

**Submission by the Endocrine Society to Notice Number NOT-NS-22-076**

**NIH Request for Information (RFI) on Interdisciplinary Research Opportunities that Bridge Neuroscience and Environmental Health Science**

May 06, 2022

**Promoting Interdisciplinary Research**

Our members report several common barriers to interdisciplinary research that impact productive collaborations across fields including:

- A lack of funding opportunities that promote meaningful interaction and collaboration;
- A failure by some grant review panels to appreciate the value of unfamiliar approaches and expertise; and
- Insufficient direction and clarity for research teams about how interdisciplinary collaborations should relate to programmatic objectives.

To address these barriers, we propose several ways that the participating ICs on this RFI could advance meaningful interaction and collaboration among research teams at the interface of neuroscience and environmental health science. To begin with, NIH should engage researchers early in the process, before funding opportunities are announced; for example by sponsoring a symposia with invited research teams to present joint pre-proposals on the topics listed in the RFI to an audience including program officers. When funding opportunities are announced and promoted, participating ICs should be clear and consistent about the expectations for proposals and objectives for interdisciplinary teams. Grant awards should also be sufficient to support multiple researchers on teams, i.e., larger than a typical R01 but not necessarily as large as a program project grant. The Virtual Consortium for Translational/Transdisciplinary Environmental Research (VICTER) grant mechanism at NIEHS is one model for such a funding opportunity, but mutual agreement on a stable funding solution with adequate support should be agreed upon by the various participating ICs in the announcement. We also note the potential for international collaboration, considering opportunities for integrating evidence from projects in other countries, e.g., the HBM4EU initiative.

**Current Gaps and Opportunities**

To fully address the gaps and opportunities within the research areas listed in the RFI, it will be essential to involve experts in endocrine science and hormone biology in research teams. Such experts will bring additional perspectives to enhance the rigor of novel approaches to evaluating the toxic effects of exposures during development and with outcomes on endocrine endpoints



such as diabetes. Indeed, many of the toxicants listed in the background paragraphs for the RFI include known endocrine-disrupting chemicals (EDCs). In this context, we offer several suggestions for research topics that would further elucidate the role of hormonal systems and endocrine disruptors in environmental neurotoxicity.

**Sex-specific or sex-biased outcomes:** Many neurological diseases and conditions display effects that are significantly influenced by biological sex. Interdisciplinary teams involving neuroscientists alongside endocrine scientists who understand the role of hormones in CNS organization will advance our knowledge of sex as a biological variable in the development of neurological disorders.

**Combining tools and expertise:** Following from the BRAIN initiative, we are enthusiastic about the possible applications of new tools, often used by neuroscientists, for interdisciplinary research in environmental toxicity. We could envision exciting projects developing new reporters for estrogen, thyroid, or glucocorticoid signaling used in combination with imaging tools and/or measurements of excitability used by the neuroscience community to evaluate the endocrine disrupting effects of chemicals during various stages of brain development. Instrumentation grants to facilitate the use of these technologies in a collaborative setting would be beneficial.

**Gestational diabetes:** We encourage participating ICs to engage with NIDDK, not only due to the endocrine expertise at the institute, but also because diseases within NIDDK's mission such as gestational diabetes may have understudied environmental influences that could affect neurodevelopmental outcomes.

**Spontaneous models of disease:** We note that companion animals often have similar exposure profiles to their human counterparts. Funding should encourage research involving companion animals and wildlife as models given the challenge of replicating real-world exposure profiles and mixtures in laboratory settings.

**Health disparities:** Exposures to environmental toxicants are not distributed equally, and many communities that suffer from health disparities also are disproportionately affected by various environmental drivers of disease. This includes pollution and ambient toxicants, but also consumer products such as personal care products (e.g., hair relaxers). Moreover, psychosocial determinants of health such as stress often compound these effects. It will therefore be critically important for interdisciplinary research teams to consider scientific aims that improve our understanding of the environmental drivers of health disparities. We encourage research support to understand the combined effects of stress, social determinants of health, and environmental exposures with impacts on endocrine endpoints.

**Thyroid biology and neurodevelopment:** We note the particular importance of the thyroid gland in brain development and its potential for disruption by environmental toxicants. Chemicals that



impact maternal, fetal, and child thyroid function or thyroid hormone action cause neurodevelopmental deficits. Interdisciplinary teams involving endocrinologists with expertise in thyroid biology working with pediatricians, neuroscientists, and others will help address this gap area.

In conclusion, our members are excited by the opportunity to participate as collaborators in interdisciplinary research at the interface between environmental health and neurological development and outcomes. We look forward to future plans and announcements by the partnering ICs on this notice and stand ready to provide additional guidance as funding opportunities take shape.