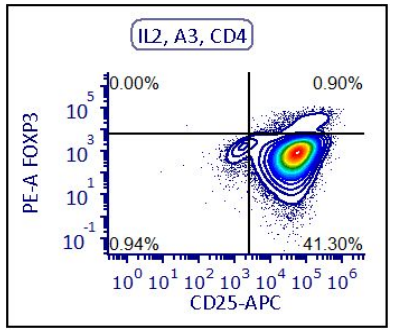
Establishing a Hydrogel-based System for Efficient Induction of Regulatory T Cells In Vitro

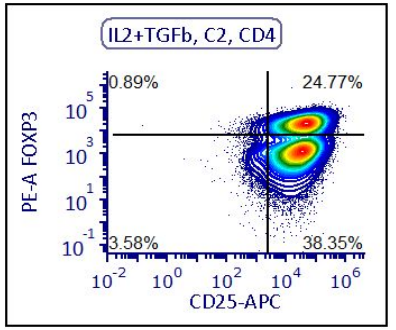
Mikayla Jackson[1], Einat Vitner[2], David Mooney[2]
[1]University of Virginia, [2]Harvard University
Wyss Institute, NSF, and Harvard University

The immune system utilizes innate and adaptive immunity, which are two lines of defense against foreign and invading bacteria, viruses, microorganisms, and other unwanted things that can cause issues if they enter the body. When these systems aren't working properly, and the immune system begins to attack healthy cells as an immune response, problems such as autoimmune diseases can arise. Our lab's therapeutical suggestion is adoptive cell therapy (ACT) which is a form of immunotherapy where specific T cells can be isolated, undergo expansion, and are then transferred back to a patient. The therapeutic potential of the transcription factor FOXP3, a master driver of T regulatory cells, has demonstrated the possibility of advancing the development of ACT toward treating inflammatory diseases. To reach this goal our lab is attempting to identify recruitment factors that act as magnet and are characterizing the effect for the expansion of T regulatory cells. The graph on the right depicts these recruitment factors and shows that they don't interfere with regulatory T cell expansion. This proves that they can be utilized in future experiments *in vivo.* Our lab is also utilizing cryogels, which are gels frozen at below temperatures temperatures that have desirable physical and biological compatibility properties due to the use of materials that are naturally occurring within the body. Our goal is to put all of our release compounds (IL-2 and TGFb) and antibodies, testing this system in vitro, and then moving to in vivo.

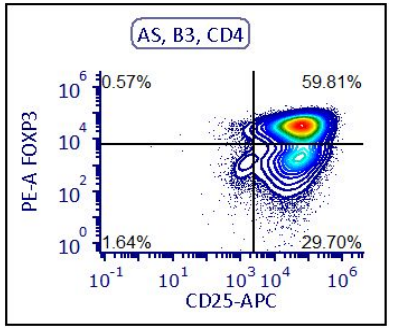
IL-2



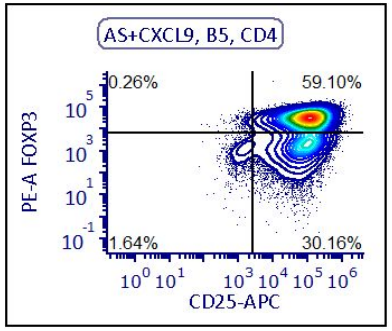
IL-2+TGFb



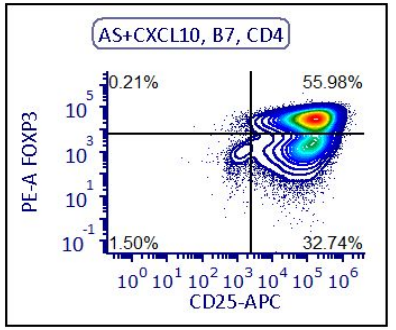
IL-2+TGFb+AS2863619



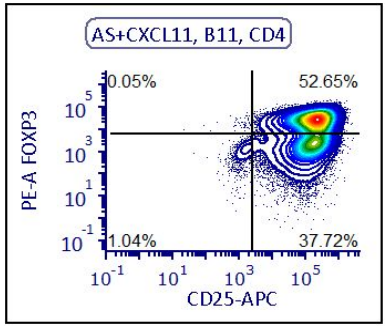
IL-2+TGFb+AS+ CXCL9



IL-2+TGFb+AS+ CXCL10



IL-2+TGFb+AS+ CXCL11



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Mikayla Jackson is a rising junior from Berlin, New Jersey attending the University of Virginia. Currently I am pursuing a Bachelor's of Science in Biomedical Engineering and hope to attain a graduate degree in computational biology or biophysics. I'm also passionate about neuroscience and tissue engineering.

My experience in the Mooney Lab and with the Harvard SEAS REU program has taught me valuable lessons. I've gained knowledge on immunology topics, learned how to use various types of advanced technology, and have been taught important techniques for tissue culturing. I've also improved as a scientist and have been given a better understanding of the graduate student experience when working in a laboratory full time. In the future I plan on continuing to participate in research, and this program has given me a real desire to earn my PhD.