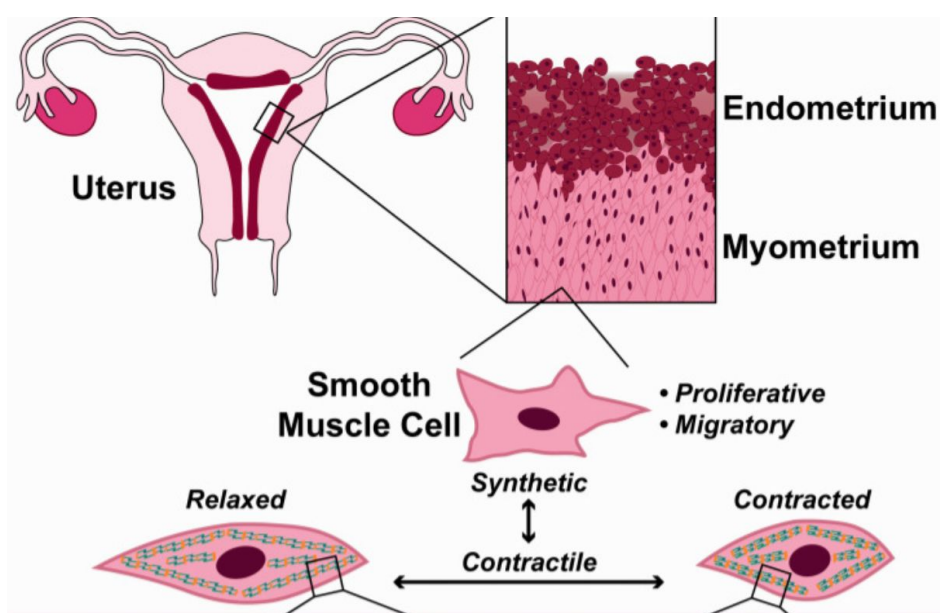


## INTRODUCTION

- To gain a better understanding of uterine tissue contraction, we need to have more effective models and ways to study the myometrium.
- The **myometrium** is the middle layer of tissue in the uterus
- Myometrial smooth muscle plays a large role in:
  - Mensuration - expels endometrium
  - Labor - rhythmic contractions to break the fetal membrane and push fetus through birth canal
- There is little understanding of how the myometrium responds to biomechanical and biochemical stimuli<sup>1</sup>



## OBJECTIVE

To engineer a stretch chamber that can be used for measuring contractile forces of myometrial smooth muscle cells.

- 1 Creating lane stamps out of PDMS for the stretch chambers  
PDMS is a silicone polymer used in labs for making imprints of stamps for cells. PDMS is a great option for making stamps because it is biocompatible, accessible, and porous.

