Mountains and Mofongo [1]

Enviado por Brittany Nelson [2] el 8 agosto 2017 - 4:18pm

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Two months ago, I was unfamiliar with research and ready for an adventure. Today, I am an enthusiastic scientist with experience in a biomaterials lab. During my time in this REU program, I became a better swimmer, overcame my fear of heights, continued to dominate in the game of dominoes, and became a confident, well-rounded student. I never thought so much about me could change in such a short amount of time.

My project focused on controlling the behavior of stem cells, specifically human mesenchymal stem cells (hMSCs). hMSCs are a type of cell that can self-replicate and differentiate into other types of cells. Stem cells play an important role in regenerative medicine because they are derived from adult tissues and secrete a variety of proteins that have therapeutic effects. The properties of these cells have contributed to their use in clinical trials to treat medical conditions such as cartilage defects, multiple sclerosis, and diabetes. Despite this breakthrough, increasing the therapeutic applications of stem cells is of great importance. Control over cell behavior may facilitate additional stem cell functionality. Cell behavior can be controlled through the chemically defined growth of stem cells, which allows for quantifiable cell-material interactions.

Cells are customarily grown on tissue culture polystyrene (TCPS) — a low-cost, semi-reusable synthetic polymer. In TCPS cell culture, adhesion occurs through interactions between cell surface receptors and proteins that have been adsorbed to the TCPS. However, TCPS alone creates a poorly defined surface for cell studies because the identity, density, and orientation of the proteins are unknown.

Here, multi-well polystyrene plates (both treated and untreated) were modified with the incorporation of 2D synthetic biomaterials. Arg-Gly-Asp (RGD) peptides were used for surface functionalization, as well as the amino acid Poly-L-Lysine, and the synthetic copolymer PEGMEMA-*ran*-GMA-*ran*-VDM (PVG). In addition, I passaged hMSCs using a combination of Arg-Gly-Asp and scramble peptides.

For my project, I solely focused on cell adhesion and spreading on multi-well plates. hMSCs have been traditionally cultured on surfaces with a relatively large area, like flasks and dishes. However, little focus has gone into the effect of cell culture on a smaller area scale. A 96-well plate is a cell culture plate consisting of 96 different wells (8 columns and 12 rows). It was specifically chosen for its ease of use and its potential for the addition of numerous variables.

I conducted 3 different experiments controlling the type of plate used (treated or untreated) and the biomaterial used. For each experiment, I measured cell adhesion and cell area to determine which variables were the most effective. After finishing the experiments and analyzing the data, it became clear that treated (TCPS) surfaces allow for greater cell adhesion than untreated (PS) surfaces. It seems that RGD may be more effective on PS than TCPS substrates. If I were to continue this project, I would try to figure out why this is the case.

I feel a lot like the cells that I have been working with all summer — living and thriving in various environments. My journey began in Madison, where I engaged in research for the first time. I was unfamiliar with working in a biology lab. Although it took a while for me to get used to everything, I finally felt comfortable and enjoyed being in the lab. I never thought I would have the opportunity

to learn so many things, like using a fluorescence microscope or creating my own cell media. I am forever grateful for my mentors, my PIs, and for this REU program giving me the amazing chance to become engulfed in science.

After completing my research, I traveled from Madison, Wisconsin to la Isla de Encanta. Being here in Puerto Rico has truly been one of the best experiences of my life. Although I have only stayed here for almost two weeks, I already feel at home. I can't even pinpoint a favorite moment that I've had in Puerto Rico because there are too many. From mountains and mofongo to muertos and merengue, I am in love with it all!

Links
[1] https://www.cienciapr.org/es/blogs/soft-matter/mountains-and-mofongo [2] https://www.cienciapr.org/es/user/brittany-nelson