

## **Auditory Mirror Therapy for Tinnitus**

Principal Investigator: Clas Linnman, PhD. Spaulding Rehabilitation Hospital

Ringings in the ears, or tinnitus, is often caused by repeated high-intensity noise and hearing loss. One in ten adults are bothered by tinnitus, and there is a great need for *safe, accessible, affordable, and non-invasive* therapeutic approaches. Tinnitus and phantom limb pain after amputation may share an underlying neural mechanism in that residual neuronal signals from a peripheral nerve injury are interpreted and amplified as a phantom perception. Mirror box therapy, where a mirror gives the illusion of a restored limb, has shown success in treating phantom pain by disrupting multisensory integration. In a pilot trial, the mirror-box concept was applied to tinnitus: A pair of headphones flip left and right sounds, so that environmental sounds arising from the left are heard as if arising from the right, and vice versa, thereby disrupting sound and vision integration. We call the intervention auditory mirror therapy (AMT). In a sample of 20 subjects with chronic tinnitus, 3 hours of AMT per day for two weeks led to significant and dose dependent improvement in tinnitus handicap and tinnitus awareness. Here we seek to further verify AMT treatment effects, controlling for placebo effects with a sham device. We will collect measurements of hearing loss and tinnitus matching before, during and after treatment. If AMT indeed can reduce tinnitus, it would be a valuable treatment option that can readily be implemented in hearing aids or disseminated as an “app” for wireless earbuds, representing significant market value and population health benefits.