Uterine healing after birth:  
A potential role for immune cells in postpartum involution

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Postpartum involution is the process by which the uterus returns to its non-pregnant state after labor and delivery of the term fetus and its placenta. During pregnancy, many blood vessels are formed in order to supply nutrients to the fetus. Once the mature fetus has left the womb and the placenta has been sheared off and delivered as after birth, this complex vasculature is compromised. The blood vessels are dilated and torn, and large amounts of blood pool into the uterus (Colin 2013). The postpartum uterus therefore has many of the features of an open wound, and certain mechanisms are required to clean it up and heal it before it is ready for another implantation and pregnancy. Like any open wound, the post-partum uterus elicits an immune response by recruiting immune cells to aid with the process of involution. Unfortunately, many things can go astray with the wound-healing process, therefore causing postpartum complications such as postpartum hemorrhage. Postpartum hemorrhage is one of the leading causes of maternal mortality in the world and has a prevalence of 6% worldwide (Fawole et al. 2010). It is therefore significant to understand the mechanisms that are involved in involution.

In this project, Rattus norvegicus is used as a model organism to understand involution. In the rat, pregnancy can occur within one week of giving birth, indicating much faster healing in the rat uterus than in the human uterus. In order to understand how this involution process occurs in such a short period, in this work we used classical histology to trace the process of uterine healing in the first week postpartum. We then used immunohistochemistry to highlight particular immune cells and tissues of interest. Macrophages, which are a part of the leukocyte family and have phagocytic properties, are among the main immune cells that play an active role in wound healing (Williams et al. 2012). Through immunohistochemistry, macrophages were confirmed to be present in the postpartum uterus, and were densely distributed throughout the very actively reorganizing uterine tissue. The anatomy, which is similarly important to understand, gave a visual representation of the recovery of the blood vessels which are vascularizing the metrial gland in the uterus. Haematoxylin and eosin highlights steady decreases in uterine blood vessel size. Further staining of the cells for the presence of smooth muscle is required to determine whether the blood vessels are being remodeled, and whether the macrophages present in the cell are positioned to play a role in this remodeling.

References:

