Taking the Guesswork out of Toxicology

Cancer is now the #1 killer of Americans under 85, having just surpassed heart disease for the top spot. The death rates from both conditions are actually declining, due to prevention efforts and more effective treatments, but the drop off has been faster for heart disease. Although some cancers are hereditary by nature, most experts agree that environmental factors, including food choices and workplace exposures, are important contributors to the onset and development of cancer.

While it may not be possible to avoid exposure to all carcinogens, knowing which compounds pose a risk may help individuals to limit contact with these chemicals. To fill this need, every two years, the National Toxicology Program (NTP), an interagency program within the US Department of Health and Human Services (HHS), issues a report that lists all known and probable human carcinogens to which a substantial part of the population may be exposed.

On 31 January, HHS released the Eleventh Edition of the *Report on Carcinogens*. With the addition of 17 substances, the report now lists 58 known and 188 suspected carcinogens, and offers detailed information on these compounds, including the nature of exposure risk and the number of persons exposed to such substances. In compiling the list, the NTP considers both human and laboratory animal studies conducted by government research agencies, academia, industry, and other research organizations that have been published in the scientific literature to determine whether substances are potential human carcinogens.

Although human epidemiological studies provide the strongest evidence of a substance's cancer-causing potential, this type of data is not always available. Therefore, one of the three criteria for deeming a compound "reasonably anticipated to be a human carcinogen" is that "there is sufficient evidence of carcinogenicity from studies in experimental animals, which indicates there is an increased incidence of malignant and/or a combination of malignant and benign tumors (1) in multiple species or at multiple tissue sites, or (2) by multiple routes of exposure, or (3) to an unusual degree with regard to incidence, site, or type of tumor, or age at onset[1]."

Carcinogenicity is just one of the effects that researchers are looking for when they do safety assessment testing of compounds, such as new drugs. Since these tests are vitally important, it is imperative that *in vivo* toxicology studies are properly conducted, well documented, and reproducible. To ensure that tests are properly conducted, the US Food and Drug Administration (FDA) enforces their Good Laboratory Practice Regulations (GLPs) for safety assessment studies of all drugs, food additives, and cosmetics. Likewise, the US Environmental Protection Agency (EPA), has devised similar regulations for the testing of pesticides and industrial chemicals.

Despite the importance of *in vivo* safety assessment studies, many individuals working in laboratory animal science may be unfamiliar with these standards. In this issue, we present two articles that introduce the readers to the GLPs. On p. 29, Joe Cwiertniewicz presents a primer on these regulations, and on p. 35, Denise Fillman-Holiday draws on her experience working in various roles within the safety assessment arena to discuss the role of the laboratory animal veterinarian in the conduct of these studies.

Reference

1. US Department of Health and Human Services, Public Health Service, National Toxicology Program. *Report on Carcinogens* 11th edn. http://ntp-server.niehs.nih.gov/ntp/roc/toc11.html.