**Effects of metformin and insulin- transferrin- selenium on porcine oocyte**

**in vitro maturation**

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*In vitro* maturation (IVM) generates oxidative stress in oocytes and embryos that triggers apoptosis, necrosis and/ or permanent arrest of the cell cycle in early embryo stages. This is reflected in a decrease in blastocyst rates and has also long- term consequences on implantation and foetal development. The supplementation of the IVM media with antioxidants has beneficial effects on embryo development. In pigs, the supplementation of the media with insulin- transferrin- selenium (ITS) improves oocyte IVM and embryonic development. The insulin-sensitizing drug metformin (M) has antioxidant and antiapoptotic properties in a variety of models. This drug is used for the treatment of type 2 diabetes mellitus and is a non- hormonal treatment for polycystic ovary syndrome. During porcine oocyte IVM, the supplementation with M plus insulin significantly increases the blastocyst rate. The objective of the present study was to assess the effects of ITS and/ or M during porcine IVM on the oocyte quality and cumulus cells viability. Porcine *cumulus*- oocyte complexes (COC) were obtained from slaughterhouse ovaries by follicular aspiration and subjected to IVM during 44-46 h in supplemented Tissue Culture Medium 199. The COC were incubated in four well plates at 38.5° C and 5% CO2 in a humidified chamber. Experimental groups were: M (10-4 M), ITS (0.1% v/v), ITS+M and control (without supplement). After IVM, oocytes were denuded with hyaluronidase and nuclear maturation rate was determined by Hoechst. It was increased with ITS+M (*Chi* square and Fisher: p < 0.01). Glucose consumption by COC was increased by ITS and ITS+M (Kruskal-Wallis and Dunn: p<0.05). Protein concentration and superoxide dismutase activity were similar in all groups. However, total glutathione was increased, and lipid peroxidation was decreased in the supplemented groups compared to control (ANOVA and Bonferroni: p<0.005). Redox balance parameters were measured using 96-well plates and a microplate reader. The viability of *cumulus* cells using annexin-V and propidium iodide by flow cytometry (cells categorized as viable, necrotic, early or late apoptotic) showed that M increased and ITS decreased viability (ANOVA and Bonferroni: p<0.0001). In conclusion, the supplementation with ITS+M has beneficial effects on porcine COC during IVM increasing nuclear maturation rate, glucose consumption, glutathione levels and decreasing lipid peroxidation. This could be beneficial in the *in vitro* development of pig embryos.