

1154-92-1162

Lauren M Childs* (lchilds@vt.edu), **Samantha Erwin** and **Stanca M Ciupe**.

Mathematical model of broadly reactive plasma cell production. Preliminary report.

Strain-specific plasma cells are capable of producing neutralizing antibodies that are essential for clearance of challenging pathogens. These neutralizing antibodies also function as a main defense against disease establishment in a host. However, when a rapidly mutating pathogen infects a host, successful control of the invasion requires shifting the production of plasma cells from strain-specific to broadly-reactive. In this study, we develop a mathematical model of germinal center dynamics and use it to predict the events that lead to improved breadth of the plasma cell response. We examine scenarios that lead to germinal centers that are composed of B-cells that come from a single strain-specific clone, a single broadly-reactive clone or both types of clones. We find that the initial B-cell clonal composition, T-follicular helper cell signaling, increased rounds of somatic hypermutation, and B-cell selection strength are among the mechanisms differentiating between strain-specific and broadly-reactive plasma cell production during acute and chronic infections. Understanding the contribution of these factors to emergence of breadth may assist in boosting broadly reactive plasma cells production. (Received September 13, 2019)