EDITORIAL

Impact and challenges of Alzheimer's disease

Impacto e desafios da doença de Alzheimer

Alessandra Bernadete Trovó de Marqui, Francielle Carvalho de Freitas Lima, Mariangela Torreglosa Ruiz Cintra

Alzheimer's disease (AD) is neurodegenerative and represents one of the most common forms of dementia in the elderly population. Dementia causes a progressive decline in cognitive domains, behavioral changes, loss of skills and difficulties in performing activities of daily living (ADLs), which causes suffering to patients and their families[1,2]. A retrospective study published recently showed that dementia was diagnosed in 68.8% of patients, with AD being confirmed in 48.9% of the cases[2]. A recent systematic review and meta-analysis study showed that the number of people living with dementia doubles approximately every five years[1]. This same survey also revealed that, in the general analysis, the prevalence was higher in women than in men (788 cases versus 561 cases per 10,000 individuals). When analyzed individuals aged 60-69 years, prevalence of AD in female was 1.9 times higher than in male (108 cases versus 56 cases per 10,000 individuals)[1].

We must consider that, currently, the population aging process is a global reality, and consequently, these conditions have become even more prevalent, placing us in front of a significant public health problem[2]. Today in Brazil, according to the Brazilian Alzheimer's Association (ABRAz), there are about 1.2 million cases, most of them still undiagnosed. By 2050, it is estimated that around 115 million individuals will have this type of dementia.

AD is mainly characterized by deposition of β-amyloid plaques in the intraneural spaces, as well as hyperphosphorylation of the tau protein, with the formation of neurofibrillary tangles in intracellular level[1,3]. Diagnosis of AD has a predominantly clinical character and is carried out through the patient's anamnesis and assessment of family history and disease. The definitive confirmation that the individual was

Universidade Federal do Triângulo Mineiro (UFTM), Uberaba, MG. ORCID: Marqui ABT - https://orcid.org/ 0000-0003-2361-5174; Lima FCF - https://orcid.org/0000-0002-4396-6142; Cintra MTR - https://orcid.org/0000-0002-8223-805X. E-mail: alessandra.marqui@ uftm.edu.br, franciellecfl@hotmail.com, mariangela.cintra@uftm.edu.br
Endereço para correspondência: Profa. Dra. Mariangela Torreglosa Ruiz Cintra. Instituto de Ciências Exatas, Naturais e Educação – ICENE. Universidade Federal do Triângulo Mineiro – UFTM. Av. Dr. Randolfo Borges Jr., 1400. Univerdecidade – Uberaba, MG. CEP: 38064-200. Email: mariangela.cintra@uftm.edu.br.

affected by AD requires an assessment of his post-mortem brain tissue; however, the clinical specifications in conjunction with the use of cerebrospinal fluid biomarkers and emission tomography may help in the diagnosis of patients still in their lifetimes[3].

As for the etiology, most cases have complex inheritance, that is, it is the result of an interaction of genetic and environmental factors, which cause cerebral atrophy and decline in the affected patient's cognitive functions. Risk factors for Alzheimer's disease include age, genetics, depression and hypertension. Cerebrovascular diseases, diabetes, obesity and dyslipidemia also increase the risk of developing AD. On the other hand, listening to music daily, meeting weekly with friends, daily intake of vitamin E, performing physical activity as well as a balanced diet were considered protective factors[4,5].

There is a consensus in the literature about the role of the *APP* genes (in English: "Amyloid Beta Precursor Protein"), *PSEN1* (Presenilin 1), *PSEN2* (Presenilin 2) and *APOE* (Apolipoprotein E) in the development of AD[6], focusing on mutations and genetic polymorphisms. In the past 10 years, more than 40 genes/loci have been linked to the risk of Alzheimer's disease. However, our knowledge of genetics, with regard to AD, is far from complete, and further genetic studies and post-GWAS analyzes are essential[7].

Another interesting approach in AD refers to lipidomics, since the brain is highly enriched in lipids and the interruption of lipid homeostasis is related to neurological disorders, as well as neurodegenerative diseases, such as AD[8]. Thus, considering that aging is associated with changes in lipid composition, it is suggested that the study of lipidome may contribute to the identification of biomarkers for prevention, diagnosis and prognosis, as well as for the discovery of new therapeutic options[7]. According to a research conducted by the authors, genetic polymorphisms associated with AD were identified, as shown in Chart 1[9]. Our data reinforce the role of lipid metabolism genes in AD pathogenesis.

Since AD is characterized as a highly disabling disease, resulting in a significant reduction in the quality of life of the affected elderly and their caregivers, with a consequent loss of autonomy and independence in ADLs, understanding the pathophysiology of AD may allow better prognosis. Thus, the identification of genetic and/or lipid biomarkers is important, as it favors the implementation of early treatment strategies with the minimization of cognitive and psychomotor limitations. In addition, early treatment is able to provide a better quality of life not only to the patient affected, but also to those around him.

Chart 1 - Identification of genetic polymorphisms associated with Alzheimer's disease, according to the genes acronyms and action mechanisms involved.

Genes	Action that the gene participates
ApoE, CD36, ABCA7, ABCA1, APOC1, MPO, PON1 and PSEN2.	Lipid metabolism
OGG1	Repair systems
NGF	Nerve regeneration
CHI3L1, CHRM2, CHRM3	Cellular responses
BIN 1, SORL1, BCAM, NECTIN 2, DLST AND PICALM	Coding of proteins of different functions.
TOMM40	Mitochondrial metabolism

Source: The authors (2020)

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