

An overview of in vitro research models for Alzheimer`s disease (AD)

ABSTRACT

Alzheimer`s disease (AD) is the most common form of age-related dementia. It is a neurodegenerative disease characterized by two aberrant features, the amyloid plaques and the neurofibrillary tangles which result in progressive memory loss and cognitive disturbances. This has led to devastating suffering to the patient, caregivers, family and economy of the country. As a result, scientists are putting efforts in understanding the mechanisms underlying the development of the disease as well as treatment for the disease. To do so, an ideal model is required that can mimic the development of AD, demonstrating the progressive degeneration of the neurons and formation of amyloid plaques and neurofibrillary tangles. In this review paper, currently available in vitro models for AD will be discussed, which include the cancer, primary culture and stem cell lines, highlighting on the benefits and limitations of each. More attention will be focused on the latest established disease-specific induced pluripotent stem cells (iPSCs) isolated from familial AD patients and Down syndrome patients. These models have their own advantages and limitations, therefore, more research needs to be done to come up with a model that is suitable not only for fundamental understanding of the disease but also for drug discovery and development.

Keyword: Alzheimer`s disease; Cell lines; Genetics; In vitro models; Mechanisms; Neuroprotection; Pathogenesis