

Bovine Sperm Capacitation Promoters: The Comparison between Serum and Non-serum Albumin originated from Fish

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Abstract : Capacitation is a prerequisite to achieving sperm competency to penetrate the oocyte naturally occurring in vivo throughout the female reproductive tract and entangling secretory fluid and epithelial cells. One of the crucial compounds in the oviductal fluid which promotes capacitation is albumin, secreted in major concentrations. However, the difficulties in the collection and the inconsistency of the oviductal fluid composition throughout the estrous cycle have replaced its function with serum-based albumins such as bovine serum albumin (BSA). BSA has been primarily involved and evidenced for their stabilizing effect to maintain the acrosome intact during the capacitation process, modulate hyperactivation, and elevate the number of sperm bound to zona pellucida. Contrary to its benefits, the use of blood-derived products in the culture system is not sustainable and increases the risk of disease transmissions, such as Creutzfeldt-Jakob disease (CJD) and bovine spongiform encephalopathy (BSE). Moreover, it has been asserted that this substance is an aeroallergen that produces allergies and respiratory problems. In an effort to identify an alternative sustainable and non-toxic albumin source, the present work evaluated sperm reactions to a capacitation medium containing albumin derived from the flesh of the snakehead fish (*Channa striata*). Before examining the ability of this non-serum albumin to promote capacitation in bovine sperm, the presence of albumin was detected using bromocresol purple (BCP) at the level of 25% from snakehead fish extract. Following the SDS-PAGE and densitometric analysis, two major bands at 40 kDa and 47 kDa consisting of 57% and 16% of total protein loaded were detected as the potential albumin-related bands. Significant differences were observed in all kinematic parameters upon incubation in the capacitation medium. Moreover, consistently higher values were shown for the kinematic parameters related to hyperactivation, such as amplitude lateral head (ALH), velocity curve linear (VCL), and linearity (LIN) when sperm were treated with 3 mg/mL of snakehead fish albumin among other treatments. Likewise, substantial differences of higher acrosome intact presented in sperm upon incubation with various concentrations of snakehead fish albumin for 90 minutes, indicating that this level of snakehead fish albumin can be used to replace the bovine serum albumin. However, further study is highly required to purify the albumin from snakehead fish extract for more reliable findings.

Keywords : capacitation promoter, snakehead fish, non-serum albumin, bovine sperm

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