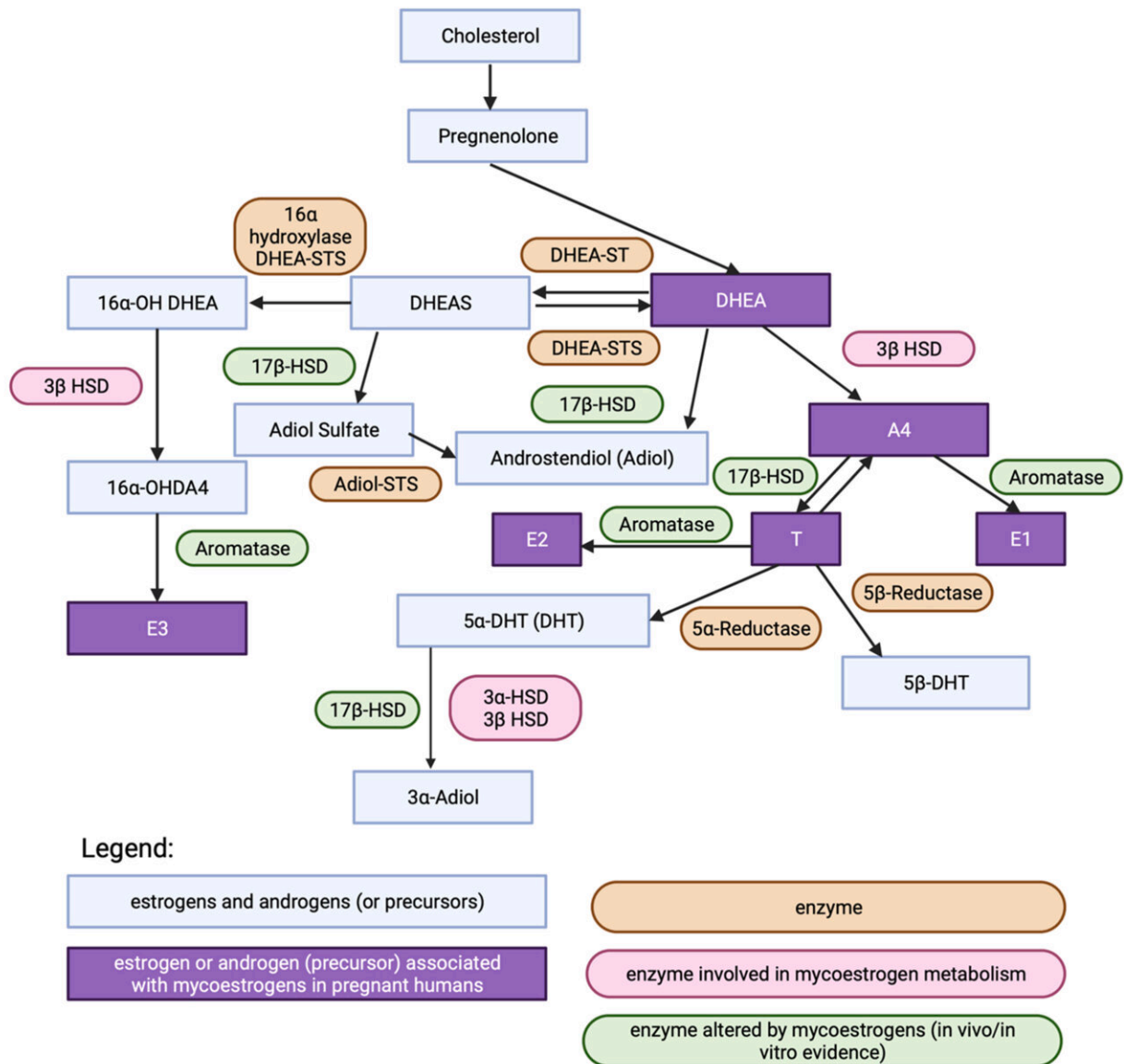


# Researchers examine how fungal toxins impact hormones in pregnancy

July 1 2024, by Andrew Smith

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† Associations between sex steroids and mycoestrogens based on the present study.

Potential disruption of the steroidogenic pathway by mycoestrogens based on the current findings and prior literature. Credit: *International Journal of Hygiene and Environmental Health* (2024). DOI: 10.1016/j.ijheh.2024.114405

A fungal toxin that hinders animal fertility and fetal development may also disrupt human sex hormones in pregnancy, according to a Rutgers Health study.

Zearalenone (ZEN), which contaminates cereal grains, meats and processed foods worldwide, is so structurally like the [hormone](#) 17 $\beta$ -estradiol (E2) that it binds with estrogen receptors. Large doses reduce the number and size of offspring in animal studies. Paradoxically, these compounds also promote growth in livestock after birth, so much so that a synthetic version of ZEN is commonly administered to cattle in the U.S.

The study, [published](#) in the *International Journal of Hygiene and Environmental Health*, connects ZEN exposure to hormone profiles during human pregnancy.

"The big picture takeaway is that [sex steroid hormones](#) like estrogens and androgens are important for all kinds of development, so in theory, this very common dietary compound could be disrupting many aspects of development by disrupting these hormones," said Carolyn Kinkade, a doctoral degree candidate in the Rutgers School of Graduate Studies Exposure Science program of and first author of the study.

"These fungal toxins could impact things ranging from neurodevelopment to asthma to growth patterns to metabolism. It's important to replicate these results, so we're currently further looking into these issues using data from other cohorts that have tracked pregnancies and early childhood."

The study team analyzed urine and [blood samples](#) taken during each trimester of pregnancy, along with placenta samples taken after birth, from 297 participants in a cohort study in Rochester, NY. Researchers also received cord blood samples from 118 cohort members.

ZEN appeared in more than 93% of urine samples and more than 57% of the placental samples.

The study reported that exposure was associated with estrogen and androgen levels, with differences observed by fetal sex. In pregnancies with [male fetuses](#), higher ZEN was associated with lower estrone and free testosterone, while in pregnancies with female fetuses, associated with higher 17 $\beta$ -estradiol were observed.

In an analysis of cord hormones, which more closely reflect the fetus' environment, ZEN exposure was inversely associated with the weak androgen androstenedione in both sexes. Placental ZEN was positively associated with free testosterone in the cord blood of male offspring.

Collectively, ZEN and other estrogen-like fungal compounds are called mycoestrogens. Such fungi contaminate [cereal crops](#), particularly corn and wheat—and researchers expect crop contamination to increase as climates become hotter and wetter.

This increase would come as other substances that disrupt hormones during pregnancy—including plastics and pesticides—are becoming more common, too. A 2022 study that checked [urine samples](#) from 177 women for 103 different compounds from plastics, pesticides and other contaminants found more than 30 chemicals in more than half of the study participants.

"We're making rapid progress in our understanding of how various environmental factors affect [fetal development](#), but much work remains to be done," said Emily Barrett, senior author of the latest study, a co-author of the 2022 study and the George G. Rhoads Endowed Legacy Professor at the Rutgers School of Public Health.

"Many questions remain about how to minimize the potential danger of

environmental contaminants and maximize the chances of healthy [pregnancy](#) and fetal development."

**More information:** Carolyn W. Kinkade et al, Associations between mycoestrogen exposure and sex steroid hormone concentrations in maternal serum and cord blood in the UPSIDE pregnancy cohort, *International Journal of Hygiene and Environmental Health* (2024). [DOI: 10.1016/j.ijheh.2024.114405](#)

Provided by Rutgers University

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