



Nuclear magnetic resonance-based study reveals the metabolomics profile of nasopharyngeal carcinoma

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ABSTRACT. Proton nuclear magnetic resonance (¹H-NMR) spectroscopy has been used to investigate metabolites in serum and several types of tissue. We used NMR spectroscopy to explore the differential metabolic profiles in serum from nasopharyngeal carcinoma (NPC) patients. Moreover, metabolites with potential as biomarkers for identifying NPC patients were primarily identified. Serum samples were collected from 40 enrolled participants comprising 20 healthy subjects and 20 NPC patients. Samples were analyzed using a 600-MHz NMR spectrometer. The ¹H-NMR spectra were further analyzed with partial least squares-discriminant analysis for screening differential metabolites. NMR spectroscopy identified a total of eight metabolites that were present at different levels when the sera of NPC patients were compared with those of healthy individuals. Methionine, taurine (P < 0.05), and choline-like metabolites (P < 0.05) were mostly elevated in the sera of NPC patients. In contrast, the levels of lipids (P < 0.01), isoleucine (P < 0.05), unsaturated lipids (P < 0.01), trimethylamine

oxidase ($P < 0.05$), and carbohydrates ($P < 0.05$) were lower in the sera of the NPC patients than in the healthy controls. We explored the differential metabolic profiles in sera from NPC patients. $[^1\text{H}]$ -NMR spectroscopy can be used to identify specific metabolites, and is capable of distinguishing between NPC patients and healthy individuals.

Key words: Nasopharyngeal carcinoma; Metabolomics; NMR spectroscopy