

Sarcoglycans in cerebral cortex of the rat: an immunohistochemical and molecular study

Giuseppe Anastasi¹, Francesco Tomasello², M'hammed Aguenouz³, Alfredo Conti², Giovanna Vermiglio¹, Gianluigi Vaccarino¹, Placido Bramanti⁴, Giuseppina Cutroneo¹, Costantino Crisafulli⁵, Valeria Barresi⁵, Giuseppe Vita³, Gaetano Barresi⁵

¹ Department of Biomorphology and Biotechnologies, University of Messina, Italy

² Neurosurgery, Department. of Neuroscience, University of Messina, Italy

³ Department of Neurosciences, Psychiatry and Anaesthesiology, University of Messina, Italy

⁴ IRCSS, Centro Studi Neurolesi, "Bonino-Pulejo", Messina, Italy

⁵ Department of Human Pathology, University of Messina, Italy

Sarcoglycans (SGC) are four transmembrane proteins: α -, β -, γ -, δ -sarcoglycans, which are type II transmembrane. α - and γ -sarcoglycan are expressed exclusively in skeletal and cardiac muscle, whereas β - e δ -sarcoglycan are more widely distributed. A fifth sarcoglycan, ϵ -sarcoglycan, homologous to α -sarcoglycan, but like γ -sarcoglycan is widely expressed in various tissues. Authors suggested that ϵ -sarcoglycan can replace α -sarcoglycan in smooth muscle, but more recent investigations [1-2] demonstrated the contemporary presence of those two proteins, that play a different roles in the same tissue.

In order to verify the exact role of sarcoglycans, in this study, we examined coronal sections of cerebral hemispheres of the rat brain. The sections were divided in frontal, parietal, temporal, and occipital zones. We analyzed the samples by immunohistochemistry, immunoperoxidase, and western blot techniques. For immunohistochemistry, we performed triple localization reactions matching antibodies to all sarcoglycans with antibodies to SMI, in order to evidence the neurons, and to GFAP, in order to evidence the glial cells; in all reaction we added also the DAPI to better visualize the nuclei of neurons. Our results showed that α -sarcoglycan nearly absent, whereas other sarcoglycans were diffusely expressed, including the ϵ -sarcoglycan. Furthermore, analyzing the patterns for β - and γ -sarcoglycan, these proteins showed a different expression in distinct tested zones.

Our results suggest a differential behaviour of SGC in the cerebral cortex as demonstrated by the absence of the classic relationship between α - and ϵ -sarcoglycans, known in muscle and non-muscle tissues. Moreover, the overexpression of all sarcoglycans, both in glial cells and in neurons, suggests an increased presence of these proteins in synaptic zones.

References

- [1] Anastasi et al. (2005) Sarcoglycan Subcomplex in Normal Human Smooth Muscle: an Immunohistochemical and Molecular Study. *Int J Mol Med* 16: 367-374.
- [2] Anastasi et al. (2007) Sarcoglycan Subcomplex Expression in Normal Human Smooth Muscle. *J Histochem Cytochem* 55: 831-843.

Key words

Sarcoglycan, cerebral cortex, western blot, immunoperoxidase, immunohistochemistry