

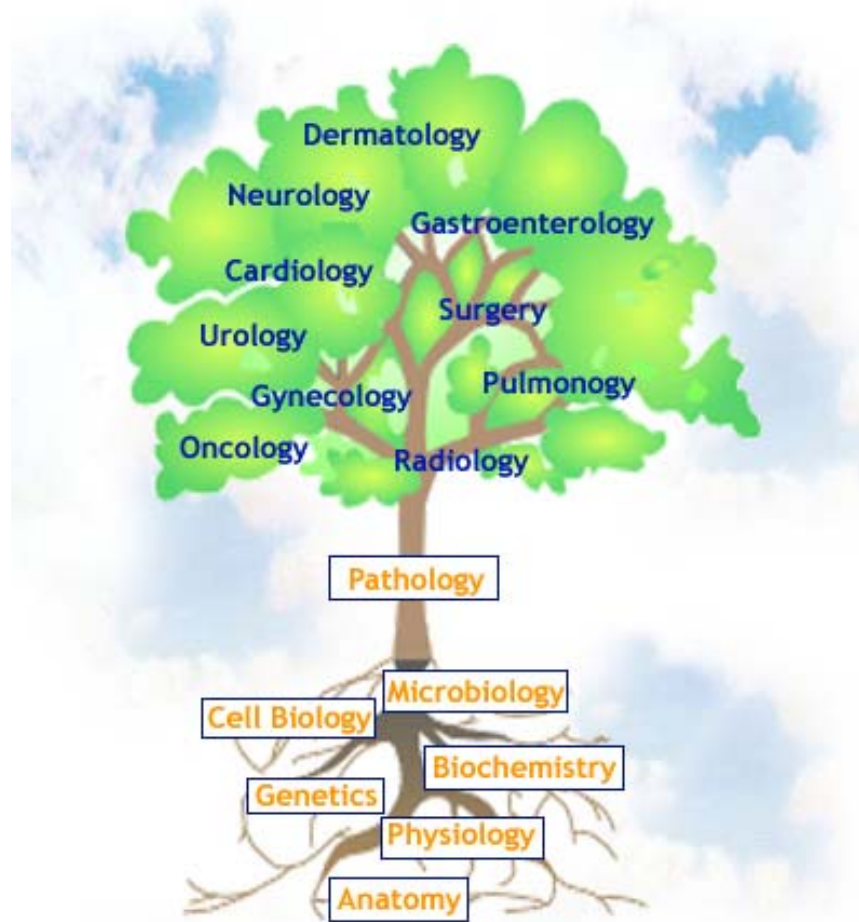
Introduction to Pathology and Diagnostic Medicine

Spring 2003

- What is *pathology*?
- Who is a *pathologist*?
- What is a *disease*?
- How are diseases *diagnosed*?

The Tree of Medicine

(After G. Diamandopoulos)



Pathology (Gr. *pathos* “disease” + *logos* “word, reason”) is the study of the links between diseases and the basic science

What is a Disease?

- A disease is a *physical* or *functional* disorder of normal body systems that places an individual at increased risk of adverse consequences
- Diseases are *diagnosed* by physicians or other health care providers through a *combination of tools*
- When a disease is diagnosed, *treatment* is given to prevent or ameliorate complications and to improve prognosis

Diagnosis

(Gr. *dia* “through” + *gnosis* “knowledge”)

- Diagnoses are made by three general categories of physicians or health care providers:
 - *Clinical diagnosticians* identify diseases by examination of patient’s *history and physical examination*
 - *Pathologists* identify diseases by examining *cells and tissues removed from the body*
 - *Radiologists* identify diseases by *imaging* the intact body

