Treating Alzheimers Disease with Neprilysin secreted by adipose derived mesenchymal stem cells

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Introduction

Alzheimer’s disease (AD) is the most common cause of dementia, accounting for up to 70% of all dementia cases, and is now estimated to be the third leading cause of death, after heart disease and cancer. AD currently affects 5.2 million people in the United States (US), with projected estimates reaching 13.8 million (115 million worldwide) by the year 2050.1 Amyloid dysfunction is known to be the main pathological reason in around 20 similar diseases: Parkinson, M. Huntington, ALS and Diabetes type 2 among others.

Alzheimer’s Disease

AD pathology shows accumulations of extracellular amyloid-beta (Ab) containing plaques and intracellular neurofibrillary tau tangles in the brain. The involvement of Ab in AD is a prerequisite to the significance of Ab clearance to AD. It should be noted that Ab is a naturally occurring endogenous peptide that may have normal physiological functions. Pathology associated with Ab is related to its aberrant accumulation/aggregation. The proteolytic degradation of Ab is a major route of clearance. Of these enzymes, neprilysin (NEP) is considered one of the most important for the control of cerebral Ab levels.2

Neprilysin from adipose derived mesenchymal stem cells ad-MSC

NEP, a 90±110-kDa plasma membrane glycoprotein, is the prototype and best-characterized member of the M13 zinc metallopeptidase family. NEP is primarily expressed in the kidney, however, it occurs at much lower levels in many other tissues, including brain, where it is located on neuronal membranes, both pre- and postsynaptically.2 Neprilysin occurs naturally in the secretome of the ad-MSC, which is produced in vitro and in vivo as a means of communication from cell to cells and as a reaction to external influences. The secretome of ad-MSC can be harvested as a clinical grade treatment for various diseases.

Patented system to augment Neprilysin in the secretome

Pretreatment of ad-MSC achieved elevated levels of Neprilysin without compromising the other active ingredients of the secretome.

Future perspectives

Two of the major neuropathological hallmarks of AD, senile plaques and neurofibrillar tangles, take place with the aging of the human brain many years prior to the disease onset. This suggests that aging is the predominant risk factor for AD, and that a large number of people entering an old age and manifesting these neuropathological structures in their brains are likely to be in a presymptomatic stage of MCI and AD. In this respect, it is most important that a preventive medicine combined with presymptomatic diagnosis allows a substantial portion of aged people to escape from the scourge of dementing syndromes.3 There have been an overwhelming number of reports indicating that neprilysin expression/activity declines with aging and in AD. Substitution with the secretome from adipose derived mesenchymal stem cells containing neprilysin should be able to prevent AD and maybe even reverse existing amyloid accumulation.

References

Ref.1 CSF Biomarkers of Alzheimer’s Disease: Impact on Disease Concept, Diagnosis, and Clinical Trial Design. Anne M. Fagan, Advances in Geriatrics, Volume 2014, Article ID 302712