

**GASTROINTESTINAL BLOCK**  
**PATHOLOGY LECTURE**  
**2016/2017**

**Benign Tumors of Intestine**

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# LEARNING OBJECTIVES

- Know the classification of intestinal tumors (small intestine and colon)
- Know the definition of a polyp.
- Compare adenomatous polyps and hyperplastic polyps with respect to pathology (gross and microscopic features).
- Know the three subtypes of adenomatous polyps, eg, tubular adenoma, villous adenoma, tubulovillous adenoma.
- Describe the adenomatous polyp-cancer sequence and the features associated with risk of malignancy, eg, polyp size, histologic architecture, and severity of epithelial dysplasia.
- Describe the classification of the hereditary syndromes involving the GI tract and the syndromes associated with an increased risk of cancer (Peutz-Jeghers syndrome, familial adenomatous polyposis, and hereditary nonpolyposis colorectal carcinoma)



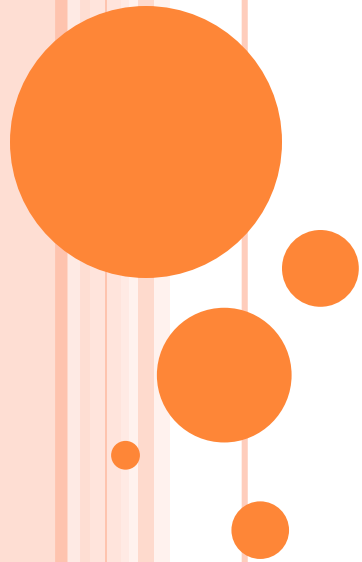
# TUMORS OF THE SMALL AND LARGE INTESTINES

*Polyps*

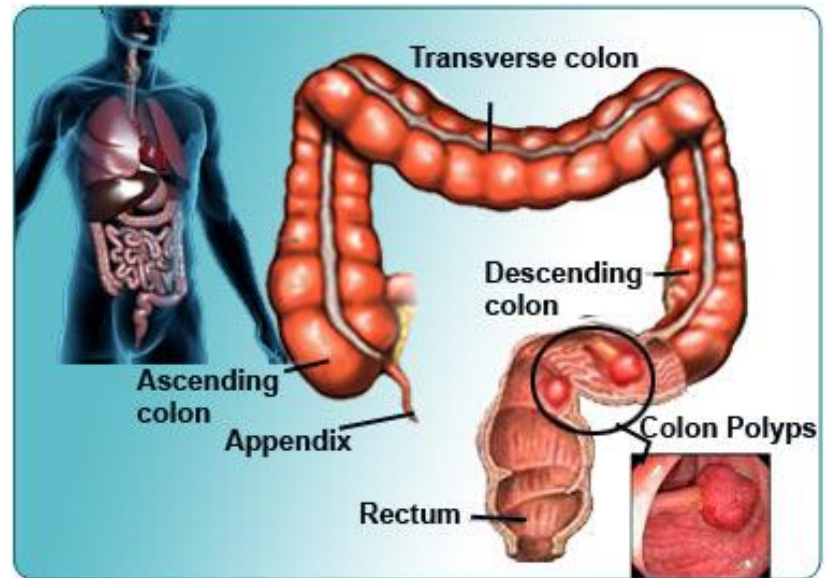
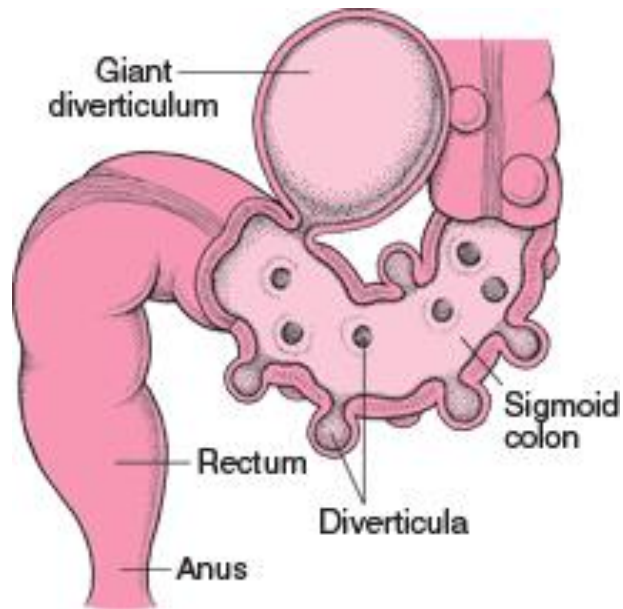
*Carcinoma*

