

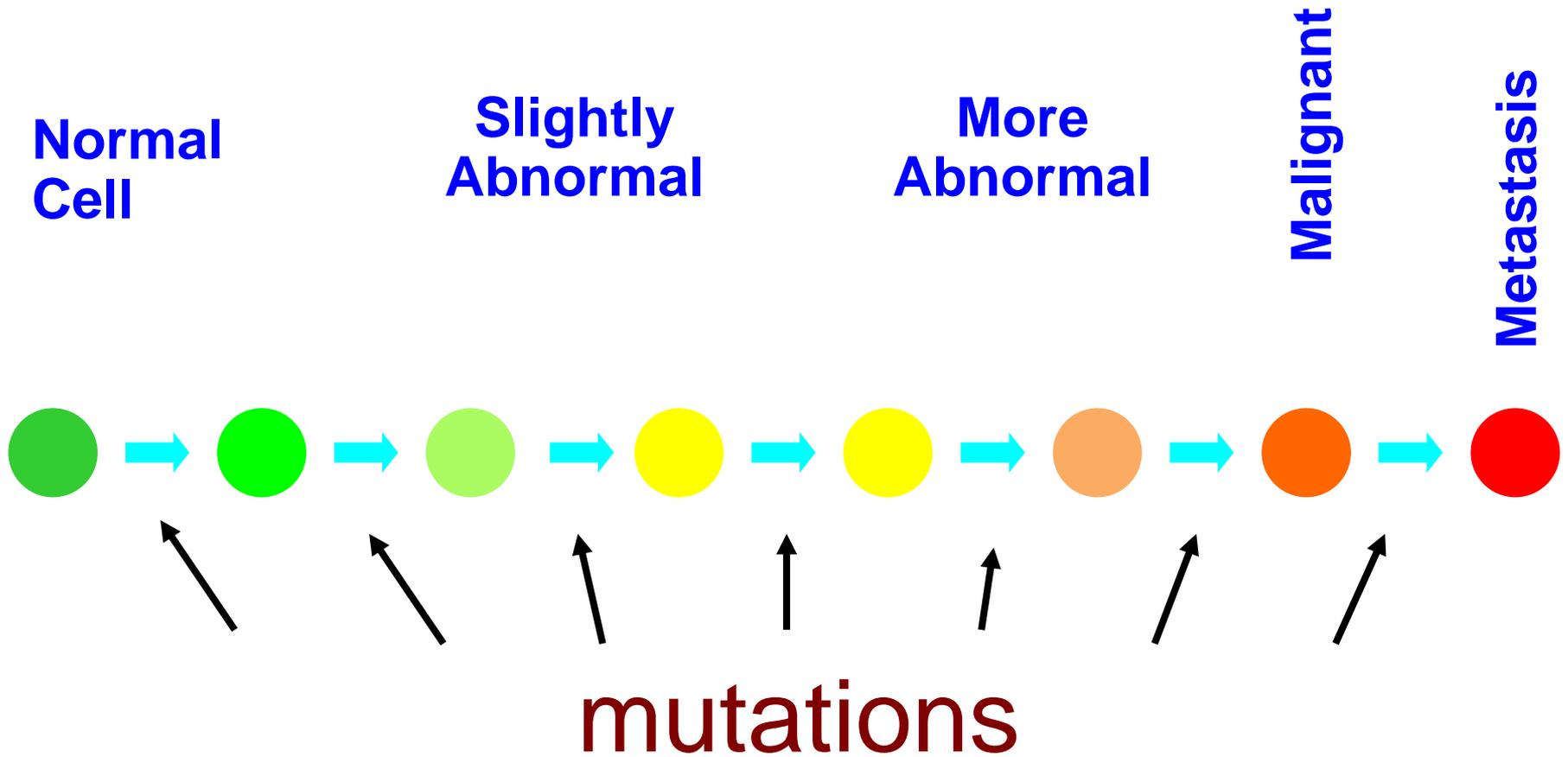
Tumour pathology, structure and nomenclature



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University of Cambridge*

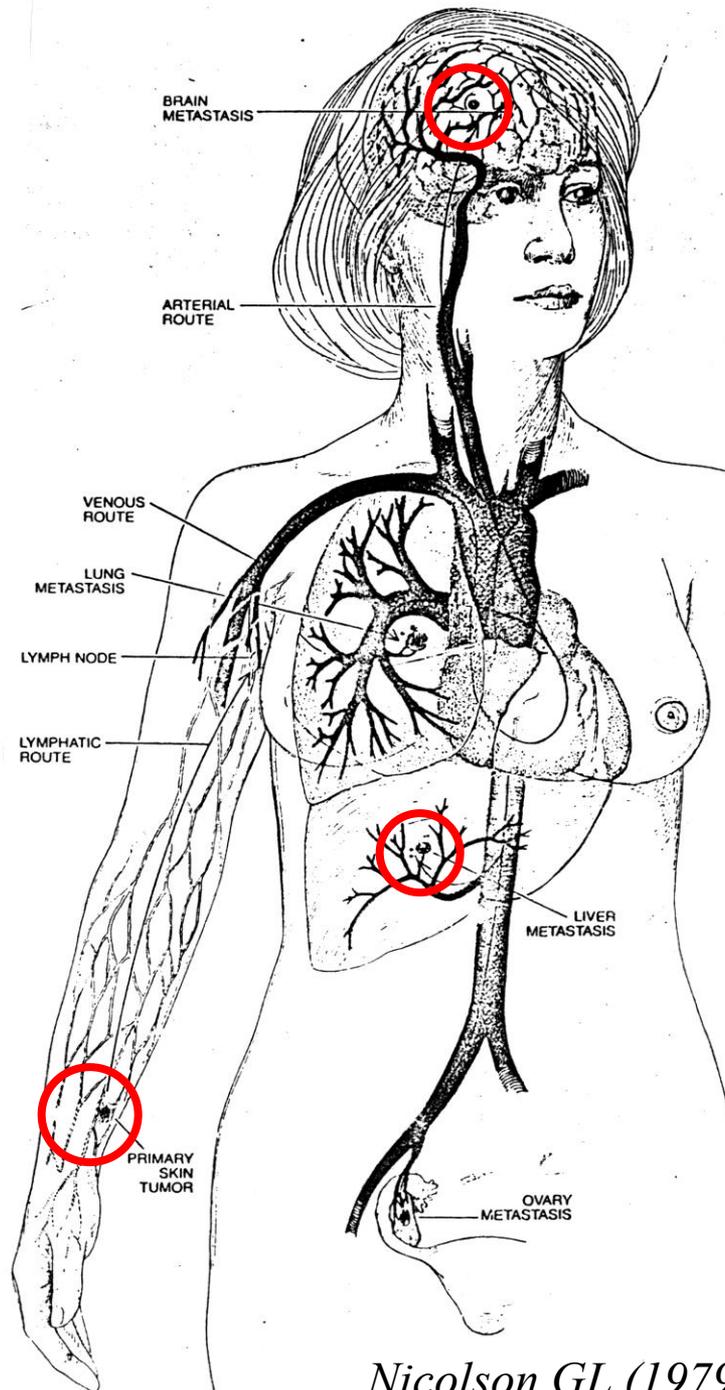
Core idea of cancer



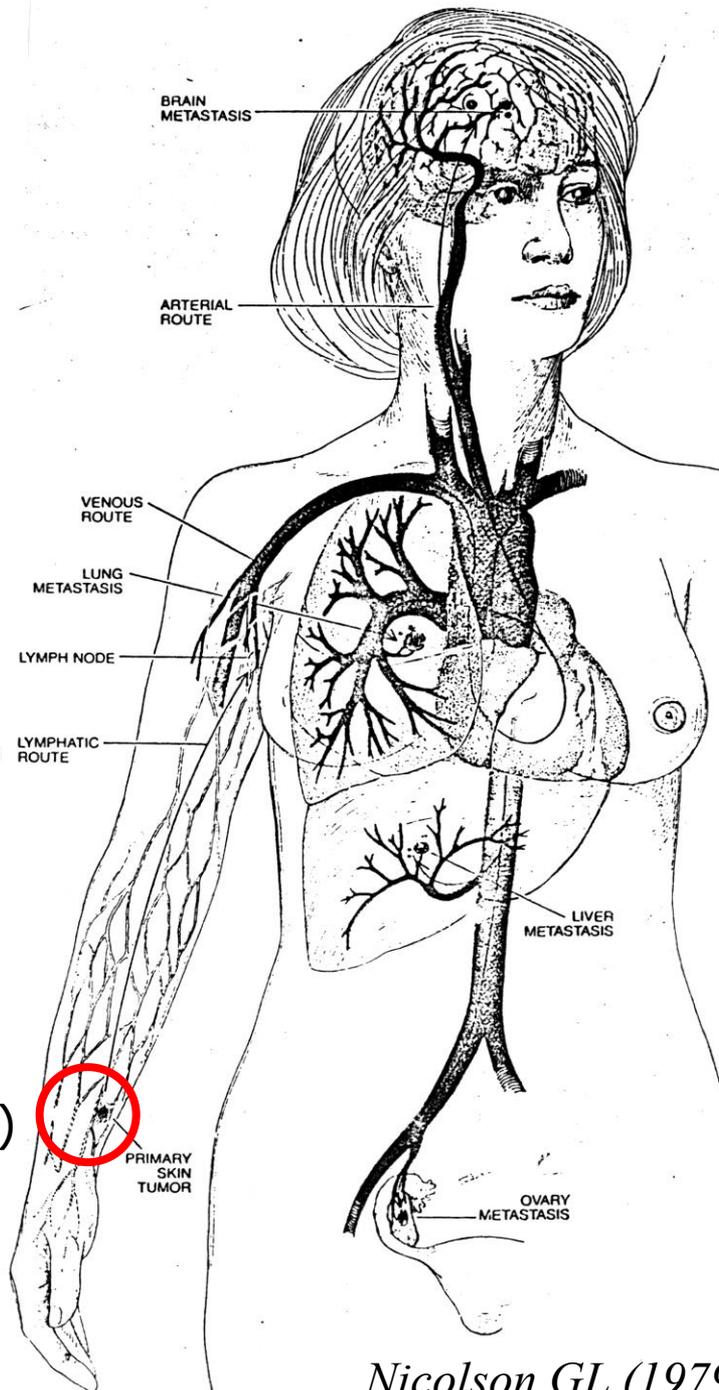
1. Malignancy and Metastasis

the central problem of cancer research,
both clinically and intellectually

Metastasis



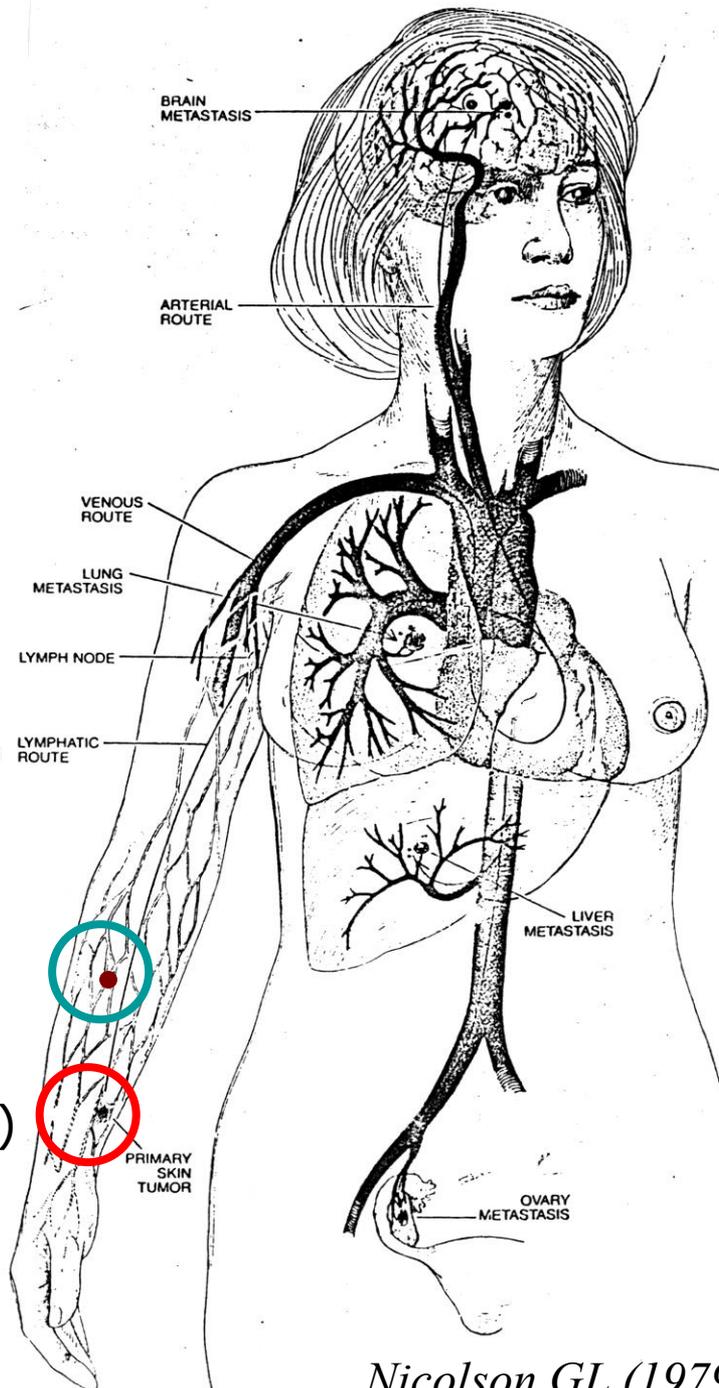
Malignancy



malignant tumour (melanoma)

capable of metastasis

Malignancy/
Metastasis is
the central
problem, both
clinically and
intellectually



Benign tumour (mole)

malignant tumour (melanoma)

1. Malignancy and Metastasis

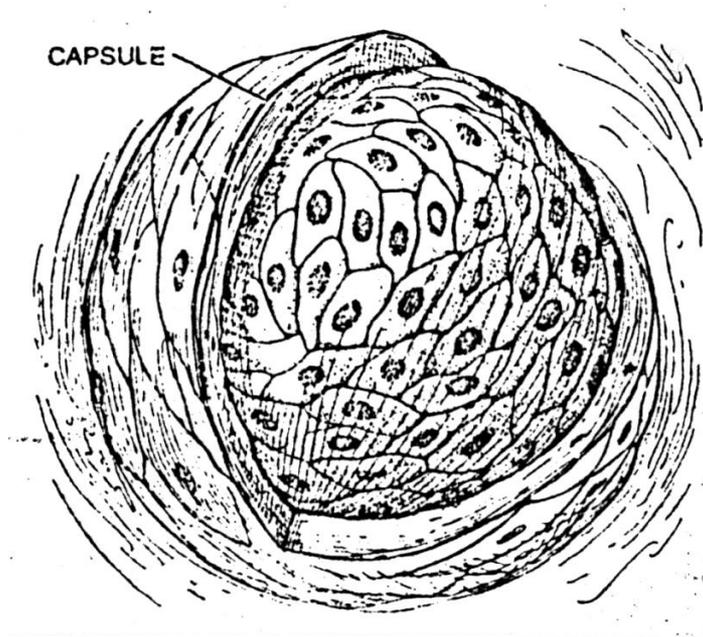
the central problem of cancer research,
both clinically and intellectually

