**An in-vivo mouse model for endolymphatic hydrops using 9.4 T MRI – many different mechanisms can induce hydrops**

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An in-vivo model of endolymphatic hydrops has been developed, using vasopressin and other substances to induce hydrops in mice and 9.4 T MRI to study it. Two weeks continuous i.v. infusion of vasopressin has been shown to induce cochlear hydrops (1).

Further studies using continuous infusion of different inhibitors of cAMP/cGMP degrading enzymes (PDE3, PDE4 and PDE5) has shown that not only vasopressin, but phosphodiesterase inhibitors can induce hydrops (2). Simultaneous treatment with the aldosterone antagonist spironolactone inhibits the formation of hydrops induced by vasopressin and PDE4 but not hydrops induced by PDE3 (3). Furthermore, dietary factors, other than sodium, seem to be important for the induction of endolymphatic hydrops.

Endolymphatic hydrops, in this specific model, can be induced by many different mechanisms. It might be of importance that a successful treatment of hydrops targets a specific mechanism. This might explain why we still are looking for ***the treatment*** for Meniere´s disease.

References

1. Degerman E, In 't Zandt R, Pålbrink AK, Magnusson M. [Vasopressin induces endolymphatic hydrops in mouse inner ear, as evaluated with repeated 9.4 T MRI.](https://www.ncbi.nlm.nih.gov/pubmed/26048336) Hear Res. 2015;330:119-24.
2. [Degerman E](https://www.ncbi.nlm.nih.gov/pubmed/?term=Degerman%20E%5BAuthor%5D&cauthor=true&cauthor_uid=27685753), [In 't Zandt R](https://www.ncbi.nlm.nih.gov/pubmed/?term=In%20't%20Zandt%20R%5BAuthor%5D&cauthor=true&cauthor_uid=27685753), [Pålbrink A](https://www.ncbi.nlm.nih.gov/pubmed/?term=P%C3%A5lbrink%20A%5BAuthor%5D&cauthor=true&cauthor_uid=27685753), [Eliasson L](https://www.ncbi.nlm.nih.gov/pubmed/?term=Eliasson%20L%5BAuthor%5D&cauthor=true&cauthor_uid=27685753), [Cayé-Thomasen P](https://www.ncbi.nlm.nih.gov/pubmed/?term=Cay%C3%A9-Thomasen%20P%5BAuthor%5D&cauthor=true&cauthor_uid=27685753), [Magnusson M](https://www.ncbi.nlm.nih.gov/pubmed/?term=Magnusson%20M%5BAuthor%5D&cauthor=true&cauthor_uid=27685753). Inhibition of phosphodiesterase 3, 4, and 5 induces endolymphatic hydrops in mouse inner ear, as evaluated with repeated 9.4T MRI. [Acta Otolaryngol.](https://www.ncbi.nlm.nih.gov/pubmed/27685753) 2017;137:8-15.
3. Degerman E, In 't Zandt R, Pålbrink A, Magnusson M. [Endolymphatic hydrops induced by different mechanisms responds differentially to spironolactone: a rationale for understanding the diversity of treatment responses in hydropic inner ear disease.](https://www.ncbi.nlm.nih.gov/pubmed/31145014) Acta Otolaryngol. 2019;139:685-691.