NCAI Funded Project Description

**Project Title:** Vortex-PAP Therapy for Treatment of Sleep Apnea

**Principal Investigator:** Liran Oren, Ph.D., University of Cincinnati, Cincinnati, OH

**Clinical Indication:** Sleep Apnea

**Product Type:** Device

**Project Description:** An estimated 18-30 million Americans have obstructive sleep apnea (OSA), a chronic disorder that results in reduction or complete pause in breathing during sleep. OSA is associated with poor performance in everyday activities, such as at work and school, motor vehicle crashes, and academic underachievement in children and adolescents as well as a growing number of health problems. Continuous Positive Airway Pressure (CPAP) is broadly considered first-line therapy for OSA but is associated with high non-compliance levels because of discomfort associated with tight-fitting masks, inability to change positions and skin-irritation.

Dr. Oren and a team of engineers at University of Cincinnati are developing a Vortex-PAP machine that takes advantage of vortex airflow. Unlike the continuous airflow (e.g., CPAP) that is characterized by the continuous motion of air particle along specific path lines, vortex airflow is pulsating and made of a train of vortices. In current CPAP therapy, a compromised seal with the patient's face results in most of the continuous airflow leaking out from the mask instead of entering the upper airway (thus reducing the effective pressure to splint the airway). On the other hand, when vortex airflow is directed toward the nostrils, the majority will enter the airway, negating the need for the tight-fitting mask. Preliminary studies have shown that Vortex-PAP can efficiently deliver airflow to patients without using a mask and that patients greatly preferred the Vortex-PAP device to CPAP machines. The current project will take a significant step toward commercialization through development and verification of an ergonomic Vortex-PAP design.

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