

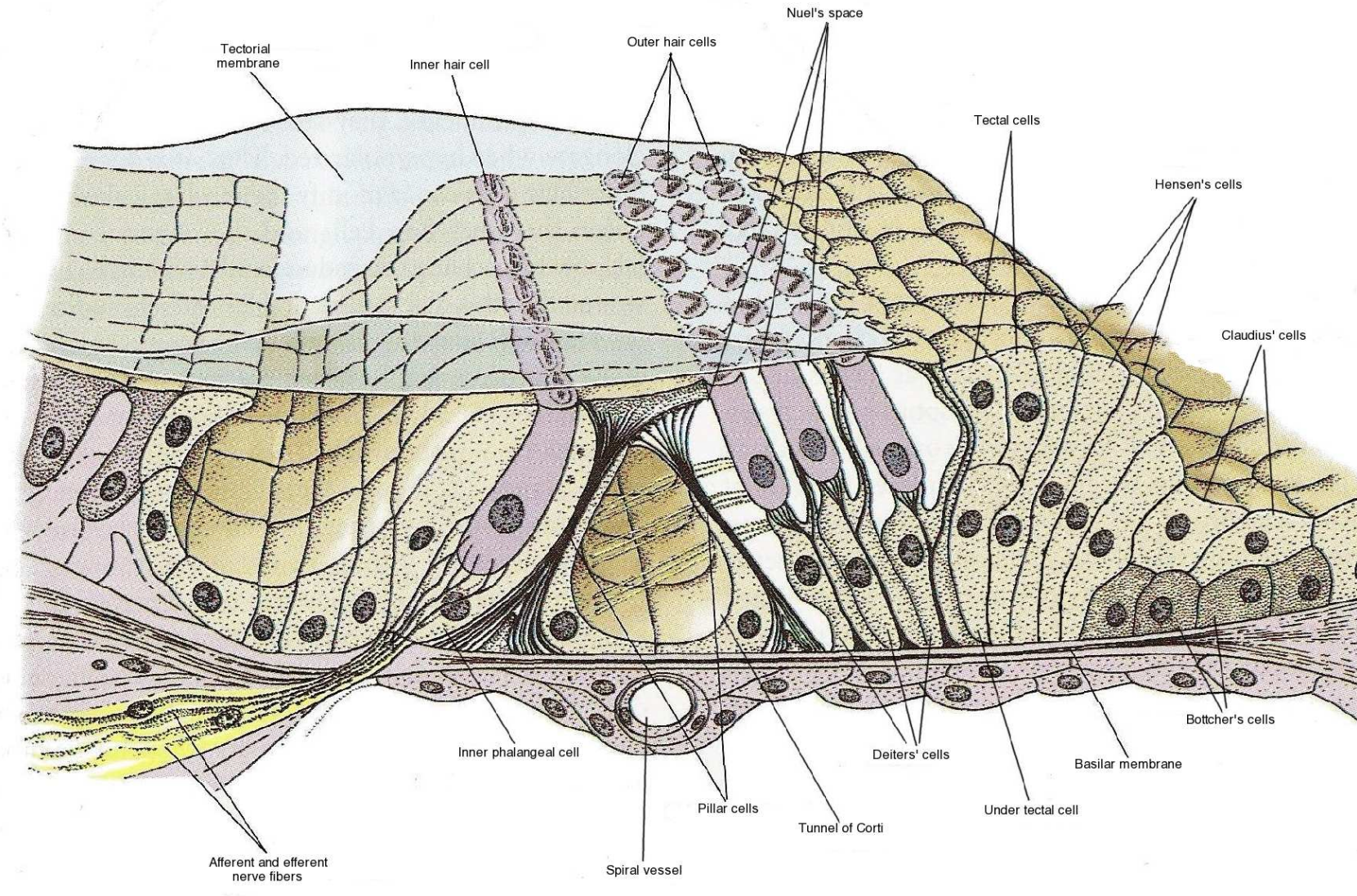
# Spatio-temporal localisation of $\beta$ -actin and $\gamma$ -actin isoforms during the development of the organ of Corti in rat from the embryonic day 18 (E18) to the post-natal day 25 (P25).

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## Introduction

The auditory organ, the organ of Corti (OC), is a highly specialized structure composed by specific cellular types. The sensory cells (HC) are characterized by stereocilia at their apex and are necessary for the sound perception. These cells are supported by supporting cells. Based on their morphology and physiology, at least four types of supporting cells can be identified in the OC: inner and outer pillar cells (PC), phalangeal cell and Deiter's cells.

