explained by another mental disorder (e.g., mood disorder, anxiety disorder, dissociative disorder, or a personality disorder. A patient may have both ADHD and ASD. Symptoms are now referred to as "presentations": Combined, predominantly inattentive, and predominantly hyperactive-impulsive presentations.

References.
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BIOLOGICAL MARKERS IN DIAGNOSIS OF ADHD

BIOLOGICALLY BASED NOSOLOGY FOR ADHD

Investigators at Oregon Health and Science University and other centers attempt to refine subtyping of childhood ADHD by using biologically based behavioral temperament types. Groups were validated using 3 external validators: cardiac measures of respiratory sinus arrhythmia, CNS functioning via functional MRI, and clinical outcomes at 1-year follow-up. Three novel types of ADHD were recognized: mild (normative emotion regulation), surgent (extreme levels of positive approach-motivation), and irritable (extreme levels of negative emotionality, anger, and poor soothability). These types were stable over time and showed unique patterns of cardiac physiological response, resting-state functional brain connectivity, and clinical outcomes. This biologically informed temperament-based typology is thought to provide a superior description of heterogeneity in the ADHD population than any current classification. (Karalunas, et al. Subtyping attention-deficit/hyperactivity disorder using temperament dimensions: toward biologically based nosologic criteria. **JAMA Psychiatry** 2014 Jul 9).

COMMENTARY. The use of a combination of biological markers may help to reduce heterogeneity and to identify homogeneous phenotypes of ADHD. A consensus report of the World Federation of Societies of Biological Psychiatry (WFSBP) task force on biological markers and the World Federation of ADHD determined in 2012 that no reliable ADHD biomarker had been described to date, but some promising candidates (e.g. olfactory sensitivity, substantial echogenicity) exist. The development of ADHD markers is hindered by sample heterogeneity due to etiological and phenotypic complexity and age-dependent co-morbidities [1].

References.
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EEG THETA/BETA RATIO IN DIAGNOSIS OF ADHD

Investigators at the Research Institute Brainclinics, Nijmegen, Netherlands, conducted a meta-analysis on the Theta/Beta ratio (TBR) during Eyes Open from location Cz (the electrode halfway between the inion and the nasion) in the EEG of children/adolescents 6-18 years of age with and without ADHD. In nine studies identified with a total of 1253 subjects with and 517 without ADHD, the grand-mean effect size (ES) of the TBR decreased from 0.75 to 0.62 with increasing age, explained by an

increase in TBR for the non-ADHD groups. A substantial sub-group of ADHD patients do deviate on the TBR measure, but excessive TBR is not a reliable diagnostic measure of ADHD. It may have prognostic value. (Arns M, et al. A decade of EEG theta/beta ratio research in ADHD: a meta-analysis. **J Atten Disord** 2013 Jul;17(5):374-83).

COMMENTARY. The FDA approved the Neuropsychiatric EEG-Based ADHD Assessment Aid (NEBA) medical device in 2013 to be used as confirmatory support or to pursue further testing after an evaluation for ADHD, in a child aged 6-17. The device was not to be used as a stand alone method of diagnosis of ADHD.

The AAN, in an Evidence-Based Practice Advisory, concludes that it is highly likely that EEG theta-beta power ratio and EEG frontal beta power correctly identify patients with ADHD (accuracy 89% to 94%) as compared to a clinical evaluation. The AAN recommends that the EEG test should not be used in place of a standard clinical evaluation, because of the risks of misdiagnosis of 6-15% when using the theta/beta ratio. There is neither evidence for, nor against the use of theta/beta EEG power ratio either to confirm a diagnosis of ADHD, nor to support further testing. Whether comorbid disorders such as ODD have similar changes in the theta/beta ratios that mimic the reported finding in ADHD is not known [1].

A recent report of spectral analysis of EEGs on 28 normal and 58 ADHD children, aged 6 to 14 years, found TBR was higher in ADHD subjects, with lower beta but no difference in theta power over Broca's area. Beta-1 power over Broca's area was the best diagnostic test, with sensitivity 0.86 and specificity 0.57. The EEG beta-1 power and TBR assist in confirming the diagnosis of ADHD in a sample with moderate pretest probability of ADHD [2].

The present symptomatic method of diagnosis, based on parent and teacher evaluations, is relatively accurate in children with the hyperactive-impulsive subtype of ADHD but less so with the inattentive type. A more objective test such as EEG if validated could be a valuable aid in the diagnosis and management of ADHD. The significance of seizure discharges in approximately 25% of sleep-deprived EEGs in ADHD children is further evidence of the utility of the EEG in ADHD management [3].

References.

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TREATMENT OF ADHD

EFFECT OF METHYLPHENIDATE ON INATTENTION DURING DRIVING

Investigators at Utrecht University, the Netherlands; and centers in Australia and Detroit, MI, evaluated the lapses of attention during on-road highway driving in 18 adult ADHD patients during treatment with methylphenidate (MPH) or placebo. Driving was significantly better with MPH when compared with placebo, with reduction in weaving, lapses, and inattention. Lapses were common on placebo (11/18 patients), and much less after MPH (5/18). Lapses often go unnoticed by drivers. (Verster JC, Roth T.