Special Seminar: *"Parasites in Laboratory Animals & Research Overview"*	Molly Lucas UW, candidate for Clinical Veterinarian Position
1/31/08	CMED 518 - Clinico-Pathologic Conference: *"Hydrocephalus in the laboratory mouse."*	Ida Washington
2/7/08	Special Seminar*: "Rat clinical case studies at the VA Puget Sound Health Care System."*	Kari Koszdin (VA PSHCS, candidate for Clinical Veterinarian Position
2/14/08	CMED 518 - Clinico-Pathologic Conference: *"Potpourri of laboratory animal clinical cases – ancient history to the present"*	Lillian Price & Joachim Bilancio
2/21/08	Special Seminar*: "Case Discussion and Research Overview"*	Denise Newsom UW, candidate for Clinical Veterinarian Position
2/28/08	CMED 518 - Clinico-Pathologic Conference: *"Playing the strain game"*	Patrick Hanley
3/13/08	Special Seminar – *"Practical mouse breeding and colony management"*	Kate Pritchett-Corning Charles River Laboratories
Autumn Quarter 2007		
10/29/07	*Dr. Barbara Deeb Lecture: "The essential function of AgRP neurons"*	Richard Palmiter Investigator at the HHMI & Professor of Biochemistry
11/1/07	CMED 518 – Clinico-Pathologic Conference: *"Rat Bone Marrow Transplants: Procedural Modifications*	Denise Newsom
11/7/07	CMED 518 – Clinico-Pathologic Conference: *"Rat Bone Marrow Transplants: Procedural Modifications*	Denise Newsom
11/8/07	CMED 518 - Clinico-Pathologic Conference: *"Dystocia in Mice: Treatment and Strategies"*	Ida Washington
12/6/07	CMED 516 - Clinico-Pathologic Conference: *"Primate Pathology Cases"*	Renee Hukkanen & Bob Murnane

Department of Comparative Medicine
CMED Conferences
Literature Review, Clinico-Pathologic, Anatomic Pathology & Research
2005-2010

Date	Course/Seminar Title	Instructor/Presenter
Spring Quarter 2007		
3/29/07	CMED 516 - Clinico-Pathologic Conference*: "Clinical Updates: Pigs and More"*	Karen Chase
5/24/07	CMED 518 - Clinico-Pathologic Conference: *Rectal Prolapse in Plasmingen-deficient mice":*	Ida Washington
Winter Quarter 2007		
1/11/07	CMED 518 - Clinico-Pathologic Conference *"Helicobacter Induced Gastric Carcinoma"*	Barry Rickman
2/22/07	CMED 518 - Clinico-Pathologic Conference: "*Streptozotocin: lesions and reasons"*	Denise Newsom
3/8/07	CMED 518 - Clinico-Pathologic Conference: *"UV Rays: Lesions of Mice and Men"*	Ida Washington
Autumn Quarter 2006		
10/5/06	CMED 518 - Clinico-Pathologic Conference: "*PGC-1-alpha Transcription Interference in Huntington's Disease"*	Annie Torrence
11/9/06	CMED 518 - Clinico-Pathologic Conference: "*Quarterly Cases & Conundrums: Part 2"*	Denise Newsom
Spring 2006		
4/6/06	CMED 518 - Clinico-Pathologic Conference: "*Bariatric Surgical Complications"*	Patrick Hanley
4/20/06	CMED 518 - Clinico-Pathologic Conference: *"Interesting cases from winter quarter"*	Molly Lucas
Winter Quarter 2006 - No Clinical Conferences		
Autumn Quarter 2005		
10/6/05	CMED 518 - Clinico-Pathologic Conference: *"Mouse models of Alzeimer's disease."*	Kari Koszdin
10/20/05	CMED 518 - Clinico-Pathologic Conference: *"Care and management of complications of implanted catheters."*	Mel Dennis

3. ANATOMIC PATHOLOGY CONFERENCE

Winter Quarter 2010		
1/21/10	CMED 514: Anatomic Pathology Conference: *"Rabbit and Rodent Respiratory Pathology"*	Piper Treuting
2/18/10	CMED 514: Anatomic Pathology Conference: *"Fish Pathology"*	George Sanders
Autumn Quarter 2009 - No Pathology Conferences		
Spring Quarter 2009		
4/2/09	CMED 514 - Anatomic Pathology Conference: "Virtual Slides description nightmares"	Piper Treuting
4/9/09	CMED 514 - Anatomic Pathology Conference: *"Zebras do get ulcers: what veterinarians knew before the 'discovery' of stress, and future opportunities in stress research"*	Catherine Hagan
5/7/09	CMED 514 - Anatomic Pathology Conference: *Veterinary dermatopathology case presentations*	Ann Hargis
5/21/09	Anatomic Pathology Conference: *'Lesions de Jour'*	Denny Liggitt

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2005-2010

Date	Course/Seminar Title	Instructor/Presenter
5/28/09	CMED 514: Anatomic Pathology Conference: *"Bone histology, histomorphometry, and other evaluation techniques"*	Chris Jerome
Winter Quarter 2009		
1/8/09	CMED 514 - Anatomic Pathology Conference*: "Gross Pathology Review: Rediscovered slides from the 'Archive'"*	Denny Liggitt
1/22/09	CMED 514 - Anatomic Pathology Conference: *"Are mental disorders bona fide brain pathology?"*	Catherine Hagan
2/19/09	CMED 514 - Anatomic Pathology Conference*: "Gross pathology quiz show"*	Rie Kikkawa, SNBL, USA
3/5/09	Anatomic Pathology Conference: *" Virtual Histopathology Slide Conference: Description Nightmares"*	Piper Treuting
Autumn Quarter 2008		
10/2/08	CMED 514 - Anatomic Pathology Conference: *"ACVP exam post-mortem"*	Piper Treuting, et al
10/16/08	CMED 514 - Anatomic Pathology Conference*: "Updates on the Lung Atlas and the Histology and Imaging Core"*	Chuck Frevert
10/30/08	Anatomic Pathology Conference: *"Mystery Neuropathology Cases: Virtual Slides"*	Piper Treuting
Spring Quarter 2008		
4/10/08	CMED 514 - Anatomic Pathology Conference: *"African Wild-life Fieldwork Revisited, and Selected Zoo Pathology Cases"*	Bob Murnane
4/24/08	CMED 514 - Anatomic Pathology Conference: *"Pathological lesions & clinical correlates in the UW aged mouse colonies"*	Piper Treuting
5/8/08	CMED 514 - Anatomic Pathology Conference: *"The Navigation Of Extracellular Matrices By Cells & Molecules"*	Chuck Frevert
5/22/08	CMED 514 - Anatomic Pathology Conference: *"Somewhere over the Brainbow: How brain histology went technicolor"*	Catherine Hagan
Winter Quarter 2008		
1/10/08	CMED 514 - Anatomic Pathology Conference*: "Review of Gross Pathology Cases."*	Chuck Frevert
1/17/08	CMED 514 - Anatomic Pathology Conference: *"Microgliosis: Mechanisms...Mysteries...and Monoamines(?)"*	Catherine Hagan
2/21/08	CMED 514 - Anatomic Pathology Conference: *"A Mouse Pathologist's Toolbox: H&E, IHC and Necropsy, Oh, My!"*	Sue Knoblaugh & Julie Randolph-Habecker
3/6/08	CMED 514 - Anatomic Pathology Conference: *"Pathology Quiz Show"*	Bob Harrington
Autumn Quarter 2007		
10/4/07	CMED 514 - Anatomic Pathology Conference: *ACVP board post mortem*	Candidates
11/29/07	CMED 514 - Anatomic Pathology Conference: *IHC*	Bernie Buetow
Spring Quarter 2007 - No Pathology Conferences		
Winter 2007		
1/4/07	CMED 514 - Anatomic Pathology Conference*: "Pathology: It's not just H&E's anymore"*	Sue Knoblaugh
Autumn Quarter 2006		

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CMED Conferences
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2005-2010

Date	Course/Seminar Title	Instructor/Presenter
9/28/06	CMED 514 - Anatomic Pathology Conference: *"Nikon BR software demo"*	Piper Treuting
11/16/06	CMED 514 - Anatomic Pathology Conference: *"A Special Gross Thanksgiving Anatomic Pathology Conference"*	Catherine Hagan
Spring Quarter 2006		
3/30/06	CMED 514 - Anatomic Pathology Conference	Piper Treuting
4/27/06	CMED 514 - Anatomic Pathology Conference	Sue Knoblaugh
5/4/06	CMED 514 - Anatomic Pathology Conference	Renee Hukkanen
5/25/06	CMED 514 - Anatomic Pathologic Conference*: "Comparative Oncology of Lung Tumors"*	Fletcher Hahn Lovelace Respiratory Research Institute, Albuquerque, NM
5/25/06	CMED 514 - Anatomic Pathology Conference	Ann Hargis
6/1/06	CMED 514 - Anatomic Pathology Conference	Bob Murnane
Winter Quarter 2006 - No Pathology Conferences		
Autumn Quarter 2005		
9/29/05	CMED 514 - Anatomic Pathology Conference: *"EM review for the anatomic pathologist (i.e. discerning the important from the trivial)"*	Renee Hukkanen
10/13/05	CMED 514 - Anatomic Pathology Conference: *"Amphibian Histopathology 101."*	George Sanders
10/27/05	CMED 514 - Anatomic Pathology Conference: *"Gross Potpourri."*	Bob Harrington

4. <u>RESEARCH CONFERENCE</u>

Winter Quarter 2010		
1/7/10	Special Seminar*: "The complement factor C5a: the gift that keeps on giving"*	Steve Taylor, Professor of Pharmacology School of Biomedical Sciences University of Queensland
1/14/10	Clerkship Presentation*: "A Case of Botryomycosis in PHOX/INOS Deficient Mice"*	Pratibha Kapoor Oregon State University
2/11/10	Experimental Pathology (Research) Conference: *"Colour Vision in Primates"*	Christina Pettan-Brewer
2/25/10	Clerkship Presentation*:*	Joe Shippert WSU
3/14/10	Special Seminar: *"Extending the Resolution of the Light Microscope: Deconvolution and 3-Dimensional Structured Illumination Microscopy"*.	Paul Goodwin Applied Precision, LLC Senior Product Manager and Technical Fellow
3/11/10	Special Seminar: *"Metastasis of Murine Cancers"*	Alanna Ruddell Neiman Lab/Basic Sciences, FHCRC
Autumn Quarter 2009		
10/29/09	Research Conference: *"Generation of humanized Toll-like receptor mice"*	Lynn Hajjar

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CMED Conferences
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Date	Course/Seminar Title	Instructor/Presenter
11/24/09	Thesis Defense: *"Cytokine Antibody Array Analysis in Brain and Periphery of Scrapie-Infected T-g338 Mice"*	Denise Newsom
Spring Quarter 2009		
4/9/09	Experimental Pathology (Research) Conference2: "Uptake Update: Rotating Disk - Voltammetry measures different types of brain serotonin"	Catherine Hagan
4/23/09	Experimental Pathology (Research) Conference: *"Using mouse models to understand bacterial pathogenesis"*	Steve Libby Research Associate Prof Laboratory Medicine
5/7/09	Experimental Pathology (Research) Conference: *Synaptic mRNA targeting and translation in Alzheimer's Disease*	Jesse Wiley
5/21/09	Experimental Pathology (Research) Conference: *"Treatment of IBD and inflammation-associated cancer by messing with IL-7R"*	Aud Seamons
5/28/09	Clerk Presentation: *"Strange cases and Hot Topics: A Clerkship in Review"*	Andrew Kocsis Ohio State University
Winter Quarter 2009		
1/15/09	Experimental Pathology (Research) Conference: *"Hem 1 and Anemia"*	Maia Chan
1/29/09	Experimental Pathology (Research) Conference: *"Disruption of the catalytic beta subunit of PKA protects against diet-induced metabolic decline, obesity, and insulin resistance"*	Linda Enns
2/19/09	Experimental Pathology (Research) Conference: *"Pathobiology of abnormal prion protein in Mustelidae?*	Bob Harrington
2/26/09	Experimental Pathology (Research) Conference: *"Lepr-/- gene onto BB DR.lyp congenic rats induced obesity and delayed the onset of diabetes in females"*	Daniel Moralejo
3/12/09	Experimental Pathology (Research) Conference: *"Malignant growth in epithelial cell models"*	Rolf Drivdahl
3/12/09	Clinico-Pathologic Conference: *"Case of monkey tuberculosis"*	Bob Murnane
Autumn Quarter 2008		
9/25/08	Experimental Pathology (Research) Conference: *"Hem1: A Master Regulator of the Actin Cytoskeleton in Hematopoietic Cells"*	Heon Park
10/9/08	Experimental Pathology (Research) Conference: *"The Basics of Transgenics and Knockouts"*	Robert Hunter
12/4/08	Experimental Pathology (Research) Conference: *"Serotonin Uptake Update"*	Catherine Hagan
12/4/08	Experimental Pathology (Research) Conference: *"Antibody Arrays and Cytokine Profiling of Scrapie Infection"*	Denise Newsom
Spring Quarter 2008		
4/3/08	Experimental Pathology (Research) Conference: *Examination of ß-carotene conversion to vitamin A using BCMO knockout mice"*	Jisun Paik
4/17/08	Clerk Presentation*: Chytrid: Global Impact and Lab Animal Medicine*	Betty Ma Washington State University
5/1/08	Experimental Pathology (Research) Conference : *DSS-induced colitis and cancer in mice with TGFb dysregulation: more than one way to*	Aud Seamons

Department of Comparative Medicine
CMED Conferences
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2005-2010

