

High doses of radiation affect the 'memory centre' in the brains of mice

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Credit: Martha Sexton/public domain

Researchers working with mice have found that long-term exposure to radiation can have an effect on specific molecular processes in the brain. The study – a collaboration between researchers in Germany, Denmark, Japan and Italy– suggests that some of these changes might be similar to those that take place in the brain in diseases like Alzheimer's.

At very high levels, [radiation](#) is known to be harmful to cells in the body and can increase the risk of cancer, but the levels people experience in everyday life generally don't have an adverse effect on health. There are a number of sources of radiation, many coming from natural, environmental sources such as the sun. Certain activities, including long haul flights and some [medical procedures](#), can expose people to additional radiation but not at a level that is considered to be harmful.

This research involved exposing mice to either 1 mGray or 20 mGray of radiation a day for 300 days. By way of a comparison, a transatlantic flight involves around 0.08 mGray of radiation and a CT head scan around 2 mGray. Following this long-term exposure, the researchers found molecular changes in a part of the brain called the hippocampus – an area involved in the formation of new memories and, in humans, often one of the first brain regions to be affected by Alzheimer's disease. These changes involved differences in the levels of certain proteins, but the radiation did not lead to cell death in the hippocampus, which is what causes memory loss in humans affected by Alzheimer's disease.

Dr Rosa Sancho, Head of Research at Alzheimer's Research UK, said:

"This study in mice highlights some possible effects of relatively high doses of radiation on specific molecular processes in the brain. The type of mice used in this study don't develop the characteristic plaques or tangles that build up in the brains of people with Alzheimer's, so it is impossible to draw any conclusions about whether radiation might influence these key disease processes.

"Over the 300 days of this study, the amount of radiation the mice experienced is the equivalent of several hundred CT head scans. While it is important to investigate the effects of radiation on the body and brain, this particular study does not indicate that any normal sources of radiation, such as routine medical procedures or flights, have any

harmful effects on the [brain](#) or increase the risk of Alzheimer's.

"The best current research shows that there are certain factors that can increase the risk of diseases like Alzheimer's. Many of these can be tackled by leading a healthy life, not smoking, only drinking in moderation, staying physically and mentally active and keeping blood pressure and cholesterol in check."

More information: Stefan J. Kempf et al. Chronic low-dose-rate ionising radiation affects the hippocampal phosphoproteome in the ApoE^{-/-} Alzheimer's mouse model, *Oncotarget* (2016). [DOI: 10.18632/oncotarget.12376](#)

Provided by Alzheimer's Research UK

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