Can Stem Cells be used to Treat Alzheimer Disease?

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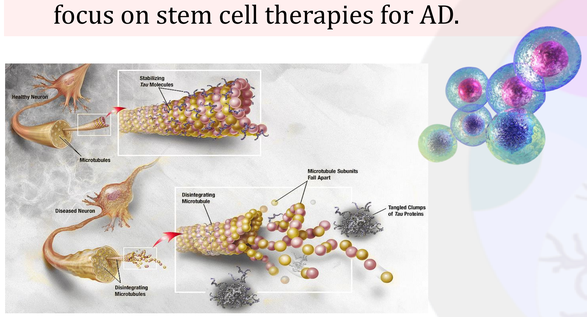
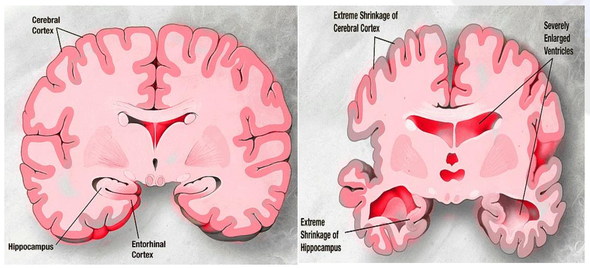
INTRODUCTION

- **Alzheimer's disease (AD)** is a progressive and neurodegenerative disorder , Which is characterized by causing memory loss and cognitive impairment.
- Pathologic characteristics of **AD** are β-amyloid plaques, neurofibrillary tangles and neurodegeneration.
- stem cell therapy has been shown to be a potential approach to various diseases, including neurodegenerative disorders, and in this poster , we focus on stem cell therapies for AD.



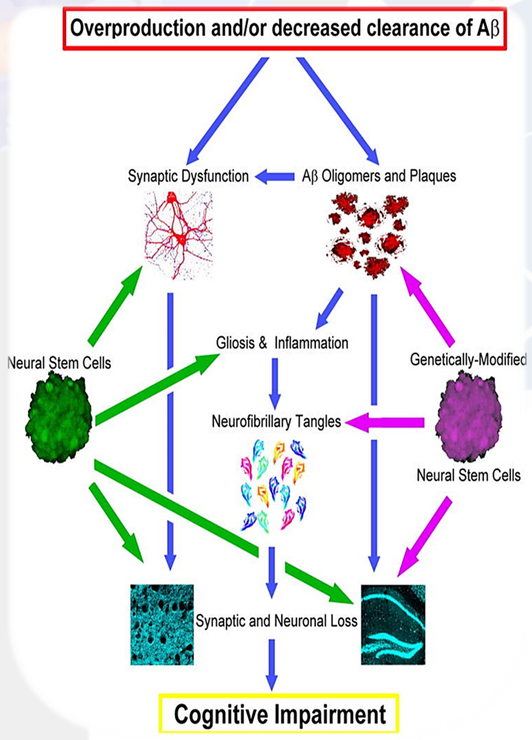


The four types of stem cells that can be generated from the human body

- Neural Stem Cells (NSCs).
- Mesenchymal Stem Cells (MSCs).
- Embryonic Stem Cells (ECSs).
- Induced Pluripotent Stem Cells (iPSCs).1

Neurotrophic and neuroprotective activity

- (NSCs) can express high levels of neurotrophins including both BDNF and NGF so that causes increases hippocampal synaptic density and improves learning and memory in transgenic models of both AD and neuronal loss
- in a transgenic model finding reduce neuronal loss and elevate levels of glial-derived neurotrophic factor (GDNF) .
- NSC-mediated delivery of enzymes that degrade Aβ, such as neprilysin, would therefore likely provide considerable additional benefit.



- In one study, MSC transplantation was found to attenuate neuro inflammation in transgenic AD mice.
- human cord blood cells has been to reduce AD pathology by a mechanism that appears to involve modulation of CD40 signaling .[2]

Investigating AD With Human Stem Cells

Modeling AD with human Embryonic Stem Cells

Human stem cell based models may provide an alternative approach to clarify both the normal and pathogenic roles of AD-associated genes. Along those lines, recently generated Embryonic Stem Cells clones that over express wild-type or mutant forms of human APP .Surprisingly, we found that all of the resulting APP hES clones rapidly and spontaneously differentiated toward a neural lineage.[3]

Modeling AD with induced pluripotent stem cells (IPSCS)

Patient-derived iPSCs have been used to model a growing list of human genetic disorders .Most recently, two groups have reported the establishment and investigation of AD iPSCs .

In first study, generated iPSCs from patients carrying familial mutations in PS1 or PS2 .The patient-derived iPSCs recapitulated an important aspect of familial AD. altered generation of Aβ42 versus Aβ40.

In the second study, generated iPSCs from 2 cases of sporadic AD and 2 unaffected controls interestingly, neurons derived from one of the sporadic AD cases showing increased Aβ 40 generation and tau phosphorylation, activation of glycogen synthase kinase-3β, and accumulation of enlarged early endosomes. [4]

CONCLUSIONS

A growing amount of evidence suggests that stem cell based-therapies could prove beneficial in AD, albeit via indirect mechanisms rather than cellular replacement .Studies of embryonic, neural, and iPSCs are also beginning to unravel the normal and pathogenic function of AD-associated genes and may provide powerful new approaches to model this disorder .

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