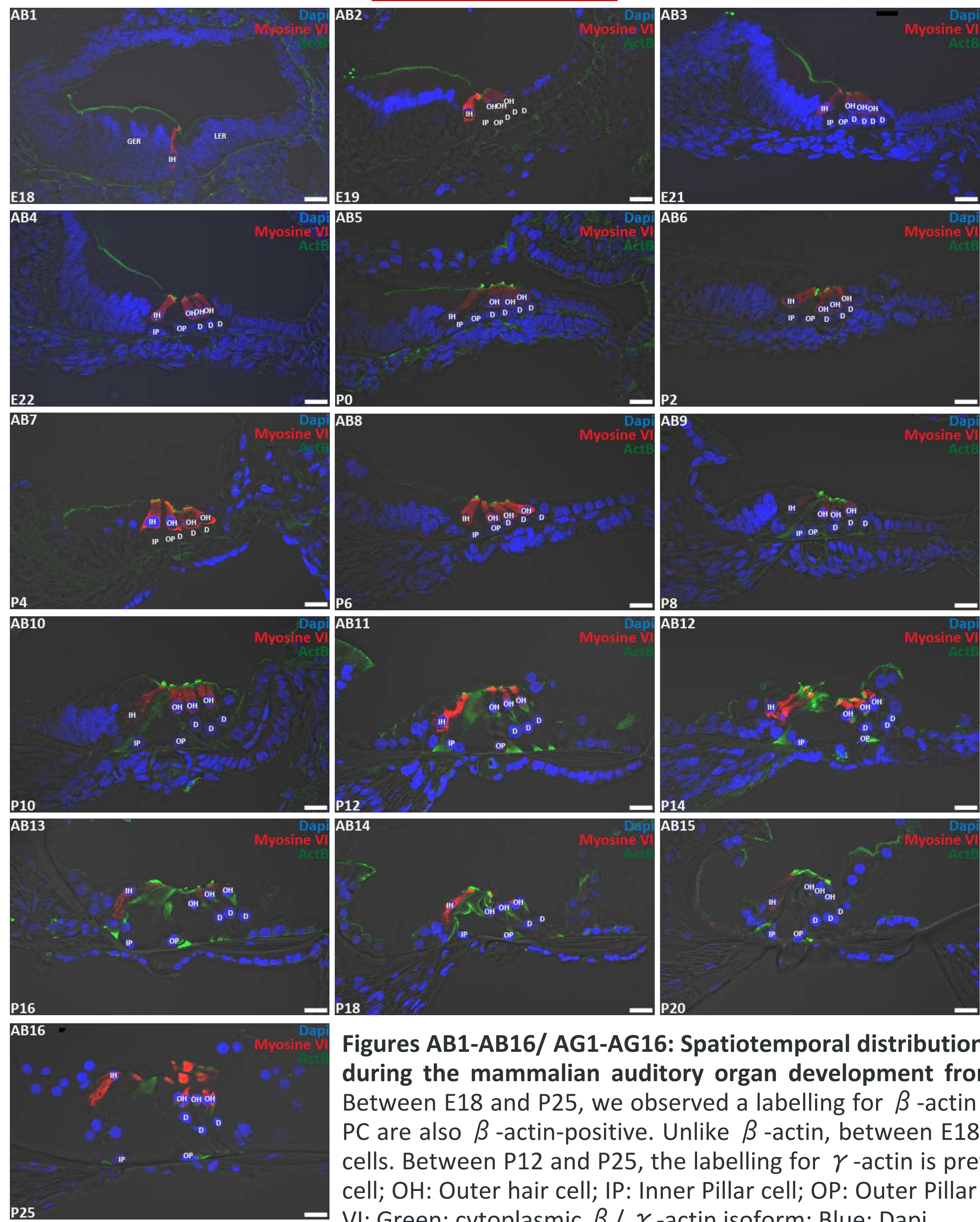
Sensory and supporting cells have cytoskeletons containing  $\beta$ -actin and  $\gamma$ -actin isoforms. In the adult mammalian cochlea, amounts of  $\gamma$ -actin increase and  $\beta$ -actin decrease in the order: outer pillar cells, inner pillar cells, Deiters' cells and hair cells. In sensory cells,  $\gamma$ -actin appears to be the most prominent component with an apparent  $\gamma$ -actin/ $\beta$ -actin ratio of approximately 2:1 (Hofer et al., 1997).  $\beta$ -actin is present in the cuticular plate but is more concentrated in the stereocilia, especially at the base where the stereocilia insert into the cuticular plate. The amount of  $\gamma$ -actin differs less between these structures, the stereocilia and cuticular plate, although its expression is apparently higher towards the tip of stereocilia and it is the predominant isoform of the hair cell's lateral wall (Furness et al., 2005). The differential subcellular localization of two actin isoforms suggests they may play different functions in auditory organ. In the brain,  $\beta$ -actin is restricted to dynamic structures whereas  $\gamma$ -actin is more ubiquitously distributed and occurs in relatively quiescent regions (Micheva et al., 1998).



