Endometrium in organ culture: a model host tissue for studies of trophoblast invasion

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Trophoblast invasion during embryo implantation is considered to be a useful model for the study of invasion mechanisms. In vivo, embryo implantation starts when the invasive phase of the trophoblast coincides with a "receptive state" of the endometrium, the latter being controlled by estrogens and progesterone. The molecular basis for the receptive state is completely unknown so far. In the present communication we are reporting results from a series of investigations in which we try to develop an in vitro culture model for the study of molecular mechanisms of this process. In the first series, it was tried to find conditions under which rabbit endometrium can be maintained in vitro in organ culture in a quasi-physiological condition, as judged by morphological criteria. Furthermore, it was attempted to induce, in vitro, the morphological transformation of the endometrium as typical for the preimplantation phase.

Fragments of rabbit endometrium are explanted during early pseudopregnancy and are cultured on a gyratory shaker for 2 to 6 days. During the first 2 days the epithelium is found to grow over the former wound so that a complete epithelial covering with a morphologically normal apico-basal polarity and a well-developed basal lamina is restored. There is no central necrosis in the stroma under the conditions used. Under progesterone substitution (10^{-5} mg/ml, similar to plasma levels found at corresponding pregnancy stages), our cultured endometrial fragments are found to show extensive fusion of epithelial cells. This mimics impressively the in vivo situation where large symplasms form in the uterine epithelium at implantation sites, from 7 d p.c. on in the antimesometrial and one day later also in the mesometrial part of the endometrium. It appears that only the superficial parts of the original (not the regenerated) uterine epithelium are capable of progesterone-induced fusion.

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ABSTRACTS

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