UNLOCKING THE SECRETS OF THE AGING MIND

Researchers at The Center for Vital Longevity at the University of Texas at Dallas study the working brain for clues on how to live longer and better as the brain ages. Analyze provides the precise measurements and 3D modeling needed to get the most out of their brain imaging assets.

"Analyze is truly powering the neuroimaging analyses that are central to our research. The 3D renderings, views, and precise measurements available in Analyze provide the evidence we need to test ideas and prove them out. I've used Analyze for 12 years now and couldn't imagine doing our research without it."

KRISTEN KENNEDY, PHD
The Center for Vital Longevity at the University of Texas at Dallas

Kristen Kennedy wants to know what's on your mind. And not just what you're thinking, but how those thoughts are formed, and physically transported from one side of your brain to the other. She also wants to know how that process changes throughout the life span.

Kennedy studies the human brain, with a special focus on the white matter – the connectors of the brain. While the gray matter of a brain is fully developed by early adolescence, the white matter continues to grow, develop and change well into the 20's of a normal person.

Kennedy is Assistant Professor of Behavior and Brain Sciences at The Center for Vital Longevity (CVL) at the University of Texas at Dallas. She's been studying age-related brain changes using structural and functional imaging techniques at the CVL for the past seven years, and is most interested in understanding how the brain changes with age and how this knowledge might be used to stave off cognitive decline.

"It's fascinating that there are so many neural, genetic and lifestyle factors that affect how we age cognitively," said Kennedy, "Our challenge is to isolate those factors and study their impact collectively, as well as one by one. Neuroimaging techniques help us analyze both brain function as it's working, and how it's affected by changes in structure over time."

With neuroimaging as the critical physical evidence and input for her research, Kennedy relies heavily on the Analyze platform to help her organize, measure and calculate key data points from regional volume analyses.

Measuring Global and Regional Brain Shrinkage

Kennedy's credentials in brain structure and function research are well-known in the scientific community. In 2010, she received a prestigious Pathway to Independence Award from the National Institute on Aging, a highly competitive 5-year career-development grant given to only a handful of recipients each year.

Her dissertation work was recognized by the American Psychological Association. Most recently, she was named a Young Research Fellow by the Greater Dallas Chapter of the Alzheimer's Association, one of only two young scientists to receive the honor in 2012.

Kennedy's in vivo imaging work keeps her focused on active and healthy brains of living individuals. Longitudinal studies of living brains over time yields some of the most interesting findings, related to brain volume, size, and performance.

"One universal sign of age in the brain is the reduction in size of major components, as well as variations in the volume of the white matter that connects them," said Kennedy. "Of course, brain volume measurements require a great deal of precision and Analyze captures this better than any other tool we've worked with."

Another term for these connection pathways in the brain is "tracts." The degradation or preservation of these tracts varies depending on region and function.

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"More preserved tracts such as those that connect language and vision are very slow to change with age," said Kennedy. "While tracts that connect recall or working memory which is the ability to make new memories, typically change more rapidly. We simply can't remember things as well as we get older."

Testing for Brain Connector Health

When Kennedy and her colleagues test brains one of the most important measurements taken is related to what's known as White Matter Hyperintensity burden or WMH burden. More WMH is not better in this case.

"It's generally accepted that the best measure of WMH burden is volume of WMH by lobe and by type," said Kennedy. "And WMH is almost like an inflammation or swelling and it can slow down our brains. So this can actually accelerate brain aging."

Not surprisingly, physical vascular health of the circulatory system has an effect on brain health. Kennedy and other researchers have found that lack of exercise, high blood pressure, and obesity often drive higher levels of WMH.

The flip side of that, and the good news for anyone at risk is that white matter integrity can be improved, and the brain made healthier, with good exercise and diet.

The trends are clear among brain researchers: the study of the working brain is relying more and more on functional imaging techniques. It's through these types of neuroimaging studies that we are likely to better understand how the brain is flexible and undergoes regular renewal to maintain healthy, functional cognitive performance into old age.

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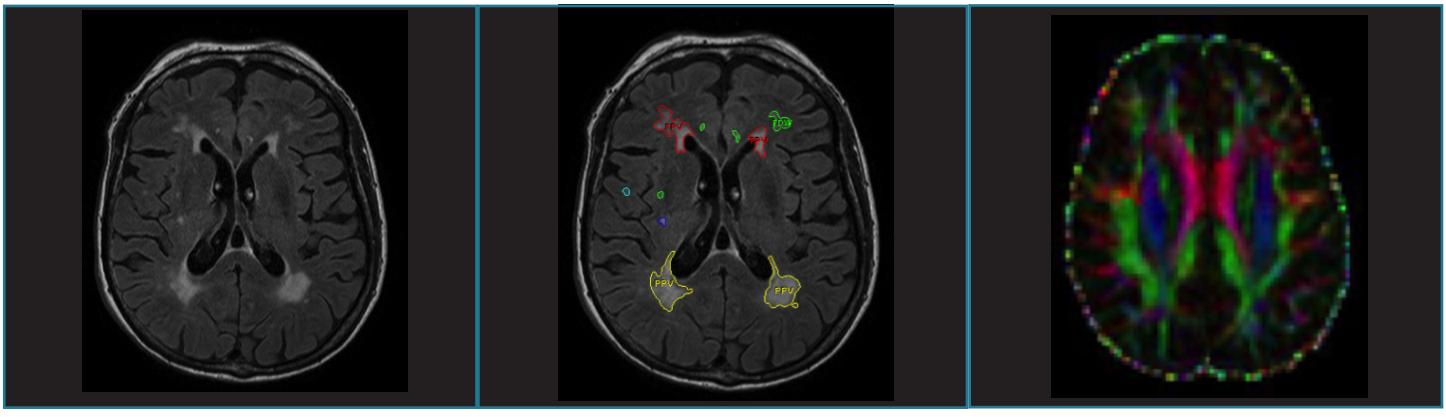
Measuring the Brain While It Works

1. Imaging and analyzing healthy brains by Kristen Kennedy and her colleagues at The Center for Vital Longevity at the University of Texas at Dallas is crucial for their brain aging research.

2. Tiny changes in brain size and volume can mean big differences in cognition and careful measurements are the key to testing correlations.

3. Analyze is the platform of choice among Kennedy and her colleagues for its precision, 3D rendering capabilities, and volumetric tracking.



Analyze highlights specific regions of the brain for better measurement, analysis and understanding.