Metastasis is when a cancer forms additional tumours
'secondaries' elsewhere in the body. A metastasis is also a secondary
tumour, plural metastases

Malignancy definition: the *ability* to form metastases (it doesn't have to
have metastasized yet)

Malignancy

can be identified down the microscope

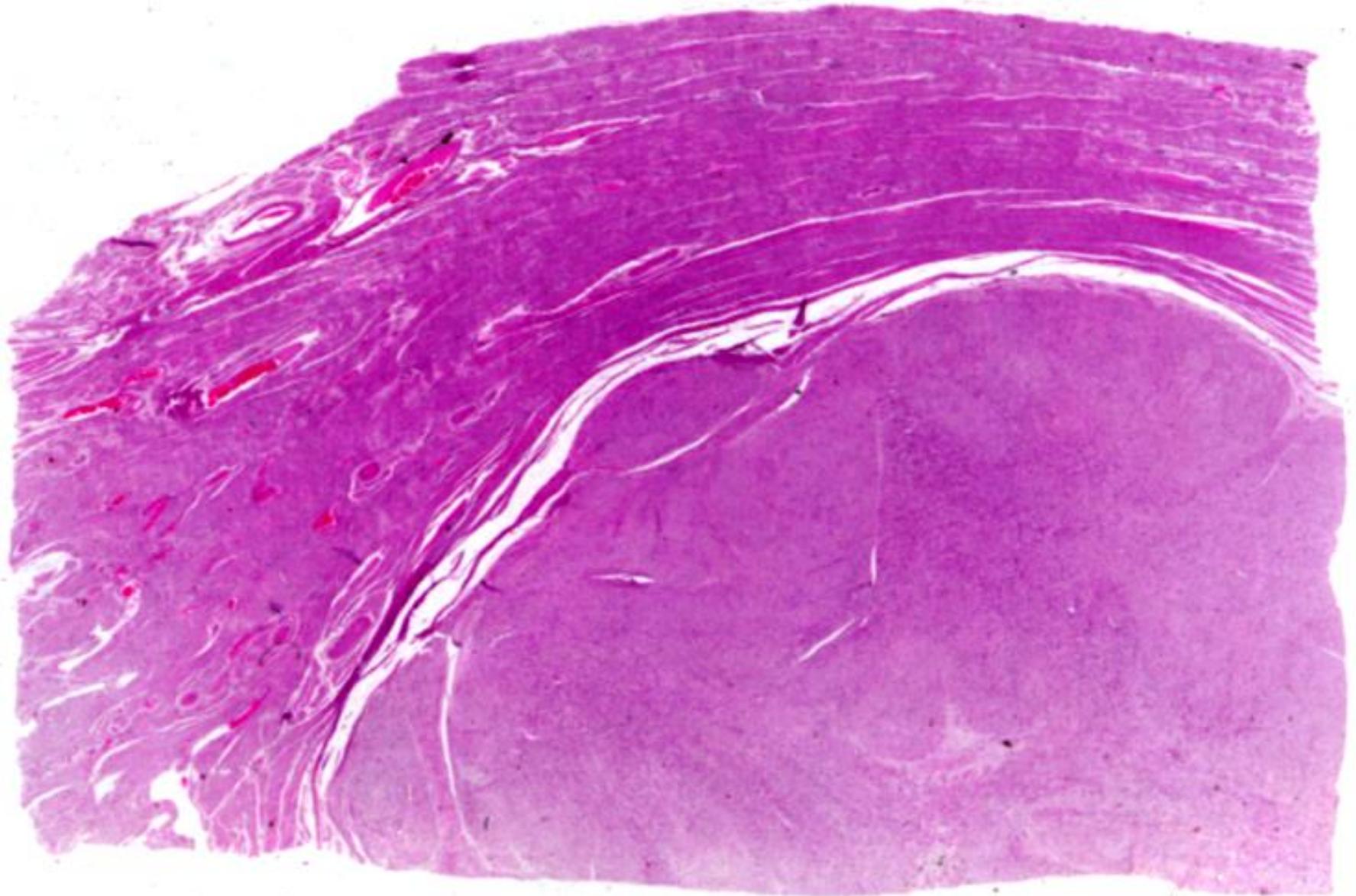


benign



malignant

Benign smooth muscle tumour of uterus (common)



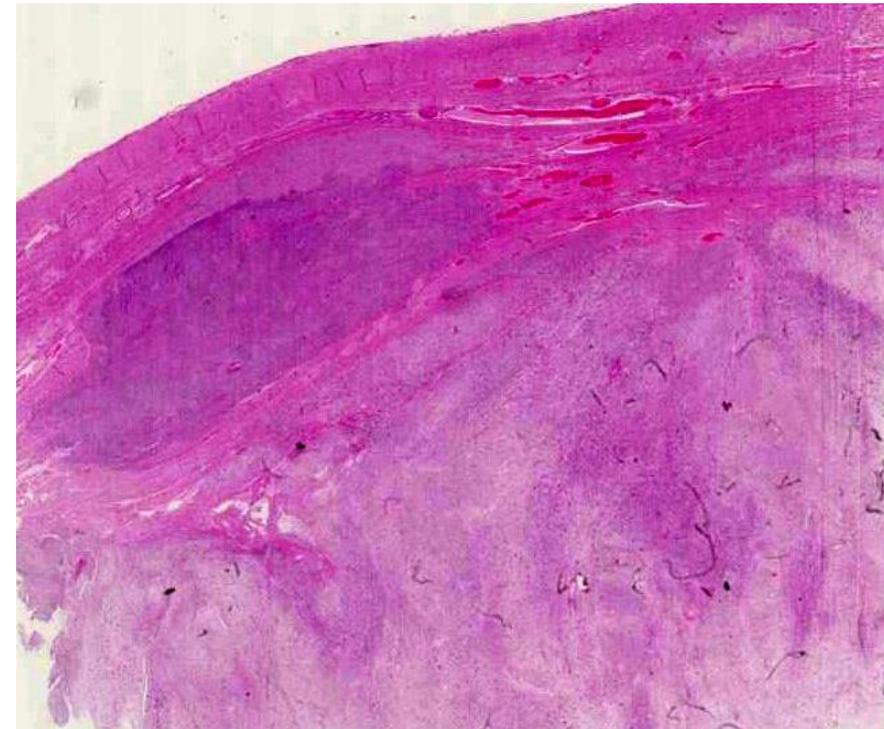
Smooth muscle tumours of uterus

Malignant

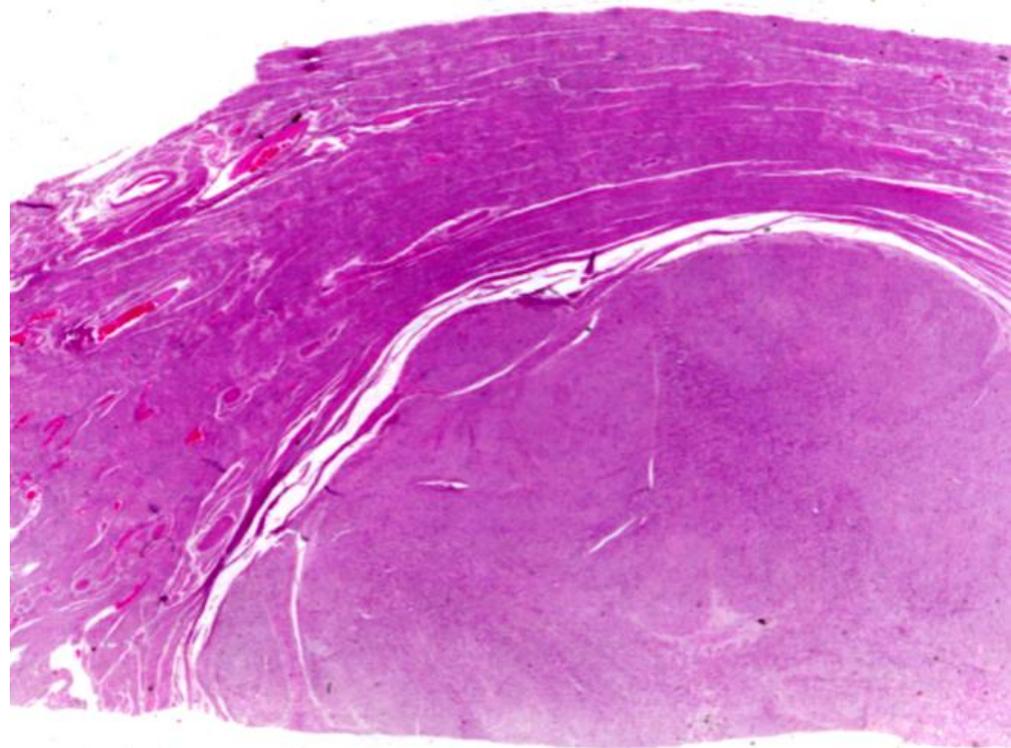
(v. rare)

Benign

(common)



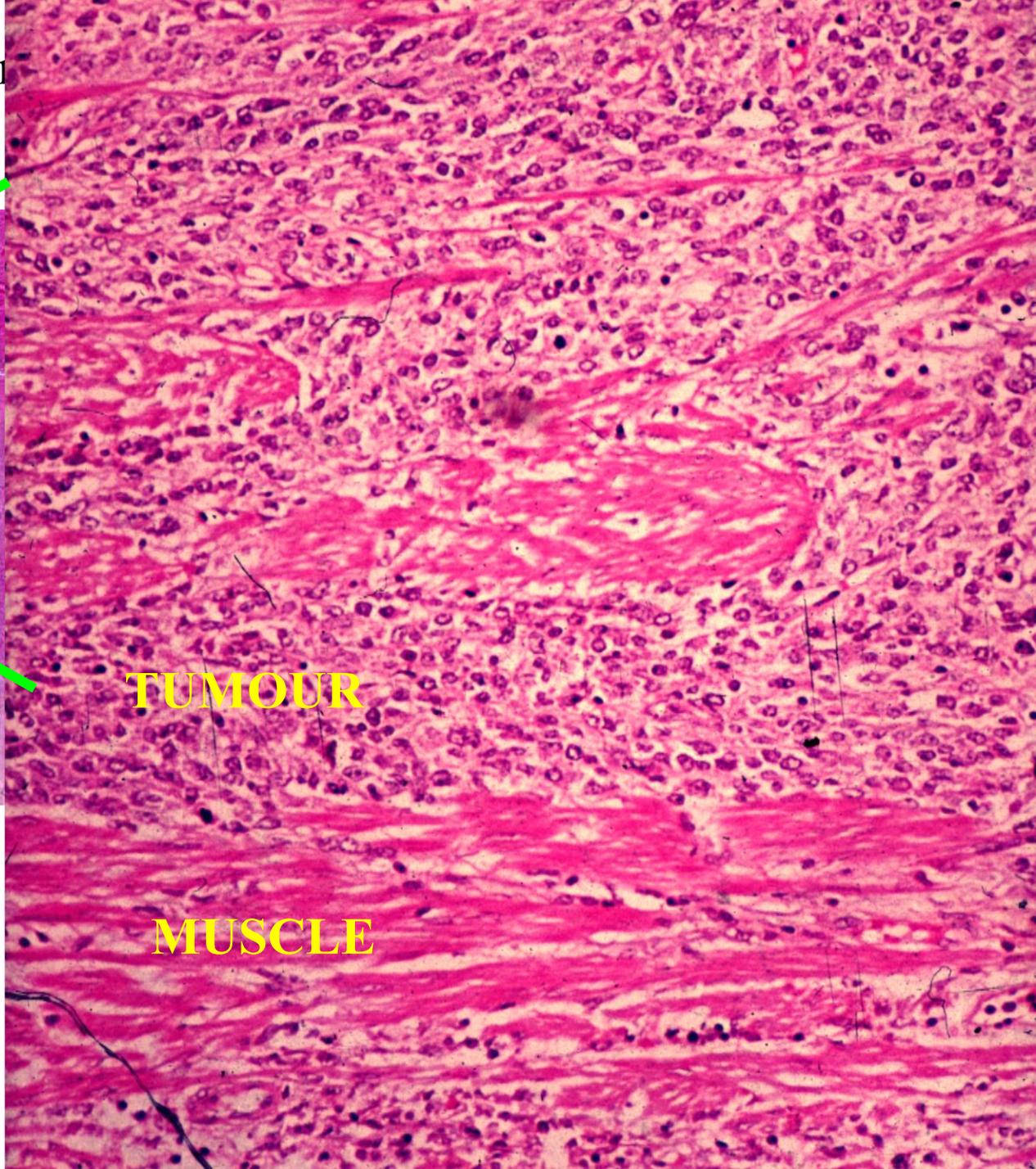
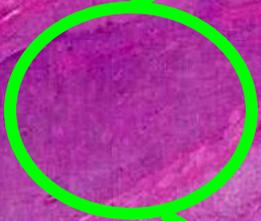
cells spread



cells stay where they belong

Malignant
(v. rare)

st



What is malignancy?

- malignancy is defined as the ability to metastasize however rarely

- what makes a tumour malignant ?

? the ability to grow in an alien environment

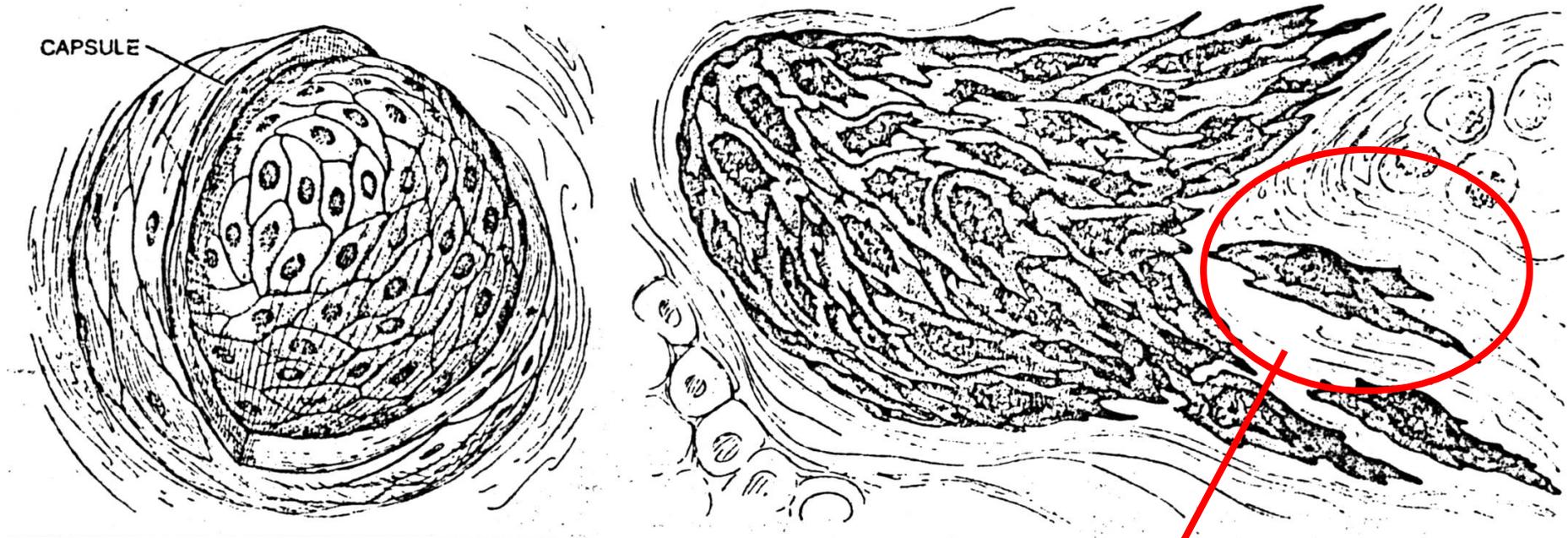
- can be identified down the microscope - WHY

? is what we are seeing this ability to grow into alien territory?

