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Morphological and molecular features of the fimbrial epithelium of the baboon Papio hamadryas oviduct during the menstrual cycle.

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The oviductal fimbria is proximal to the ovary and picks up the ovulated oocytes in the ostium of the infundibulum [1] and could be involved in several pathological conditions including tumors [2]. Although several reports have been published on the cyclic changes of the fimbrial epithelium of some non-human primates oviduct, a sole study reports the effect of the menstrual cycle on the oviductal fimbriae of the baboon Papio hamadryas [3]. This study aimed to investigate more in-depth the fimbrial epithelium of Papio hamadryas oviduct during the menstrual cycle. The fimbriae obtained by laparoscopic salpingotomy of adult and healthy Papio hamadryas females bred in the Zoo Safari (Fasano, Italy) were used. The tissues were processed for the study of: 1) the morphology, using histological and scanning electron microscopy (SEM) approaches, 2) the glycoprotein through conventional (PAS, H&E/Alcian Blue) and lectin (AAL, GNL, LCA, RCA120) histochemistry, 3) the immunolocalization of the chaperone heat shock protein 70 (HSP70), estrogen (ER α) and progesterone (PR) receptors. The histomorphological analysis demonstrated that the fimbrial epithelium reached the maximum height and differentiation status during the preovulatory phase when the ciliated and non-ciliated cells were well distinguishable. SEM observations revealed that non-ciliated cells of the preovulatory phase contained small apical protrusions covered by thin microvilli and that ciliated cells were unevenly distributed along the fimbrial epithelium. The glycohistochemistry displayed the presence of glycopeptides mainly in the apical surface of the epithelium, which displayed: 1) a low presence of non-sulfated acidic (Alcian Blue positivity) and complex (Man/GlcNAc core with α -1,6Fuc) N-glycans (LCA reactivity) during the follicular phase, 2) the appearance of sulfated (HID positivity), fucosylated (AAL affinity), terminal α -galactose-terminating glycans (RCA120 labeling), as well as increase of complex mammalian N-glycopeptides (GNL and LCA affinity) during the preovulatory phase, 3) low presence of AAL, LCA, and RCA120 binders during the luteal phase. Immunohistochemistry evidenced the presence of HSP70 (1) in the cytoplasm and nucleus of all epithelial cells during the follicular phase, 2) mainly in the cells and the cytoplasm of the ciliated cells during the preovulatory phase, 3) in the cytoplasm of some epithelial cells during the luteal phase. ER α and PR were constitutively expressed in the fimbriae during the menstrual cycle and were localized to the cell nuclei of the epithelium. The percentage of ER positive cells was higher in the follicular phase than the preovulatory and luteal phases. ER α staining intensity did not change during the menstrual cycle. PR immunostaining was detected in the nuclei of all epithelial cells and the immunostaining intensity was low in the preovulatory phase and increased from the luteal to the follicular phases. Overall, this study adds further information on morphological and chemical changes occurring in the fimbrial epithelium of the baboon Papio hamadryas oviduct during the menstrual cycle.

[1] Yuan S. et al. Oviductal mottle cells are essential for oocyte pickup but dispensable for sperm and embryo transport. PNAS, 118, 2021.
[2] Madhires F. et al. The tubal fimbria is a preferred site for early adenocarcinoma in women with familial ovarian cancer syndrome. Am. J. Surg. Pathol., 30: 230, 2006.
[3] Deans S. et al. Modification of morphology and glycan pattern of the oviductal epithelium of baboon Papio hamadryas during the menstrual cycle. Animals, 12:2769, 2022.