

## Supplementary Figures

### The role of mesenchymal estrogen receptor 1 in mouse uterus in response to estrogen

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**Supplementary Figure S1**-----**2**  
Enlarged images for Figs. 1C, 1D, 2C, and 2D.

**Supplementary Figure S2**-----**3**  
ESR1 protein expression in the uterus of control and *Isl1-Esr1*KO mice at 3, 10, and 21 days of age.

**Supplementary Figure S3**-----**4**  
Ovarian histology of control, conventional *Esr1*KO, and *Isl1-Esr1*KO mice at 8 weeks of age.

**Supplementary Figure S4**-----**5**  
Diameter and the number of uterine gland in control and *Isl1-Esr1*KO mouse uterus.

**Supplementary Figure S5**-----**6**  
Immunofluorescent imaging of EdU-incorporating and ESR1 expressed cells.

**Supplementary Figure S6**-----**7**  
*Cdkn1* gene expression at 2, 6 h, and 24 h after E2 administration.

Fig. 1C

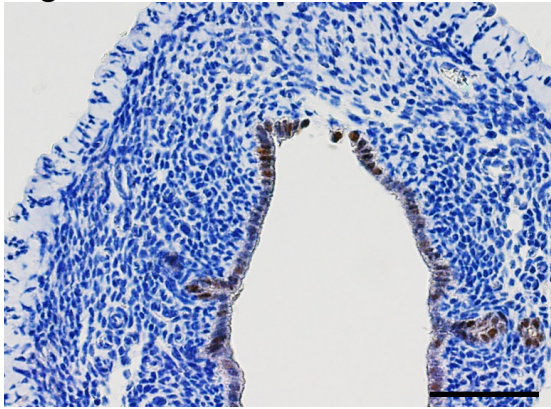


Fig. 1D

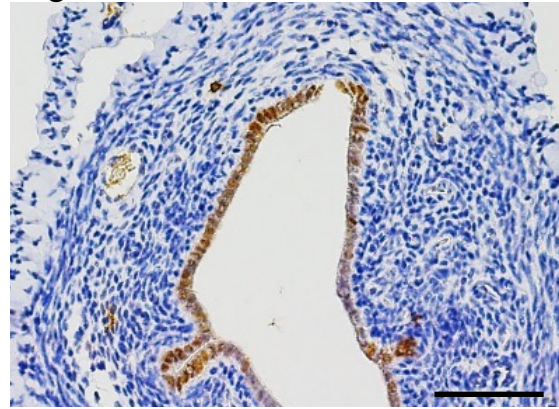


Fig. 2C

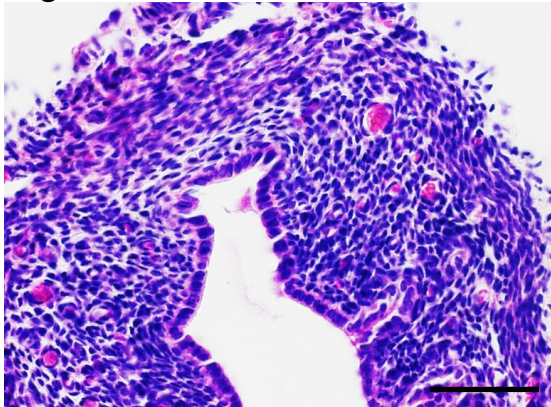


Fig. 2D

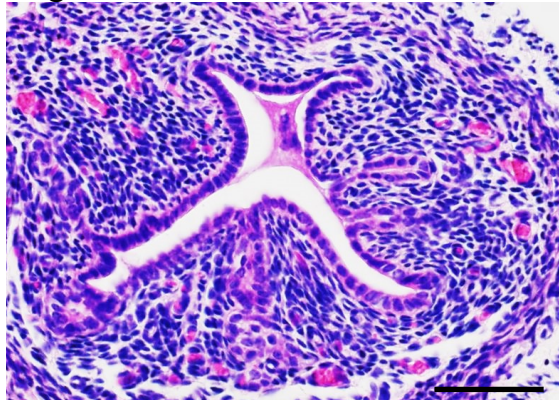


Fig. S1

Enlarged images for Figs. 1C, 1D, 2C, and 2D Scale bars, 50  $\mu$ m.

