CHARACTERIZATION OF THE PERINUCLEAR THECA SUBSTRUCTURE OF THE BOAR SPERM HEAD Katherine Arancibia-Salinas (1), María Elena Trujillo-Ortega(2), Enrique Hernández-González(3), Hugo Montaldo-Valdenegro(4), María de Lourdes Juárez-Mosqueda(1). (1)Departamento de Morfología, FMVZ-UNAM. México, D.F.; (2)Departamento de Producción Animal Cerdos FMVZ-UNAM. México, D.F.; (3) Centro de Investigación y de Estudios Avanzados (CINVESTAV-INP) México, D.F.; (4)Departamento de Genética y Bioestadística FMVZ-UNAM. México, D.F. Email: katherine7mx@yahoo.com.mx
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The perinuclear theca (PT) is the main cytosqueletal mammalian (1) sperm structure that surrounds the nucleus, except at the insertion point of the sperm tail into the base of the nucleus (2) (3). Morphologically, the PT has two regions; the subacrosomal layer and the postacrosomal sheath or calyx (4) (Fig. 1). Additionally, it was detected a substructure on the PT surface from diverse mammals spermatozoa (rabbit, ram, bull, boar and guinea pig). The PT substructure is located on the apical region of the postacrosomal theca layer, circling the sperm head, and its shape is species-specific (5). In a remarkable way, that substructure can be useful as a morphological marker to evaluate the PT integrity. In the boar has been reported a eyelash-shaped substructure but it had not been characterized previously. The objective of this study was to characterize the PT substructure in pig spermatozoa (length, diameter and distance between one eyelash and its neighbor). To expose the PT, the plasmatic membrane and the acrosome were solubilized with Brij 36-T (1.2% final concentration). The sperm samples were fixed in Karnowsky fixative and washed. A drop of sperm suspension on a collodion-carbon-coated grid was stained with aqueous 0.02% phosphotungstic acid for three minutes. The samples were obtained at 20,000 magnifications and scanned using a ScanJet 5300C (Hewlett Packard). Morphometrical analyses were performed using the software "Automontage". A minimum of 21 measurements for each variable were performed. Remarkably, the eyelash-like substructure was present only in the freezed-thawed sperm samples (Fig. 1). Fresh semen showed a PT substructure as a row of papillae circling the sperm head (Fig. 2). The average length of the substructure projections (s.d.) was 132 $\pm$ 33 nm, the mean diameter was 9.44 $\pm$ 4.1 nm and the mean distance between one projection and its neighbor was 78.9 $\pm$ 29 nm. These measurements differ to the results obtained in guinea pig (4) where the mean (s.d.) for length was 237 $\pm$5.1 nm, the mean diameter was 17.5 $\pm$ 3.2 nm and the mean distance between one projection and its neighbor was 27.5 $\pm$ 7.6 nm. Furthermore, the eyelash-like substructure in guinea pig was reported on fresh samples and the eyelashes could be the result of a major increased cell sensitivity, and inconsequence the contact with the detergent might "stand up" the structure. Contrarily, in the boar the eyelashes substructure would be "getting up" after freezing-thawing process. It is suggested to continue with the measurements of the structure in boars from different breeds to look if there are similar results. Also is important to carry out these analyses in other species and correlate them with the viability of the spermatozoa after the freezing-thawing process.

References

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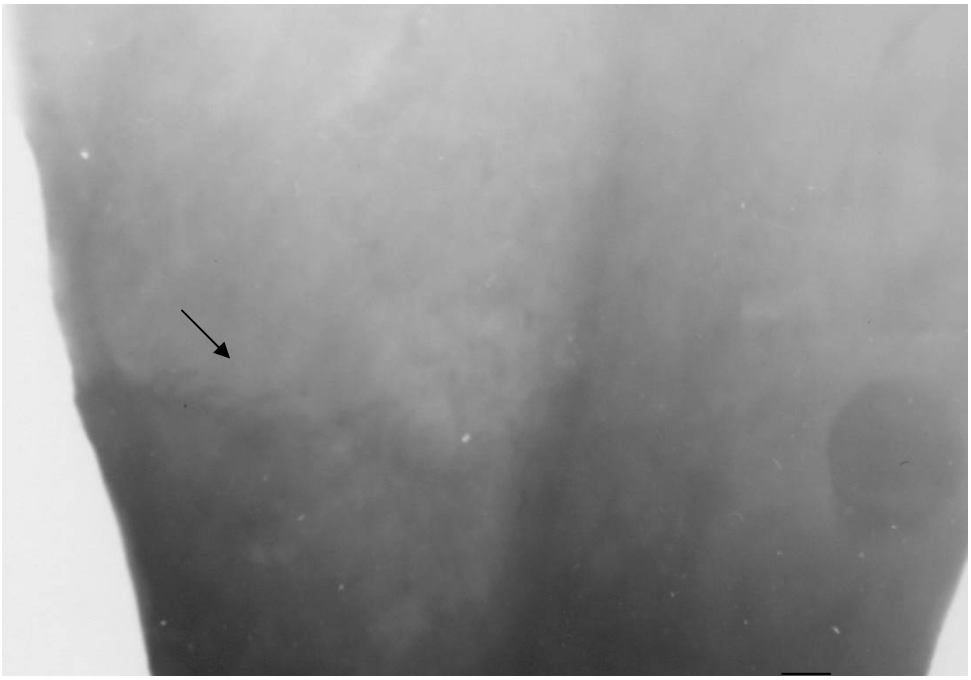

Fig. 1. Electron micrograph showing the perinuclear theca morphology of frozen-thawed boar spermatozoa. It consists of projection resembling "eyelashes" circling the sperm head.

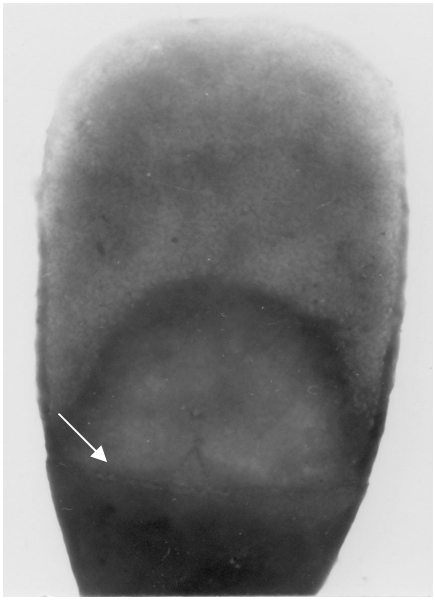

Fig. 2. Whole-mount preparation showing the PT substructure (arrow) in fresh boar spermatozoa.