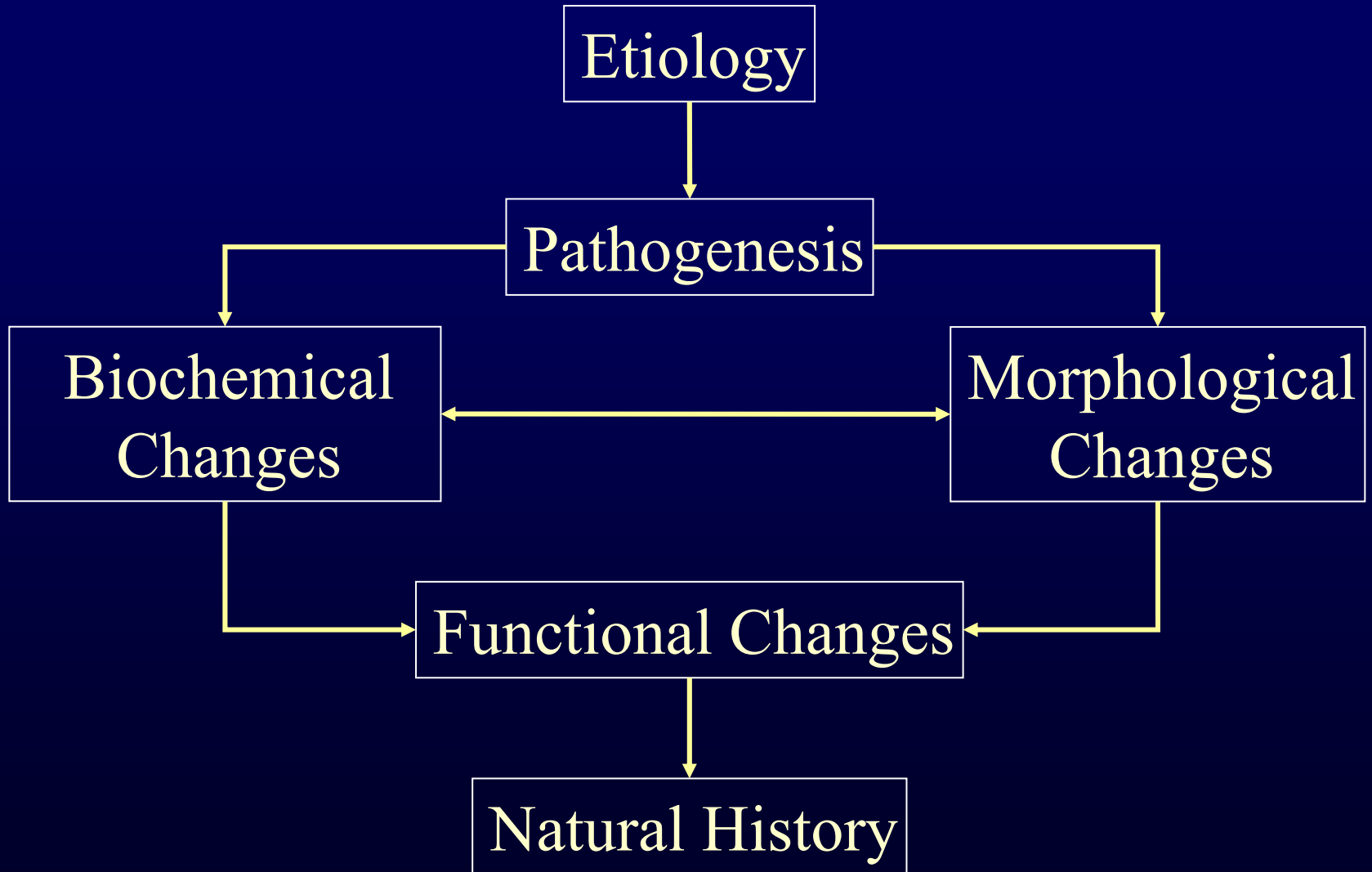
Pathology is the study of the links between
diseases and the basic science

Pathologist is a person identifying diseases
based on the examination of *cells and tissues*
removed from the body

***Therefore, pathology is not necessarily what a
pathologist does!***

HST.035 is the study of *Pathology*!

The Disease Paradigm



Historical Paradigm of Diagnostic Pathology

- The “gross, microscopic and biochemical structure” of “lesional” cells and tissues provide information about:
 - The nature of the underlying process (*diagnosis*)
 - The degree of deviation from normal (*grade*)
 - The extent of the disease (*stage*)

CELLULAR PATHOLOGY

AS BASED UPON

PHYSIOLOGICAL AND PATHOLOGICAL
HISTOLOGY.



