

Determination of Plasma Free Fatty Acids from Juvenile Obese by GC-MS after Converting Acids into Weinreb Amides

**S.J. Kumari A Ubhayasekera,¹, Johan Staaf², Anders Forslund³, Peter Bergsten²,
Jonas Bergquist¹**

¹Analytical and Neurochemistry, Department of Chemistry-Bio Medical Center, Uppsala University, Box 599, 751 24, Uppsala, Sweden

²Department of Medical Cell Biology, Uppsala University, Box 571, 751 23, Sweden

³Department of Women's and Children's Health, Teaching Hospital, Uppsala University, SE-75185 Uppsala, Sweden

E-mail: kumari.ubhayasekera@kemi.uu.se

Plasma free fatty acids (FFA) play important physiological roles in skeletal muscles, heart, liver and pancreas. Elevated FFA closely related with childhood obesity is a major cause of surging numbers of young individuals developing type 2-diabetes. Not only obesity but also obesity related complications have been reported. The fatty acid palmitoleate has documented “cytoprotective” effects on the insulin-producing β-cells. We hypothesized that elevated circulating palmitoleate levels in the young obese individuals correlated with improved β-cell function as manifested in lowering of fasting insulin levels. To test the hypothesis fasting insulin and FFA levels were measured in 50 young obese (ISO-BMI >35) subjects. Various methods have been used to analyze FFA due to the unavailability of a standard method. In this study, a simple, direct and accurate method for the determination of FFA in human plasma was developed by converting the plasma FFA into its acid fluorides and then into Weinreb amides (dimethylamide) in one flask. This derivatization method is very mild and efficient, and selective only towards to FFA. The present method provides a precise measurement of quantification when analyzed with capillary gas chromatography tandem mass spectrometry (DB5-MS 30m x 0.18mm, 0.18μm). The established method showed good accuracy. Standard curves were linear over the range of 1-25 μg/mL for both palmitic and palmitoleic acids where the correlation coefficient was 0.998 with coefficient of variation below 10%. The GC-MS technique was reproducible and repeatable for both palmitic and palmitoleic acids. The recoveries were above 90% for both palmitic and palmitoleic acids. The results demonstrate the suitability of Weinreb amides for efficient and rapid isolation of FFA from plasma prior to quantitative GC-MS analysis.