Date	Course/Seminar Title	Instructor/Presenter
	get to Rome?	
5/1/08	Experimental Pathology (Research) Conference: *"Hurricane warning: TLR signaling in Helicobacter induced inflammation"*	Patrick Hanley
5/29/08	Deeb Lecture Series*: "Strategies for Enhancing the Safety and Efficacy of Recombinant Vaccines"*	Tilahun Yilma DVM, PhD, UC Davis
6/5/08	Experimental Pathology (Research) Conference: *"Research Update and Overview of the new Institute For Stem Cell and Regenerative Medicine"*	Carol Ware
Winter Quarter 2008		
2/7/08	Experimental Pathology (Research) Conference[4]: *"How to measure brain serotonin uptake and why."*	Catherine Hagan
2/14/08	Experimental Pathology (Research) Conference: *"TGF-b signaling in cardiovascular development"*	Ida Washington
2/28/08	Experimental Pathology (Research) Conference: *"Species barriers to transmission of chronic wasting disease"*	Bob Harrington
Autumn Quarter 2007		
9/27/07	Experimental Pathology (Research) Conference*: "Principles and applications of imaging flow cytometry: Who needs 100,000 images?"*	Thaddeus George and Sherree Friend, Amnis, Inc.
11/1/07	Experimental Pathology (Research) Conference: *"Evaluation of phytoestrogens in feeds for zebrafish, Danio rerio"*	Molly Lucas
11/15/07	Experimental Pathology (Research) Conference*: "Small Animal Imaging"*	Robert Miyaoka Department of Radiology
Spring Quarter 2007		
3/29/07	Experimental Pathology (Research) Conference: *Regulation of Hematopoiesis by Hematopoietic Protein-1"*	Heon Park
4/19/07	Clerk Presentation: *"Hydrogel Drug Delivery to the Eye Post-Cataract Surgery"*	*Dawn Evert (WSU)*
4/19/07	Clerk Presentation: *"Testing of Precision Engineered Material for Treatment of Pelvic Organ Prolapse in the Rabbit Model"*	*Geoffrey Goebel Washington State University*
5/24/07	Experimental Pathology (Research) Conference: *Mock General Exam – "Neuronal serotonin autoreceptor regulation of the serotonin transporter""*	Catherine Hagan
Winter Quarter 2007		
1/11/07	Experimental Pathology (Research) Conference: *"Proteoglycans and Hyaluronan as a Framework for the Innate Immune Response to Gram-Negative Pneumonia"*	Chuck Frevert
1/25/07	Experimental Pathology (Research) Conference: *"Retinoid and carotenoid metabolism in health and disease"*	Jisun Paik Department of Pathobiology
2/8/07	Clerk Presentation: *"Herpes Simplex Virus Cutaneous Lesions in Mice in a HSV-2 Vaccine Study"*	Katy Swindell Michigan State Univ
2/22/07	Experimental Pathology (Research) Conference: *"High on Drugs:*	Manel Camps

Department of Comparative Medicine
CMED Conferences
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2005-2010

Date	Course/Seminar Title	Instructor/Presenter
	Using Molecular Genetics to Study Mechanisms of Drug Action and Toxicity"	Department of Pathology
3/8/07	Experimental Pathology (Research) Conference: *"Alzheimer's Disease: Why stress it?"*	Jesse Wiley
Autumn Quarter 2006		
10/5/06	Experimental Pathology (Research) Conference: *"Quarterly Cases and Conundrums"*	Denise Newsom
11/9/06	Experimental Pathology (Research) Conference: *"Murine Norovirus: An Update"*	Karen Chase
11/16/06	Clerk Presentation: *"Update on Mouse Models Used for the Study of Telomeres"*	Jennifer Finley WSU
Spring Quarter 2006		
4/6/06	Experimental Pathology (Research) Conference: *"Serotonin 1B Autoreceptor Regulation of Serotonin Transporter Kinetics: Investigating the mechanism of how 5HT-1B receptors alter stress reactivity & anxiety-related behaviors"*	Catherine Hagan
4/20/06	Experimental Pathology (Research) Conference: *"Pathogenesis of Cerebrocortical Malformation in Alpha-Dystroglycan Null Mice"*	Tim Myshrall
5/11/06	Special Seminar (Dr. Barbara Deeb 1st Lecture): *"Mouse models of human cancer or mouse models of mouse cancer?"*	Jerrold Ward Comparative Medicine Branch, NIAID, NIH
5/11/06	Round Table Discussion: *"Naturally-Occurring Infectious Diseases Interfering with Research in SPF Rodent Research Facilities."*	Jerrold Ward, Faculty, Postdocs
5/18/06	Experimental Pathology (Research) Conference: *"In vivo testing of the anticancer effects of artemisinin derivatives."*	Henry Lai Department of Bioengineering
6/1/06	Experimental Pathology (Research) Conference: *"Roux-en-Y gastric bypass Model in Swine."*	David Flum Department of Surgery
Winter Quarter 2006 - No Research Conferences		
Autumn Quarter 2005		
10/6/05	Experimental Pathology (Research) Conference	Barry Rickman
10/20/05	Experimental Pathology (Research) Conference: *"Huntington's Disease."*	Annie Torrence
12/1/05	Experimental Pathology (Research) Conference	Thea Brabb

Sample - Postdoc Quarterly Activity Report

Date : ***12/21/05***

To : ***Cecil Mancebo***

From : ***Catherine Hagan***

cc : ***MaryEllin Robinson (MCB), Dr. Denny Liggitt, Dr. John Neumaier***

SUBJECT: POSTDOCTORAL ACTIVITIES REPORT – AUTUMN QUARTER 2005

Following is a summary of my postdoctoral activities during the academic quarter just completed:

A. ACTIVITIES PLANNED

1. CMED Rotations

on research/training grant

2. Classes

BIOENG 599: Special Topics: Brain and Learning (4.0 units)
CONJ 531 Signaling Mechanisms in Excitable Cells (1.5 units)
CONJ 532 Signal Transduction from the Cell Membrane to Nucleus (1.5 units)
CONJ 546 Survey of Technologies for Molecular Biology (1.5 units)
C MED 520 Biology of Laboratory Animals (1 unit)
C MED 530 Diseases of Laboratory Animals (1 unit)
MCB 600 Independent study, research (6 units)

3. Research

Had planned to continue with uptake studies, cloning rat dopamineRs, and was considering undertaking a small comparative genetics study looking for serotonin transportor promotor mutation that is highly correlated with responsiveness to antidepressants in people in canine peripheral blood using primers designed based on dog genome sequence.

B. ACHIEVEMENTS

1. CMED Rotations

not applicable

2. Classes

Autumn 2005

Course	Course Title	Credits	Grade	Grade Points
BIOEN 599	SPEC TOPICS BIOENG	4.0	3.8	15.20
C MED 520	BIOL OF LAB ANIMALS	1.0	3.8	3.80
C MED 530	LAB ANIM DISEASES	1.0	3.8	3.80
CONJ 531	SIGNALING MECHANISM	1.5	3.7	5.55
CONJ 532	SIGNAL TRANSDUCTION	1.5	3.6	5.40
CONJ 546	TECHNOL MOLEC BIOL	1.5	3.8	5.70
MCB 600	INDEPNDNT STDY/RSCH	6.0	CR	0.00

Research

Successfully cloned Rat Dopamine 1 and 2 receptors into lab's expression vector. Currently confirming sequence. Planning neurotransmitter uptake studies for next quarter. No further progress on side project involving canine SERT or 1B, still interested; first priority is to establish plan for dissertation research.

3. Ancillary (e.g., project review groups and protocol tracking; teaching, e.g., *seminars and presentations*; attendance at meetings and workshops)

a. ***attended the following seminars:***

10/6/05: Dr. Robert Foehring, Univ. of Tennessee - Neuromodulators and Control of Cortical State, Implications of Cellular Effects for Psychiatry.",

11/8/05:"Decisions About Dopamine"-Paul Phillips, PhD - Psychiatric Neurosciences seminar - 4pm, SCC 254,

11/21/05: Robert Sapolsky, "Stress and health: from molecules to society";

10/5/05: King County Vet Med association: Continuing Education: Dr. Rick LeCouteur, Neurology

12/13/05: Harborview Neuro Club: Susan Ferguson "Role of 5-HT6Rs in drug experience-dependent plasticity"

b. ***Teaching/Presentations:***

10/13/05: Lit Review, Comparative Medicine "Some Stuff about TUFs, Transcripts of Unknown Function".

10/28/05: Departmental Retreat, Comparative Medicine, Research Activities Overview

12/8/05: Comparative Medicine Departmental Lit Review: "Animal Models of Anxiety and Depression"

c. ***Workshops/Meetings attended:***

9/13/05-9/14/05: Future Faculty Fellows workshop, University of Washington, Seattle. Provided post-doctoral participants with job-seeking skills and teaching strategies. http://depts.washington.edu/biology/hhmi/postdocs/fff.html

11/12/05 - 11/15/05: Society for Neuroscience Meeting, Washington D.C.

Other: Still monitoring Ratner protocol

5. Comments (positive or negative) in regard to the contribution of the activities toward ultimate goals:

Majority of activities contribute positively toward ultimate goals (obtain PhD, obtain funding for early career independent research).

6. Impediments to student's progress:

no significant impediments

C. PROJECTED ACTIVITIES FOR NEXT QUARTER

1. CMED Rotations

not applicable

2. Classes

BIOENG 599: Special Topics: Brain and Learning (4.0 units)

CMED 521: Biology of Laboratory Animals (1.0 unit)

CMED 531: Diseases of Laboratory Animals (1.0 unit)

Considering PCHOL 530: Neuronal Signaling Mechanisms (2.0 units)

3. Research

Completing sequence confirmation of rat dopamine 1 and 2 receptors and project completed. Will resume neurotransmitter uptake studies using synaptosomal

preparations and pharmacologic manipulation of Serotonin 1B receptor to elucidate interaction between serotonin transporter and 1B receptor.

4. Ancillary (e.g., project review groups and protocol tracking; teaching, e.g., *seminars and presentations*; attendance at meetings and workshops)

a. ***Seminars/meetings:***

Weekly lab meeting alternating between presentations and discussion of recent research data,
Biweekly lab journal club on Serotonin receptor research,
Biweekly Harborview Neuro Journal club on various topics on neurobiolog (multiple labs)y,
Weekly departmental seminars on Thursday afternoons in Comparative Medicine Department

b. ***Protocol tracking: Ratner***

c. ***Teaching for AUTS (Animal Use Training) as needed (one scheduled in late December).***

D. COMMITTEE MEMBERS / TRAINING APPOINTMENT YEAR

1. My current committee members are:
   Committee not yet selected
2. My current appointment year is *(e.g., Internship year, Research year 1, Research year 2, etc.)*
   Research year 1

c:\Academic\PostdocQuarterlyReportForm

Laboratory Animal Medicine

Trainee Evaluation
Department of Comparative Medicine
University of Washington

Trainee: **Evaluator:**

Date of Evaluation: **Quarter:**

Please evaluate the trainee in each category being as complete and specific as possible. You may attach other sheets as necessary. Return to Cecil Mancebo, Box 357190, by the end of the quarter.

1. **Contact with trainee during this evaluation period (frequency and depth).**

2. **Attendance, punctuality, and dependability**.

3. **Attitude, initiative, interest.**

4. **Interpersonal relationships.**

5. **Knowledge in subject area.**

6. **Technical.**

7. **Strengths.**

8. **Have you noted any problems during this rating period that should be addressed? Please be specific.**

9. **Accomplishments during this rating period.**

10. **How does this trainee compare with others you have trained at this level?**

11. **Additional pertinent information/recommendations/etc.**

University of Washington Department of Comparative Medicine

Faculty Teaching Performance – Peer Evaluation

Faculty Member Being Evaluated:	
Instructional Environment *(e.g., course, laboratory, clinic, seminar, discussion, etc.):*	
Topic:	
Number of Students:	Background of Students:
Date of Evaluation:	Quarter:
Name of Evaluator *(optional):*	

RATE THE FOLLOWING ITEMS USING THE NUMERICAL SCALE:
5 = Excellent; 4 = Very good; 3 = Good; 2 = Fair; 1 = Poor; N/A = Not applicable

Rating

___ 1. Preparation, clarity and organization of presentation.

___ 2. Use of supporting materials (e.g., examples, illustrations, and summaries).

___ 3. Use of instructional resources (e.g., overheads, slides, handout materials).

___ 4. Quality of questions or problems raised by instructor.

___ 5. Enthusiasm and stimulation of student interest.

___ 6. Answers to student questions and ability to present alternative explanations when needed.

___ 7. Openness to student views and encouragement of active participation.

___ 8. Pace of presentation.

___ 9. Overall teaching effectiveness.

What aspects of the teaching or content of this presentation do you feel were especially good?

What changes could be made to improve the teaching methodology for this presentation?

Other comments/recommendations:

When this evaluation form is completed, please return it to the faculty member being evaluated.

PRESENTATION / OBSERVATION FORM

Name: _____ Date: _____

Topic: _____

Describe specific observation in relation to each element of the presentation.

INTRODUCTION	Y/N	NOTES
1. Introduced topic, stated objectives, offered preview		
2. Gained attention & motivated learning		
3. Established climate for learning & participation		
BODY OF LECTURE		
1. Presented 3-5 main points in clear & organized fashion		
2. Provided supporting materials, examples & summaries		
3. Used visuals, handouts, &/or demonstrations		
CONCLUSION		
1. Summarized major principles, key points without introducing new material		
2. Provided closure or stimulated further thought		
TEACHING DYNAMICS		
1. Exhibited enthusiasm & stimulated interest in content		
2. Encouraged active participation		
3. Used questions to stimulate thought & discussion		

STRENGTHS	RECOMMENDATIONS

DISCUSSION / OBSERVATION FORM

Name: _____ Date: _____

Topic: _____

Describe specific observation in relation to each element of the discussion.

