

FRONTIERS IN VASCULAR DEVELOPMENT: THE POTENTIAL ROLE OF THYMOSIN BETA-4 IN COCHLEAR VASCULOGENESIS

Balint Lippai^{1,2*}, Peter Bako^{2,3*}, Sofie Kramer^{2,3}, Ferenc Gallyas^{1,2} and Ildiko Bock-Marquette^{1,2}

¹*Department of Biochemistry and Medical Chemistry, University of Pecs, Medical School, Pecs, Hungary*

²*Szentagotthai Research Centre, University of Pecs, Pecs, Hungary*

³*Department of Otorhinolaryngology, University of Pecs, Medical School, Pecs, Hungary*

**These authors contributed equally to this work.*

The auditory system is an imperious sensory organ possessing a significant role in communication and three-dimensional orientation. Based on the WHO's data, 5% of the world's population suffer from hearing loss. To achieve proper auditory regeneration in adults, it is crucial to understand the development and the molecular role players of the ear. In this study we investigated the relevance of vascularization and the molecular regulatory components of embryonic inner ear development in mice. E10.0-E14.0 C57BL6 mouse embryos were harvested in 4% PFA. In addition to performing in situ hybridization utilizing Thymosin beta-4 (TB4) specific mRNA probes, samples were equally processed to acquire paraffin embedded sections. To investigate morphology, half of the slides were stained with hematoxylin-eosin. The remaining sections were processed for immunohistochemistry against TB4. Signals were detected via confocal microscopy and analyzed using ImageJ software.

In situ hybridization and immunodetection of TB4 indicated significant presence for the peptide during embryonic ear development. Distinctively, we found strong signals in the spiral vascular components of the developing embryonic inner ear at various time points.

Our research is the first in describing a role for TB4 throughout cochlear vascular development. Since the peptide is capable of reminding the adult heart on its embryonic program regarding vascular re-growth, we predict it will perform similarly in the adult ear. Our observations provide novel findings highlighting the complex and specific processes of cochlear spiral vascularization, implying the potential for TB4 in treating hearing loss in the future.

Keywords: Inner ear, Embryonic development, Vasculogenesis, Thymosin beta-4

Funding: OTKA-K108550, GINOP-2.3.2-15-2016-00047 and 2022-4.1.1-TKP2022 Thematic Excellence Program 2022 - National Excellence Sub-program