

Spontaneous Calcium Transients in Interdental Cells during the Critical Period of Cochlear Development

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The tectorial membrane (TM) is essential for normal hearing. It stretches across the sensory epithelium of the inner ear, contacts the stereocilia of the outer hair cells and is spiralling along the longitudinal axis of the cochlea. It consists of collagens and glycoproteins. Mutations of these proteins lead to aberrant TM formation and deafness. During the critical period of cochlear development, interdental cells (IDCs) secrete TM proteins into the endolymph. Little is known about the physiology of IDCs and TM formation. We stained cochlear cryosections and performed Ca^{2+} imaging of acutely dissected organs of Corti at postnatal day 4-5 using the indicator Fluo-8 AM. IDCs generated spontaneous Ca^{2+} transients in part of the IDCs at a rate of ~ 1 event/10 min. Spontaneous Ca^{2+} signals in IDCs were variable in shape and duration. Applying 10 μM ATP evoked Ca^{2+} oscillations in all IDCs at ~ 0.1 Hz whereas 1 μM led to oscillations in only part of the IDCs at ~ 0.05 Hz. Ca^{2+} transients never spread to neighbouring cells. Our results emphasize the role of IDCs during the critical phase of cochlear differentiation. Further studies are needed to elucidate the underlying mechanisms.

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