

Close-range blast exposure and neurodegenerative processes among those with genetic risk for Alzheimer's disease

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A new study raises the possibility that close-range blast exposure among veterans with a genetically higher risk for Alzheimer's disease (AD), may make them more susceptible to degradation of their white matter, the part of the brain made of fiber connections called axons that connect nerve cells.

Although there is evidence that genetic risk for AD may elevate the risk of neurodegeneration following traumatic brain injury, it has been unknown if blast [exposure](#) also interacts with AD disease risk to promote neurodegeneration.

Researchers examined whether apolipoprotein (APOE) $\epsilon 4$, a well-known genetic risk factor for AD, influenced the relationship between close-range blast exposure (approximately 10 yards) and white matter integrity in a group of 200 Iraq and Afghanistan War veterans.

"We found that veterans who had close-range blast exposure and carried the $\epsilon 4$ allele had more spatially diffused white matter abnormalities than those without the $\epsilon 4$ allele," explained corresponding author Danielle R. Sullivan, Ph.D., a research health science specialist at the National Center for PTSD, VA Boston Healthcare System and assistant professor of psychiatry at Boston University School of Medicine. According to Sullivan this interaction remained significant after controlling for [traumatic brain injury](#), pointing to the specificity of close-range blast

exposure and APOE in white matter disruptions.

The researchers believe this study has implications for the long-term health effects of veterans returning from the Iraq and Afghanistan Wars. "It suggests that veterans who experienced a blast exposure within close-range and have elevated genetic risk for neurodegenerative disease may be at a greater risk for neurodegeneration and subsequent presentation of [neurodegenerative diseases](#) such as Alzheimer's disease."

Research has shown that repetitive and sub-concussive injuries without apparent acute symptoms are especially important in neurodegenerative processes. "Therefore, it is possible that close-range [blast exposure](#), particularly when combined with [genetic risk](#) for neurodegenerative disease, may be a sensitive marker for sub-clinical but persistent effects on the brain related to potential neurodegenerative processes."

More information: Danielle R Sullivan et al, Close-range blast exposure is associated with altered white matter integrity in APOE ε4 carriers, *Journal of Neurotrauma* (2019). [DOI: 10.1089/neu.2019.6489](https://doi.org/10.1089/neu.2019.6489)

Provided by Boston University School of Medicine

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