INTRODUCTION	NOTES
1. Introduced topic, stated objectives, created agenda	
2. Established climate & mutual respect	
3. Gained attention & motivated learning	
DISCUSSION	
1. Exhibited enthusiasm & stimulated interest in learning	
2. Encouraged active participation & group interaction	
3. Used questions to clarify & stimulate thought	
4. Responded to questions raised by students or elicited response from group	
5. Ensured that discussion kept on track	
6. Summarized key ideas periodically	
CONCLUSION	
1. Summarized key concepts without introducing new material	
2. Provided closure or stimulated further thought	
STRUCTURE & ENVIRONMENT	
1. Selected an appropriate group process to accomplish objectives	
2. Arranged physical environment to facilitate learning	
3. Utilized resources (visuals, handouts, cases, demonstrations) to promote learning	
STRENGTHS	**RECOMMENDATIONS**

Department of Comparative Medicine (DCM)
Clerkship Program for Veterinary Students
1999-2010

Rotation Date	Name/School	Degree(s)	Current Position/Employment
2010			
1/4-15/10	Pratibha Kapoor, Oregon State University	DVM, 1991	Evaluated Clinical Year Experience as PAVE Candidate, School of Veterinary Medicine, Oregon State University
1/19-29/2010	Dana Alexander*		3rd Veterinary student, Western University of Health Sciences
1/19-29/2010	Vincent Nguyen-The*		3rd Veterinary student, Western University of Health Sciences
3/29-4/9/2010	Vanessa Biegen*		3rd Veterinary student, Western University of Health Sciences
3/29-4/9/2010	Peter Chu*		3rd Veterinary student, Western University of Health Sciences
3/29-4/9/2010	Lindsey Heath*		3rd Veterinary student, Western University of Health Sciences
4/16-6/5/10	Joseph Shippert, Washington State University		Senior Veterinary Student, Washington State University
4/26-5/7/2010	Avery Krein*		3rd Veterinary student, Western University of Health Sciences
4/26-5/7/2010	Elisa Nishimoto*		3rd Veterinary student, Western University of Health Sciences
4/26-5/7/2010	Tiffany Stilian*		3rd Veterinary student, Western University of Health Sciences
9/6-10/1/10	Nicholas Reyes, Western University of Health Sciences		Senior Veterinary Student, Western University of Health Sciences,
2009			
4/16-6/5/09	Andrew Kocsis, Ohio State University		Senior Veterinary Student, Ohio State University
6/22-7/10/09	Elizabeth Nunamaker, Purdue University		Senior Veterinary Student, Purdue University
8/3-8/28/09	Kvin Lertpiriyapong, Western University of Health Sciences		Senior Veterinary Student, Western University of Health Sciences, Pomona, CA
8/3-8/28/09	Mayu Uchihashi, Western University of Health Sciences		Senior Veterinary Student, Western University of Health Sciences, Pomona, CA
8/24-9/8/09	Cassandra L. Miller, University of Wisconsin		Senior Veterinary Student, University of Wisconsin
8/31-9/25/09	Erika Wedel, Western University of Health Sciences		Senior Veterinary Student, Western University of Health Sciences, Pomona, CA
9/21-10/2/09	Stacey Moritz, Ohio State University		Senior Veterinary Student, Ohio State University
10/12-25/09	Pratibha Kapoor, Oregon State University		Evaluated Clinical Year Experience as PAVE Candidate, School of Veterinary Medicine, Oregon State University

Department of Comparative Medicine (DCM)
Clerkship Program for Veterinary Students
1999-2010

Rotation Date	Name/School	Degree(s)	Current Position/Employment
11/9-20/2009	Justin Liang*		3rd Veterinary student, Western University of Health Sciences
11/9-20/2009	Peyvand Mirzadeh*		3rd Veterinary student, Western University of Health Sciences
11/9-20/2009	Alyson Tani*		3rd Veterinary student, Western University of Health Sciences
2008			
3/24-4/18/08	Betty Ma, Washington State University	DVM 2008	Barney & Russum Animal Clinic, 2255 Boynton Avenue, Fairfield, CA 94533
7/14-8/1/08	Katie McCool, Ohio State University		Veterinary Student, Ohio State University
2007			
1/22-2/9/07	Katy Swindell, Michigan State University	DVM, 2008	
3/26-4/20/07	Dawn Evert, Washington State University	DVM, 2007	Critter Care Animal Clinic, 1708 W University Way, Ellensburg, WA 98926
3/27-4/20/07	Geoffrey Goebel, Washington State University	DVM, 2007	MercantileCircle.com, 23714 222nd Pl SE Ste L, Maple Valley, WA 98038
4/16-5/11/07	Alice Liou, University of California, Davis	DVM, 2007	PhD Student, University of California, Davis
8/6-17/07	Brittney Fierro, Michigan State University	DVM, 2008	MPI Resident, Veterinary Medical Center, Michigan State University, East Lansing, MI 48824
8/28-9/29/07	Samantha Lieberman, Ross University /Washington State University	DVM, 2008	Midwest Bird & Animal Hospital, 7510 W North Avenue, Elmwood Park, IL
8/28-9/29/07	Emma O'Brien, Ross University /Washington State University	DVM, 2008	Haven Animal Hospital, 1045 Fulton Ave., Grand Haven, MI 49417
2006			
1/23-2/3/06	Amanda Blackburn, University of California – Davis	DVM, 2006	Resident, Pennsylvania Veterinary Medicine, University of Pennsylvania
5/30-6/23/06	Joshua Woolsey, Washington State University	DVM, 2007	VCA North Division Animal Medical Center, 8714 North Division Street, Spokane, WA 99218
7/3-7/28/06	Brandi Eskesen, Washington State University	DVM, 2008	Hawthorne Hills Veterinary Hospital, 4020 NE 55th, Seattle, WA 98105

Department of Comparative Medicine (DCM)
Clerkship Program for Veterinary Students
1999-2010

Rotation Date	Name/School	Degree(s)	Current Position/Employment
8/7-9/1/06	Brigitte Raabe, University of Wisconsin – Madison	DVM, 2007	Postdoc Research Associate, Biologic Resources Laboratory, University of Illinois in Chicago, 1840 W. Taylor, MC 533, Chicago IL 60612-7348
10/24-11/17/06	Jennifer Finley, Washington State University	DVM, 2008	
11/2-9/06	Anne Sally Davis, North Carolina State University	DVM, 2007	Cary, NC
2005			
1/4-2/4/05	Shannon Donahue, Washington State University	DVM, 2005	
5/9-13/05	Jordan Herod-Nuccio, Tufts University	DVM, 2005	Need-A-Vet., Portland, Oregon
7/11-15/05	Rudolph Beiler, Colorado State University	DVM, 2006	Yale University , Department of Laboratory Medicine , CB 407, PO Box 208035, 333 Cedar Street, New Haven, CT 06520-8035
2004			
1/5-30/04	Catherine Hagan, University of California – Davis	DVM, 2004	Acting Instructor, Department of Comparative Medicine, University of Washington, Seattle, WA
3/1-5/04/04	Karen Chase, University of California – Davis	DVM, 2004 MS, 2007	Senior Clinical Veterinarian, Office of Laboratory Animal Research, California Technical Institute, MC 156-29, Pasadena CA 91125
5/10-6/4/04	Sarah Pownder, Washington State University	DVM, 2005	Resident, Department of Clinical Sciences, Cornell University, College of Veterinary Medicine, Ithaca, NY 14853
6/7-7/2/04	Leah Cloud, Washington State University	DVM, 2005	Spring Glen Veterinary Hospital, 17604 110th Avenue S.E., Renton, WA 98055
7/6-31/04	Lori Stose, Washington State University	DVM, 2005	Eagle's Landing Veterinary Hospital, 1635 Hwy 42N, McDonough, GA 30253
10/4-11/12/04	Sarah Kanagy, Purdue University	DVM, 2005	Blum Animal Hospital, 3219 North Clark Street, Chicago, Illinois 60657
2003			
2/4-27/03	Michele Browning, Texas A&M University	DVM, 2003 DACLAM, 2006	Assistant Director, Primate Biology & Medicine, Bioqual, Inc., 2501 Research Boulevard, Rockville, MD 20850

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Clerkship Program for Veterinary Students
1999-2010

Rotation Date	Name/School	Degree(s)	Current Position/Employment
10/12-11/7/03	Laura Lemke, Texas A&M University	DVM, 2004 MS DACLAM	Clinical Veterinarian, The University of Texas at Austin, Animal Resources Center, 1 University Station A2500, Austin, TX 78712
5/10-6/4/03	Sarah Wells, Ross University	DVM, 2005	Twin Maple Veterinary Hospital, 3646 Watertower Lane, West Carrollton, OH 45449
2002			
3/1-31/02/02	Jennifer Ward, Washington State University	DVM, 2002 DACVP	Pathologist, Phoenix Central Laboratory, Everett, WA
3/18-4/22/02	Evan Shukan, University of Wisconsin - Madison	DVM MPH DACVPM, 2009	
5/13-6/1/02	Paul Rennekamp, Purdue University	DVM, 2003	Small and Mixed Practice, 728 Linden Drive, Seymour, IN, 47274
6/17-30/02	TimothyMyshrall, Cornell University	DVM, 2003 MPH, 1999	Staff Veterinarian, Biological Resources Unit, Mail Code FF60, Cleveland Clinic Foundation, Cleveland, OH 44195
9/3-27/02	Cathy Styer, University of California – Davis	DVM, 2003	
2001			
1/2-26/01	Eric Hansen, Washington State University	DVM	Banfield The Pet Hospital, 20 W University Parkway, Orem, UT 84058
3/12-4/6/01	Melinda Eaton, Washington State University	DVM, 2001 MPH, 2004	PhD Student, Gillings School of Global Public Health, University of North Carolina
10/8-11/2/01	Szczepan Baran, University of Pennsylvania	VMD, 2002 MS	President and COO, Veterinary Bioscience Institute, 92 Main Street (PMB 300), Harleysville, PA 19468 Adjunct Faculty, Drexel University
2000			
2/14-3/10/00	Jacob Searle, Washington State University	DVM,	Chuckanut Valley Veterinary Clinic, 896 N Burlington Boulevard, Burlington, WA 98233
7/5-28/00	Renee Gamboa-Hukkanen, University of Illinois -	DVM, 2001	Veterinary Pathologist, WA National Primate Research Center,

Department of Comparative Medicine (DCM)
Clerkship Program for Veterinary Students
1999-2010

Rotation Date	Name/School	Degree(s)	Current Position/Employment
	Champaign	MS, 2005	University of Washington
6/19-7/15/00	Boris Rozhik, Washington State University	DVM	Animal Surgery And Care Center, 12926 Mukilteo Speedway Suite E13, Lynnwood WA 98037
1-/2-10/27/00	Theresa Boulineau, Purdue University	DVM DACVP	Assistant Professor of Pathology, Laboratory of Pathology and Toxicology, University of Pennsylvania
1999			
2/22-3/12/99	Sandra Valenti, University of Buenos Aires - Argentina		
3/15-4/9/99	Stephanie Oba, Tufts University	DVM, 2000	Associate Veterinarian, VCA Antech
6/19-7/15/99	Roger Willms, Washington State University	DVM	Arrow Animal Hospital Place, 5144 W Thunderbird Rd, Glendale, AZ 85306-4828
7/12-23/99	Darrell O'Quinn, Louisiana State University	DVM PhD, 2008	Postdoctoral Scholar, University of Alabama, Birmingham

* DCM hosts 3rd year veterinary students from Western University of Health Sciences College of Veterinary Medicine. Each Lab Animal Rotation hosts 2-4 students (typically 3 students) and student are expected to be on site for 40 hours per week with 20 contact hours and 20 study hours each week for a two week period.

