Characterization of the Immune Response in a Pre-Clinical Model of Severe Trauma

Prather, Ayanna (School: Coretta Scott King Young Women's Leadership Academy)

Purpose: There is in an estimated 7.9 million bone fractures annually in which 5-10% of these result in delayed healing and progression to chronic nonunions. One factor that has previously been as a possible contributor to these complications is immune dysregulation, a state in which the immune system becomes suppressed. However, immune dysregulation as it relates to severe trauma has been poorly characterized. Therefore, we aimed to better characterize the immune response in order to aid in the development of potential immunotherapies. Procedures: In order to characterize the immune response, we used Flow Cytometry to look at immune cell populations in the blood throughout various time points in the preclinical model. Towards the end of the study, we used MicroCT to analyze bone volumes following treatment in the model. Data and Results: Upon the establishment of immune dysregulation in the rats following 8 weeks, we discovered a relationship between bone volume and immune cell populations. The more functional immune cells systemically resulted in higher bone volume following treatment whereas the more immunosuppressive cells resulted in poorer bone volume. Conclusions: We concluded that the rats progressed towards a state of immune dysregulation and established a relationship between immune cell populations and bone volumes. Future work called for the development of a possible immunotherapy that could potentially combat immune dysregulation, ultimately promoting better bone healing following severe trauma.

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