Objective & Research Question:
The primary objective of this research is to design, construct, and evaluate magnetic micro-robots capable of conducting tissue resection within the human GI tract.

Background:
- Robotic surgery and rehabilitation have become prevalent in medical centers today.
- Magnetic robots can assist physicians in performing intricate procedures such as surgery and drug delivery in hard-to-access areas of the human body.
- This research has the potential to mitigate surgical risks, enhance precision, and carry out surgical procedures that are challenging for surgeons.

Methods:
- Performing experiments to characterize forces between magnets.
- Utilizing COMSOL Multiphysics software for conducting simulations of magnet interactions.
- Utilizing SolidWorks to design a gastrointestinal (GI) tract container. Setting the stage for the use of full-size internal and external magnets in in vitro experiments.
- Using a laser cutter to fabricate a precise container cover. The design is specifically targeted to prevent any potential odor leakage.

Results:
- When the number of internal magnets remains constant, the force required decreases as the distance between the internal magnet and the external magnet extends (Fig. 1).
- The magnetic force increases proportionally with increasing the number of internal magnets placed at the same distance (Fig. 2).
- The seal is not quite tight for the container (Fig. 3). During experiments, we observed air leaks.

Conclusion and Future Work:
- The preliminary experiments and simulations suggest that the magnetic force generated by the external magnet is sufficient to control the internal magnet and perform tissue resection.
- We had issues maintaining the inflation of the colon throughout the experiment.
- Future plan is to persist with our research, shifting focus to experiments with the stomach in both ex-vivo and live animal experiments.