

Abstract

Rostral or the prechordal part of the vertebrate head is one of the key features that distinguishes us from other chordates. A part of this so-called New head is also a prechordal plate, also known as the prechordal or premandibular mesoderm, axial mesoderm or ventral cranial mesoderm. This most rostral population of the mesendoderm should develop from the anterior end of the notochord. It forms the head mesenchyme, and later contributes to the so-called head cavities and ocular muscles. In this work, I analyze the earliest development of the prechordal plate in sturgeon, gar and bichir, in which the endodermal preoral gut has recently been described as the most rostral head structure. Using histological techniques, immunohistochemistry, and *in situ* hybridization, developmental relationship of the prechordal plate and preoral gut has been analyzed. and In the rostral part of the forming head, it is the preoral gut as clearly defined endodermal epithelium, that appears first. The mesenchymal population of the prechordal plate arises only later, and has dual embryonic origin. Its posterior part takes its origin from the anterior end of the notochord, whereas its anterior part develops from the preoral gut around the rostral end of the brain. The prechordal plate later expands to the lateral region near the optical vesicle where they form head cavities in sturgeon and gar. Thus, the endodermal preoral gut appears earlier in ontogenesis, giving rise to the anterior portion of the mesenchymal population of the so-called prechordal plate. This unique mesenchyme of the rostral head thus forms by the epithelial-mesenchymal transition directly from the endoderm.

Key words: prechordal plate, vertebrate new head , preoral gut, notochord, head mesenchyme, head cavities