Summary of Phonemic Intelligence Research

I. Analysis of Cerebral Cortical Response to Non-Linguistic Phonemes: 2016

A neuroradiologist at Harvard Medical School and the Massachusetts General Hospital completed data acquisition for a functional magnetic resonance imaging (fMRI) pilot study conducted at the Martinos Center for Biomedical Imaging at Harvard. Early analysis of the data has suggested that discrete phonemes have **unique fMRI signatures in the human brain**. The fMRI scans identified increased blood flow to important areas of the brain, such as the orbitofrontal, periorlandic cortex, parietal cortex, and the cerebellum, while the study subjects were listening to phonemes used in the Phonemic Intelligence Core Technique.

II. Detroit Public Schools: 2014-15 School Year

Three DPS schools implemented the practice of the Phonemic Intelligence Core Technique during the 2014-15 school year. A small controlled research study of the PI intervention was performed utilizing six fifth-grade classrooms. Three classrooms in the experimental group performed the PI technique daily, and three control classrooms were identified for comparison. We analyzed Star Math testing data and found that **those classrooms performing PI daily scored higher on Star Math tests** than the control classrooms ($p<0.5$). Also, those classrooms participating with PI reported 30% fewer code-of-conduct infractions than control classrooms. The study is in the final submission phase for publication in a peer-reviewed journal.

III. Examining the cognitive benefits of using a Phonemic Intelligence Program in older adults with Mild Cognitive Decline using psychometric testing and QEEG brain mapping

This clinical trial was conducted at a private physician's office in the southeastern USA, utilizing 55 adults over age 65 years who self-reported memory loss. An in-depth psychometric test, the Memory Assessment Scales (MAS), was performed before and after an eight-week daily practice of the Phonemic Intelligence Core Technique. An EEG was obtained from each subject before and after the eight-week practice period and evaluated with NeuroGuide QEEG software. 30 of the participants were in the practice group, and 25 were randomized to the control group. Data acquisition was completed in early 2015 and is currently being analyzed and prepared for publication and presentation.

IV. Phonemic Effects on the Human Brain as seen with EEG: A Pilot Study by Brain Science International: 2012

Four healthy young adults were subjected to QEEG data collection while listening to phonemes used in the Phonemic Intelligence Core Technique. The data was analyzed with independent component analysis (ICA), an advanced EEG evaluation technique. **Neuronal activation was demonstrated at >3 standard deviations above normal baseline in the anterior cingulate cortex of all volunteers.**

The anterior cingulate cortex (ACC) is important in decision making, error detection, and impulse control. The ACC is an important hub in the neuronal networks that play an active role in the executive functions of the brain to perform properly. This is an area currently targeted by the social-emotional learning programs (SEL) currently being instituted by public and private schools.

V. PI/MST Research Study, Chennai, India: 2010

The study used Duke University's health profile (DHP) to assess the effect of PI on 42 medical students (ages 18-23) from SRM Medical College, SRM University in Chennai, India six weeks before final exams.

The DHP for adults is a 17 item self-report instrument, derived from 63 items, containing six health dimensions such as physical (PHS), mental, MHS, social, SHS, general (GHS), perceived health (PH), self-esteem (SE), and four dysfunction dimensions such as anxiety, depression, pain and disability.

PI techniques introduced sounds into various parts of the body and incorporated brainwave entrainment tones, stimulating different regions of the brain. PI was introduced for 20 minutes per day for six weeks. Students were seated comfortably and kept eyes closed while following pre-recorded instructions.

Students were randomized into two major groups:
Group I (n=21): Control group
Group II (n=21): PI practice group R

Results showed that after 6 weeks of practice of PI by Group II the level of SHS, GHS, SE, and PS showed significant increase ($p<0.001$), while anxiety, depression scores were further decreased when compared with control Group I. There were no significant changes in Group I. Results also showed improved academic scores, better coping skills, and reduced stress hormones in Group II after 6 weeks of practicing PI for six weeks (Indian Journal of Medical Science, 2010).