*Carcinoid tumor*

*Lymphoma*



- Sigmoid colon: Most common site GI polyps, diverticula and cancer

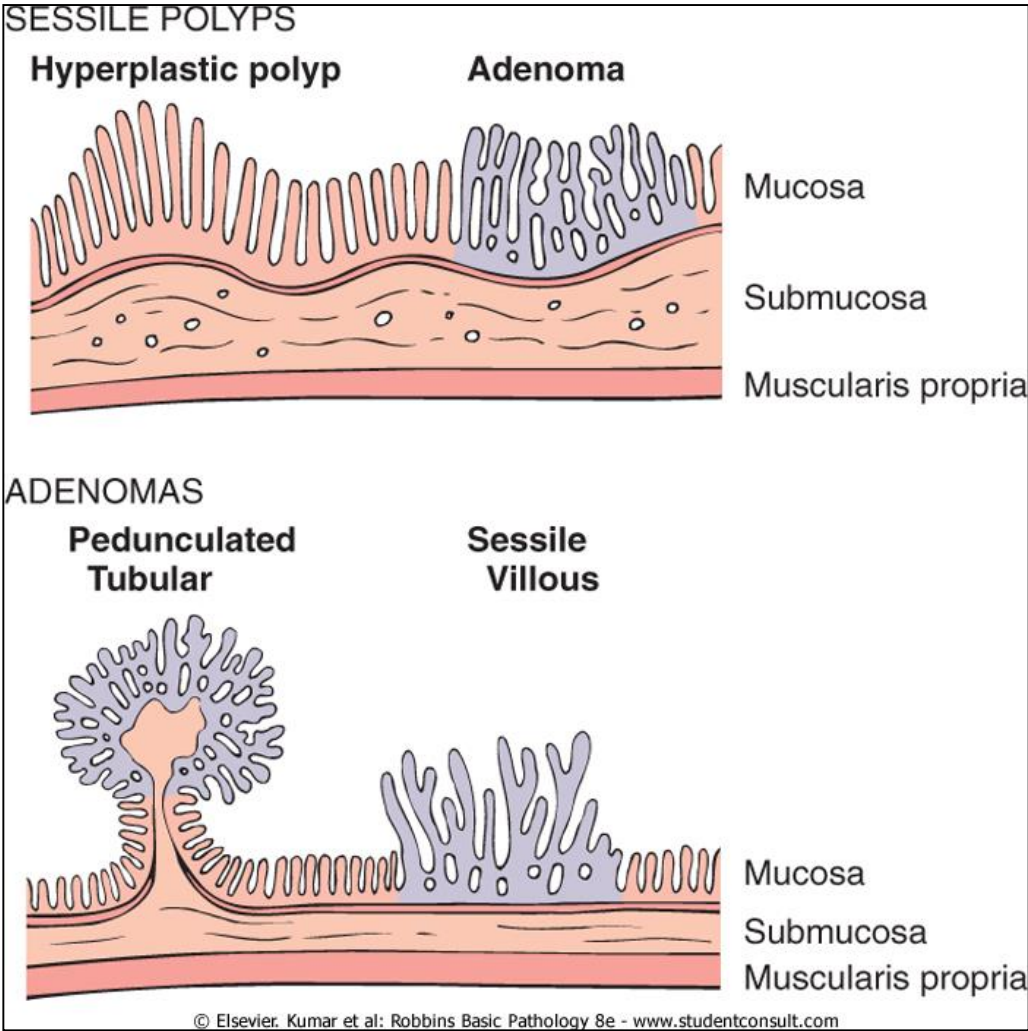


# *POLYPS*

- ***Non-neoplastic polyps***    **90%**
  - Hyperplastic polyps
  - Hamartomatous polyps (Juvenile & Peutz-Jeghers polyps)
  - Inflammatory polyps
  - Lymphoid polyps
  
