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Yu Lab

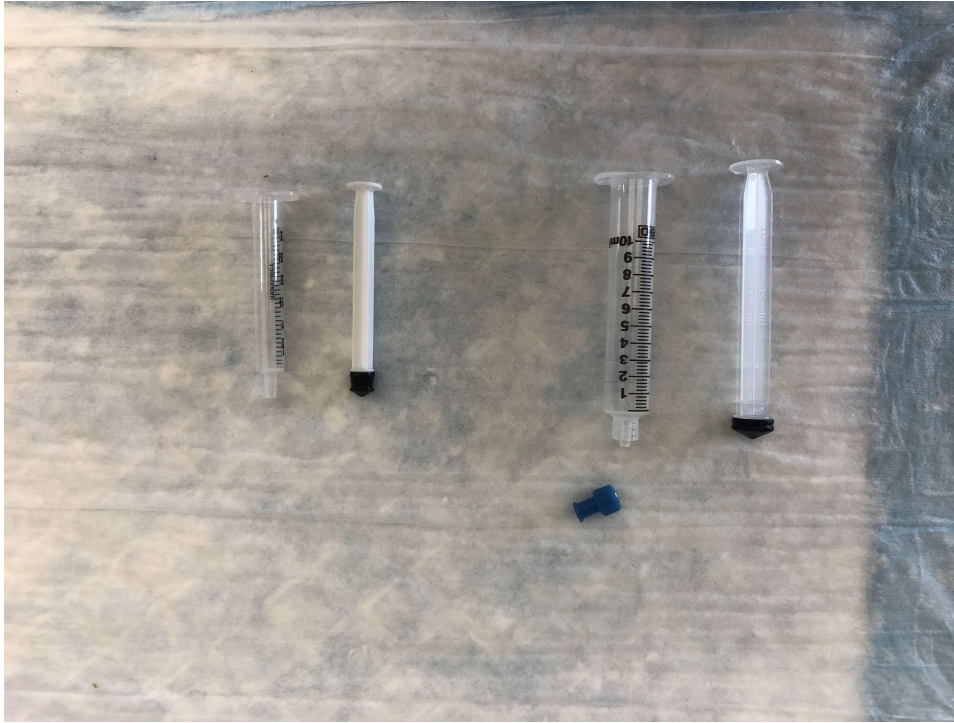
Last Updated: 9/9/22

### Information for BME Project: Operation Brain Capsule

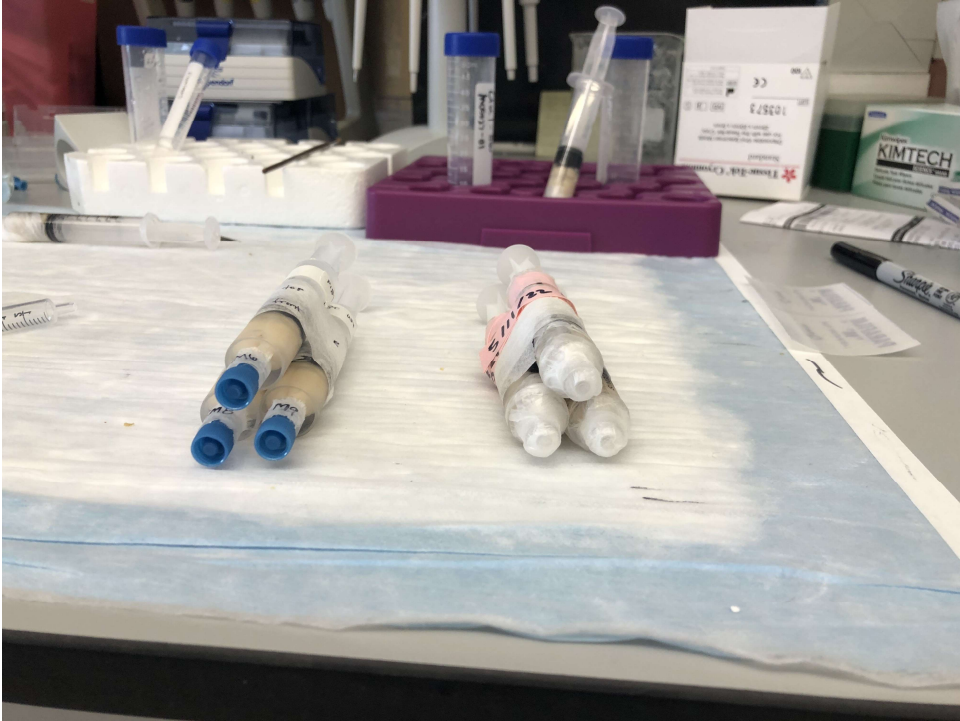
Goal: To Develop a new holder or capsule or containment for brains that we scan due to our current limitations of having a tight maximum on how many brains we can scan at a time, the amount of money it costs per scan, and the amount resources used in the process of prepping the brains to be scanned.

