

## **The NTrainer: A System to (Re)Habilitate Impaired Oromotor Development in Preterm Infants**

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With the advent of advanced life-saving and life-sustaining technologies in modern neonatal intensive care units, the number of premature infants who survive has increased dramatically in recent years (in 2000, there were nearly 500,000 premature births). For many of these preterm infants, oral motor skills related to feeding behavior are significantly impaired as characterized by disordered feeding behaviors. Often, preterm infants are subjected to prolonged periods of oxygen intubation, resulting in a loss of sensory and motor experiences during a critical period of neural development for oral motor behavior. This sensory/motor deprivation period has significant repercussions on oral motor development and presumably later speech and language development.

We present a new therapeutic stimulation system (the NTrainer) for entraining the suck central pattern generator (sCPG) in premature infants at risk for significant oral motor dysfunction due to prolonged periods of sensory deprivation and neurological insult. This translational neuroscience application benefits from the neuroscientific principles underlying the modulation of CPGs using mechanosensory stimulation (e.g. entrainment). A specially designed silicone pacifier system known as the NTrainer is pneumatically driven by a servo-pump to produce a physiologically salient stimulus which simulates the classic '*burst-pause*' motor pattern associated with the non-nutritive suck. This type of stimulus has the potential for entraining the sCPG, thus providing relatively normal oral sensory and motor experiences and leading to improved oral motor function.

It is expected that improved oral motor skills in premature infants with impaired oral motor function will lead to improved speech and language development. Due to the importance of the oral structures such as the tongue and lips in early learning of object properties and manipulation (often associated with hand-mouth behavior), it is possible that improvement of oral motor control and associated appropriate sensory experiences will lead to improvement of other cognitive functions as well.