



Activation Procedures

Activation procedures are performed during an EEG to induce, enhance, or better define abnormal EEG patterns. The most commonly used activation procedures are hyperventilation, photic stimulation, and sleep.

Activation procedures should be used whenever possible and not medically contraindicated. Good history taking is an important first step to help determine which activation procedures would most likely elicit EEG abnormalities.

Hyperventilation (HV), sometimes referred to as overbreathing, is breathing deeply to exhale all the “dead space” air at a rate of 18 to 24 breaths per minute for 3 to 5 minutes. HV causes a decrease in the carbon dioxide in the blood (hypocapnia). Hypocapnia causes a constriction of the arteries, including the cerebral arteries.

Demonstrate, as well as explain, to the patient how to perform hyperventilation. Be sure to inform the patient of the possible side effects which include dizziness, light headedness, tingling in finger, toes, and around the mouth, and a dry mouth. Blowing bubbles, pretending to blow out candles on a birthday cake, and a pinwheel to blow and spin are useful tricks to get a young child to perform an effective HV.

Contraindications for HV vary among END departments. Be sure to check with your supervisor and Medical Director regarding HV policies. Contraindications include subarachnoid hemorrhage, sickle cell anemia, recent cerebrovascular accident or myocardial infarction, significant cardiopulmonary disease, active asthma,

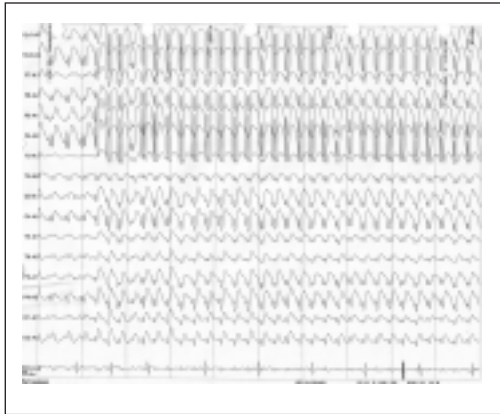


Figure 1

known aneurysm, known moyamoya disease, and advanced pregnancy.

A normal response to HV is often called a “buildup” characterized by an increase in amplitude and diffuse bilateral theta and delta activity (see Figure 1). Children have a much more pronounced buildup than adults. In children, the theta and delta appear much more abruptly, are maximal posteriorly, are higher amplitude, and persist longer than in adults. At times adults will have no noticeable slowing even with a well performed HV. The EEG usually returns to baseline one minute after HV ends. Hypoglycemia (low blood sugar) can increase the normal buildup response. Ask the patient when he ate his most recent meal. If the buildup is excessive and or persists longer than expected, give the patient some orange juice, and have the patient perform HV later in the recording. A buildup that persists several minutes after HV is suggestive of moyamoya disease.

Abnormal EEG or clinical responses to HV can occur at any age. HV may reproduce the clinical symptoms that is patient is complaining of such as dizziness, numbness, tingling, transient blurring of vision, ringing in ears.... Be sure to ask the patient to tell you if she has any unusual feelings

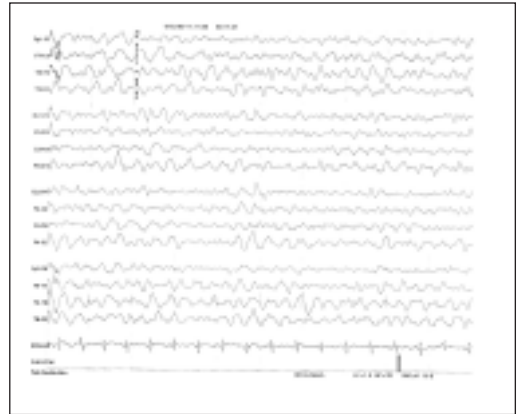


Figure 2

(besides the normal side effects you warned her about) during the HV.

HV is very effective in activating generalized 3 Hz spike and wave (see Figure 2). A clinical absence seizure may accompany the 3 Hz spike and wave. Give the patient unrelated words to remember during the burst of 3 Hz spike and wave, e.g. black, tall, fast, yellow, dog.... Then ask the patient to repeat the words. This will help to document the clinical changes seen with the 3 Hz spike wave. If a patient is referred for “staring spells” and has no 3 Hz spike and wave during the first three minutes of HV, extend the HV to five minutes. If possible, have the patient repeat the HV at the end of the recording in a sitting position to increase the air exchange and thus the hypocapnia produced.

Focal slowing caused by an underlying lesion or focal area of cortical dysfunction may be increased or even provoked by HV. Generalized slow spike and wave at 2 to 2.5 Hz and focal interictal spikes and sharp waves can be activated by HV.

The November Newsletter will continue the review of activation procedures with a discussion of photic stimulation. ■