A New 3D Printing Technology for Building Human Tissues

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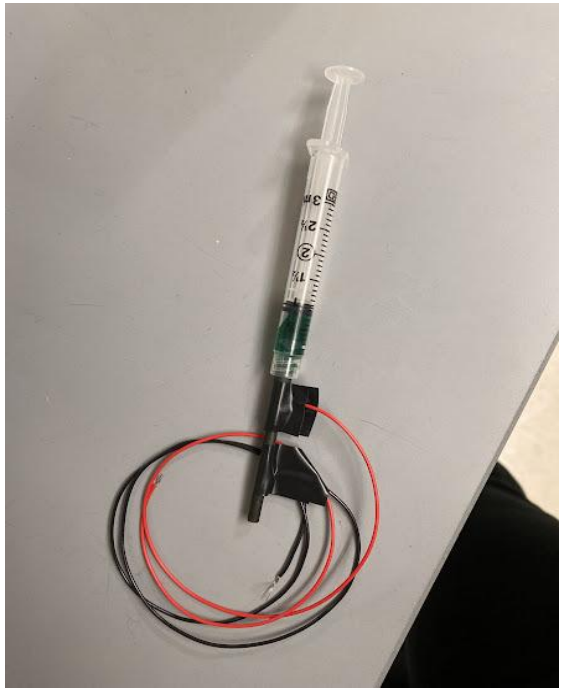
There is currently an organ shortage in the United States today–leaving many in need of organ transplants without any organs for transplantation. This summer I worked with Aric Lu, a PhD student in Jennifer Lewis' lab at Harvard University, to work on developing a manufacturable solution to this problem – a new 3D printing technology for building human tissues. By combining genetic engineering with 3D printing, we are able to print multiple different cell types at once–a feat that is necessary for one day printing full, functioning organs. This summer, we designed and tested a nozzle that utilizes electroporation, a process that involves applying an electric field to these cells, to form temporary pores inside of the cell membrane. This then allows us to genetically engineer human cells as we print them by inserting DNA into the cells through these pores. By selectively modifying these cells during the printing process, we are able to assemble the different cell types into the patterns we need to build complex tissues using 3D bioprinting.



Shown above is a picture of the nozzle we designed attached to a syringe filled with cells.

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Hi! I'm Maggie Lashutka and I'm a rising senior bioengineering student at The Ohio State University. Although I had previous research experience before coming to Harvard, this summer was my first time working in a wet lab! Through this opportunity I have developed lots of new and useful laboratory skills, including taking care of and maintaining my own cells. I also was able to design my own experiments for the first time, which was really cool! Overall, I feel as though I am walking away from this experience with much more research knowledge than when I had arrived–thanks primarily to my awesome mentor Aric as well as everyone in the Lewis Lab!

Top: Me with my mentor Aric looking at cells under a microscope.
Bottom: Me working with cells in TC hood.

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