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Zona pellucida protein binding ability of porcine sperm during epididymal maturation and the acrosome reaction

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In many mammals, the first interaction between gametes during fertilization occurs when sperm contact the zona pellucida surrounding the egg. Although porcine sperm first contact the zona pellucida via their plasma membrane, the regions of the sperm surface that display zona receptors have not been determined. We have used the Alexa 488 fluorophore conjugated to solubilized porcine zona pellucida proteins to observe zona receptors on live boar sperm. Zona proteins bound live, acrosome-intact sperm on the anterior portion of the sperm head, concentrated in a thin band over the acrosomal ridge. When sperm membranes were permeabilized by fixation or acrosome reactions induced by the ionophore A23187, zona binding was extended to a broad area covering the entire acrosomal region. Zona binding proteins were present in the acrosomes of sperm from all regions of the epididymis. In contrast, zona binding sites were found on the plasma membrane of most sperm from the corpus and cauda epididymis, but on only 6% of caput epididymal sperm. In conclusion, acrosome-intact boar sperm exhibit concentrated zona protein binding over the acrosomal ridge and acquire this binding in the corpus region of the epididymis, correlating with the developmental stage at which sperm gain the ability to fertilize oocytes.

Keywords

fertilization; zona pellucida; sperm; acrosome; epididymis



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