? is invasion actually a kind of local metastasis?

Malignancy

WHY can be identified down the microscope



benign

**invasion = local growth in alien environment
'local metastasis' ?**

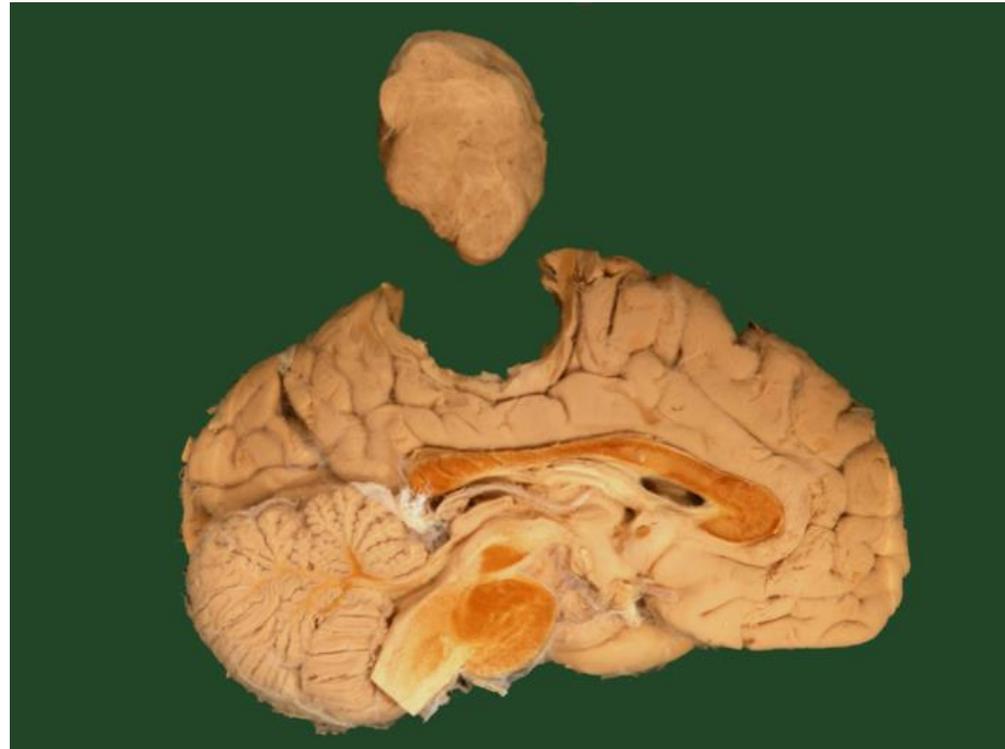
Benign tumours can kill

Benign tumours can cause death or at least disease, e.g.

meningioma,

pituitary adenomas

and benign growths can
simply obstruct



Nomenclature

Pathologist's terminology

- Neoplasia

means “new growth” : all tumours (benign and malignant) and leukaemias

- Dysplasia:

abnormal differentiation, e.g. mitoses in wrong place

- Metaplasia:

change of differentiation, e.g. glandular epithelium of lung changing to squamous (skin-like) pattern.

Nomenclature

not entirely consistent but roughly speaking:

Benign tumours:

tissue name + - oma e.g.

lipoma = benign fat tumour

Leiomyoma = benign smooth muscle tumour

Papilloma = wart

adenoma [of the colon] = benign glandular lump, including glandular polyp

Malignant tumours from mesenchyme

-[name of tissue] sarcomas E.g

- osteosarcoma (malignant bone tumour),

- leiomyosarcoma (malignant smooth muscle)

Malignant tumours from epithelium

[name of tissue] carcinoma

e.g. breast carcinoma

Some Exceptions to the above rules:

malignant melanoma

Neuroblastoma

} malignant

Haemopoietic system:

Leukaemias liquid neoplasms

lymphoma solid lymphocytic neoplasms

Leukaemias

	Myeloid	Lymphocytic
Acute	AML	ALL
Chronic	CML	CLL

Leukaemias are liquid, mainly in blood. Lymphomas are related proliferations of lymphocytes as solid masses mainly in lymph nodes

Incidence

Benign tumours:

very **common** all tissues

Leiomyoma of uterus, lipoma, wart, mole

Malignant tumours from mesenchyme

generally **rare** but often rapidly lethal

-E.g osteosarcoma (malignant bone tumour),

Malignant tumours from epithelium

Common - most important cancers

e.g. breast carcinoma,

colorectal

lung,

ovary

prostate

Liver (low in West, high elsewhere, HBV + aflatoxin)

Cervix (HPV)

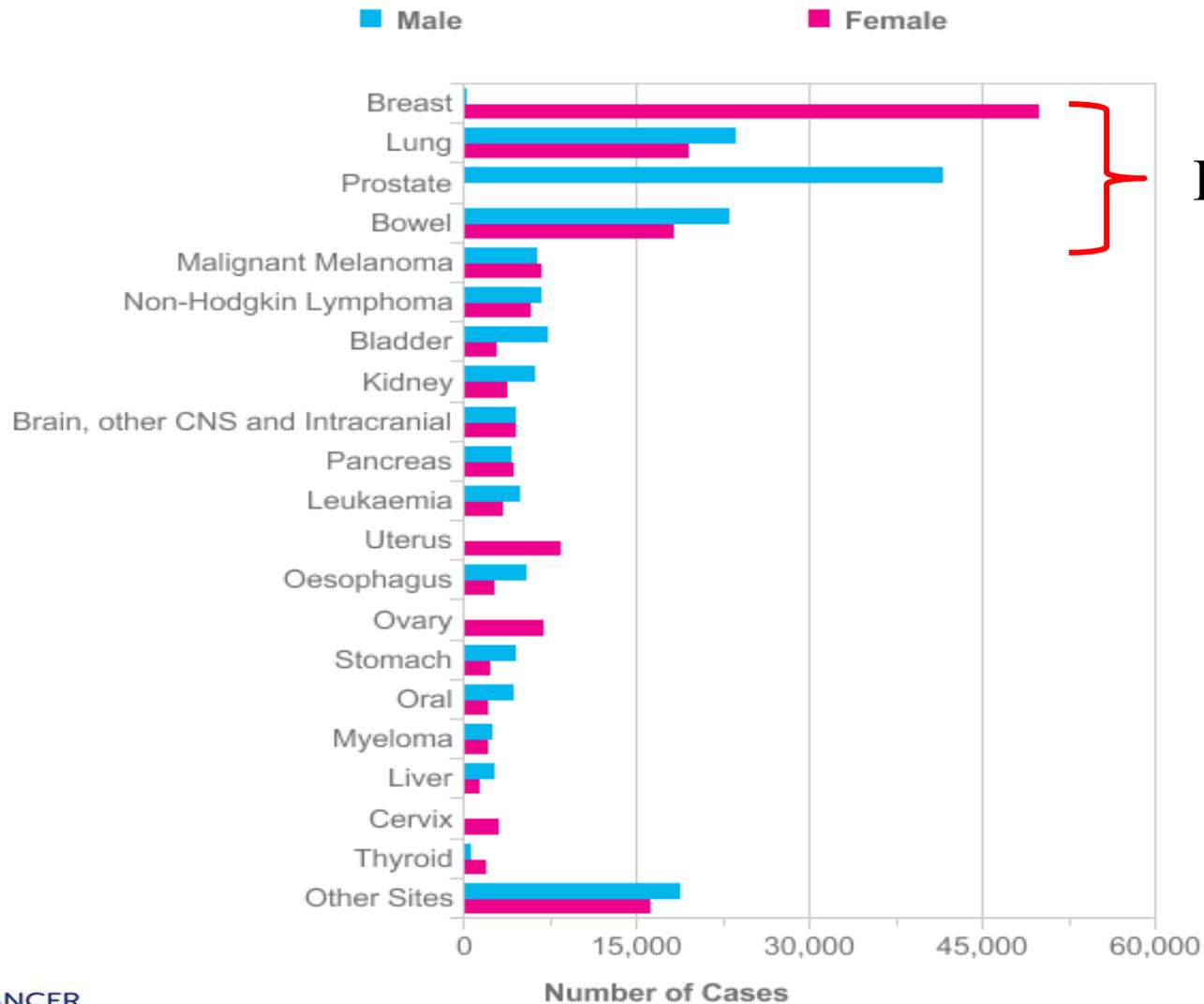
Nasopharyngeal (chinese, EBV))