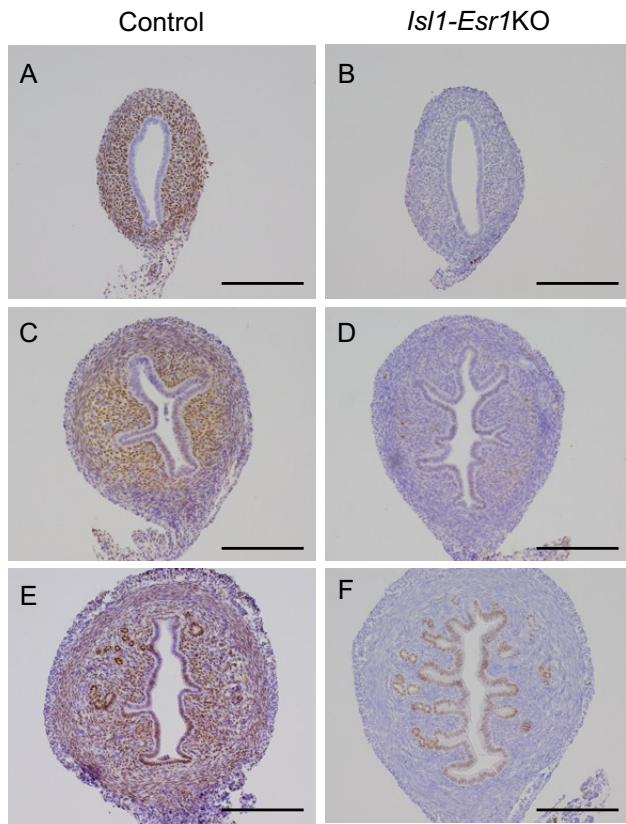


Fig. S2

ESR1 protein expression in the uterus of control (A, C, D) and *Isl1-Esr1KO* mice (B, D, F) at 3 (A, B), 10 (C, D), and 21 (E, F) days of age. Stromal ESR1 is lost at the neonatal period in the *Isl1-Esr1KO* mouse uterus. Scale bars, 100  $\mu\text{m}$ .

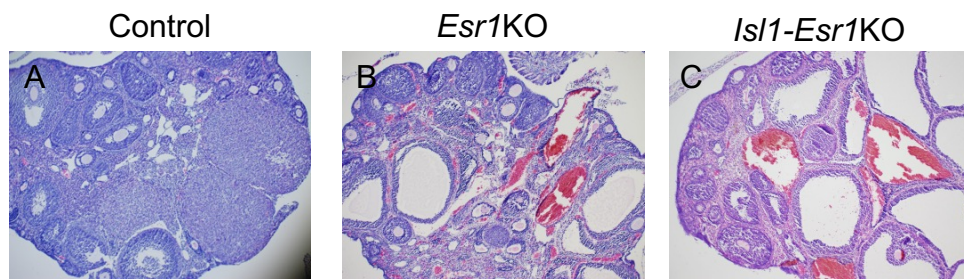


Fig. S3

Ovarian histology of control (A), conventional *Esr1*KO (B), and *Isl1-Esr1*KO mice (C) at 8 weeks of age. Intact mice exhibit mature follicles and corpora lutea. The ovary of *Isl1-Esr1*KO mice lacked corpora lutea, and accompanied by hemorrhagic cysts like that of conventional *Esr1*KO mice.

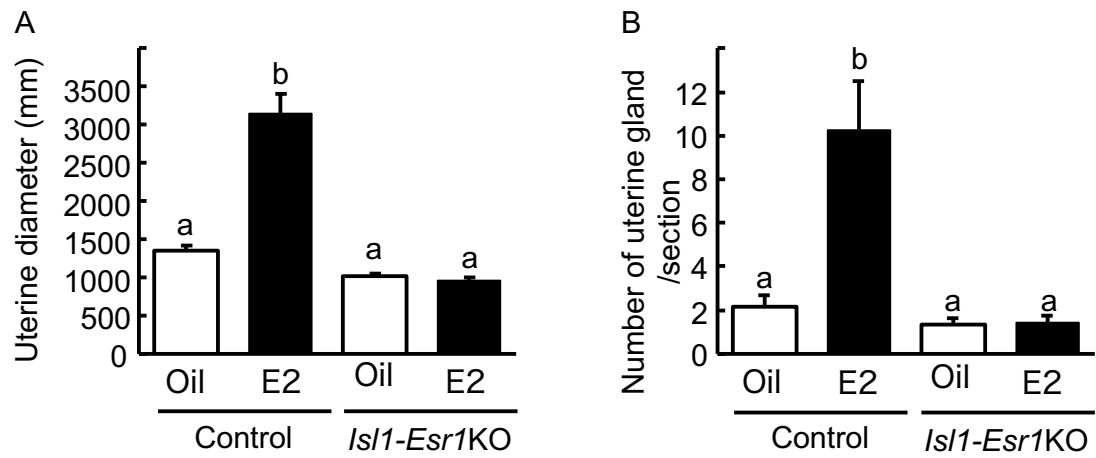


Fig. S4

Diameter (A) and the number of uterine gland (per section) (B) in control and *Esr1KO* mice. More than 5 animals were analyzed. Error bars represent SEM. \* indicates significant difference compared with OVX group assessed by student's t-test ( $p < 0.05$ )

