



Journal of Andrology, Vol 17, Issue 4 409-419, Copyright © 1996 by The American Society of Andrology

## JOURNAL ARTICLE

# Compromised sperm protein phosphorylation after capacitation, swim-up, and zona pellucida exposure in teratospermic domestic cats

B. S. Pukazhenthil, D. E. Wildt, M. A. Ottinger and J. Howard  
Conservation and Research Center, National Zoological Park, Smithsonian Institution, Front Royal, Virginia, USA.

Tyrosine phosphorylated proteins recently have been found in mouse and human spermatozoa. Our objectives were to (1) determine if domestic cat spermatozoa also express tyrosine phosphorylated proteins, and (2) examine the changes in protein phosphorylation between normospermic and teratospermic domestic cats following sperm capacitation, swim-up separation and exposure to zona pellucida (ZP). Membranes from cat spermatozoa contained two phosphorylated proteins of molecular weights 160 kDa and 95 kDa (designated as p160 and p95) that immunoreacted with monoclonal antibodies to tyrosine phosphate. The p95 protein was distinct from sperm-specific hexokinase. Following capacitation, the extent of phosphorylation of p95 was increased ( $P < 0.05$ ) 3-fold in normospermic cats compared to only 1.75-fold in teratospermic cats. Similarly, phosphorylation of p160 also increased ( $P < 0.05$ ) 2.4-fold in normospermic compared to 1.84-fold in teratospermic cats. Although swim-up separation increased the percentage of normal spermatozoa in teratospermic ejaculates, phosphorylation of p95 in swim-up, aliquots was increased ( $P < 0.05$ ) only 1.95-fold in teratospermic cats compared to 2.9-fold in normospermic counterparts. Likewise, phosphorylation of p160 was lower ( $P < 0.05$ ) in teratospermic (1.5-fold) compared to normospermic cats (2.0-fold) cats. Phosphorylation also was influenced by exposure to cat ZP proteins ( $P < 0.05$ ). Solubilized cat ZP bound to the sperm proteins of apparent molecular mass 120, 95, 50, 42, 30, 27, 23 and 20 kDa, suggesting a direct binding interaction between p95 and the ZP. Overall, these findings (1) indicate the presence of tyrosine phosphorylated proteins in the domestic cat spermatozoon that directly interact with homologous ZP glycoproteins; (2) demonstrate that cat sperm hexokinase is not phosphorylated on tyrosine residues; and (3) suggest that the diminished phosphorylation efficiency of sperm from teratospermic cats may result in a compromise in capacitation and the acrosome reaction.

This article has been cited by other articles:

### This Article

- ▶ [Full Text \(PDF\)](#)
- ▶ [Alert me when this article is cited](#)
- ▶ [Alert me if a correction is posted](#)

### Services

- ▶ [Similar articles in this journal](#)
- ▶ [Similar articles in PubMed](#)
- ▶ [Alert me to new issues of the journal](#)
- ▶ [Download to citation manager](#)

### Citing Articles

- ▶ [Citing Articles via HighWire](#)
- ▶ [Citing Articles via Google Scholar](#)

### Google Scholar

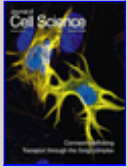
- ▶ [Articles by Pukazhenthil, B. S.](#)
- ▶ [Articles by Howard, J.](#)
- ▶ [Search for Related Content](#)

### PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Pukazhenthil, B. S.](#)
- ▶ [Articles by Howard, J.](#)

**BIOLOGY of REPRODUCTION**[▶ HOME](#)

K. Neubauer, K. Jewgenow, S. Blottner, D. E. Wildt, and B. S. Pukazhenth  
Quantity Rather Than Quality in Teratospermic Males: A  
Histomorphometric and Flow Cytometric Evaluation of  
Spermatogenesis in the Domestic Cat (*Felis catus*)  
Biol Reprod, November 1, 2004; 71(5): 1517 - 1524.  
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

**Journal of Cell Science**[▶ HOME](#)

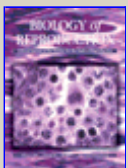
K. L. Asquith, R. M. Baleato, E. A. McLaughlin, B. Nixon, and R. J. Aitken  
Tyrosine phosphorylation activates surface chaperones facilitating  
sperm-zona recognition  
J. Cell Sci., July 15, 2004; 117(16): 3645 - 3657.  
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

**BIOLOGY of REPRODUCTION**[▶ HOME](#)

L. M. Penfold, L. Jost, D. P. Evenson, and D. E. Wildt  
Normospermic Versus Teratospermic Domestic Cat Sperm  
Chromatin Integrity Evaluated by Flow Cytometry and  
Intracytoplasmic Sperm Injection  
Biol Reprod, November 1, 2003; 69(5): 1730 - 1735.  
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

**BIOLOGY of REPRODUCTION**[▶ HOME](#)

C. I. Marín-Briggiler, M. H. Vazquez-Levin, F. Gonzalez-Echeverría, J. A.  
Blaquier, J. G. Tezón, and P. V. Miranda  
Strontium Supports Human Sperm Capacitation but Not Follicular  
Fluid-Induced Acrosome Reaction  
Biol Reprod, September 1, 1999; 61(3): 673 - 680.  
[\[Abstract\]](#) [\[Full Text\]](#)

**BIOLOGY of REPRODUCTION**[▶ HOME](#)

B. Pukazhenth, K. Pelican, D. Wildt, and J. Howard  
Sensitivity of Domestic Cat (*Felis catus*) Sperm from Normospermic  
versus Teratospermic Donors to Cold-Induced Acrosomal Damage  
Biol Reprod, July 1, 1999; 61(1): 135 - 141.  
[\[Abstract\]](#) [\[Full Text\]](#)

[HOME](#) [HELP](#) [FEEDBACK](#) [SUBSCRIPTIONS](#) [ARCHIVE](#) [SEARCH](#) [TABLE OF CONTENTS](#)

Copyright © 1996 by The American Society of Andrology.