

Distribution of synuclein immunoreactivity in the central nervous system of the South African clawed frog *Xenopus laevis*

Rosa Vaccaro¹, Arianna Casini¹, Mattia Toni², and Carla Cioni²

¹ Dept. of Anatomical, Histological, Forensic Medicine and Orthopedics Sciences, Sapienza, University of Rome, Rome, Italy.

² Dept. of Biology and Biotechnology "Charles Darwin", Sapienza, University of Rome, Rome, Italy.

Alpha, β and γ synucleins (syns) have been identified in the nervous system of mammals and biochemical evidence suggest a crucial role for α -syn in the pathogenesis of several human neurodegenerative diseases. Our research is focused on the molecular expression and morphological localization of syns in the nervous system of representative species with the aim of understanding the evolutionary history of these proteins in vertebrates [1, 2]. Current model for our comparative analysis is the adult stage of the South African clawed frog *Xenopus laevis*. On the basis of previous studies on gene and protein expression of α - and β -syn in frog tissues, we have selected two antibodies immunoreactive for α - and β -syn for the immunohistochemical localization of *Xenopus* syns in the CNS. Double-immunohistostainings for ChAT, TH or serotonin were performed in order to analyze the distribution of syn immunoreactivity in cholinergic, catecholaminergic and serotonergic areas. Both α - and β -syn were localized in the frog retina and in several brain regions with different patterns of distribution. Syn proteins are expressed in the retina of a wide range of vertebrates, including humans, and this suggests that retinal neurodegenerative diseases may be mediated by synucleinopathies. Strong α -syn immunoreactivity was also found in the visual projections and in the interpeduncular nucleus, interspersed with cholinergic fibers, whereas β -syn immunoreactive axons formed a dense network in the ventral and dorsal striatum within the catecholaminergic plexus that plays a key role in the movement control in amphibians as in mammals. Present data are the background for further studies on physiological roles of syns during the vertebrate evolution.

References

- [1] Vaccaro et al. (2015) Localization of α -synuclein in teleost central nervous system. *J Comp Neural* 523: 1095-1124.
- [2] Toni et al. (2016) Synuclein expression in the lizard *Anolis carolinensis*. *J Comp Physiol A Neuroethol Sens Neural Behav Physiol* 202(8): 577-95.

Keywords

Synuclein, central nervous system, eye, *Xenopus laevis*