

CONTRACT CONCEPT REVIEW

NTP Board of Scientific Counselors Meeting

December 15, 2022

Title: Pathology Support Contract Services for the Division of Translational Toxicology (DTT) and Division of Intramural Research (DIR), National Institute of Environmental Health Sciences (NIEHS)

Presenter: Danica Andrews, Pathology Coordinator, Comparative and Molecular Pathogenesis Branch, DTT, NIEHS

Background and Significance:

The Division of Translational Toxicology (DTT) has a long history (>40 years) of conducting toxicology studies to characterize the effects of agents of public health concern. DTT and DIR scientists conduct research using cutting-edge approaches and technologies to better understand how environmental exposures may impact human health. Much of this research is multidisciplinary and often done in collaboration with other NIEHS laboratories, federal agencies, industry, and academia. Research initiatives for each division are further described at the following websites for the DTT at

<https://www.niehs.nih.gov/research/atniehs/dntp/index.cfm> and for the DIR at <https://www.niehs.nih.gov/research/atniehs/dir/index.cfm>.

Justification for use of contract mechanisms:

Pathology support is needed for the diverse research initiatives within DTT and DIR. These groups have need for pathology support including peer review for DTT/NTP studies, pathology evaluations for NIEHS studies, histology, molecular pathology, comparative pathology/medicine, digital imaging, in vitro studies and bioinformatics expertise supporting various investigative/mechanistic studies, and also scientific publication support for technical writing, content updates for atlases, and toxicologic pathology training material. To provide this support, a wide range of organ systems expertise as well as diverse technical capabilities are needed. The scope of the needed capabilities, facilities, equipment, and personnel with relevant expertise needed to provide pathology support, exceed the resources available at NIEHS; therefore, we request approval to obtain support through contract mechanisms.

Needed capabilities:

The DTT and DIR anticipate continued and/or increasingly diversified needs for pathology support in the following areas:

- **Pathology peer review for DTT/NTP studies and other pathology evaluations for principal investigator driven NIEHS studies.** Pathology peer review for DTT studies consists of several independent steps which must be performed per established DTT

guidelines to avoid conflict of interest. The diversity of DTT and DIR studies requires a wide range of organ systems expertise for proper review of studies.

- **Histology** (including special stains, cryostat sections), immunohistochemistry/immunofluorescence, in situ hybridization, and electron microscopy. Specialists in the use of the equipment and data interpretation are necessary for some of these specialized techniques.
- **Digital Imaging:** There is increased and expanded use of new imaging technologies. Digital imaging includes morphometry, image analysis, and artificial intelligence. Also needed are whole-slide scanning, telepathology, magnetic resonance imaging (MRI – such as for developmental neurotoxicity in vivo studies) and computed tomography (CT – used for longitudinal lung studies and mouse embryo phenotyping) which will provide 3D assessments and quantitative data. These imaging sciences require specialized equipment and trained professionals.
- **Content Updates:** DTT has created several online atlases, including the Non-Neoplastic Lesion atlas, Electron Microscopy (Ultrastructural) Atlas, and Mouse Embryo atlases which are freely available to the public. These existing atlases require updates or additions over time, and the creation of several more are planned. Pathologists with expertise in various organ systems as well as support staff are necessary to provide content for these atlases.
- **Publication Support:** In addition to the atlases, support for other scientific publications including technical reports, manuscripts, posters, and other online content is needed.
- **The Global Toxicologic Pathology training program** is a new undertaking to help provide extensive training to pathology trainees and serve as a reference resource worldwide. This program requires the curating of slide sets, developing organ-based training manuals, preparing webinars and other tutorials.
- **Investigative/mechanistic studies** are increasingly needed to support DTT's mission focused on toxicology studies that are more mechanistic, predictive, and translatable to human health. To achieve this objective as well as support the newly established DTT's Health Effects Innovations (HEIs), additional support and expertise is needed for in vitro studies (2D and 3D cultures) as well as validation of novel animal models of human disease and toxicology.
- **Specialists to support these capabilities** are necessary to meet DTT/DIR needs.