- ***Neoplastic polyps***    **10%**
  - Adenoma

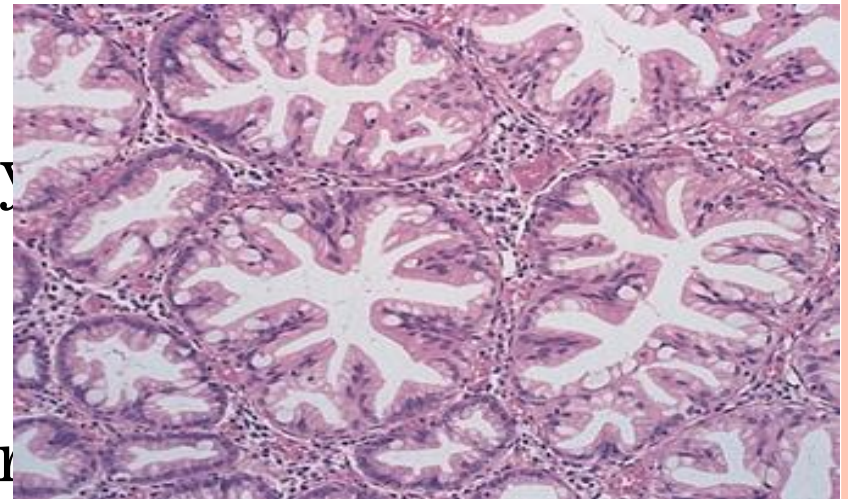
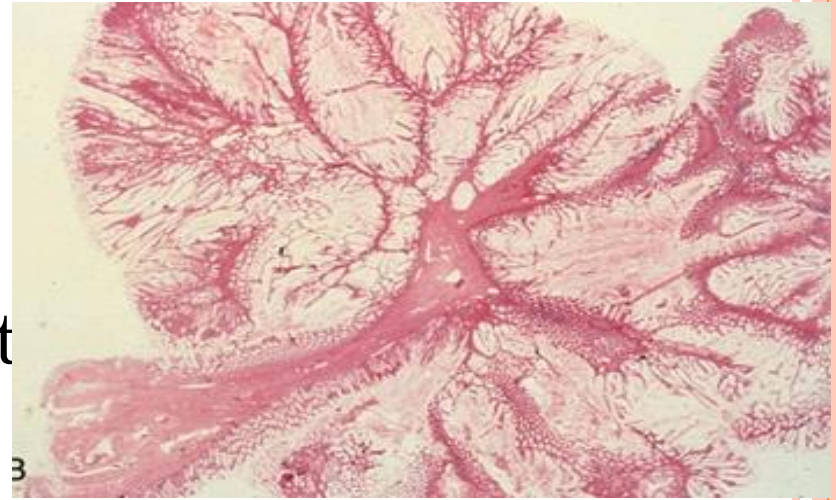


# POLYPS

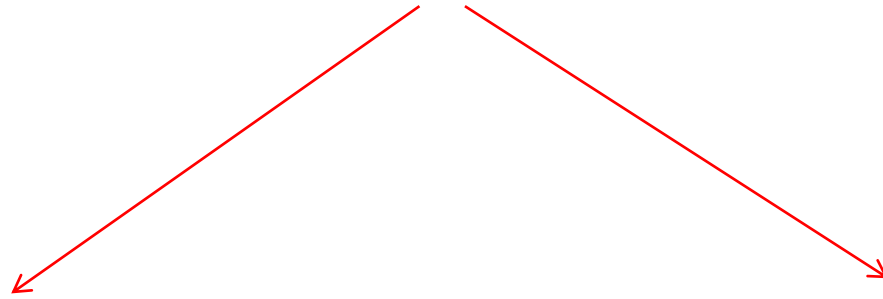


### Hyperplastic Polyp

- Asymptomatic
- > 50% are located in the rectosigmoid
- Most common type in adult
- Sawtooth surface
- Star shaped crypts
- Composed of well-formed glands and crypts lined by differentiated goblet or absorptive cells.
- No malignant potential or polyposis syndromes



