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Title: High Resolution MRI Microscopic Neuro-Imaging Studies and Voice Disorders

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Abstract: Spasmodic dysphonia is a neurologic voice disorder. Surprisingly its etiology is unknown. Treatment methods are principally surgical resection or long term, low dose, periodic treatment with the botulinum toxin. To fully understand this disorder and to evaluate various treatment methods an animal model would be great importance. One potential small animal candidate is the songbird. Some songbirds have similar vocal motor control pathways to humans. In addition, much is known about songbird anatomy, neuro-anatomy, physiology and acoustics of vocalization. One of the most relevant candidate songbirds is the zebra finch (Taeniopygia guttata). The zebra finch is an ideal animal model since the auditory behavior, the neural pathways, the genomic profile, and the neural pathways for sound generation are similar to humans. Only the male has learned patterned sound generation. However, for the zebra finch to be a useful research model for the study of vocal neuro-motor control non-invasive methods for visualization of the central neural pathways are needed. In this report we will present the results of our work mapping in three dimensions (3D) the vocal production circuitry of the zebra finch. 14.1 Tesla MRI microscopy and 3D diffusion tensor weighted fiber tracking 50 ìm resolution imaging were fused with serial 3 µm cyto-histological sections of the complete brain of a male and female zebra finch. These results of this mapping will be presented and discussed in light of current 3D image fusion methods and relevant sound generation motor control tracts.