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Pregnancy - The Unique Immunological Paradigm

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Abstract : Purpose of presentation: Pregnancy represents the most important period for the conservation of the species. The immune system is one of the most important systems protecting the mother against the environment and preventing damage to the fetus. This presentation aims to review and discuss the role of the immune system during pregnancy, the evolutionary inflammatory process through pregnancy, infectious and environmental exposure influences on the mother and the fetus, and the impacts of sexual dimorphism of the placenta on offspring susceptibility to different disorders. Recent Findings: In 1960, Peter Medawar (Nobel Prize Winner) proposed that the fetus, a semi-allograft, is similar to a tissue graft that escapes rejection through a mechanism involving systemic immune suppression (Graft –Host response). However, recent researchers and studies have documented that implantation means inflammation, and the inflammatory process is considered a breach of tolerance in pregnancy with immune induction, which is necessary for the protection of the mother and the fetus against infections and environmental triggers. This inflammatory process should be maintained during different pregnancy phases till parturition, and any block at any phase will be associated with pregnancy complications, including pregnancy failure or loss, miscarriage, and preterm birth subsequently. Maternal immune activation following any trigger can have a positive effect on the fetus. The old concept of the placenta being asexual is inaccurate, and being with sexual dimorphism with clear differences in susceptibility to different factors that stimulate maternal immunity. Summary: The presence of different immune cells ((i.e., T cells, B cells, NK cells, etc.) at the implantation site is considered proof of a strong maternal immune response to the fetus. Therefore, human pregnancy is considered a unique immunological paradigm requiring maternal immune modulation rather than suppression. So Medawar's postulation of maternal systemic immunosuppression is wrong. Maternal immune system activation triggered by infections, stress, diet, and pollution can have a positive effect on the fetus, with the development of fetal-trained immunity necessary for survival. The sexual dimorphism of the placenta seems to have an impact on the differences in sex susceptible to the environment maternal risk stimuli. This link to why the incidence of autism is increasing more among boys than girls.

Keywords : pregnancy, maternal immunity, implantation and inflammation, placenta sexual dimorphism
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