

ENDOCRINOLOGY OF EMBRYO-ENDOMETRIAL INTERACTIONS

*Satellite Symposium
of the Ninth International Congress of Endocrinology
(N.I.C.E. 92)*

Cell Biology of Endometrial Receptivity and of Trophoblast-
Endometrial Interactions: Recent Aspects.

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Implantation initiation is commonly thought to require that 1) the trophoblast or subpopulations of it have reached a state of "invasiveness" and, synchronously, 2) the endometrium a state of "receptivity" ("implantation window"). Many questions remain open, in particular for the situation in the human. The cell biological basis of "receptivity" as well as of "invasiveness" is still largely unknown, but recently it appears that the application of modern concepts of cell and developmental biology opens promising new views of it, concentrating on cell adhesion and cell polarity phenomena.

Implantation initiation requires that the trophoblast attaches with its apical plasma membrane to the apical plasma membrane of the uterine epithelium. Since apical plasma membranes of epithelia are normally non-adhesive, this has been called a cell biological paradox (Denker, 1986). In development, cells can attain two major phenotypes and can switch between these: 1) the mesenchymal/ fibroblastoid phenotype that is compatible with cells moving individually; 2) the epitheloid phenotype which is characterized by cells expressing apico-basal polarity and strong association with neighbouring cells via various junctions, so that they can migrate as sheets but not as individual cells. Application of this concept to embryo implantation results in postulating that the trophoblast of blastocysts has to give up part of its typical epithelial organization when becoming invasive: It must express cell-cell adhesion molecules or matrix receptors non-typically at its apical plasma membrane and must change its motility apparatus. This applies in a somewhat similar way to the uterine epithelium at "receptivity". Interestingly, recent data show that a great number differentiation parameters of these cells change in addition. It appears that part of the epithelial differentiation program is down-regulated at this phase. This new concept appears to offer interesting aspects of the basis of steroid hormone action at the endometrium, as well as of trophoblast invasiveness, postulating that switches occur in the activity of regulatory "master" genes as also involved in decision making during development.

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FINAL PROGRAM

September 6-10, 1992