

Brain Medicine

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INNOVATORS & IDEAS: RISING STAR

Ruth M. Barrientos: Vulnerabilities associated with the aging brain that make it more susceptible to inflammatory challenges leading to memory dysfunction

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Dr. Ruth Barrientos is an associate professor (with tenure) in the Institute for Behavioral Medicine Research and the Department of Psychiatry and Behavioral Health in the College of Medicine at The Ohio State University. She currently serves as associate editor of *Brain, Behavior, and Immunity*, the flagship journal for the Psychoneuroimmunology Research Society. Her research aims to uncover the vulnerabilities associated with the aging brain that make it more susceptible to inflammatory challenges resulting in memory dysfunction, ranging from mild cognitive impairments to Alzheimer's Disease; and to discover interventions to improve these vulnerabilities and prevent memory degradation. We conducted an interview with Dr. Barrientos, asking questions about her life and scientific career and finished up with selected questions from the Proust Questionnaire.

The Genomic Press Interview Part 1: Ruth Barrientos: Life and career

Could you give us a glimpse into your personal history, emphasizing the pivotal moments that first kindled your passion for science?

I was born in Bolivia, South America, and immigrated to the United States with my family at the age of 3. We settled in the Washington, DC/Northern Virginia area where I stayed through graduate school. I attended George Mason University as an undergraduate student and it was there that I was first exposed to the exciting world of preclinical neuroscience research. I was a volunteer research assistant in a laboratory that studied the behavioral effects of cocaine and opiate receptor blockade. I was so fascinated and intrigued to understand the brain mechanisms underlying behavior, that I abandoned my original plans of pursuing a degree in clinical psychology and instead pursued a career in Neuroscience. During graduate school at the George Washington University in Washington, DC, I applied for and was selected for a predoctoral Summer Intramural Research Training Award at the NIH and joined Dr. Esther Sternberg's laboratory. It was there that I was first exposed to the burgeoning field of psychoneuroimmunology and I was immediately hooked. It just made sense to me that the brain and the immune system worked in concert and that this relationship manifested various behavioral outputs. Following a successful summer internship, I was fortunate to have Dr. Sternberg extend my stay in her laboratory long enough to allow me to complete my dissertation research. This was a critical time in my life that enabled me to deepen my knowledge about the bidirectional communication between the immune system and the brain, and hone various research skills including brain surgeries, dissections, and cognitive behavioral tasks.

We would like to know more about your career trajectory leading up to your current role. What defining moments channeled you toward this leadership responsibility?

After obtaining my Ph.D., I secured a joint postdoctoral position at the University of Colorado (CU) Boulder, in the laboratories of Dr. Steven Maier



Figure 1. Ruth M. Barrientos, PhD, The Ohio State University, USA.

and Dr. Jerry Rudy. Under their supervision I continued to hone my skills and focus my interest in psychoneuroimmunology to answer questions about how chronic neuroinflammation might impair memory function, especially during aging. Following 5 years as a postdoctoral fellow, I transitioned to an Assistant, then Associate Research Professor position at CU Boulder. During this time, I reviewed many manuscripts for dozens of journals and have served on the editorial boards of several key journals such as *Brain Behavior and Immunity*, the flagship journal for the Psychoneuroimmunology Research Society. In fact, I won the coveted "BBI Reviewer of the Year" award in 2013 and 2016. In 2018, I was recruited to join the faculty at The Ohio State University, a premier hub for psychoneuroimmunology research. Soon thereafter, I was invited to become an Associate Editor of BBI. This experience has allowed me to learn and grow with regard to PNI-related science as well as the world of publishing.

Please share with us what initially piqued your interest in your favorite area of research or professional focus

In the mid-1990s, it was not as well-known as it is today that the immune system could signal the brain and that the brain could signal the immune system. It made so much sense to me and it was exciting to discover the many pathways through which these systems were communicating with





each other, and to identify how their interactions might manifest into various behavioral outcomes.

What kind of impact do you hope to achieve in your field through your focus on your specific research topics?

I hope to discover an intervention that will ameliorate exaggerated neuroinflammation-induced memory impairments in older individuals, with the hope of preserving old memories and the ability to form new ones.

Could you tell us more about your current scholarly focal points within your chosen field of science?

