Sea urchin sperm: An ion channel reconstitution study case

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Ionic fluxes play a key role in the activation of respiration and motility, in chemotaxis, and in the acrosome reaction of sea urchin spermatozoa, and therefore in fertilization. There is growing evidence that ion channels mediate some of these fluxes in response to egg components. Since spermatozoa are tiny cells, it has been necessary to use a combination of complementary approaches to unravel ion channel function and regulation in sperm behavior. Planar bilayer and patch clamp techniques have allowed us to detect, for the first time, the activity of single channels in the plasma membrane of these cells. Unlike intact sperm, swollen sperm can be much more easily patch clamped and single channel activity recorded. Thus, patch clamping of swollen sperm and planar bilayers with incorporated sperm membranes provides new avenues for studying ionic channels and their regulation by egg factors and second messengers. These techniques, together with studies of membrane potential, intracellula