Researchers at the University of South Florida have developed Methylene blue-loaded nanoparticles that provide a more effective treatment option for Alzheimer’s disease and other tauopathies.

Methylene blue (MB) has a long history of medical use, proving effective in treatment for a number of diseases including Alzheimer’s disease. However, challenges remain in targeting the brain in pharmaceutical therapy due to the selectivity of the blood brain barrier (BBB), which restricts most chemical agents from crossing into the brain tissue. MB, which is a highly hydrophilic molecule, is largely limited in its ability to penetrate the hydrophobic BBB. Pharmacokinetic studies on MB have shown a wide distribution of intravenously or orally-administered MB in the brain as well as various other organs such as the heart, lungs, liver, and kidneys, which also decreases its bioavailability in the brain.

Our inventors have resolved this problem by preparing a novel hydrophobic glutathione coated poly-(lactic-co-glycolic) acid nanoparticle to improve BBB permeation of MB. This nanoparticle has shown to be an effective carrier for MB due to its low toxicity, controlled drug release and reduced uptake by the reticuloendothelial system (RES) in vivo. Targeted drug delivery to the brain enhances MB bioavailability while decreasing systemic MB side effects. In well-characterized cellular models of Alzheimer’s disease and other related tauopathies, treatment with MB-loaded nanoparticles have shown greater reduction in tau levels compared to using MB solution alone. The superior functionality of this invention offers a valuable tool and therapeutic option for optimal medical care.