CHAPTER 6

Characterisation of plasma Homocysteine by FTIR Spectroscopy

Abstract

Accumulation of homocysteine is a potentially severe complication because of the association between homocysteine levels and cardiovascular disease. If homocysteine is not completely broken down it begins to cause oxidative damage to the walls of the arteries, oxidation of blood fats and abnormal blood clotting by making the platelets stick together leading to atherosclerotic vascular disease. Recent population based observations demonstrate that plasma total homocysteine concentration are elevated in patients with renal insufficiency and that a lower glomerular filtration rate (GRF) is associated with a higher plasma homocysteine concentration. Also habits such as smoking and alcoholism elevate plasma homocysteine levels as they destroy the cofactors involved in the metabolism of homocysteine. The present study aims at employing FTIR spectroscopy for analyzing the blood plasma of patients with elevated homocysteine levels to detect spectral parameters which might serve as biomarker for identifying and detecting homocysteine levels. The FTIR spectrum of blood plasma of the patients were recorded and analyzed. The analysis led to the identification of specific modes of vibration pertaining to homocysteine in blood plasma. The internal ratio parameter was calculated. The absorbance values at these specific modes of vibration varied significantly from that of healthy volunteers. These parameters could be used as a basis for deriving a spectral method for determining and measuring plasma homocysteine spectroscopically.