Resources used for 1 standard set that we use:

- Rat Brains
  - Measurements of Rat Brain:
    - Length = 2.53 cm
    - Width = 0.60 cm
    - Height = 0.73 cm
  - Measurements of Syringe for Rats are:
    - Length = 9.57 cm
    - Width Base = 2.48 cm
    - Width of Cylinder = 1.85 cm
    - Length of Plunger = 9.96 cm



- We roughly try to have 4 mL of Fluorinert within the syringe to have the brain fully submerged within it to be scanned.
- Require parafilm or caps used to cover the syringe opening so that no air or air bubbles are trapped within the syringe because if so, our scanning will be impaired and thus will need to be repeated.
- Labeling on the syringes is done via tape with a marker as well to denote the midline indentation on top of the brain
- When scanning these brains, we are limited to 3 brains per scan and must trip the ends of the syringe (the areas for the fingers to rest) and orient them in this way so that they can fit within the machine:



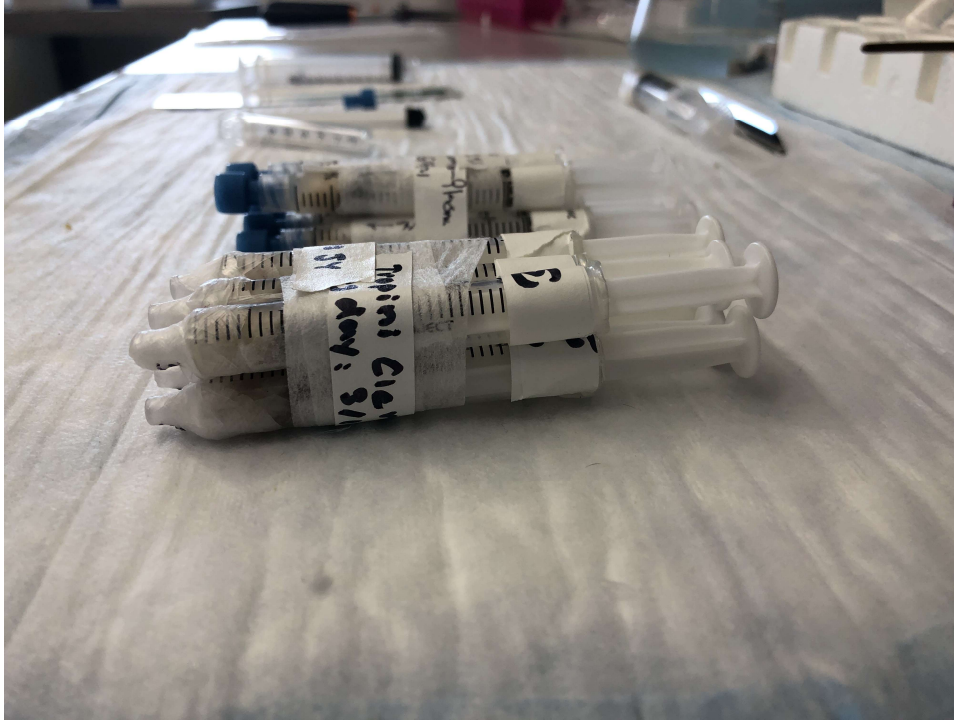


- **FOR MICE.** Each Brain requires its own syringe (the one we use for Mice is the one on the Left)
  - Measurements of Mice Brains:
    - Length = 1.43 cm
    - Width = 1.00 cm
    - Height = 0.50 cm
  - Measurements of Syringe for Mice are:
    - Length = 7.30 cm
    - Width Base = 2.00 cm
    - Width of Cylinder = 1.75 cm
    - Length of Plunger = 7.65 cm



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- We roughly try to have 1 mL of Fluorinert within the syringe to have the brain fully submerged within it to be scanned.
- The parafilm and marking with tap and marker are done in the same manner as with the rats above.
- The syringes are oriented in this way with your ends trimmed off like we would for the Rats:





As you can see, we are able to fit 6 mouse brains within the scanner with this orientation.

