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Effect of Plasmin on Sperm-Oocyte Interaction during *In Vitro* Fertilization in the Pig

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Plasmin is a trypsin like proteolytic enzyme with broad substrate specificity, which has the ability to activate latent forms of some other proteinase, such as procollagenase and proelastase. Extracellular proteolytic activity generated by plasminogen activation to plasmin is readly controlled by plasminogen activator inhibitor and plasmin inhibitors. The PA/plasmin system might play a role in mammalian oocyte fertilization, in sperm motility and acrosome reaction of capacitated sperm and alteration of ZP. The present study was undertaken to examine the effect of plasmin on sperm-oocyte interaction during *in vitro* fertilization and fertilization ability of boar fresh spermatozoa. The present study suggests that levels of sperm viability were not affected by plasmin treatment. Also, the rates of acrosome reaction (AR) in plasmin treated groups except concentration of plasmin 0.1 ng/ml at 6 h were significantly ($P<0.05$) higher than that of the control group. Concentrations of plasmin from 0 to 0.1 ng/ml (83.1 and 94.9, respectively) had no effect on sperm binding, whereas 1 (122.9), 10 (124.4) and 100 ng/ml (123.6) significantly ($P<0.05$) increased sperm binding compared with the control (83.1). The zona pellucida solubility (zona digestion time) was lower ($P<0.05$) in medium with 1 (123.1 sec), 10 (99.3 sec) or 100 ng/ml (95.4 sec) plasmin compared with control (175.8 sec). When pig oocytes and sperm were co-incubated in various concentrations of plasmin for 6 h, the penetration rate of sperm tended to increase. The penetration rate was highest in medium with plasmin 1.0 ng/ml (77.5 ± 3.1). However, there were no differences in the polyspermic rate and mean number of sperm(MNS)/oocyte rate between the groups

treated with plasmin and the control groups. These results suggest that plasmin may play a role in events related to fertilization. This work was supported by grant No. R01-2003-000-10500-0 from the Basic Research program of the Korea Science & Engineering Foundation.

Key words) *Plasmin, In vitro fertilization, Sperm-egg interaction, Pigs*