

# NHPs Help Advance Childhood Anxiety Disorder Research

Read an interview with Margaux Kenwood, PhD who studies rhesus macaques to better understand how we can better prevent and treat childhood anxiety.

By Logan France, DVM, DACLAM

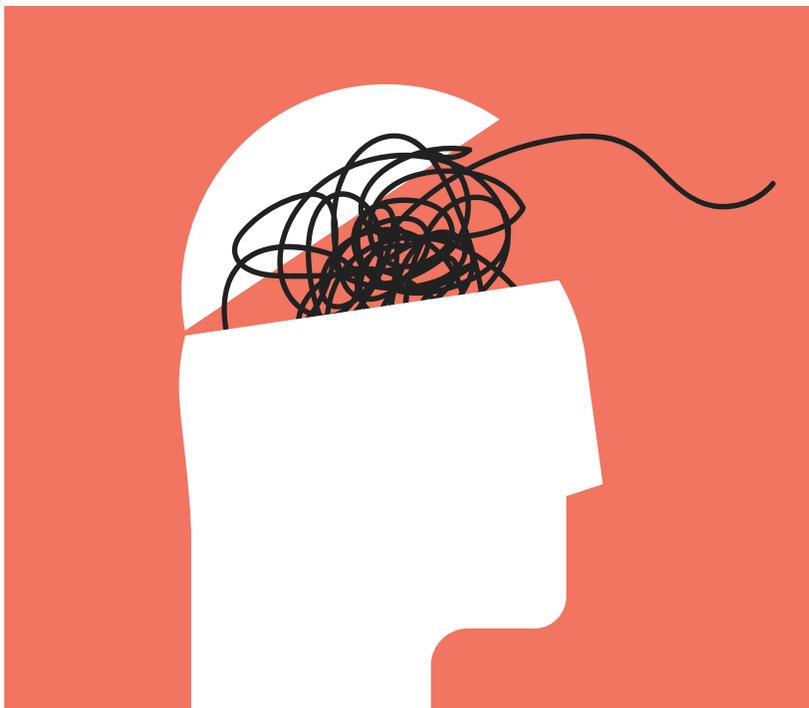
If you tuned in to the Biomedical Research Awareness Day (BRAD) 2021 webinar in September, you heard Dr. Margaux Kenwood discuss her fascinating research on anxiety disorders in children. Dr. Kenwood is a post-doctoral research fellow in the Psychiatry Department at the University of Wisconsin – Madison and will soon be transitioning to Weill Cornell. She studies nonhuman primates, rhesus macaques specifically, to better understand individual differences in anxious temperament and how we can better prevent and treat childhood anxiety. She is also the ACNP/AMP BRAD Fellow for 2021-2022. Here we learn more about her research and the vital role of nonhuman primates.

**France:** For those who may have missed the webinar, can you tell us a little bit more about your research?

**Kenwood:** Everyone gets anxious at some time or another – public speaking, meeting new people, so many situations can cause us to feel anxious. For the most part, that anxiety can help us to prepare for and succeed in those situations. For a subset of people, anxiety can become uncontrollable and overwhelming, in what we consider to be an anxiety disorder. Our work is centered around understanding the brain circuits and molecules that contribute to who develops anxiety disorders, focusing on the early adolescent time point when anxiety disorders tend to emerge. In order to better characterize the brain regions, cells and molecules that contribute to pathological anxiety, we rely on the use of a nonhuman primate model, which allows us to probe and manipulate the brain circuits we think are important. Rhesus monkeys have naturally occurring individual differences in anxiety-related temperaments that look a lot like the anxiety-related temperaments we can characterize in humans, and our research relies on understanding how the brain contributes to those individual differences.

**France:** Monkeys to study childhood anxiety – for some that may seem like a big jump. Why are monkeys a good model for this type of research?

**Kenwood:** It's not as big a jump as you would think! Rhesus monkeys and humans diverged in evolution roughly 23 million years ago, which can seem like a long time but is actually relatively recent in the scope of billions of years of evolution. Rhesus monkeys share a lot of really important similarities with respect to understanding human anxiety: they live in interconnected social groups, have long periods



## Read more about Dr. Kenwood's research here:

**Kenwood, MM**, Kalin, NH, Barbas H. The role of the primate prefrontal cortex in anxiety and anxiety disorders. *Neuropsychopharmacology Reviews*, published online August 17, 2021

**Kenwood, MM**, Kalin, NH. Nonhuman primate models to explore mechanisms underlying early-life temperamental anxiety. *Biological Psychiatry*, April 1, 2021.

