

Department of Nutritional Sciences
COLLEGE OF ALLIED HEALTH SCIENCES

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 2, 2009

The Department of Nutritional Sciences is pleased to offer the following research project for the summer of 2009. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and if possible, develop a timetable for the twelve-week research period.

NUTRITION, PREGNANCY AND FUTURE DISEASES

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Project Description

Twenty-five to 50 percent of women are obese when they become pregnant. Obesity in pregnancy increases the risk of gestational diabetes and pre-eclampsia, and predisposes the mother for later metabolic and cardiovascular disease. A common problem for the babies of these mothers is fetal overgrowth, which is associated with traumatic birth injuries and the development of the metabolic syndrome in childhood or later in life. The obese, pregnant woman has increased serum levels of pro-inflammatory cytokines and low circulating levels of adiponectin leading to decreased insulin sensitivity, which has been suggested to link obesity in pregnancy to metabolic and cardiovascular disease later in life. Fetal growth is determined by placental nutrient supply and our preliminary data show that placental nutrient transport is increased in obesity. Up-regulation of placental nutrient transporters in obesity may be caused by the abnormal maternal metabolic profile, since high insulin and pro-inflammatory cytokines and low adiponectin have been shown to stimulate placental nutrient transport. Approximately one third of all women enter pregnancy being obese and despite the serious adverse consequences for the health of the woman and her child, no specific treatment is currently available. The **aim of our study** is to supplement the diet of obese pregnant women with docosahexaenoic acid (DHA), a safe, low cost, readily available dietary component that we have shown is extremely low in the diet of our mid-western urban population (10% of recommended levels for pregnancy). This omega-3 fatty acid has been shown to have a significant impact on improving insulin sensitivity and circulating levels of pro-inflammatory cytokines and adiponectin in non-pregnant obese women. DHA has been studied extensively as a dietary supplement in pregnancy as a potential mechanism to improve cognitive function in children. However, the effect of DHA maternal metabolic status and placental function has not been previously reported. We **hypothesize** that DHA supplementation will improve maternal insulin sensitivity, reduce pro-inflammatory cytokines, increase circulating adiponectin, down-regulate placental nutrient transport, and reduce fetal growth. Our **approach** for this pilot study will be to recruit 90 obese (BMI 30-45), pregnant women in mid gestation and then randomize them into the placebo or DHA treatment (800 mg/day) group. Subjects will be studied again in late gestation after 12 weeks of supplementation. In **Aim 1**, we will determine the effect of DHA supplementation on maternal inflammatory status and insulin sensitivity. In **Aim 2**, we will establish the impact of DHA supplementation on placental nutrient transport and fetal growth. We propose that improved maternal metabolic status and reduced nutrient delivery to the fetus will result in a significant improvement in the long term health of women and their children.