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Bypassing insufficient sound transfer in the chronically disabled middle ear by an active/passive prosthesis

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In many patients with chronic middle ear diseases, like recurrent cholesteatoma, persistent tubal dysfunction etc., modern surgical techniques often result in an elimination of disease with a dry, small cavity, but even repetitive tympanoplasty cannot restore a social hearing. Implantable hearing aids promise a new alternative for these patients. Contrary to SNHL-patients with their concerns on ear-surgery, this group of patients often agrees to the proposal of a tympanoplasty for an improved hearing, due to their experience with previous surgeries. Furthermore, their regular hair-cell function promises a nearly-normal aided hearing.

The idea of a composite middle ear implant, which acts as a passive prosthesis in cases of adequate air conduction, but which will stimulate the cochlea by an active vibration in case of a chronically disabled middle ear, is obvious. Yet previous concepts had to be disregarded mostly due to technical reasons. We designed a new type of implant, merging our concepts of passive prosthesis design, which integrates the reliable Vibrant Soundbridge transducer in a titanium holder for a Columella-reconstruction.

Our concept promises a surgically easy procedure similar to a normal tympanoplasty. Temporal bone experiments demonstrate the acoustical efficiency of this composite columellar implant.