

***THE 16TH U.S.-KOREA FORUM ON NANOTECHNOLOGY:  
NANOMEDICINE FOCUSING ON SINGLE CELL LEVEL AND SENSORS RELATED TO HUMAN COGNITION  
AND BRAIN RESEARCH***

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**NON-INVASIVE NANOSENSORS FOR NEURODEGENERATIVE DISEASE**

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**Abstract**

Lipid dysregulation occurs in neurodegenerative diseases, including Alzheimer's disease, Parkinson's disease, and lysosomal storage diseases. Current methods cannot monitor endolysosomal lipid content in living cells or in live animals. We developed a nanosensor capable of detecting lipid accumulation in live cells and organisms, with the goal of accelerating preclinical drug development and research. Our nanosensor is based on carbon nanotubes that are fluorescent at the tissue-transparent infrared wavelengths and specifically targets the lysosomes. The reporter dynamically monitors endolysosomal lipid accumulation in live cells and in live animals, allowing measurements of disease progression, and it responds to the removal of lipids from within lysosomes. These findings suggest the potential of this new technology to accelerate preclinical research and drug development processes for neurodegenerative diseases, as well as the potential for improving diagnostic methods.