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JOURNAL ARTICLE

The mouse sperm glycine receptor/chloride channel: cellular localization and involvement in the acrosome reaction initiated by glycine

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Previously, we reported that glycine initiates the in vitro acrosome reaction (AR) of porcine and human sperm by a mechanism that includes the glycine receptor/Cl- channel (GlyR) and that this receptor/channel is required for the zona-pellucida-initiated AR. Because mouse sperm are important tools in the study of fertilization, we investigated whether glycine initiated the mouse sperm AR and whether the sperm GlyR was involved in that initiation. Glycine (250 microM to 1 mM) initiated the AR of capacitated but not noncapacitated mouse sperm. The glycine-initiated AR was significantly inhibited by 50 nM strychnine, a neuronal GlyR antagonist. The neuronal GlyR agonists taurine and beta-alanine did not initiate the AR at 1 mM or 5 mM. A monoclonal antibody against the rat spinal cord GlyR significantly inhibited the glycine-initiated AR but not the spontaneous AR. Indirect immunofluorescence localization studies with that monoclonal antibody and postfixed live sperm detected 3 patterns of immunoreactivity involving 2 sites in the periacrosomal plasma membrane. These patterns were as follows: type A localization on the plasma membrane overlying the tip of the anterior acrosomal region; type B localization on the plasma membrane overlying the posterior part of the acrosomal equatorial segment and/or, in acrosome-reacted sperm, the posterior part of the modified equatorial segment; and type C localization that included both type A and type B. Type A and type C localization were only observed on the acrosome-intact sperm. During capacitation, the number of the sperm showing type A localization increased. Our results demonstrate that mouse sperm provide an excellent model for studying the role of the GlyR in the acrosome reaction.

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