

OAEs Defined

Otoacoustic emissions are low-level sounds generated by the outer hair cells of the cochlea (inner ear) in response to auditory stimuli. OAEs are present in nearly all normal-hearing ears. Absent OAEs indicate hearing loss and/or middle ear pathology.

The ERO•SCAN measures two types of OAEs: Distortion Product Otoacoustic Emissions (DPOAEs) and Transient Evoked Otoacoustic Emissions (TEOAEs). DPOAEs are generated by simultaneous stimulation of the outer hair cells by presenting two pure tones of different frequency through the OAE probe. TEOAEs are generated when the ear is stimulated by clicks or tonebursts. DPOAEs and TEOAEs are equally reliable in the 1.5 kHz to 4 kHz range. TEOAEs are more reliable for frequencies below 1.5 kHz while DPOAEs are more reliable for frequencies above 4 kHz.

OAE Detection

An OAE probe with eartip is inserted into the ear canal to obtain a seal. The acoustic signal is presented from the probe. The signal travels through the ear canal, the middle ear, and finally reaches the cochlea where the outer hair cells are excited and the emission is generated. The emission travels back through the middle and outer ears and is detected by a highly sensitive microphone in the OAE probe.

Emissions are very soft sounds that must be separated from environmental and biological (body) sounds. Computer averaging and noise reduction techniques are used to separate the emissions from the noise.

Note that both the stimuli and the emission must travel through the middle ear. Middle ear abnormalities preclude measurement of OAE's (OAE's will be absent). For this reason, OAE tests detect middle ear pathology as well as cochlear hearing loss.