Department of Comparative Medicine
Publications - Faculty and Postdocs
1999-2010

David M. Anderson, DVM, Clinical Associate Professor

1. Eitner F, Cui Y, Hudkins KL, Schmidt A, Birkebak T, Agy MB, Hu SL, Morton WR, **Anderson DM**, Alpers CE (1999). Thrombotic microangiopathy in the HIV-2 infected macaque. *Am J Pathol.*155:649-661.
2. Kimata JT, Kuller L, **Anderson DM**, Dailey P, Overbaugh J (1999). Emerging cytopathic and antigenic simian immunodeficiency variants influence AIDS progression. *Nature Med.* 5:535-541.
3. Perret-Gentil MI, Dennis MB, Sinanan M, Pasieka H, Weyhrich JT, Horgan S, **Anderson D** (1999). A novel application of minimally invasive surgery for serial visceral biopsy in HIV- and HIV+ pigtail macaques (Macaca nemestrina). *J Invest Surg* 12:76.
4. Perret-Gentil M, Dennis M, Sinanan M, **Anderson D**, Pasieka H, Weyhrich J, and Birkebak T (1999). Videoendoscopic techniques for multiple, serial, visceral biopsy in HIV- and HIV+ pigtail macaques (Macaca nemestrina). *J Invest Surg* 12:228.
5. Perret-Gentil MI, Sinanan MN, Dennis MB, Horgan S, Weyhrich JT, **Anderson DM** and Hudda K (1999). Videoendoscopy: an effective and efficient way to perform multiple visceral biopsies in small animals. *J Invest Surg* 12:157-165.
6. Eitner F, Cui Y, Grouard-Vogel G, Hudkins KL, Schmidt A, Birkebak T, Agy MB, Hu S-L, Morton WR, **Anderson DM**, Clark EA, Alpers CE (1999). Rapid shift from virally-infected cells to germinal center-retained virus after HIV-2 infection of macaques. *Am J Pathol* 156:1197-1207.
7. Zhu Y, Koo K, Bradshaw JD, Sutton WF, Kuller L, Bucala R, **Anderson D**, Mossman SP, Villinger F and Haigwood NL (2000). Macaque blood-derived antigen-presenting cells elicit SIV-specific immune responses. *J Med Primatol* 29:182-192.
8. McClure J, Schmidt AM, Rey-Cuillé M-A, Bannink J, Misher L, Tsai C-C, **Anderson DM**, Morton WR and Hu S-L (2000). Derivation and characterization of a highly pathogenic isolate of HIV type 2 that causes rapid CD4+ cell depletion in *M. nemestrina*. *J Med Primatol* 29:114-126.
9. Ho RJY, Larsen K, Bui T, Wang XY, Herz A, Sherbert C, Finn E, Nosbisch C, Schmidt A, **Anderson D**, Agy M, Morton WR and Unadkat JD (2000). Suppression of maternal virus load with AZT, DDI, and indinavir combination therapy prevents mother-to-fetus HIV transmission in macaques. *J AIDS* 25:140-149.
10. Kuller L, Schmidt , Mack H, Durning M, Birkebak T, Reiner MT, **Anderson DM**, Morton WR and Agy MB (2001). Systemic and intestinal immune responses to HIV-2/287 infection *in Macaca nemestrina*. *AIDS Res Hum Retroviruses* 17:1191-1204.
11. Ho RJY, Larsen K, Kinman L, Wang XY, Finn E, Nosbisch C, Schmidt A, **Anderson D**, Agy M, Hu SL, Ochs H, Morton WR and Unadkat JD (2001). Characterization of a maternal-fetal HIV transmission model using pregnant macaques infected with HIV-2/287. *J Med Primatol* 30:131-140.
12. Doria-Rose NA, Pierce CC, Hensel MT, Sutton WF, Sheikh N, Polacino P, Kuller L, Zhu Y-D, Hu S-L, **Anderson D**, Haigwood NL (2003). Multigene DNA prime-boost vaccines for SHIV89.6P. *J Med Primatol* 32:218-228.
13. Doria-Rose NA, Ohlen C, Polacino P, Pierce CC, Hensel MT, Kuller L, Mulvania T, **Anderson D**, Greenberg PD, Hu S-L, Haigwood NL (2003). Multi-gene DNA prime-boost vaccines protect macaques from acute CD4+ T cell depletion after SHIV89.6P mucosal challenge. *J Virol* 77:11563-577.
14. Kinman L, Brodie SJ, Tsai CC, Bui T, Larsen K, Schmidt A, **Anderson D**, Morton WR, Hu S-L, Ho RJY (2003). Lipid-drug association enhanced HIV-1 protease inhibitor indinavir localization in lymphoid tissues and viral load reduction: A proof of concept study in HIV-2/287-infected macaques. *J AIDS* 34:387-397.
15. Locher C, Witt SA, Ashlock BM, Polacino P, Hu SL, Shiboski S, Schmidt AM, Agy MB, **Anderson D**M, Staprans S, and Levy JA (2004). Human immunodeficiency virus type 2 DNA vaccine provides partial protection from acute baboon infection. *Vaccine* 22:2261-2272.

16. Jayaraman P, Mohan D, Polacino P, Kuller L, Sheikh N, Bielefeldt-Ohmann H, Richardson B, **Anderson D**, Hu SL, Haigwood NL (2004). Perinatal transmission of SHIV-SF162P3 in Macaca nemestrina. *J Med Primatol*. 33(5-6):243-50.
17. Kinman LM, Worlein JM, Leigh J, Bielefeldt-Ohmann H, **Anderson DM**, Hu S-L, Morton WR, Anderson BD, Ho RJY (2004). HIV in central nervous system and behavioral development- an HIV-2 287 macaque model of AIDS. *AIDS*18(10):1363-1370.
18. Grant, RF, Watanabe R, Kuller L, Poland B, Vinh C, McLain R, Jones-Engel L, Schillaci M, Lee B, J Pamungkas J, Iskandriati D, Kyes R, **Anderson D** (2005). Comparison of wild-type SRV in macaques from Singapore and Indonesia. (Abstract) 22nd An.Symp NHP Models AIDS, *J. Med. Primatol,* pp.332-33.
19. Kuller L, Watanabe R, **Anderson D**, Grant R (2005). Development of a whole-virus multiplex flow cytometric assay for antibody screening of a specific pathogen-free primate colony. *Diag Microbiol Infect Dis* 53(3):185-93.
20. Hukkanen RR, Liggitt HD, Kelley ST, Grant R, **Anderson D**, Beaty BJ, Marlenee NL, Hall RA, Bielefeldt-Ohmann H (2006). Comparison of commercially available and novel West Nile Virus immunoassays for detection of seroconversion in the pigtailed macaque (*Macaca nemestrina*). *Comp Med* 56(1):46-54.
21. Hukkanen RR, Liggitt HD, Kelley ST, Grant R, **Anderson DM**, Hall RA, Tesh RB, Travassos DaRosa AP, Bielefeldt-Ohmann H (2006). West Nile and St. Louis encephalitis virus antibody seroconversion, prevalence, and persistence in naturally infected pig-tailed macaques (Macaca nemestrina). *Clin Vaccine Immunol*: 13(6):711-4.
22. Hukkanen RR, Liggitt HD, **Anderson DM**, Kelley ST (2006). Detection of systemic amyloidosis in the pig-tailed macaque (Macaca nemestrina). *Comp Med* 56(2):119-27.
23. Jayaraman P, Zhu T, Misher L, Mohan D, Kuller L, Polacino P, Richardson BA, Bielefeldt-Ohmann H, **Anderson D**, Hu SL, Haigwood NL (2007). Evidence for persistent, occult infection in neonatal macaques following perinatal transmission of simian-human immunodeficiency virus SF162P3. *J Virol* 81(2):822-34.
24. Polacino P, Larsen K, Galmin L, Suschak J, Kraft Z, Stamatatos L, **Anderson D**, Barnett SW, Pal R, Bost K, Bandivdekar AH, Miller CJ, Hu SL (2008). Differential pathogenicity of SHIV infection in pig-tailed and rhesus macaques. *J Med Primatol* 37 (Suppl 2):13-23.

Szczepan W. Baran, VMD, MS, Senior Fellow 2002-2005

Peer Reviewed Publications

1. **Baran SW**, Johnson EJ, Kehler J. Hankenson FC. Development and Implementation of Multimedia Content for a Web-based Course on Rodent Surgery. JAALAS (in press).
2. **Baran SW**, Johnson EJ, Stephens M, Kehler J. Development of electronic learning courses for surgical training of animal research personnel. Laboratory Animal – Nature. 2009 September, 3(9): 295-304.
3. **Baran SW**, Johnson EJ, Kehler J. An introduction to electronic learning and its use to address challenges in surgical training. Laboratory Animal – Nature. 2009 June, 38(6):1-9.

Non-Peer Reviewed Publications

1. **Baran SW**, Johnson EJ, Perret-Gentil MI. Fundamentals of pain assessment in rodents – a recipe for successful rodent analgesia. Animal Laboratory News. In press.
2. **Baran SW**, Johnson EJ, Perret-Gentil MI. Training for the laboratory animal science community

during challenging economic times. Animal Laboratory News. 2010 January.
3. **Baran SW**, Johnson EJ, Perret-Gentil MI. Rodent Surgery – Who Said it Didn't Have to Be Sterile? American Association for Laboratory Animal Science Delaware Valley Branch Newsletter. January 2010.
4. **Baran SW**, Johnson EJ, Perret-Gentil MI. Basics of pain detection in rodents - a recipe for successful rodent analgesia. American Association for Laboratory Animal Science Delaware Valley Branch Newsletter. December 2009.
5. **Baran SW**, Johnson EJ, Kehler J. A guide for developing effective online surgical training courses. Animal Laboratory News. 2009 March.

Carole Rivka Baskin Granillo, DVM, MS, Affiliate Assistant Professor, Senior Fellow, 2001-2005

1. **Baskin, C.R.**, Hinchcliff, K.W., DiSilvestro, R.A., et al. Effects of dietary antioxidant supplementation on oxidative damage and resistance to oxidative damage in sled dogs during prolonged exercise. American Journal of Veterinary Research. 2000 Aug; 61(8):886-91
2. **Baskin, C.R.**, Couto, C.G., and Wittum, T.E. Factors influencing first remission and survival in 145 dogs with lymphoma: a retrospective study. Journal of the American Animal Hospital Association. 2000 Sep-Oct; 36(5):404-9
3. Piercy, R.J., Hinchcliff, K.W., Dilsilvestro, R.A, Reinhart, G.A., **Baskin, C.R.**, Hayek, M.G, Burr, J.R., Swenson, R.A. Effect of antioxidant supplementation on exercise-induced muscle damage in Alaskan sled dogs. Am. J. Vet. Res. 2000; 61 (11): 1438-1445
4. Lacombe, V.A., Hinchcliff, K.W., Geor, R. J., **Baskin, C.R.** Muscle Glycogen Depletion and Subsequent Replenishment Affect Anaerobic Capacity of Horses. Journal of Applied Physiology. 2001 Oct. 91 (4): 1782-90
5. Newbound, G.C., Cooper, J. R., O'Rourke, J. P, **Baskin, C. R.**, Bunnell, B. A. Analysis of the Gene Transfer Efficiency of Retrovirus Producer Cell Transplantation for In Situ Gene Transfer to Hematopoetic Cells. Journal of Experimental Hematology. Experimental Hematology. 2001 Feb. 29 (2): 163-73
6. Tarantal, A. F., O'Rourke, J.P., Case, S. S., Newbound, G.C., Li, J., Lee, C.I., **Baskin, C.R.**, Kohn, D.B., Bunnell, B. A. Rhesus Monkey Model for Fetal Gene Transfer: Studies With Retroviral-based Vector Systems. Molecular Therapy. 2001 Feb; 3(2): 128-38
7. **Baskin, C.R.,** Liu, Z. J., King, G. J., Maggio-Price, L. Vascular Leak Syndrome In Sprague-Dawley Rats In a Mandibular Distraction Osteogenesis Study. Comp Med. 2003 Apr;53(2):207-12
8. **Baskin, C. R.**, Garcia-Sastre, A., Tumpey, T.M., Bielefeldt-Ohmann, H., Carter, V.S, Nistal-Villán, E., Katze, M.G. Integration of Clinical Data, Pathology, and cDNA Microarrays in Influenza Virus-Infected Pigtailed Macaques (*Macaca nemestrina*). **Cover article**. Journal of Virology, October 2004, 78(19): 10420-32
9. Ladiges, W., Knoblaugh, S., Morton, J., Korth, M.J., Sopher, B., **Baskin, C.R.**, MacAuley, A., Goodman, A. J., LeBoeuf, R., Katze, M.G. Pancreatic ß cell failure and diabetes in mice with a deletion mutation of the endoplasmic reticulum molecular chaperone gene P58IPK. Diabetes. April 2005, 54(4):1074-81
10. M. J. Thomas, Flanary, L. R., Brown, B. A., Katze, M. G., **and Baskin, C. R.** Use of Human Nasal Cannulas during Bronchoscopy Procedures as a Simple Method for Maintaining Adequate Oxygen Saturation in Pigtailed Macaques (Macaca nemestrina). Contemp. Top. Lab. Animal Sci. July 2006, 45(3): 44-8
11. Bollen, A.M, **Baskin, C. R.**, and Treuting, P. Urolithiasis in rats consuming a dl bitartrate form of choline in a purified diet. Comp. Med. August 2006, 56(4):245-6
12. **Baskin, C. R.**, Garcia-Sastre, A., Tumpey, T.M., Bielefeldt-Ohmann, H., Carter, V.S, Nistal-Villán, E., Katze, M.G. Integration of Clinical Data, Pathology, and cDNA Microarrays in Influenza Virus-

Infected Pigtailed Macaques (*Macaca nemestrina*). **Cover article**. Journal of Virology, October 2004, 78(19): 10420-32

