

Developmental stages of follicles:

Primordial→primary→preantral (early secondary→late secondary)→antral→preovulatory

Developmental stages of oocytes:

Primary (prophase I→metaphase I→anaphase I→telophase I)→secondary (prophase II→metaphase II)

GV (early prophase I)→GVBD (late prophase I→metaphase I→anaphase I→telophase I→prophase II)→MII (metaphase II)

SUPPLEMENTARY FIG. S1. More complete lists of the various developmental stages of mammalian follicles and oocytes *in vivo*: follicles in the ovary are dominantly at early stages before the antral stage, culturing primordial and primary follicles *in vitro* is still extremely challenging, the exact mechanism of the follicle development is not completely understood to date, and the preovulatory stage is difficult to judge *in vitro* because mimicking ovulation *in vitro* has not been successful. Any oocytes before the appearance of the first polar body are primary. Primary oocytes are usually arrested at the early prophase I stage with an intact GV. They resume meiosis in response to hormone stimulation to the GVBD stage and if nothing goes wrong, eventually to the MII stage and get arrested again at MII. If everything goes right, during the follicle development *in vivo*, oocytes in the preovulatory follicles should be at the MII stage. This happens every month in women, and usually, only one ovarian follicle could develop to the antral and preovulatory stage and eventually ovulates to release one MII oocyte. However, this is not always the case, particularly for infertile individuals. The nonovulated oocytes will become degenerated in the ovary. GV, germinal vesicle; GVBD, GV breakdown; MII, metaphase II.