

Fast Grading Colon Cancer by using Wax-Physisorption-Kinetics-based FTIR Imaging

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KEY WORDS: Colon cancer, FTIR imaging, Wax Physisorption Kinetics, neosynthesis.

Hypoxia-induced neosynthesis altered cell surface glycan residues covalently attached to protein, glycan of glycoconjugates, and made glycan elongation on the cell surface of colon cancer than those of normal tissue. Neosynthesis of glycan of surface layer glycoconjugates play a crucial role during the cancer development and progression. A novelty of human colon cancer screening by using wax-physorption-kinetic FTIR (WPK-FTIR) imaging by using n-pentacosane and beeswax as screening agents for discriminating relative chain length of oligosaccharides in the cell surface molecules[1-3]. Goblet cells (GC) and Epithelial cells (EC) of colon tissue in the well-differentiated tissue area in course of the WPK-FTIR imaging exhibited a relative shorter chain-length glycan of glycoconjugates within neoplasm as compared with the area of malignancy, whereas longer chain-length glycan were observed in EC of crypts and inflammatory cells (IC) in the area of mucosa of the poor-differentiated tissue section. Consequently, the chain length of glycan of glycoconjugates within the benign and malignant tissue was suggested to be respectively similar to n-pentacosane and beeswax. The temporal profile of the amount of remained wax onto colon tissue sections in the course of acid-catalyzed hydrolysis (ACH) elucidated that shorted glycan of glycoconjugates was observed at different stages of cancer as hydrolysis. Benign tumor showed an exponential decreasing for both n-pentacosane and beeswax remain as deglycosylation by hydrolysis; nevertheless, pre-cancerous area in early stage malignant colon tumor exhibited a Gaussian distribution and the maximum amount of n-pentacosane residue at 3th second. Moreover, late stage malignant colon tumor exhibited two or more maxima of n-pentacosane residues during the hydrolysis, which might indicate several cancer grades developed within malignant tissue. We proposed that there was a strong correlation between progression of colon cancer and chain length of glycan of glycoconjugates in colon cancer. The WPK-FTIR imaging coupled with ACH would have potential for fast grading colon cancer in the future.

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