

Ru-Rong Ji, Ph.D., Recipient of the 2020 Excellence in Research Award

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THE American Society of Anesthesiologists (ASA) initiated its Excellence in Research Award in 1986, with the first honor to Dr. John Severinghaus. The award recognizes an individual for outstanding achievement in research that has or is likely to have an important impact on the practice of anesthesiology, and must represent a body of original, mature, and sustained contributions to the advancement of the science of anesthesiology.

The 2020 ASA Excellence in Research Award goes to Ru-Rong Ji, Ph.D., Distinguished Professor of Anesthesiology, Professor of Neurobiology and of Cell Biology, and Co-Director of the Center for Translational Pain Medicine at Duke University (Durham, North Carolina). He was born in Wuxi, China (near Shanghai), and from his earliest days was interested in pain. His dedication to anesthesia and analgesic research started in college, when he became fascinated by acupuncture and the question of how something so seemingly minor as a tiny needle could have such profound analgesic effects. In fact, his college laboratory research experience and thesis at Nanjing University was on acupuncture. He then earned his Ph.D. in Neurobiology at Shanghai Institute of Physiology in 1990. Continuing his interest in acupuncture, he did his first postdoctoral fellowship at Beijing Medical University (now Peking University), still studying the mechanisms of acupuncture in animals. Evaluating c-FOS activation in various brain regions, he found that electroacupuncture can activate several brain regions implicated in analgesia. In 1993, Dr. Ji joined the Karolinska Institute in Stockholm to study neuropeptide regulation in inflammatory and neuropathic pain for a second postdoctoral fellowship, where he used newly developed antibodies to opioid receptors to identify the distribution of μ -, κ -, and δ -opioid receptors in primary sensory neurons. In a third postdoctoral fellowship, beginning in 1995, in the Department of Neuroscience at Johns Hopkins University, Ru-Rong studied repetitive transcranial magnetic brain stimulation in rats, and its effect on brain circuits that regulate circadian rhythm.

In a self-described career-defining event, he was recruited in 1998 by Dr. Warren Zapol (another Excellence in Research Award winner, 1999) and Dr. Clifford Woolf (Excellence in Research Award winner, 2004) to join the

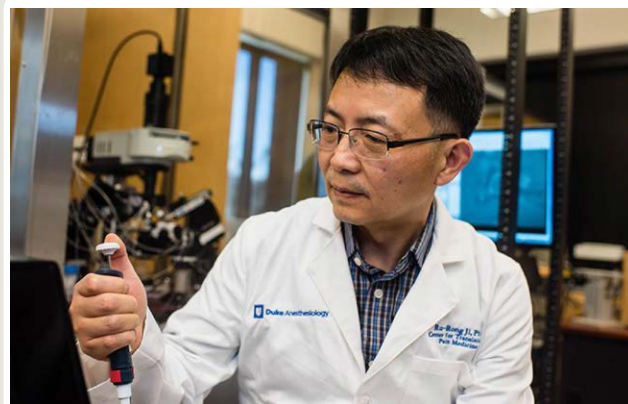


Fig. 1. Ru-Rong Ji, Ph.D., recipient of the 2020 Excellence in Research Award.

Department of Anesthesia at Massachusetts General Hospital and work in Dr. Woolf's Neural Plasticity Research Group. There he discovered the role of mitogen-activated protein kinase as a specific marker in the spinal cord for painful stimulation and central sensitization, which also revealed a critical process for the generation of "memory of pain" in the transition from acute to chronic pain. In addition, inhibiting this process blocked central sensitization and attenuated pain in various animal models.

In 2003, he moved across town to the Brigham and Women's Hospital as an Assistant Professor (and later Associate Professor and Associate Director of the Pain Research Center), beginning a collaboration with another Excellence in Research awardee (1998), Dr. Gary Strichartz. It was during his time at Brigham that he developed his research interest in the role of glial cells (as opposed to neurons), noting activation of glial activity after injury, thereby initiating his long-term interest in the role of neuroimmune interactions and pain. He also discovered the role of matrix metalloproteases in chronic pain and also identified (along with Dr. Charles Serhan at Harvard) the ability of the lipid mediators resolvins to inhibit inflammatory pain, but without opioid side effects.

In 2012 he was recruited to Duke University (with the help of yet another Excellence in Research Award

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winner, Dr. David S. Warner, Vice-Chair of Research) as a Distinguished Professor in the Department of Anesthesiology and Chief of Pain Research, where he remains today. In 2017 he became the codirector of the newly founded Center for Translational Pain Medicine in the Department of Anesthesiology. Ru-Rong's work at Duke has further defined and refined several important mechanisms underlying pain "chronification," such as gliopathy, nonneuronal cell modulation, neuroinflammation, and resolution failure. Recent work has focused on unique neuronal signaling of pattern recognition receptors, such as toll-like receptors and their contribution to pain and itch, and the connection between mediators of cancer and pain suppression, showing that tumor cells produce PD-L1 to suppress not only the immune system, but also pain perception, thus permitting cancer growth and metastasis.

Ru-Rong Ji's entire research career has focused on the molecular basis of pain, with more than 200 peer reviewed publications to date, published in every major neurobiology journal in the world, including *Nature*, *Science*, *Proceedings of the National Academy of Sciences of the United States of America*, *Journal of Neuroscience*, as well as *ANESTHESIOLOGY* (for which he serves as an Associate Editor), the *British Journal of Anaesthesia*, and others, and while also serving as an Associate Editor for five other journals (!). He has served on numerous National Institutes of Health Review Panels and received the National Institutes of Health Transformative Award. Since 1999, he has served as a mentor for more

than 60 individuals, ranging from high school students to undergraduates, residents, graduate students, postdoctoral fellows, and anesthesiologists—many of whom have gone on to major faculty positions in other institutions around the world.

Throughout a research career on three continents, Ru-Rong has never lost his original interest in acupuncture and how it might produce long-lasting neuromodulation and immune modulation at the neuroimmune interface. He has commented that his "research has now come full circle," back to where he started in college.

He has been married for more than 25 yr, and he and his wife, a former pediatrician, are the parents of two children. His son is in high school and his daughter will soon be starting college.

Congratulations to Dr. Ru-Rong Ji for an extraordinary career, his passion for research, and his contributions to our specialty.

Competing Interests

Dr. Kharasch is the Editor-in-Chief of *ANESTHESIOLOGY* and his institution receives salary support from the American Society of Anesthesiologists (Schaumburg, Illinois) for this position. Dr. Todd declares no competing interests.

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