**Kenwood, MM**, Roseboom, PH, Oler, JA, Kalin, NH. New Insights into the Mechanisms of Ketamine's Antidepressant Effects: Understanding the Role of VEGF in Mediating Plasticity Processes. *American Journal of Psychiatry*, May 1, 2019.

is the region that I study. Because we have so many tools at our disposal to characterize and manipulate the function of brain regions, cells and molecules in rhesus monkeys that are not available in humans, we can use rhesus monkey to really characterize the brain circuits and molecules that are related to extreme anxious temperament, which should give us insight into how to better treat anxiety disorders in humans.

**France:** How do you decide which species of monkey to work with?

**Kenwood:** We have worked primarily with rhesus monkeys. For my work specifically, the similarities between the rhesus monkey frontal lobe and human frontal lobe are very important. Rhesus monkeys have many of the same subregions that make up the frontal lobe as humans do, and understanding the interaction between those subregions, as well as the molecular makeup of those regions, is a central theme of my work. Neuronal connections among frontal regions, as well as between frontal regions and other parts of the brain are organized into big fiber bundles, which act like electrical cables and transmit signals between connected regions. You can think of them like big highway systems in the brain, along which information travels in the form of electrical signals. Rhesus monkeys have a lot of similarities in terms of the organization of these fiber bundles to humans, and part of my work has focused on the effect of disrupting these fiber bundles, which impacts anxiety and anxiety-related brain function. While other model organisms, both primate and otherwise, are very important in understanding anxiety, we have favored the rhesus monkey model

of maternal care, interact with the world through a well-developed visual system, the list goes on and on! Importantly for our research, rhesus monkeys display individual differences in anxiety-related temperaments that look really similar to temperaments in children that we know are strongly linked to the later emergence of anxiety disorders. They also have a lot of similarities in terms of brain structure and function, particularly within the frontal lobe, which

because of the conserved anxiety-related temperaments and important similarities in frontal lobe structure and function.

**France:** Animal research is controversial despite its proven importance for human and animal medical advancements. How do you advocate for animal research, specifically nonhuman primate research?

**Kenwood:** I've found that participating in outreach and education efforts is one of the most important ways to advocate for the importance of animal research. A lot of the controversy around animal research, specifically nonhuman primate research, is driven by misinformation about how and why we're doing the work that we do. Using animals in our work is a huge privilege and comes with the responsibility to educate the public on how our research will ultimately translate into better interventions to decrease the significant suffering associated with anxiety disorders. I think that having conversations, albeit difficult ones, about the importance of what we do and encouraging transparency about research practices is essential. Most of my outreach has been focused on elementary and middle schoolers, and I've found that our participants are engaged and willing to have challenging conversations about how and why animal research is done. A side benefit is that this kind of outreach is really fun and reminds me how lucky I am to have a career in such an interesting and impactful field! Part of my work as a BRAD fellow will be to develop outreach kits so that others can engage in outreach events targeted to a variety of audiences, so stay tuned for that!

### More About BRAD

BRAD is an international outreach program through Americans for Medical Progress that seeks to increase public awareness about animal roles in biomedical research and the resulting medical advancements that benefit both humans and animals. BRAD highlights the importance of animal studies, including those involving nonhuman primates, and demonstrates research organizations' commitment to providing excellent animal care. It also builds a research advocate community and showcases biomedical research and laboratory animal care and medicine careers. Since its April 2016 inaugural celebration, BRAD participation has grown from 20 events in the U.S. to over 200 celebrations annually around the world. Beyond educating the public, BRAD can increase community engagement, unite an institution's research community, boost employee morale, and allow individuals to discuss their biomedical research roles. Follow BRAD on Facebook (@BRAD-global), Instagram (@brad\_global), and Twitter (@amp\_brad). Visit [BRADglobal.org](http://BRADglobal.org) or contact [BRAD@amprogress.org](mailto:BRAD@amprogress.org) to learn more and to join the celebration!

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