Characterising Biomaterial-Induced T Cell Recruitment and Tertiary Lymphoid Structure (TLS) Formation

Rea Tresa[1], Joshua M. Brockman[2,3], Nicholas Jeffreys[2,3], David J. Mooney[2,3]
[1]Imperial College London, [2]Harvard John A. Paulson School of Engineering and Applied Sciences, [3]Wyss Institute for Biologically Inspired Engineering
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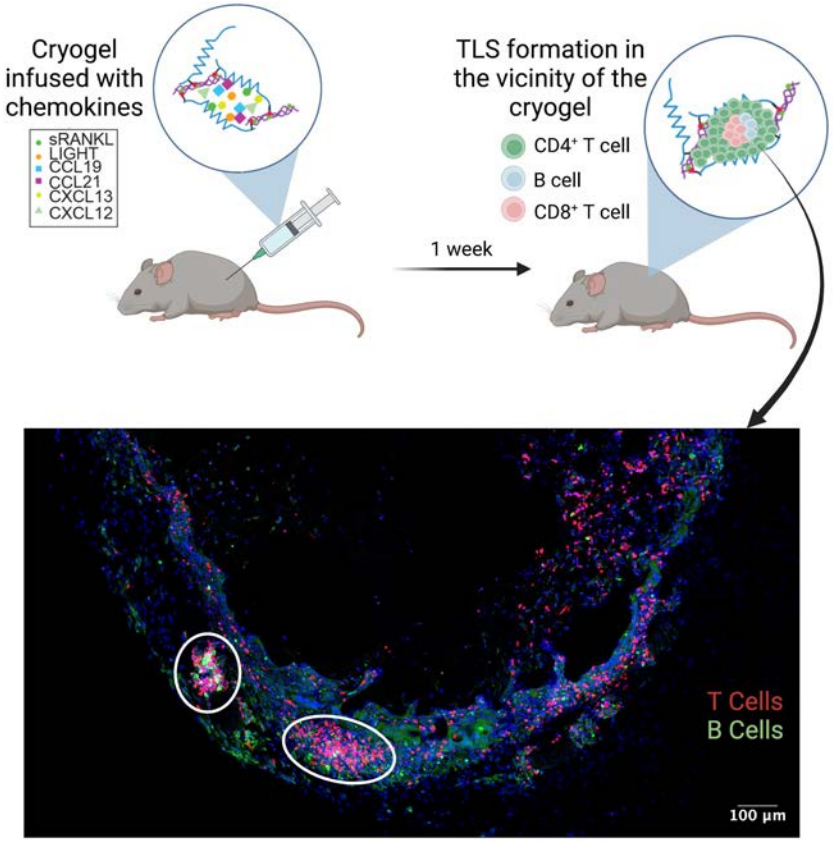
Immunotherapies have exhibited significant clinical promise as a cancer therapeutic, as they rely on harnessing the power of the immune system to fight the disease; however, most patients still fail to respond. Recent reports suggest that patients who do respond to immunotherapies often form tumor-associated tertiary lymphoid structures (TLS).

TLS are lymph-node like structures that form at sites of chronic inflammation, including tumors, and are associated with a positive prognosis in many human cancers. Since there is evidence that TLS locally educate and improve infiltration of immune cells to the tumor, there has been a growing interest in developing methods to create these structures on demand, in hopes of improving patient responses to immunotherapies. In this project, we inject a biomaterial platform based on cryogels to induce TLS formation in mice, and observe that immune cells are successfully recruited to the vicinity of the gel and TLS are formed as early as one week after injection.



Injection of mice with cryogels infused with chemokines and formation of TLS in the vicinity of the cryogel. Microscope image showing the gel infiltrated by immune cells and two TLS formed one week after injection

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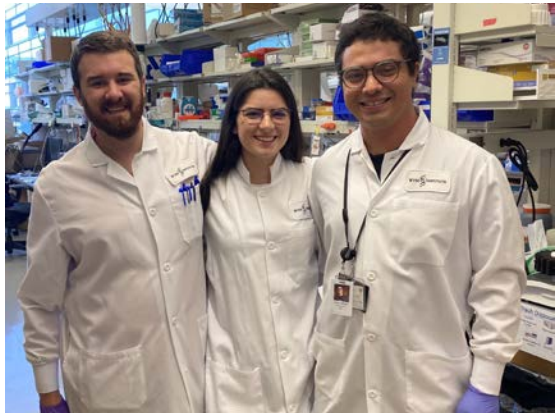
My name is Rea Tresa and I am originally from Albania – a small Mediterranean country in southeastern Europe. I study Molecular Bioengineering at Imperial College London, and I joined the Mooney Lab at Harvard this summer to conduct research in immunoengineering.

The goal of my project was to develop a quantitative understanding of lymphocyte recruitment and TLS formation in response to a cryogel-based biomaterial system developed in the lab. I have acquired new skills like fluorescence microscopy, immunostaining and image analysis while developing an imaging-based method for quantifying T cell recruitment to the cryogel, and I have thoroughly enjoyed conducting impactful research for society in a collaborative and supportive environment. The residential life and REU activities have enabled me to connect with fellow scientists and engineers from all over the world, and it has been a true pleasure learning from each other and sharing this journey together.

This research experience has furthered my interest in immunoengineering, and I look forward to commencing graduate studies in the field. In the future, I would like to pursue an academic career path that will involve conducting research on harnessing the power of our own immune system to fight disease, while teaching and mentoring the next generation of scientists and engineers.



Photos with Prof. Dave Mooney (top) and my mentors Dr. Joshua Brockman (bottom left) and Nikko Jeffreys (bottom right)