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Researchers identify link between brain and bone in Alzheimer's disease

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Researchers at NEOMED have just identified a major connection between areas of the brainstem - the ancient area that controls mood, sleep and metabolism - and detrimental changes to bone in a preclinical model of Alzheimer's disease (AD). The study, titled "Early Evidence of Low Bone Density and Decreased Serotonergic Synthesis in the Dorsal Raphe of a Tauopathy Model of Alzheimer's Disease," is led by Christine Dengler-Crish, Ph.D., assistant professor of pharmaceutical sciences, and anatomy and neurobiology, and will be published in the upcoming issue of the *Journal of Alzheimer's Disease*, an international multidisciplinary journal that reports progress in understanding the causes, symptoms, and treatment of Alzheimer's.

More than five million Americans are living with Alzheimer's disease. Along with being the sixth leading cause of death in the U.S., Alzheimer's has major social, emotional and financial consequences for patients and their families. Incurable and seemingly unstoppable, less than 5 percent of AD cases are due to a clear genetic reason, so it is hard to predict who will be at risk for acquiring this devastating disease.

Dr. Dengler-Crish and her research team that included graduate students Matthew Smith (NEOMED) and Gina Wilson (Kent State University) report that early reductions in bone mineral density (BMD) that occur in a preclinical model of AD are due to degeneration in an area of the brainstem that produces the majority of the brain's serotonin—a neurochemical that controls mood and sleep, which are two processes that are also affected early in AD.

One's bones may be one of the earliest indicators of brain degeneration in Alzheimer's disease

Reduced BMD, which sometimes leads to osteoporosis, translates to increased bone fracture risk, decreased quality of life, and increased mortality for AD patients. Furthermore, Dr. Dengler-Crish's research suggests that early bone loss and serotonin deficiency in AD may tell us something very important about how we approach diagnosing and treating this disease.

"Measurement of bone density, which is routinely performed in the clinic, could serve as a useful biomarker for assessing AD risk in our aging population," notes Dr. Dengler-Crish. "The findings of this study motivate us to explore the serotonin system as a potential new therapeutic target for this devastating disease."

Dengler-Crish, who received her bachelor's degree from Baldwin Wallace University, her master's in psychology from the University of Illinois at Chicago and her Ph.D. in neuroscience from Vanderbilt University, has now been named an associate editor for the *Journal of Alzheimer's Disease*. She is excited to facilitate the work of other scientists in this important area. "I am thrilled to be able to assist the publication of researchers' innovative work, here and across the world, that is desperately needed to combat these currently incurable chronic diseases. Now more than ever, there is hope that we soon will be able to slow, stop or reverse the progression of these destructive neurodegenerative conditions."

"This is extremely exciting and has significant translational potential and relevance to early detection of the disease," noted Jason R Richardson, Ph.D., DABT, director for Neurodegenerative Disease and Aging Research at NEOMED.

Provided by Northeast Ohio Medical University