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Researchers find a new culprit in Alzheimer's disease: Too many blood vessels

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University of British Columbia scientists may have uncovered a new explanation for how Alzheimer's disease destroys the brain – a profusion of blood vessels.

While the death of cells, whether they are in the walls of blood vessels or in brain tissue, has been a major focus of Alzheimer's disease research, a team led by Wilfred Jefferies, a professor in UBC's Michael Smith Laboratories, has shown that the neurodegenerative disease might in fact be caused by the propagation of cells in blood vessel walls.

Examining brain tissue from mouse models of Alzheimer's disease, Jefferies' team found nearly double the density of capillaries compared to normal mice. They also found a similarly higher density of capillaries in brain samples of people who had died of the disease, compared to samples from people who didn't have it.

Jefferies, in an article published online today by *PLoS One*, theorizes that the profusion of blood vessels is stimulated by amyloid beta, a protein fragment that has become a hallmark of Alzheimer's disease. The blood vessel growth, or "neo-angiogenesis," leads to a breakdown of the blood-brain barrier – the tightly interlocked network of cells that allows oxygen-carrying blood to reach brain tissue while blocking harmful substances, such as viruses.

"When the blood vessels grow, the cells of the vessel walls propagate by dividing," Jefferies says. "In the process of splitting into two new cells,

they become temporarily rounded in shape, and that undermines the integrity of the blood-brain barrier, potentially allowing harmful elements from outside the brain to seep in."

The deterioration of the barrier might in turn allow the depositing of amyloid beta, which accumulates around neurons and eventually kills them.

Previous research had touched on the "leakiness" of the barrier, but it was assumed that it was caused by the death of blood vessels – not their growth.

Jefferies also sees an intriguing parallel with the "wet" form of age-related macular degeneration, in which blood vessels grow behind the retina and then leak blood and fluid, leading to hemorrhaging, swelling, and formation of scar tissue.

"Given the new link between both conditions, the next logical step in the treatment of Alzheimer's disease would be to look for treatments that specifically target blood vessel growth," says Jefferies, who holds appointments in the departments of microbiology and immunology, medical genetics and zoology, and is also a member of the Biomedical Research Centre and the Brain Research Centre.

Provided by University of British Columbia