

# Differences in photosensitivity in epilepsies of childhood and adolescence compared to adulthood

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The study by Y. Lu *et al.* (2008) reported here is a retrospective analysis of an original cohort of more than 1000 children who attended the Neuropediatric Department of Kiel University Hospital in Germany over a period of almost 30 years (1975-2002). To be included, patients had to have had at least two EEG studies with intermittent photic stimulation (IPS) performed between the ages of five and 15 years and to have had a syndromic diagnosis made according to the 1989 ILAE classification. Only a third of those with childhood absence epilepsy (CAE), rolandic and febrile seizures were included. The final cohort (566 in total; 322 boys and 244 girls) therefore consisted of 122 children with CAE, 103 with rolandic epilepsy, 117 with febrile seizures and 234 with other syndromes.

One hundred and seventy seven (31%) of the children studied had, at some time in childhood or adolescence, a photoparoxysmal reaction (PPR) to IPS. This consisted of occipital spikes (grade 1 PPR) in six cases (1%), occipital spike and waves (grade 2 PPR) in 26 cases (5%), a more diffuse response (grade 3 PPR) in 62 cases (11%) and a generalised response (grade 4 PPR) in 83 cases (15%). These are remarkable findings. Previous studies have found prevalence rates of PPR in 2-10% of children and 5% of adults with epilepsy (Kasteleijn-Nolst Trenité 1989, Shiraishi *et al.* 2001). There are a number of possible explanations for this.

The population studied by Y. Lu *et al.* was clearly highly selected. For example, it included children with both CAE and febrile seizures. However, there were more children with the former than the latter, which is not the case in the childhood epilepsy population as a whole (Hamdy *et al.* 2007), and children with definite epilepsy but no syndromic diagnosis were excluded. The authors do not make clear how the children in Kiel were selected for EEG, including repeat EEG studies. Why, for example, were children with febrile seizures studied, despite authorities viewing EEG as unhelpful? Even with the best intentions, selection bias is a potent mechanism of distortion.

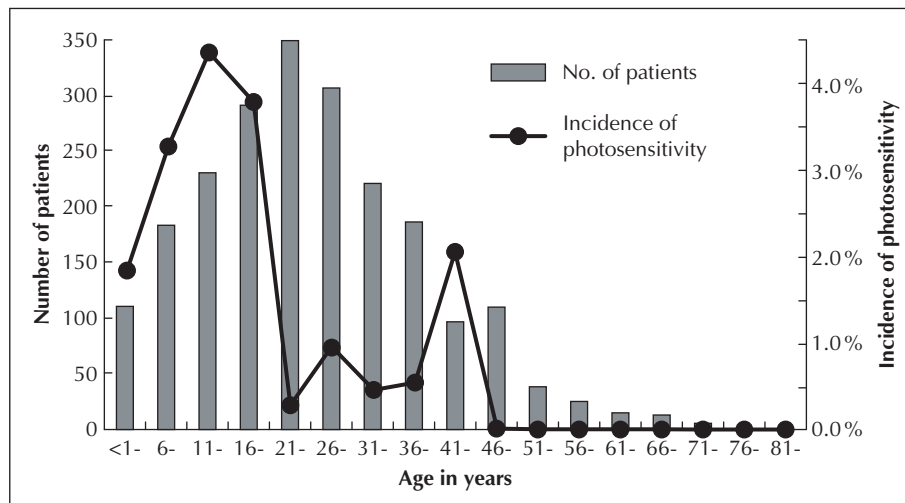
The study by Y. Lu *et al.* (2008), unlike most other studies, included all grades of PPR, including localised occipital spikes. The significance of spikes confined to the occipital regions during IPS is controversial. Not all authorities consider them as pathological. They may simply be evoked responses or else be a genetic trait unrelated to an increased propensity to epileptic seizures. However, even if all localised PPR are excluded, the photosensitivity rate was still 26%.

The method Y. Lu *et al.* (2008) used to select subjects maximised detection of photosensitivity. To be included subjects had to have had at least two EEG studies performed between five and 15 years of age. It is well established that photosensitivity is highest in adolescence, as illustrated in the figure (figure 1).

Following up patients over several years, including adolescence, with repeated EEGs is predestined to detect more positive cases than is a conventional incidence or point prevalence study. The study is, in effect, a mixture of point prevalence, incidence and cumulative incidence. A different methodology was used by Shiraishi *et al.* (2001). These authors studied 2,187 unselected patients from a Japanese epilepsy centre (age range 1-81; mean 24.2 yrs; 56% male), and found 37 patients (1.7%) with a generalized PPR. In a prospective comparative prevalence study performed in Caucasian patients with epilepsy attending a Dutch epilepsy centre, the prevalence of generalised PPR was 1.2 % in three to five year olds, 1.1 % in children aged five to ten and 7.6% in those of ten to 15 years (Kasteleijn-Nolst Trenité 1989).

Finally, the details of how photic stimulation was applied may be important. It is established that the longer the duration of stimulation the more likely it is that PPR will be obtained, especially in children. For this reason, adopting a standard methodology in studies of photosensitivity is crucial.

In the study by Y. Lu *et al.* patients were divided into epilepsy syndromes. Moreover, this is the first study to look specifically at children with occasional seizures (neonatal and febrile). It, like previous studies from Japan (Shiraishi



**Figure 1.** Incidence of photosensitivity in patients with epilepsy at different ages. Number of patients with epilepsy at different ages (bars). The incidence of the photoparoxysmal response (straight line) gradually increased with ages up to 15 years, and suddenly decreased after age 20 years (from Shiraishi *et al.* 2001).

*et al.* 2001) and Germany (Wolf and Goosses, 1986), used the 1989 ILAE syndrome classification. Therefore, it is useful to compare the syndrome-related findings. All found the highest rate of photosensitivity in idiopathic generalised epilepsies, especially juvenile myoclonic epilepsy. However, very different (absolute and relative) rates were found in the syndrome of *grand mal* on awakening. Y. Lu *et al.* found the rate to be 70% compared to around 8% in the other two studies. This is not easy to explain. Another remarkable difference between these studies is that no subjects with photosensitivity were classified as having an occipital epilepsy by Y. Lu *et al.* In the two other studies, around 6% of subjects with occipital epilepsy were photosensitive. The failure to find any subjects with a photosensitive occipital epilepsy is all the more surprising since focal and localised PPR were included. In contrast, the high rate of photosensitivity reported in rolandic epilepsy is at variance with all other reports of this syndrome and with clinical experience. Classification of seizure disorders has evolved, with new syndromes, including idiopathic photosensitive occipital lobe epilepsy, being recognised. This adds to the difficulties of retrospective studies. It is possible that reclassifying the patients in the study using the latest proposals for classification of epilepsy (Engel 2001) and photosensitivity (Kasteleijn-Nolst Trenité *et al.* 2001) would lead to substantial modifications.

Where does this leave us? It seems inconceivable that almost a third of children with epilepsy are photosensitive as suggested by Y. Lu *et al.* Other studies and our own experience tell us that this is not the case. However, perhaps their study will act as a stimulus, if not an irritant,

prompting better epidemiological studies, including longitudinal studies, of photosensitivity (both clinical and EEG) in children and adults, using prospective designs and standard, and now agreed, methodology. The study by Y. Lu *et al.* collected patients over almost 30 years. If we want answers within a reasonable time-frame, multicentre collaboration will be essential. □

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