TWENTY LECTURES

DELIVERED IN THE

PATHOLOGICAL INSTITUTE OF BERLIN

DURING THE

MONTHS OF FEBRUARY, MARCH AND APRIL, 1858.

BY

RUDOLF VIRCHOW,

PUBLIC PROFESSOR IN ORDINARY OF PATHOLOGICAL ANATOMY, GENERAL PATHOLOGY AND THERAPEUTICS IN
THE UNIVERSITY OF BERLIN; DIRECTOR OF THE PATHOLOGICAL INSTITUTE, AND PHYSICIAN TO
THE CHARITÉ HOSPITAL, ETC., ETC.

TRANSLATED FROM THE SECOND EDITION OF THE ORIGINAL,

BY

FRANK CHANCE, B.A., M.B., CANTAB.

LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS; PHYSICIAN TO THE BLENHEIM FREE DISPENSARY
AND INFIRMARY.

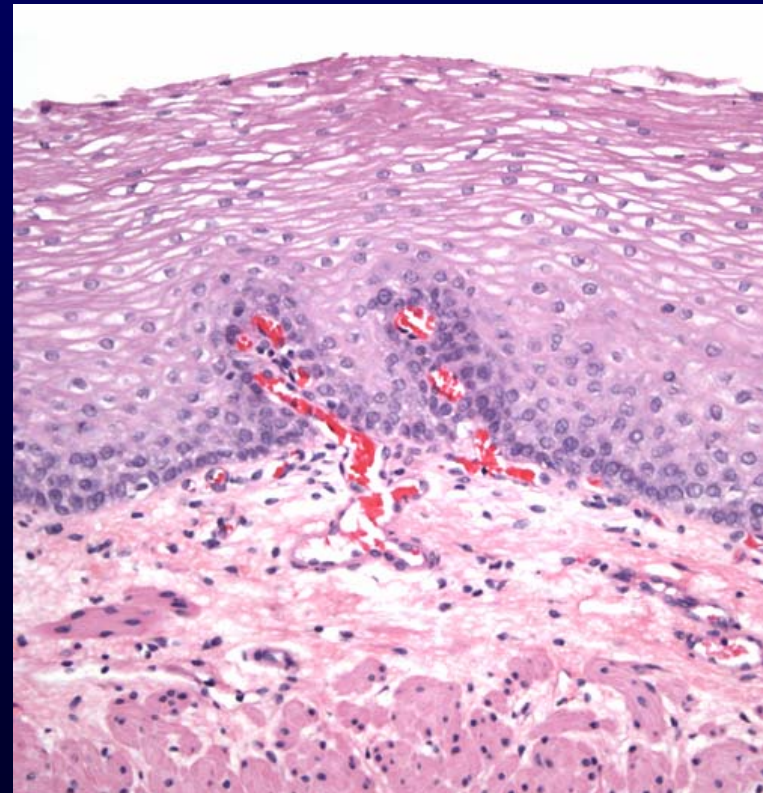
Virchow's Theory of Cellular Pathology

“The object chiefly aimed at in [my lectures], illustrated as they were by as an extensive a series of microscopical preparations as it was in my power to supply, was to furnish a clear and connected explanation of those facts upon which, according to my ideas, the theory of life must now be based, and out of which also the science of pathology has now to be constructed. They were more particularly intended as an attempt to offer in a better arranged form than had hitherto been done, a view of the *cellular nature of all vital processes*, both physiological and pathological ... so as distinctly to set forth what the people have long been dimly conscious of, namely, *the unity of life in all organized beings.*”

(Virchow, 1858)

