Animal Studies and One Health: IACUC Considerations

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Background

The articles in this issue vividly illustrate the One Health concept, which historically has applied to the evolutionary dynamics of infectious diseases in nonhuman animals and humans. Stephen S. Morse, a microbiologist, further defined the concept in 1993 when he noted that new pathogens emerge from an enormous, murky pool of known and unknown microbes that occupy many ecological niches in the environment, in animals, and in people. The One Health concept was the basis for Morse’s subsequent founding of the Program for Monitoring Emerging Diseases (ProMED), which has become a “global electronic reporting system for outbreaks of emerging infectious diseases and toxins” that enables early warning of diseases that may affect humans, animals, and plants (www.promedmail.org).

Morse’s insight into the causes of the emergence of new diseases has resulted in a worldwide effort to discover and treat emerging diseases, collaboration among scientists and clinicians in many disciplines, and the development of novel approaches to the treatment of infectious diseases using techniques that have only recently been discovered.

The growing understanding and adoption of the One Health concept is likely to complicate the deliberations of institutional animal care and use committees (IACUCs) through the integration of animal and human research, which require the collection and analysis of numerous, cross-disciplinary observations. This essay reviews aspects of “One Health” research that may be relevant for IACUC consideration in the review and approval of protocols.

The One Health Approach in Clinical Research

As human populations grow and disturb the environment through deforestation, intense animal husbandry practices, pollution, and antibiotic usage, these changes give rise to new selection pressures, enabling previously silent microbes to jump from animals to humans or mutate to cause novel diseases (e.g., AIDS, SARS) that are direct consequences of human activity. These new diseases require study to understand their origins and mechanisms of transmission and infection, and the One Health concept has expanded to include the use of animal models for such research.

Animal models are also critical in studies of long-standing diseases and conditions. Gordon and Khanna (2010) and Withrow and Wilkins (2010) describe the use of dogs in efforts to develop surgical and pharmaceutical approaches to the treatment of cancer. Such studies are important because research of novel therapeutic agents in mice often does not yield results that can be directly applied to humans. Because osteosarcoma in particular is similar in both people and dogs, the latter are an ideal model for studies and trials in this area (Withrow and Wilkins 2010). Preclinical trials of therapeutic agents in dogs (typically pets whose owners wish to try new treatments to achieve remission or a cure) improve the usefulness of such trials before moving to human subjects.

The One Health Approach Beyond the Laboratory

The Public Health Service (PHS) Policy requires oversight of the use of all types of vertebrate animals, both in the laboratory and in the wild (NIH 2002):

If the activities are PHS-supported and involve vertebrate animals then the IACUC is responsible for oversight in accord with PHS Policy. IACUCs must know where field studies will be located, what procedures will be involved, and be sufficiently familiar with the nature of the habitat to assess the potential impact on the animal subjects. Studies with the potential to impact the health or safety of personnel or the animal’s environment may need IACUC oversight, even if described as purely observational or behavioral. When capture, handling, confinement, transportation, anesthesia, euthanasia, or invasive procedures are involved, the IACUC must ensure that proposed studies are in accord with the Guide [for the Care and Use of Laboratory Animals; NRC 1996]. The IACUC must also ensure compliance with the requirements of pertinent state, national, and international wildlife regulations.

A study on free-living wild USDA-covered species that involves invasive procedures, harms, or materially alters the behavior of an animal under study is covered by USDA animal welfare regulations and requires IACUC review and approval.

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Thus protocols describing studies of wild animals require review by the IACUC. But such protocols are unusual and may present challenges for the committee. For example, there is no way to verify the handling of the wild animals as the research often takes place at remote sites.

Furthermore, some off-site research practices require IACUC approval and others do not. Studies of the shedding of enterohemorrhagic *Escherichia coli* (EHEC) O157, described by García, Fox, and Besser (2010), would require review if the animals were captured, samples obtained, and released, whereas IACUC approval would not be necessary for research that relies on fecal samples and does not require capturing the animal. IACUC members must be attentive to such distinctions.

**The One Health Approach in Public Health**

The discovery of West Nile virus in the brains of patients who died of encephalitis illustrates the need for collaboration between human and comparative medicine practitioners. The virus first appeared in humans in Uganda in 1937, then in Israel in 1957 and New York state in 1999, and has now spread to much of the world. But, as Palacios, Briese, and Lipkin (2010) explain, it was not until 1999 that researchers finally made the connection between the concurrent appearance of the disease in humans, birds, and mosquitoes.

The early involvement of infectious disease experts and epidemiologists can facilitate the early detection of novel disease-producing agents and the development of containment methods such as vaccines. Efforts to treat and prevent the following diseases might have benefited from such early cross-disciplinary collaboration:

- Ebola: no specific therapy is available; a vaccine is still experimental;
- Dengue fever: prevention depends on the use of mosquito repellent; no specific therapy is available;
- Lassa fever: supportive therapy is available; efforts are under way to develop a vaccine.

These examples illustrate the desirability of approving cross-disciplinary protocols, which require more work but ultimately are worth the extra effort.

**Clear and Accurate Communication**

Beyond scientific expertise, excellent communication skills are a must, as became dramatically evident in the recent experiences with the novel H1N1 virus, initially dubbed the swine flu—the incorrect use of the word “swine” led to the needless slaughter of thousands of pigs in Egypt and Mexico (Pappaioanou and Gramer 2010). It takes an experienced communicator to provide meaningful explanations to a public that has only a hazy understanding of the science involved. Better understanding of public risk perception can also contribute to more effective messages about emerging zoonoses and the role of wildlife (Decker et al. 2010).

Careful choice of words, experience interacting with the press, and cautious interpretation of the available data are all critical. In all cases it is important to avoid overreacting and to encourage other control measures such as quarantine where indicated. Everyone involved should be clear about discussing the findings of research, especially when communicating with the public.

**Online Reporting and Resources**

Many scientists are now using the internet to share observations and therapeutic results in the hopes of enabling new treatments to improve the health and well-being of animals and humans alike. Veterinarians and physicians should therefore have training in techniques for recording and posting observations of a novel illness that appears to be transmitted. Local or state health departments and the Centers for Disease Control and Prevention (CDC) encourage or may require such reporting, and the IACUC should be aware of such requirements.

The IACUC should also ensure that both veterinarians and physicians learn about what is currently known about emerging pathogens and outbreaks through online postings from CDC, local health departments, and ProMED (Rabinowitz 2010 describes additional registries and databases). Early detection and information about microbes that may cause illness in humans and nonhuman animals could lead to further studies on both.

**Institutional Review Collaboration**

A “One Health” approach may apply to collaboration not only between disciplines but also between institutional review bodies. Studies may require review by both the IACUC and the institutional review board (IRB) if new methods of treatment are proposed to address the effects of a novel organism on human and nonhuman animals. In the experience of this author, involvement of the IRB may entail one or more joint meetings with the IACUC. Each committee has a different focus and a different way of approaching study approval, so several meetings may be necessary to resolve all issues. The number of joint meetings of the two committees may increase so that members of both are confident that the interests of their constituency are satisfied.

**References**


