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Relationship Between Fertilizing Ability and cAMP in Human Spermatozoa

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The goal of this study was to investigate the relationship between cAMP and the fertilizing ability of human spermatozoa. Levels of cAMP were measured in human spermatozoa during 6-hour *in vitro* incubation in capacitation medium, in both the presence and absence of phosphodiesterase (PDE) inhibitor. The fertilizing ability of the same samples was assayed with zona-free hamster eggs. In the absence of PDE inhibitor, no relationship was apparent between mean cAMP levels, which remained at 3-4 pmol cAMP/10^7 spermatozoa, and mean fertilizing ability, which increased from 4% at the start of the incubation to 33% at 6 hours. In the presence of PDE inhibitor (7 mM caffeine or 10 mM theophylline), cAMP concentrations increased within minutes to 3-4 times control levels. Despite this increase in cAMP, there was no immediate change in fertilizing ability. This was true whether PDE inhibitor was present from the start or added to control sperm after 6 or 22 hours of incubation. However, once the sperm were exposed to PDE inhibitor for 4-6 hours, they fertilized a significantly greater proportion of eggs than did control samples. These results suggest that PDE inhibitors, or elevated cAMP levels, do not immediately induce the acrosome reaction, but rather appear to reduce the amount of time required for capacitation to occur *in vitro*.

Key words: capacitation of human spermatozoa, cAMP in human spermatozoa, fertilization of zona-free hamster eggs

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