main **virus**-associated cancers

The 20 Most Common Cancers

New Cases, UK, 2011



Half of all cases

Core idea of cancer

Normal
Cell

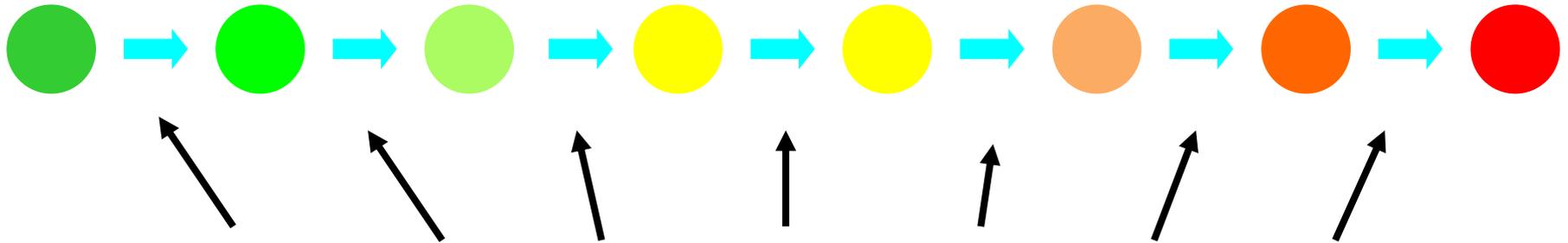
Slightly
Abnormal

More
Abnormal

Malignant

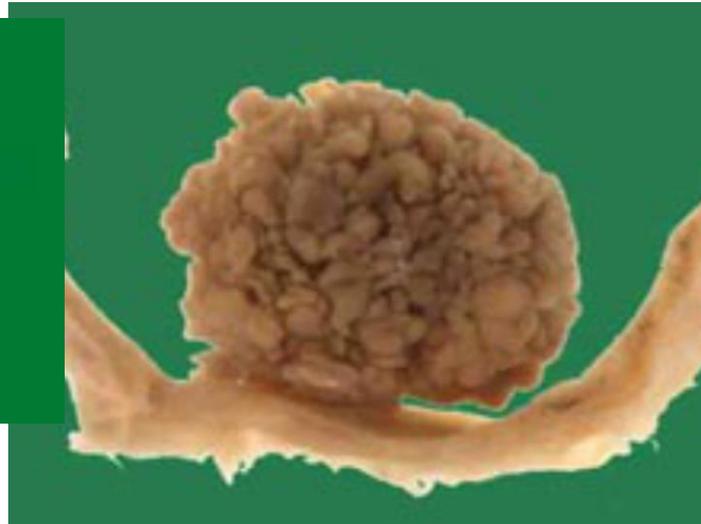
Metastasis

some of these abnormal growths can be seen



mutations

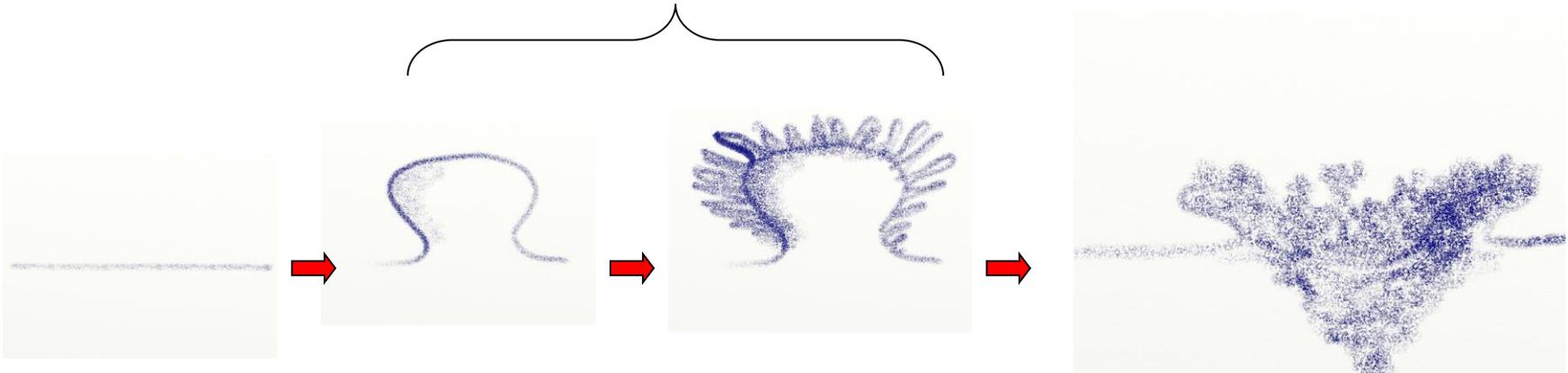
Cancer develops in multiple stages



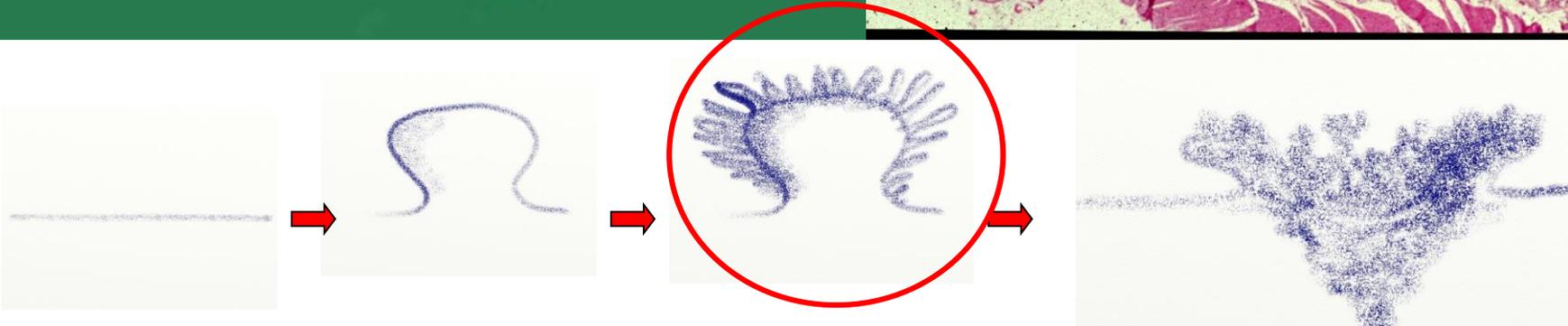
Normal

