The menstrual cycle of the Baboon (*Papio hamadryas*) evaluated by vaginal cytology and hormonal variations

Maria Albrizio[1], Annarita Imperante[1], Salvatore Desantis[1], Mario Cinone[1], Piero Laricchiuta[2], Nicoletta Santamaria[1], Luca Lacitignola[1]

[1]Università degli Studi di Bari-Aldo Moro, Dipartimento dell'emergenza e dei trapianti di organi (DETO) [2] *Zoosafari-Fasano, Brindisi, Italy*

Corresponding author: Maria Albrizio (maria.albrizio@uniba.it)

Hamadryas baboons (*Papio hamadryas*) form part of a highly successful branch of the primate family (*Cercopithecidae*), commonly referred to as savannah baboons. They are broadly distributed over the African continent, and the Arabian Peninsula inhabiting the semiarid regions [1]. Baboons are menstruating primates, the average length of a normal reproductive cycles is 32 (24-38) days with close similarity to women's [2]; so that the baboon is considered a valuable model for increasing knowledge to overcome human reproductive disorders.

This study aims s to acquire knowledge on the modifications of vaginal cytology and Fallopian tubes during the menstrual cycle of females living in captivity. The stage of the menstrual cycle of 14 healthy adult females of different ages (8.5 yrs) and weights (10.5 kg) on the day of laparoscopic salpingectomy has been evaluated. The baboons breed with high fertility rates in captivity so that laparoscopic salpingectomy was employed as irreversible contraceptive surgical therapy for an extensive control birth program in the Safari Zoo (Fasano - BR). The clinical activity was authorized with written informed consent by the Zoo's property (Lion 3000 S.p.a.) and obtained the favorable opinion of the ethics committee of DETO (05/2020). The stage of the reproductive cycle was analyzed by 1) vaginal cytology (Harris-Shorr's and Diff-Quik staining), 2) endocrine changes measuring 17β-estradiol (E2) and progesterone (P4) concentrations in peripheral plasma by ELISA, 3) histological uterine tubes morphology. The stage of the cycle can be also approximated by external observation of the perineum so that the perineal turgescence, characteristic of the follicular phase, was checked during the observation of external genitalia. Laparoscopic evaluations monitored the presence of corpora lutea and the Graafian follicle and when ovulation had occurred, the increased vascularized fimbriae too. Changes in the type of vaginal cells (basal and parabasal, small and large intermediate, anuclear keratinized, erythrocytes, neutrophils) found during the follicular and luteal phases (early and late) of the ovarian cycle were analyzed. Based on hormonal evaluations and cytological observations we found 9/14 subjects in the follicular phase (mean E2 concentration 150±73 pg/ml; mean P4 concentration 0.3±0.1 ng/ml; presence of small and large intermediate, anuclear keratinized cells) and 5/14 females in the luteal phase (mean E2 concentration 50±20 pg/ml; mean P4 concentration 4±0.5 ng/ml; presence of basal and parabasal cells, neutrophils) of their reproductive cycle. Histological investigations revealed morphological and morphometric changes in the uterine tube segments related to the stage of the menstrual cycle. In addition, a different degree of hyperemia was observed in the infundibulum between follicular and luteal stages. The acquired knowledge could be the starting point to propose a hormonal contraceptive strategy for baboons living in captivity with little effect on social interactions such as grooming relationships, aggression, affiliation and sexual behavior while reducing their reproductive success.

[1] Newman TK, Jolly CJ, Rogers J. Mitochondrial phylogeny and systematics of baboons (*Papio*). American Journal of Physical Anthropology, 124: 17-27, 2004.
[2] Stevens VC, Sparks SJ, and Powell JE. Levels of estrogens, progestogens, and luteinizing hormone during the menstrual cycle of the baboon. Endocrinology, 87: 658, 1970.