

Environmentally Relevant Maternal Atrazine Exposure Leads to Aberrant Endocrine Effects in Piglets

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Atrazine is a widely used herbicide in United States agriculture. Atrazine is an environmental toxicant that persists in soil and is one of the most commonly detected contaminants in U.S. surface water sources. For drinking water, the U.S. Environmental Protection Agency has set the maximum contaminant level of 3 µg per liter for atrazine. Previous toxicology studies in rodents indicated that atrazine is an endocrine disruptor and disrupts the hypothalamic-pituitary-gonadal axis. Further, a previous study found that atrazine exposure increases luteinizing hormone serum levels in gilts. The effects of environmental atrazine exposure on the female reproductive capacity of agriculture animals are unknown. This study tested the hypothesis that maternal atrazine exposure leads to aberrant endocrine effects in piglets. Pregnant sows were exposed to either vehicle control (0.002% (v/v) ethanol) or atrazine (20 µg/L) via drinking water administered ad libitum from 28 days of gestation through parturition and lactation (~127 days total). Umbilical cord sera were collected at birth, and atrazine exposed piglets and controls were necropsied on post-natal day 10. Pregnenolone, progesterone, and estradiol cord serum levels were quantified by enzyme-linked immunosorbent assays. Gene expression was assessed by quantitative pcr (qPCR) on pituitaries collected at necropsy. Atrazine exposed piglets had lower levels of cord progesterone than control exposed piglets (p=0.0043). In contrast, cord serum levels of pregnenolone and estradiol did not differ between atrazine exposed and control exposed piglets. To examine a possible mechanism of atrazine exposure leading to decreased progesterone serum levels, pituitary mRNA expression of luteinizing hormone beta (*Lhb*), follicle stimulating hormone beta (*Fshb*), and thyroid stimulating hormone subunit beta (*Tshb*) were assessed by qPCR, and the results indicate that pituitary *Lhb*, *Fshb*, and *Tshb* expression levels were similar between control exposed piglets and atrazine exposed piglets. These results suggest that maternal atrazine exposure during gestation and lactation may lead to aberrant ovarian steroid hormone levels in the exposed piglet offspring through mechanisms that do not include changes in pituitary expression of *Lhb*, *Fshb*, and *Tshb*. Supported by the University of Nebraska Collaboration Initiative (to ATD).