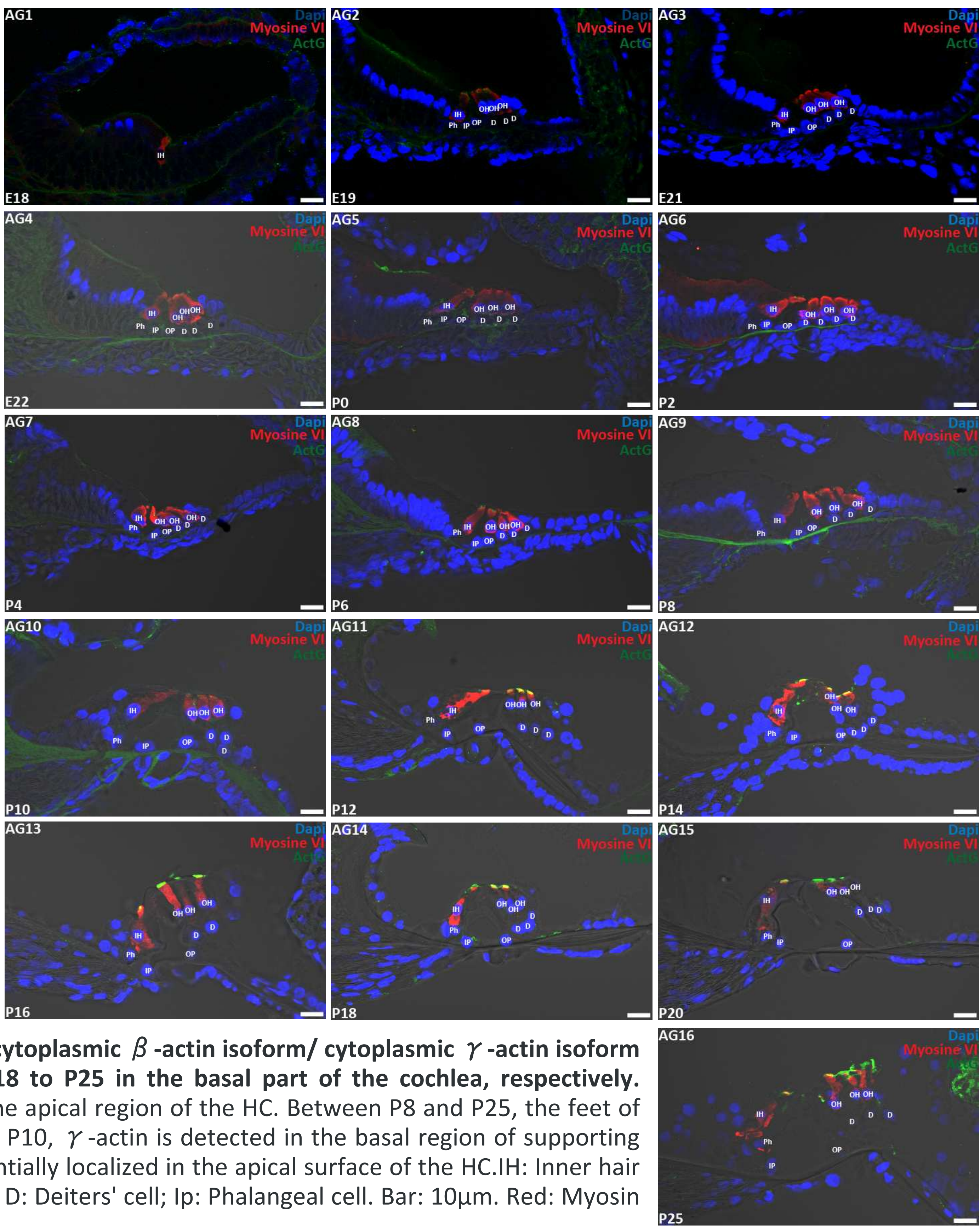
In the present study, by using confocal microscopy, we investigated the spatio-temporal localisation of  $\beta$ -actin and  $\gamma$ -actin isoforms during the development of the OC in rat from the embryonic day 18 (E18) to the post-natal day 25 (P25).

## Results

### $\beta$ -actin



### $\gamma$ -actin



**Figures AB1-AB16/ AG1-AG16: Spatiotemporal distribution of cytoplasmic  $\beta$ -actin isoform/ cytoplasmic  $\gamma$ -actin isoform during the mammalian auditory organ development from E18 to P25 in the basal part of the cochlea, respectively.** Between E18 and P25, we observed a labelling for  $\beta$ -actin in the apical region of the HC. Between P8 and P25, the feet of PC are also  $\beta$ -actin-positive. Unlike  $\beta$ -actin, between E18 and P10,  $\gamma$ -actin is detected in the basal region of supporting cells. Between P12 and P25, the labelling for  $\gamma$ -actin is preferentially localized in the apical surface of the HC. IH: Inner hair cell; OH: Outer hair cell; IP: Inner Pillar cell; OP: Outer Pillar cell; D: Deiters' cell; Ip: Phalangeal cell. Bar: 10 $\mu$ m. Red: Myosine VI; Green: cytoplasmic  $\beta$  /  $\gamma$ -actin isoform; Blue: Dapi.

## Conclusion

Our results revealed that during development  $\beta$ -actin isoform preceded  $\gamma$ -actin isoform in the apical region of HC. They also suggest that  $\gamma$ -actin isoform might be involved in attachment of supporting cells with their basal membrane and that  $\beta$ -actin isoform might play a role in PC reorganization during the formation of Corti tunnel.