## Hamartomatous polyps



Juvenile polyps  
Retention polyp

Peutz-Jeghers  
polyps





# HAMARTOMATOUS POLYP

### Juvenile Polyps (retention polyp)

- Developmental malformations affecting the glands and lamina propria
- Commonly occur in children under 5 years old in the rectum.
- In adult called retention polyp.
- no malignant potential

### Juvenile polyposis

- Autosomal dominant
  - TGF- $\beta$  signaling pathway abnormalities
  - Juvenile polyps; risk of gastric, small intestinal, colonic, and pancreatic adenocarcinoma
- Cronkhite-Canada syndrome
  - Nonhereditary polyposis syndrome
  - Polyps plus ectodermal abnormalities (Nail atrophy, hair loss, abnormal skin pigmentation) cachexia, and anemia



# HAMARTOMATOUS POLYP

Juvenile Polyps (retention polyp)



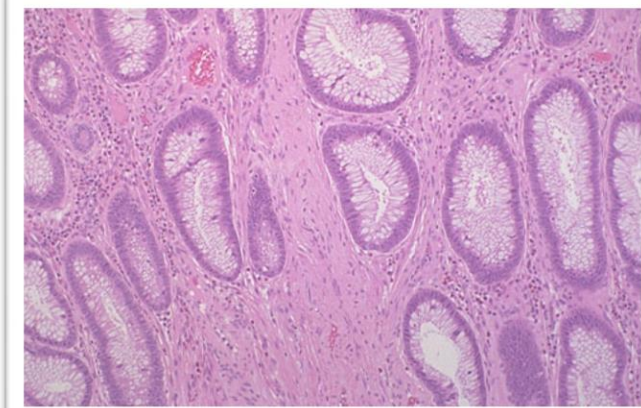
Smooth eroded surface with numerous mucus retention cysts, typical of sporadic juvenile polyps.



