Secretion of Vascular Endothelial Growth Factor in a Three-Dimensional Culture of Human Endometrium; an In-Vitro Model for Endometriosis

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Abstract

Introduction: Endometriosis is the presence of endometrial glandular and stromal cells outside the uterine cavity. The disease is prevalent in about 10% of women of reproductive age and in up to 50% of infertile women. Surgery continues to be the first line of treatment in eradicating endometriotic lesions but recurrence of the condition is seen in up to 47% of the cases. VEGF is an effective factor in the establishment of endometriosis. The aim of the present study was to determine VEGF levels in a three-dimensional (3D) fibrin matrix culture of human endometrial tissue.

Materials and Methods: Endometrial biopsies were obtained from the uterine fundus of 10 ovulating (at 19th to 24th day of menstruation cycle) premenopausal women attending the Toronto Center for Advanced Reproductive Technology (TCART) for the treatment of infertility, ovarian cysts or non-endometrial complaints. Each tissue fragment was divided into ten segments for culture in a total of 100 wells. The samples were cultured on three-dimensional fibrin matrices and the supernatant fluid was collected from each endometrial sample for the assessment of VEGF levels. The endometrial samples were stained by anti-Cox-2 antibody (anti-cyclooxygenase -2) for immunohistochemical evaluation of angiogenesis.

Results: VEGF levels in the supernatant fluid of wells with angiogenesis was significantly higher ($p<0.05$) than wells with no signs of the phenomenon (492±3.11 and 183±13.2, respectively). The results were indicative of cell proliferation in 91% of the wells and angiogenesis was observed in 51 wells (56%) with cell proliferation.

Conclusion: It seems that VEGF secretion plays an important role in promoting neovascularization and cell proliferation of endometrial cells. Therefore, VEGF secretion seems to be involved in the establishment of endometriosis. Seeking the relationship between cell proliferation and VEGF secretion rates is suggested.

Key Words: Angiogenesis, Endometriosis, Endometrium, Female infertility, Three-dimensional tissue culture, VEGF.

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