Lifespan Cognitive Neuroscience

Fresh Approaches to Dementia and Anxiety

Left, Drs. Thomason, Raz and Ofen. Above Gerd Kempermann of the Center for Regenerative Therapies in Dresden, Germany, gives the keynote on *Adult Hippocampal Neurogenesis* at the 2011 Margret and Paul Baltes International conference hosted by the IOG.

"Brain aging is a not a discrete event that happens overnight but a long stretch on the developmental continuum," says **Dr. Naftali Raz**, director of the Lifespan Cognitive Neuroscience Program at the IOG. Created through the Lifespan Alliance, a collaboration with the IOG's sister institute, the Merrill Palmer Skillman Institute for Child & Family Development, the program seeks to understand when, how and why the brain changes and how those changes affect thought and behavior.

In October, Dr. Raz hosted the Margret and Paul Baltes International Conference on Lifespan Cognitive Neuroscience. Top neuroscientists from Europe and the U.S. discussed neural plasticity, the brain's ability to alter its structure and function in response to experience. The goal is to build interdisciplinary bridges to inspire fresh research approaches to problems like dementia and pediatric anxiety disorder.

Four faculty members conduct research through the Lifespan Cognitive Neuroscience Program. Director Raz' neuroimaging studies of healthy adults have revealed differential shrinkage of brain tissue. His goal is to delineate the causes of this shrinkage, both genetic and health-related. "Charting individual age-related change is challenging but may hold the key to expansion of the human health span," Dr. Raz says. He has been continuously funded through the National Institutes of Health since 1993, and he also is a recipient of a MERIT award through the National Institute on Aging.

Dr. Scott Moffat heads a four-year grant to investigate the effects of the stress hormone cortisol on the structure and function of the brain. His team assayed over 8,000 urine samples from more than 2,000 individuals in the Baltimore Longitudinal Study of Aging to chart the association between cortisol exposure and cognitive and neural outcomes. One early finding is that higher cortisol levels are associated with greater decline in verbal memory. "We are trying to understand the marked individual differences in brain function and volume as people age," says Dr. Moffat. "We think cortisol exposure may play a role in that."

Though memory problems in older adults are the subject of extensive research, little is known about the development of memory systems in children and young adults. **Dr. Noa Ofen** joined the cognitive neuroscience program in August (from the Massachusetts Institute of Technology) to focus on brain development in 5 to 30-year-olds. She uses functional magnetic resonance imaging (fMRI) to track where memories are encoded in the brain at different stages of development. "I'm interested in the clinical applications of what we learn about memory development," she says. "How can we help patients with memory deficits?"

Dr. Moriah Thomason joined the program earlier this year from Stanford University as a faculty member at the Merrill Palmer Skillman Institute. Like Dr. Ofen, she uses fMRI to scan children's brains but concentrates on anxiety disorders in adolescents age 7 to 15. "I'm fascinated with how children develop inside and out, the ties between emotional behavior and the brain's chemistry, function and structure," she says. She is also helping to conduct large-scale fetal imaging *in utero* to study the networks that connect the brain. Someday diagnosis and treatment of problems could occur *before* symptoms appear. "This is an amazing opportunity to make a large difference in a lot of lives," she says.

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– Dr. Thomason