

Image of the Year Emphasizes Gene–Brain–Behavior Relationship in Male Aggression

An image describing an investigation into the relationship between human brain chemistry and behavior was selected as the 2007 Image of the Year at SNM's 54th Annual Meeting, June 2–6 in Washington, DC.

"One of the major scientific contributions of molecular imaging is its ability to relate human brain chemistry and behavior," said Henry N. Wagner, Jr., MD, SNM past president and historian, who chose the Image of the Year as part of his 30th annual Highlights Lecture, a review of the research presented at the SNM annual meeting. The image will be included in Newsline's full publication of Wagner's Highlights Lecture in the August issue of *The Journal of Nuclear Medicine*.

"Scientists from Brookhaven National Laboratory [BNL] have shown a statistical relationship between brain levels of the enzyme monoamine oxidase (MAO) A and a quantitative assessment of their human subjects' personality," said Wagner.

Researchers used the Tellegen and Waller Multidimensional Personality Questionnaire to measure volunteers' personality traits and the tracer ^{11}C -clorgyline to measure enzymatic brain MAO A activity.

The Image of the Year is actually a series of 4 images: 1 providing a view of human genes with high and low concentrations of MAO A; 1 of a brain PET scan showing brain MAO A activity; and 2 images of human aggression.

"The study is an example of how scientists are beginning to investigate the complex relationships between an individual's biology and his behavior toward others," said Nelly Alia-Klein, PhD, first author of the study and assistant scientist at the Brookhaven Center for Translational Neuroimaging at BNL (Upton, NY).

"After a publicized case of violence, we see and hear many stories about the aggressor's behavior prior to the incident and his way of life and the relationships he had with other people," Alia-Klein said. "However, scientists agree that there are many reasons why and how people move from aggression to violence. Our study concentrated on how someone's genetic and brain makeup can influence aggressive personality in healthy, nonviolent volunteers."

The study reported that the amount of MAO A activity in the brains of 27 healthy men inversely corresponded to the amount of aggression reported by the volunteers. Aggression was measured by positive answers to statements about taking advantage of others and causing them discomfort. Although the questionnaire assessed other aspects of personality, only those indicating short temper, vindictiveness, and enjoyment of violent movies were related to MAO A levels.

"Our finding corroborates the relevance of brain MAO A in aggressive personality," Alia-Klein said. "If this model of understanding is tested on individuals who engage in violent behavior (e.g., domestic violence), it could show promise in the future for pharmacological intervention against abnormal violence."

The image was submitted with Scientific Poster 1194, "Gene-Brain-Behavior Relationships: Evidence that Aggression is Associated with Brain MAO A Activity in Healthy Males," by N. Alia-Klein, E. Shumay, R.Z. Goldstein, A. Kriplani, J. Logan, F. Telang, G. Wang, F. Henn, and J.S. Fowler, BNL; B. Williams, I. Craig, King's College (London, UK); and N.D. Volkow, BNL and the National Institute of Drug Abuse (Bethesda, MD).

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The 2007 SNM Image of the Year—focusing on the relevance of brain chemistry in aggressive personalities—is actually a series of 4 images: 1 illustrating the genetic basis of low/high concentrations of MAO A; 1 PET image of brain MAO A activity; and 2 (non-patient) images demonstrating human aggression. The images were provided by Brookhaven National Laboratory.