Histology and Histopathology

From Cell Biology to Tissue Engineering

Volume 34 (Supplement 9, 2019

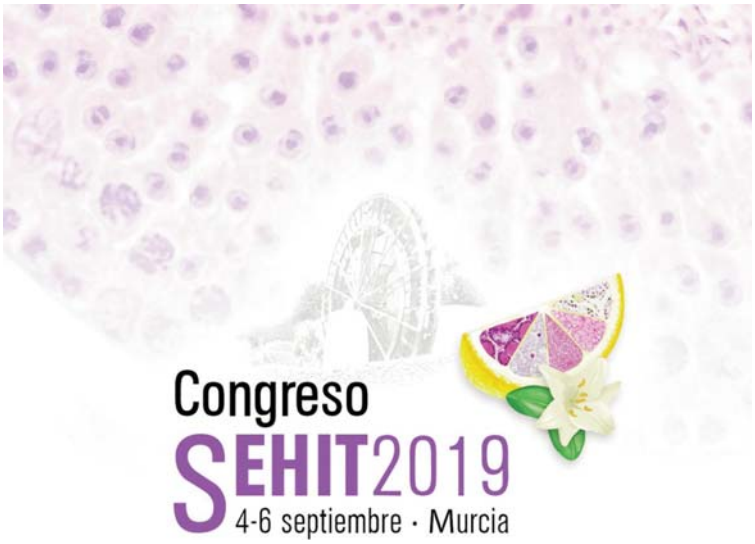
http://www.hh.um.es

XX CONGRESO DE LA SOCIEDAD ESPAÑOLA DE HISTOLOGÍA E INGENIERÍA TISULAR

VIII INTERNATIONAL CONGRESS OF HISTOLOGY AND TISSUE ENGINEERING

VI CONGRESO IBEROAMERICANO DE HISTOLOGÍA

September 4-6, 2019, Murcia, Spain



Organizan:

Patrocina:

Apoya:

Colaboran:

Poster presentation: Session 1. Topic: Histopathology. Code: 5674

Histology and Histopathology
From Cell Biology to Tissue Engineering

Reactive macroglia provide living scaffolds for spontaneous axon regeneration in conditions of traumatic neuroma in the lizard optic nerve

Romero-Alemán M.M.
Instituto Universitario de Investigaciones Biomédicas y Sanitarias, Universidad de las Palmas de Gran Canaria, Spain

Reptiles are the only amniotic vertebrates known to be capable of spontaneous axon regeneration in the central nervous system. However, this has been shown only in few species as the lizard *Gallotia galloti*. In healthy conditions, astrocytes co-express the intermediate filaments vimentin and GFAP in the adult lizard optic nerve and chiasm which reflects local adaptations to mechanical forces probably related to eye movements. Long-term axon regeneration occurs despite persistent astrogliosis after unilateral optic nerve transection in this lizard species. Astrogliosis is defined by hypertrophy, with up-regulation of intermediate filaments, and hyperplasia of reactive astrocytes. The present study aims to show the regeneration response in special cases of traumatic neuroma in the experimental lizard optic nerve and atrophy of the optic tract after long surviving periods (12 months post-lesion). The traumatic neuromas are unusual after the surgical procedure described below and occurs when both nerve stumps are not aligned. This extreme situation explores the limits of the regeneration competence of this lizard species.

Adult lizards were anaesthetized by intraperitoneal injection with diazepam/ketamine. An incision in the supraocular plaque exposed the right optic nerve, which was transected using iridectomy scissors. Next, the osteodermal plaque was put back into place. After a surviving period of 12 months, lizards were anesthetized and perfused transcardially (Bouin's fixative). The dissected brains showing traumatic neuroma in the optic nerve and severe atrophy of the contralateral optic tract were processed for paraffin embedding. Double ABC-immunoperoxidase stainings and sequential detection of vimentin (mouse monoclonal, DSHB, USA), and proteolipid protein (PLP, mouse monoclonal, Serotec/Biorad, USA) consisted of revealing one of them in black/dark grey using DAB solution containing 1% ammonium nickel sulphate, whereas only DAB was used afterwards with the other one in brown. Single ABC-Immunoperoxidase and Hematoxylin nuclei counterstaining were also performed.

The caudal optic nerve and optic tract in the experimental side showed significant atrophy in comparison to the intact side. Unexpectedly, some PLP-positive cell bodies and few myelinated nerve fibers were observed in the experimental side. These cells were undetected in the intact side. Moreover, intensely vimentin-positive reactive astrocytes showed a network-like structure in the experimental optic nerve and chiasm suggesting a role in reinforcing the cell scaffold caudal to the traumatic neuroma. By contrast, they were round-shaped with abundant cytoplasmic granules in the experimental optic tract which may be linked to a role in detritus removal. These different phenotypes suggest different functions of reactive astrocytes. Accordingly, some authors have shown that the cytoskeleton can affect cell behavior through cell surface integrin receptors. Hematoxylin nuclei counterstaining revealed more abundant nuclei in the experimental side indicating the gliosis persistence.

1) Some surviving retinal ganglion cells are able of axon regrowth despite the traumatic neuroma in the optic nerve and caudal atrophy. 2) Reactive vimentin-positive astrocytes form cell structural networks which can support spontaneous axon regrowth in the optic nerve/chiasm and debris removal in the optic tract. 3) Reactive PLP-positive oligodendrocytes are involved in the remyelination process of some regenerating nerve fibers.

This Journal is supported by

SOCIEDAD ESPAÑOLA DE HISTOLOGIA E INGENIERÍA TISULAR

UNIVERSITY OF MURCIA

University of Murcia

Indexed in: Science Citation Index, Science Citation Index Expanded (SciSearch), Journal Citation Reports/Science Edition, PubMed, Medline, SCOPUS, EMBASE, Chemical Abstracts Service (CAS), Google Scholar, EBSCO, CSA, CAB International, Biological Abstracts, BIOSIS, CAB Abstracts, Current Contents/ Life Sciences, SCImago, Zoological Record

Published by "Sercrisma International S.L." - Murcia, Spain

ISSN 0213-3911

Printed by "Jiménez Godoy, S.A." D.L. MU-33-1986 - Murcia, Spain