



Journal of Andrology, Vol 23, Issue 2 211-219, Copyright © 2002 by The American Society of Andrology

JOURNAL ARTICLE

Importance of glycosylation and disulfide bonds in hyaluronidase activity of macaque sperm surface PH-20

M. W. Li, A. I. Yudin, K. R. Robertson, G. N. Cherr and J. W. Overstreet

Department of Obstetrics and Gynecology, University of California, Davis 95616, USA.

PH-20 is a glycoprotein located on the surface of the sperm plasma membrane and on the inner acrosomal membrane. The best understood function of sperm surface PH-20 is its hyaluronidase activity, which results in hydrolysis of the hyaluronic acid-rich cumulus matrix during sperm penetration of this extracellular oocyte investment. In this study, we investigated whether alterations in the secondary and tertiary structures of sperm surface PH-20 would affect its enzyme activity. Proteins were isolated from the sperm plasma membrane by treatment of living cells with phosphatidylinositol-specific phospholipase C (PI-PLC). PH-20 was purified from the PI-PLC released proteins by immunoaffinity chromatography. Two-dimensional electrophoresis of purified PH-20 revealed 6 isoforms with isoelectric points ranging from 5.1 to 6.0. Removal of the N-linked glycans from PH-20 with N-glycosidase F shifted the molecular weight from 64 kd to approximately 54 kd, its deduced molecular weight based on sequence analysis, suggesting that most if not all, of the potential N-glycosylation sites are linked to oligosaccharides. The lectins Con A and PSA recognized purified sperm surface PH-20 after Western blotting, suggesting that mannose is a major sugar within or at the terminal end of the linked glycan. The lectins UEA and LPA did not recognize PH-20 Western blot, suggesting that fucose and sialic acid are not terminal sugars of sperm surface PH-20. Deglycosylation of sperm surface PH-20 resulted in a complete loss of its hyaluronidase activity. The reduction of disulfide bonds with beta-mercaptoethanol or dithiothreitol also resulted in loss of enzyme activity. We conclude that the hyaluronidase activity of sperm surface PH-20 is dependent on structural features established by sulfhydryl linkages, as well as glycosylation.

This article has been cited by other articles:



T. L. Tollner, A. I. Yudin, A. F. Tarantal, C. A. Treece, J. W. Overstreet, and G. N. Cherr

Beta-Defensin 126 on the Surface of Macaque Sperm Mediates Attachment of Sperm to Oviductal Epithelia

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 Li, M. W.](#)
- ▶ [Articles by Overstreet, J. W.](#)
- ▶ [Search for Related Content](#)

PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Li, M. W.](#)
- ▶ [Articles by Overstreet, J. W.](#)

Biol Reprod, March 1, 2008; 78(3): 400 - 412.
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



BIOLOGY of REPRODUCTION

[▶ HOME](#)

H. Tatemoto, N. Muto, S.-D. Yim, and T. Nakada
Anti-Hyaluronidase Oligosaccharide Derived from Chondroitin Sulfate A Effectively Reduces Polyspermy During In Vitro Fertilization of Porcine Oocytes
Biol Reprod, January 1, 2005; 72(1): 127 - 134.
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of ANDROLOGY

[▶ HOME](#)

H. Zhang and P. A. Martin-Deleon
Mouse Epididymal Spam1 (PH-20) Is Released in the Luminal Fluid With its Lipid Anchor
J Androl, January 1, 2003; 24(1): 51 - 58.
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

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

[Copyright © 2002 by The American Society of Andrology.](#)