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Adhesiveness of the apical membrane of uterine epithelial cells: a cascade of molecular alterations that leads to stable cell-cell binding

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At embryo implantation, two epithelia, trophoblast and uterine epithelium, initiate an adhesive interaction via their apical plasma membrane. With respect to the uterine epithelium, this interaction seems to be possible only in a specific state called receptivity which is hormonally controlled. The adhesive properties of the apical surface of uterine cells might be facilitated by changes in the epithelial phenotype. In the study reported here, we developed an in vitro model for implantation in the human using endometrial RL95-2 and HEC-1-A cell lines. Data obtained suggest that apical adhesiveness of these cells is due to a loss of apico-basal polarity and a re-organization of adhesion molecules enabling an integrin-mediated signaling pathway. Using a novel approach of force measurements with the atomic force microscope we have characterized parameters of these specific adhesive interactions. Data presented here are consistent with the concept that uterine epithelial cells in the receptive state possess a reorganized epithelial phenotype, i.e. a non-polarized architecture and, thus, a luminal plasma membrane equipped with appropriate adhesion molecules; if trophoblast cells are positioned onto the surface for sufficient periods of time, a cascade of events can be initiated that leads to the formation of strong adhesion at the apical cell pole.