Drawing-induced epilepsy

Drawing of a simple "sawtooth" pattern (A) did not evoke epileptic activity whereas drawing a more complex meander (B) did.

Kho et al. studied a patient in whom drawing, but not writing, selectively triggered seizures with a right frontal onset. Their findings in the patients with reflex epilepsy support current models in the neurocognition of drawing.

see page 723

Figuring out drawing-induced epilepsy

Commentary by Bruce L. Miller, MD

The article by Kho et al. is a major contribution to the rich and fascinating literature on the reflex epilepsies. Clinically, the triggers may be remarkably specific; seizures can be induced by viewing round objects, viewing specific video games or cartoons (including *Pokemon*),¹ listening to specific songs or nursery rhymes, playing mah jong or planning to move in chess, touching hot water, or brushing ones teeth. Similarly, experiencing specific emotions or movements can trigger seizures. Genetic forms of epilepsy can cause certain types of reflex epilepsy, but focal lesions also can be a trigger.

In this report a young fashion design student experienced arm twitches followed by loss of consciousness induced by drawing. Spike and wave activity in the right frontotemporal region could be precipitated by copying a complex figure, drawing a figure from memory, or even when he imagined himself in the activity of drawing. In contrast, drawing simple repeating figures, picturing complex visual scenes, calculating, writing, or reading did not induce seizure activity.

The mechanisms underlying reflex epilepsies remain uncertain. The simplistic notion is that those brain regions subserving specific functions that are also triggers for the seizure are hyperexcitable. While this may be an accurate description—and pharmacologic manipulations that decrease excitation (by interfering with glutamate neurotransmission) or increase inhibition (by increasing GABA neurotransmission^{2,3}) suggest that this is plausible—it falls far short of explaining exactly how the normal physical structure or chemical connections of the brain are deranged. Further, it is unclear to what extent genetic models, in which these studies are performed—such as photic-induced seizures in the baboon, *Papio papio*—are analogous to reflex seizures in humans, even those induced by photic stimulation, a fairly common occurrence among the reflex epilepsies.

This case offers interesting insights into the cognitive processes involved with drawing, a relatively understudied topic. The dissociation between writing and drawing emphasizes the

presence of anatomically distinctive cognitive modules in the dominant and nondominant hemispheres. Inducing a system in the nondominant hemisphere involved with various components of creating a picture was enough to trigger a right frontoparietal seizure focus. In contrast, activating the dominant hemisphere with tasks like writing or calculating did not. This case helps to stimulate new work to determine the mechanisms associated with reflex epilepsy while challenging cognitive neurologists to think about the anatomic systems involved with the creation of a drawing.

References

1. Erba G. Preventing seizures from "Pocket Monsters": a way to control reflex epilepsy. *Neurology* 2001;57:1747-1748.
2. Smith SE, Durmuller N, Meldrum BS. The non-N-methyl-D-aspartate receptor antagonists, GYKI 52466 and NBQX are anticonvulsant in two animal models of reflex epilepsy. *Eur J Pharmacol* 1991;201:179-183.
3. Smith SE, Parvez NS, Chapman AG, Meldrum BS. The γ -aminobutyric acid uptake inhibitor, tiagabine, is anticonvulsant in two animal models of reflex epilepsy. *Eur J Pharmacol* 1995;273:259-265.

see page 723

Neurology[®]

March 14 Highlight and Commentary: Figuring out drawing-induced epilepsy

Neurology 2006;66;619

DOI 10.1212/01.wnl.0000207697.56102.b0

This information is current as of March 13, 2006

Updated Information & Services

including high resolution figures, can be found at:
<http://n.neurology.org/content/66/5/619.full>

References

This article cites 3 articles, 1 of which you can access for free at:
<http://n.neurology.org/content/66/5/619.full#ref-list-1>

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
http://www.neurology.org/about/about_the_journal#permissions

Reprints

Information about ordering reprints can be found online:
<http://n.neurology.org/subscribers/advertise>

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright . All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.