II-1. Physiology of the immune system during pregnancy

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1. Pregnant women are considered to be a special population group due to their specific susceptibility to some infectious diseases because of the specific immunological condition caused by pregnancy. Therefore, pregnancy presents many challenges for making decisions on how to approach, prevent and treat infectious diseases in pregnant women, newborns and young infants.

At the time of “foetus implantation” the presence of immune cells at the implantation site is not associated with a response to the “foreign body”, but to facilitate and protect the pregnancy. Therefore, the immune system at the implantation site is not suppressed, but on the contrary it is active, functional and is carefully controlled.

2. Pregnancy represents all the means to protect the mother and the child. During pregnancy the maternal immune system is characterized by a reinforced network of recognition, communication, trafficking and repair and to be able to raise the alarm, if necessary, to maintain the well-being of the mother and the fetus. On the other side is the foetus who provides a developing active immune system that will modify the way the mother responds to the environment, providing the uniqueness of the immune system during pregnancy. That is why the immune condition is modulated, but not suppressed.

3. Sex hormones also modify immune responses. During the course of pregnancy, changing levels of sex hormones induce variable immune responses. Increases in estradiol levels during pregnancy are associated with relatively higher type 2 helper T-cell (Th2) responses and diminished type 1 helper T-cell (Th1) responses and therefore contribute to a Th1-to-Th2 shift in pregnancy. Additionally, increasing progesterone, as the natural immune suppressor, levels during pregnancy are associated with a reduction in immune responses and an alteration of the Th1–Th2 balance. Other parts of the immune system are maintained and, in some cases, even enhanced, accounting for the fact that pregnancy is not a generalized state of immunosuppression. The immunology of pregnancy is the result of the combination of signals and responses originated from the maternal immune system and the foetal–placental immune system. The placenta functions as a regulator of the trafficking between the foetus and the mother, rather than as a barrier. Foetal and maternal cells move in the two directions. Valuable and crucial for a long term immunity or protection IgG (antibodies) concentrations trafficking into umbilical vein from a mother to a child are starting to increase from week 17 and significantly raise in the 3rd trimester of pregnancy.
Topic conclusions

The immunology of pregnancy is the result of the combination of signals and responses originated from the maternal immune system and the foetal-placental immune system. This combination ensure optimal immune protection both for mother and foetus. Trafficking into from a mother to a child of IgG antibodies is valuable and crucial for new-born protection.