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Early detection and treatment of Alzheimer's disease- Nanotechnology as a tool

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Background: Dementia of Alzheimer's type (AD) affects memory, thinking and behavior. Scientists believe that changes in the brain may begin 10-20 years before symptoms appear and AD is diagnosed. The need to diagnose and treat the devastating disease at an early stage is critical to manage and treat AD. Unfortunately, the lack of valid biomarkers limits the possibility of the earlier stages of Alzheimer's disease. The advance of nanotechnology could offer huge opportunities in early-stage diagnosis and well-treatment of AD.

Methods: This presentation discusses the challenges of current treatment and diagnosis of AD and the development of biocompatible nanoparticles, and provides the rational and potentials of using nanoparticles for both drug carrier and imaging contrast agent for diagnosis and treatment of AD.

Results: Biocompatible nanoparticles with diameter in the range of 1-100 nm could be used as targets delivery system for drugs (e.g Rivastigmine) to overcome the blood-brain barrier (BBB), and to minimize the side effects caused by over-dosage. In addition, biocompatible nanomaterials with enhanced optical and magnetic properties, may allow them being excellent alternative contrast agents for early-stage diagnosis.

Limitations: The limit knowledge of biocompatibility of nanomaterials may inhibit the development of nanotechnology for diagnosis and treatment for AD.

Conclusion: With more studies on using nanomaterials and nanotechnology in complex biochemical environment of the central nervous system, it is most likely that nanomaterials and nanotechnology can be give significant impact on the early-stage diagnosis and treatment of AD.

Biography

Jerzy Leszek is Full Professor of Psychiatry at the Medical University in Wroclaw, Poland, vice –director of the Psychiatry Department and head of Alzheimer's Disease Lab. He is author and co-author more than 230 papers (especially from old age psychiatry), some chapters to the books published in reputed Polish and international journals and serving as an editorial board member of several journals. He is Scientific Editor and co-author of first Polish academic handbook on Alzheimer's disease and seven another academic handbooks from psychogeriatrics, member a lot of scientific associations e.g. Founder and President of Lower Silesian Association of Alzheimer's Families, first of its kind in Poland and Former Member of Board of Directions of International Psychogeriatric Association and President of Polish Psychogeriatric Association.

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