My laboratory focuses on the vulnerabilities of the normal aging brain that, when challenged, lead to long-lasting memory deficits. My laboratory has examined various triggers such as bacterial infection, surgery, and high-fat diet that induce exaggerated and prolonged neuroinflammation in discrete regions of the aged brain. We have identified sensitized microglia as playing a key role in this exaggerated response. This potentiated neuroinflammatory response causes robust inhibition of brain-derived neurotrophic factor (BDNF) and long-term potentiation (LTP) in the hippocampus and other regions, two mechanisms critical to forming long-term memories. Furthermore, we have demonstrated that behavioral interventions such as exercise and reducing saturated fats from the diet can desensitize microglia, normalize the inflammatory response in the brain, and protect memory function.

What habits and values did you develop during your academic studies or subsequent postdoctoral experiences that you uphold within your own research environment?

Experimental organization (keeping very detailed notes on everything I have done so that it can be repeated exactly the same way every single time) and teamwork are two of the most important skills and values that I developed during my academic training and that I continue to uphold in my laboratory.

At Genomic Press, we prioritize fostering research endeavors based solely on their inherent merit, uninfluenced by geography or the researchers' personal or demographic traits. Are there particular cultural facets within the scientific community that warrant transformative scrutiny, or is there a cause within science that deeply stirs your passions?

I agree with this stance. There is no room in science for influence based on the prestige of the institution, the number of grants awarded to the PI, or how big a name they have. Science should be evaluated on its inherent merit, rigorous approach, and fair interpretation. How to ensure this happens in every review situation represents one of the biggest challenges for science today.

What do you most enjoy in your capacity as an academic and research leader?

I love it when my trainees show me new data. I get as excited for new data as a kid on Christmas. I also very much enjoy seeing my trainees shine, in any context or capacity.

Outside professional confines, how do you prefer to allocate your leisure moments, or conversely, in what manner would you envision spending these moments given a choice?

I prefer to spend my leisurely moments outside, in nature. During the day, I love hiking in the woods. At night, I enjoy star gazing.

The Genomic Press Interview Part 2: Ruth Barrientos – Selected questions from the Proust Questionnaire¹

What is your idea of perfect happiness?

Being physically and mentally healthy, never worrying about money, and spending lots of quality time with my family.

What is your greatest fear?

To have regrets of “living to work” rather than “working to live” later in life. I try to strike a good balance, but don’t always get it right.

Which living person do you most admire?

Barack and Michelle Obama.

What is your greatest extravagance?

I have a greenhouse attached to my house.

What are you most proud of?

My children. They are amazing.

What is your greatest regret?

Not selling some stock at its peak price.

What is the quality you most admire in people?

Kindness, because this quality is often misinterpreted as a weakness. In fact, it takes a strong and confident person to be kind in the face of a challenging situation.

What do you consider the most underrated virtue?

Acceptance.

What is your favorite activity (physical or psychological)?

My favorite activity is hiking through natural landscapes.

Where would you most like to live?

Colorado.

What is your most treasured possession?

My photo albums.

When and where were you happiest? And why were so happy then?

During my postdoc years. I could focus solely on doing research, without worrying about grant funding, and I was in the best shape of my life, spending evenings and weekends in the great outdoors.

What is your most marked characteristic?

My grit and perseverance.

Among your talents, which one gives you a competitive edge?

My organizational skills.

What do you consider your greatest achievement?

Earning a Ph.D. despite struggling with dyslexia.

If you could change one thing about yourself, what would it be?

I wouldn't change anything because even my flaws or challenging traits have allowed me to learn, grow, and adapt.

What do you most value in your friends?

Their willingness to give it to me straight.

Who are your favorite writers?

Khaled Hosseini, Barbara Kingsolver, Kathryn Stockett.

¹In the late 19th century various questionnaires were a popular diversion designed to discover new things about old friends. What is now known as the 35-question Proust Questionnaire became famous after Marcel Proust's answers to these questions were found and published posthumously. Proust answered the questions twice, at ages 14 and 20. Multiple other historical and contemporary figures have answered the Proust Questionnaire, such as Oscar Wilde, Karl Marx, Arthur Conan Doyle, Stéphane Mallarmé, Paul Cézanne, Martin Boucher, Hugh Jackman, David Bowie, and Zendaya. The Proust Questionnaire is often used to interview celebrities: the idea is that by answering these questions an individual will reveal his or her true nature. We have condensed the Proust Questionnaire by reducing the number of questions and slightly rewording some. These curated questions provide insights into the individual's inner world, ranging from notions of happiness and fear to aspirations and inspirations.



Who is your hero of fiction?

I don't have one.

Who are your heroes in real life?

My mom and dad. They sacrificed so much coming to a foreign country, having to learn a new language, a new culture, and basically start from scratch, to give their children more opportunities for a better future.

What aphorism or motto best encapsulates your life philosophy?

Your triumphs will do the talking for you.

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