

Canine mother baseline metabolites measured

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The Clinic for Animal Reproduction, Faculty of Veterinary Medicine, Freie Universitaet Berlin in Germany, has investigated the intensive molecular changes that take place during dog pregnancy.

In the paper, "Metabolomics during canine pregnancy and [lactation](#)," published in *PLOS One*, the researchers identify [metabolites](#) showing specific changes in [blood serum](#) at different phases of pregnancy and lactation, providing a baseline of normal metabolic changes during a healthy canine pregnancy and birthing.

During pregnancy and giving birth, female dogs have to cope with various challenges such as providing nutrients for the growth of the fetuses, hormonal changes, whelping, nursing, milk production, and uterine involution.

While this may be true for all mammalian mothers, pregnancy-related changes in metabolic parameters are more intensive in dogs than in many other species because [fetal development](#) is rapid. The duration of pregnancy in dogs averages just 63 days, with an average of five to six puppies per litter, though it can be as high as 12. Birthing usually lasts several hours, is laborious, and often exhausting.

The study included 27 privately owned female dogs of 21 different breeds, sampled at six time points: during heat, in early, mid and late pregnancy, at the suspected peak of lactation and after weaning. Researchers quantified 123 molecular measurables, including a comprehensive lipoprotein analysis, fatty acids, triglycerides, cholesterols, [amino acids](#), glycolysis- and fluid balance-related metabolites, and a novel inflammatory marker glycoprotein acetyls, similar to a method utilized in human metabolomics studies on pregnancy.

Metabolites were then grouped into five clusters based on concentration patterns and biochemical relationships between the metabolites: high in mid-pregnancy, low in mid-pregnancy, high in late pregnancy, high in lactation, and low in lactation.

Several metabolites—albumin, glycoprotein acetyls, [fatty acids](#), lipoproteins, glucose, and some amino acids—followed similar patterns during pregnancy and lactation as found in humans. The patterns of branched-chain amino acids, alanine and histidine differed between these species. For most metabolites, it is unclear if observed changes are from resorption from the intestines, modified production, or metabolism in the maternal or fetal tissues.

The researchers hope that knowledge of these molecular changes during [pregnancy](#) and the relation to discrete biological events such as embryo development and placentation will support a better understanding of the processes and the causes of infertility or disease and aid in identifying treatments for these conditions in the future.

More information: Sebastian P. Arlt et al, Metabolomics during canine pregnancy and lactation, *PLOS ONE* (2023). [DOI: 10.1371/journal.pone.0284570](#)

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