13. **Baskin, C.R.*** , Baas, T. *, D.L. Diamond, A. García-Sastre, H. Bielefeldt-Ohmann, T.M. Tumpey, M.J. Thomas, V.S. Carter, T. H. Teal, N. Van Hoeven, S. Proll, J.M. Jacobs, Z. R. Caldwell, M.A. Gritsenko, R.R. Hukkanen, D.G. Camp II, R.D. Smith, and M.G. Katze. An Integrated Molecular Signature of Disease: Analysis of Influenza-Infected Macaques through Functional Genomics and Proteomics. **(*Both authors contributed to this work equally) selected for JVI Highlights**. Journal of Virology 2006 Nov;80(21):10813-28
14. **Baskin, C.R.**, H. Bielefeldt-Ohmann, A. García-Sastre, T.M. Tumpey, N. Van Hoeven, V.S. Carter, M.J. Thomas, S. Proll, A. Solórzano, R. Billharz, J.L. Fornek, S. Thomas, C-H. Chen, E.A. Clark, K. Murali-Krishna and M.G. Katze. Functional Genomic and Serological Analysis of the Protective Immune Response Resulting from Vaccination of Macaques with an NS1-Truncated Influenza Virus. Journal of Virology 2007 Nov; 81(21): 11817–11827
15. Jentarra, G.M., M.C. Heck, K. Kibler, J.O. Langland, **C.R. Baskin**, O. Ananieva, Y. Chang, and B.L. Jacobs. Vaccinia Viruses with Mutations in the E3L Gene as Potential Replication-Competent, Attenuated Vaccines: Scarification Vaccination. Vaccine 2008 Jun 2;26(23):2860-72
16. Favre,D., Lederer, S., Kanwar,B., Min Ma,Z., Proll, S., Kasakow,Z., Mold, Z., Swainson,L., **Baskin, C.R.**, Palermo, R., Miller,C., Katze,M.G., McCune, J.M. Critical loss of the Balance between Th17 and T Regulatory Cell Populations in Pathogenic SIV Infection. PLoS Pathogen 2009 Feb; 5 (2): 1-17
17. **Baskin, C.R.**, H. Bielefeldt-Ohmann, T. M. Tumpey, P. J. Sabourin, J. P. Long, A. Garcia-Sastre, A.-E. Tolnay, R. Albrecht, L. D'Aicher, V.S. Carter, E.R. Rosenzweig, M.-K. Kaja, E. A. Clark, M.S. Kotur, J. L.
    Fornek, S. Proll, R.E. Palermo, C. L. Sabourin, and M.G. Katze. Early and Sustained Innate Immune Response Defines Pathology and Death in Highly Pathogenic Influenza-Infected Non-Human Primates. Proc Natl Acad Sci U S A. 2009 Feb 13. **Featured in Leading Edge section of Cell 136, March 6, 2009.**
18. Lederer, S.,D. Favre, K.-A. Walters, S. Proll, B. Kanwar, Z. M. Ma, Z. Kasakow, J. Mold, L. Swainson, **C. R. Baskin**, C. J. Miller, R. E. Palermo, J. M. McCune, M.G. Katze. Transcriptional profiling reveals significant distinctions between pathogenic and non-pathogenic SIV infection that emphasize kinetics and tissue compartmentalization. PLoS Pathog. 2009 Feb;5(2):e1000296
19. Jacobs B.L., J.O. Langland, K.V. Kibler, K.L. Denzler, S.D. White, S.A. Holechek, S. Wong, T. Huynh, and **C.R. Baskin**. Vaccinia virus vaccines: Past, present and future. Antiviral Res. 2009 Jun 26.
20. Tolnay, A-E., **C.R. Baskin**, T.M. Tumpey, P.J. Sabourin, C.L. Sabourin, J.P. Long6, J.A. Pyles, R.A. Albrecht, A. García-Sastre, M.G. Katze, and H. Bielefeldt-Ohmann. Inflammatory tissue responses in cynomolgus macaques (Macaca fascicularis) infected with highly pathogenic avian influenza A (H5N1) or reassortants containing genes from the 1918 pandemic influenza virus. *Submitted*

Book Chapters

1. Korth, M.J., Kash, J.C., Baskin, C.R., Katze, M.G. Insights into influenza virus-host interactions through global gene expression profiling: cell culture systems to animal models. In: Y. Kawaoka (ed.), Influenza Virology: Current Topics. Caister Press, Wymondham, U.K. March 01, 2006

Invited

1. **Baskin C.R.** and M.G. Katze. Systems Biology Could Help Us Understand & Protect Against Pandemics: A Comprehensive View of Host Responses is needed to Understand, Predict, and Alter

the Course of Influenza and Other Viral Infections. Solicited article for the Features section of Microbes, American Society for Microbiology. 2008 May: 3(5): 227-233

2. **Baskin C.R.** and D. DeNardo. Which Protocol Deviations Require Preapproval? Communication is the Key. Protocol Review for Lab Animal Magazine 2008 June. 37 (6):1-2

Thea L. Brabb, DVM, PhD, DACLAM, Clinical Associate Professor

1. **Brabb T**, von Dassow P, Ordonez N, Schnabel B, Duke B, Goverman J (2000). In-Situ tolerance within the CNS as a mechanism for preventing autoimmunity. *J. Exp. Med.* 192:871-80.
2. Meyer AL, Benson J, Song F, Javed N, Gienapp IE, Goverman J, **Brabb T**, Hood L, Whitacre CC (2001). Rapid depletion of peripheral antigen-specific T cells in TCR-transgenic mice after oral administration of myelin basic protein. J Immunol. 166:5773-81.
3. Burich A, Hershberg R, Waggie K, Zeng W, **Brabb T**, Westrich G, Viney JL, Maggio-Price L (2001). Helicobacter-induced inflammatory bowel disease in IL-10- and T cell-deficient mice. Am J Physiol Gastrointest Liver Physiol. 281:G764-778.
4. Huseby ES, Liggitt D, **Brabb T**, Schnabel B, Ohlen C and Goverman J (2001). A pathogenic role for myelin-specific CD8+ T cells in a model for multiple sclerosis. J. Exp Med., 194:669-676.
5. Hukkanen RR, Richarson M, Wingfield JC, Treuting P, **Brabb T** (2003). Avipox in a Gray-crowned Rosy Finch (Leucosticte tephrocotis) Colony. Comparative Medicine. 53:548-552.

Bernard S. Buetow, DVM, PhD, DACVP, Affiliate Assistant Professor

1. K.L. Stocking, J.C. Jones, N.E. Everds, **B.S. Buetow**, M.P. Roudier, and R.E. Miller. 2009. Use of Low Molecular Weight Heparin to Decrease Mortality in Mice after Intracardiac Injection of Tumor Cells. Comparative Medicine, 59(1), 37-45.
2. K.R. Pitts, A. Stiko, **B.S. Buetow**, F. Lott, P. Guo, D. Virca, and C.F. Toombs, 2007. Washout of Heme-containing Proteins Dramatically Improves Tetrazolium-based Infarct Staining. J Pharmacol Toxicol Methods, 55(2), 201-208.
3. **B.S. Buetow**, K. Tappan, J.R. Crosby, R.A. Seifert, and D.F. Bowen-Pope. 2003. Chimera Analysis Supports a Predominant Role of PDGFRß in Promoting Smooth-Muscle Cell Chemotaxis after Arterial Injury. American Journal of Pathology, 163 (3), 979-984. P.M. Treuting, L.I. Chen, **B.S. Buetow**, W. Zeng, T.A. Birkebak, V.L. Seewaldt, K.M. Sommer, M. Edmond, L. Maggio-Price, and K. Swisshelm. 2002. Retinoic Acid Receptor β_2 Inhibition of Metastasis in Mouse Mammary Gland Xenografts. Breast Cancer Research and Treatment 72 (1), 79-88.
4. **B.S. Buetow**, J.R. Crosby, W.E. Kaminski, R.K. Ramachandran, P. Lindahl, P. Martin, C. Betsholtz, R.A. Seifert, E.W. Raines, and D.F. Bowen-Pope. 2001. Platelet-Derived Growth Factor B-Chain of Hematopoietic Origin is Not Necessary for Granulation Tissue Formation and Its Absence Enhances Vascularization. American Journal of Pathology 159 (5), 1869-1876.
5. **B.S. Buetow**, L.I. Chen, L. Maggio-Price, and K. Swisshelm. 1999. Diagnostic Exercise: Peritonitis in Nude Mice in a Xenograft Study. Contemporary Topics 38 (6), 47-49.
6. **B.S. Buetow**, P.M. Treuting, and G.L. Van Hoosier. 1999. "The Hamster." In "Clinical Chemistry of Laboratory Animals," 2nd edition. Ed. Loeb and Quimby. Taylor and Francis, Washington DC.

Andrew J. Burich, DVM, MS, DACLAM, Affiliate Instructor, Senior Fellow 1998-2001

Department of Comparative Medicine
Publications - Faculty and Postdocs
1999-2010

1. Keen KL, **Burich AJ**, Mitsushima D, Kasuya E, Terasawa E. Effects of pulsatile infusion of the GABA(A) receptor blocker bicuculline on the onset of puberty in female rhesus monkeys. Endocrinology. 1999 Nov;140(11):5257-66.
2. **Burich A**, Hershberg R, Waggie K, Zeng W, Brabb T, Westrich G, Viney JL, Maggio-Price L. Helicobacter-induced inflammatory bowel disease in IL-10- and T cell-deficient mice. Am J Physiol Gastrointest Liver Physiol. 2001 Sep;281(3):G764-78.
3. Maggio-Price L, Shows D, Waggie K, **Burich A**, Zeng W, Escobar S, Morrissey P, Viney JL. Helicobacter bilis infection accelerates and H. hepaticus infection delays the development of colitis in multiple drug resistance-deficient (mdr1a-/-) mice. Am J Pathol. 2002 Feb;160(2):739-51.
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Maia Chan, DVM, Senior Fellow 2008-present

Sonja Chou, DVM, MS, Senior Fellow 2000-2004

1. White, W.J., **Chou, S.T.**, Kole, C.B., Sutcliffe, R. "Transportation of Laboratory Animals." UFAW Handbook on the Care and Management of Laboratory Animals (in print).
2. Conour, L.A., **Chou, S.T.**, Anderson, L.C. "Chapter 25: Regulatory Issues" Anesthesia and Analgesia in Laboratory Animals (2nd ed.) Fish, R.E., Brown, M.J., Danneman, P.J., and Karas, A.Z. (editors) American College of Laboratory Animal Medicine Series. 2008.
3. **Chou, S.**, Walter, K., Ahearn, E., Harper, E., Driscoll, R., and Conour, L. "Characterizing the Neurological Phenotype of the Spontaneous Mutant Ataxic OFA Rats." (Abstract) *JAALAS* 47(5): 83-84, 2008.
4. Walter, K. **Chou, S.**, Ahearn, E., Mendonca, D., and Conour, L. "Evaluation of the GE Lunar Prodigy Whole Body Densitometer for Use in Mice." Poster Session, 59th National American Association for Laboratory Animal Science. Indianapolis, IN. 2008.
5. Harbert, K. **Chou, S.**, Driscoll, R., Barbeau, L., Mendonca, D. Liang, H. Clifford, C., and Conour, L. "Characterization of the Charles River GK Rat (GK/TohiCskCrljCrl)." Poster Session, 59th National American Association for Laboratory Animal Science. Indianapolis, IN. 2008.
6. Liang, H., Driscoll, R., Harbert K., **Chou, S.**, and Conour, L. "Impact of Transportation on Murine Xenograft Tumor Models." Poster Session, 59th National American Association for Laboratory Animal Science. Indianapolis, IN. 2008.
7. **Chou, S.**, Colby, L., White, W. "Air Transport of Laboratory Mice and Rats: What You Should Know Before You Ship." Electronic tutorial module developed for ACLAM/IATA. 2008.
8. Conour, L. **Chou, S.**, Driscoll, R., Fister, R., Clifford, C., and Liang, H. "High dietary sodium provokes development of hypertension in lean SHROB." Poster Session, 57th National American Association for Laboratory Animal Science. Salt Lake City, UT. 2006.
9. Parker, N.J., **Chou, S.**, Mahoney, M.A., Driscoll, R.A., and Conour, L.A. "Embryo Transfer as a Means of Eliminating Potential Pathogens in the Guinea Pig (*Cavia porcellus*)." Poster Session, 39th Annual Meeting of the Society for the Study of Reproduction. Omaha, NE. 2006.
10. **Chou, S.**, Rabkin, B, Dowling, S., Vaezy, S. Theiss, P. "An immunocompetent orthotopic isograft mouse model of ovarian epithelial carcinoma for high-intensity focused ultrasound treatment." *Comparative Medicine* 54(6): 2004.
11. Li, W., **Chou, S.**, Wang, C., Perkins, J. "The role of the liver in peripheral tolerance: induction through oral antigen feeding." *American Journal of Transplantation*. 4(10):1574-82, 2004.

12. **Chou, S.**, Rabkin, B., Theiss, P., Vaezy, S. "Characterization of ovarian cancer progression in an immunocompetent mouse model in preparation for high-intensity focused ultrasound treatment." Poster Session, 54th National American Association for Laboratory Animal Science, Seattle, WA. 2004.
13. Li, W., **Chou, S.**, Wang, C., Perkins, J. "The role of the liver in peripheral tolerance." (Abstract) University of Washington Department of Surgery, The Ninth Annual Resident Research Symposium, 2003.
14. **Chou, S.**, Ladiges, W. "Detection of transgene expression in mouse peripheral blood lymphocytes: a minimally-invasive microassay." *Comparative Medicine* 52(6): 533-537, 2002.
15. **Chou, S.**., Filly, G., W. Ladiges. "A minimally-invasive micro-assay for detecting transgene expression in mouse white blood cells." (Abstract) *Contemporary Topics* 40(4): 55-56, 2001.
16. **Chou, S.** "A Fairy Tooth Tale," *Journal of Veterinary Dentistry* 16(2): 94, 1999.

Melvin B. Dennis, Jr., DVM, DACLAM, Professor Emeritus

1. Perret-Gentil M, Sinanan M, **Dennis MB Jr**, Horgan S, Weyhrich J, Anderson D, Hudda K (1999). Videoendoscopy: An effective and efficient way to perform multiple visceral biopsies in small animals. J Invest Surg 12(3):155-163.
2. **Dennis MB Jr (**1999). Alternative training methods II: Incorporating inanimate surgical models. Lab Animal, 28(5):32-36.
3. **Dennis MB Jr (**2000). Humane endpoints for genetically engineered animal models. Inst Lab Anim Resources J, 41(2):35-39.
4. **Dennis MB Jr** (2000). IACUC review of genetic engineering. Lab Animal, 29(3):1-4.
5. Perret-Gentil MI, Sinanan MN, **Dennis MB Jr**., et al (2000). Videoendoscopic techniques for collection of multiple serial intra-abdominal biopsy specimens in HIV-negative and HIV-positive pigtail macaques (*Macaca nemestrina*). J Invest Surg, 13:181-195.
6. **Dennis MB Jr (**2002). Welfare issues of genetically modified animals. Inst Lab Animal Resources J, 43(2):100-110.

