**Re-evaluation of the servo-null animal model for measuring cochlear chamber pressures**

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(presented at ARO San Diego, 2016)

There are two ways to assess fluid pressures in cochlear chambers: indirect and direct. Indirect methods attempt to find a physiological effect that changes with pressure, e.g., phase of the distortion product, and attempt to calibrate that effect against externally applied changes in pressure, e.g., due to body tilt. The direct approach is to develop an animal model in which a pressure transducer is directly connected to a cochlear chamber. The "servo-null" approach was developed in the 1960s to cope with tiny vessels. The tip of a glass micropipette is introduced into the test chamber, and, as the pressure changes, a servo mechanism tracks that pressure, adjusting externally derived pressure sources within the micropipette for zero flow and outputting the value of that matching pressure to a recording device. The tip is also used to measure independently the electric potential at the point of entry. The use of glass micropipettes to measure pressure is thus an order of magnitude more complex than using them to measure electric potential.

Overpressure has long been suspected responsible for membrane ruptures in Meniere's attacks, yet only a direct method can hope to show real pressures. Despite 40+ studies that have used this approach, none have shown that the pressure in perilymph or in endolymph, nor the difference between them, is remarkable. We have been studying this technique for five years, using both bench testing and its use in the cochleae of some 80 Mongolian gerbils. This first presentation focusses upon a review of the literature and is followed by an assessment of their results in the hindsight of a delineation of the strengths and weaknesses of the methodology. The servo-null approach was not designed for any system in which frequency-dependent electric potentials could interfere with the measurement. The commercial system lacks any indication of whether the servo-system is indeed phase-locked and tracking and is not supplied with any data on the characteristics of the device or micropipettes. It was not designed for a biological system in which conceivably there is internal active homeostatic regulation of pressure. It does not mean that the device, as is, is unusable. It simply means that every aspect of the measurement must be qualified with caveats, and such, is beyond the scope of most of the literature reviewed.