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Exposure towards isoflavones during adolescence modulates estrogen sensitivity of uterus and vagina and reduces visceral body fat dose-dependently

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There is contradictory data about the consequences of isoflavone (ISO) exposure during development of female organisms. Potential impacts on tumor risk, reproduction but also altered susceptibility to develop metabolic diseases like obesity or diabetes are discussed. The aim of this study was to investigate in depth how ISO exposure during adolescence modulates the estrogen sensitivity of the uterus, vagina and visceral body fat.

Therefore, we exposed female Wistar rats starting in parental animal prior to mating, continuing in utero, through weaning and adolescence into adulthood with an ISO-depleted (IDD) or ISO-rich diets of different ISO content (IRD50: 50 mg/kg; IRD400: 400 mg/kg). Estrogen sensitivity in uterus and vagina was investigated in an uterotrophic assay at the end of the experiment on PND 80. On this day rats were ovariectomized. Followed by a hormonal decline for 14 days animals were treated either with a vehicle (OVX) or 17b-estradiol (E2: 4 µg/g BW/day) for 3 days. 80 days old intact rats served as controls. Visceral fat mass, uterine wet weight (UWW), uterine epithelial height (UEH), uterine proliferative activity and vaginal epithelial height (VEH) were determined.

In all diet groups E2 treatment resulted in an increase of UWW, height and proliferative activity of the uterine epithelium and VEH. UWW, proliferative activity of the uterine epithelium and VEH were higher in E2 treated IRD400 animals compared to IDD and IRD50 animals. The amount of visceral fat in OVX animals was lowest in the IRD400 group. After E2 treatment the lowest visceral fat mass could be observed in IRD400 animals as well.

Our data provide evidence that ISO exposure over all critical periods of development dose-dependently enhances the estrogen sensitivity of uterus and vagina and reduces visceral fat mass in E2 treated but also non treated OVX animals.