# HAMARTOMATOUS POLYPS

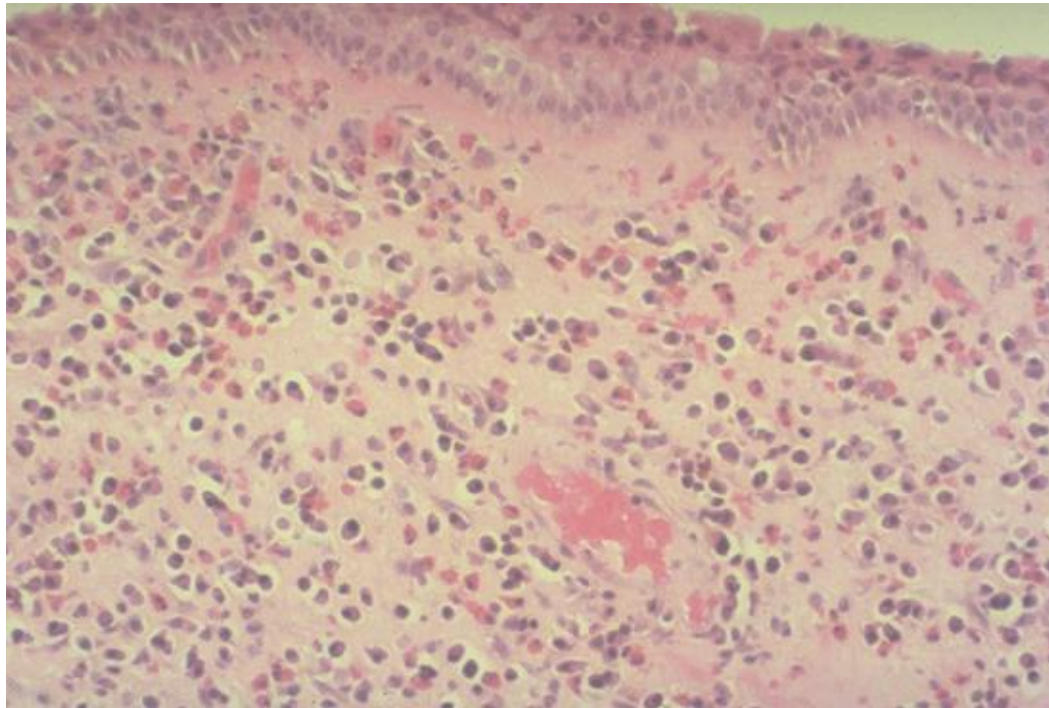
## Peutz-Jehgers syndrome

- Rare, autosomal dominant
- hamartomatous polyps accompanied by mucosal and cutaneous pigmentation around the lips, oral mucosa, face and genitalia, present with red blood in stool.
- Polyps tend to be large and pedunculated.
- Increased risk of developing carcinoma of the pancreas, breast, lung, ovary and uterus.



# Inflammatory Polyps

- longstanding IBD, especially in chronic ulcerative colitis.
- Represent an exuberant reparative response to longstanding mucosal injury called pseudopolyps





**LYMPHOID POLYPS**



## NEOPLASTIC POLYPS (ADENOMAS)

### *Adenomatous Polyp ( adenoma )*

- Occur mainly in large bowel.
- Sporadic and familial
- Vary from small pedunculated to large sessile
- Epithelium proliferation and **dysplasia**



# NEOPLASTIC POLYPS (ADENOMAS)

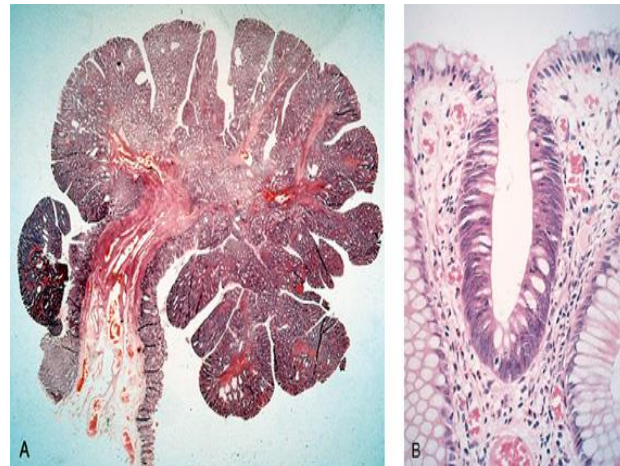
## *Adenomatous Polyp ( adenoma )*

- Divided into:
  1. Tubular adenoma: less than 25% villous architecture
  2. Villous adenoma: villous architecture over 50%
  3. Tubulovillous adenoma: villous architecture between 25 and 50%.



# *TUBULAR ADENOMA*

- Represents 75% of all neoplastic polyps.
- 75 % occur in the distal colon and rectum
- Sigmoid colon most common site.

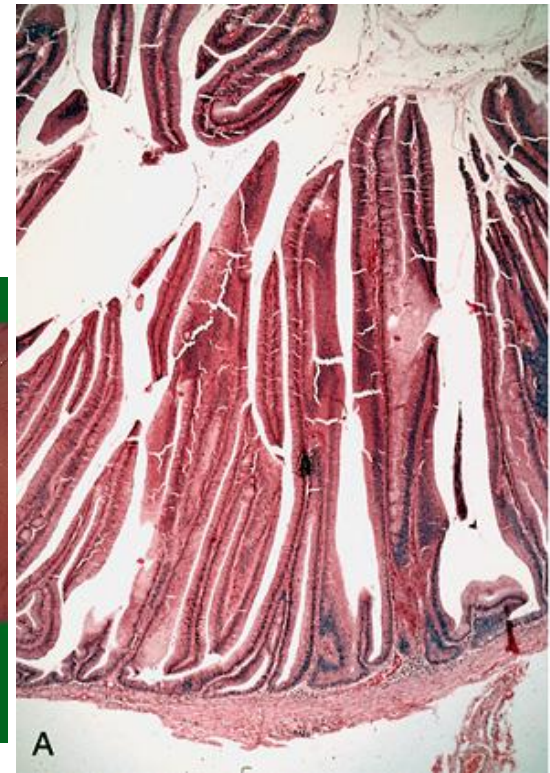




# VILLOUS ADENOMA

- The least common, largest and most ominous of epithelial polyps (most likely to undergo malignant transformation).
- Age: 60 to 65 years, 75% located in rectosigmoid area
- Present with rectal bleeding or anemia, large ones may secrete copious amounts of mucoid material rich in protein and potassium

Large tumors can produce hypoalbuminemia and hypokalemia.



