Study explores how environmental exposures before conception may impact fetal development
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"A better understanding of these complex processes further our understanding of health and disease and—one day—may be the foundation for new disease prevention measures."

Today's study centers on a gene called nc886, which is one of about 100 "imprinted" genes that pass from the mother to the fetus. Imprinted genes retain important chemical tags applied by either the mother or the father before conception. The result is an "epigenetic memory" through which non-genetic information, such as maternal age, may flow directly from parent to offspring. To date, nc886 is the only known imprinted gene that exhibits variation in the likelihood of imprinting based on maternal factors.

Using data from 1,100 mother-child pairs from South Africa, Jones and colleagues found the imprinting of nc886 was increased in older mothers but decreased in mothers who drank alcohol the year before conception. The team also investigated cigarette smoking but found no impact on imprinting of nc886.

A 2018 study published by Jones and his collaborators demonstrated that failure to imprint nc886 was associated with higher body mass in children at five years of age. Research by other groups also have linked failure to imprint nc886 with increased survival in people with acute myeloid leukemia, an aggressive type of blood cancer. Most recently, a group in Taiwan found that lack of imprinting on nc886 may reduce response to an anti-diabetic drug.

More information: Brittany L. Carpenter et al, Oocyte age and preconceptual alcohol use are highly correlated with epigenetic imprinting of a noncoding RNA (nc886), Proceedings of the National Academy of Sciences (2021). DOI: