Time-Dependent Changes in PI3K/AKT Signaling During Capacitation in a Mouse Model.

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Sperm must undergo functional maturation through the process of capacitation to gain the ability to fertilize. During capacitation, numerous proteins are involved and are either phosphorylated or dephosphorylated. However, the molecular mechanism of capacitation has not been clearly identified. The present study aimed to identify changes in PI3K/AKT-related proteins over various time periods (0, 30, 60, and 90 min) in a capacitation-inducing medium. Mouse spermatozoa were cultured in media supplemented with bovine serum albumin (BSA) to induce capacitation, and various sperm functions were assessed. The results showed no significant difference in cell viability and sperm motility; however, significant increases in several kinematic parameters were observed after 90 min of incubation. In addition, acrosome reaction and capacitated spermatozoa were observed to increase in a time-dependent manner. Moreover, the expression of protein kinase A and tyrosine phosphorylation significantly increased. Interestingly, phosphorylation of PI3K/AKT-related proteins was found to increase overall depending on the incubation time. These results suggest that PI3K/AKT-related proteins may play an early and essential role during capacitation, regulating the functions of mouse spermatozoa. Our findings will contribute to further understanding of the interactions and molecular mechanisms of the PI3K/AKT signaling pathway in the capacitation process.