

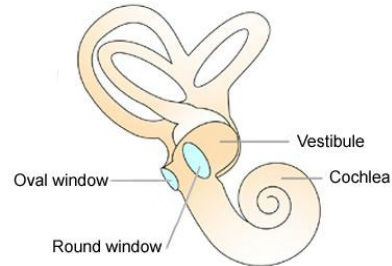
The route of sound through the cochlea

The structure of the cochlea

The cochlea consists of a meandering channel that appears in three parts in cross-section.

The upward part is called scala vestibuli, and it starts with the oval window.

The downward part is called scala tympani. The liquid movements that are caused by the movements of the stapes on the oval window lead away from the oval window to the top of the cochlea. From there, they continue to the **round window**.



Between both scala, there is a membranous tube that is also filled with liquid. This is where the actual hearing organ is located, namely the **organ of Corti**.

How does the sound channelling work?

The movement of the stapes (ossicles in the middle ear), which varies according to the sound pressure, exerts pressure on the oval window.

These pressure fluctuations produce a traveling wave through the scala vestibuli and the scala tympani.

The movement of the traveling wave is transferred to the spiral canal, then it is scanned by the sensory cells (hair cells) of the organ of Corti as the movement of the tectorial membrane. This information is then sent to the hearing nerve.

While the scala vestibuli is required for the “reception of sound”, we need the scala tympani to provide an “outlet for the sound”. This is because the traveling wave exits via the scala tympani and, with its elasticity, the round window prevents what would be a disturbing reflection.

The following section of the uncoiled cochlea shows that the scala vestibuli, the scala tympani and the spiral canal are three parallel canals. The direction of the sound as traveling wave is indicated. The location of the organ of Corti as the “sound recipient” is clearly shown.

It is also shown clearly that the scala vestibuli and the scala tympani that seem to be two separate liquid chambers in cross-section, are actually just one liquid chamber.

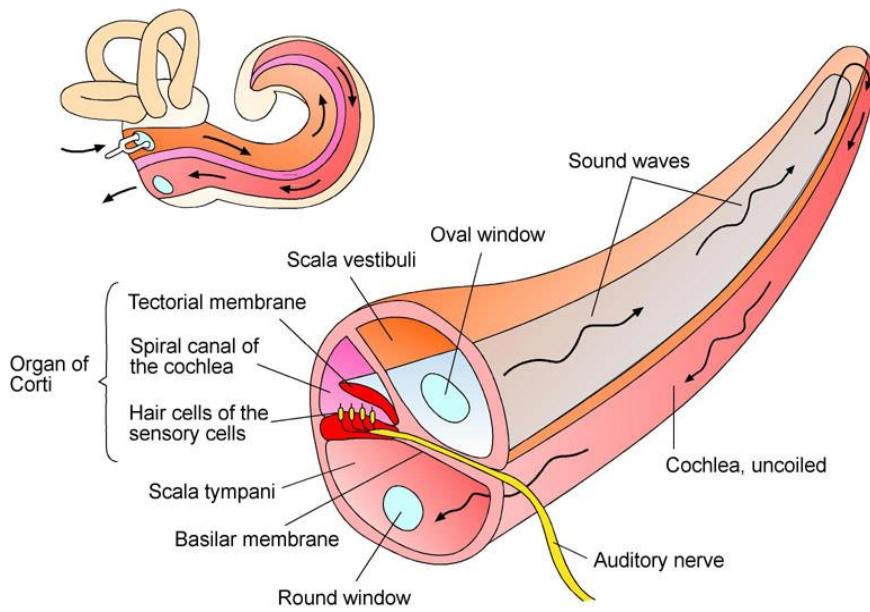


Illustration: Cochlea – rolled out transparently

This illustration clearly shows that the overall cochlea is a liquid channel and that the vibrations of hair sensory cells are transformed to nerve impulses.