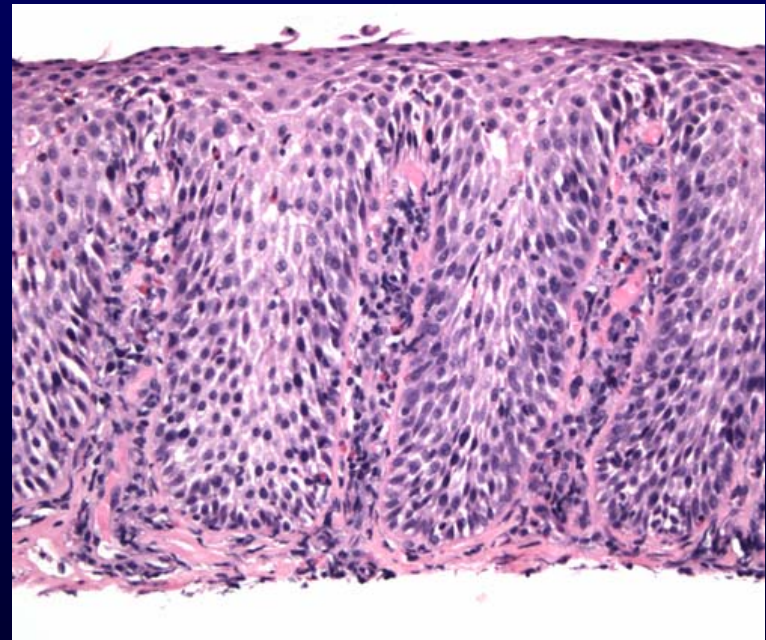
Morphological Diagnosis *based on* Morphological Knowledge Database

- **Step 1:** The vast majority of patient who did not have a disease had an esophagus that looked like this:



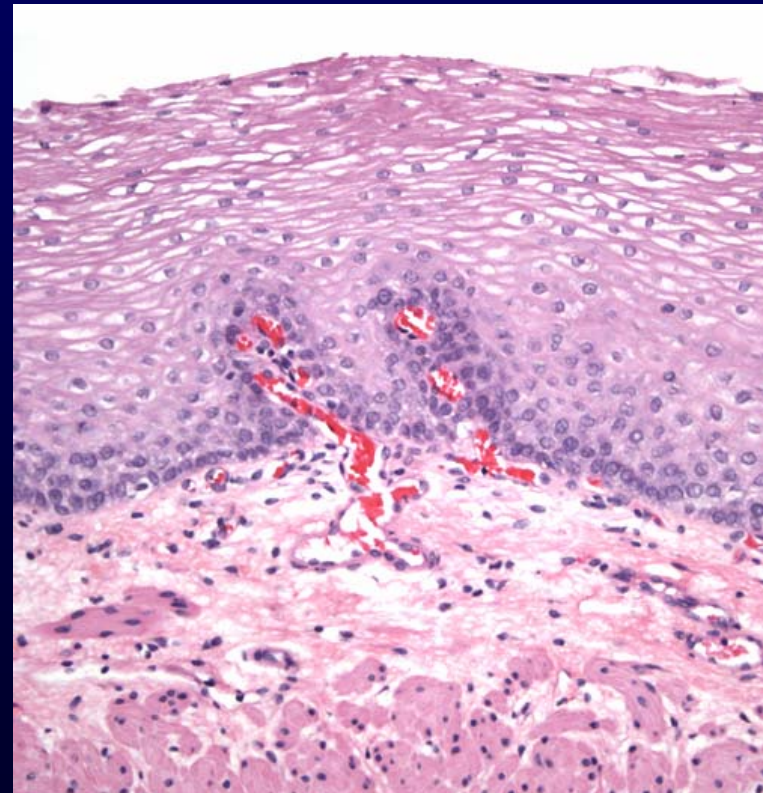
Morphological Diagnosis *based on* Morphological Knowledge Database

- **Step 2:** The vast majority of patient who complained about “heartburn” had an esophagus that looked somewhat like this:



