ENDOMETRIAL RECEPTIVITY AND TROPHOBLAST INVASIVENESS: CELL BIOLOGICAL ASPECTS

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The cell biological basis of endometrial receptivity and trophoblast invasiveness, the two preconditions for implantation ("implantation window"), still remains enigmatic. Recently, however, the application of modern concepts of cell and developmental biology concentrating on cell adhesion and cell polarity phenomena seems to open promising new views of these phenomena which will be discussed in the present communication.
At implantation initiation, the trophoblast has to attach via its apical plasma membrane to the apical plasma membrane of the uterine epithelium. This presents a cell biological paradox since apical plasma membranes of epithelia are normally non-adhesive. Solutions for the paradox are found when taking a side view to processes in embryology that involve interaction of two epithelia, typically combined with epithelium-to-mesenchyme interconversion, a process that is recently also being discussed to be involved in tumor cell invasion.
Application of this concept allows to formulate certain predictions: The trophoblast has to give up part of its typical epithelial polarity when becoming invasive, i. e. 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, many non-related differentiation parameters of these cells change in addition. It appears that part of the epithelial differentiation program is down-regulated at this phase. This concept offers new 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 and, possibly, in tumor invasion. The concept can be expected to be of value in selecting certain classes of molecules as good candidates for markers of invasiveness/receptivity, and it may open new approaches for manipulating these states.

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