

New model sheds light on the relationship between Alzheimer and diabetes

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UCA researchers in the lab.

Recently, many epidemiological studies have found links between diabetes and Alzheimer's disease. Researchers consider diabetes to be a significant risk factor for the development of Alzheimer's and vascular dementia, the two main causes of dementia. At the University of Cadiz,

several researchers led by Dr. Monica Garcia-Alloza, including Juan José Ramos-Rodríguez and María del Carmen Infante-García, have focused on analysing the different types of diabetes—mellitus type 1 and type 2—and studying to what extent these affect and/or worsen central nervous system conditions by favouring development of dementia.

"We have created new models of animals generated in the laboratory and we have typified them at different ages. These are the results out of crossing [diabetes](#) models with Alzheimer models in order to determine how both diseases advance in different stages," says PhD student Ramos-Rodriguez. "We have focused part of our work on analysing how diabetes type 1, which causes low insulin levels, and diabetes type 2, in which there is [insulin resistance](#) and high levels of insulin, negatively contribute to developing [vascular dementia](#) and significantly worsen development of Alzheimer's. They generate a major phosphorylation in the tau protein, leading to soluble and more toxic forms of amyloid beta. These are two of the typical neuropathological features of this disease." The researchers believe that insulin has a window which must be monitored. "If you are not within those levels, the central [nervous system](#) starts having trouble."

Moreover, the creation of these new models enables studying the relationship between dementia and diabetes in different developmental stages, helping to complete a thorough study proving that "the conversation between Alzheimer's and diabetes goes back and forth. Suffering from Alzheimer's worsens metabolic features, and at the same time, metabolic alterations have an impact on the central nervous system," says Garcia-Alloza.

In the School of Medicine of the University of Cadiz, they have observed cerebral atrophy linked to the age of these models that so far it had been elusive. "We have been able to confirm that cerebral atrophy is partly due to the death of more neurons. And the density of dendritic

spines is at risk."

More information: Juan José Ramos-Rodríguez et al. Increased Spontaneous Central Bleeding and Cognition Impairment in APP/PS1 Mice with Poorly Controlled Diabetes Mellitus, *Molecular Neurobiology* (2015). [DOI: 10.1007/s12035-015-9311-2](https://doi.org/10.1007/s12035-015-9311-2)

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