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Usefulness of galactose oxidase-Schiff test in rectal mucus for screening of colorectal malignancy.

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Abstract

Based on a "field-effect" theory in colon carcinogenesis, and the expression of the disaccharide tumor marker D galactose-beta-[1-->3]-N-acetyl-D-galactosamine (Gal-GalNAc) in the rectal mucus of patients with cancer and precancer of the colon, Shamsuddin developed a simple, accurate, inexpensive, easy to perform and rapid (< or = 15 min) screening test for colonic cancer and precancerous lesions. In this study we examined 137 rectal mucus samples of randomly selected patients with colorectal malignancy or other colorectal diseases to confirm the sensitivity and specificity of this test in Croatia. Additionally, to test the validity of the "field-effect" theory, that the mucosa away from the obvious cancer will show abnormalities as a result of the generalized effect of the carcinogen throughout the entire field of the target tissue, we also monitored a subset of 53 patients post-operatively. Individuals free of colonic or any other malignancies served as control (n = 31). The rectal mucin was smeared on membrane filter and developed by a sequential reaction of galactose oxidase (GO) and Schiff's reagent. The test results were correlated to the findings from colonoscopy/surgery and histopathology. The sensitivity of the test was shown to be 100% and the specificity was 96.8% ($p < 0.001$). Interestingly, the test was positive in 60% (32 of 53) of the samples collected from patients after tumor resection, showing the persistence of the biochemical changes even though malignant tumors were removed, hence supporting the field-effect phenomenon of carcinogenic stimuli. Five patients out of these 32 (16%) postoperative cases with positive GO test had a tumor recurrence within a year ($0.05 < p < 0.10$), suggesting that a persistently positive GO test in this population may serve as a predictor of tumor recurrence. We conclude that Gal-GalNAc is an early and intermediate biomarker, suitable not only for the detection of malignancy in its inception, but also for monitoring of people at high risk for cancer, and the efficacy of the cancer therapy as well as secondary prevention by this technology.