

Distribution of the glucose transporters (GLUTs) for spermatozoa and specific extender for semen cryopreservation in Asian elephant

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Abstract

The objective of this study was to investigate the distribution of the glucose transporters (GLUTs) for spermatozoa and specific extender for semen cryopreservation in Asian elephant. Spermatozoa, as other eukaryotic cells, need hexoses to produce energy for moving along the female genital tract and maintaining membrane homeostasis. Glucose transporter 3 (GLUT3) proteins, as a whole, is mainly responsible for the transport of hexose across mammalian sperm membranes and play a major role in the regulation of sperm glucose and fructose metabolism. The aims of this study were to determine the localization of GLUT3 in freshly ejaculated Asian elephant sperm with different quality of progressive motility, and to evaluate the effect of different extenders in cooled semen on the expression of GLUT3. For experiment I, the fresh semen samples were collected from 10 Asian elephants bulls, and were classified according to the percentages of motile sperm: Group 1 ($\leq 20\%$; n=4), Group 2 ($> 20\% - 60\%$; n=3) and Group 3 ($> 60\%$; n=3). In experiment II, six semen samples were collected from 3 Asian elephant bulls for 2 times, in which motile sperm were $>60\%$. The samples were suspended in Tris extender with 3% glycerol (TG) and without 3% glycerol (T) and kept in a refrigerator at 4°C for 48 h. The GLUT3 was determined by immunocytochemical localization using the rabbit anti-GLUT3 polyclonal antibody. The results of experiment I showed that the GLUT3 were localized at the principal and end piece of the sperm tail. The percentages of sperm with GLUT3 expression were highest in Group 3, and lowest in Group 1. In experiment II, the sperm GLUT3 expressions after cold storage in T and TG extenders were different. The sperm of T group showed the localization of GLUT3 similar to those of fresh semen, while the sperm of TG group showed GLUT3 expressions at the head, middle piece, principal piece and end piece. Therefore, the present study demonstrated that GLUT3

expression was related with sperm motility and was affected by 3% glycerol in extender after cold storage.

Keywords: GLUT, Elephant, Sperm