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Optimization of estrogen dosage for uterine receptivity for implantation in post-coital bilaterally ovariectomized mice

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Abstract

Estrogens and progesterone, in unison and/or separately, synchronize the distinct events of blastocyst development, uterine priming and receptivity induction for implantation. In contrast to high implantation failure rates, the mechanistic concepts regarding the uterine receptivity for implantation still remain elusive. The present study aims to define the minimum estradiol (E₂) dose to induce uterine receptivity for successful implantation in post-coitus bilaterally ovariectomized (BLO) progesterone-primed uterus of mice. Post-coital sperm-positive adult female mice were divided into two groups. In both the groups, delayed implantation was induced by BLO on post-coitus Day 4 (D4). Group 1 received 2 mg of progesterone (P₄) from D5 until sacrifice, and E₂ injection of 3.0, 10.0, 25.0 and 50.0 ng on D7. On D8, all mice of this group were sacrificed except the mice that received second dose of 25.0 ng of E₂ on D8 and were sacrificed on D9. Group 2 followed the same doses, but were given simultaneously on D4, and sacrificed on D5. The mice that received second doses of 25.0 ng E₂ were sacrificed on D6. The minimum dose of E₂ required to induce uterine receptivity for implantation is a single dose of 50.0 ng E₂. The uterus remained refractory following short receptive period at E₂ doses lower than 50.0 ng, which is just sufficient to establish desired uterine receptivity. However, repeated administration of sub-threshold doses of 25.0 ng of E₂ could also not effectively sustain uterine receptivity towards successful implantation.

Keywords: Estrogen; Implantation; Ovariectomy; Pregnancy; Progesterone.

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