Elevated maternal linoleic acid reduces male fetal survival

N. Shrestha,[1] J.S.M. Cuffe,[1] O.J. Holland,[1] A. Cox,[1] A. Bulmer,[1] A.V. Perkins,[1] A.J. McAinch[2,4] and D.H. Hryciw[2,3] [1]School of Medical Science, Griffith University, Southport, QLD 4215, Australia, [2]Institute for Health and Sport, Victoria University, Melbourne, VIC 8001, Australia, [3]School of Environment and Science, Griffith University, Nathan, QLD 4111, Australia and [4]Australian Institute for Musculoskeletal Science (AIMSS), Victoria University, Melbourne, VIC 8001, Australia.

Linoleic acid (LA) is an omega 6 fatty acid that is increasing in consumption, with elevated consumption in women including those of childbearing age. Across species, the consumption of elevated LA has been demonstrated to increase inflammation, and in pregnancy, alter the sex ratio of offspring. This study aimed to investigate whether a maternal diet with elevated LA altered maternal or fetal growth, maternal inflammation, maternal metabolic indicators, or fetal sex-ratio. Female Wistar Kyoto rats consumed a high LA diet (6.21%) or control LA diet (1.44%) with matched omega 3 concentrations (0.3%), for 10 weeks prior to mating. Animals were sacrificed at E20, and maternal body and organ weights, fetal body and organ weights, placental weight, maternal blood and sex-ratio determined.

Compared with maternal rats consuming a control LA diet, a high LA diet had no effect on maternal body weight and organ weight, water and food consumption, impedance, circulating maternal inflammatory mediators, fetal body weight and organ weight, placental weight, or maternal and fetal blood glucose. In litters from mothers consuming a high LA diet, there was a decrease in the number of male offspring.

The sex-ratio change is similar to studies in mice and sheep. This study indicates that the consumption of a maternal diet high in LA may reduce the survivability of male fetuses. Further, the mechanism for this is unknown, but it is not due to an increase circulating maternal inflammatory mediators.