

Ultrastructure of human in vitro-matured (IVM) oocytes

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Breeding of agriculturally important species may take advantage of the technique of in vitro maturation (IVM) of the oocytes. In assisted reproduction technology, IVM may be an alternative treatment to avoid the problems of standard ovarian stimulation. Even if IVM of human oocytes can generate live births, this technique is still controversial and not yet optimized [1,2]. We studied the ultrastructure of human IVM oocytes in order to evaluate if they might present cytoplasmic fine morphological markers eventually related to a maturation failure. We obtained in vivo-matured oocytes (controls, n=10); and immature oocytes that reached the metaphase II stage in vitro after 24-hour culture (IVM oocytes, n=10). Female age was 24-34 years. Microscopy samples were prepared and evaluated according to protocols previously described [3,4]. IVM oocytes showed shape, ooplasm morphology as well as organelle dimension and distribution comparable to those of in vivo-matured oocytes. Mitochondria-smooth endoplasmic reticulum aggregates were more numerous in controls, whereas mitochondria-vesicle complexes increased in IVM oocytes. Cortical granule distribution was slightly compromised in IVM oocytes. The above changes of IVM oocytes are signs of a maturation impairment and are likely in relation with the culture period and/or medium conditions.

References

- [1] Cotichio et al. (2012) Human oocyte maturation in vitro. *Int J Dev Biol* 56: 909-918.
- [2] Shahedi et al. (2013) The effect of vitrification on ultrastructure of human in vitro matured germinal vesicle oocytes. *Eur J Obstet Gynecol Reprod Biol* 167: 69-75.
- [3] Nottola et al. (2009) Ultrastructural markers of quality in human mature oocytes vitrified using cryoleaf and cryoloop. *Reprod Biomed Online* 19 Suppl 3: 17-27.
- [4] Khalili et al. (2012) Ultrastructure of human mature oocytes after vitrification. *Eur J Histochem* 56: e38.

Keywords

Oocyte, In Vitro Maturation, Ultrastructure, Human, Assisted Reproduction Technology.