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Stimulus Grant of Nearly $9 Million to UC San Diego Funds Big Study of Young Brains

ARRA Award by NIDA Boosts Search for Links between Genetic Variation and Differences in Developing Brains

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Thanks to a grant of $8,950,590 provided through the American Recovery and Reinvestment Act (ARRA), researchers at the University of California San Diego looking for the biological bases of differences in human behavior will use sophisticated gene-mapping tools and imaging technology to collect a wealth of data about brain development in children.

The grant was awarded by the National Institute on Drug Abuse (NIDA), a part of the National Institutes of Health (NIH). The study, called PING (for pediatric imaging, neurocognition and genetics), represents one of NIDA's signature projects. The UC San Diego-based project, which involves 10 sites throughout the country, is expected to create approximately 25 new jobs.

The project will be coordinated within UC San Diego's Center for Human Development (CHD), and the advanced neuroimaging work of the project will be based in the MultiModal Imaging Laboratory. Faculty from at least seven different UC San Diego departments will participate in the project, a testament to the growth and importance of interdisciplinary research, according to Vice Chancellor for Research Arthur B. Ellis.

"This very significant award - one of the largest single ARRA awards that UC San Diego has received to date - recognizes the vital, life-saving research being conducted at the CHD, an interdisciplinary Organized Research Unit -- and makes possible swift advances in the pediatric brain-imaging and genomics projects so important to families in California and across America," Ellis said.

UC San Diego professors Terry Jernigan and Anders Dale are the project's leaders; professors Linda Chang and Thomas Ernst at the University of Hawaii, and Sarah Murray of Scripps Genomics lead other components of the project.

Jernigan, professor of cognitive science and director of the CHD, said the award will advance key pediatric research projects. "One might say that PING is a study of the genetic and neural factors that contribute to individuality. Understanding why we have different personalities and mental qualities is critically important for solving many problems that affect children," she said. "The impact of the study is likely to be very broad - it will provide information that could help to enhance education, improve early detection of mental disorders, and identify targets for early interventions that may prevent negative outcomes, such as addiction and mental disorders."

Dale, professor of radiology and neurosciences in UC San Diego's School of Medicine and one of the world's leading developers of sophisticated computational neuroimaging techniques, said "Our major aim is to create a database - essentially a map depicting the genomic landscape of the developing human brain - as a resource for the scientific community."

Since it is known that structural and functional connectivity in the brain undergoes continuous remodeling during childhood, the investigators have chosen to study 1,400 children between the ages of 3 and 20. This will make it possible to search for links between genetic variation and developing patterns of brain connectivity, and to examine the implications for emerging personality and mental abilities.

Investigators interested in the effects of a particular gene will be able to search the database for any brain areas or connections between areas that differ as a function of variation in a particular gene, and to determine if the genes appear to affect the course of brain development at some point during childhood.

The scientists will also be looking for links to the developing behavior of the children. The investigators plan to gather data on many aspects of human brain architecture, including the patterns of connection between brain regions, using different types of magnetic resonance imaging (MRI).

"This should give us a better understanding of the role or contribution that specific gene variants have on the developing brain and how they influence the risk of developmental, behavioral, and clinical outcomes," said Jernigan. "In turn, we may be able to use this knowledge to predict vulnerability to specific disorders and to develop better pharmaceutical and/or behavioral interventions to mitigate, slow down, or reverse their impact. "

The impressive new database will be available to the entire scientific community, which in turn may put this information to multiple uses. These include helping scientists to understand how genes influence brain development and how it can go awry in certain individuals or following certain environmental events, she said.

All the information contained in the database will be stripped of personal identifiers and codified so as to preserve the privacy of participating individuals.

"This imaging-genetics resource will be unique," said Jernigan, "and will accelerate the investigation of genetic risk factors and gene-by-environment interactions that contribute to the pathogenesis of behavioral, neurological, psychiatric and substance-use disorders."

Families who may want to participate in the study, or others who want to know more about it, may email questions to PING@ucsd.edu.

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