Research Article

Application of champedak mannose-binding lectin in the glycoproteomic profiling of serum samples unmasks reduced expression of alpha-2 macroglobulin and complement factor B in patients with nasopharyngeal carcinoma

The use of lectin affinity chromatography prior to 2-DE separation forms an alternative method to unmask the expression of targeted glycoproteins of lower abundance in serum samples. Reduced expression of alpha-2 macroglobulin (AMG) and complement factor B (CFB) was detected in sera of patients with nasopharyngeal carcinoma (NPC) when pooled serum samples of the patients and those of healthy individuals were subjected to affinity isolation using immobilized champedak mannose-binding lectin and analyzed by 2-DE and densitometry. The AMG and CFB spots were not detected in the 2-DE protein profiles when the same pooled serum samples were subjected to albumin and IgG depletion and neither were they detected when the depleted samples were analyzed by western blotting and lectin detection. Together with other acute-phase response proteins that were previously reported to be altered in expression in NPC patients, AMG and CFB may serve as useful complementary biomarkers for NPC.

Keywords: alpha-2 Macroglobulin / Biomarker / Complement factor B / Lectin / Nasopharyngeal carcinoma

DOI 10.1002/elps.201000164

1 Introduction

Early diagnosis of cancer provides improved chances of survival for patients. Yet the diagnosis of cancer is often difficult and involves invasive procedures. Nasopharyngeal carcinoma (NPC), a type of head and neck carcinoma common in Southeast Asia and Southern China [1], is no exception and depicts these difficulties well. Its nonspecific presenting features render it hard to detect, and the diagnosis of NPC is done mainly by obtaining a biopsy of the NPC mass. Hence, the discovery of easily accessible biomarkers that are specific to NPC, particularly from the serum, will greatly improve its diagnosis and subsequent treatment.

Currently, only a few biomarkers are used as diagnostic tools for certain types of cancers and these include prostate-specific antigen for prostate cancer and CA125 for ovarian cancer [2, 3]. Not only are these biomarkers present in low abundance in the serum, their use is often unreliable [4, 5]. With the recent advance in proteomics, it appears that instead of relying on a single tumor marker, a series of serum proteins may be able to discriminate different types of cancers when analysed simultaneously.

One of the main technical difficulties in studying serum proteins via proteomics is that a handful of proteins such as albumin, immunoglobulins and transferrin dominate the total protein content of serum, whereas the rest of the proteins are only present in trace amounts [6]. One way of overcoming the technical difficulties is to deplete albumin and other high-abundant proteins from serum prior to the analysis of the proteins via 2-DE. This allows the visualization of lower abundant proteins. A second approach is to reduce the complexity of serum proteins by focusing on sub-proteomes of serum. For example, lectins may be used to enrich and profile serum glycoproteins specifically.

Lectins are carbohydrate-binding proteins and their application is diverse. Through conjugation into affinity