Type of presentation: Poster

**LS-14-P-6032 Adult neurogenesis in the brain of the weakly electric teleost Gymnotus omarorum**

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Adult neurogenesis is the process through which new neurons are generated and added to, or replace lost neurons of preexisting circuits. This primitive, evolutionary conserved trait was reduced along evolution from anamniotes to amniotes. In mammals is almost limited to two brain regions, but in teleosts several brain proliferating zones (PZs) with high neurogenic capacity are profusely distributed, subserving its high regenerative potential. In spite of the physiological and pathological relevance of adult neurogenesis, and the recognized need of comparative studies to achieve a better understanding of its regulation and function, few vertebrate species have already been studied (Zupanc, 2001; Lindsey & Tropepe, 2006; Grandel & Brand, 2012). Within the teleostean radiation, the wave type weakly electric fish *Apteronotus*, is a “model” species in which differences with non electroreceptive species in the distribution of adult brain PZs and neurogenesis are attributed to its functional specialization.. A similar distribution of brain PZs was found in the pulse-type weakly electric gymnotid *Gymnotus omarorum* through postnatal development (Iribarne & Castelló, 2014; Olivera & Castelló, 2014). In the present work, we evidenced the neurogenic potential of *G. omarorum* adult brain PZs by analyzing the co-localization of long term label retaining (30, 90 and 180 days) of the thymidine analog 5-Chloro-2′-deoxyuridine (CldU) and the expression of markers of neuronal differentiation (HuC/HuD, beta III tubulin, and tyrosine hydroxylase -TH-) or in vivo retrograde transport of the neuronal tracer neurobiotin. Our results support a rostral migratory stream, from the rostral region of the subpallial PZ to the olfactory bulb, where derived cells express HuC/HuD first, and differentiate into $TH^+$ interneurons later (Fig. 1), and radial migration giving rise to subpallial HuC/HuD and $TH^+$ neurons, and co-localization of CldU and b III tubulin in the caudal telencephalon (Fig. 2), and CldU and HuC/HuD in the caudal regions of the mesencephalic tectum opticum (Fig. 3) and the torus semicircularis, and the rombencephalic electrosensory lateral line lobe (ELL) and the corpus cerebelli (CCb). We further demonstrated the insertion of newborn neurons into circuits of the CCb, by co-localization of retrogradely transported neurobiotin in long CldU label retaining cells already migrated to CCb granular layer (Fig. 4). In conclusion, in this work we provide further evidences that adult neurogenesis is a conserved feature of euteleosts, giving rise to interneurons that are incorporated into preexisting neural networks. We also demonstrated for the first time a new neurogenic region at the functionally relevant ELL, the first and exclusive relay of electrosensory information.

Acknowledgement: This work was partially funded by PEDECIBA and ANII (FCE_2009_1_2246 & FCE_3_2011_1_6168).

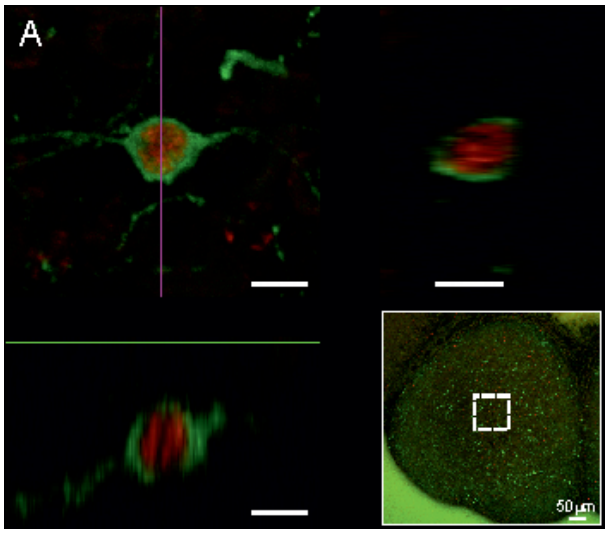


Fig. 1: Confocal images of a stack of sequential focal planes and orthogonal images generated for the position indicated by the crossing lines for demonstrating the co-localization of CldU long term (180d) label retaining (red) and TH expression (green) in a newborn cell already migrated into the olfactory bulb (arrow in inset). Scale bars: 5 µm.

