Abstract

The fusion of the oocyte and sperm is a crucial step in fertilization and represents a highly regulated process resulting in the formation of a totipotent zygote. The aim of this bachelor thesis is to summarize current knowledge about the molecular mechanisms that enable this process in mammals. The thesis focuses on individual stages of fusion, including capacitation, chemotaxis, sperm binding to the zona pellucida, the acrosome reaction and acrosome formation, sperm penetration through the zona pellucida, and the final fusion of the gamete plasma membranes.

Special attention is paid to the interactions between key sperm surface proteins (such as IZUMO1, SPACA6, SPESP1, TMEM95) and their receptors on the oocyte oolemma, particularly JUNO, CD9, and integrins. The interaction between IZUMO1 and JUNO is described in detail as a fundamental recognition and binding pair. The final part of the thesis briefly addresses fusion defects and their potential clinical relevance in the context of human infertility.