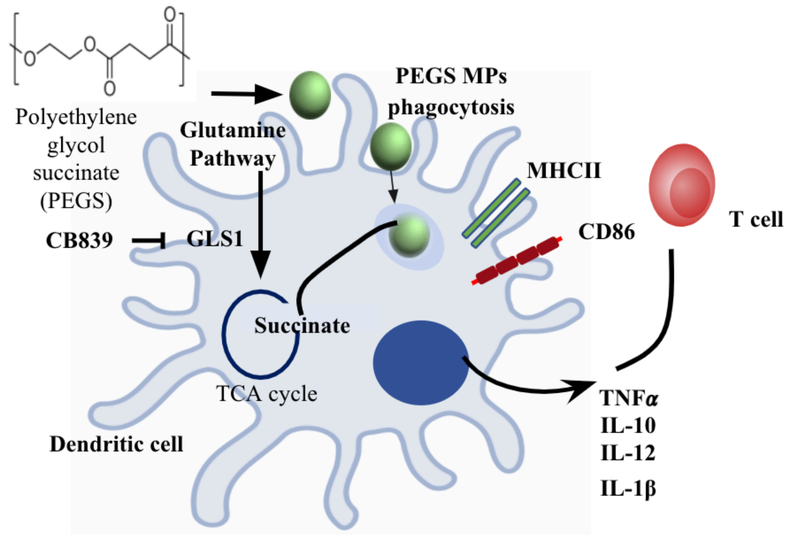
Metabolite-based Cancer Vaccine to Modify Immunometabolism and Prevent Melanoma Growth in Aging Mice

Alison Sundem, Chemical Engineering
Mentor: Dr. Abhinav Acharya, Assistant Professor
School for Engineering of Matter, Transport & Energy, Arizona State University

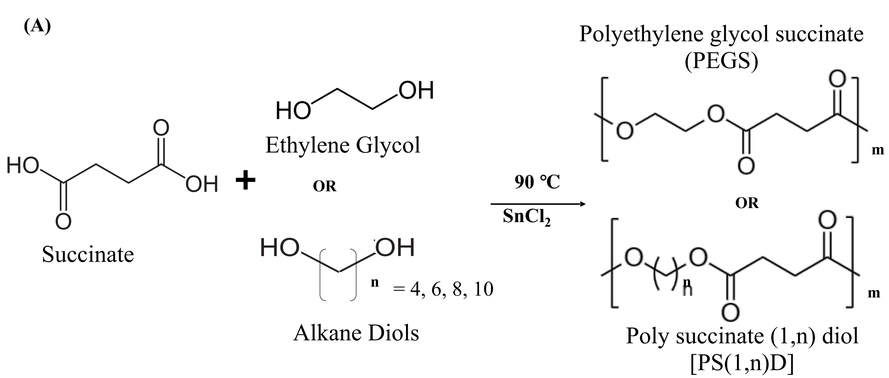
Introduction

Cancer vaccines generate robust antigen-specific anti-tumor responses by adjuvant-mediated induction of high energy-consumption state in immune cells. Unfortunately, this elevated and sustained energy immunometabolism mediated activation of immune cells is associated with toxicity and induction of autoimmune diseases. Moreover, because of immunosenescence due to aging, there is a reduced proliferation and potency of lymphocytes (T cells), increasing the susceptibility to tumorigenesis. Herein, an adjuvant-less immunometabolism modifying succinate-based microparticle (MP) therapy was developed to activate dendritic cells, and in turn the adaptive immunity, and reduce melanoma growth in aging mice.

Hypothesis



Results and Discussion



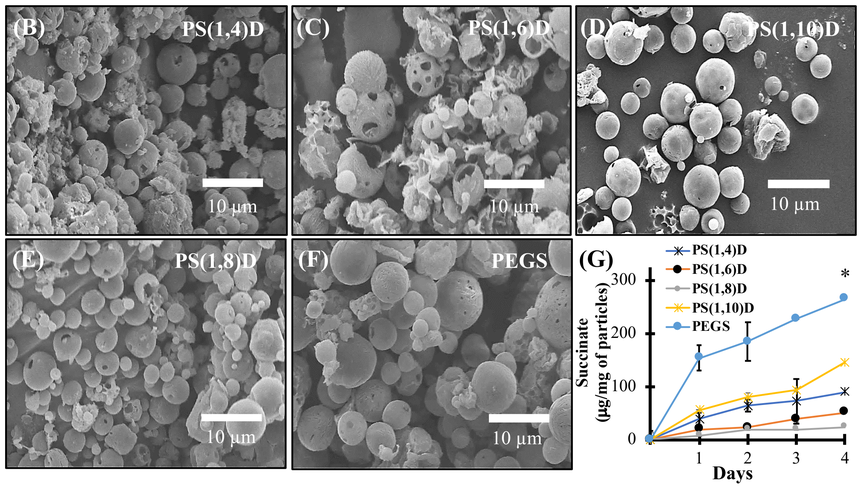
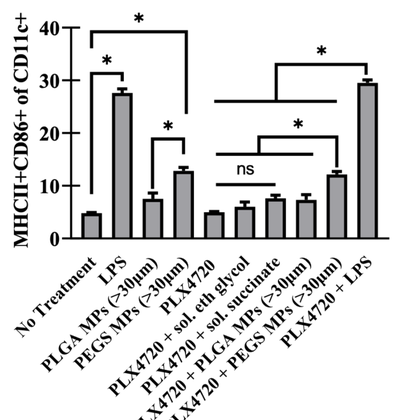


Figure: (A) Reaction procedure for synthesis of succinate-based polymers. (B-F) Scanning electron microscopy (SEM) images polymeric microparticles. (G) Release kinetics of polymeric microparticles.

Results and Discussion



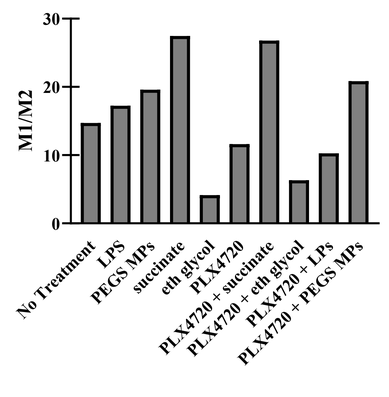


Figure: PEGS MPs are able to activate Innate Immune cells (A) DCs and (B) Macrophages using flow cytometry

Conclusion

- Successfully able to make metabolite-based polymers
- Succinate based polymeric microparticles were able to activate and modulate the innate immune system in vitro

Future Work

- MTT assay on YUMM1.1 cells using PLX4720 (BRAF inhibitor)
- Injection of YUMM1.1 cells in murine model
- Immunological study of immune cells in vivo

FURI

Acknowledgements

All experiments were performed in the Goldwater Center under the guidance of Dr. Abhinav Acharya and PhD Student Sahil Inamdar

Ira A. Fulton Schools of Engineering
Arizona State University