

A physiological approach for supporting oocyte-cumulus cell communication and chromatin remodelling at meiotic resumption Alberto Maria Luciano, Italy

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Short description of the presentation

In vitro embryo production (IVP) remains inefficient in both clinical applications of human reproduction and animal breeding and the development of pre-maturation strategies to improve IVP is a mayor challenge in assisted reproductive technologies. The diversity of oocyte competences is mainly due to the intrinsic heterogeneity of the cohort of follicles from which cumulus-oocyte complexes to be subjected to standard IVP procedures are isolated. In particular, the precocious meiotic resumption that occurs when oocytes are isolated from the follicles is the main factor that impairs oocyte ability to become an embryo in vitro. Here are presented a series of studies on physiological approaches to pre-maturation system in order to develop the suitable conditions for in vitro maturation that support high quality oocyte production. The large-scale chromatin remodeling process that occurs in the germinal vesicle has been considered as a specific hallmark of the progressive meiotic and developmental competencies acquisition during the final stages of oocyte differentiation in order to obtain high quality egg in vitro.

Keywords

Oocyte, chromatin, cumulus cells, germinal vesicle, gap junctions, cAMP, cGMP, phosphodiesterase, meiosis

References

- Albertini, D.F., Combelles, C.M., Benecchi, E., and Carabatsos, M.J. (2001). *Reproduction* 121(5), 647-53
- Atef, A., Paradis, F., Vigneault, C., and Sirard, M.A. (2005). *Mol Reprod Dev* 71(3), 358-67
- Blondin, P., and Sirard, M.A. (1995). *Mol Reprod Dev* 41(1), 54-62
- Bonnet-Garnier, A., Feuerstein, P., Chebrout, M., Fleurot, R., Jan, H.U., Debey, P., and Beaujean, N. (2012). *Int J Dev Biol* 56(10-12), 877-87
- Dieci, C., Lodde, V., Franciosi, F., Lagutina, I., Tessaro, I., Modena, S.C., Albertini, D.F., Lazzari, G., Galli, C., and Luciano, A.M. (2013). *Biol Reprod* 89(3), 68
- El-Hayek, S., and Clarke, H.J. (2015). *Biol Reprod* 93(2), 47
- Eppig, J.J. (2001). *Reproduction* 122(6), 829-38
- Fair, T. (2003). *Anim Reprod Sci* 78(3-4), 203-16
- Fair, T., Hulshof, S.C., Hyttel, P., Greve, T., and Boland, M. (1997). *Mol Reprod Dev* 46(2), 208-15
- Franciosi, F., Cotichio, G., Lodde, V., Tessaro, I., Modena, S.C., Fadini, R., Dal Canto, M., Renzini, M.M., Albertini, D.F., and Luciano, A.M. (2014). *Biol Reprod* 91(3), 61
- Franciosi, F., Lodde, V., Goudet, G., Duchamp, G., Deleuze, S., Douet, C., Tessaro, I., and Luciano, A.M. (2012). *Mol Hum Reprod* 18(5), 243-52
- Gruzova, M.N., and Parfenov, V.N. (1993). *Int Rev Cytol* 144, 1-52
- Li, R., and Albertini, D.F. (2013). *Nat Rev Mol Cell Biol* 14(3), 141-52
- Lodde, V., Modena, S., Galbusera, C., Franciosi, F., and Luciano, A.M. (2007). *Mol Reprod Dev* 74(6), 740-9
- Lodde, V., Modena, S., Maddox-Hyttel, P., Franciosi, F., Lauria, A., and Luciano, A.M. (2008). *Mol Reprod Dev* 75(5), 915-24
- Lodde, V., Modena, S.C., Franciosi, F., Zuccari, E., Tessaro, I., and Luciano, A.M. (2009). *Eur J Histochem* 53(4), e24
- Luciano, A.M., Franciosi, F., Modena, S.C., and Lodde, V. (2011). *Biol Reprod* 85(6), 1252-9
- Luciano, A.M., and Lodde, V. (2013). In 'Oogenesis.' (Eds. G Cotichio, DF Albertini and L De Santis) pp. 93-108. (Springer London)
- Luciano, A.M., Modena, S., Vassena, R., Milanese, E., Lauria, A., and Gandolfi, F. (2004). *Biol Reprod* 70(2), 465-72

Luciano, A.M., Pocar, P., Milanesi, E., Modena, S., Rieger, D., Lauria, A., and Gandolfi, F. (1999). *Mol Reprod Dev* 54(1), 86-91

Mattson, B.A., and Albertini, D.F. (1990). *Mol Reprod Dev* 25(4), 374-83

O'Brien, M.J., Pendola, J.K., and Eppig, J.J. (2003). *Biol Reprod* 68(5), 1682-6

Ozawa, M., Nagai, T., Somfai, T., Nakai, M., Maedomari, N., Fahrudin, M., Karja, N.W., Kaneko, H., Noguchi, J., Ohnuma, K., Yoshimi, N., Miyazaki, H., and Kikuchi, K. (2008). *Mol Reprod Dev* 75(5), 857-66

Sanchez, F., Romero, S., De Vos, M., Verheyen, G., and Smits, J. (2015). *Hum Reprod* 30(6), 1396-409

Shu, Y.M., Zeng, H.T., Ren, Z., Zhuang, G.L., Liang, X.Y., Shen, H.W., Yao, S.Z., Ke, P.Q., and Wang, N.N. (2008). *Hum Reprod* 23(3), 504-13

Thomas, R.E., Armstrong, D.T., and Gilchrist, R.B. (2004). *Biol Reprod* 70(3), 548-56

Vanhoutte, L., Nogueira, D., Dumortier, F., and De Sutter, P. (2009). *Hum Reprod* 24(8), 1946-59