

NEW INSIGHTS IN AUDITORY ORGAN DEVELOPMENT: THE INNER PILLAR CELL GOES IT OWN WAY.

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Background : Although the structure of the auditory organ in mature mammals, the organ of Corti, is clearly established, its development is far to be elucidated. Using cytochemical and immunocytochemical methods at the light and electron microscope levels, we examine its spatio-temporal development in rat from embryonic day 16 (E16) to E19.

Results : We demonstrate that the organ of Corti develops from a non-proliferating cell zone that is located in the junctional region between the greater epithelial ridge (GER) and the lesser epithelial ridge (LER) of the dorsal epithelium of the cochlear duct and characterized by the presence of numerous microvilli. Using the periodic acid-thiocarbohydrazide-silver proteinate method at the ultrastructural level, we reveal that the first cells to develop in this zone are the inner pillar cells, a particular nonsensory supporting cell type; they arise in the base of the cochlear duct at the boundary between the two ridges at E16. The cell differentiation in this prosensory region continues according to a base-to-apex gradient, the inner hair cells appear in the greater epithelial ridge at E17 and the outer hair cells in the lesser epithelial ridge at E18. At E19, the different cell types of the Corti's organ are in place. We also show that the development of inner pillar cells within the prosensory domain does not involve Notch1 signalling.

Conclusions : These results highlight the central role that could play the inner pillar cells in the organ of Corti development.