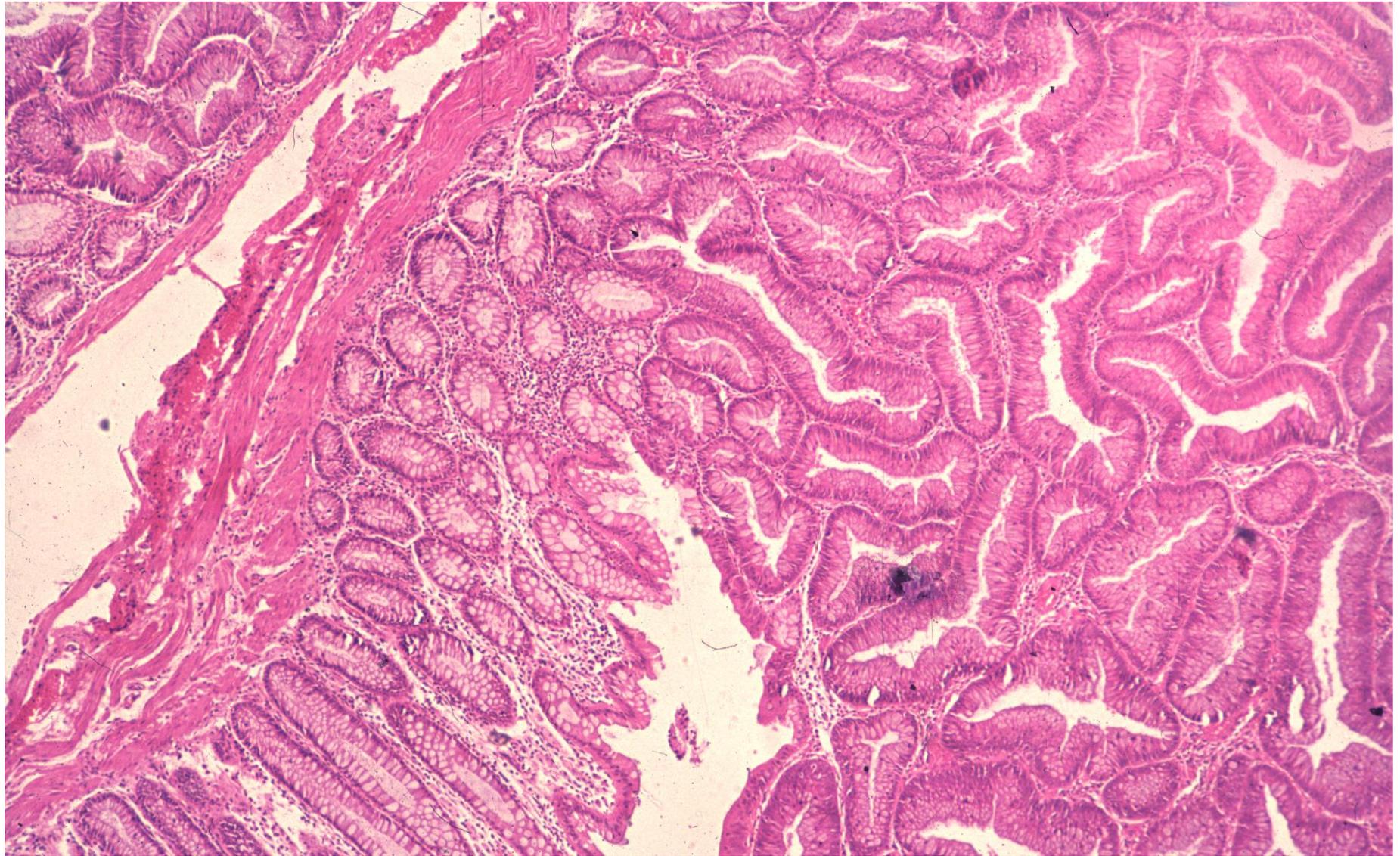
Benign

Malignant

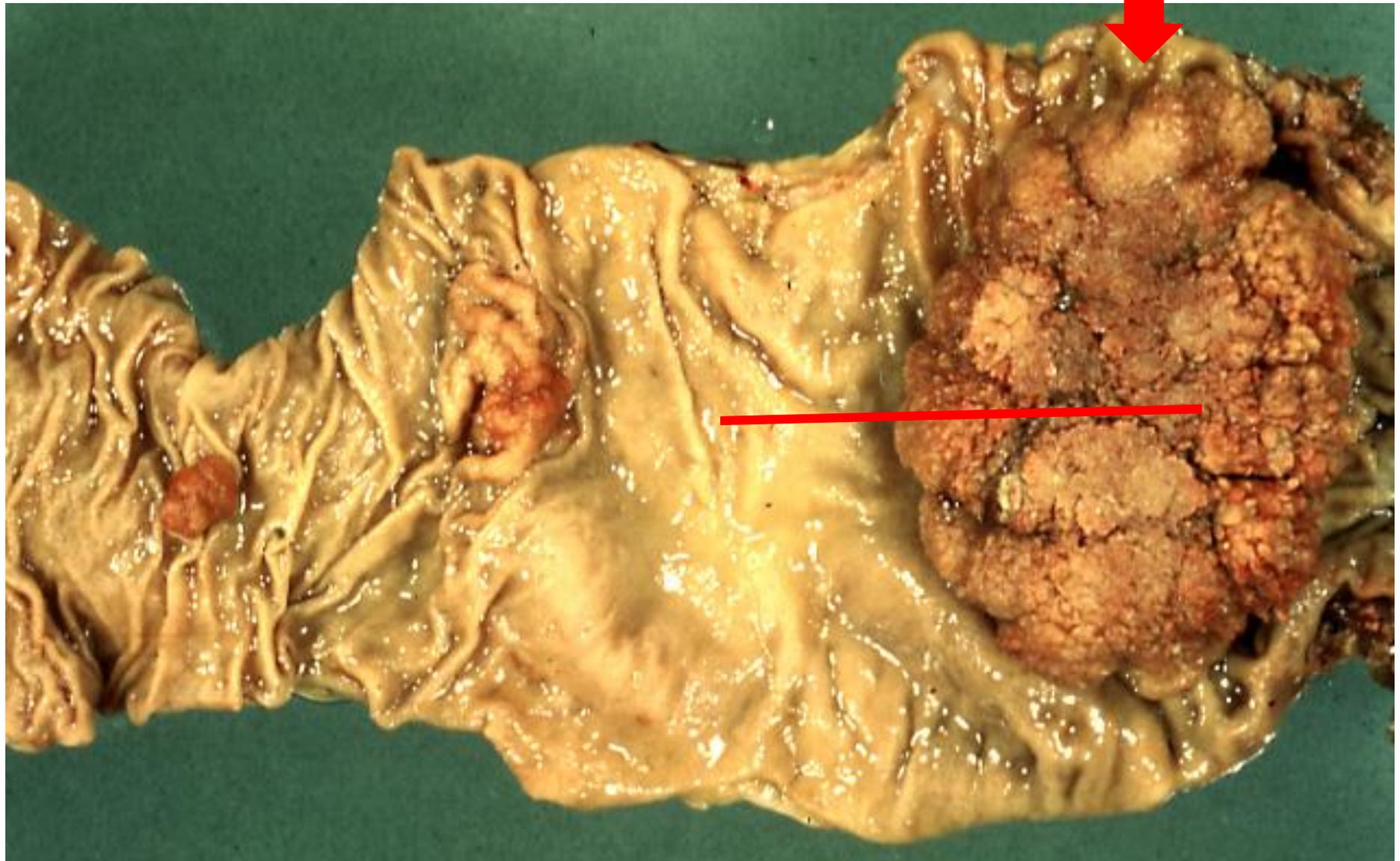


Colon cancer precursor: benign adenoma or polyp





Colon/rectum cancer: malignant

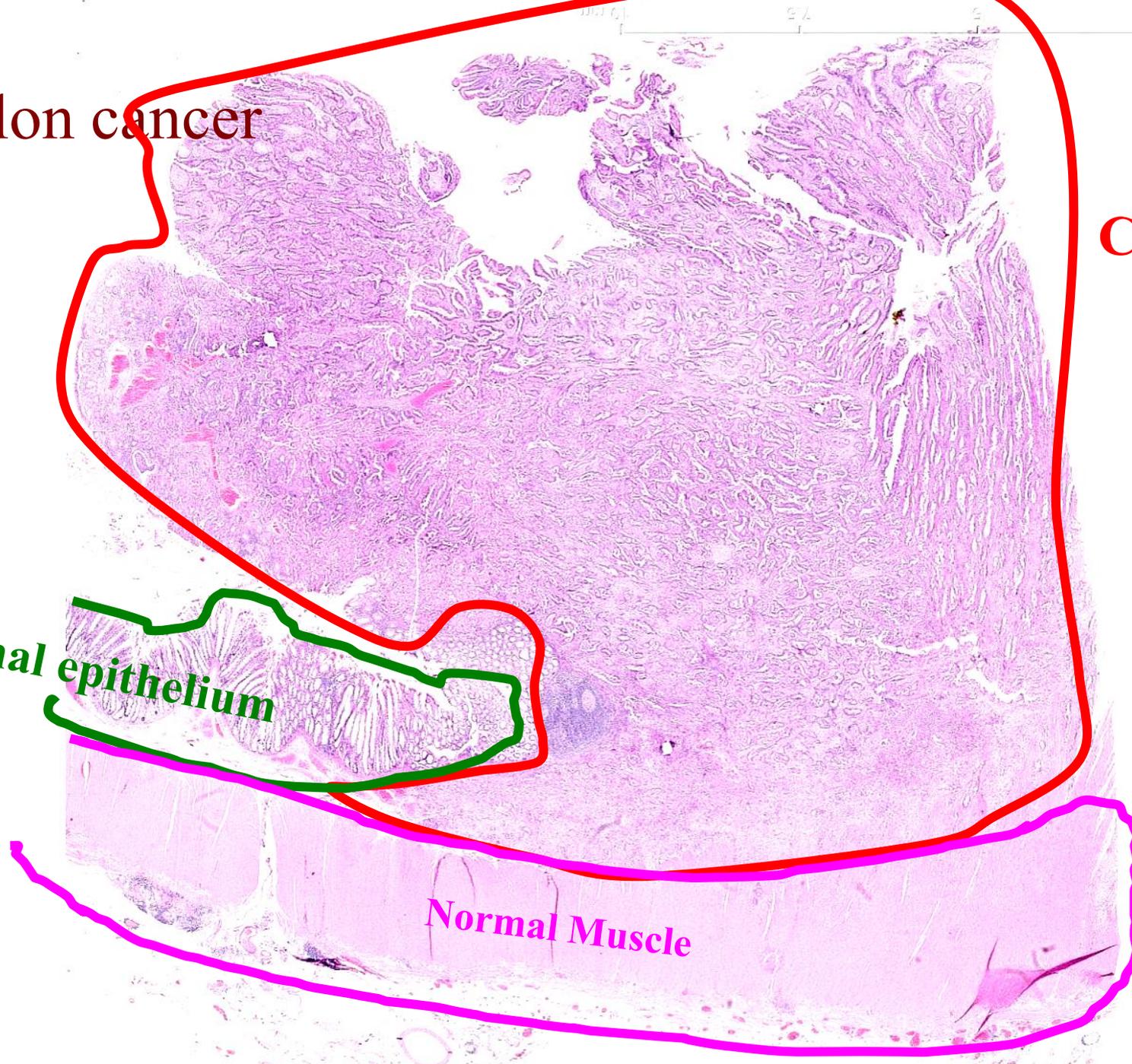


Colon cancer

Cancer

Normal epithelium

Normal Muscle



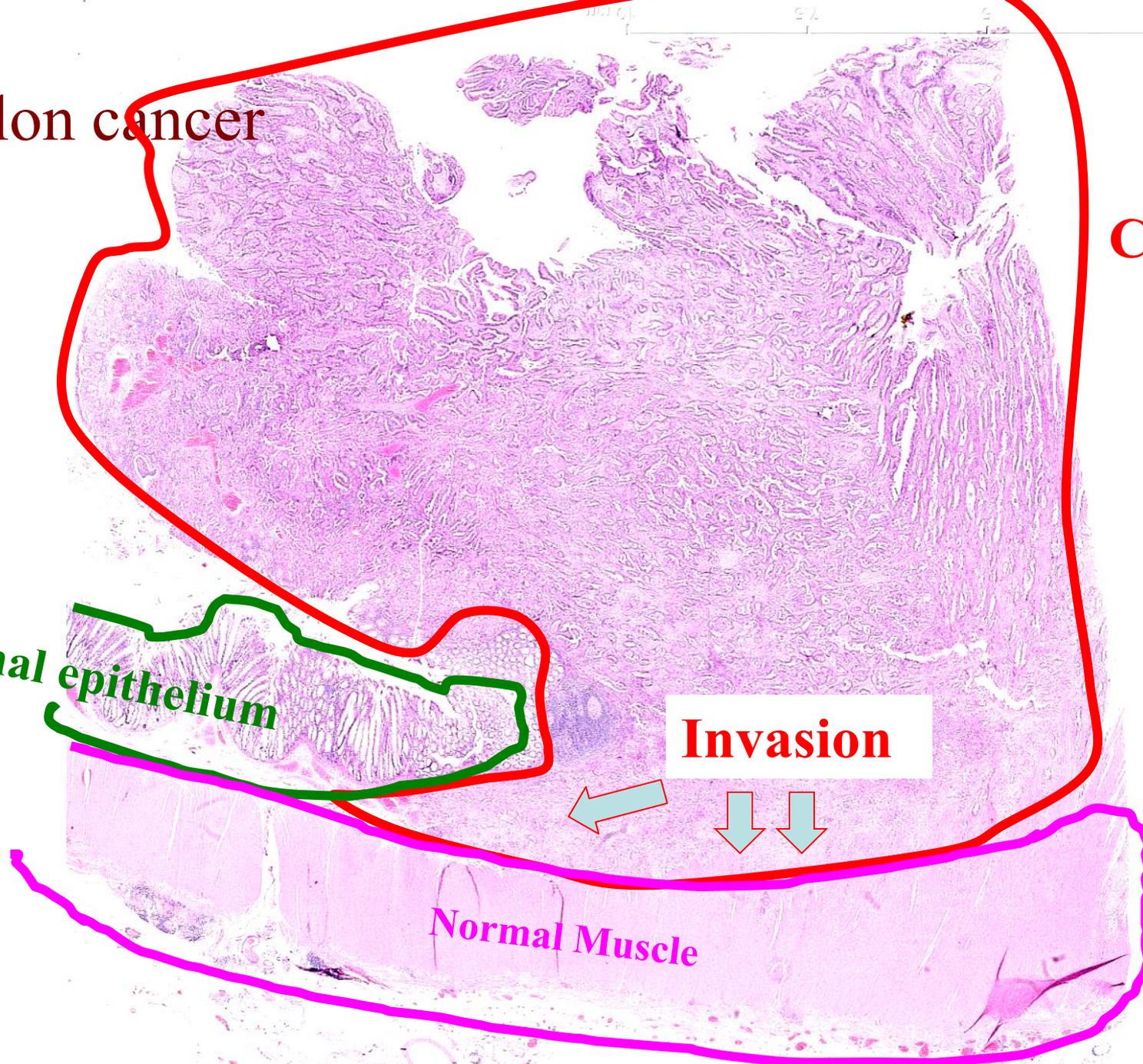
Colon cancer

Cancer

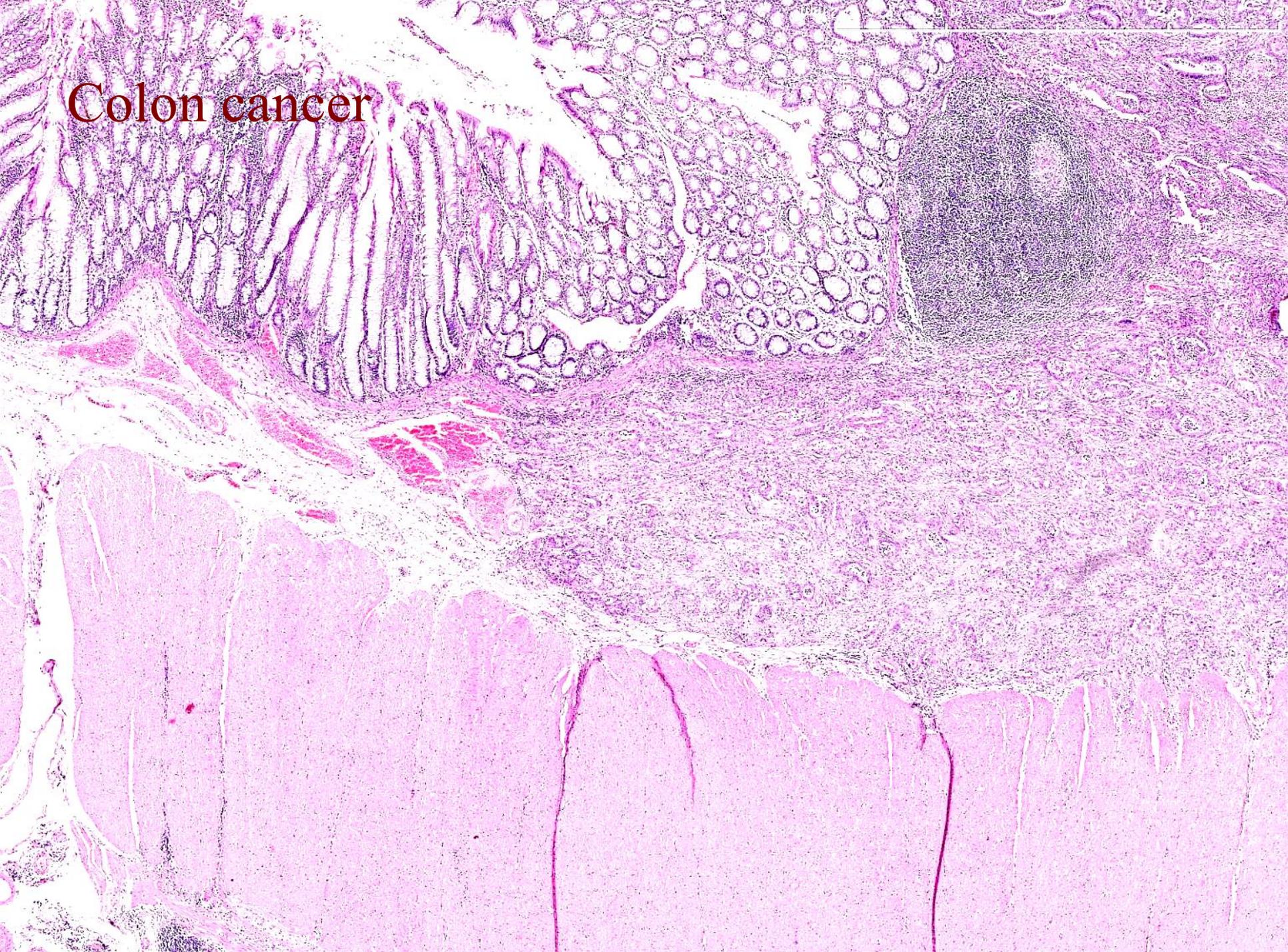
Normal epithelium

Invasion

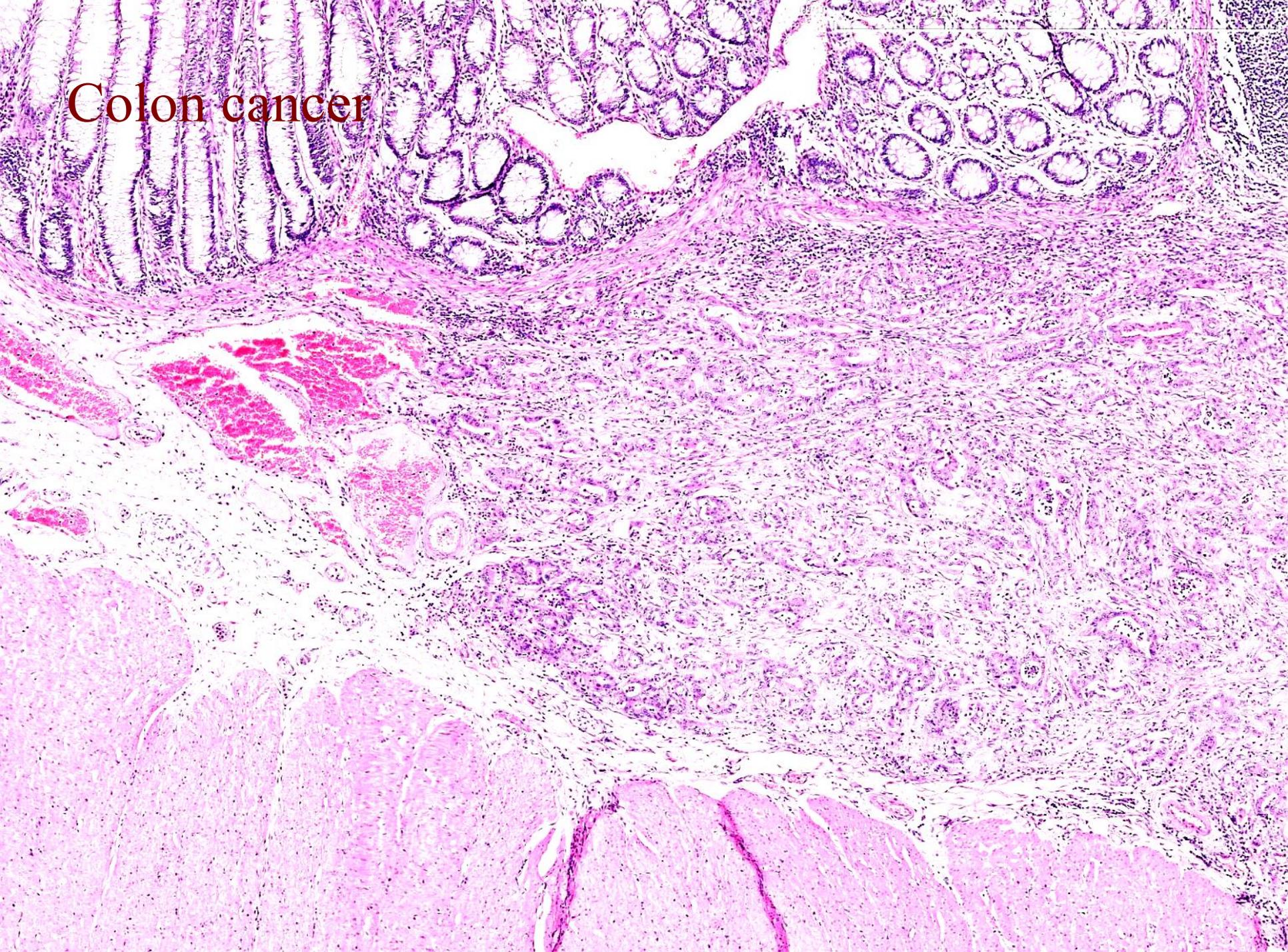
