Gold particles provide luminous peek into brain

Light can be used to activate normal, non-genetically modified neurons through the use of targeted gold nanoparticles, report scientists from the University of Chicago and the University of Illinois at Chicago. The new technique represents a significant technological advance with potential advantages over current optogenetic methods, including possible use in the development of therapeutics toward diseases such as macular degeneration.

“This is effectively optogenetics without genetics,” said study senior author Francisco Bezanilla, PhD, Lillian Eichelberger Cannon Professor of biochemistry and molecular biology at the University of Chicago. “Many optogenetic experimental designs can now be applied to completely normal tissues or animals, greatly extending the scope of these research tools and possibly allowing for new therapies involving neuronal photostimulation.”

Optogenetics, the use of light to control neural activity, is a powerful technique that has seen widespread use in neuroscience research. It involves genetically engineered neurons that express a light-responsive protein originally discovered in algae. This allows scientists to stimulate individual neurons as well as neural networks with precise flashes of light. However, since optogenetics is reliant on genetic modification, its use is primarily limited to relatively few model organisms.

Bezanilla and his colleagues have previously shown that normal, non-genetically modified neurons can be activated by heat generated from pulses of infrared light. But this methodlacked specificity and can damage cells. To improve the technique, they focused on gold nanoparticles – spheres only 20 nanometers in diameter, more than 300 times smaller than a human blood cell.

Read full, original article: Non-genetically Modified Neurons And Light: Optogenetics Without The Genetics