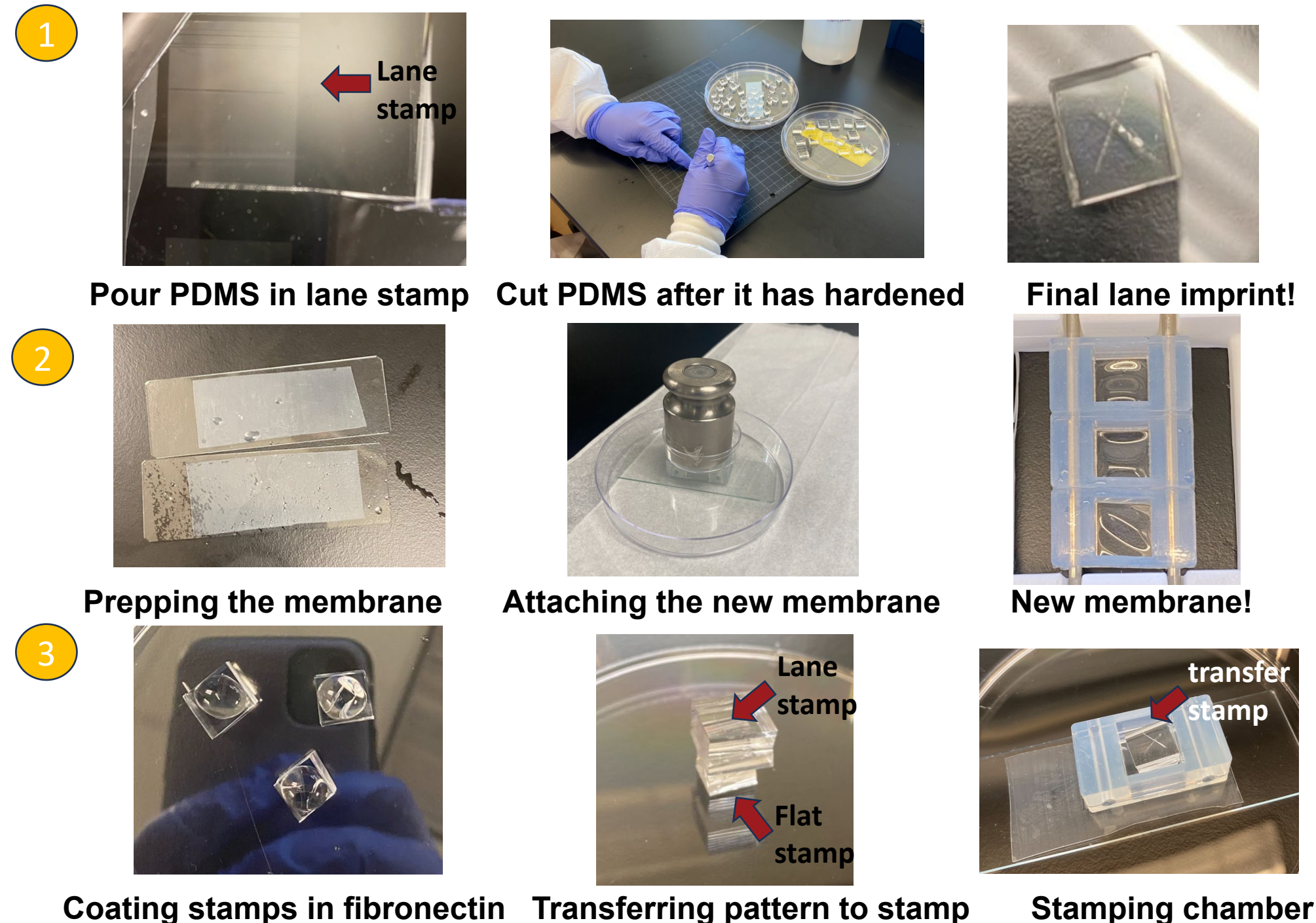
- 2 Assembling stretch chambers

We add a new membrane to the stretch chamber because the membranes that it comes with are less compatible with microcontact printing. By using a new membrane, the stretch chambers also become reusable because the new membrane is replaceable.

- 3 Microcontact printing & fibronectin antibody staining

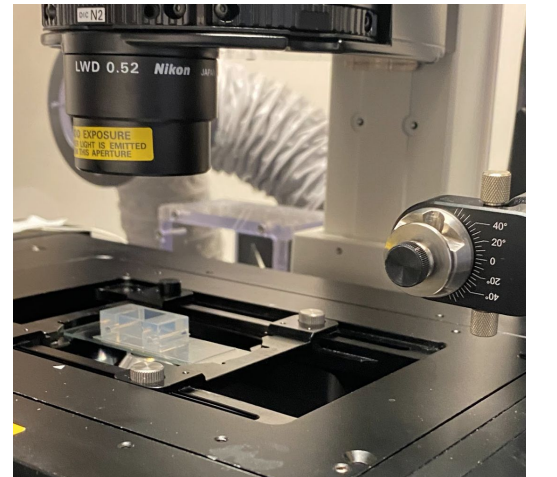
Microcontact printing is used to transfer the pattern from out PDMS lanes onto the stretch chambers. This is where the cells will be cultured.

