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### Altered copper metabolism as a theranostic biomarker in neurodegeneration

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Copper is an essential nutrient element, but excess of copper is harmful. Copper homeostasis is tightly regulated by a delicate network of copper transporters and chaperons. Wilson's disease, or hepatolenticular degeneration, caused by mutation of *ATP7B* gene is characterized by accumulation of excess copper ions in liver and brain tissues. Positron emission tomography (PET) is a versatile tool for real-time assessment of copper fluxes *in vivo* noninvasively and quantitatively. Increased accumulation of <sup>64</sup>Cu in liver of *Atp7b*<sup>-/-</sup> knockout mice, a well-established mouse model of Wilson's disease, was demonstrated by measuring copper fluxes *in vivo* with PET/CT using copper-64 chloride (<sup>64</sup>CuCl<sub>2</sub>) as a radioactive tracer (<sup>64</sup>CuCl<sub>2</sub>-PET/CT). Age-dependent increase of <sup>64</sup>Cu radioactivity was detected in the brain of *Atp7b*<sup>-/-</sup> knockout mice at 20 weeks of age compared with <sup>64</sup>Cu radioactivity in the brains of *Atp7b*<sup>-/-</sup> knockout mice at 6 to 12 weeks of age. In addition to hepatolenticular degeneration, emerging body of evidence suggests the role of altered copper metabolism in pathophysiology of Alzheimer's disease (AD) and other neurodegenerative diseases. Altered copper metabolism may be a useful theranostic biomarker for early diagnosis of AD at preclinical stage with PET/CT using <sup>64</sup>CuCl<sub>2</sub> as a radioactive tracer. Based on favorable outcome of copper-modulating therapy in clinical management of the patients diagnosed with Wilson's disease, altered copper metabolism holds potential as a therapeutic target for copper modulating therapy of AD and other neurodegenerative disease associated with disturbance of cerebral copper metabolism.

#### Biography

Fangyu Peng has graduated from Jiangxi Medical College, China, in 1982 and obtained his PhD in Medical Microbiology and Immunology from University of South Florida, USA, in 1994. He completed his nuclear medicine residency training at University of Connecticut Health Center in 2000, and clinical fellowship in nuclear medicine and molecular imaging at National Institutes of Health Clinical Center in 2003. He is currently Associate Professor of Radiology and Advanced Imaging Research Center, University of Texas Southwestern Medical Center, USA. He has published more than 30 peer-reviewed articles in reputed journals and serving as an editorial board member of Journal of Radiology and Radiation Therapy.

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