Selected book chapters

1. **Dennis MB Jr** (1999). IACUC Review of Genetic Engineering Protocols. IN: Genetic Engineering and Animal Welfare: Preparing for the 21st Century. Whitney RA (ed). Scientists Center for Animal Welfare, Greenbelt, MD, pp 20-31.

Ronald F. DiGiacomo, VMD, MPH, Professor Emeritus

1. Deeb BJ, **DiGiacomo RF** (2000). Respiratory diseases of rabbits. Vet. Clinics No. Am: Exotic Anim. Practice. 3:465-480.
2. Martin KM, Rossing M, Ryland LM, **DiGiacomo RF**, Freitag WA (2000). Evaluation of dietary and environmental risk factors for hyperthyroidism in cats. JAVMA. 217:853-856.
3. Koszdin KL, **DiGiacomo RF** (2002). Outbreak: Detection and Investigation. Cont. Top. Lab Anim. Sci. 41:18-27.
4. Hankenson FC, Johnston NA, Weigler BJ, **DiGiacomo RF** (2003). Zoonoses of occupational health: importance in contemporary laboratory animal research. *Comp Med* 53:579-601.
5. Pollari FL, **DiGiacomo RF**, Evermann JF (2003). Comments on comparison of culling rates among cows. J Am Vet Med Assoc. Oct 1;223(7):946; author reply 946.

6. Weigler BJ, **DiGiacomo RF**, Alexander SA (2005). National survey of laboratory animal workers concerning occupational risks for zoonotic diseases. *Comp Med* 55: 183-191.
7. Chase KL, **DiGiacomo RF**, Van Hoosier GL (2006). Biomedical journals: keeping up and reading critically. J Am Assoc Lab Anim Sci. Sep;45(5):8-15. Review.
8. Norman SA, **DiGiacomo RF**, Gulland FM, Meschke JS, Lowry MS (2008). Risk factors for an outbreak of leptospirosis in California sea lions (Zalophus californianus) in California, 2004. J Wildl Dis. 2008 Oct;44(4):837-44.
9. Lipton BA, Hopkins SG, Koehler JE, **DiGiacomo RF** (2008).A survey of veterinarian involvement in zoonotic disease prevention practices. J Am Vet Med Assoc. Oct 15;233(8):1242-9

Charles W. Frevert, DVM, ScD, Associate Professor

Peer Reviewed Publications (Out of 60 total publications)

1. Cummings CJ, Martin TR, **Frevert CW**, Quan JM, Wong VA, Mongovin SM, Hagen TR, Steinberg KP, Goodman RB. Expression and function of the chemokine receptors CXCR1 and CXCR2 in sepsis. J Immunol 1999;162:2341-2346.
2. Hoffer E, Baum Y, Tabak A, **Frevert C**. Adhesion molecules of blood polymorphonuclear leukocytes and alveolar macrophages in rats: modulation by exposure to ozone. Human & Experimental Toxicology 1999;18:547-551.
3. **Frevert CW**, Matute-Bello G, Skerrett SJ, Goodman RB, Kajikawa O, Sittipunt T, Martin TR. Effect of CD14 Blockade in rabbits with *Escherichia coli* pneumonia and sepsis. J of Immunol 2000;164:5439-5445.
4. Matute-Bello G, **Frevert CW**, Kajikawa O, Skerrett SJ, Goodman RB, Park DR, Martin TR. Septic shock and acute lung injury in rabbits with peritonitis: failure of the neutrophil response to localized infection. Am J Respir Crit Care Med 2000, Am J Respir Crit Care Med, 2001 163:234-243.
5. Matute-Bello G, Liles WC, **Frevert CW**, Nakamura M, Wynant K, Ballman K, Kiener PA, Martin TR. Recombinant human Fas-ligand induces alveolar epithelial cell apoptosis and lung injury in rabbits. Am J Physiol:Lung 2001;281:L328-L335.
6. Matute-Bello G, **Frevert CW**, Liles W, Nakamura M, Ruzinski J, Ballman K, Wong V, Vathanaprida C, Martin TR. The Fas/FasL system mediates epithelial injury, but not pulmonary host defenses, in response to inhaled bacteria. Infect and Immun 2001;69:5768-5776.
7. **Frevert CW**, Goodman RB, Kinsella MG, Kajikawa O, Ballman K, Clark-Lewis I, Proudfoot AEI, Wells TNC, Martin TR. Tissue-specific mechanisms control the retention of interleukin-8 in lungs and skin. J Immunol 2002; 168: 3550-3556.
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9. **Frevert CW**, Kinsella, MG Vathanaprida C Goodman RB, Baskin DG, Proudfoot A, Wells T, Wight TN, Martin TR. Binding of IL-8 to Heparan Sulfate and Chondroitin Sulfate in Lung Tissue. Am J Respir Cell Mol Biol 2003; 28: 464-472.
10. Lee JS, **Frevert CW**, Wurfel MM, Martin TR, Goodman RB. Duffy antigen facilitates movement of chemokine across the endothelium in vitro and promotes neutrophil transmigration in vitro and in vivo. J of Immunol 2003, 170: 5244-5251.

11. Park DR, Thomsen AR, **Frevert CW**, Pham U, Skerrett SJ, Kiener PA, Liles WC. Fas (CD95) induces proinflammatory cytokine responses by human monocytes and monocyte-derived macrophages. J of Immunol 2003 170: 6209-6216.
12. Wagner TE, **Frevert CW**, Herzog EL, Schnapp LM. Expression of the intergrin subunit □8 in lung development. J Histochem Cytochem 2003;51:1307-1315.
13. Rai S, Engelberts D, Laffey JG, **Frevert C**, Kajikawa O, Martin TR, Post M, Kavanagh BP. Therapeutic hypercapnia is not protective in *in vivo* surfactant depletion. Peds Research 2003;55:1-8.
14. Langdale LA, Kajikawa O, **Frevert C**, Liggitt HD. Sustained tolerance to lipopolysaccharide after liver ischemia-reperfusion injury. Shock 2003;19:553-558.
15. Moriyama K, Ishizaka A, Nakamura M, Kubo H, Kotani T, Yamamoto S, Ogawa EN, Kajikawa O, **Frevert CW**, Kotake Y, Morisaki H, Koh H, Tasaka S, Martin TR, Takeda J. Enhancement of the endotoxin recognition pathway by ventilation with a large tidal volume in rabbits. Am J Physiol Lung Cell Mol Physiol 2004; 286: L1114-L1121.
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17. Nakamura M, Matute-Bello G, Liles WC, Hayashi S, Kajikawa O, Lin SM, **Frevert CW**, Martin TR. Differential response of human lung epithelial cells to Fas-induced apoptosis. Am J Pathol 2004;164:1949-1958.
18. Matute-Bello G, Lee JS, **Frevert CW**, Liles WC, Sutlief S, Ballman K, Wong V, Selk A, Martin TR. Optimal timing to repopulation of resident alveolar macrophages with donor cells following total body irradiation and bone marrow transplantation in mice. J Immunol Methods 2004;292:25-34.
19. Altemeier, W.A., Matute-Bello, G., **Frevert, C.W.,** Kawata, Y., Kajikawa, O., Martin, T.R. and Glenny, R.W.: Mechanical Ventilation with Moderate Tidal Volumes Synergistically Increases Lung Cytokine Response to Systemic Endotoxin. Am J Physiol Lung Cell Mol Physiol 2004;287:L533-L542.
20. Kajikawa O, **Frevert CW**, Lin SM, Goodman RB, Mongovin SM, Wong V, Ballman K, Daubeuf B, Elson G, Martin TR. Gene expressio of toll-like receptor-2, toll-like receptor-4 and MD2 is differentially regulated in rabbits with *Escherichia coli* pneumonia. Gene 2005;3:193-202.
21. Matute-Bello G, Liles WC, **Frevert CW**, Dhanireddy S, Ballman K, Wong V, Green RR, Song HY, Witcher DR, Jakubowski JA, Martin TR. Blockade of the Fas/FasL system improves pneumococcal clearance from the lung without preventing bacteremic dissemination to the spleen. J Infec Dis 2005;191:596-606.
22. Kim KH, Burkhart K, Chen P, **Frevert CW**, Randolph-Habecker J, Hackman RC, Soloway PD, Madtes DK. Tissue inhibitor of metalloproteinase-1 deficiency amplifies acute lung injury in bleomycin exposed mice. Am J of Cell and Mol Biol 2005;33:271-279.
23. Matute-Bello G, Lee JS, Liles WC, **Frevert CW**, Mongovin S, Wong V, Ballman K, Sutlief S, Martin TR. Fas-mediated acute lung injury requires fas expressin on nonmyeloid cells of the lung. J Immunol 2005;175:4069-4075.
24. Lee JS, **Frevert CW**, Matute-Bello G, Wurfel MM, Wong VA, Lin SM, Ruzinski J, Mongovin S, Goodman RB, Martin TR. TLR-4 pathway mediates the inflammatory response but not bacterial eliminiaton in E. Coli pneumonia. Am J Physiol Lung Cell Mol Physiol 2005;289:L731-L738.
25. Martin TR, **Frevert CW**. Innate Immunity in the lungs. Proceedings of the American Thoracic Society 2005;2:403-411.
26. **Frevert CW**, Sannes PL. Matrix proteoglycans as effector molecules for epithelial cell function. Eur Respir Rev 2006;14(97):1-8.

27. **Frevert CW**, Boggy G, Keenan TM, and Folch A. Measurement of cell migration in response to an evolving radial chemokine gradient triggered by a microvalve, Lab on a Chip 2006;6:849-856.
28. O'Mahoney D, Liles W, Altemeier W, Dhanireddy S, **Frevert CW**, Liggitt D, Martin T, Matute-Bello G. Mechanical ventilation interacts with endotoxemia. Critical Care 2006;10, R136.
29. Lee JS, Wurfel M, Matute-Bello G, **Frevert CW**, Rosengart M, Ranganathan M, Wong V, Holden T, Sutlief S, Richmond A, Peiper S, Martin T. The Duffy antigen modifies systemic and local tissue chemokine responses following LPS stimulation. J Immunol 2006; 177, 8086-8094.
30. Krupa A, Walencka MJ, Shrivastava V, Loyd T, Fudala R, **Frevert CW,** Martin TR, Kurdowska AK. Anti-kc autoantibody:Kc complexes cause severe lung inflammation in mice via IgG receptors. *Am J Respir Cell Mol Biol* 2007; 37:532-543.
31. Matute-Bello G, Wurfel MM, Lee JS, Park DR, **Frevert CW**, Madtes DK, Shapiro SD, Martin TR. Essential role of MMP-12 in fas-induced lung fibrosis. *Am J Respir Cell Mol Biol* 2007; 37:210-221.
32. Otto CM, Markstaller K, Kajikawa O, Karmrodt J, Syring RS, Pfeiffer B, Virginia P, Good VP, **Frevert CW**, Baumgardner, JE. Spatial and Temporal Heterogeneity of Ventilator-Associated Lung Injury after Surfactant Depletion, *Journal of Applied Physiology*, 2008; 104(5): 1485-94.
33. West TE, **Frevert CW**, Liggitt HD, Skerrett SJ. Inhalation of Burkholderia thailandensis results in lethal necrotizing pneumonia in mice: a surrogate model for pneumonic melioidosis. Trans R Soc Trop Med Hyg. 2008;102/S1:S119-S126.
34. Bem, R. A., A. W. Farnand, V. Wong, A. Koski, M. E. Rosenfeld, N. van Rooijen, **C. W. Frevert**, T. R. Martin, and G. Matute-Bello. Depletion of Resident Alveolar Macrophages Does Not Prevent Fas-Mediated Lung Injury in Mice. *Am J Physiol Lung Cell Mol Physiol, 2008;* 295(2):L314-25.
35. Matute-Bello, G., **C.W. Frevert**, and T.R. Martin, Animal Models of Acute Lung Injury. *Am J Physiol Lung Cell Mol Physiol*, 2008; 295(3):L379-399.
36. Park, H., K. Staehling-Hampton, M.W. Appleby, M.E. Brunkow, T. Habib, Y. Zhang, F. Ramsdell, H.D. Liggitt, B. Freie, M. Tsang, G. Carlson, S. Friend, **C.W. Frevert**, and B.M. Iritani, A point mutation in the murine Hem1 gene reveals an essential role for Hematopoietic Protein 1 in lymphopoiesis and innate immunity J. Exp. Med. 2008; 205(12):2899-913
37. Smith LS, Kajikawa O, Elson G, Wick M, Mongovin S, Kosco-Vilbois M, Martin TR, **Frevert CW**. Effect of TLR4 Blockade on Pulmonary Inflammation Caused by Mechanical Ventilation and Bacterial Endotoxin, *Exp Lung Res*, 2008; 34(5): 225-43.
38. Webb-Robertson BM, Mccue LA, Beagly N, Mcdermott JE, Wunschel DS, Varnum S, Hu JZ, Isern NG, Buchko GW, Mcateer K, Skerrett SJ, Liggitt D, Pounds JG, **Frevert, CW**. A Bayesian Integration Model of High-Throughput Proteomics and Metabolomics Data for Improved Early Detection of Microbial Infections. *Pac Symp Biocomput*. 2009:451-63.
39. Hukkanen, R.R., H. Denny Liggitt H.D, Murnane R.D., **Frevert C.W.** Systemic Inflammatory Response Syndrome in Non-human Primates Culminating in Multiple Organ Failure, Acute Lung Injury, and Disseminated Intravascular Coagulation, *Toxicol. Pathol.* 2009: 37:799-804
40. Wunschel, D., Webb-Robertson, B. J., **Frevert, C.W.,** Skerrett, S., Beagley, N. Willse, A., Colburn, H., and Antolick, K. 2009. Differentiation of gram-negative bacterial aerosol exposure using detected markers in bronchial-alveolar lavage fluid. PLoS ONE 4(9):e7047.
41. Smith, L. S., Gharib S. A., **Frevert C. W.,** and T. R. Martin. Effects of Age on the Synergistic Interactions between Lipopolysaccharide and Mechanical Ventilation in Mice. *Am J Respir Cell Mol Biol*. 2010 (In Press).
42. Keenan, T.M., **Frevert, C.W.,** Wu, A., Wong, V., and Folch, A. A New Method for Studying Gradient-Induced Neutrophil Desensitization Based on an Open Microfluidic Chamber. *Lab on a Chip*. 2010 (In Press).

