ORP as a measure of sleep depth is a great step forward to helping us realize the goal of leveraging enormous amounts of sleep study data to help guide patient care.

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What is ORP? The short story

In 2013, Cerebra scientific founder Dr. Magdy Younes, developed the patented algorithm for Odds Ratio Product (ORP). ORP micro-analyses the Electroencephalogram (EEG) signal, moving beyond conventional scoring methods to dig deeper into brain activity during sleep.

How does ORP work?
ORP is a measure of sleep depth ranging from 0 (deep sleep) to 2.5 (Full wakefulness). ORP uses Fast-Fourier Transform to convert the EEG into 4 frequency bands (delta, theta, alpha, beta) and assigns a power value of 0 to 9 for each 3-second epoch. This creates a 4-digit combination for each 3-second epoch creating 10,000 potential patterns across the night. These patterns are assessed for the probability of being asleep or awake and are converted to an ORP value.

How is ORP superior to conventional scoring methods?
Conventional scoring and other approaches like delta power are not sensitive enough to reflect the sleep period and quality, particularly in Stage NREM 2, which typically takes up 50% of sleep period. There is a wide range of sleep depth that is not captured by conventional staging methods.

- Research shows that when compared to Conventional Sleep Staging, ORP provides a more detailed, continuous measure of sleep*
- Research shows that compared to delta power, ORP is more discriminating among sleep stages, more sensitive to sleep restriction, and better able to predict arousability*

ORP Sleep Architecture

ORP Sleep Architecture provides an easy-to-understand visual representation of a patient’s sleep profile

- ORP presented as an architecture is broken down into 10 deciles ranging from 0-2.5. The deciles reflect the amount of time spent in different sleep depths across the night, creating a pattern of the patient’s sleep profile
- The shape of the sleep profile curve describes a patient’s sleep quality represented by the deep sleep deciles on the left, balanced by the wake deciles on the right

ORP revolutionizes sleep medicine

Researchers are using ORP to better understand brain activity during sleep. This will guide the future diagnosis and treatment of sleep disorders.

- Phenotyping Sleep Apnea and improving CPAP Adherence
- Improving the ability to differentiate Obstructive Sleep Apnea (OSA) from Insomnia
- Guiding research in early disease detection and prevention
- Personalizing sleep medicine

*Younes et al., SLEEP 2015
At Cerebra, we may sleep, but we never rest

Cerebra’s innovation and research continues. Through ORP we are reinventing the future of sleep diagnostics and the ability to personalize sleep medicine by providing an objective measurement of sleep quality. This will guide better research, diagnosis and treatment. It’s a vital part of how we’re putting ‘sleep’ back into sleep medicine.