Journal of Andrology, Vol 16, Issue 1 55-63, Copyright © 1995 by The American Society of Andrology

JOURNAL ARTICLE

Expression of mannose-binding sites on human spermatozoa and their role in sperm-zona pellucida binding

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A D-mannosylated albumin (DMA) neoglycoprotein was assessed to validate experimentally a probe capable of detecting mannose-binding sperm receptors involved in human sperm-egg interaction. DMA specifically blocked zona binding of swim-up human spermatozoa in a concentration-dependent manner. While no considerable effect was observed on sperm-zona initial contact, almost 50% of spermatozoa bound to the zona during a 2-hour period detached from it when DMA was introduced in the incubation medium. DNA inhibition was evident when 10% fetal bovine serum, but not 3.5% human serum albumin (HSA), was used as Ham's F10 medium supplementation. This may be due to the amount of free calcium in the medium since addition of 40 mM CaCl2 to F10-HSA restored DMA inhibition. Furthermore, the higher the calcium concentration in the incubation buffer, the greater the DMA blockage of sperm-zona binding. Unfixed sperm presented fluorescent DMA label over the entire acrosomal area (cap pattern), or concentrated at the equatorial segment (bar pattern). These patterns increased during capacitation, appearing on an average of 20% of the sperm after overnight incubation. They also increased, especially the bar pattern, following calcium ionophore treatment. Nearly all of methanol-fixed spermatozoa displayed the fluorescent label at the head level. Concomitant assessment of sperm membrane integrity and DMA fluorescent patterns revealed that DMA fluorescence coincided mostly with permeabilized or altered sperm plasma membrane. In conclusion, DMA is a suitable probe to identify human sperm mannose-binding sites crucially involved in sperm-zona interaction. These sites appear to require free calcium concentrations to operate, and their expression changes with capacitation and acrosome reaction.(ABSTRACT TRUNCATED AT 250 WORDS)

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