## METHODS



Coating stamps in fibronectin Transferring pattern to stamp Stamping chamber

## IMAGING

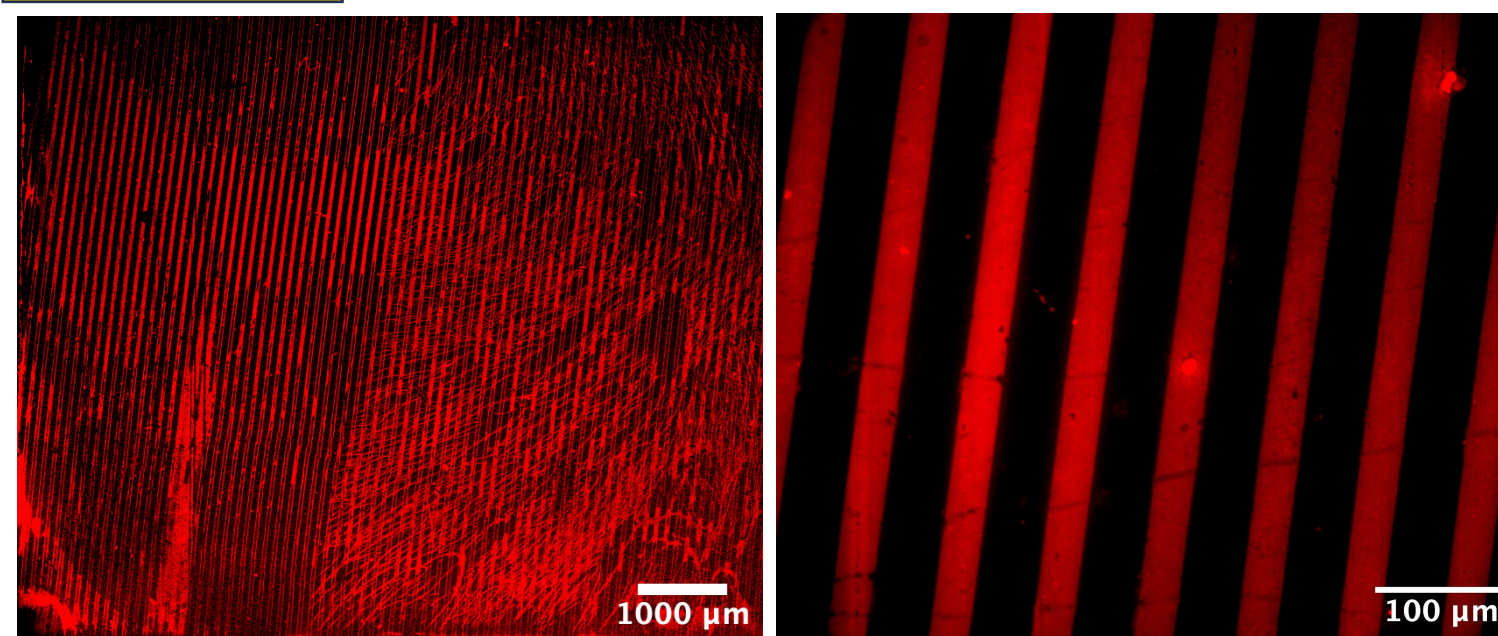


## SKILLS LEARNED

- Working with PDMS
- Microcontact printing
- Working with membranes & stretch chambers
- Working with different types of micropipettes



## DATA



Calcium imaging of PDMS lanes for myometrial smooth muscle cells

- Test images from the microscope will measure how well cells adhere to the lanes
- Images depict 40 micron lanes because the stamp off caused the 75 micron lanes to become inverted

## FUTURE

- Research could result in better health outcomes for mothers and newborns
- Developing a calcium imaging assay
  - Establishing the rate and time at which myometrial smooth muscle cells would be stretched on the Cytostretcher machine
  - Knowing how many cells to seed
- Future: study tocolytics or biomechanical stimuli on the uterus
- Limitations: limited stretch
- Advantage: primary human cells

## REFERENCES

- [1] A.P. Maxey and M. L. McCain, "Tools, techniques, and future opportunities for characterizing the mechanobiology of uterine myometrium," *Experimental Biology and Medicine*, vol. 246, no. 9, pp. 1025–1035, 2021, doi: 10.11x 7/1535370221989259.