Participation of analogues of lysophosphatidic acid (LPA): oleoyl-sn-glycero-3-phosphate (L-\(\alpha\)-LPA) and 1-oleoyl-2-\(O\)-methyl-rac-glycerophosphothionate (OMPT) in uterine smooth muscle contractility of the pregnant pigs

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Abstract

Recent studies show that a representative of phospholipids, namely lysophosphatidic acid (LPA) and its receptors (LPA₁, LPA₂, LPA₃) play a significant role in the reproductive processes, i.e., in the modulation of the uterine contractility. The participation of LPA₃ in the reproductive processes has been revealed in mice and has not been studied in gilts. Therefore, in the present study we investigated the role/action of LPA and its receptors LPA₁, LPA₂ and LPA₃ on the contraction activity in the porcine uterus. The study was conducted on an experimental model in which the pig uterus consisted of the one whole uterine horn and a part of the second horn, both connected with the uterine corpus. Uterine strips consisting of the endometrium with the myometrium (ENDO/MYO) and myometrium (MYO) alone were collected on days 12-14 of the estrous cycle (control group; n = 5) or pregnancy (experimental group; n = 5). Two analogues of LPA at increasing doses were used: oleoyl-sn-glycero-3-phosphate (L-\(\alpha\)-LPA, a selective agonist of LPA₁ and LPA₂ receptors; 10⁻⁷ M; 10⁻⁶ M and 10⁻⁵ M) and 1-oleoyl-2-\(O\)-methyl-rac-glycerophosphothionate (OMPT, a selective agonist of LPA₃ receptor; 68 nM; 136 nM and 680 nM). L-\(\alpha\)-LPA caused an increase in the contraction tension, amplitude and frequency of ENDO/MYO from the uterine horn with the developing embryos. This effect was not observed in MYO in both groups examined. In the ENDO/MYO strips of the uterine horn with developing embryos, OMPT significantly increased the contraction tension at the highest dose (680 nM) and amplitude at all doses examined, while frequency of contractions was decreased at doses of 136 nM and 680 nM. In the MYO strips of the uterine horn with embryos a significant increase in the contraction tension and amplitude after the highest dose of OMPT was observed. The results obtained imply the important role of receptors LPA₁, LPA₂ and LPA₃ in the contraction activity of the porcine uterus during early pregnancy.

Key words: gilts, uterine smooth muscle, LPA, OMPT, embryos

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