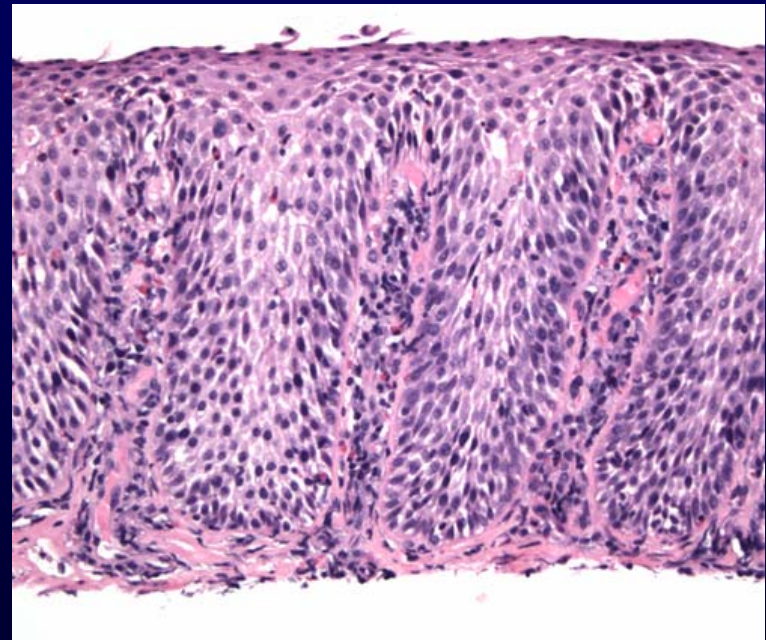
Morphological Diagnosis *based on* Morphological Knowledge Database

- **Step 3:** Therefore, the next patient whose esophagus looks like this should have no symptoms of heartburn, *and*

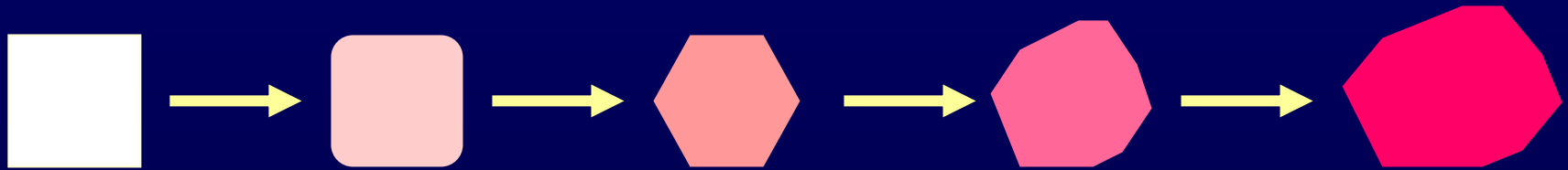


Morphological Diagnosis *based on* Morphological Knowledge Database

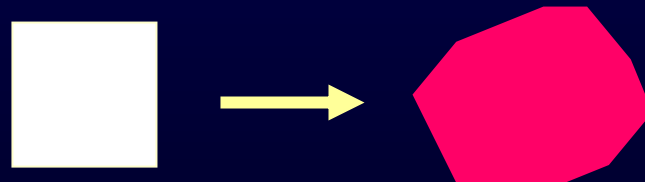
- **Step 4:** The next patient whose esophagus looks like this should have had the symptoms of heartburn.



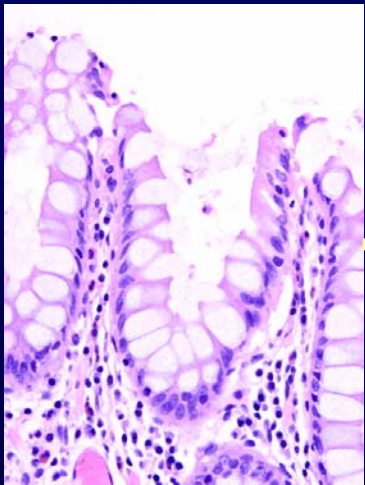
Histological Grading and Staging: *Historical Quilt by Association*



