AUCTORES
Globalize your Research

Journal of Brain and Neurological Disorders
Marco Orsini *

Open Access

Opinion Article

Neurofilaments as Biomarkers in Amyotrophic Lateral Sclerosis? What do we have Concrete in the Present?

Marco Orsini [1*], Jaqueline Fernandes do Nascimento [2], Clara de Almeida [3] Araújo Leite [3] and João Marcio Garcia [4]

[1] PhD in Neurology from UFF and Post-Doctorate from the Federal University of Rio de Janeiro - IPUB- UFRJ. Responsible for the Scientific Council of ABRELA-SP, affiliated to the ALS Association. UNIG - Medicine Department, Brazil.

[2] Physician - Iguaçu University - UNIG - Medicine Department, Brazil.

[3] Estácio de Sá University - Medicine Department, Brazil.

[4] Neurosurgery Service - HUAP-UFF, Brazil.

***Corresponding Author:** Marco Orsini, PhD in Neurology from UFF and Post-Doctorate from the Federal University of Rio de Janeiro - IPUB-UFRJ. Responsible for the Scientific Council of ABRELA-SP, affiliated to the ALS Association. UNIG - Medicine Department, Brazil.

Received Date: 14 March 2023 | **Accepted Date:** 24 March 2023 | **Published Date:** 02 April 2023

Citation: Marco Orsini, Jaqueline F.do Nascimento, Clara De Almeida, Araújo Leite, and João Marcio Garcia, (2023), Neurofilaments as Biomarkers in Amyotrophic Lateral Sclerosis? What do we have Concrete in the Present? *Brain and Neurological Disorders*. 6(2): DOI:10.31579/2642-973X/054

Abstract

ALS can be defined as a neurological, progressive and degenerative disease that progresses with the depletion of upper and lower motor neurons. For the general population, it is a disease that affects the neurons of the spinal cord and brain. The course of the disease, until the present moment, is inexorable, with survival ranging from 2-8 years after the onset of symptoms.

Keywords: neurofilaments; biomarkers; electroneuromyography; CSF; ALS; DNA; blood; brain

Introduction

ALS can be defined as a neurological, progressive and degenerative disease that progresses with the depletion of upper and lower motor neurons. For the general population, it is a disease that affects the neurons of the spinal cord and brain. The course of the disease, until the present moment, is inexorable, with survival ranging from 2-8 years after the onset of symptoms.

In most cases (about 80%), the diagnosis is clinical, with associated involvement of these two populations of neurons. In others, neurologists need complementary tests to support the diagnosis - electroneuromyography, neuroimaging and laboratory tests (blood). In a few cases, withdrawal of spinal cord fluid (liquor) may be necessary. In suspected genetic cases, DNA extraction is performed, with approximately more than 66 mutations already described.

The use of light and heavy chain neurofilaments in the blood and CSF of patients with ALS is currently emerging. In addition to better managing the quality of life, survival and mishaps of the disease, we will introduce the patients early in randomized controlled clinical studies, double blind in several research centers, which can effectively change the catastrophic evolution of ALS. Reliable and robust biomarkers to accelerate ALS diagnosis and provide a means to monitor disease progression is what we need to bring hope and disease control.

More than 90% of the cell volume of the neuron is taken up by the axons and their building blocks: cytoskeleton (composed of three main structural components: Microtubules (the largest component of them), (Intermediate filaments), Microfilaments (the smallest component) and the intermediates - “neurofilaments” - these have already been captured as objects of several studies. These are subdivided into 4 units: Neurofilaments of light, medium and heavy chains and α-internexin in the central nervous system or peripherin in the peripheral nervous system.

In ALS patients, in addition to the death of motor neurons, there is massive destruction of axons. These die earlier. a fact already proven in biopsies containing motor neurons (the axons are found in large numbers and degraded in the areas surrounding the lesion). When axons begin to die (earlier than neurons), a very high concentration of neurofilaments is dumped into the blood and cerebrospinal fluid.

“The time for neurofilaments as a disease biomarker is not yet ripe - that's science's candid answer !” Patients who have a clinical diagnosis of ALS, in comparison with “healthy” individuals or with other diseases, but deeper studies are still needed, seeking the reliability of serum measurements in relation to CSF measurements, in addition to standardization of analytical methods. These biomarkers have diagnostic value in diferentiating ALS from

clinically relevant ALS mimics. Plasma NFL levels can be used to diferentiate between clinical and genetic ALS subgroups. Other disorders also show an increase in neurofilaments in CSF and blood.

These discussion opens a window for a better understanding of the potentially heterogeneous pathogenetic processes underlying the different disease phenotypes.

Conclusion

In conclusion, biomarkers for the diagnosis of motoneuron diseases (MND) are urgently needed to improve the diagnostic pathway, patient stratification and monitoring.

References

1. Zhou YN, Chen YH, Dong SQ, Yang WB, Qian T, Liu XN, Cheng Q, Wang JC, Chen XJ. (2021). Role of Blood Neurofilaments in the Prognosis of Amyotrophic Lateral Sclerosis: A Meta-Analysis. Front Neurol. Oct 6:12:712245.
2. Behzadi, A., Pujol-Calderón, F., Tjust, A.E. et al.(2021). Neurofilaments can differentiate ALS subgroups and ALS from common diagnostic mimics. Sci Rep 11:22128.
3. Falzone YM, Russo T, Domi T, Pozzi L, Quattrini A, Filippi M, Riva N. (2021). Current application of neurofilaments in amyotrophic lateral sclerosis and future perspectives. Neural Regen Res. Oct:16(10):1985-1991.
4. Gagliardi D, Faravelli I, Meneri M, Saccomanno D, Govoni A, Magri F, Ricci G, Siciliano G, Pietro Comi G, Corti S.(2021). Diagnostic and prognostic value of CSF neurofilaments in a cohort of patients with motor neuron disease: A cross-sectional study. J Cell Mol Med, Apr:25(8):3765-3771.
5. Steinacker P, Feneberg E, Weishaupt J, Brettschneider J, Tumani H, Andersen PM, von Arnim CA, Böhm S, Kassubek J, Kubisch C, Lulé D, Müller HP, Muche R, Pinkhardt E, Oeckl P, Rosenbohm A, Anderl-Straub S, Volk AE, Weydt P, Ludolph AC, Otto M.(2016). Neurofilaments in the diagnosis of motoneuron diseases: a prospective study on 455 patients. J Neurol Neurosurg Psychiatry, Jan:87(1):12-20.

DOI:10.31579/2642-973X/054