

Feasibility study to identify human plasma proteins using Matrix Assisted Laser Desorption Ionization Time of Flight (MALDI-TOF) mass spectrometry

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A project has been initiated to identify proteins in the blood of cancer patients. Plasma, one of the major components of blood, has been chosen for this study as it is easily separated. In addition it consists of a large number of proteins compared to any other tissue, cell or organ. Therefore, the plasma *proteome* is an ideal source of diagnostic markers and therapeutic targets for many human diseases.

In this study, One Dimensional Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis (1D – SDS - PAGE) coupled with Matrix Assisted Laser Desorption Ionization Time Of Flight (MALDI-TOF) Mass Spectrometry (MS) has been used to identify plasma proteins. In order to investigate the feasibility of this technique, plasma from healthy individuals has been used. Plasma samples were electrophoresized under denaturing conditions and silver staining was carried out to visualize proteins. A total of 40-50 gel protein bands were detected in healthy individuals and of these, selected protein bands were excised, trypsinized and then subjected to MALDI-TOF-MS analysis. The identification of proteins was performed by peptide mapping using sequence databases. The mass of peptides derived from an in-gel proteolytic digestion were measured and subsequently searched against the protein databases available on internet.

By using the above technique, the major plasma proteins, Transferrin, Macroglobulin alpha 2, Albumin, Proapolipoprotein and a few other plasma proteins were identified with sequence coverage range of 16 – 54 %. It has been possible to obtain sequences of all the identified proteins as well as their few modifications. This technique, already being employed at the Department of Physics, University of Colombo, could be applied to identify plasma proteins in cancer patients in Sri Lanka by comparing their protein profiles with those of healthy persons. The results of this work clearly indicate that the particular technique has the potential as a tool of clinical investigations.

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