N-Glycan Expression Analysis of Formalin-Fixed Paraffin-Embedded Tissues of Surgical Specimens Obtained from Patients with Renal Cell Carcinoma

Introduction and Objective: Glycosylation is one of the most common post-translational modification reactions. Aberrant glycosylation has been implicated in tumourigenesis and tumour progression in various types of cancers. However, most of the glycosylation studies were performed using serum samples, and only few studies have used surgical specimens. This is the first study in which formalin-fixed paraffin-embedded (FFPE) tissues of surgical specimens have been used to investigate the N-glycan expression in patients with renal cell carcinoma.
Materials and Methods: Eleven FFPE tumor tissues were obtained from patients with renal cell carcinoma who had undergone nephrectomy at our institute. Nine tumors were clear cell carcinoma and 2 were chromophobe cell carcinoma. These samples included 7 matched pairs of the tumour and normal tissues of the kidney. N-glycan expression analysis was performed by integrating glycoblotting and matrix-assisted laser desorption/ionisation-time of flight mass spectrometry (MALDI-TOF-MS). The peaks were selected only if the estimated structures were reported in the GlycoSuite Database. Furthermore, glycotyping analysis was performed.
Results: A total of 103 N-glycans were detected and quantified using MALDI-TOF-MS. The mean amount of total N-glycans in the tumour tissues was 1914.6 pmol/200 µg of protein (range, 1100–3061.7 pmol/200 µg of protein) and that in normal tissue was 2624.3 pmol/200 µg of protein (range, 1794.3–5298.8 pmol/200 µg of protein). In 3 of the 7 matched pairs, the amount of total N-glycans in the tumour tissues was higher than that in the normal tissue. There is no specific profile of N-glycan expression levels between tumour and normal tissue in 7 matched paired samples. However, the expression levels of 2 N-glycans (*m/z,* 1340.537 and *m/z,* 1486.604) in chromophobe cell carcinoma were drastically increased compared to those in clear cell carcinoma. With regard to glycotyping, no specific pattern about the fucosylated type, sialylated type, and the other type was detected between tumours and normal tissues.
Conclusions: Glycoblotting and MALDI-TOF-MS enabled N-glycan analysis of FFPE samples of renal cell carcinoma. Our preliminary study suggested that 2 N-glycans could serve as markers for chromophobe cell carcinoma.