

Academics and Research Committee Report

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Introduction

Comparative Medicine is based on the philosophy of one medicine and as a discipline explores the biology and diseases of animals for the benefit of both human and animal health. Comparative medicine scientists come from diverse backgrounds that include veterinary medicine, human medicine, and the basic sciences. They have made valuable contributions to the understanding of basic biology of many species of laboratory animals, the development and validation of animal models, improvement of animal health and welfare, and alternatives to animal use. ACLAM already acknowledges the achievements of comparative medicine scientists; many, if not most, of the honorary members of ACLAM are comparative medicine scientists. Comparative medicine continues to offer a unique opportunity for veterinarians to make valuable contributions in basic and applied research as well as improvement of veterinary care and animal welfare.

Professional challenges for the ACLAM diplomate

The challenges facing laboratory animal medicine today are indeed daunting, and changes in animal based research and teaching are occurring at an ever-increasing rate. These changes are being driven by shifting regulations and standards, new bio-technologies, and alterations in the way academic and other research institutions conduct business.

Today's research institutions are under considerable pressure from regulatory agencies, accreditation organizations, and animal welfare interests to develop and maintain increasingly high standards for laboratory animal care and use. It seems likely that the use of laboratory rodents and birds will soon come under the Animal Welfare Act. Furthermore, the USDA has issued a new policy that clarifies when farm animals are covered under the Animal Welfare Act (AWA). It explicitly states that farm animals used to test and produce biologicals for nonagricultural animals (e.g., dogs and cats) are covered under the regulations. This category includes farm animals used to test biologicals that will eventually be used on both agricultural animals and nonagricultural animals. In addition, farm animals used to test or manufacture biological products that will ultimately be used by humans are covered by the AWA. This use is considered to be biomedical research. The regulations regarding dealers of random source dogs and cats continue to be debated; a new policy on environmental enrichment for nonhuman primates has been accepted, and other rules are under discussion. These issues alone provide ample evidence that the standards for animal care and use continue to spiral upward. However, without adequate scientific input, especially from the fields of animal behavior and species specific biology, there

is a large potential to actually decrease the welfare of laboratory animals. Failure to recognize sources of human bias in assessing animal well-being, making inappropriate comparisons within or between groups and species, and failure to include proper controls, and the scientific methodologies to avoid these errors are well understood in behavioral sciences.

The 1996 edition of the "Guide for the Care and Use of Laboratory Animals," drastically changed the philosophy underlying how animal care programs should be established and evaluated. The new "performance" standards are fundamentally different from the "engineering" standards that fueled the development of the modern laboratory animal vivarium. Ideally performance standards define an outcome in detail and provide criteria for measuring the outcome, but do not limit the methods for achieving that outcome. Unfortunately in many cases, objective data on which to base performance standards are not currently available.

Even if extremists are ignored, the guiding principles of animal welfare (replacement, reduction, and refinement) also will affect the way animal research is performed in the future. Society demands that scientists provide better justification for animal experiments, especially those that have a high potential for inducing pain and distress. The mental health of animals is also beginning to be addressed as typified by the requirements for exercise for dogs and environmental enrichment for primates. More research will be devoted to finding alternatives to traditional animal models. However, predictions that animal-related research would decline were clearly wrong; research animal populations, particularly genetically altered rodents, have experienced rapid and significant increases during the past few years. Members of this rapidly increasing population of genetically altered mice have various health problems and often require specialized care. These mice must be protected from adventitious infectious diseases through increased diagnostic surveillance, rederivation, containment housing, prophylactic drug use and other intervention strategies. Many of these infectious diseases require intense study to develop prevention, control, therapeutic and sensitive and specific diagnostic strategies. The increased inter-institutional traffic in genetically altered mice is compounding the problem.

While most ACLAM diplomates will deal with these issues as administrators or clinicians, these challenges also offer opportunities for diplomates to generate research data that can directly affect animal welfare and the research in which these animals are used.

