

Japan-U.S. Brain Research Cooperation Program  
Researchers Dispatched to the U.S. Program FY2022: Report

**Field:** 3 (Behavior, systems, and cognition)

**1. Researcher**

**Name:** Aya Kanno, MD, PhD

**Title:** Assistant Professor

**Affiliation:** Department of Neurosurgery, Sapporo Medical University

**2. Research Title:**

Recognition pathway of human voice in the network of posterior lateral superior temporal auditory cortex

**3. U.S. Joint Researchers/Institutes**

Please give the name, title and affiliation.

**U.S. Joint Researcher:** Eishi Asano

**Title:** Professor, Pediatrics & Neurology, Wayne State University.

Director, Neurodiagnostics, Children's Hospital of Michigan.

**Affiliation:** Department of Neurodiagnostics, Detroit Medical Center, Children's Hospital of Michigan, Wayne State University, Detroit, Michigan, USA.

**4. Research Period, from/to (yyyy/mm/dd):**

From 2022/10/01 to 2023/03/15 ( 6 months)

**5. Abstract, Results, and Research Significance (300 Words):**

**Objective:**

Our group has previously constructed a brain functional atlas, called dynamic tractography, to measure and visualize intra- and inter-hemispheric neural communication via white matter pathways. Using this atlas, I aim to elucidate the dynamics of human voice recognition connectivity pathways involving the posterior lateral superior temporal auditory cortex (PLST auditory cortex).

**Method:**

I plan to complete the analysis of white matter streamlines based on diffusion weighted imaging data from 1,065 healthy participants to visualize tractography streamlines directly connecting pairs of regions of interest (ROIs) within the Montreal Neurological Institute (MNI) standard space. I plan to perform time-frequency analysis of event-related high gamma activity and epileptic discharges to extract the spatiotemporal dynamics of physiological and pathological neural communications. I will compute the transmission time of white matter fibers based on the cortico-cortical evoked potential (CCEP) measured between ROIs. I will integrate CCEP measures with the tractography streamlines on the MNI standard brain to generate video atlases that visualize the intensity and speed of intercortical communication over time.

**Results:**

I have successfully visualized tractography streamlines across 31 ROIs, with 1891 possible combinations of pairs. I plan to segregate functional from non-functional white matter pathways based on the assessment of CCEP measures. My goal is to use this dynamic tractography atlas to clarify the rapid dynamics of the connectivity pathway supporting human voice recognition function.

**6. Other (Research-related concerns, particular points to note):**

I am pleased to report that my research is progressing smoothly and as per my plan. I have encountered no issues or concerns related to my research.

\*Please attach any reference materials as necessary.