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Effect of gestation on obesity-induced hepatic and placental inflammation in mice

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Introduction Maternal obesity is associated with increased risk of metabolic dysfunction in the offspring. It is not clear which physiological aspects of the obese state that cause this metabolic programming. Obesity causes many metabolic changes but it is also associated with the development of a chronic low grade inflammation. In this study, we have determined if increased low grade inflammation was present in obese dams compared to controls dams during gestation.

Methods Female C57BL/6 mice were fed either a standard chow diet (3% fat) or a highly palatable obesogenic diet consisting of a high fat pellet diet (20% fat) supplemented with sweetened condensed milk. After 6 weeks on the diets, half the mice (n=12) were sacrificed and the remaining half were mated and sacrificed on gestation day 18 (n=8). Blood and tissues were collected for analysis.

Results The obesogenic diet increased adiposity ($p < 0.0001$), adipocyte size ($p < 0.0001$) and leptin ($p < 0.0001$) levels but gestation had no effect on these parameters. There was also a tendency for increased hepatic lipid accumulation in obese mice ($p = 0.05$). Body weight was increased in pre-gestating obese mice ($p < 0.001$), but at the end of gestation there was no change in body weight between control and obese dams. Insulin levels increase in the control dams during gestation ($p < 0.01$), but this effect was not seen in the obese dams due to an elevated insulin level prior to gestation ($p < 0.05$). Blood glucose levels were unaffected by diet or gestation. Local inflammation was assayed by macrophage count on immunohistochemistry stained sections from liver and placenta. Hepatic macrophage count was increased by the obesogenic diet ($p = 0.05$). Gestation reversed the infiltration, so the obese dams showed a significantly lower macrophage count at the end of gestation compared to pre-gestating obese mice ($p < 0.01$), since gestation in general decreased the hepatic macrophage count ($p < 0.001$). Placenta macrophage count was unaffected by the diet.

Conclusion At gestation day 18 obese dams were found not to express increased inflammation in placenta and liver compared to lean dams, despite an incipient hepatic inflammation before gestation. Thus, the obesity associated hepatic inflammation is reversed during gestation and placental inflammation is not induced.