Evolving needs for biomedical scientists

Balanced against regulatory and welfare requirements, investigators demand improved services to protect and improve the quality of their animal-based research, and, at the same time, to minimize costs. The increased use of

genetically engineered rodents is forcing reevaluation of barrier maintenance of rodents, and there is an increasing awareness of the importance of maintaining appropriate and consistent strain backgrounds to eliminate confounding variables. Investigators also are beginning to demand phenotypic evaluation of thousands of new animal strains created by genetic manipulation. To be complete, phenotypic evaluation should include genetic, morphological, histological, microbial, and behavioral characterization. Soon investigators will demand chemically controlled environments as investigators who design increasingly sophisticated studies 'will discover' that chemicals, allergens, irritants, mutagens, and teratogens can confound study data. While genetic engineering is probably the most pervasive new technology, investigators also increasingly use new monitoring and data collection technologies inside animal facilities to the extent that many animal rooms are truly extensions of the investigator's laboratory. Once again these issues offer fertile opportunities for ACLAM diplomates to make significant contributions in both basic and applied research.

Changing requirements and constraints of academic research institutions

Concurrently, academic research institutions are facing financial constraints, including compliance with cost accounting standards, that place a premium on efficient operation of animal facilities. In many health centers, the increasing role of managed health care has limited resources derived from patient care to be used for physician training and research. These funds cannot be used for research forcing investigators to seek more and more outside funding. Also the widespread use of genetically engineered mice coupled with increasing awareness that adventitious infectious agents not previously recognized are compromising research, are increasing the burden on institutions and investigators to monitor for these agents and eliminate them from existing mouse populations. A recent survey by Jacoby and Lindsey in 1997 revealed that infectious agents are once again either common or not tested for at many institutions. Many genetically altered mice have immunologic perturbations that render them susceptible to otherwise innocuous and widespread emerging or previously recognized pathogens. Despite these increased needs, NIH support for diagnostic and investigative laboratories was precipitously withdrawn. These laboratories that had operated for ~ 30 years have largely disappeared. They provided the necessary resources and personnel to support discovery, and investigation of laboratory animal diseases as well as developing and providing the diagnostic assays to monitor research animal colonies for the myriad of diseases known to infect these populations. These ever increasing pressures to provide state of the art diagnostic oversight to research animals have been severely compromised by forced reduction in animal resource budgets due to changes in cost accounting being mandated by federal agencies.

Need for scientific progress in laboratory animal medicine

To meet these rapidly evolving research needs, laboratory animal medicine specialists will still require traditional training in animal husbandry, clinical veterinary medicine, principles of disease prevention and management of specific pathogen free (SPF) and barrier facilities. However, these traditional ACLAM skills will not suffice as the quality of animals increase and disease levels decrease. The laboratory animal medicine specialist for the future will need to have increased scientific skills. Veterinary education provides a solid foundation upon which increased scientific training can be built. No other profession emphasizes comparative anatomy, physiology, pathology, and medicine to the same extent. This knowledge base is further strengthened by specialty training in laboratory animal medicine. This background training provides veterinarians specializing in laboratory animal medicine the fundamental background necessary to also function as comparative medicine scientists.

However, our specialty must remain current with evolving technology, respond positively to increasing needs to fully understand mammalian genetics and be in the forefront of elucidation of pathogenesis and epidemiology of new diseases in laboratory animals. There is a desperate need for both basic and applied scientific information in laboratory animal and comparative medicine. Professional input from scientists and research findings on any proposed changes to implementation of the Animal Welfare Act are essential mechanisms for injecting information into the development and implementation of USDA regulations. Panels of experts have been convened to consider the scientific basis for evaluating matters of occupational safety, animal well-being, and product testing before regulations in these areas were implemented. However, much of the information regarding environmental enrichment, housing and exercise requirements to provide adequate socialization, and even appropriate specialized housing systems for immunodeficient or transgenic animals, to identify only a few, are based on clinical impressions. These impressions need to be verified, or replaced with scientific data. Otherwise, public perceptions become the underlying basis for regulations. Not only should laboratory animal medicine specialists be involved in generating these data, they must be able to interpret the data of others and use data appropriately to make management decisions. Furthermore, unless some ACLAM members are involved in research, who can serve as role models for, or train, future diplomates, we will lose the ability to train our future generations of ACLAM diplomates. If this unfortunate event occurs, it is only a matter of time until our specialty is devalued.

