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CABYR, a Novel Calcium-Binding Tyrosine Phosphorylation-Regulated Fibrous Sheath Protein Involved in Capacitation

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Abstract

To reach fertilization competence, sperm undergo an incompletely understood series of morphological and molecular maturational processes, termed *capacitation*, involving, among other processes, protein tyrosine phosphorylation and increased intracellular calcium. Hyperactivated motility and an ability to undergo the acrosome reaction serve as physiological end points to assess successful capacitation. We report here that acidic (pI 4.0) 86-kDa isoforms of a novel, polymorphic, testis-specific protein, designated calcium-binding tyrosine phosphorylation-regulated protein (CABYR), were tyrosine phosphorylated during *in vitro* capacitation and bound ⁴⁵Ca on 2D gels. Acidic 86-kDa calcium-binding forms of CABYR increased during *in vitro* capacitation, and calcium binding to these acidic forms was abolished by dephosphorylation with alkaline phosphatase. Six variants of CABYR containing two coding regions (CR-A and CR-B) were cloned from human testis cDNA libraries, including five variants with alternative splice deletions. A motif homologous to the RII dimerization domain of PK-A was present in the N-terminus of CR-A in four CABYR variants. A single putative EF handlike motif was noted in CR-A at aas 197–209, while seven potential tyrosine phosphorylation-like sites were noted in CR-A and four in CR-B. Pro-X-X-Pro (PXXP) modules were identified in the N- and C-termini of CR-A and CR-B. CABYR localizes to the principal piece of the human sperm flagellum in association with the fibrous sheath and is the first demonstration of a sperm protein that gains calcium-binding capacity when phosphorylated during capacitation.

Keywords

CABYR; spermatozoa; capacitation; calcium-binding protein; fibrous sheath; tyrosine phosphorylation; postmeiotic expression

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