

Expression of PCNA positivity in the brain of normal adult heterothermic Vertebrates: further observations

Vito Margotta *, Antonio Morelli * and Brunella Caronti **

* Dipartimento di Biologia animale e dell'Uomo

** Dipartimento di Scienze Neurologiche
Università di Roma "La Sapienza"

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SUMMARY

As part of our study of non-experimentally induced encephalic proliferation in unequivocally adult individuals of several heterothermic Vertebrates (*Podarcis sicula*, *Triturus carnifex*, *Rana esculenta*, *Carassius carassius*), we deal here with areas not considered in previous investigations, i.e. various encephalic regions (except the telencephalon) in *Podarcis sicula*, *Triturus carnifex* and *Rana esculenta*, the diencephalon and medulla oblongata in *Carassius carassius*, and the olfactory bulbs in the two Amphibians. In the previous and current research, we have used Proliferating Cell Nuclear Antigen (PCNA) as a marker. PCNA is a ubiquitous intracellular antigen of the cycline family (proteins that regulate the cell cycle), which acts as an auxiliary protein to DNA polymerase δ ; it can be detected immunocytochemically with monoclonal antibodies to reveal cell cycle phases that coincide with DNA synthesis.

Spontaneous proliferation events, revealed by PCNA positivity, were constantly present in this study, being substantial in the olfactory region and diencephalon, very modest in the mesencephalon and myelencephalon, and absent in the cerebellum. In particular, signs of proliferation were abundant in the epithelium lining the cavities of the olfactory bulbs, while they were of different magnitude in tracts (with multiple and comparatively different sites related to the dorsal and/or ventral thalami) of the ependyma that delimits portions of the III ventricle and also, in all the species examined, at the level of the preoptic and infundibular recesses. Such signs were rare in the ependymal epithelium of the mesencephalic ventricle in *Podarcis sicula* and the rhombencephalic ventricle in all four species examined. This immunoreactivity was also observed in extra-ependymal areas: in the internal granular layer of the olfactory bulbs in *Triturus carnifex* and *Rana esculenta*; in the diencephalic nuclei of the habenula in *Podarcis sicula*, in both Amphibians and in *Carassius carassius*; in the mesencephalic tectum in *Podarcis sicula* and in the two Amphibians.

As in our previous studies, the current immunocytochemical picture revealed by PCNA positivity generally agrees with literature reports on the presence of normal proliferation in the areas investigated here. These literature sources consist primarily of the observations of Kirsche (1967), emerging from his preceding experimental investigations, and of confirmatory data from studies in subsequent decades by other researchers obtained with tests different from our marker. Nevertheless, the number of studies that deal with the species considered in the present research, or species closely related to them, is rather limited.