Since 2014, the NIH BRAIN Initiative has embarked on an exciting endeavor to revolutionize our understanding of how the brain works. This work is anchored on unraveling the circuits and computations underlying complex behaviors through the development of novel neurotechnologies. Ultimately, it may deliver great insight and treatments to help patients who experience the most devastating effects of brain disorders or injury.

What is neuroethics? A tool for the advancement of neuroscience

The most fundamental aspects of our selves—such as personality—can be rapidly changed due to brain illness, injury, and, in some cases, brain interventions. **Neuroscience research can raise new ethical questions, beyond typical research ethics or compliance issues.** Familiar topics in bioethics such as privacy, safety, fairness, freedom and free will, personal identity, informed consent, and moral responsibility, can take on new dimensions and complexities given the unprecedented precision of new neurotechnologies and tools, and the brain's centrality to human identity[1]. Questions that are important to address include, for example:

- How do research participants' and investigators' perceptions of the risks and benefits of data sharing align or differ?
- Do researchers, funders, and other stakeholders have responsibilities to facilitate access to and maintenance of implanted neural devices for research participants after a trial has ended?
- An improved understanding of brain circuitry may allow for the prediction of risk for future brain disorders and resilience against injury. How might this, in turn, affect healthcare, insurability, and healthcare policy?
- What implications do new neurotechnologies have on notions of free will and agency? What, if any, are the broader implications for legal policies?

Neuroethicists can partner with neuroscientists to address ethical questions that arise in association with neuroscience research—both its conduct, and application of research findings. Neuroethicists can help scan the horizon and assist in anticipating and navigating ethical concerns. As such, neuroethics can empower a neuroscience research team and help to inform how studies are designed, conducted, interpreted, and applied. Importantly, neuroethics is not a policing mechanism meant as a constraint on neuroscience progress, but rather a valuable tool that scientists can utilize to facilitate neuroscience research. For these reasons, neuroethics is a priority research area under the NIH BRAIN Initiative.

[1] Henry T. Greely, Khara M. Ramos, Christine Grady. ***Neuroethics in the Age of Brain Projects*** Neuron, 2016 Nov 2, 92(3): 637–641.

How is neuroethics research conducted?

There are two major forms of neuroethics research:

1. Conceptual research involves the analysis of key concepts, the values at stake in ethical challenges, and ways to navigate ethical dilemmas. It can make use of ethical theories, legal scholarship, and/or the analysis of similar cases. For example, it may involve an analysis of what privacy is, and when researchers ought to prioritize protecting participants' privacy.
2. Empirical research involves the collection of data relevant to an ethical issue. Often, social science research methods are used (such as interviews or surveys) to explore or quantify perspectives of relevant stakeholders. For example, this may involve studying scientists' and research participants' views and values around data sharing.

These approaches allow them to **anticipate and help mitigate challenging value conflicts to empower neuroscience research and clinical practice.**

How can I integrate neuroethics into my project?

Integrating a neuroethics perspective into a research project can be a powerful way to maximize positive impact of the research. Such integration opportunities could include:

1. Seeking the advice of a bioethicist on experimental design, research protocols, etc.
2. Collaborating with a bioethicist to explore an ethical challenge related to the implementation of the experiment or possible implications of study findings.
3. Collaborating with a bioethicist to conduct parallel empirical ethics studies with patients, participants, the public, or researchers.

What are the NIH BRAIN Initiative's neuroethics efforts?

- Funding neuroethics research projects within the scope of the BRAIN Initiative
- Managing the Neuroethics Working Group (NEWG) and organizing topical workshops
- Facilitating collaborations between BRAIN-funded neuroscientists and neuroethicists
- Identifying relevant ethical questions within the NIH BRAIN Initiative research portfolio
- Disseminating NEWG findings through high-profile publications

To learn more please visit: https://www.braininitiative.nih.gov/about/neuroethics.htm

And see: *Neuroethics Guiding Principles for the NIH BRAIN Initiative*, Greely *et al.*, J Neurosci. 2018; *Ethical Challenges of Risk, Informed Consent, and Posttrial Responsibilities in Human Research With Neural Devices* by Hendriks *et al.* JAMA Neurology, 2019; *Neuroethics: Fostering Collaborations to Enable Neuroscientific Discovery*, Farahany & Ramos, American Journal of Bioethics Neurosci, 2020; *Neuroethics and the BRAIN Initiative: Where Are We? Where Are We Going?* by Koroshetz et al., American Journal of Bioethics Neurosci, 2020; *Ethical considerations of COVID-19-related adjustments to clinical research* by Hsu et al., Nature Medicine, 2021; and *Survey of Investigators About Sharing Human Research Data in the Neurosciences* by Hendriks et al., 2022.