Stem Cell, Neurogenesis, and Rehabilitation

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Abstract:
Brain diseases such as Alzheimer’s Disease, Parkinson’s disease, and injury such as stroke have been considered to result in permanent loss of neurons with no possibility of cellular regeneration. This widely held belief has been challenged by evidence that certain brain areas retain the capability to generate new neurons in rodents and humans. The neuronal stem cells are found in hippocampus and cerebral cortex in human brains, suggesting the regenerative capacities in those areas of human brains.

Recent studies also indicates that exposure to an enriched environment produces a significant increase in hippocampal neurogenesis in rodents. These regenerative capabilities of adult brains can be applied for the prevention of neurodegenerative diseases such as Alzheimer’s disease, or the rehabilitation after the brain injuries such as cerebral stroke. In this lecture, I will talk on the biology, physiology, pathology of neuronal stem cells in the contest with the clinical applications.

I will also show the evidence that environmental enrichment such as exercises or social interactions would enhance the neurogenesis and improve learning and memory in Alzheimer’s disease mouse model. Finally, I will show an intervention study conducted in Finland that followed 1,260 elderly people aged 60–77 with or without intervention with diet, exercise and lifestyle for 2 years. The study showed the intervention is effective for the prevention for the decline of cognitive function with elderly people. I will also focus on the dietary factors such as omega 3 fatty acid and coconut oil that would prevent Alzheimer’s disease in the lecture.