**ABSTRACT**

This study was designed to determine the spectral characteristics and organization of oromotor output among preterm infants. The integrity of the neonate suck central pattern generator is regulated by a network of interneurons that can produce rhythmic motor patterns in the absence of phasic drive, either from a sensory input or a descending control. The fast Fourier transform (FFT) analysis was used as a tool to characterize the developmental progression and organization of oromotor output among preterm infants. Three groups were defined: **PRETERM CONTROL** (no respiratory or feeding problems), **RDS** (Respiratory Distress Syndrome), and **OROMOTOR DYSFUNCTION** (prematurity and oromotor dysfunction due to neurologic insult). The study was conducted in the NICU at Stormont-Vail Regional Medical Center, Topeka, KS. Data was analyzed from 54 preterm neonates, all ventilated with CPAP or cannula. In the spectrum, both frequency and amplitude variation were observed. A statistically significant difference was observed between the three groups as well as in individual developmental profiles, especially for babies with severe oromotor dysfunction. The principal frequency component ranging between 1.5 to 2.5 Hz as a function of gestational age was observed. In contrast, babies who have sustained IVH reveal significantly less time spent posturing on the silicone nipple and proportionately more time dedicated to organized NNS bursting. In contrast, babies who have sustained IVH reveal significantly less time spent posturing on the silicone nipple and proportionately more time dedicated to organized NNS bursting.

**CONCLUSIONS:** Spectral analysis of oromotor output and oromotor patterns among full-term, preterm, and extremely preterm infants suggests a critical period during which the suck central pattern generator is vulnerable to a variety of neurologic insults. The suck central pattern generator is also a target of future research to determine the influence of various stimuli on its development.

**SUMMARY**

- PRETERM CONTROL: Typically well-organized NNS without any evidence of neurologic insult or feeding therapy.
- RDS: Show increased frequency and amplitude variation in NNS apparent in FFT spectrum. Approximately 4 weeks delayed relative to Pre-Term Controls in establishing a preferred sucking rate and pattern. Possible disruption of critical period for NNS.
- OROMOTOR DYSFUNCTION: Two extremes: constant NNS with no pauses, or just posturing without sucking. Sustained neural damage with limited suck activity.

- Statistical analysis of suck patterns revealed a significant difference between the three groups as well as in individual developmental profiles, especially for babies with severe oromotor dysfunction.