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JOURNAL ARTICLE

A study of phospholipase in albumin and its role in inducing the acrosome reaction of guinea pig spermatozoa in vitro

C. L. Singleton and G. J. Killian

Phospholipase activity associated with guinea pig spermatozoa during capacitation and the acrosome reaction (AR) was determined by measuring the production of [14C] glycerylphosphorylcholine (GPC) from [14C] phosphatidylcholine (PTC) over a 2-hour period at the beginning and at the end of a 6-hour incubation. Spermatozoa converted 13 X more [14C] PTC to [14C] GPC during the last 2 hours of incubation than during the first 2 hours which corresponded to an increase in AR from 7% at 2 hours to 55% at 6 hours. In vitro studies also were performed to assess the role of phospholipase activity in bovine serum albumin (BSA) in inducing the AR of guinea pig spermatozoa. Spermatozoa, obtained by backflushing the cauda epididymidis, were incubated for up to 6 hours in Biggers, Whitten, and Whittinghams' (BWW) medium alone or containing various additives. These additives were: 0.1% BSA, phospholipase A2, p-bromophenacyl bromide, DMSO, 0.1% BSA plus p-bromophenacyl bromide, or 0.1% BSA plus DMSO. Each hour of incubation, samples were assessed for the percentage of AR sperm and sperm motility. The percentage of AR sperm after 6 hours in BWW supplemented with phospholipase A2, at the level of PTC hydrolyzing ability detected in BWW with 0.1% BSA, was similar to that of BWW and BSA. However, the percentage of AR sperm in BWW with BSA and the phospholipase inhibitor p-bromophenacyl bromide was significantly lower than that in BWW with BSA or phospholipase A2 and similar to that in BWW without BSA. Sperm motility was significantly less in incubations containing phospholipase A2, but lacking BSA. It was concluded that phospholipase activity in BSA may contribute to capacitation and the AR of guinea pig sperm in vitro by mimicking the action of native sperm phospholipase.

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