CUMULUS OOPHORUS

Discus Proligerus

A group of granulosa cells that support the oocyte in an antral follicle.

♀ Reproductive cells ♂ Female

About Cumulus oophorus

Function

Cumulus oophorus consists of a cluster of granulosa cells that surround and support the oocyte (a female germ cell involved in reproduction) in an antral follicle (a developmental stage of a follicle, with a single fluid-filled cavity in the center, Pic. 1). These cells serve three primary functions:

1. Before ovulation, the cells of cumulus oophorus support oocyte maturation and coordinate follicle (a small sac-like structure which contains developing oocytes) development. Their roles include transport of nutrients to the oocyte, production of specific proteins and regulation of gene expression (production of proteins encoded by specific genes).
2. During ovulation, these cells protect the oocyte and probably serve to direct it into the oviduct (Fallopian tube).
3. During fertilization, they also protect the oocyte and they participate in the complex regulation of fertilization. Cumulus cells are thought to have the ability, to some extent, to select viable sperm cells that enter the oocyte, entrap them and guide them towards the oocyte.

Structure

Cumulus oophorus consists of a group of cells that are tightly packed together around the maturing oocyte. They originate from the cell population known as membrana granulosa, or granulosa cells, which form a solid layer around the oocyte in the early stages of follicle maturation (Pic. 2). As the follicle matures, small spaces start to appear among the granulosa cells. These spaces gradually fuse together until they form a single cavity in the center of the follicle, which is filled with fluid and is called a follicle antrum. One part of the granulosa cells then forms a layer lining the antrum, and the rest forms a cluster of cells that bulges into the antrum and contains a mature oocyte, which is called the cumulus oophorus (Pic. 3). The part that connects the cumulus itself to the rest of granulosa cells is sometimes called discus prodigerus. Furthermore, the innermost layer of the cumulus, that directly surrounds the oocyte, is called corona radiata, and it has important roles in protecting the oocyte during ovulation.

Gene expression profiling

Gene expression profiling is a procedure used to estimate oocyte quality in laboratory conditions. It can give hints whether the gene information contained in the oocyte have suffered mutations or hints about the embryo development and pregnancy outcomes. Such information is used to describe the competence of an oocyte. It is possible to determinate the competence of an oocyte according to the level of gene expression of specific genes of cumulus cells.

Pathological conditions

The exact role of cumulus cells in fertility and its disorders is still not fully understood. However, studies show that proteins produced by cumulus cells are indispensable for a healthy oocyte development and normal ovulation. Therefore, disorders of the cumulus oophorus functions may account for a portion of cases of unexplained infertility and ovulatory disorders.

Find more about related issues

Diagnoses

Anovulation
Failure of the ovaries to release an oocyte over a period of time generally exceeding 3 months.
Learn more at: www.fertilitypedia.org/therapy/dia/diag/anovulation

Repeated implantation failure
The absence of implantation after three or more transfers of high-quality embryos or after placement of 10 or more embryos in multiple transfers.
Learn more at: www.fertilitypedia.org/therapy/dia/diag/repeated-implantation-failure

Premature ovarian failure
The loss of function of the ovaries before age 40.
Learn more at: www.fertilitypedia.org/therapy/dia/diag/premature-ovarian-failure

Menopause
The time in most women's lives when menstrual periods stop permanently, and the woman is no longer able to have children.
Learn more at: www.fertilitypedia.org/therapy/dia/diag/menopause
Ovariotomy
Surgical removal of one or both ovaries.
Learn more at: www.fertilitypedia.org/therapy/diag/ovariotomy

Organ
Ovary
The ovum-producing organs of the internal female reproductive system.
Learn more at: www.fertilitypedia.org/edu/organsovary

Reproductive functions
Oogenesis
The process of the maturation of the female gametes through the meiotic division.
Learn more at: www.fertilitypedia.org/edu/reproductive-functions/oogenesis

Gallery
Pic
An illustration of the structure of an ovarian follicle. Germinal vesicle is another term for a nucleus of an oocyte.

Pic
This picture shows three basic stages of ovarian follicle development. Gradually, space-filled cavities start to develop within the membrana granulosa, finally creating the antrum.

Pic
An oocyte in cumulus oophorus
A microphotograph of the structure of cumulus oophorus.

Sources
"Anatomy and Physiology of the Female Reproductive System" — sourced from OpenStax College licensed under CC BY 4.0. Download for free at http://cnx.org/content/col11496/latest/

"Cumulus oophorus" — sourced from Wikipedia licensed under CC BY-SA 3.0

"CUMULUS OOPHORUS" — sourced from World Heritage Encyclopedia licensed under CC BY-SA 3.0

"Utility of antioxidants during assisted reproductive techniques: an evidence based review" — by Agarwal et al. licensed under CC BY 4.0

"Molecular analysis of the cumulus matrix: insights from mice with O-glycan-deficient oocytes" — by PLoutrachou et al. licensed under CC BY 3.0

"Cumulus cells accelerate oocyte aging by releasing soluble Fas Ligand in mice" — by Zhu et al. licensed under CC BY 4.0

"Advancing ovarian folliculometry with selective plane illumination microscopy" — by Amy Lin et al. licensed under CC BY 4.0

"Cumulus oophorus" — sourced from Wikidoc licensed under CC BY-SA 3.0

"Ovum in Cumulus Oophorus, Human Ovary" — by Uthman licensed under CC BY 2.0

"Ovarian follicle" — by Henry Vandyke Carter licensed under CC BY 1.0

"Follicle maturation" — by Internet Archive Book Images licensed under CC BY 1.0