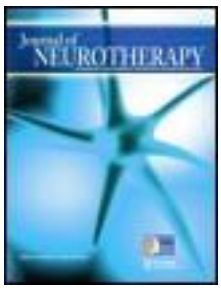

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Temporal Lobe Slow Waves

John R. Hughes MD [a]

[a] University of Illinois College of Medicine , 912 South Wood Street, Chicago, IL, 60612 E-mail:

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Temporal Lobe Slow Waves

John R. Hughes, MD

Temporal slow waves are the most common kind of EEG abnormality in the majority of EEG laboratories. A number of reasons for this include the exquisite sensitivity of neurons within the temporal lobe, especially of the adult so that minor disturbances within the temporal lobe and even from neighboring areas may show as temporal slowing (Hess, 1958). Other reasons are that the major pathological changes in aging, anoxic conditions, head injury and many other etiologies are found *in* the temporal lobe (Blackwood & Corsellis, 1976), especially within the depth of this lobe, the amygdala and hippocampus. These disturbances then present as slow wave abnormalities on the temporal lobe.

Temporal slowing during the aging process presents a definitional problem of the term "normal." The *expected incidence* in percent of some *slow waves on the temporal lobe* is approximately *one-half of the age*, so that around 40% of all octogenarians will show some slowing (Hughes & Cayaffa, 1977). If one defines normal only in terms of the statistical average for a given age group without investigating various cognitive or motor deficits, then the designation of these slow waves (as long as they are not prominent delta waves) as "normal" might seem justified, since nearly one-half of these individuals show the slowing. On the other hand, if one defines normal in terms of the *healthy* in that same age group, after having found no obvious cognitive or motor deficit, then the designation of these slow waves as abnormal seems justified. Thus, this problem of temporal lobe slowing is similar to the problem of the slowed frequency

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John R. Hughes is Professor of Neurology and Director of Clinical Neurophysiology and the Epilepsy Clinic, University of Illinois College of Medicine, 912 South Wood Street, Chicago, IL 60612 (E-mail: jhughes@uic.edu).

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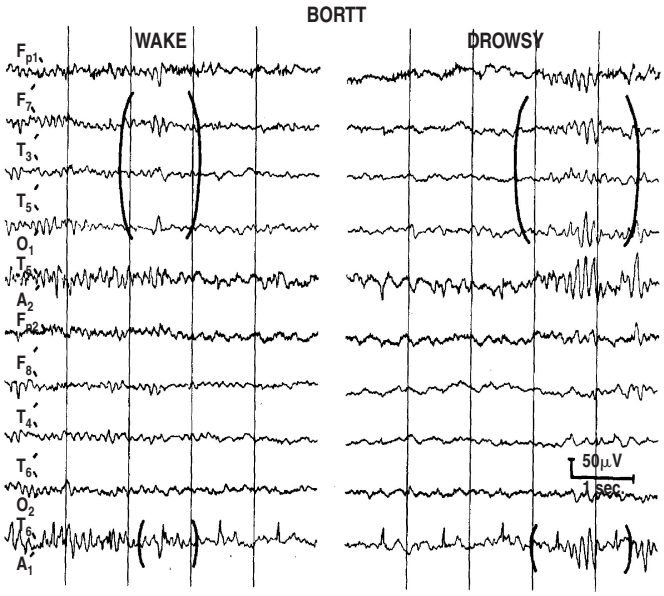
FIGURE 1. Burst of rhythmical temporal theta (BORTT). Note (left) the very short burst during wakefulness on Channels 2 to 4 (left temporal area), seen also on the last channel (left ear) and note also (right) the longer burst in the drowsy record.



of the background rhythm. Although the statistical majority of aged individuals may show alpha <8 c/sec, *healthy* centenarians show frequencies >8 c/sec. Similarly, the majority of the aged may show some temporal slowing, but the *healthy* do not.

One specific pattern called bursts of rhythmical temporal theta (BORTT; Maynard & Hughes, 1984) is often seen as a first sign of cognitive decline in these patients (see Figure 1). Gibbs and Gibbs (1963) have referred to "minimal temporal slow activity" and Niedermeyer (1987) has referred to "minor temporal slow" in similar conditions. Thus, definite slow waves on the temporal lobe of aged patients, although common, can be called abnormal, often only mildly so. When appropriate tests are run, such as a fluency test (Visser, Hooijer, Jonker, Van Tilburg, & DeRijke, 1987), the appropriate electroclinical correlations will often appear. Some investigators have failed to find any correlations with these tempo-

ral slow waves, but others have found a relationship between only mild disturbances and a general cognitive deficit (Drachman & Hughes, 1971). The prominence of *left*-sided temporal slowing is well known and often bitemporal slow waves are more apparent on the left side (Passouant, Cadilhac, & Jean, 1956). This preference for the left side may, in part, be related to the fact that the left temporal lobe involves the speech area in most patients. Therefore, with left temporal slow waves patients may seek medical attention more often than with right temporal slowing. However, this is only a partial explanation, since elderly individuals without obvious cerebral signs or symptoms, but with slow waves, also show a left temporal emphasis (Hughes, 1960; Maynard & Hughes, 1984). See Figure 2.

Temporal slowing is associated with *many different etiologies*, just as temporal pathology is found in most conditions that affect the brain. Since head injuries, regardless of site of impact, often involve the scraping of the temporal lobe along the inner part of the sharp, bony middle fossa, temporal slow waves are often seen following concussions or brain contusions (Courville, 1958).

FIGURE 2. Slow waves on both temporal areas. As commonly seen, the slowing is more prominent on the left temporal area (first 5 channels) than the right (last 5 channels).

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