Normal Muscle



Colon cancer



Colon cancer



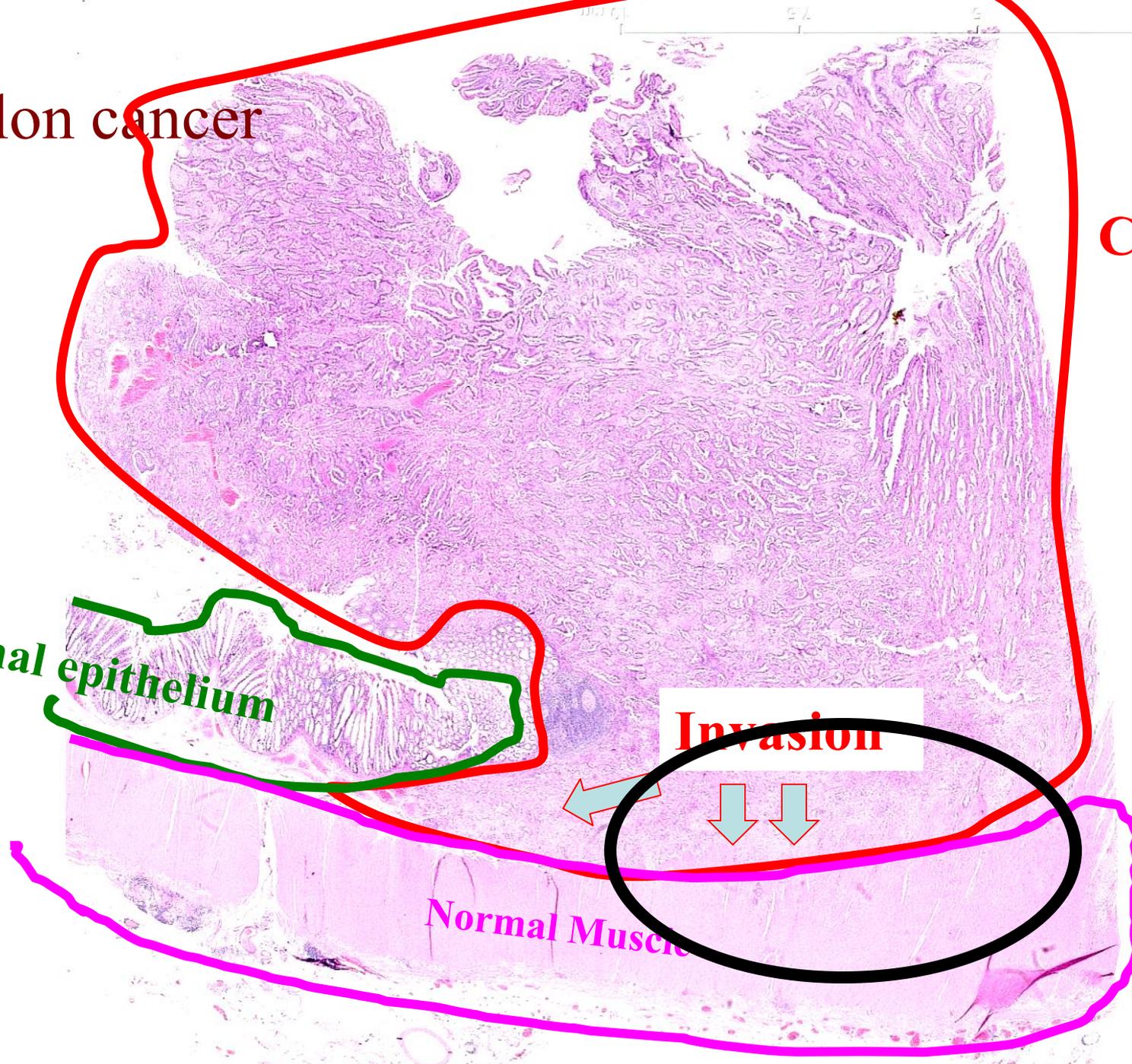
Colon cancer

Cancer

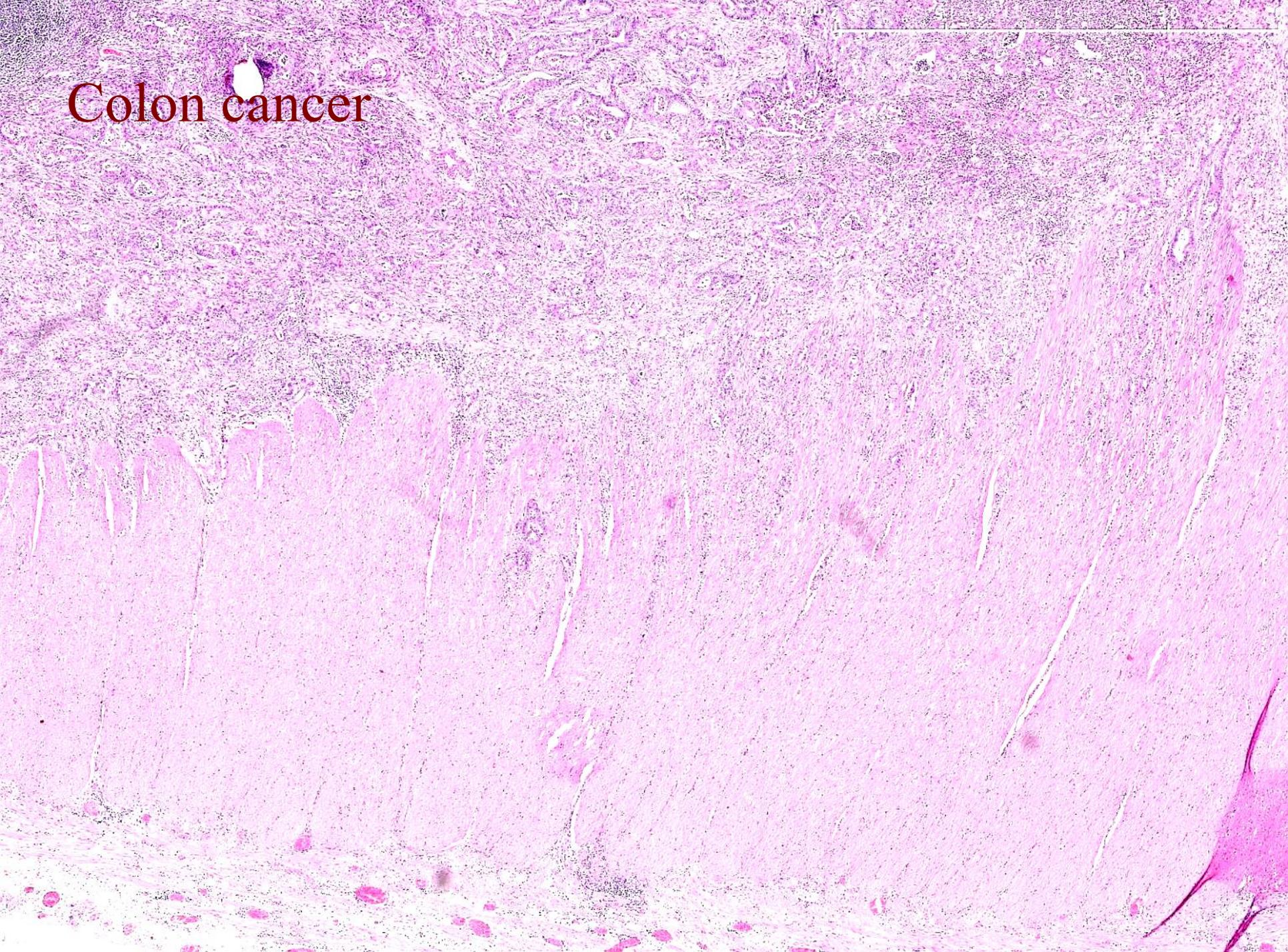
Normal epithelium

Invasion

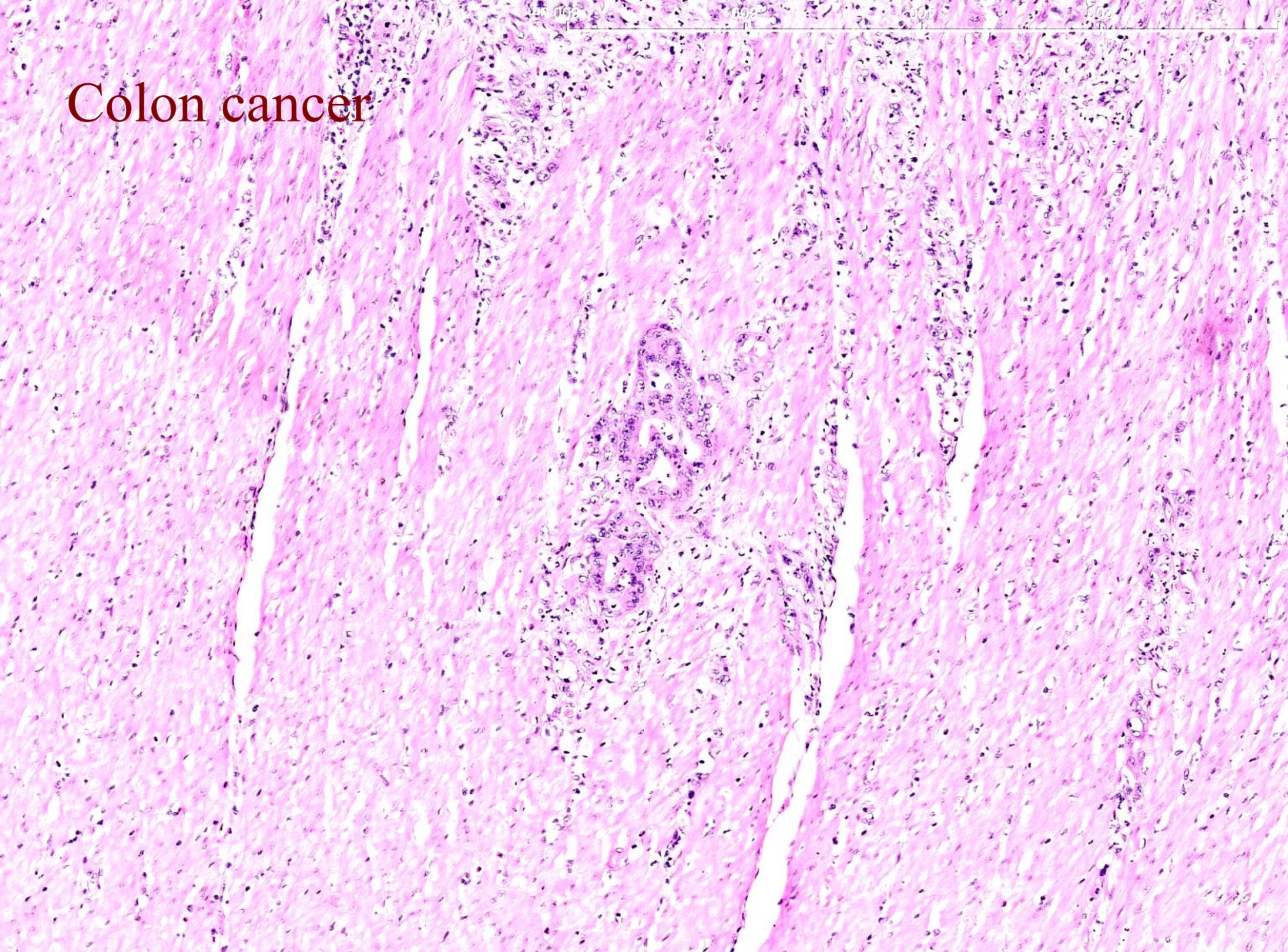
Normal Muscle



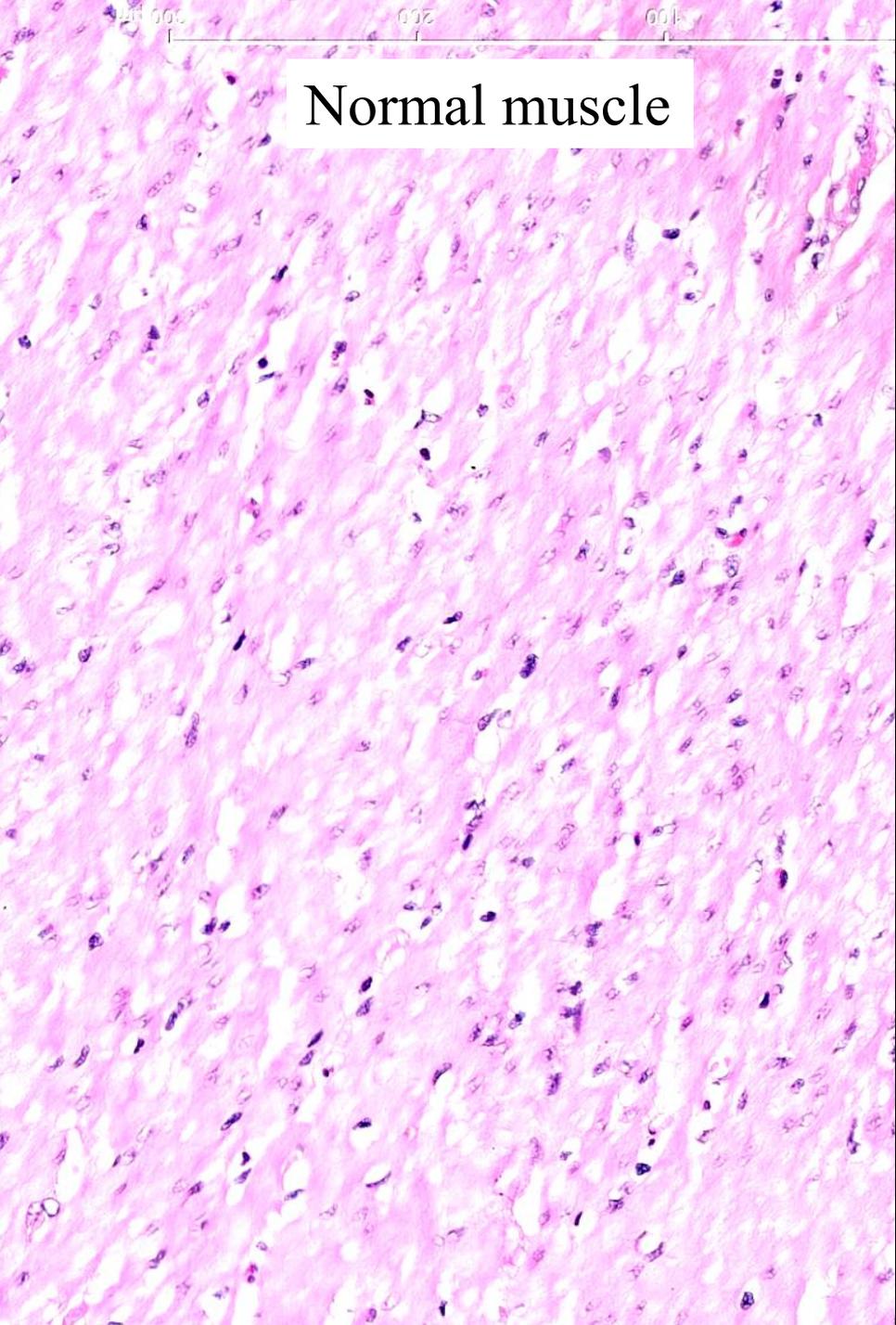
Colon cancer



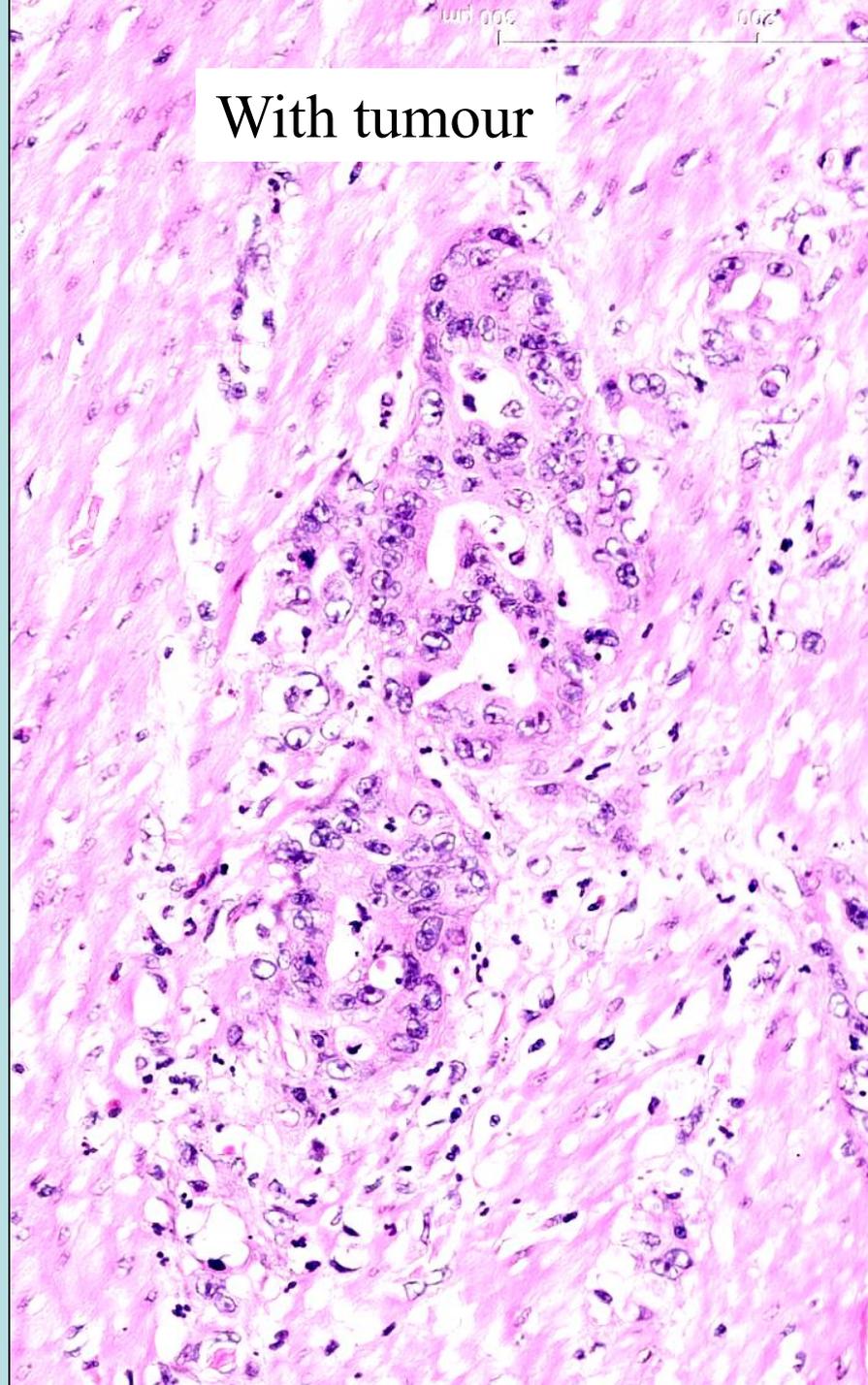
Colon cancer



Normal muscle

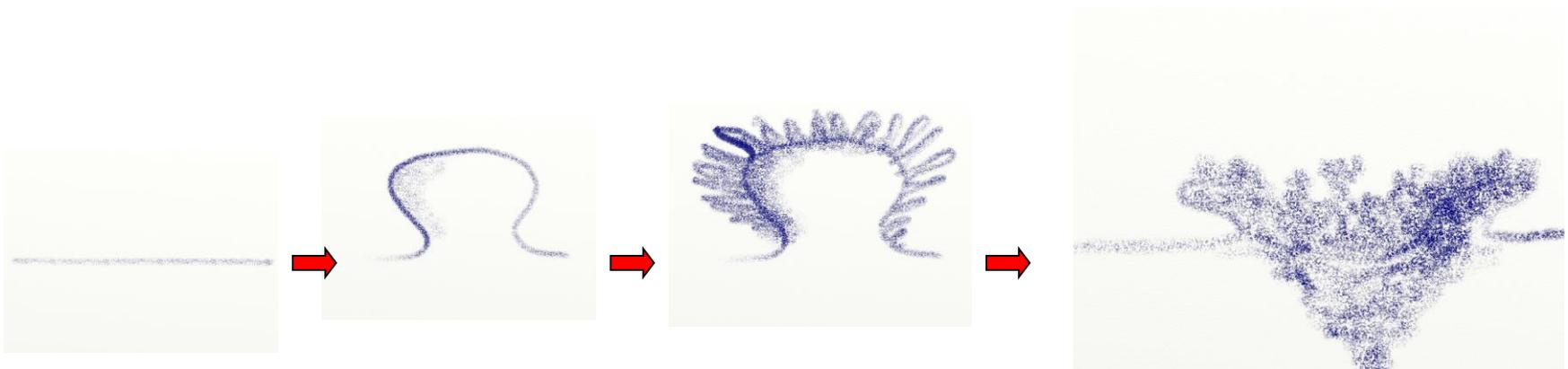
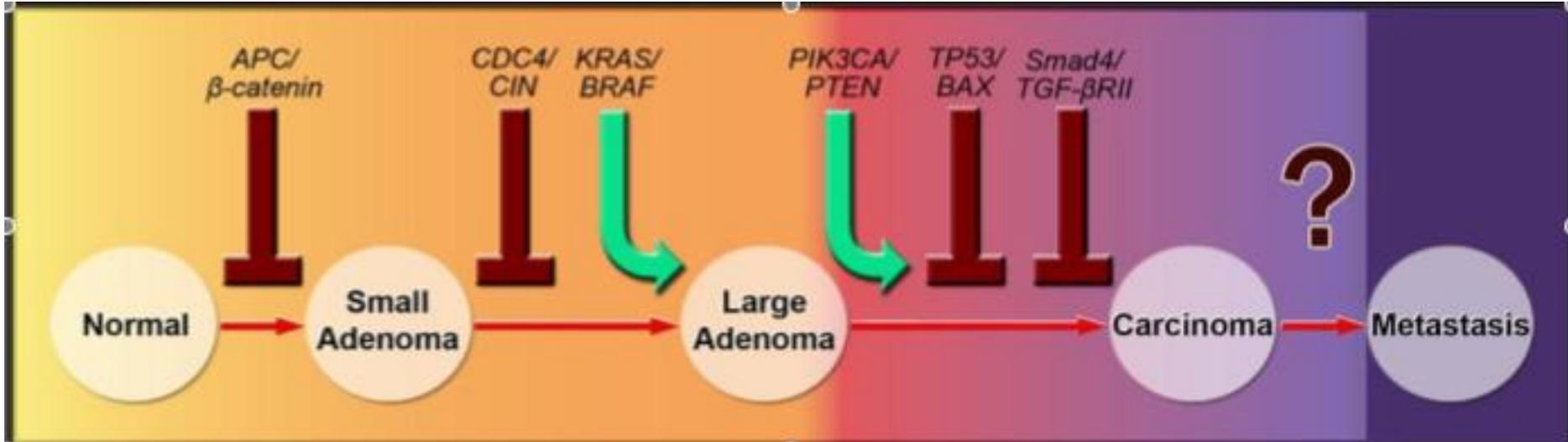


