Immunology and Immunopathology of Reproduction

Contributions to
Gynecology and Obstetrics
Vol. 14

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P.J. Keller, Zrich

KARGER


Based on the Materials of the International Symposium on
Immunology of Reproduction, Tel-Aviv, October 21-25, 1984

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V. Tider, Tel-Aviv

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Preface

The present decade has witnessed the rapid growth of some interrelated basic and clinical studies we now know as the immunobiology of reproduction. Directly or indirectly, immunology has how intruded or has been shown to underlie nearly every aspect of mammalian reproduction. Some
very recent important developments in basic immunology and immunogenetics that have allowed us to look at immunoreactivity in precise ways in individuals experiencing both normal and abnormal pregnancies. The important areas are: (1) molecular and genetic approaches to immunological systems; (2) the cloning of immunocompetent cells; (3) hybridoma technology to produce monoclonal antibodies and the application of monoclonal reagents to biology and medicine; (4) the antigens of the major histocompatibility complex and their biological functions; (5) regulatory mechanisms of immune responses by idiotypes and anti-idiotypes; (6) the functions of mediators including interleukn-1, interleukin-2 and others; (7) the roles that hormones exert on immune responses, gene expression, and oncogenic regulation [1]. In addition, these advances in immunogenetics have allowed a definition of the critical features of the trophoblast of the fetal/placental unit of all species that initiate and establish its immunoprotection in the mother. These are: (1) in the maternal uterus, unlike in extra-uterine sites, the trophoblast is resistant to immune damage by cytotoxic lymphocytes, antibody, and antigen/antibody complexes [2]; (2) it forms a physical barrier to most immune effectors except IgG from reaching the fetus [3, 4] while at the same time functioning as a dialysis membrane conducting two-way nutritive and respiratory functions between the mother and her fetus; (3) it signals and/or recruits the migration of lymphoid cells into the uterine decidua and the uterine lymphatics that have suppressed activity or are functionally hyporesponsive to paternal antigens [5]; (4) it produces progesterone and other hormones in local concentrations far greater than measured systemically. These hormones have immunoregulatory functions in blocking the efferent limb of the immunological reflex arc as well as regulating gene expression of tissues at the maternal/fetal interface [6-8]; (5) the fetal placental unit from implantation onward promotes and sustains in the mother the production of blocking factors (antibodies) that are present in the maternal serum and bind on an antigen-specific basis to the placental trophoblast. These blocking factors can be eluted from the placenta and can block mixed lymphocyte culture reactions between mother/father/child. These blocking factors do not cross the placenta nor appear in the cord sera of the infant [3]. There is a growing body of data from experiments on inbred strains of animals that reproduce unsuccessfully as well as in vivo and in vitro studies in humans experiencing repeated pregnancy wastage indicating that the critical features of the trophoblast for immune protection in the mother are not seen, fail to become established, or deviate along cytotoxic lines. In addition, we can no longer talk of the 'riddle of the fetal allograft' [9] and expect
that a single mechanism underlies the immunological coexistence between mother and child. Likewise, it is no longer debated that the above-mentioned features have evolved in humans to ensure successful viva parity and genetic polymorphisms [10].

The manuscripts presented in Contributions to Gynecology and Obstetrics, volume 14, presented and discussed at the International Symposium on Immunology of Reproduction in Tel Aviv, October 21-25, 1984, are by leading investigators in the area of the immunobiology of the maternal/fetal reaction and address these critical features of the trophoblast for immune protection in the mother just described. The scientific field of reproductive immunology has certainly come of age and workers in this area are rapidly answering some of the most basic outstanding questions in reproductive biology.

Alan E. Beer, MD
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