43. Gill, S., Wight, T.N., and **Frevert, C.W.,** Proteoglycans: Key Regulators of Pulmonary Inflammation and the Innate Immune Response to Lung Infection. *Anat. Rec*. 2010 (In Press).
44. Tanino Y, DR Coombe, SE Gill, WC Kett, O Kajikawa, AE Proudfoot, TN Wells, WC Parks, TN Wight, TR Martin, **CW Frevert**. Kinetics of chemokine-glycosaminoglycan interactions control neutrophil migration into the airspaces of the lungs. *J Immunol*. 2010 (In Press).

Book Chapters

1. Martin TR, Matute-Bello G, Skerrett SJ, **Frevert CW**. Extrapulmonary Sepsis and Cytokines in Lung Injury and Defense. In: Nelson S, Martin TR, eds. *Cytokines in Pulmonary Disease*. New York, NY: Marcel Dekker, Inc., 2000, pp 403-458.
2. **Frevert CW**, Matute-Bello G, Martin TR. Rabbit models of pneumonia, peritoneal sepsis and lung injury. In: Proudfoot A, ed. *Chemokine Protocols*. Humana Press Molecular Biology Series, Humana Press, Totowa, NJ, 2000.
3. **Frevert CW**, Martin TR. Sepsis and the lung host response. In: Pulmonary Host Defenses, Seminars in Respiratory and Critical Care Medicine 2004;25:85-93.
4. **Frevert CW and Wight T**. Extracellular Matrix. Chapter In: *The Encyclopedia of Respiratory Medicine*. G Laurent, ed. Elsevier, London, U.K. (2006)
5. **Frevert, C.W.,** Key Elements of Immunohistochemistry. Chapter In: Principles and Applications of Immunohistochemistry. In Press

Cynthia Glover, DVM, MS, Senior Fellow 2001-2004

1. **Glover CE**, Gurley KE, Kim KH, Storer B, Fero ML, Kemp CJ. Endocrine dysfunction in p27Kip1 deficient mice and susceptibility to Wnt-1 driven breast cancer. Fred Hutchinson Cancer Research Center, Seattle, WA 98109, USA.

Jennifer E. Graham, DVM, DABVP-Avian, DACZM, Affiliate Assistant Professor

Refereed Publications

1. Mickley K, Buote M, Kiupel M, **Graham JE**, Orcutt C. Ovarian hemangiosarcoma in an orange-wing Amazon parrot. Journal of Avian Medicine and Surgery 23(1): 29-35, 2009
2. **Graham JE**, Kollias-Baker C, Craigmill AL, Thomasy SM, Tell LA. Pharmacokinetics of ketoprofen in Japanese quail (*Coturnix japonica*). Journal of Veterinary Pharmacology and Therapeutics 28:399-402, 2005
3. Ferrell ST, De Cock HE, **Graham JE**, Kass PH, Tell LA. Assessment of a caudal external thoracic artery axial pattern flap for treatment of sternal cutaneous wounds in birds. American Journal of Veterinary Research 65 (4):497-502, 2004
4. **Graham JE**, Tell LA, Lamm M, Lowenstine LJ. Megacloaca in a Moluccan cockatoo (*Cacatua moluccensis*). Journal of Avian Medicine in Surgery 18(1):41-49, 2004
5. **Graham JE**, Werner JA, Lowenstine LJ, Wallack ST, Tell LA. Periorbital liposarcoma in an African grey parrot (*Psittacus erythacus*). Journal of Avian Medicine and Surgery 11(3):147-153, 2003
6. Wilson GH, **Graham JE**. Management of egg-related peritonitis in a blue and gold macaw (*Ara ararauna*). Compendium 25(1):42-47, 2003

7. Gibbons PM, Busch MD, Tell LA, **Graham JE**, Lowenstine LJ. Internal papillomatosis with intrahepatic cholangiocarcinoma and gastrointestinal adenocarcinoma in a peach-fronted conure (*Aratinga aurea*). Avian Pathology 46:1062-1069, 2002
8. **Graham JE**, Roberts RE, Wilson GH, Boyd KL: Perianal apocrine gland adenocarcinoma in a ferret. Compendium 23(4):359-362, 2001
9. **Graham JE**, Larocca RD, McLaughlin SA: Implantation of an intraocular silicone prosthesis in a great horned owl (*Bubo virginianus*). Journal of Avian Medicine and Surgery 13(2):98-103, 1999

Review Articles

1. **Graham JE**, Tell LA. Problem Solving in Avian Medicine. Journal of Exotic Pet Medicine: Evidence and Problem Solving 18(3): 187-193, 2009
2. **Graham JE,** Heatley JJ. Raptor emergency medicine. Veterinary Clinics of North America: Exotic Practice. Emergency Medicine. Emergency and Critical Care 10(2): 395-418, 2007
3. Hawkins M, **Graham JE**. Rodent emergency medicine. Veterinary Clinics of North America: Exotic Practive. Emergency Medicine. Emergency and Critical Care 10(2):501-532, 2007
4. **Graham JE**. Common techniques in the rabbit. Veterinary Clinics of North America: Exotic Practice. Common Procedures 9(2):367-388, 2006
5. **Graham JE**, Kent MS, Theon AP. Current therapies in exotic animal oncology. In: Veterinary Clinics of North America: Exotic Practice. Oncology 7(3):757-782, 2004
6. **Graham JE**. Approach to the dyspneic avian patient. In: Seminars in Avian and Exotic Medicine: Emergency Medicine 13(3):154-159, 2004
7. **Graham JE**. Rabbit wound management. In: Veterinary Clinics of North America: Exotic Animal Practice. Wound Management 7(1):37-55, 2004
8. **Graham JE**, Fidel J, Mison M. Rostral maxillectomy and radiation therapy to manage squamous cell carcinoma in a ferret. Veterinary Clinics of North America: Exotic Practice. Case Reports: The Front Line in Exotic Medicine 9(3):701-706.

Book Chapters

1. **Graham JE**, Wright TF, Dooling RJ, Korbel R. Sensory Capacities of Parrots. *In:* Luescher A, ed. Manual of Parrot Behavior. Ames, IA: Blackwell Publishing, 2006

Non-refereed Publications

1. **Graham JE**. Abstract summary and commentary on human deaths associated with rodent LCM virus and LCM virus infection in organ transplant recipients – Massachusetts, Rhode Island, 2005. Exotic Mammal Medicine and Surgery. Volume 3.2 December; 10, 2005
2. **Graham JE**. Abstract summary and commentary on hedgehog zoonoses. Exotic Mammal Medicine and Surgery. Volume 3.1 May; 12, 2005
3. **Graham JE**. Approach to the dyspneic avian patient. Proceedings for the Veterinary Specialty Center Annual Conference, Lynnwood, WA, March, 2004
   Graham, JE. The rabbit liver in health and disease. The House Rabbit Society Newsletter, 2004.
5. Seibert LS, **Graham JE**. That time of year? Seasonal reproductive disorders in birds. Association of Avian Veterinarians Proceedings; 219-227, New Orleans, 2004
6. **Graham JE**. 'Ask the vet' column in Pet and Aviary Bird Magazine, 2004-2005
7. **Graham JE**. Abstract summary and commentary on pathophysiological and functional aspects of the megacolon-syndrome of homozygous spotted rabbits. Exotic Mammal Medicine and Surgery. Volume 1.2 December; 13-14, 2003

8. **Graham JE**. Ferret medicine. Proceedings of the UC Davis Avian and Exotic Symposium, 2003
9. **Graham JE**. 'The Owl' – online client education newsletter; monthly from 11/03 – 7/04, then quarterly until 2005
10. **Graham JE**, Tell LA, Klasing K, Kollias-Baker C. Preliminary investigation into the pharmacodynamics of ketoprofen in adult Japanese quail (*Coturnix japonica*). Association of Avian Veterinarians Proceedings; 75-77, Monterey, 2002
11. Ferrell ST, De Cock HV, Tell LA, **Graham JE**, Kass P. Evaluation of an axial pattern skin flap for the treatment of sternal cutaneous wounds in birds using Japanese quail (*Coturnix Coturnix japonica*). American College of Veterinary Surgeons Proceedings, 2002
12. Ferrell ST, **Graham JE**, Swaim SF. Avian wound healing and management. Association of Avian Veterinarians Proceedings; 337-347, Monterey, 2002
13. **Graham JE**, Tell LA, Kollias-Baker C, Craigmill AL. UC Davis Annual House Officer's Day Proceedings; Pharmacokinetics of ketoprofen in adult Japanese quail (*Coturnix japonica*), 2002
14. Gibbons PM, Norris AJ, **Graham JE**, Osofsky A, Koski M, Terio K. Mid-body swelling in a wild-caught amelanistic corn snake, *Elaphe guttata guttata*. Proceedings of the Association of Reptile and Amphibian Veterinarians; 55-57, Reno, 2002
15. **Graham JE**. Various client handouts, 2002 – present
16. **Graham JE**, Tell LA, Kollias-Baker C, Craigmill AL. Pharmacokinetics of ketoprofen in adult Japanese quail (*Coturnix japonica*). Association of Avian Veterinarians Proceedings;9-21, Orlando, 2001
17. Wilson GH, **Graham JE**, Roberts RE, Greenacre CB, Ritchie BW. Integumentary masses in birds: surgical and medical treatment. Association of Avian Veterinarians Proceedings; 211-214, Portland, 2000
18. Greenacre CB, Wilson GH, **Graham JE,** Ritchie BW. The many faces of megabacterium. Association of Avian Veterinarian Proceedings; 193-196, Portland, 2000
19. Wilson GH, **Graham JE,** Ritchie BW. Otitis externa in a group of neonatal psittacine birds. Association of Avian Veterinarian Proceedings; 197-198, Portland, 2000
20. **Graham JE.** Case review: Management of a perianal carcinoma in the ferret. University of Georgia College of Veterinary Medicine Exotic Animal Symposium: Recent Advances and Practical Information Proceedings, 2000
21. **Graham JE.** Pasteurellosis in rabbits. University of Georgia College of Veterinary Medicine Exotic Animal Symposium: Recent Advances and Practical Information Proceedings, 2000

Guest Editing

1. Guest Editor of Veterinary Clinics of North America: Exotic Animal Practice. Oncology. September 2004

Manuscripts in Preparation

1. 'Basic Approach to Veterinary Care for Rabbits' – chapter written for the 3rd Edition of Ferrets, Rabbits, and Rodents – submitted in 2009, to be published in 2010

Catherine E. Hagan, DVM, Acting Instructor PhD Student, Senior Fellow 2004-2008

1. **Hagan C. E**., Neumaier J. F., Schenk, J. O. "*Rotating disk electrode voltammetry measurements of serotonin transporter kinetics in synaptosomes.*" **Analytical Chemistry**. Submitted.

2. Tolwani R. J., **Hagan C. E**., Runstadler J. A., et al. "*Magnetic resonance imaging and surgical repair of cleft palate in a four-week-old canine (Canis familiaris): An animal model for cleft palate repair.*" **Contemporary Topics in Laboratory Animal Science**. 2004. 43(6):17-21.
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2. **Hagan, C. E**., Neumaier, J. F. "*Rotating disk electrode voltammetry reveals multiple transport systems and 5-HT_{1B} autoreceptor regulatory mechanisms for serotonin in brain synaptosomes.* **American College of Neuropsychopharmacology**, 48:1-61, 2009..

