Asymmetric Therapeutics: Non-Paramagnetic Chair

Overview
Current magnetoencephalography (MEG) sensors in clinical settings are expensive to install and maintain, making their use limited. Additionally, the current helmet designs take recordings from the entire head at once, with no regards to specific areas of the brain. Because of the extremely small magnitude fields being measured, the MEG procedure must be performed in a magnetically isolated room. Any other materials that exist in the room must not produce a magnetic field that may disrupt the measurements.

Objectives
The team was tasked with designing and constructing a chair made entirely from all non-paramagnetic materials that could be used in parallel with a novel MEG sensor that can measure magnetic fields from specific areas of the brain. The chair should be adjustable and maneuverable so that all areas of the head can be accessed from the fixed sensor. The chair also required a head rest that would immobilize the head of the patient while allowing full access to the skull.

Approach
- The team began by developing the customer needs for the project as well as research into different material options for construction of the chair.
- After several meetings with the instructor and the sponsor, it was determined that a table design would be utilized instead.
- Not only is a table easier to construct with the materials limitations given, it also reduced the necessary degrees of motion from the initial chair design.
- CAD models were developed in order to visualize the design of the table as well as the elevation system.
- A visit to a collaborator at UPMC Presbyterian Hospital in the MEG division verified our choices of materials were appropriate.
- The table was constructed using red oak wood and non-paramagnetic hardware materials (aluminium, austenitic steel).
- Tabletop was upholstered similar to a hospital bed, and headrests were installed that immobilize the head of the patient.

Outcomes
- A unique solution was developed that allows total access to the brain for MEG procedures.
- The table is able to support the desired weight of 300 lbs, is easily moved around a room, and uses a threaded rod to adjust the incline of the table.
- Asymmetric Therapeutics has requested possession of the table after its completion to test with the MEG sensor currently in development.