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Glycopathological Profiling of Acquired Cystic Disease Associated Renal Cell Carcinoma

Kunio Kawanishi
University of Tsukuba, Japan

Acquired cystic disease-associated renal cell carcinoma (ACD-RCC) is distinctively categorized in the 2016 WHO Classification. ACD-RCC is the most common RCC developed in a background of acquired cystic kidney disease (ACKD) in end-stage renal disease (ESRD). Although clinicopathological characteristics such as calcium oxalate crystal accumulation and α-methylacyl-coenzyme A racemase overexpression were identified, the detail mechanism of how ACD-RCC develops in ESRD is not completely elucidated. Since many noninherited diseases are influenced by acquired changes in glycan synthesis or recognition, we focused on ACD-RCC-relevant changes in protein glycosylations by tissue glycomic profiling using lectin microarray of formalin-fixed paraffin-embedded (FFPE) samples isolated with laser microdissection. The lectin microarray analysis revealed, as an example, that the degree of sialylation of glycoproteins was significantly elevated in ACD-RCC compared to clear cell RCC in ESRD. Sialylation was also significantly elevated in clear cell RCC patients with ESRD than in the patients without ESRD, which is partly associated with previous findings that sialic acid accumulation occurs in ESRD patients due to an antagonizing function of evolutionally conserved enzymes upon excess D-mannose. We also established a low-vacuum scanning electron microscope (LVSEM) imaging combined with lectin stain for the ultrastructural analysis. Further work is required, but our glycopathological approach could characterize ACD-RCC specific glycosylation patterns from FFPE samples and may be useful for an evaluation of its clinical significance as a possible tumor marker.