Mitochondrial bioenergetics is altered in fibroblasts from patients with sporadic Alzheimer's disease

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The identification of an early biomarker to diagnose Alzheimer's disease (AD) remains a challenge. Neuropathological studies in animal and AD patients have shown that mitochondrial dysfunction is a hallmark of the development of the disease. Current studies suggest the use of peripheral tissues, like skin fibroblasts as a possibility to detect the early pathological alterations present in the AD brain. In this context, we studied mitochondrial function properties (bioenergetics and morphology) in cultured fibroblasts obtained from AD, aged-match and young healthy patients. We observed that AD fibroblasts presented a significant reduction in mitochondrial length with important changes in the expression of proteins that control mitochondrial fusion. Moreover, AD fibroblasts showed a distinct alteration in proteolytic processing of OPA1, a master regulator of mitochondrial fusion, compared to control fibroblasts. Complementary to these changes AD fibroblasts showed a dysfunctional mitochondrial bioenergetics profile that differentiates these cells from aged-matched and young patient fibroblasts. Our findings suggest that the human skin fibroblasts obtained from AD patients could replicate mitochondrial impairment observed in the AD brain. These promising observations suggest that the analysis of mitochondrial bioenergetics could represent a promising strategy to develop new diagnostic methods in peripheral tissues of AD patients.

Alzheimer's disease

Biomarker

Fibroblasts

Mitochondria

OPA1

optic atrophy 1 protein

regulator protein

unclassified drug

adult

aged

Alzheimer disease

Article

bioenergy

brain mitochondrion

cell fusion

cell structure

controlled study

diagnostic test

disease marker

disorders of mitochondrial functions

human

human cell

human cell culture

middle aged

protein degradation

protein expression

protein processing

skin fibroblast

very elderly