With tumour



Vogelstein model of colon cancer

- a classic example of stages in cancer development



Cause of illness and death

Loss of function

e.g. failure of normal bone marrow in leukaemia

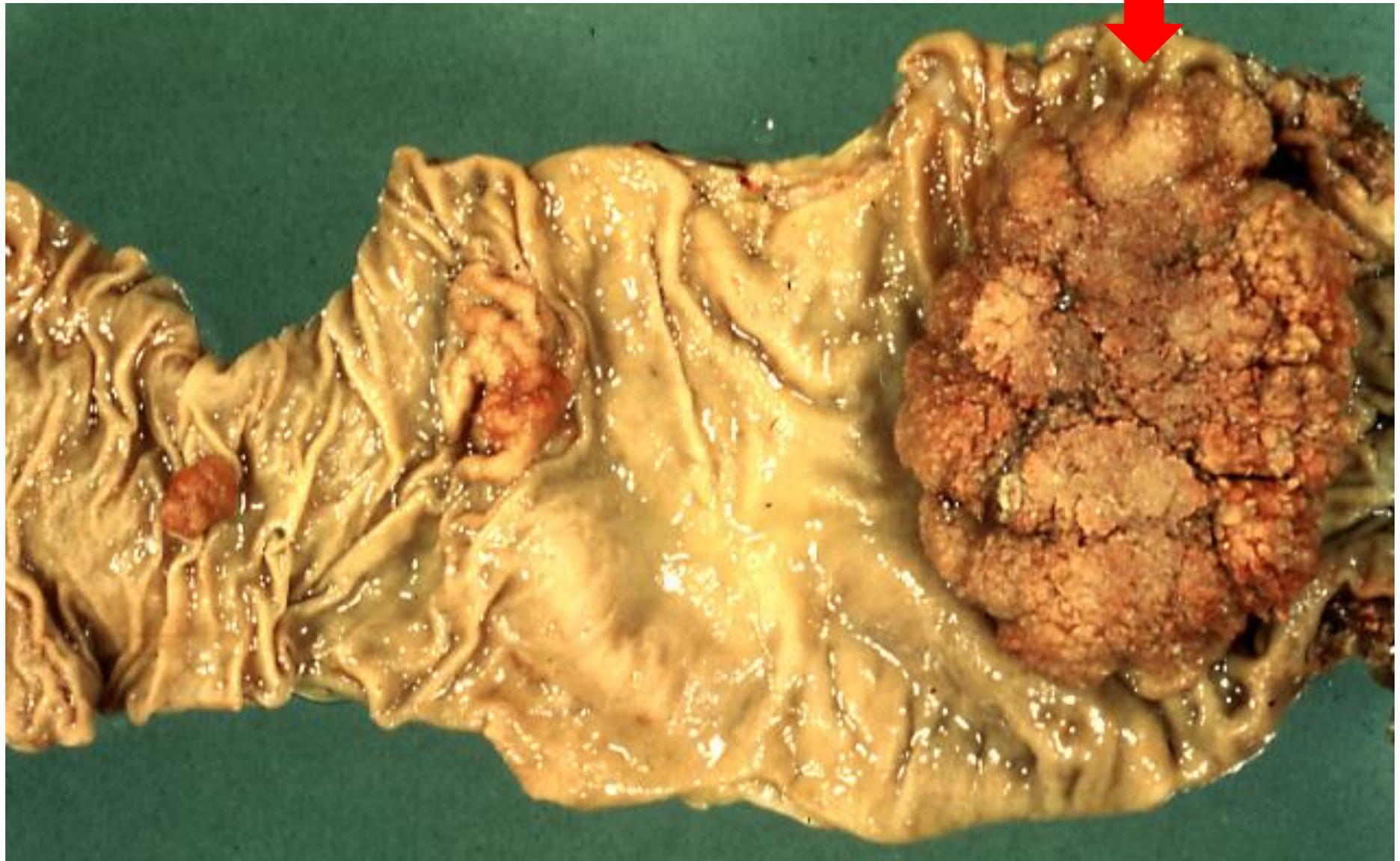
(see also spleen)

Liver overwhelmed by metastatic colon cancer

etc etc

Presentation and screening

Colon/rectum cancer: pain, bleeding...



Best example of screening

Cervical Cancer

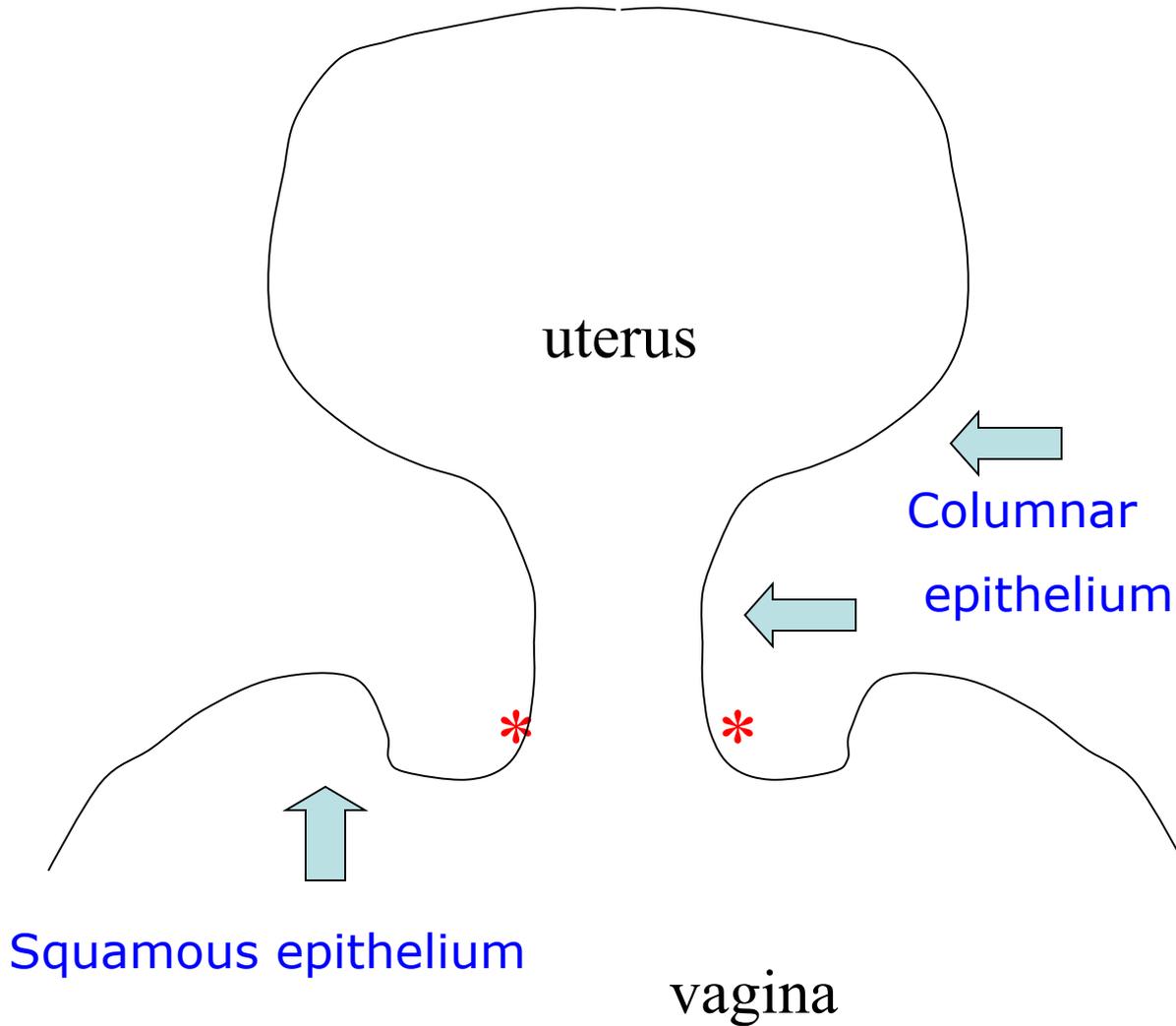
Cervical Cancer: Second Classic multistep example

Illustrates:

- multiple stages
- Benign to malignant transition

- Metaplasia
- Virus infection
- screening

Cervix and cervical Cancer



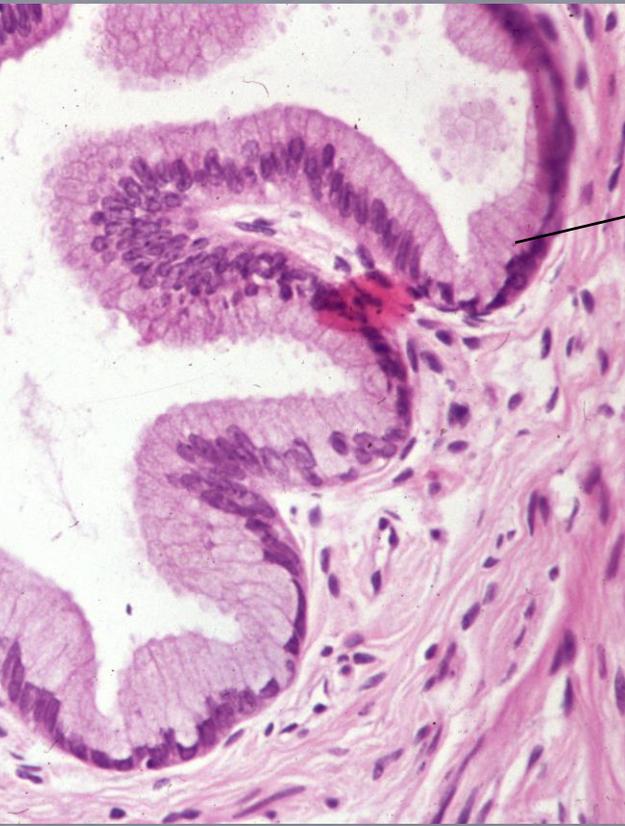
Cervix at low power

uterus, glandular

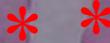
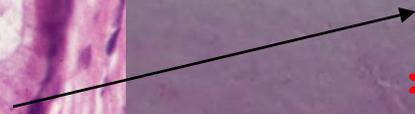


