

Molecular and Functional Characteristics of NK Cells from Peripheral Blood and Endometrium in Patients with Reproductive Failure

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Abstract

Uterine natural killer (uNK) cells play a significant role in influencing processes such as embryo implantation and placental development. The endometrium undergoes changes during the menstrual cycle due to the impact of steroid hormones. These changes include decidualization, which prepares the endometrium for blastocyst implantation. uNK cells can enhance endometrial receptivity, assess embryo quality and support placental development through the regulation of angiogenesis.

Differences in the phenotype of uNK cells compared to peripheral blood NK (pbNK) cells were found. uNK cells are predominantly of the CD56^{bright} CD 16^{dim} subset, whereas the CD56^{dim} subset constitutes about 90% of NK cells in peripheral blood with CD56^{bright} comprising approximately 10%. Peripheral and uterine NK cells can also be distinguished based on their receptor expression.

Cases such as recurrent miscarriages (RM) and recurrent implantation failure (RIF) suggest that alterations in uNK cell levels may be associated with fertility issues. In RM, elevated levels of cytotoxic CD56^{dim} cells are linked to excessive production of angiogenic factors and oxidative stress, which results in abnormal decidualization in affected women. Conversely, a deficiency of angiogenic factors, such as VEGF, correlates with the hyperactivation of uNK cells in women with RIF.