JOURNAL ARTICLE

Development of computer-directed methods for the identification of hyperactivated motion using motion patterns developed by rabbit sperm during incubation under capacitation conditions

R. J. Young and B. A. Bodt
Life Sciences Department, Edgewood Research, Development and Engineering Center, Aberdeen Proving Ground, Maryland.

Rabbit spermatozoa developed motions that mimicked hyperactivated motility during incubation for 16-20 hours under capacitation conditions and in several other commonly used media. Sperm from some rabbits failed to acquire this type of motility, and sperm from others failed to survive the long incubation time. Four motility patterns developed during incubation for 16-20 hours. Motility parameters measured by the CellSoft and CellTrak motion analysis systems were similar except for the average amplitude of lateral head displacement. Multivariate discriminant analysis with complementary regression analysis, and an unrelated tree structured classification method (CART), were used to derive rules, based on motility parameters, for the objective classification of sperm into the two motility classes: 1) nonhyperactivated motility and 2) hyperactivated motility or motility that mimicked hyperactivated motility. The motility parameter wobble (WOB) as superior to the commonly used parameter, linearity, as a classifier of motility types. It classified sperm into the two motility groups with 96.6% efficiency and, together with curvilinear velocity (VCL), attained classification efficiencies of 98%. The classification model produced by CART was preferred over the one obtained by discriminant analysis. The rule for motility classification was dependent on the motion analysis system used to measure the motion parameters. The rule for the CellSoft system, WOB < or = 0.78 and VCL > or = 51 microns/second, classified sperm with an efficiency of 98%, whereas the rule for the CellTrak system, WOB < or = 0.6 and VCL > or = 55 microns/second, achieved a classification efficiency of 97%. These rules should facilitate the study of sperm hyperactivation and its role in sperm function.

This article has been cited by other articles:

Journal of ANDROLOGY

[HOME]

J. Baumber and S. A. Meyers
Hyperactivated Motility in Rhesus Macaque (Macaca mulatta) Spermatozoa
J Androl, May 1, 2006; 27(3): 459 - 468.
[Abstract] [Full Text] [PDF]

BIOLOGY of REPRODUCTION

[HOME]

P. Caballero-Campo, M. Chirinos, X. J. Fan, M. E. Gonzalez-Gonzalez, M. Galicia-Chavarria, F. Larrea, and G. L. Gerton
Biological Effects of Recombinant Human Zona Pellucida Proteins on Sperm Function
Biol Reprod, April 1, 2006; 74(4): 760 - 768.
[Abstract] [Full Text] [PDF]