

Involvement of sperm protein Izumo in gamete adhesion

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The interaction between gametes involves the pairing of a sperm and an oocyte. These cells are able to specifically recognize and bind each other, then to undergo cell-cell fusion during fertilization. The mechanisms underlying the crucial interaction of gamete fusion are not elucidated yet. Only two proteins have been shown to be essential for fertilization: CD9, a transmembrane protein which belongs to the family of tetraspanin proteins and which is expressed by the oocyte; and Izumo, a transmembrane protein of the Immunoglobulin Superfamily which is localized at the sperm head membrane. The mechanisms by which Izumo mediates cell-cell fusion are still unknown. Previous studies have shown that while Izumo deleted sperm's are able to bind to oocytes, the fusion between these cells is prevented. These experiments raise crucial questions: what is the specific role of Izumo during fertilization? Does Izumo confer mechanistic properties which underlie gametic fusion? Do oocytes express cognate receptors specific to Izumo?

In order to investigate these questions, we have used confocal microscopy and a biophysical technique, the Biomembrane Force Probe (BFP), which enable us to measure the interaction force between an oocyte and a glass bead functionalized with a soluble recombinant ectodomains of Izumo. Our preliminary results suggest that Izumo is involved in the adhesion step of fertilization and adheres to a specific receptor which is more expressed and/or accessible on WT egg membranes than on CD9 deleted egg membranes.

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