Research Models of Environmental Exposure

The description of the course:

The students will learn about sentinels of environmental exposure and animal models of diseases that are strongly influenced by the environment. The course will help the students understand the powerful significance that sentinels and animal models can have for the molecular understanding of disease processes and for the development of new drugs and recommendations for environmental protection as well as the limitations of these models. In addition, the course will also give a glimpse of cutting edge research. Finally, the course will address ethical issues associated with cell and animal studies.

The aims of the course:

The objective of this course is to provide students with a review of cell and animal models as tools in research aimed at understanding the molecular basis for the responses to environmental pollution.

At the conclusion of the course, the students should:
1) be familiar with the principles, strengths, and limitations of sentinels and animal models of environmental exposure;
2) be able to evaluate and judge scientific reports from studies involving sentinels or animal models;
3) understand how research models of human disease are developed in a process that molds clinical features of human disease, epidemiological and genetic analysis of clinical and environmental components.

The list of recommended readings:

The websites, book, and journal publication listed below are the general references recommended for the course and should provide reference materials for future use. Additional readings will be assigned later by the individual lecturers.

1) ILAR: Institute for Laboratory Animal Research: ILAR's mission is to evaluate and disseminate information on issues related to the scientific, technological, and ethical use of animals and related biological resources in research, testing, and education. Using the principles of refinement, reduction, and replacement (3Rs) as a foundation, ILAR promotes high-quality science through the humane care and use of animals and the implementation of alternatives. Through the reports of expert committees, the ILAR Journal, web-based resources, and other means of communication, ILAR functions as a component of the National Academies to provide independent, objective advice to the federal government, the international biomedical research community, and the public.
http://dels.nas.edu/ilar_n/ilarhome/index.shtml

2) Science, Medicine, and Animals (2004)
Science, Medicine, and Animals discusses how animals have been and continue to be an important component of biomedical research. It addresses the history of animal research and what it looks like today, and gives an overview of some of the medical advances that would not have been possible without animal models. Finally, it looks at the regulations and oversight governing animal use, as well as efforts to use animals more humanely and efficiently.
http://dels.nas.edu/ilar_n/ilarhome/reports.shtml

3) National Center for Research Resources (NCRR) is a part of the National Institutes of Health (NIH).
NCRR provides laboratory scientists and clinical researchers with the tools and training they need to understand, detect, treat, and prevent a wide range of diseases. NCRR supports all aspects of clinical and translational research, connecting researchers, patients, and communities across the nation. This support enables discoveries made at a molecular and cellular level to move to animal-based studies, and then to patient-oriented clinical research, ultimately leading to improved patient care. The link to scientific resources is: http://www.ncrr.nih.gov/scientific_resources/


The number and duration of each week’s lectures

One lecture (1 hour and 15 minutes) will be given each week for a total of 14 weeks (see Table below for details).

A description of evaluation and examinations

This is a 2-credit course. The grade will be based on class participation (20%), the midterm examination (30%), and the final examination (50%). Both examinations will be based on a review of manuscripts that are relevant to the field of study and that are selected by the course organizer.
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Course instructor/organizer: Gabriele Grunig, DVM, PhD, (845-731-3669)

Plan 2015

Date (if tutorial-lecture course): once weekly, 2 lessons (2.5 hours / week – explanations, manuscripts, small write-up)

Topics (a manuscript relevant to the topic will be discussed)

- Introduction: classification; relevance and importance to human disease
- Genetic Basis for Responses to Environmental Pollutants
- Disease Modeling in Lower Order Animals
- Environmental Exposure in Utero
- Skin Cancer & UV light & environmental exposure
- Environmental Exposure and the Cardio-vascular system
- Environmental causes of Cancer

Midterm Exam

- Environment & the Lungs I
- Environment & the Lungs II
- Environment & the Lungs III
- Environment, the Microbiota & IL-17
- Environment, regulatory T cells & immunologic tolerance
- Helicobacter & the microbial environment
- Ethical Issues in Studies Involving Experimental Animals

Final Exam

If desired, we will use the course to develop an abstract to be presented at an international conference and a review manuscript, as we have done in 2013. The 2013 course produced an award-winning abstract at the 2014 pulmonary hypertension meeting of the German/Austrian/Swiss pulmonary hypertension research group, has been selected for presentation in a poster-discussion session at the international conference of the American Thoracic Society 2015, and is being converted into a manuscript.