BabyStrong Transcutaneous Auricular Vagus Nerve Stimulation (taVNS) Paired Bottle Feeding to Improve Oral Feeding

STUDY DESCRIPTION

Brief Summary

Feeding is critical for pre-term infants and term infants with hypoxic ischemic brain injury, in order to be discharged home with their families and avoid a gastrostomy tube (G-tube) placement. The proposed study will employ a novel system that stimulates the vagus nerve through the skin in front part of the ear, the BabyStrong feeding system, to delivered transcutaneous auricular vagus nerve stimulation (taVNS) paired with oral feedings daily for 10 days. In an earlier study at Medical University of South Carolina (MUSC), this type of vagus nerve stimulation resulted in more than half of infants who were slated to receive G-tubes, taking full oral feeds by mouth and avoiding a G-tube. In this study some babies will receive the therapy for 10 days and others will get no stimulation. If no progress is made in feeding volumes by day 10, the infants will be switched to the other treatment for 7 days. Parents, study personnel, and care providers will be blinded to taVNS assignment. The electronic stimulation device is Federal Drug Administration (FDA)-cleared for investigational use, and the BabyStrong has been designated a Breakthrough Medical Device by the FDA. This study will be conducted in MUSC's Neonatal Intensive Care Unit.

Condition or Disease: Infant Feeding Problems, taVNS

Intervention/treatment: Device: transcutaneous auricular vagus nerve stimulation

Phase: Phase 1

DETAILED DESCRIPTION

In this Phase I study, we will conduct a small-scale safety and efficacy study of the BabyStrong portable taVNS feeding system. We will test the BabyStrong feeding system using active (n=10) and sham (n=10) taVNS in infants with twice daily (A or B treatment) for 10 days, with cross over to B/A treatment if there is no progress with feeds within 10 days of taVNS treatment. Subsequent A/B treatment will be continued for another 7 days for any treatment effect, prior to arranging for G-tube placement if infant continues to make no progress. If the infant attains full oral feeds and gains weight, they may be discharged at any time during the treatment protocol. The treatment assignment will be blinded to care providers, study personnel and parents. We will compare daily oral feeding volumes over 10 days prior and the 10 days of treatment, and diffusion magnetic resonance imaging (MRI) changes before and after 10 days of taVNS treatment, and after another 7 days if the cross-over design is employed. Safety measures will be bradycardia and discomfort, as in our prior taVNS feeding pilot trial, "taVNS paired with bottle feeding in infants failing oral feeds" National Clinical Trials #04643808.

Criteria for success of BabyStrong feeding system: No sustained increase in discomfort scores; No bradycardia; Improvement in daily feeding volumes compared with pre-taVNS, and/or attainment of full oral feeds in 50% of infants; improvement in white matter microstructure by diffusion MRI before and after active treatment.

STUDY DESIGN

Study Type: Interventional

Estimated Enrollment : 20 participants

Allocation : Randomized

Intervention Model Description: If progress in daily oral feeding volumes is <4ml/kg/d (based on response rate in pilot trial) after 10 days with either treatment A or B, we will offer cross-over to the alternate treatment.

Intervention Model : Crossover Assignment

Masking: Triple (Participant, Care Provider, Outcomes Assessor)

Primary Purpose: Treatment

Official Title: BabyStrong Transcutaneous Auricular Vagus Nerve Stimulation (taVNS) Paired Bottle Feeding to Improve Oral Feeding

Actual Study Start Date: August 2022

Estimated Primary Completion Date: May 2023

Estimated Study Completion Date: July 2023

ARMS AND INTERVENTIONS

<table>
<thead>
<tr>
<th>Arm</th>
<th>Intervention/treatment</th>
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<tr>
<td>Active Comparator: active taVNS</td>
<td>Device: transcutaneous auricular vagus nerve stimulation stimulation of the auricular branch of the left vagus nerve paired with oromotor feeding. We will deliver taVNS via the BabyStrong system, with pulses paired with oral feeding, off with rest during 2 feeds a day. Current will be delivered at 0.1 milliAmperes (mA) &lt; perceptual threshold (PT), 500 microseconds, 25 Hertz (Hz). The ear electrode will be positioned on left tragus for active taVNS.</td>
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<tr>
<td>Sham Comparator: sham taVNS</td>
<td>Device: transcutaneous auricular vagus nerve stimulation stimulation of the auricular branch of the left vagus nerve paired with oromotor feeding. We will test the PT with active stimulation, and then program a sham setting on the BabyStrong unit to deliver no current after the PT is determined.</td>
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OUTCOME MEASURES
Primary Outcome Measures:
1. bradycardia [Time Frame: 30 minutes during taVNS paired-feed]
   - safety: episodes of Heart rate < 80beats per minute for 10 seconds
2. discomfort scores [Time Frame: 30 minutes during taVNS paired-feed]
3. increase in oral feeding volumes [Time Frame: 20 days]
   - slopes of daily po volumes over the first 10 days of treatment; compare between sham and active taVNS

Secondary Outcome Measures:
1. white matter tract neuroplasticity [Time Frame: 10 days]
   - change in fractional anisotropy by diffusion imaging before and after active vs sham treatment

ELIGIBILITY CRITERIA

Ages Eligible for Study: 2 to 5 Weeks (Child)

Sexes Eligible for Study: All

Accepts Healthy Volunteers: No

Inclusion Criteria:
- Infants born at any gestational age (GA), failing oral feeds after trying to learn feeding for 2 weeks if term, and 4 weeks if preterm safe to attempt oral feeds every feed without volume limitations by occupational or speech therapists, and clinical team has determined will likely need a G-tube.

Exclusion Criteria:
- cardiomyopathy unstable bradycardia significant respiratory support infants of poorly controlled diabetic mothers, defined by obstetrical care providers, HgbA1C>5.6% or ketonuria.

CONTACTS AND LOCATIONS

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Locations
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Sponsors and Collaborators
Medical University of South Carolina
Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)

INVESTIGATOR

MORE INFORMATION

Responsible Party: Medical University of South Carolina

ClinicalTrials.gov Identifier: NCT04849507

Other Study ID Numbers:
- 108881, 1R41HD104409

First Posted: April 19, 2021

Last Update Posted: August 4, 2022

Last Verified: August 2022

Individual Participant Data (IPD) Sharing Statement:
- Plan to Share IPD: Yes
  - We will share our extensive database generated during the conduct of this study with other interested researchers on a collaborative basis, including developmental assessment and neuroimaging data associated with this study. Data will be de-identified consistent with Institutional Review Board (IRB) regulations and approval, as well as NIH data sharing policies.

Supporting Materials:
- Study Protocol
- Access Criteria: We will identify where the data will be available and how to access the data in any publications and presentations that we author or co-author about these data.

Studies a U.S. FDA-regulated Drug Product:
- No

Studies a U.S. FDA-regulated Device Product:
- Yes
Product
Manufactured in and
Exported from the
U.S.: Yes