

Journal of Andrology, Vol. 25, No. 2, March/April 2004
Copyright © [American Society of Andrology](#)

Involvement of A₁ Adenosine Receptors in the Acquisition of Fertilizing Capacity

ALBA MINELLI^{*}, LAVINIA LIGUORI^{*}, ILARIA BELLAZZA^{*}, ROBERTA MANNUCCI[†], BJÖRN JOHANSSON[‡] AND BERTIL B. FREDHOLM[‡]

From the ^{*} *Dipartimento di Scienze Biochimiche e Biotecnologie Molecolari, Sezione Biochimica Cellulare, Perugia, Italy;* [†] *Dipartimento di Medicina Interna e Scienze Oncologiche, Policlinico Monteluce Perugia, Italy;* and [‡] *Department of Physiology and Pharmacology, Section of Molecular Neuropharmacology, Karolinska Institutet, Stockholm, Sweden.*

Correspondence to: Dr Alba Minelli, Dipartimento Scienze Biochimiche e Biotecnologie Molecolari, Sezione Biochimica Cellulare, Via del Giochetto, 06123 Perugia, Italy.

Ejaculated mammalian spermatozoa acquire competence to fertilize oocytes by a two-step process: capacitation followed by acrosome reaction. The biochemical and biophysical modifications occurring in vivo in the female reproductive tract can be reproduced in vitro, and previous studies have suggested a capacitative role for adenosine A₁ receptor (A₁R). Mice with a targeted disruption of the Adora 1 gene (A₁R^{-/-} mice) provide a useful model for better understanding the role of the A₁R in fertility. Murine spermatozoa express A₁R in the head, neck, midpiece region, and tail. The number of capacitated spermatozoa incubated in human tubal fluid was significantly reduced in A₁R^{-/-} compared with A₁R^{+/+} and A₁R^{+/-} spermatozoa. The difference between A₁R^{+/+} and A₁R^{-/-} mouse spermatozoa was mainly in the time necessary to reach the maximum percentage of capacitation. A₁R^{+/+} murine sperm obtained the full state of capacitation within 90 minutes whereas A₁R^{-/-} sperm required 240 minutes. Caffeine, a known antagonist of A₁ and A_{2A} adenosine receptors, lowered the number of capacitated sperm and affected the time of capacitation in a dose-dependent manner, mimicking the effects of the lack of A₁ receptors. Although number, motility, and viability of A₁R^{-/-} murine sperm was not significantly different from A₁R^{+/+} mouse spermatozoa, a significant reduction of the number of pups produced by A₁R^{-/-} male mice suggests that A₁ receptors must be fully operative to accomplish the optimal degree of capacitation and thereby fertilization.

Key words: A₁ adenosine receptors KO mice, A₁ adenosine receptors mouse sperm localization, capacitation, caffeine, fertility

This Article

- ▶ [Full Text](#)
- ▶ [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 Minelli, A.](#)
- ▶ [Articles by Fredholm, B. B.](#)
- ▶ [Search for Related Content](#)

PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Minelli, A.](#)
- ▶ [Articles by Fredholm, B. B.](#)

This article has been cited by other articles:



BIOLOGY of REPRODUCTION

[▶ HOME](#)

S. M. Schuh, A. E. Carlson, G. S. McKnight, M. Conti, B. Hille, and D. F. Babcock

Signaling Pathways for Modulation of Mouse Sperm Motility by Adenosine and Catecholamine Agonists

Biol Reprod, March 1, 2006; 74(3): 492 - 500.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Cell Science

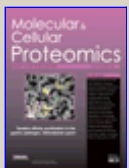
[▶ HOME](#)

L. Cotton, G. M. Gibbs, L. G. Sanchez-Partida, J. R. Morrison, D. M. de Kretser, and M. K. O'Bryan

FGFR-1 signaling is involved in spermiogenesis and sperm capacitation

J. Cell Sci., January 1, 2006; 119(1): 75 - 84.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Molecular & Cellular PROTEOMICS

[▶ HOME](#)

A. S. Georgiou, E. Sostaric, C. H. Wong, A. P. L. Snijders, P. C. Wright, H. D. Moore, and A. Fazeli

Gametes Alter the Oviductal Secretory Proteome

Mol. Cell. Proteomics, November 1, 2005; 4(11): 1785 - 1796.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

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

[Copyright © 2004 by The American Society of Andrology.](#)