DIOPSYS™

Advancing the Science of Vision Testing

VEP/EEG Technology Explained

Sensors attached to the scalp will record "brainwaves" (the electroencephalogram or EEG), and when properly enhanced, this electrical activity from the brain can be displayed on a monitor. The pattern of the brainwaves changes with whether the patient is fully awake and alert, or drowsing, or sleeping. EEG is typically used in clinical studies of epilepsy to assist in localizing the part of the brain in which seizures occur.

The Visual Evoked Potential (VEP) occurs when a patient observes a visual stimulus, such as a flash of light, or a pattern on a monitor. The size (magnitude) of the VEP is very small, even smaller than the background EEG of which it is a part. With appropriate enhancement, and the presentation of a number of identical visual stimuli, the VEP can be visualized and measured.

VEP recordings have been employed to assess the status of the optic nerve. In cases of optic nerve inflammation, for example, the transmission of the visual pathway is slowed, and this can be visualized as a delay between the timing of the stimulus and the VEP response from the visual cortex. It has also been employed in cases of suspected "malingerers", since there is no way to "fake" a VEP test.

The Enfant™ is able to utilize the VEP to measure the function of the entire visual pathway, from the lens of the eye to the visual cortex of the brain, to detect optical or neural abnormalities related to vision. These abnormalities are often subtle and difficult to detect by ordinary means. The Enfant™ produces a visual stimulus consisting of an equal number of horizontal black-and-white bars. By rapidly switching the black and white bars in the pattern, the visual pathway is stimulated, and its electrical signal is measured. By changing the width of the bars, the visual pathway's response to stimuli requiring different visual acuities can be objectively assessed. This is performed rapidly for each eye separately, and results in a comparison between left and right eyes. This stimulus produces a good VEP signal in normally sighted eyes as long as the bars do not become too small to be seen well. Thus, the VEP signal being recorded will be clear as long as it is perceived by the patient. Special computer algorithms compare the VEP signal from the right and left visual pathways. If there is a significant difference between them, the patient fails the test, and is then referred for further evaluation.

The width of the bars can be related to Snellen visual acuity by comparing their width to the width of the detail size in the letters on the Snellen chart.