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Progesterone Receptor Availability in Mouse Spermatozoa During Epididymal Transit and Capacitation: Ligand Blot Detection of Progesterone-Binding Protein

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The goals of the present study were to determine the availability of progesterone (P4) receptor (P4r) in mouse sperm during maturation and capacitation and to make the first steps toward a characterization of P4r. It has been proposed that P4 is able to induce an acrosomal reaction (AR) by using a membrane P4r. This induction was verified in sperm isolated from the cauda epididymis (fully mature) when incubated in specific conditions that capacitate sperm. First, we set up the conditions in our laboratory to induce an AR in mature and capacitated sperm triggered by P4 that was detected by a chlortetracycline (CTC) assay. Then, we examined sperm isolated from the caput epididymis (immature) incubated under conditions that support cauda sperm capacitation and found that the AR could not be detected. Moreover, P4 was unable to induce the AR when it was applied to sperm isolated from either region and incubated under conditions that did not support capacitation. These results can be explained by changes in P4r availability. A suitable marker for P4r is the gold (Au)-P4 complex. This marker shows a binding capacity that can be visualized directly by electron microscopy (EM) and indirectly by silver-enhanced methods with light microscopy. The Au-P4 complex was localized in capacitated cauda sperm at the dorsal edge of the head. Using these techniques, we observed a significant decrease in both noncapacitated cauda sperm and caput sperm (whether incubated in capacitating media or not). Genomic P4r could be responsible for the signal detected, but antibodies against the P4 nuclear receptor did not recognize any sites in the sperm by immunostaining methodology. Instead, a 44-kd protein band was detected in the sperm by a ligand blot assay. In conclusion, P4 promotes the AR in capacitated cauda sperm but is unable to do so in noncapacitated or immature sperm because the availability of P4r increases during epididymal transit and after capacitation. The P4r responsible for this behavior is different from a classical nuclear receptor—on the basis of the immunostaining results—and is probably a protein close to 44 kd—on the basis of the ligand assay results.

Key words: Acrosome reaction, sperm, maturation

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