# NEOPLASTIC POLYPS

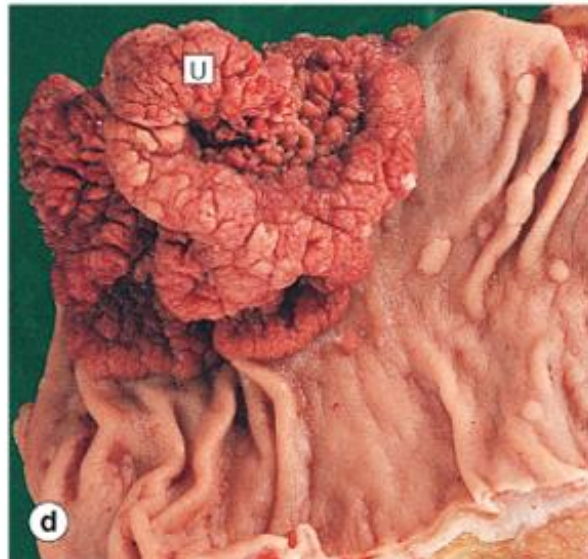
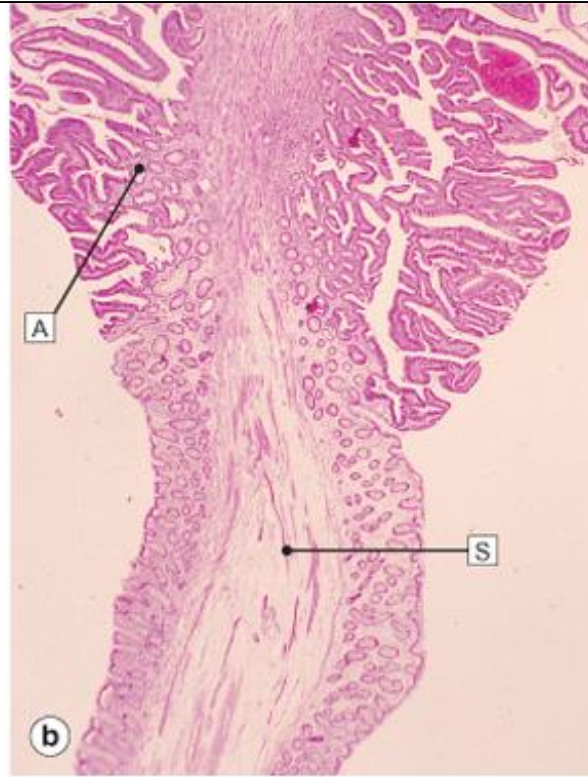
## 3] *Tubulovillous adenoma*

- 20%–30% of polyps
- Intermediate in size, degree of dysplasia and malignant potential between tubular and villous adenomas.





