People with increased risk of Alzheimer's have deficits in navigating

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In a previous study, the researchers had shown that grid cells exhibit altered functioning in people at genetic risk for developing Alzheimer's disease. However, the test persons did not show any obvious navigation problems. "We assume that they used compensatory mechanisms to find their way," explains Nikolai Axmacher, "presumably via external cues in their surroundings. In Bochum, for example, the winding tower of the Bergbau-Museum can be seen in many places, as it is often visible over the rooftops of other buildings."

Alzheimer's risk and navigation problems go hand in hand

In the current study, the team therefore used a computerized navigation task in which the participants couldn't use external landmarks to find their way. The researchers compared the navigation performance of 202 volunteers without genetic Alzheimer's risk and 65 volunteers with increased genetic risk. The latter had a specific expression of the gene for apolipoprotein E, the APOE-4 allele.

Participants with a genetic risk of Alzheimer's disease didn't perform as well as the control group.

Insights into grid cell activity

An additional group of test persons performed the same task while the researchers recorded their brain activity with functional magnetic resonance imaging. The objective of this experiment was to find out which brain processes play a role in path integration. The team found grid cell representations in the entorhinal cortex to be specifically associated with navigation without external cues, which highlights the role of this brain region for path integration.

"In this study, we demonstrated a very specific deficit in healthy people with a genetically increased risk for Alzheimer's," concludes Lukas
Kunz. "In the future, such behavioral changes might perhaps help diagnose Alzheimer's disease earlier, before any serious symptoms appear."

Researchers believe that drug therapies for Alzheimer's disease have so far failed, because the diagnosis is made too late.


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