Medical Xpress

# Dopamine-receptor gene variant linked to human longevity

January 3 2013

(Medical Xpress)—A variant of a gene associated with active personality traits in humans seems to also be involved with living a longer life, UC Irvine and other researchers have found.

This derivative of a dopamine-receptor gene – called the DRD4 7R allele – appears in significantly higher rates in people more than 90 years old and is linked to lifespan increases in mouse studies.

Robert Moyzis, professor of biological chemistry at UC Irvine, and Dr. Nora Volkow, a psychiatrist who conducts research at the Brookhaven National Laboratory and also directs the National Institute on Drug Abuse, led a research effort that included data from the UC Irvine-led 90+ Study in Laguna Woods, Calif. Results appear online in The Journal of Neuroscience.

The variant gene is part of the dopamine system, which facilitates the transmission of signals among neurons and plays a major role in the brain network responsible for attention and reward-driven learning. The DRD4 7R allele blunts dopamine signaling, which enhances individuals' reactivity to their environment.

People who carry this variant gene, Moyzis said, seem to be more motivated to pursue social, intellectual and physical activities. The variant is also linked to attention-deficit/hyperactivity disorder and addictive and risky behaviors.

"While the genetic variant may not directly influence longevity," Moyzis said, "it is associated with personality traits that have been shown to be important for living a longer, healthier life. It's been well documented that the more you're involved with social and physical activities, the more likely you'll live longer. It could be as simple as that."

Numerous studies – including a number from the 90+ Study – have confirmed that being active is important for successful aging, and it may deter the advancement of neurodegenerative diseases, such as Alzheimer's.

Prior molecular evolutionary research led by Moyzis and Chuansheng Chen, UC Irvine professor of psychology & social behavior, indicated that this "longevity allele" was selected for during the nomadic out-of-Africa human exodus more than 30,000 years ago.

In the new study, the UC Irvine team analyzed genetic samples from 310 participants in the 90+ Study. This "oldest-old" population had a 66 percent increase in individuals carrying the variant relative to a control group of 2,902 people between the ages of 7 and 45. The presence of the variant also was strongly correlated with higher levels of physical activity.

Next, Volkow, neuroscientist Panayotis Thanos and their colleagues at the Brookhaven National Laboratory found that mice without the variant had a 7 percent to 9.7 percent decrease in lifespan compared with those possessing the gene, even when raised in an enriched environment.

While it's evident that the variant can contribute to longevity, Moyzis said further studies must take place to identify any immediate clinical benefits from the research. "However, it is clear that individuals with this gene variant are already more likely to be responding to the well-known medical adage to get more physical activity," he added.

Provided by University of California, Irvine