

Unusual copper and iron found forming in brains of Alzheimer's patients

June 10 2021, by Bob Yirka



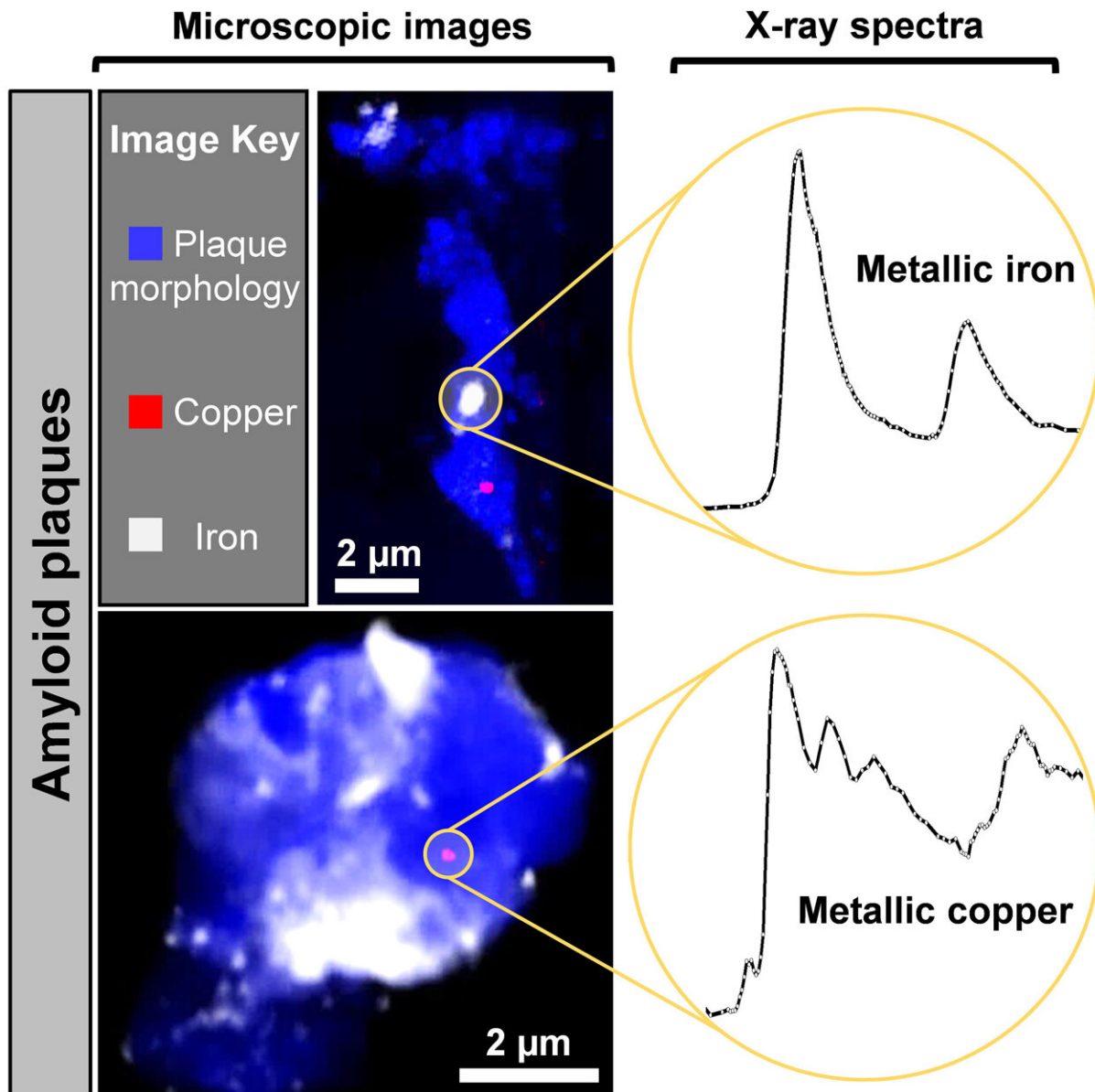
X-ray spectromicroscopy on beamline I08 at the Diamond Light Source (UK).
Credit: Neil Telling and James Everett

A team of researchers associated with several institutions in the U.K., Germany and the U.S. has found evidence of an unusual kind of copper and iron in the brains of Alzheimer's patients. In their paper published in the journal *Science Advances*, the group describes their discovery of the metals in two Alzheimer's patients and what it could mean for the study and treatment of the disease.

Alzheimer's is a progressive brain disorder. Brain cells waste away, leaving those afflicted to lose [brain function](#) until they eventually die; there is no cure. In this new effort, the researchers have made what they describe as a surprising discovery—small amounts of a certain kind of copper and iron inside of amyloid plaque samples taken from two Alzheimer's patients.

Copper and iron are found throughout the bodies of healthy people, including the brain. The body uses them for a variety of purposes. Also, they can both exist in the body in different oxidation states depending on the compound where they reside. The body also regulates such metals because they can take on harmful forms; harmful types are expelled. In this new effort, the researchers found some of those harmful elemental forms in the amyloid plaque, one of the hallmarks of Alzheimer's.

The work involved collecting [brain tissue](#) from two deceased Alzheimer's patients and then using X-ray imaging to learn more about the material inside of the plaque that had formed in the tissue. It was during this study that the team found traces of unusual forms of [copper](#) and iron. More specifically, they found nanoparticles of both in the cores of the plaque that had not oxidized—they had not gained or lost any electrons. They note this is the first instance of such nanoparticles being seen in human tissue of any kind. The researchers suggest the metals they found could explain how Alzheimer's harms cells—their surfaces would be highly reactive, which could lead to damage when exposed to [brain cells](#).



Summary of methodology from study. Credit: Neil Telling and James Everett

The researchers acknowledge that much more work needs to be done, such as looking to see if such metals appear in the plaque of other Alzheimer's patients or if they exist in non-Alzheimer's patients, who

may have other degenerative [brain](#) disorders.

More information: James Everett et al, Biogenic metallic elements in the human brain?, *Science Advances* (2021). [DOI: 10.1126/sciadv.abf6707](#)

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