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Adeline (Lynn) M. Hajjar, DVM, PhD, Research Associate Professor

1. Aldape MJ, Bryant AE, Katahira EJ, **Hajjar AM**, Finegold SM, Ma Y, Stevens DL. Innate immune recognition of, and response to, Clostridium sordellii. *Anaerobe*, in press.
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Department of Comparative Medicine
Publications - Faculty and Postdocs
1999-2010

F. Claire Hankenson, DVM, MS, Senior Fellow, 1998-2001

Peer-Reviewed Publications

1. Gwynn SR, **Hankenson FC**, Lauring AS, Rohn JL, Overbaugh J. Feline leukemia virus envelope sequences that affect T-cell tropism and syncytium formation are not part of known receptor-binding domains. *J. Virology* 74(13):5754-5761, 2000.
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10. Stender R, Whitney E, Braun T, **Hankenson FC *.** Establishment of Blood Analyte Intervals for Laboratory Mice and Rats by Use of a Portable Clinical Analyzer. *J Am Assoc Lab Anim Sci*. 46(3): 47-52, 2007.
11. Pritt S, **Hankenson FC**, Wagner T, Tate M**.** The Basics of Animal Biosafety and Biocontainment Training. *Lab Anim (NY),* 36(6): 31-38, 2007.
12. Meier T, Myers DD, Eaton KA, Ko MC, **Hankenson FC**. Gangrenous *Clostridium perfringens* infection and subsequent wound management in a Rhesus Macaque (*Macaca mulatta*). *J Am Assoc Lab Anim Sci*. 46(4): 68-73, 2007.
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Department of Comparative Medicine
Publications - Faculty and Postdocs
1999-2010

19. Garzel LM [t], **Hankenson FC**[t *], Combs J, Hankenson KD. Comparison of quantity and stability of isolated murine DNA measured by quantitative PCR**.** (in press, *Lab Anim (NY)*) [t] these authors contributed equally to this work
20. **Hankenson FC*,** Wathen AB, Eaton K, Miyazawa T, Swiderski DL, Raphael Y. Guinea pig adenovirus infection does not inhibit cochlear transfection with human adenoviral vectors in a model of hearing loss. (*accepted to Comparative Medicine Jan 2010)*

* corresponding author

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2. Wilson JM, **Hankenson FC*.** Comparison of diagnostic testing methods against the zoonotic pathogen, *Giardia duodenalis*, in domestic sheep (*Ovis aries*).
3. **Hankenson FC*,** Braden-Weiss G, Blendy J. Behavioral Assessments of Laboratory Mice (*Mus musculus*) following tail biopsy.
4. **Hankenson FC***, Cooper D, Hupp A, Weigler B. Survey of Vaccination Programs and Tuberculosis Screening Recommendations for Employees in Biomedical Research.
5. **Hankenson FC***, Walton R, Whitney M, Shofer F, Rosenthal K. Establishment of reference intervals for laboratory mice using a tabletop serum chemistry analyzer.

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Book Chapters

1. **Hankenson FC**, VanHoosier GL. Biology and Diseases of Hamsters. In: *Laboratory Animal Medicine, 2nd Edition.* Fox JL, Anderson L, Loew F, Quimby F (eds). Academic Press, CA, 2002.
2. Rush HG, **Hankenson FC**. Ch 68: Animal Research and Diagnostics. In: *APIC Text of Infection Control and Epidemiology, Volume II, 2nd ed.* Ed. Carrico R. Association for Professionals in Infection Control and Epidemiology, Inc. 2005.
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Textbook

1. **Hankenson FC** and Makidon P**.** *Critical Care Management for Laboratory Animals*. CRC Press LLC, Boca Raton, FL. (*in preparation*)

Patrick W. Hanley, DVM, MPH, Senior Fellow 2005-2007

Department of Comparative Medicine
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1999-2010

1. Duclos DD, Hargis AM, **Hanley PW**. "Multiple comedomes and follicular cysts in the interdigital or elbow skin causing furunculosis and draining tracts in dogs, a case series". J of Vet Derm. 19(3) Jun 2008.
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Ann M. Hargis, DVM, MS, DACVP, Affiliate Associate Professor

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Robert D. Harrington, DVM, PhD, Affiliate Clinical Instructor, Senior Fellow 2000-2003

1. Ladiges WC, Filley GM, Morton JF, **Harrington RD**, Treuting PA, Poot M. A Transgenic Mouse Model of Age and Gender Associated Inflammation (2001). *Transgenics* 3:207-214.
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Renee (Gamboa) R. Hukkanen, DVM, MS, DACVP, Clinical Instructor, Senior Fellow 2001-2005

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Brian M. Iritani, DVM, PhD, Associate Professor

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Christopher P. Jerome, BSc, BVetMed, PhD, MRCVS, Affiliate Associate Professor

1. **Jerome CP**, Johnson CS, Vafai HT, Kaplan KC, Bailey J, Capwell B, Fraser F, Hansen L, Ramsay H, Shadoan M, Lees CJ, Thomsen JS, Mosekilde Li, 1999.The effect of treatment for 6 months with human parathyroid hormone (1-34) peptide in ovariectomized cynomolgus monkeys (Macaca fascicularis). Bone 25: 301-309.
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Dana Ness, DVM, MS, Senior Fellow 1997-2001

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(note: previous last name was Smoak)

Manuscripts in Refereed Journals

1. **Smoak** IW. (1999) Glucose metabolism in mouse embryos exposed to metformin in vitro. Toxicol In Vitro 13: 27-33.
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1999-2010

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Jesse C. Wiley, PhD, Acting Assistant Professor

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Norman S. Wolf, DVM, PhD, Adjunct Professor

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9. **Wolf NS**, Penn PE, Rao D, McKee MD. Intraclonal plasticity for bone, smooth muscle, and adipocyte lineages in bone marrow stroma fibroblastoid cells. Exp. Cell Res. 290: 346-57, 2003.
10. Van Remmen H, Ikeno Y. Hamilton M, Pahlavani M, **Wolf N**, et al. Lifelong reduction in MnSOD activity results in increased DNA damage and higher incidence of cancer but does not accelerate aging. Physiol. Genomics 16: 29-37, 2003.
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1999-2010

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15. Melov S, **Wolf N**, Strozyk D, Doctrow S, Bush A. Mice transgenic for Alzheimer disease beta Amyloid develop lens cataracts that are rescued by antioxidant treatment. Free Rad. Biol. Med. 38: 258-61, 2005.
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17. **Wolf N**, Penn P, Pendergrass W, Van Remmen H, Bartke A, Rabinovitch P, Martin GM. Age-related cataract progression in five mouse models for anti-oxidant protection or hormonal influence. Exp Eye Res. 81(3):276-85, 2005.
18. Pendergrass W, Penn P, Possin D, **Wolf N**. Accumulation of DNA, nuclear and mitochondrial debris, and ROS at sites of age-related cortical cataract in mice. Invest Ophthalmol Vis Sci. 2005 Dec;46(12):4661-70.
19. **Wolf N**, Pendergrass W, Singh N, Swisshelm K, Schwartz J. Radiation cataracts: mechanisms involved in their long delayed occurrence but then rapid progression. Mol Vis. 2008 Feb 5;14:274-85.

Department of Comparative Medicine (DCM)
Post-DVM Trainee/Resident List – Master's and Doctoral Degrees Granted
1999-2010

Trainee Name	Period of Training	Institution, Degree at Entry	Degree earned at UW, if any	Board Certification, if any	Current Position
Moritz, Stacey	2010 - present	2010, DVM, Ohio State University			Incoming resident.
Nagy, Lee	2010 - present	1996, DVM, University of Illinois			Incoming resident.
Chan, Maia	2008 - present	2005, DVM, North Carolina State University	MS student		Senior Fellow, Department of Comparative Medicine, University of Washington, Seattle, WA
Moralejo, Daniel	2008 - present	1986, DVM, University of La Plata, Argentina 1998, PhD, University of Tokushima, Japan			Acting Assistant Professor, Department of Comparative Medicine, University of Washington, Seattle, WA
Newsom, Denise	2006 - 2008	2006, VMD, University of Pennsylvania	2009 MS in Comparative Medicine		Clinical Veterinarian, Department of Comparative Medicine, University of Washington, Seattle, WA
Hanley, Patrick	2005 – 2008	2005, DVM, Colorado State University	2008 MS in Public Health		Assistant Professor, Department of Veterinary Services, Michael E. Keeling Center for Comparative Medicine & Research, The University of Texas, MD Anderson Cancer Center, 650 Cool Water Drive, Bastrop, TX 78602
Lucas, Molly	2005 – 2008	2003, DVM, University of California-Davis 1997, MS, University of Hawaii			Clinical Veterinarian, Department of Comparative Medicine, University of Washington, Seattle, WA
Lencioni (Chase), Karen	2004 – 2008	2004, DVM, University of California-Davis	2008 MS in Comparative Medicine	ACLAM	Senior Clinical Veterinarian, California Institute of Technology, Office of Laboratory Animal Resources, 1200 E California Blvd, Mail Code 156-29, Pasadena, CA 91125
Hagan, Catherine	2004 – 2008	2004, DVM, University of California-Davis	PhD candidate		Acting Instructor, Department of Comparative Medicine, University of Washington, Seattle, WA
Myshrall, Timothy	2003 - 2007	2003, DVM, Cornell University 1999, MPH, Yale University			Staff Veterinarian, Biological Resources Unit, Cleveland Clinic Foundation, Cleveland, OH 44195

Department of Comparative Medicine (DCM)
Post-DVM Trainee/Resident List – Master's and Doctoral Degrees Granted
1999-2010

Trainee Name	Period of Training	Institution, Degree at Entry	Degree earned at UW, if any	Board Certification, if any	Current Position
Torrence (Minard), Anne	2003 - 2007	2003, BVSc, University of Sydney, Australia	2007, MS in Comparative Medicine	ACLAM	Veterinarian, Washington National Primate Research Center, University of Washington, Seattle, WA
Baran, Szczepan	2002 - 2005	2002, VMD, University of Pennsylvania	2005, MS in Comparative Medicine		President and COO, Veterinary Bioscience Institute, 292 Main Street, PMB 300, Harleysville, PA 19468 Adjunct Faculty, Drexel University College of Medicine, 2900 Queen Lane, Philadelphia PA 19129
Rickman, Barry	2002 - 2006	2001, VMD, University of Pennsylvania 1997, PhD, Columbia University		ACVP	Veterinary Pathologist, Phoenix Central Laboratories, 11620 Airport Rd # 100, Everett, WA 98204
Granillo (Baskin), Carole	2001 - 2005	2001, MS, Ohio State University, 1996, DVM, North Carolina State University			Scientific Program Officer, Science Foundation Arizona, 400 E. Van Buren Street, Suite 200, Phoenix, AZ 85004 Affiliate Assistant Professor, Department of Comparative Medicine, University of Washington, Seattle, WA
Glover, Cynthia	2001 - 2004	2001, DVM, Texas A&M University			Study Director, SNBL USA, Ltd., 6605 Merrill Creek Pkwy, Everett, WA 98203
Hukkanen (Gamboa), Renee	2001 - 2005	2001, DVM, University of Illinois-Champaign	2005, MS in Comparative Medicine	ACVP	Veterinary Pathologist, Washington National Primate Research Center, University of Washington, Seattle, WA
Chou, Sonja	2000 - 2004	2000, VMD, University of Pennsylvania	2004, MS in Comparative Medicine	ACLAM	Assistant Director, Corporate Veterinary Services, Charles River Laboratories, 251 Ballardvale Street, Wilmington, MA 01887-1000
Harrington, Robert	2000 - 2003	1991, DVM, Washington State University	2008, PhD		Clinical Instructor, Department of Comparative Medicine, University of Washington, Seattle, WA
Pritchett, Kathleen	2000 - 2001	1993, DVM, Washington State University		ACLAM	Director, Research & Professional Services, Charles River Laboratories, 251 Ballardvale Street, Wilmington, MA 01887-1000
Johnston, Nancy	1999 -	1999, DVM, University of	2003, MS in		Research Assistant Professor, Department of Pharmacology,

Department of Comparative Medicine (DCM)
Post-DVM Trainee/Resident List – Master's and Doctoral Degrees Granted
1999-2010

Trainee Name	Period of Training	Institution, Degree at Entry	Degree earned at UW, if any	Board Certification, if any	Current Position
	2003	Illinois-Urbana	Comparative Medicine		& Clinical Veterinarian, Division of Laboratory Animal Medicine, Southern Illinois University, School of Medicine, 801 North Rutledge Street, PO Box 19611, Springfield, IL 62794
Burich, Andrew	1998 - 2002	1998, DVM, University of Wisconsin	2002, MS in Comparative Medicine	ACLAM	Veterinarian & Animal Services Manager, Benaroya Research Institute at Virginia Mason, 1201 Ninth Avenue, IN-RC, Seattle, WA 98101-2795
Hankenson, F. Claire	1997 - 2001	1997, DVM, Purdue University	2001, MS in Microbiology	ACLAM	Assistant Professor, LAM, & Senior Associate Director, ULAR, University of Pennsylvania, 3800 Spruce Street, Philadelphia, PA 19104-6009
Sanders, George	1997 - 2001	1997, DVM, Louisiana State University	2001, MS in Comparative Medicine	Fish Pathologist (AFS/FSH)	Part-Time Instructor, Department of Comparative Medicine, University of Washington, Seattle, WA
Ness, Dana	1997 - 2001	1997, DVM, University of California-Davis	2001, MS in Comparative Medicine		Veterinarian, Fair Isle Animal Clinic, 17312 Vashon Hwy SW, Vashon, WA 98070
Kalishman, Jennifer	1996 - 2000	1996, DVM, University of Wisconsin	2002, MS in Comparative Medicine		Clinical Veterinarian\Educational Services Coordinator, Division of Comparative Medicine, Washington University in St. Louis, Campus Box 8061, 660 South Euclid Avenue, St Louis, MO 63110
Treuting, Piper	1996 - 2000	1996, DVM, Louisiana State University	2000, MS in Comparative Medicine	ACVP	Assistant Professor, Department of Comparative Medicine, University of Washington, Seattle, WA
Perret-Gentil, Marcel	1995 - 1998	1987, DVM, Kansas State University	1999, MS in Comparative Medicine		University Veterinarian and Director, LARC-RST, The University of Texas at San Antonio, One USTA Circle, San Antonio, TX 78249
Brabb, Thea	1994 - 1996	1985, University of Illinois, Urbana	1999, PhD in Molecular Biotechnology	ACLAM	UW Attending Veterinarian & Clinical Associate Professor, Department of Comparative Medicine, University of Washington, Seattle, WA