

Divergent Innate and Adaptive Immunological Responses are Observed in Humans Following Blunt Trauma

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The immune response to trauma has traditionally been modeled as a biphasic response. The first phase is proposed to consist of a hyper-inflammatory response, which is then followed by a second phase of hypo-inflammation. Here, we undertook a study to determine the immune response specifically to blunt trauma in male patient and healthy control cohorts. These patients and healthy controls were 18-55 years of age. After obtaining consent, peripheral blood was drawn 40-96 hours following trauma. From this blood, the phenotype and functionality of both myeloid and lymphocyte cell populations were determined. Consistent with a hyper-inflammatory response, neutrophil numbers were observed to be elevated in trauma patients as compared to healthy controls. Further, neutrophils isolated from trauma patients had increased raft formation and phospho-Akt. Consistent with this, the neutrophils had increased oxidative burst compared to healthy controls. In direct contrast, T lymphocytes isolated from trauma patients had decreased naïve T cell numbers. Upon activation with a T cell specific mitogen, trauma patient T cells were observed to have decreased T cell receptor mediated signaling. Consistent with these results, upon activation, trauma patient T cells produced less IFN-gamma as compared to those from healthy controls. Altogether, these results suggest that following trauma, there is a simultaneous and divergent immunological response to trauma. This consists of a hyper-inflammatory response by the innate arm of the immune system, while there is a hypo-inflammatory response by the adaptive arm.