

Cochlear Potentials

- Endolymphatic Potential
- Cochlear Microphonic
- Summating Potential
- Intracellular Potential
- Compound Action Potential



Endolymphatic potential (EP) has a steady state of +80mV of DC. This is measured through an electrode placement in the scala media. The EP does not require an acoustic stimulus, it is generated by the stria vascularis, and therefore any damage to the stria vascularis will result in an abolished EP.

The cochlear microphonic (CM) is an AC potential and it is the first response seen on the ECOG. The CM can be recorded from many sites within or near the cochlea and it requires an acoustic stimulus to be presented for it to be recorded. It reflects the outer hair cell integrity at the base of the cochlea, and it does not adapt with increased duration of sound. A greater intensity stimulus will result in a greater CM amplitude, however this response plateaus at some high intensity. The CM represents summed activity of the outer hair cells that are generating the response.

A summating potential (SP) is a DC potential that occurs in response to an acoustic stimulation and it can be negative or positive. It mainly reflects the inner hair cells however there is some contribution from the outer hair cells as well. It represents the summed activity of the inner hair cells. The amplitude of the SP can be compared to the amplitude of the action potential to identify Meniere's Disease. The SP occurs before the action potential.

Intracellular potential of the hair cells do not have any clinical significance. The outer hair cells have a resting potential of -70mV and the inner hair cells have a resting potential of -40mV. In response to sound, there is some AC fluctuating response.

Compound action potential (CAP) is an AC potential that can be recorded with an electrode placed near or within the cochlea. The CAP represents a summed output response from synchronous firing of the population of auditory nerve fibers. The source of the AP is the auditory nerve and it has two negative peaks (N1 and N2).