

Department of Clinical Laboratory Sciences

Graduate Masters Theses

Plasma Malondialdehyde and 8-Isoprostane as Markers of Oxidative Stress in Type 2 Diabetic patients and the effect of *Ginkgo biloba* as an Antioxidant. Ariel Welch, MS. May, 2009.

ABSTRACT:

The literature continues to show a significant link between oxidative stress and chronic diseases such as cancer and diabetes. In the case of diabetes, hyperglycemia appears to be a significant contributor to oxidative stress which is also linked to diabetes related complications. In an effort to reduce oxidative stress and the difficulties associated with it, antioxidant therapies are being used. *Ginkgo biloba* extract has been shown to be one of these potent antioxidants. Previous studies using a randomized double-blind placebo-control crossover procedure found that the ingestion of *Ginkgo biloba* extract (120 mg as a single dose daily for 3 months) significantly reduced platelet lipid peroxidation (measured as malondialdehyde, MDA) in both healthy control subjects and type 2 diabetic subjects. Using stored plasma samples from those earlier studies the present study examined a selection of healthy control subjects (n=12; age 44 ± 9 years; fasting plasma glucose 93 ± 13 mg/dl; body mass index 28.9 ± 5.2 kg/m²) and type 2 diabetic subjects (n=6; age 50 ± 16 years; fasting plasma glucose 147 ± 37 mg/dl; body mass index 32.17 ± 6.4 kg/m²) to determine if the plasma and urinary markers of oxidative stress were similarly reduced. It was found that the ingestion of *Ginkgo biloba* extract did not significantly alter plasma MDA levels in healthy controls subjects (4.6 ± 1.0 μ M vs 4.3 ± 0.6 μ M; p=0.1357) or diabetic subjects (4.3 ± 1.2 μ M vs 4.2 ± 1.1 μ M; p=0.1736) between the placebo and *Ginkgo biloba* cycles, respectively. The ingestion of the extract also did not alter urine 8-Isoprostane (8-iso-PGF_{2 α}) levels in healthy control subjects (0.30 ± 0.13 μ g/mg creatinine vs 0.43 ± 0.34 μ g/mg creatinine; p=0.0918) or type 2 diabetic subjects (0.23 ± 0.17 μ g/mg creatinine vs 0.31 ± 0.14 μ g/mg creatinine; p=0.2005). The ingestion of the extract did, however, produce a significant difference in the total antioxidant capacity in the healthy controls subjects (0.55 ± 0.04 mM vs 0.52 ± 0.05 mM; p=0.0174) but not in the diabetic subjects (0.55 ± 0.04 mM vs 0.57 ± 0.03 mM; p=0.2327). In conclusion, the ingestion of *Ginkgo biloba* extract did not result in a significant difference in the plasma level of MDA or urinary 8-Isoprostane, perhaps because MDA and 8-isoprostane are both producers of arachidonic acid metabolism, which is located on the plasma membranes. The total antioxidant capacity was significantly reduced in the healthy controls but not in the diabetics because of increased oxidative stress in diabetic subjects.