Gestation reverses obesity-induced hepatic inflammation in mice

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Background: Maternal obesity is associated with increased risk of metabolic dysfunction in the offspring. It is not clear which physiological aspects of the obese state cause this metabolic programming. Obesity causes many metabolic changes but also chronic low-grade inflammation.

Objective: In this study, we determined if 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 diet (22% 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: Obesogenic diet increased adiposity ($p<0.0001$), adipocyte size ($p<0.0001$) and plasma leptin ($p<0.0001$) however, gestation had no effect on these parameters. There was also an increased hepatic lipid accumulation in obese mice ($p=0.05$). Body weight was increased in pre-gestating obese mice ($p<0.001$), but this difference was equalized by gestation. Insulin levels increased in the control dams during gestation ($p<0.01$), but this effect was absent in obese dams due to elevated insulin levels before gestation ($p<0.05$). Blood glucose levels were unaffected by diet or gestation. Local inflammation was assayed by macrophage count in liver and placenta. Hepatic macrophage count was increased by the obesogenic diet ($p=0.05$). Gestation reversed the infiltration, so obese dams showed lower macrophage count at the end of gestation compared to pre-gestating obese mice ($p<0.01$). Overall, hepatic macrophage count was decreased by gestation ($p<0.001$). Placenta macrophage count was unaffected by the diet.

Conclusion: 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, obesity-induced inflammation is not maintained during gestation.