

Rebecca Segal, Department of Mathematics and Applied Mathematics, Virginia Commonwealth University, Richmond, VA 23284

Racheal Cooper, Department of Mathematics and Applied Mathematics, Virginia Commonwealth University, Richmond, VA 23284

Robert Diegelmann, Department of Biochemistry, Virginia Commonwealth University, Richmond, VA 23284

Kevin Ward, Department of Emergency Medicine, Virginia Commonwealth University, Richmond, VA 23284

Angela Reynolds, Department of Mathematics and Applied Mathematics, Virginia Commonwealth University, Richmond, VA 23284

The Dynamics of Wound Healing With Elevated Cortisol Levels.

During the wounding healing process many complex interactions occur between fibroblasts immune cells and immune mediators. These interactions determine whether or not the wound will heal or become chronic. Cortisol is a stress hormone that remains elevated when individual are stressed. It acts as an anti-inflammatory mediator and delays wound healing.

To better understand the wound healing in trauma patients, we have developed a system of differential equations modeling the dynamics between local fibroblast, neutrophils, macrophages, collagen and the systemic mediator Cortisol. This model is calibrated using data from wounded, restrained (stressed) animals. Using this model, we focused on the accumulation of collagen in an oxygen-deprived wound (diabetes) with and without trauma (high cortisol levels).