

Research Paper

Demonstration of Mucins in Gastrointestinal Tract Carcinoma Lesions in Sudanese Patients

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Abstract: *It seems that demonstration of mucins is important in assessment and classification of gastrointestinal carcinomas. It has been noticed that increased mucin production occurs in many cancers, including adenocarcinomas of pancreas, lung, breast, ovary, and colon. The aim of the present study was to demonstrate and identify the different types of mucins and their relationship with gastrointestinal tract carcinoma lesions in Sudanese patients. Tissue sections from formalin-fixed paraffin-embedded tissue blocks of gastrointestinal tract carcinoma lesions were stained by the following histological stains to demonstrate different mucins: Hematoxylin and Eosin, Periodic acid-Schiff's (PAS), Alcian Blue, combined Alcian Blue-PAS, and combined Alcian Blue-Aldehyde Fuchsin. Neutral mucin was the most prominent in esophageal and gastro esophageal carcinomas while acid mucin was the most prominent in carcinomas of colon, rectum and stomach. Carboxylated mucin was the most prominent type of acid mucins in all GIT carcinomas. It can be concluded that demonstration of different mucins in GIT carcinomas may assist in their classification and predicting prognosis and behavior of the tumor.*

Keywords: Acid Mucin, Carboxylated Mucin, GIT Carcinoma, Neutral Mucin, Sulphated Mucin.

Introduction

Mucins are glycoproteins of high molecular weight that are synthesized, stored and secreted by the epithelial mucosal cells of several organs including gastrointestinal tract. [1, 2] Their general structure and biochemical composition provides protection for the cell surface against pathogens and toxins. [3, 4] Mucins are classified into neutral mucins and acidic mucins; the latter include sulpho and sialo mucins. The neutral mucins can be found primarily in the surface epithelia of the stomach, Brunner's glands of the duodenum and in the prostatic epithelium. The acid mucins are found widely distributed throughout the gastrointestinal tract and the respiratory tract. [5] Increased mucin production is indicative of many cancers, including cancers of the pancreas, lung, breast, ovary, urinary bladder, colon and other tissues. [6]

Several staining techniques can be used in the clinical histology laboratory to demonstrate mucins. [7] Alcian Blue is used alone to demonstrate acid mucins and combined with PAS staining procedure to demonstrate both acid and neutral mucins; Alcian Blue will stain acidic mucins blue and PAS will stain neutral mucins rose red. [8] Combination between Aldehyde fuchsin and alcian blue is used to distinguish between sulphated and carboxylated acid mucins (staining purple for sulphated mucin and blue for carboxylated mucin). [9, 10]

The purpose of the current study was to demonstrate and classify mucins in formalin-fixed paraffin-embedded gastrointestinal tract cancer lesions of Sudanese patients.

Material and Methods

This was a retrospective descriptive study included hundred paraffin-embedded formalin-fixed tissue blocks of gastrointestinal tract cancer lesions obtained from the archives of the histopathology departments of Khartoum hospitals during the period between October 2010 and March 2011.

Every tissue block was cut by a rotary microtome into five 5 μ –thick sections. Each section was mounted on a new frosted-end glass slide, dried, deparaffinized, hydrated by deionized water, and stained by one of five staining methods. The first slide was stained by the H&E (Hematoxylin and Eosin) method to confirm the histopathological diagnosis that obtained from the records. The second slide was stained by Alcian Blue technique to identify Acid Mucin. The third slide was stained by Periodic acid-Schiff's (PAS) to identify Neutral Mucin. The fourth slide was stained by combined Periodic acid-Schiff's (PAS) and Alcian Blue to distinguish between neutral and acidic mucin. The fifth slide was stained by Aldehyde fuchsin/alcian blue technique to distinguish between sulphated and carboxylated acid mucin. The slides were then viewed and assessed by using a light microscope. All quality control measures were followed carefully. Simple statistical methods were used for analysis of results and clinical data.

Results and Discussion

Cases in this study included 44 cases adenocarcinomas of the colon, 21 cases rectal carcinoma, 15 cases Gastric Carcinoma, 10 cases esophageal carcinoma, and 10 cases gastro esophageal carcinoma (Table No 1).

The main result in this study was that both types of mucin were almost similar in distribution in most parts of the GIT. Neutral mucin was the most prominent in esophageal and gastro esophageal carcinomas while acid mucin was the most prominent in carcinomas of colon, rectum, and stomach. Carboxylated mucin was the most prominent type of acid mucins in all GIT carcinomas (Table No 2). JR JASS [11] studied 22 cases of esophageal adenocarcinomas and found that well differentiated adenocarcinomas secreted sulpho mucins and poorly differentiated ones secreted sialo mucins and

neutral mucins. Although esophageal carcinoma cases were few in this study (only 10 cases), results seem to be similar to JR JASS study.

Prathima S and Harendra Kumar ML [12] studied 27 cases of gastric adenocarcinomas and found 19 cases secreted both neutral and acidic mucins. Ganesh IM and colleagues [13] found significant staining of sialo mucins and mild staining of neutral mucins in gastric carcinoma compared to normal gastric mucosa. Wabinga HR [14] in his study of mucin secretion by gastric carcinoma cells by Alcian blue/PAS stain in 30 cases found that in 84% of cases the tumor cells secreted either neutral or mixed mucins. In this study, gastric adenocarcinomas lesions secreted both neutral and acid mucins with predominance of carboxylated mucins (sialo mucins).

Ionila M et al [15] investigated 149 cases of colon adenocarcinomas and proved the predominance of mixed mucinous adenocarcinomas. Biochemically, the predominant cases were those with acidic mucins with the prevalence of sialo mucins over sulpho mucins (68%). Clinical pure mucinous forms were detected mainly in advanced stages. Mirna HF et al [16] reported that colorectal mucinous adenocarcinomas showed a higher tumor grade than non- mucinous adenocarcinomas. Usman Ali and colleagues [17] studied 16 cases of adenocarcinomas of the colon and observed predominance of acid mucins over neutral mucins. In the present study, acid mucins in colon carcinoma casers predominate over neutral mucins and carboxylated mucins predominate over sulphated mucins.

Table 1: Grading of GIT Carcinomas in this study

	Well Differentiated	Moderately Differentiated	Poorly Differentiated
Colon Carcinoma	44	---	---
Rectal Carcinoma	14	4	3
Gastric Carcinoma	8	---	7
Esophageal Carcinoma	5	5	---
Gastro esophageal Carcinoma	4	---	6

Table 2: Positive results of Mucins in GIT carcinomas of this study

	Neutral Mucin	Acid Mucin	Sulphated Mucin	Carboxylated Mucin
Colon Carcinoma	21/44 (48%)	24/44 (55%)	5/24 (21%)	19/24 (79%)
Rectal Carcinoma	11/21 (52%)	11/12 (52%)	3/11 (27%)	8/11 (73%)
Gastric Carcinoma	8/15 (53%)	9/15 (60%)	1/9 (11%)	8/9 (89%)
Esophageal Carcinoma	6/10 (60%)	4/10 (40%)	1/4 (25%)	3/4 (75%)
Gastro esophageal Carcinoma	6/10 (60%)	4/10 (40%)	3/4 (75%)	1/4 (25%)

Conclusions

From this study, it can be concluded that demonstration and identification of different types of mucins in GIT carcinomas can assist in their classification and predicting prognosis and behavior of the tumor.

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