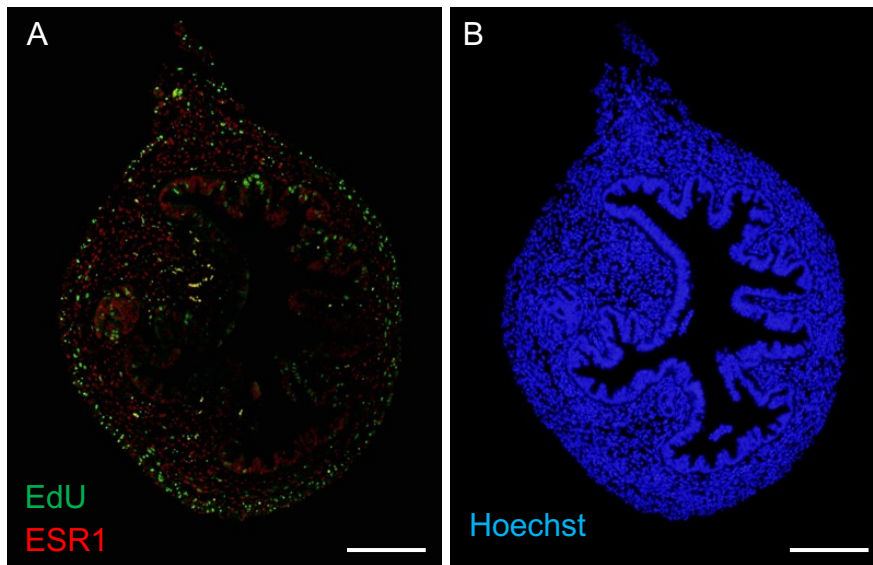


Fig. S5

EdU-incorporating cells (green) do not always overlapped with ESR1 expressed cells (red) in the wild-type mice uterus (A). Blue fluorescent signal (B) indicates Hoescht staining in the same image of EdU staining. Scale bars, 200  $\mu$ m

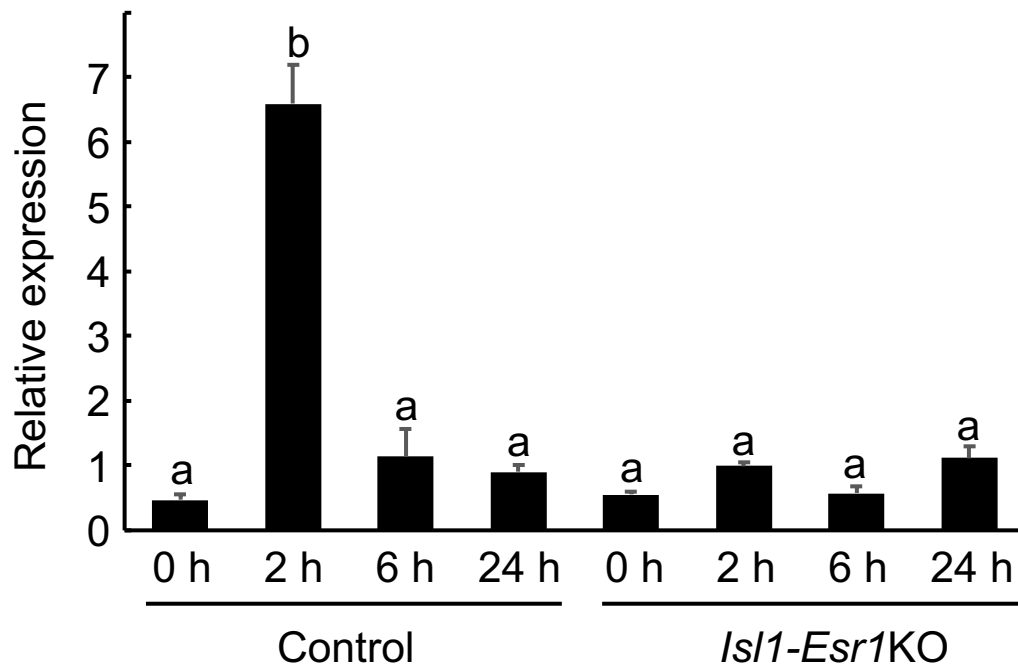


Fig. S6

Cdkn1 gene expression at 2, 6 h, and 24 h after E2 administration. Results are mean  $\pm$ SEM. A two-way ANOVA followed by a Tukey–Kramer test was used and  $p < 0.05$  was considered as significantly different.