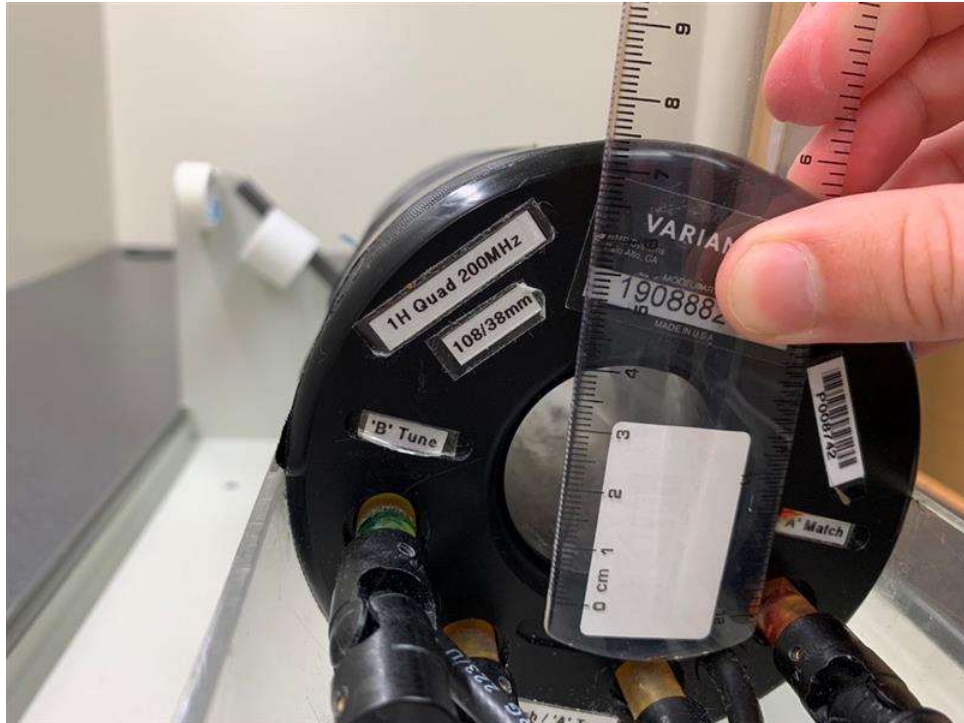
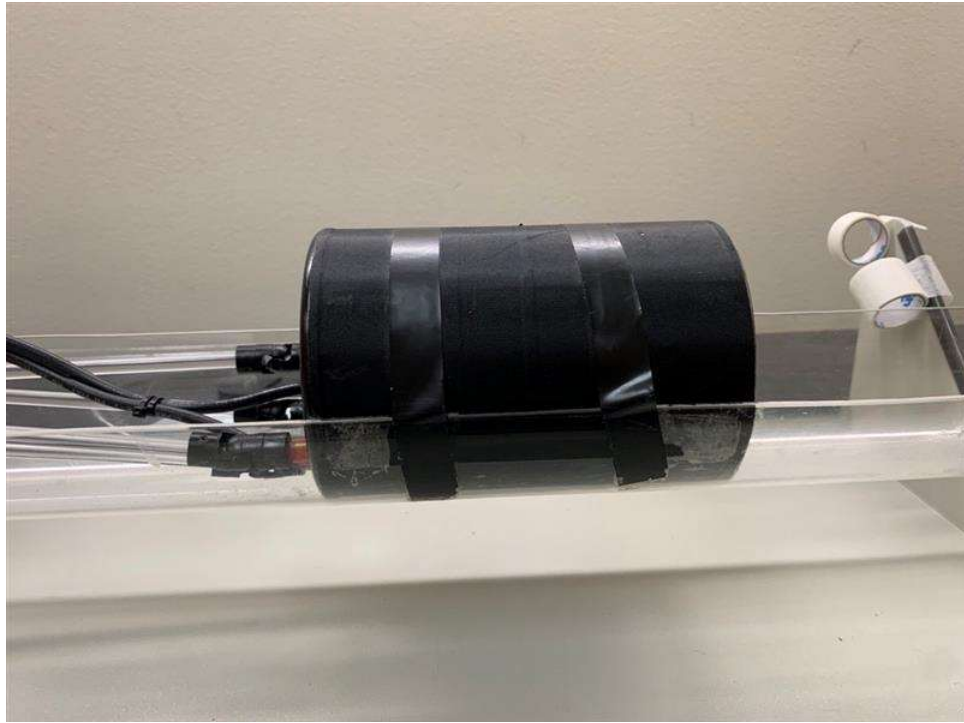
Measurements of Scanner:

The brains will go inside the coil.

Inside diameter of coil: 4 cm

Length of coil: 15.5 cm

Imaging location is within center of the coil and is a length of 5 cm (within the electrical tape); however, only one brain can be imaged along the length dimension at our current resolution







End Goal:

- Have a capsule that can be used multiple times
- Has the ability to be reproduced
- Withstand the overtime use of Fluorinert
- Not obscure our scanning results
- Will not damage brains during loading process

- Ease of loading brains and taking them out
- Spill-proof
- Seal of Air
- Lock brain in Place
- Point of reference to line up the Brain
- Size should be kept in mind to be on the smaller and efficient end
- Finally, this capsule can be done separately for Rats and Mice, but it would be preferred to have a capsule that is able to do both (also this feature will provide a solid challenge for students)