Pregnancy is a critical period of development, for both mother and fetus, and is accompanied by transient insulin resistance and adipose tissue accumulation (Musial et al., 2016; Pipe et al., 1979). This insulin resistance and propensity for energy conservation also may be modified by maternal diet and environmental stressors. The timing of feeding is an aspect of diet that is gaining more consideration as a modifiable behavior for improving metabolic health, including being named a priority for the next iteration of the dietary guidelines for Americans (I’ll find this reference tomorrow). Recent studies have detailed the benefits of early time-restricted feeding (eTRF) in improving chronic disease-related outcomes like insulin resistance (Gabel et al., 2018; Sutton et al., 2018), and high blood pressure (Gabel et al., 2018; Stote et al., 2007). Only one study of eTRF during pregnancy has been completed thus far (Upadhyay, 2019); however, maternal insulin resistance, energy conservation and offspring health in the post-natal period were not evaluated.

It is likely that women experience time-restriction of food intake during pregnancy in many

ways; such as food insecurity, hyperemesis gravidarum, while observing Ramadan, and engaging in shift work. I aim to evaluate the mechanism of insulin resistance and energy conservation in normal mouse pregnancy and to investigate how these physiological phenomena respond to time-restricted feeding. I will test the hypothesis that the state of insulin resistance in pregnancy will drive energy conservation and improved absorptive capacity compared to non-pregnant animals. Further, in the setting of early time-restricted feeding (eTRF), insulin resistance in pregnancy will be lessened, which will improve offspring insulin sensitivity and confer resistance to high fat diet feeding.

**Aim 1: Evaluate the molecular components contributing to the propensity for energy conservation, insulin resistance, and digestive efficiency during pregnancy.** Age matched pregnant and non-pregnant female mice will be compared in this study. Energy expenditure, insulin sensitivity, and absorptive capacity will be compared.

**Aim 2: Examine the effect of early time-restricted feeding in the perinatal period on maternal health.** Dams exposed to 8-hour, dark cycle time-restricted feeding will be compared to age-matched *ad libitum* fed controls. Food intake, body composition, energy expenditure, insulin sensitivity, and gestation length will be measured.

**Aim 3: Determine the effect of** **early time-restricted feeding in the perinatal period on offspring health.** Pups of dams exposed to 8-hour, dark cycle time-restricted feeding will be compared to pups of ad libitum fed dams. Survival, birthweight, body composition, insulin sensitivity and resistance to a high fat diet will be measured.

**Aim 4: Determine the prevalence of intentional and unintentional fasting in a local sample of pregnant women and its associations with perinatal health outcomes.** The prevalence of Hyperemesis Gravidarum, breakfast skipping, food insecurity, and length of overnight fast will be evaluated in the Michigan Medicine OB biorepository and their associations with preterm birth, low birthweight/small for gestational age, intrauterine fetal demise, gestational diabetes, and re-eclampsia will be evaluated.