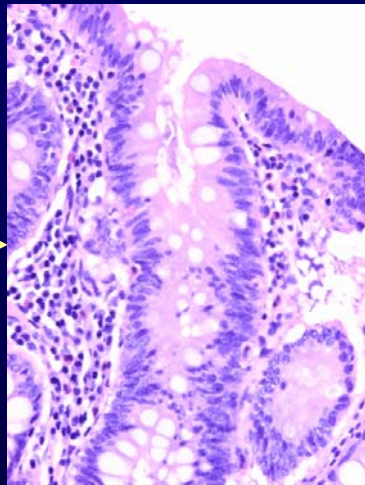
Therefore,



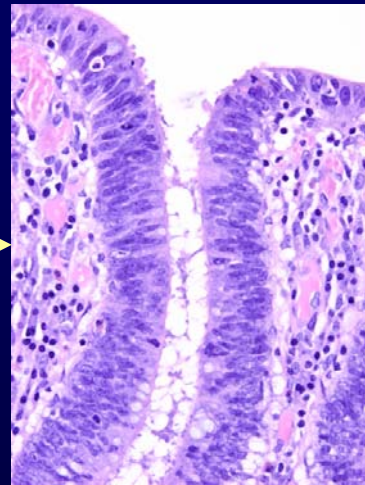
Histological Grading of Colonic Neoplasia