# Neoplastic Polyp

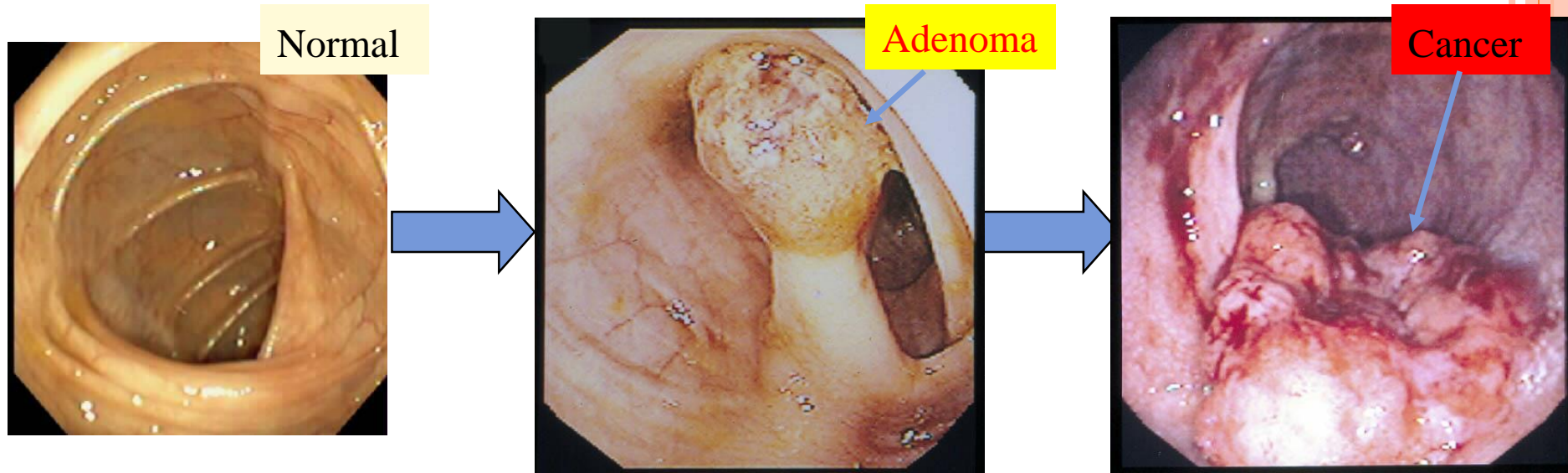


# RELATIONSHIP OF NEOPLASTIC POLYPS TO CARCINOMA

- Adenoma to carcinoma sequence is documented by several genetic alterations.



# ADENOMA TO CARCINOMA PATHWAY



APC  
loss

K-ras  
mutation

Chrom 18  
loss

p53  
loss

Normal  
Epithelium

Hyper-  
proliferation

Early  
Adenoma

Intermediate  
Adenoma

Late  
Adenoma

Cancer

# RELATIONSHIP OF NEOPLASTIC POLYPS TO CARCINOMA

- The probability of carcinoma occurring in a neoplastic polyp is related to:
  1. The size of the polyp.
  2. The relative proportion of its villous features.
  3. The presence of significant cytologic atypia (dysplasia) in the neoplastic cells.
  4. Multiple polyps



# FAMILIAL POLYPOSIS SYNDROME

- Patients have genetic tendencies to develop neoplastic polyps.
  - *Familial polyposis coli (FPC)*
  - *Gardener's syndrome*
  - *Turcot syndrome*



## FAMILIAL POLYPOSIS SYNDROME

### *Familial polyposis coli (FPC)*

- Genetic defect of Adenomatous polyposis coli (*APC*).
- *APC* gene located on the long arm of chromosome 5 (5q21).
- *APC* gene is a tumor suppressor gene
- Innumerable neoplastic polyps in the colon (500 to 2500)
- Polyps are also found elsewhere in alimentary tract
- The risk of colorectal cancer is 100% by midlife.

*Gardener's syndrome*

*Turcot syndrome*





**Neoplastic Polyp**



*Familial polyposis coli (FPC)*

*Familial polyposis coli*

## FAMILIAL POLYPOSIS SYNDROME

### *Gardener's syndrome*

- Polyposis coli, multiple osteomas, epidermal cysts, and fibromatosis.

