



# EPILEPSY & The Facts

## Photosensitivity

### What is photosensitive epilepsy?

Some people with epilepsy can be triggered to have seizures by flashing or flickering lights, rapidly changing images or visual patterns. This is called photosensitive epilepsy. When given an EEG test, the majority of people with photosensitive epilepsy will show epileptic discharges in the brain when exposed to flashing lights.

### Who has photosensitive epilepsy?

It is estimated that fewer than five per cent of people with epilepsy are photosensitive. In addition, there are an unknown number of photosensitive persons who have as yet not had a seizure. Photosensitive epilepsy is largely genetically determined, although its inheritance is complex. It most commonly affects children, and usually appears between the ages of eight and 20 years. The incidence is highest around ages 12 and 13, suggesting a link with early puberty, and girls are affected more often than boys. One quarter of patients lose their photosensitivity around 25 years of age. The rest remain photosensitive for life.

### What kinds of flashing lights can trigger seizures?

Not all flashing lights or visual patterns will trigger a seizure, even in individuals who are photosensitive. The rate of the flashing light, the duration of the flashing, and the intensity of the light all play a part. A frequency of between 15 and 20 flashes per second is most likely to cause a seizure, whereas very few people are sensitive to a rate of three flashes per second. Recent advances in technology and special effects expose many people to a wide range of photosensitive stimuli. But natural sources, like the effect of sunlight through trees or dazzling reflections off water, are also known seizure triggers.

### Can other visual patterns trigger seizures?

Besides flickering light, there are also visual patterns that can be seizure provoking. Stripes, bars, “dartboard”, spiral and “whirling wheel” type patterns maximally stimulate the visual cortex and are therefore provocative, especially when they fill the field of vision. High light-dark contrast is critical to abnormal brain response; colours of equal brightness are less provocative. Patterns that move or reverse (white to black and vice versa) are more provocative than stationary patterns, especially if they oscillate in the “dangerous” frequency of 15 – 20 Hz. Long wavelength red is the most provocative colour.



## **Why do flashing images cause seizures in some people?**

Lights flashing at roughly the same frequency as brain waves seem to entrain brain rhythms, causing nerve cells in the brain to misfire and produce a seizure. According to neurologist Jerome Engel, “Instead of the nerve cells firing individually, like fingers playing notes on the piano, many fire at once—like the banging of dissonant chords”. This only happens when the flashing light or pattern is in the central area of vision and is seen by both eyes.

## **What do photosensitive seizures look like?**

The seizures that are produced are of various types, such as tonic clonic (grand mal), absence, myoclonic, or, less often, simple or complex partial seizures. This means that they may consist of convulsions, or they may be brief episodes of blank staring, rapid blinking or twitching of the mouth or face, jerking movements in other parts of the body, loss of attention, the inability to talk or respond, or sensory hallucinations.

## **Can television cause seizures?**

Television is by nature a flickering medium, and can pose a risk to viewers with photosensitive epilepsy. The closer the viewer to the set, the more the screen fills the entire field of vision and the greater the effect of the flicker frequency of the picture. Tiredness may be an associated factor. The further provocative factor is the material itself. Music videos and high-tech promotional materials are known for their quick-cut editing, rapidly changing images and high-contrast lighting patterns that often prove problematic for people with photosensitive epilepsy. Highly detailed computer-generated images can also be provocative.

## **Can discotheques or nightclubs cause seizures?**

The strobe or flashing lights, which may be part of the entertainment in nightclubs or at theatre events, can trigger seizures in people who are photosensitive.

## **Can video games cause seizures?**

Current medical opinion suggests that video games featuring patterns of flashing lights, rapidly changing images or patterns do not create a tendency to have seizures in persons where that tendency is not already there, but may trigger seizures in people with photosensitivity. Today, the manufacturers of video games often put a warning to that effect right on their products.

## **Can computer screens cause seizures?**

Seizures may be triggered in individuals with photosensitive epilepsy who are sensitive to the flickering of the computer screen, although the flicker rate is not thought to be very provocative.

## **Is sunlight a seizure trigger?**

Natural light sources are just as likely to trigger seizures in a photosensitive individual as artificial ones. For example, sunlight flickering off water or through a line of trees can trigger seizures.

## **How can photosensitive seizures be avoided?**

If you have photosensitive epilepsy, taking a few simple steps can be helpful:

- Sitting at least 2.5 metres away from the television set and 30 cm. back from a computer monitor.
- Not increasing the contrast and brightness of a screen. Using a high-quality computer monitor, with a refresh rate of at least 60 Hz (VGA quality or better).
- Viewing in a well-lit room to help counteract the brightness of the screen. Eliminating reflected ambient light on the screen. Minimizing exposure to fluorescent lighting.

- Placing a hand over one eye or wearing an eyepatch when approaching the TV picture will also help, since images have to be viewed through both eyes in order to provoke photosensitive seizures.
- Wearing a good pair of polarized blue sunglasses (preferably with side shades) of tinted lenses when exposed to flickering light both indoors and outside.
- Calling ahead when planning on attending a movie, theatrical or other event which may contain strobing or provocative stimuli can reduce surprises.
- Sodium valproate (valproic acid) is the drug of choice for controlling photosensitive seizures.