

Activation Procedures, Part II

Photic Stimulation

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Photic stimulation, sometimes referred to as intermittent photic stimulation, is a series of brief, brilliant light flashes. The flash rate, the number of flashes per second, can be varied. Each END department develops its own procedure for the rate at which the flash is started, how long the flash lasts, and the rate sequence. Many departments have the light flash for 10 seconds with a 5 to 10 second pause between rates. A common flash rate sequence is 3, 5, 7, 9, 12, 15, 18, 21, 24, 25, and 30.

The photic light should be placed 12 inches or 30 centimeters from the patient's face. The light should flash straight into both of the patient's eyes. If the light is skewed to the left or to the right, an asymmetric response may be caused by how the patient is seeing the light and is not due to a true cerebral abnormality.

Photic stimulation can be performed routinely with eyes open or eyes closed. If an abnormal response is suspected due to the history or previous EEG findings and is not seen with eyes closed, repeat the stimulation with the eyes open or with the patient opening and closing his eyes during the flash sequence. The patient should be awake and alert during photic stimulation.

Be sure to warn the patient of expected side effects or normal changes experienced during photic stimulation. The patient may see colors or patterns. Some patients have told me that photic stimulation makes them feel like they are moving. A few patients will find photic stimulation so annoying that they will ask you to stop the procedure.

Normal responses to photic stimulation include no response (which is seen at all ages) and photic driving. Photic driving is a cerebral response that is time-locked to the rate of the light flashes. Photic driving is seen over the posterior head regions and is maximal in the occipital electrodes (O1 and O2). The best photic driving response is usually seen at a frequency near the patient's alpha rhythm. Photic driving can occur at the same rate as the flash, at a harmonic (two or three times faster than the flash frequency) (see Fig. 1), or at a subharmonic

(one-half the flash frequency). If an asymmetry of photic driving is seen, make certain that your electrode placement is symmetric and that the photic light is shining straight into the patient's eyes. For an asymmetry of photic driving to be significant, the asymmetry must be persistent throughout the entire range of flashes and must be present in the resting EEG.

A photomyogenic response (old term, photomyoclonic response) is characterized by brief, repetitive muscle potentials over the anterior portions of the head and is maximal in the Fp1 and Fp2 electrodes. A photomyogenic response is not cerebral in origin but is muscle artifact. At times the patient may have visible fluttering of the eyelids and face. A photomyogenic response will build as the flashes are presented and the response will stop as soon as the light is stopped. Photomyogenic responses are felt to be within normal limits and to have no clinical significance.

A photoparoxysmal (old term, photoconvulsive response) is characterized by generalized spikes, multiple spikes (poly-spikes), sharp wave bursts, or generalized spike and wave complexes. A sustained photoparoxysmal response will continue after the flash has been stopped (see Fig. 2). An unsustained photoparoxysmal response will stop while the photic light is still flashing. The element of surprise may help to elicit a photoparoxysmal response. If there is a question of photic sensitivity or if the patient has a past history of photoparoxysmal response, begin at 15 to 18 flashes per second, which are the frequencies that most often elicit a photoparoxysmal response.

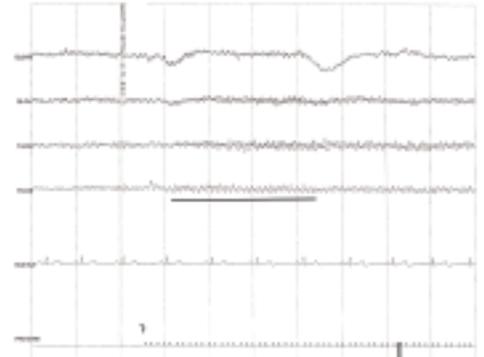


Figure 1

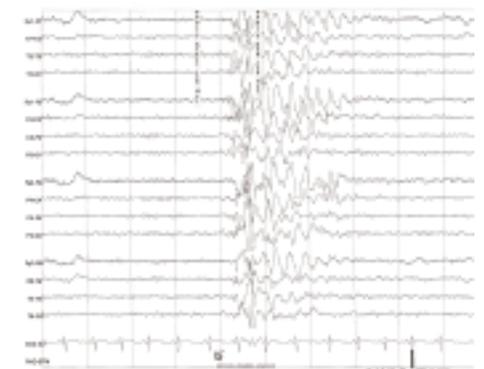


Figure 2

A generalized tonic-clonic seizure can be induced by photic stimulation. **Turn off** the photic light as soon as a photoparoxysmal response is seen. The same flash frequency should be presented again to verify the discharge was truly caused by the photic light and was not coincidental. It may be useful to determine the range of the flash rates that produce the photoparoxysmal response. If you observe facial twitching or upper body jerks be very careful if you decide to continue photic stimulation. Each department should have a procedure regarding how to stimulate (or not stimulate) once a photoparoxysmal response is seen.

This is a very brief overview of photic stimulation. I urge you to research other photic responses, such as the H-response and bioccipital spikes as well as the use of color filters in altering the photic response.

The March newsletter will continue the review of activation procedures with a discussion of sleep. ●