### *Turcot syndrome*

- Polyposis coli, glioma and fibromatosis

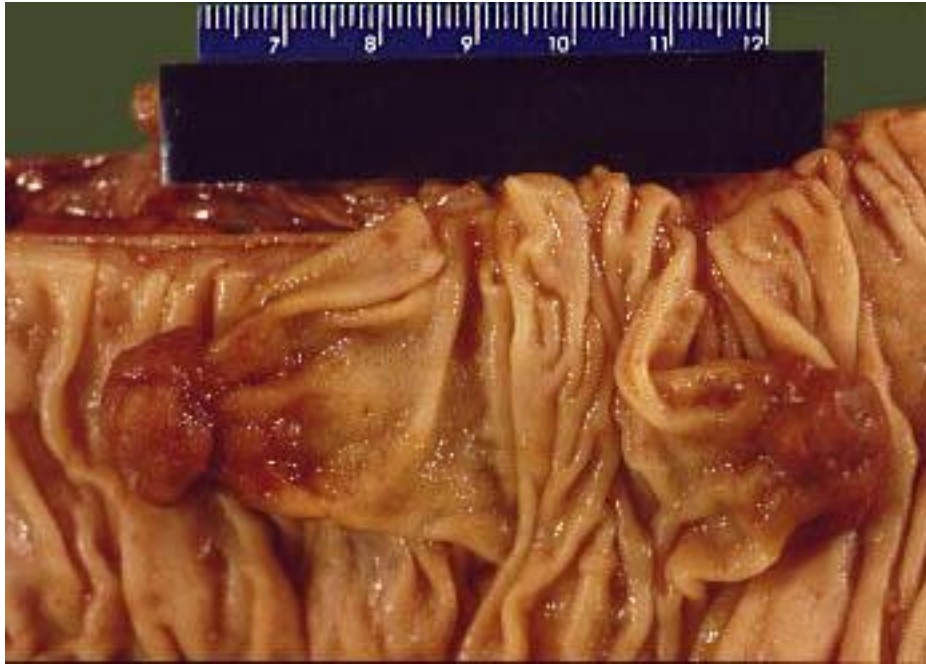








## Colon, pedunculated adenomatous polyp



Did this patient have familial polyposis syndrome?

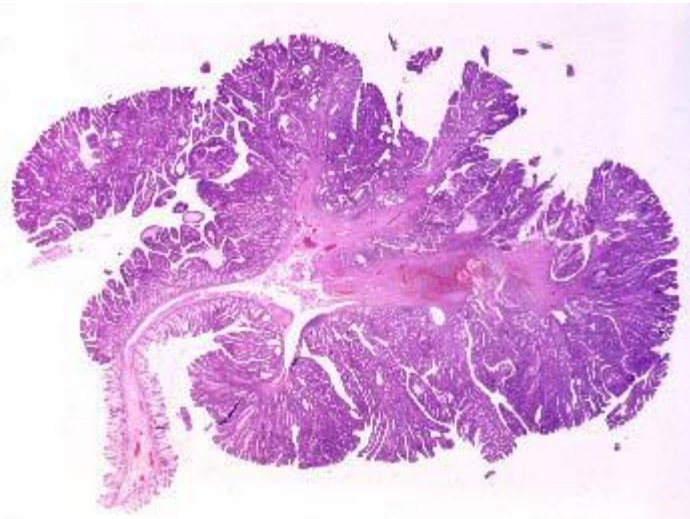
No. there are two isolated polyps. Patients with familial adenomatous polyposis syndrome have at least 100 polyps, and usually many more polyps, carpeting their colonic mucosa.

Can isolated polyps like the ones illustrated develop into colonic ca?

Yes. Although all polyps do not progress to carcinoma, it is thought that most colonic carcinomas start as polyps.



## Colon, pedunculated adenomatous polyp



Are all polyps neoplastic?

No. Polyps can result from focal hyperplasia of the mucosa. Hyperplastic polyps do not have malignant potential

What variables determine the likelihood of malignant change in a polyp?

Three interrelated features determine the risk of cancerous transformation: polyp size, histologic architecture, and severity of dysplasia.

(1) Cancer is rare in tubular adenomas less than 1 cm in diameter.

(2) The likelihood of cancer is high (about 50%) in sessile villous adenomas that are greater than 4 cm in diameter.

(3) Severe dysplasia is likely to progress to cancer. Such dysplasias are found in villous areas. **Of all these, size is the most important factor.**



What types of mutations are likely to be present in such a lesion?

There is progressive accumulation of mutations during the conversion of adenomas to carcinomas. In this scheme, mutations of the *APC* gene (resulting in homozygous loss of this tumor suppressor gene) are believed to occur first. (Patients with familial adenomatous polyposis syndrome are born with loss of one copy of the *APC* gene in all somatic cells.) As the adenomas enlarge, mutations in the *RAS* proto-oncogene and *LOH 18q* (*Smad4*) tumor suppressor genes occur. Eventually, mutations of *TP53* and several other genes are superimposed.

In this large sessile villous adenoma, it is likely that the *APC*, *LOH 18q*, and *RAS* genes have been affected.