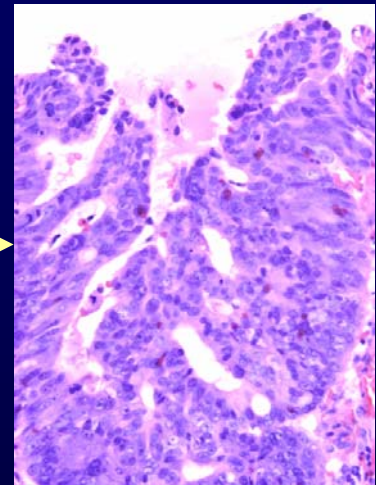
**Normal
Crypt**



**Early
Adenoma**

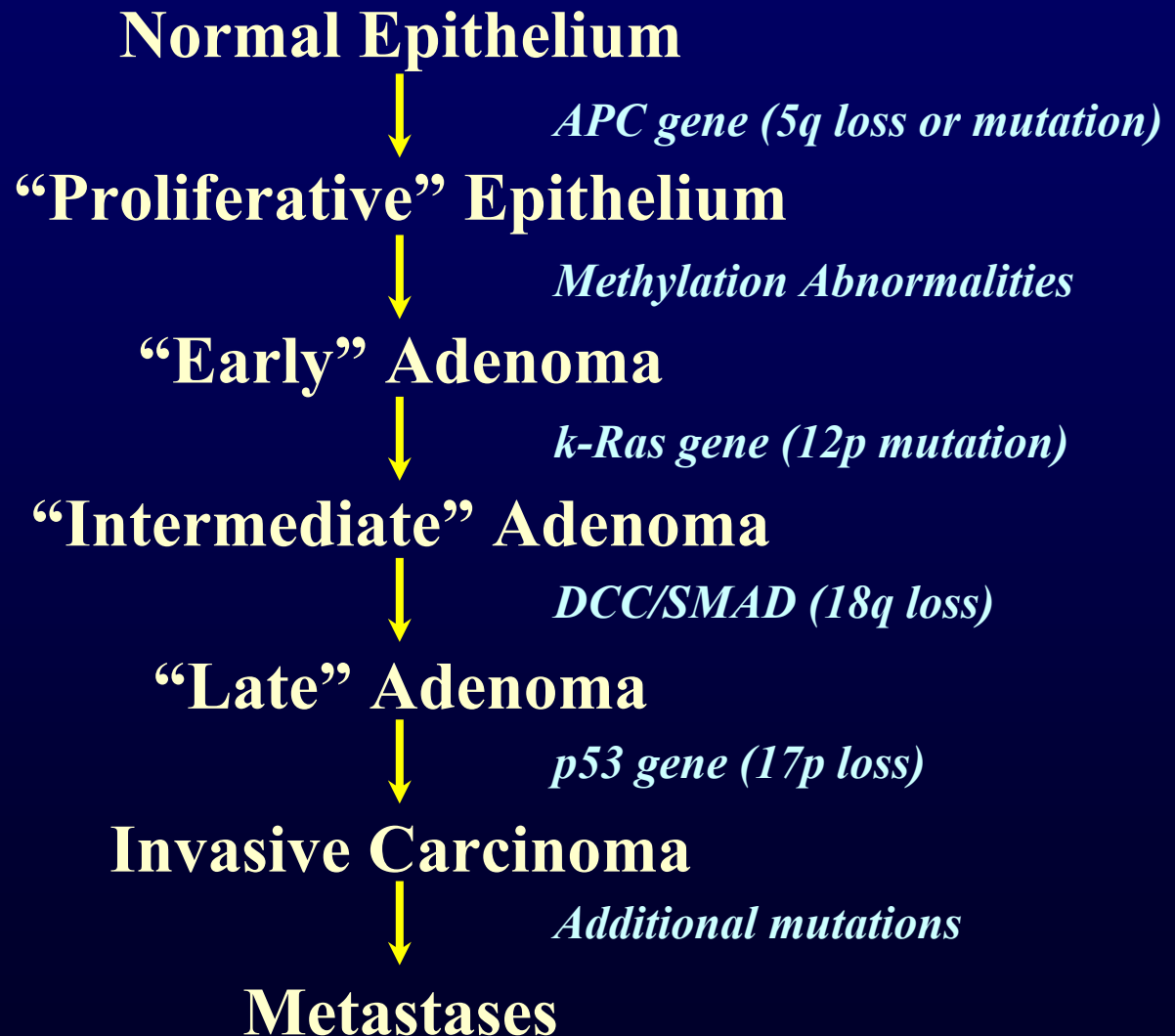


**Late
Adenoma**



Adenocarcinoma

From Cellular Pathology to Molecular Medicine

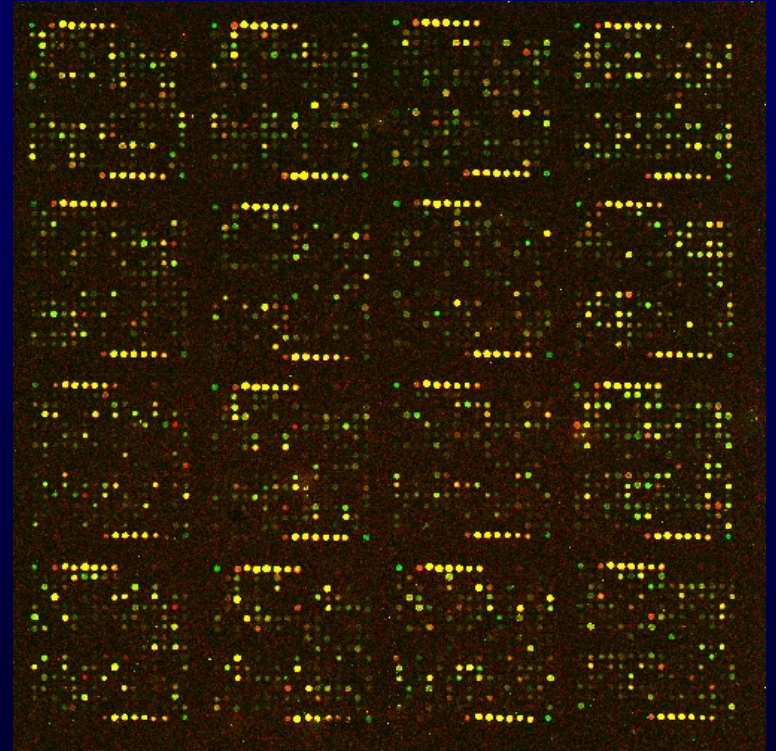


And, Back to Diagnosis

Please see Dong SM, et. al. Detecting colorectal cancer in stool with the use of multiple genetic targets. J Natl Cancer Inst. 2001 Jun 6;93(11):858-65.

Beyond Virchow: *The Theory of Molecular Pathology*

Image removed due to copyright considerations.



Painted Chromosomes

DNA Microarray

And *Diagnostic Imaging*

Please see Weissleder R. In vivo magnetic resonance imaging of transgene expression. *Nat Med.* 2000 Mar;6(3):351-5.

HST.035

- Will introduce you to the basic principles of cellular pathology,
- Discuss major issues in pathology of specific organ systems,
- Introduce you to the principles of diagnostic pathology, and
- Introduce you to novel diagnostic technologies and challenges posed in their translation into clinical practice.