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Time course of spontaneous in vitro sperm acrosome reaction

G. M. Centola, S. P. Weisensel, V. Lewis, E. G. Andolina and R. C. Herko

Department of Obstetrics and Gynecology, University of Rochester Medical Center, New York, USA.

The acrosome reaction (AR) is an exocytotic process essential for sperm penetration of the zona pellucida and binding to the oocyte (DeJonge, 1994). Evaluation of in vitro AR can suggest fertility potential. The purpose of this study was to determine AR as a function of time after removal of sperm from the seminal fluid using a novel test, the Acrobeads test (Fertility Technologies, Natick, Massachusetts), which uses paramagnetic beads coated with MH61, a monoclonal antibody that binds to acrosome-reacted sperm. Specimens were acquired from known fertile donors ($n = 9$) and in vitro fertilization (IVF) patients ($n = 8$) with no apparent male factor on the day of the IVF and processed by a minipercoll wash at 30 minutes after ejaculation. An aliquot of washed sperm was then divided into two portions. The first was placed with the Acrobeads (according to the manufacturer's instructions) and assessed for bead binding after 6 and 24 hours with the beads. The second aliquot of washed sperm was held at room temperature for 24 hours, then exposed to the beads, with bead binding assessed at 6 and 24 hours later (30 and 48 hours after washing). The Acrobeads score was determined by assessing the binding of MH61 beads in each of four replicates with a resulting score of 1 (lowest) to 4 (highest). The mean (\pm SD) motility was 62.0% (7.5) at 6 hours, 52.3% (6.4) at 24 hours, 55.9% (10.4) at 30 hours, and 54.7% (8.4) at 48 hours after removal from the seminal fluid. At 6 hours after washing and exposure to the beads, the score was 0.077 (0.27) with a range of 0-1; one donor specimen gave a score of 1, while all others had a score of 0. At 24 hours postremoval from the semen, donor and patient sperm were positive for the test, with a mean score of 3.6 (0.65). The mean fertilization rate for the IVF patients was 64.4% (range 33-90). When sperm were held for 24 hours prior to the test, there was little or no bead binding 6 hours later (score of 0.46 \pm 0.77) and at 24 hours later (48 hours after washing) (mean score of 0.25 \pm 0.45). These data suggest that completion of the acrosome reaction occurs by 24 hours after removal of the sperm from the seminal fluid. Since the MH61 beads bind to specific residues on the inner acrosomal membrane, these data also suggest that following the acrosome reaction at 24 hours with removal of the outer acrosomal contents and acrosomal matrix, the inner acrosomal membrane may be modified in some way that does not allow MH61 beads to bind to the sperm.

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