

Human Brain Derived Neurotrophic Factor A Marker for the Prediction of Reproductive Potential in Women

Background

Neurotrophins are a family of growth factors expressed in the mammalian nervous system. Some examples of neurotrophins include nerve growth factor (NGF), brain-derived neurotrophic factor (BDNF), neurotrophin-4/5 (NT-4/5), and neurotrophin-3 (NT-3). These neurotrophins have also been found to be expressed in a variety of non-neuronal tissues such as cardiovascular, immune, endocrine and reproductive systems. NGF, BDNF, NT-4/5, NT-3 and their corresponding receptors have been shown to be expressed in murine ovaries. Their presence in the ovaries has been shown to be critical for ovarian function such as ovulation.

This invention is the first demonstration that BDNF is expressed in human ovarian follicles and offers a definitive way to measure human ovarian reserve, and consequently, represents a useful method for the prediction of the success of assisted reproductive techniques.

Description of the Technology

BDNF was detected in human follicles derived from women undergoing in vitro fertilization (IVF). Specifically, cumulus granulosa cells appear to secrete the factor. Stimulation with cAMP or forskolin, an activator of cAMP, increased secretion of BDNF by cumulus granulosa cells. By contrast, mural granulosa, oocytes, and embryos did not secrete BDNF.

Studies with mouse models revealed that the receptor for BDNF, TrK B, was localized to unfertilized oocytes indicating that oocytes are the target of BDNF. The presence of TrK B receptors on unfertilized oocytes suggests a role for BDNF in oocyte maturation.

Taken together, these studies reveal that BDNF is critical to human oocyte maturation and offers a definitive way to predict the reproductive capability of women undergoing IVF.

Advantages

Neurotrophins as markers for female reproductive capability:

- Currently, serum markers such as FSH and ultrasound are used to measure ovarian reserve. These approaches do not measure the ovarian reserve directly. BDNF can be used for the direct assessment of ovarian reserve and thereby predict the success of Assisted Reproductive Technologies.

Neurotrophins in oocyte induction:

- Current methods attempt to stimulate oocyte induction through the use of fertility drugs such as clomiphene citrate (Serophene), HMG (human menopausal gonadotropin), FSH (follicle stimulating hormone), or hCG (human chorionic gonadotropin)
- By contrast, the present invention would entail the use of small molecules such as cAMP and forskolin and other signal transduction agents in oocyte induction

Applications

- . • To predict the reproductive potential of women undergoing IVF
- . • To stimulate oocyte production and maturation as a way to treat infertility

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- . •To develop contraceptives
- . •To develop agents that stimulate the production of BDNF
- . •To promote oocyte maturation in women during IVF prior to transfer of embryos

Patent Status

- . •United States patent application filed.
- . •Application was published on 03/13/03; Publication No. US-2003-0049244-A1

Licensing Opportunity

- This technology is available for non-exclusive or exclusive license.

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