Judy Day, University of Tennessee, Knoxville, TN, USA
Yoram Vodovotz, University of Pittsburgh, Pittsburgh, PA, USA

The Role of T-cells in Hemorrhagic Shock

It has traditionally been thought that the immune response acts in two separate, virtually distinct phases when encountering infection or trauma: the innate immunity phase and the adaptive immunity phase. The cells in the innate immunity phase act in a general way toward the present danger and communicate appropriately to the adaptive immune players who then act in a more specific, focused way. However, the lines between these two phases can be quite blurred since T-cells, primary members of the adaptive arm, can produce many of the cytokine molecules that are produced by the cells involved in the innate response. In this way, T-cells can augment or regulate the response of the "innate arm" of the response.

In the work of Torres et al. 2009, experimental and modeling work was carried out to examine the cascade of immune events triggered by a drastic loss of blood over a relatively short period of time. At the time, it was not widely accepted that T-cell responses could have an earlier effect on some of the typical "innate" immune response events in this scenario. Thus, the communication cascade going from the innate mediators (e.g. macrophages) to the antigen presenting cells (e.g. dendritic cells) and then to the T-cells was not considered in the work. Here we explore the role that T-cells, including T-helper cells of type 1 and 2 as well as T regulatory cells, have on the immune response effort to guard against hemorrhagic shock.

Torres A, Bentley T, Bartels J, Sarkar J, Barclay D, Namas R, Constantine G, Zamora R, Puyana JC, Vodovotz Y. Mathematical modeling of posthemorrhage inflammation in mice: studies using a novel, computer-controlled, closed-loop hemorrhage apparatus. Shock. 2009 Aug;32(2):172-8.