Professional judgment and hypothesis-based approaches to evaluate the best options for meeting the intent of "The Guide," with IACUC involvement and oversight, have become quintessential ingredients for successful animal care programs and accreditation by AAALAC. Even evaluation of an animal care program requires scientific reasoning coupled with ethical considerations,

understanding of experiment-related complexities, and regulatory mandates to ensure that animals are cared for and used appropriately. There are multiple options for the design and conduct of acceptable programs, but the best programs arise through attention to the scientific foundation for principles of nutrition, disease surveillance and control, and understanding the animal's micro and macro environment. If some ACLAM members do not take an active role in generating the scientific knowledge upon which the future of our clinical specialty will be based, then non-diplomates, and non-veterinarians, will generate the knowledge that will define our specialty in the future. At that point, we will no longer be regarded as having scholarly credentials within academic institutions or within the professional marketplace.

In a broader sense, the laboratory animal medicine specialist also is uniquely qualified to be involved in basic research including development of animal models, study of new laboratory animal diseases, and identification and control of variables that effect animal research. Finally, it is becoming increasingly clear that most biomedical research problems involving human health are best solved by a collaborative effort involving specialists in many different fields. Laboratory animal/comparative medicine veterinary scientists are invaluable collaborators and should be involved as leaders on many of the pressing questions that continue to challenge the biomedical research community.

Conclusions and Recommendations

Clearly there are two essential components to ACLAM. Most diplomates are involved in the implementation of the clinical and administrative services related to laboratory animal care that are required by both industry and academic research institutions. The other necessary component is generation of new knowledge through research. Within ACLAM are diplomates who provide primarily clinical or administrative services, or both; those that devote most of their efforts to research or training endeavors, and some who divide their time among all three. All of these individuals are critical; if we lose, or diminish the value of any of these areas, our specialty will be weakened. The majority of diplomates will primarily function in clinical or administrative services. This majority must recognize and support the smaller research and academic component of our specialty to ensure that diplomates remain involved in generating the knowledge base that defines our specialty. This knowledge must also serve as the foundation for training of future diplomates.

As a college, ACLAM can take positive steps to promote high quality science in the entire field of laboratory animal medicine from basic research designed to generate knowledge to clinical and management application. The ACLAM text series stands out as the standard in veterinary specialties which exemplifies an ongoing effort to inform scientists, via state of the art treatises in relevant species of laboratory animals, of the current knowledge regarding biology, use in research, and diseases. Funding of research through the Foundation is

another pivotal example of steps already taken by the college to promote research, and its effects are beginning to show dividends. Another positive step would be recognizing training and experience in basic or applied research related to laboratory animal medicine as appropriate experience for ACLAM certification. Traditionally, many diplomates have been trained in laboratory animal medicine through training grants funded by NIH. According to PHS policy, these grants are granted to provide research, not clinical training, and this interpretation has been strictly enforced for more than five years. These training grants form the backbone of many training programs recognized by ACLAM. In these programs, research experience should be given equal status with more traditional residency type training and clinical or facilities management experience. This concept, already in the re-certification process to some degree should be extended. ACLAM should take a leadership role to encourage academic, government, and industry research institutions to involve laboratory animal medicine specialists in their research programs both as collaborators and as independent investigators. The value of expertise in animal biology and medicine should be emphasized at the national and international levels so that research teams using animal models routinely incorporate laboratory animal medicine scientists as indispensable members of the research group. Finally, ACLAM should take the lead in emphasizing to scientists, scientific organizations, and NIH that basic research regarding laboratory animal behavior, biology, disease, and medicine is necessary for continued progress in biomedical research. Research that aims to improve animal health, develop new models and techniques, and understand the biology of research animals is just as critical as research that more directly contributes to human health.

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