Lauren Lafond

Auditory steady-state response

There are two different pathways by which sound waves produce the sensation of hearing, air conduction and bone conduction. In air conduction sound waves it the tympanic membrane(ear drum) and cause it to move which in turns causes the stapes to move, forming pressure waves in the fluid filled inner ear. Different frequencies of noises stimulate different hairs on the cochlea, which translates pitches. Hearing by bone conduction occurs when a sound wave or other source of vibration causes the bones of the skull to vibrate. These vibrations are then transmitted to the fluid surrounding the cochlea and hearing results.

Hearing loss occurs by two ways, conductive and sensorineural. Conductive hearing loss results form physical problems with the movement of the sound waves through the ear. An example of this is blockage of the ear canal. Sensorineural is from damage to the hair cell or nerves that sense sound waves. An example of this is acoustic trauma which is prolonged exposure to loud noises which causes the hair cells on the cochlea to become less sensitive. To detect hearing loss there is a test called ASSR, auditory steady state response; this is an evoked potential test that can accurately measure auditory sensitivity beyond the limits of other test methods. ASSR testing provides audiometric information that is essential in the management of children with sever to profound hearing loss. It also is a step up from the auditory brainstem response (ABR).

The ASSR works because it is an auditory evoked potential, elicited with modulated tone that can be used to predict hearing sensitivity in patients of all ages. The response is an evoked neural potential that follows the enveloping of a complex stimulus. The neural potential is evoked by turning on and off a tine. The neural response is a brain potential that closely follows the time courses of modulation, and can be detected objectively at intensity levels close to behavioral thresholds. We can compare ASSR to ABR. They both record bioelectric activity from electrodes arranged in similar recording arrays. They are both auditory evoked potential and use acoustic stimuli delivered through inserts. But their differences are what make ASSR superior to ABR. ABR depends on amplitude and latency while ASSR uses amplitudes and phases in spectral frequency domain. ASSR depends on peak detection across a spectrum, rather than peak detection across a time versus amplitude wave form. It is also evoked using repeated sound stimuli presented at a high repetition rate. ABR is evoked using brief sounds presented at a relatively low repetition rate.

The Goals of ASSR are to create an estimated audiogram from which questions regarding hearing, hearing loss, and aural rehabilitation can be answered. It will allow the hearing care professional to create statistically valid audiograms for those unable or unwilling to participate in traditional behavioral tests. ASSR will produce a clinically acceptable, frequency-specific prediction of behavioral thresholds in patients of all ages, states, and degree of hearing loss.