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## JOURNAL ARTICLE

# Atrial natriuretic peptide (ANP) as a stimulus of the human acrosome reaction and a component of ovarian follicular fluid: correlation of follicular ANP content with in vitro fertilization outcome

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Atrial natriuretic peptides (ANPs) from several species induced the human acrosome reaction. The maximal response was highest for human ANP (18.6% above unstimulated or baseline values) and decreased progressively for peptides derived from animals lower on the phylogenetic scale. ANP concentrations required for a half-maximal effect in noncapacitated spermatozoa ranged from 0.07 to 0.38 nM. ANP induced the acrosome reaction in capacitated spermatozoa, but the concentration required was higher than in noncapacitated cells. The response in noncapacitated spermatozoa was independent of added extracellular Ca<sup>2+</sup> and was completely inhibited by 1 μM LY83583 (inhibits particulate guanylate cyclase). However, 10 μM N omega-nitro-L-arginine (inhibits soluble guanylate cyclase) had no effect. ANP (80 pM) and 3 μM 1,2-dihexanoyl-sn-glycerol each induced a nearly half-maximal acrosome reaction. Added in combination, they produced no increased response, suggesting antagonism. Follicular fluid had variable levels of immunoreactive ANP. Average ANP content was nearly zero in samples that contained no oocyte at the time of aspiration but was higher (6.9 pM; 90% confidence limits = 1.67-28.72 pM) in follicular fluid containing oocytes that did not fertilize in vitro. Highest concentrations of ANP were present in follicular fluid containing oocytes that fertilized in vitro (72.8 pM; 90% confidence limits = 38.1-139.1 pM). These data suggest that noncapacitated spermatozoa can acrosome react without added extracellular Ca<sup>2+</sup> in response to an extracellular ligand. Also, human spermatozoa appear to contain receptors for ANP similar to those found in other cell types. The ANP content of follicular fluid might partly explain the ability of follicular fluid to induce the acrosome reaction.

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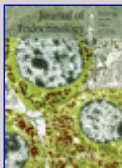
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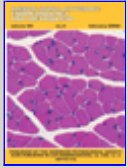
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