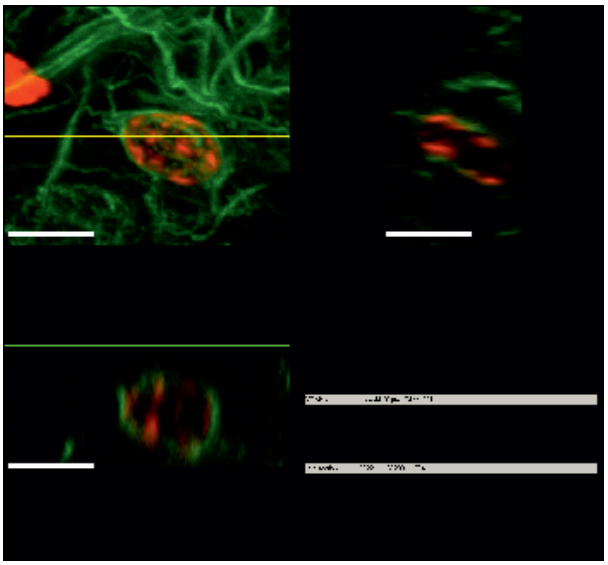

Fig. 2: Confocal images of a stack of sequential focal planes and orthogonal images generated for the position indicated by the crossing lines for demonstrating the co-localization of CldU long term (30 d) label retaining (red) and beta III tubulin immunoreactivity (green) in a newborn cell in the caudal telencephalon. Scale bars: 5µm.

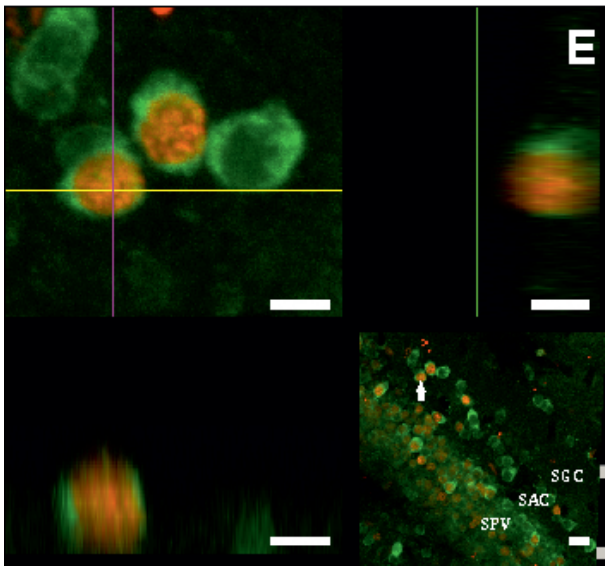


Fig. 3: Confocal images of a stack of sequential focal planes and orthogonal images generated for the position indicated by the crossing lines for demonstrating the co-localization of CldU long term (90d) label retaining (red) and HuC/HuD expression (green) in a newborn of the tectum opticum (arrow in inset). Scale bars: 5µm.

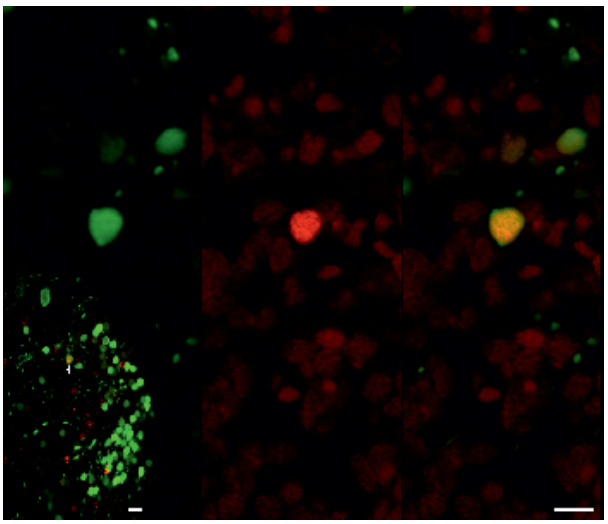

Fig. 4: The integration of newborn neuron into neural circuits of the CCb was evidenced by sequential acquired confocal images of retrogradely transported neurobiotin (green, left), long term (180d) CldU label (red, middle), and the overlay (yellow, right) in a newborn cell at the granular cell layer of CCb (arrow in inset). Scale bars: 5µm.