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MEETING ABSTRACT Open Access

The role of particulate guanylyl cyclase B (GC-B) in auditory function in adult mice

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Background

cGMP signaling triggered by the binding of C-type natriuretic peptide (CNP) to its receptor guanylyl cyclase B (GC-B; NPR2; NPRB) has been linked by genetic evidence to a remarkable variety of physiological functions like skeletal bone growth, female fertility, cardiac growth, fat metabolism and gastrointestinal function. For the nervous system it has been recently demonstrated that the CNP/GC-B/cGMP/cGMP-dependent protein kinase type I (cGKI) signaling pathway is essential for sensory axon branching at the dorsal root entry zone of the spinal cord and at the rhombomeres of the hindbrain during embryonic development [1]. Also in the auditory system, distinct auditory nerve fiber (ANF) types that differ in their discharge rate and sound sensitivity bifurcate in the cochlear nucleus (CN), sending collaterals to the anteroventral, posteroventral, and dorsal subdivisions. The lack of GC-B has been shown to lead to a central phenotype [2].

Results

Here, we describe that the lack of GC-B in addition leads to a peripheral phenotype which is manifested in auditory threshold loss and altered wave amplitudes and latencies of stimulus-evoked auditory brainstem responses (ABR). Our preliminary results indicate that this deficit is related to a combined afferent and efferent fiber phenotype.

Outlook

We will further investigate the functional consequences of bifurcation loss of ANF on central hearing function and central plasticity. This may lead to sound localization problems, a progressive aging phenotype [3] and an increased risk for tinnitus [4].

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References

1. Ter-Avetisyan G, Rathjen FG, Schmidt H: **Bifurcation of axons from cranial sensory neurons is disabled in the absence of Npr2-induced cGMP signaling.** *J Neurosci* 2014, **34(3)**:737-747.
2. Lu CC, Cao XJ, Wright S, Ma L, Oertel D, Goodrich LV: **Mutation of Npr2 leads to blurred tonotopic organization of central auditory circuits in mice.** *PLoS Genet* 2014, **10(12)**:e1004823.
3. Sergeyenko Y, Lall K, Liberman MC, Kujawa SG: **Age-related cochlear synaptopathy: an early-onset contributor to auditory functional decline.** *J Neurosci* 2013, **33(34)**:13686-13694.
4. Knipper M, Van Dijk P, Nunes I, Rüttiger I, Zimmermann U: **Advances in the neurobiology of hearing disorders: recent developments regarding the basis of tinnitus and hyperacusis.** *Prog Neurobiol* 2013, **111**:17-33.

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