vagina, squamous

Cervix at low power



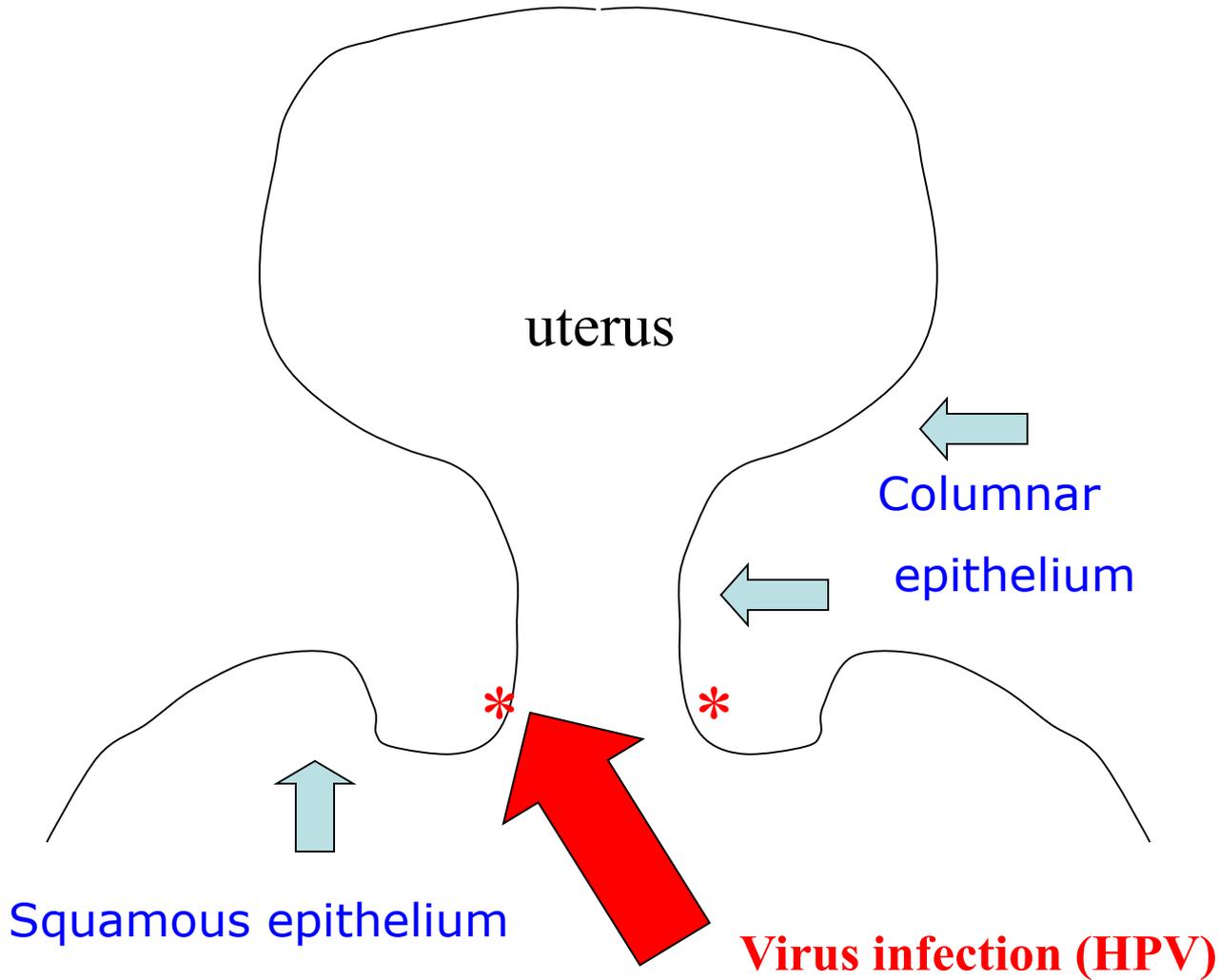
glandular



squamous

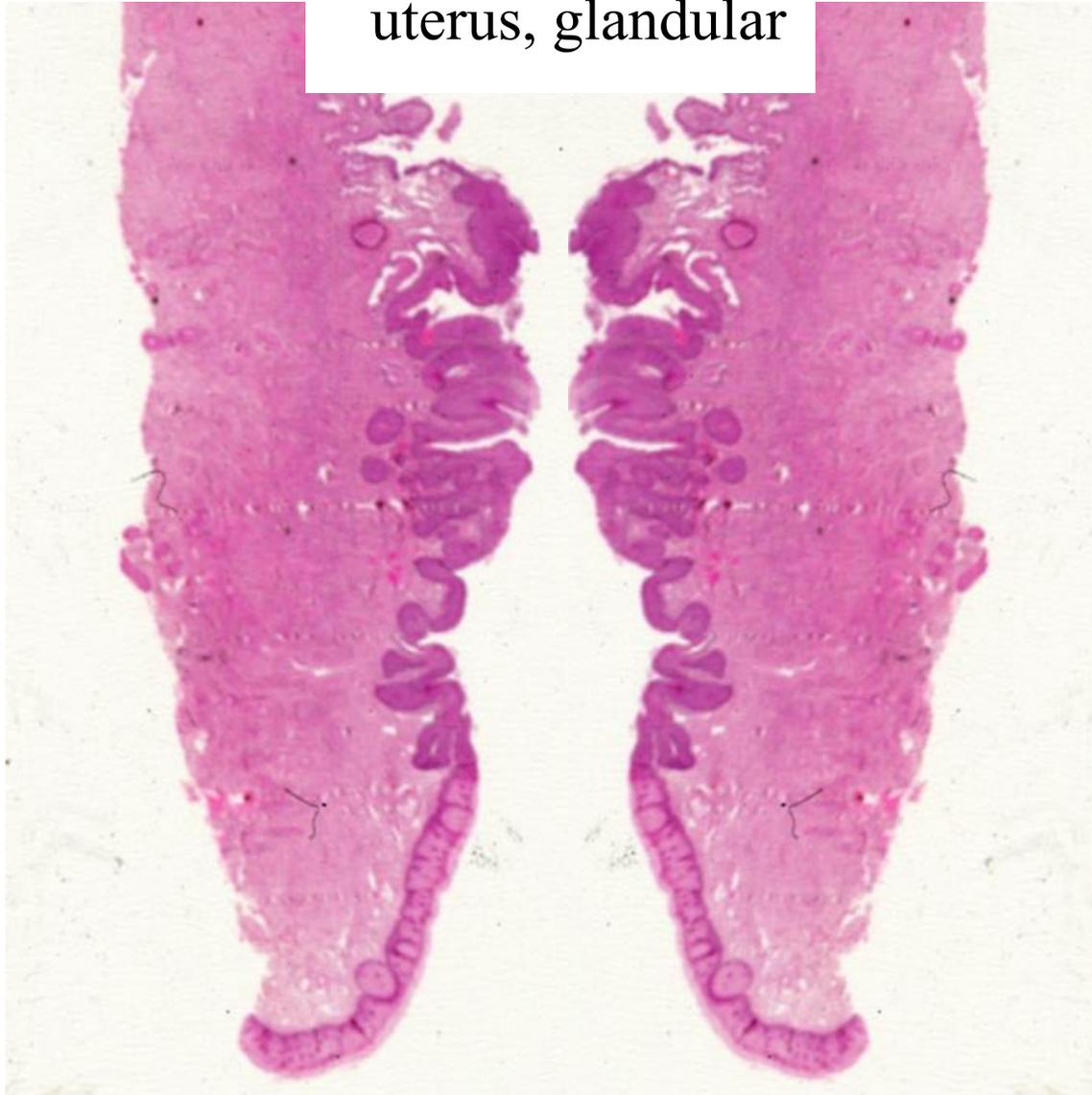


Cervix and cervical Cancer



Very dysplastic but still benign cervix epithelium 'CINIII'

uterus, glandular

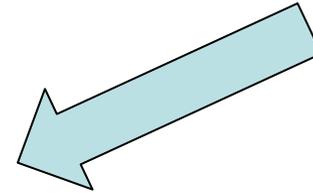


vagina, squamous

Very dysplastic but still benign cervix epithelium 'CINIII'



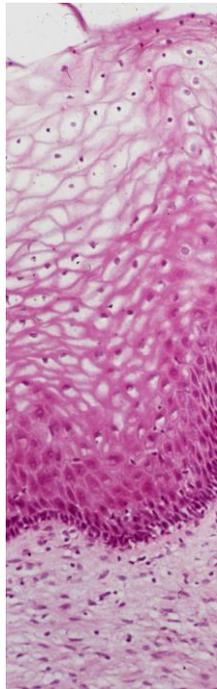
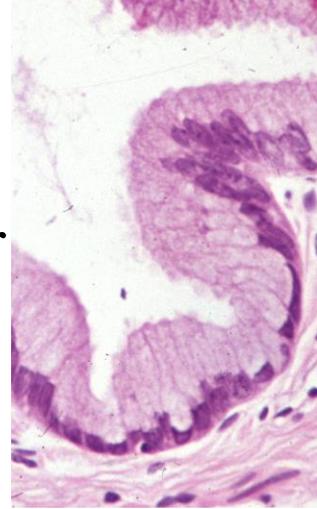
normal glandular



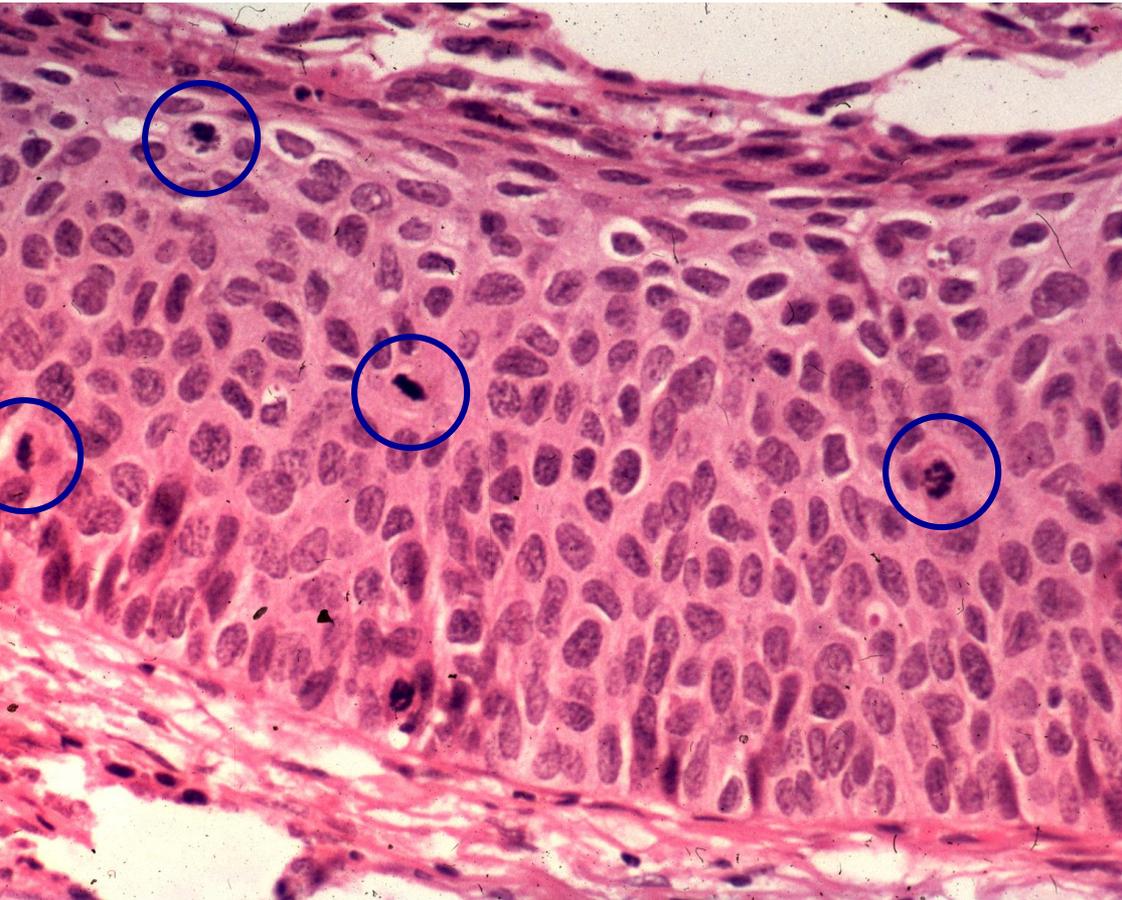
squamous metaplasia
+
severe dysplasia

'CINIII'

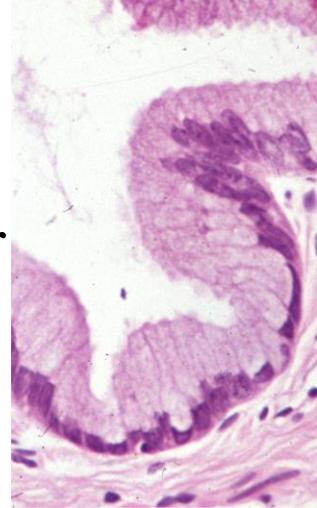
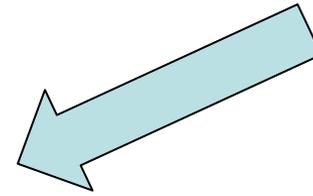
normal squamous



Very dysplastic but still benign cervix epithelium 'CINIII'



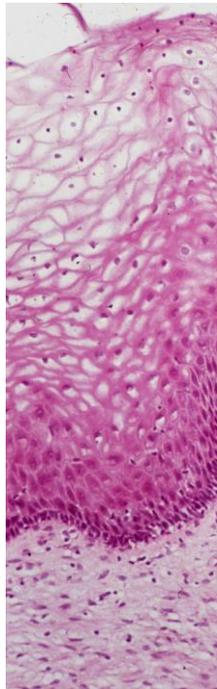
normal glandular



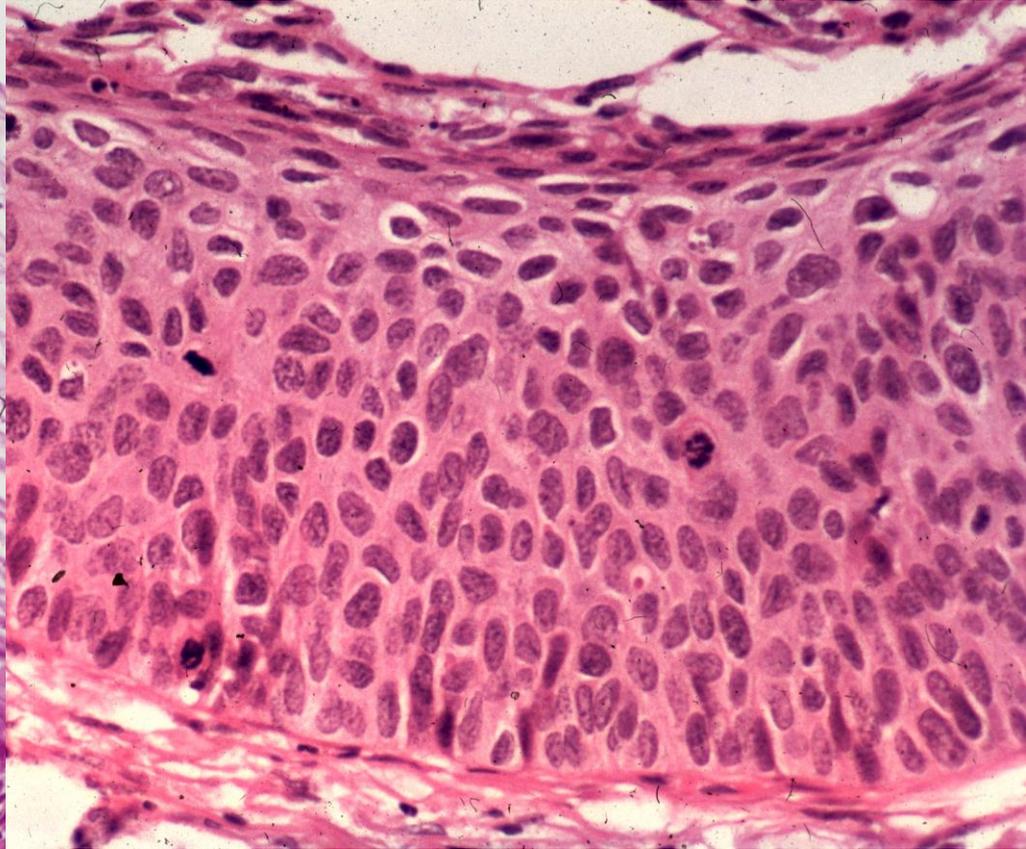
squamous metaplasia
+
severe dysplasia

'CINIII'

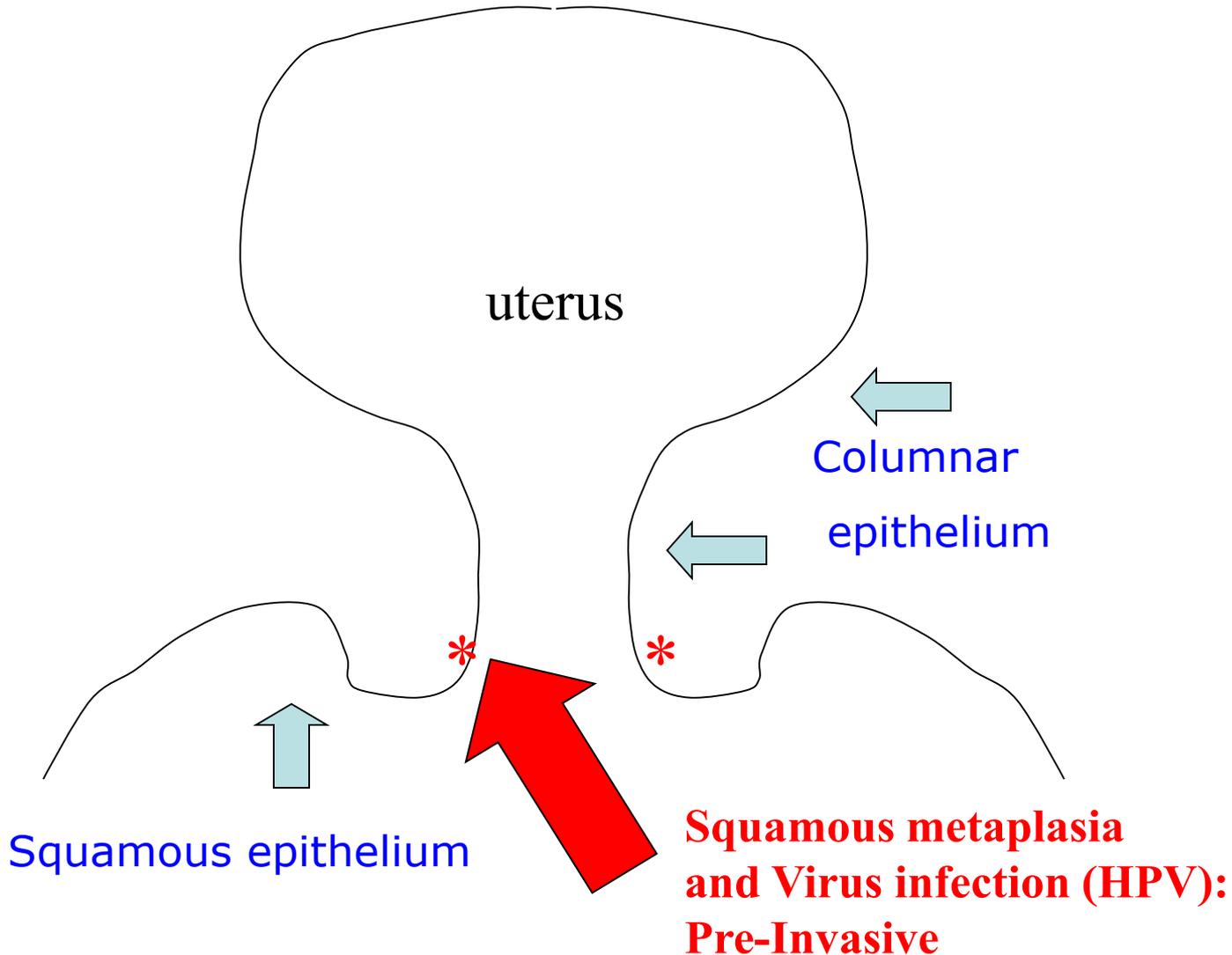
normal squamous



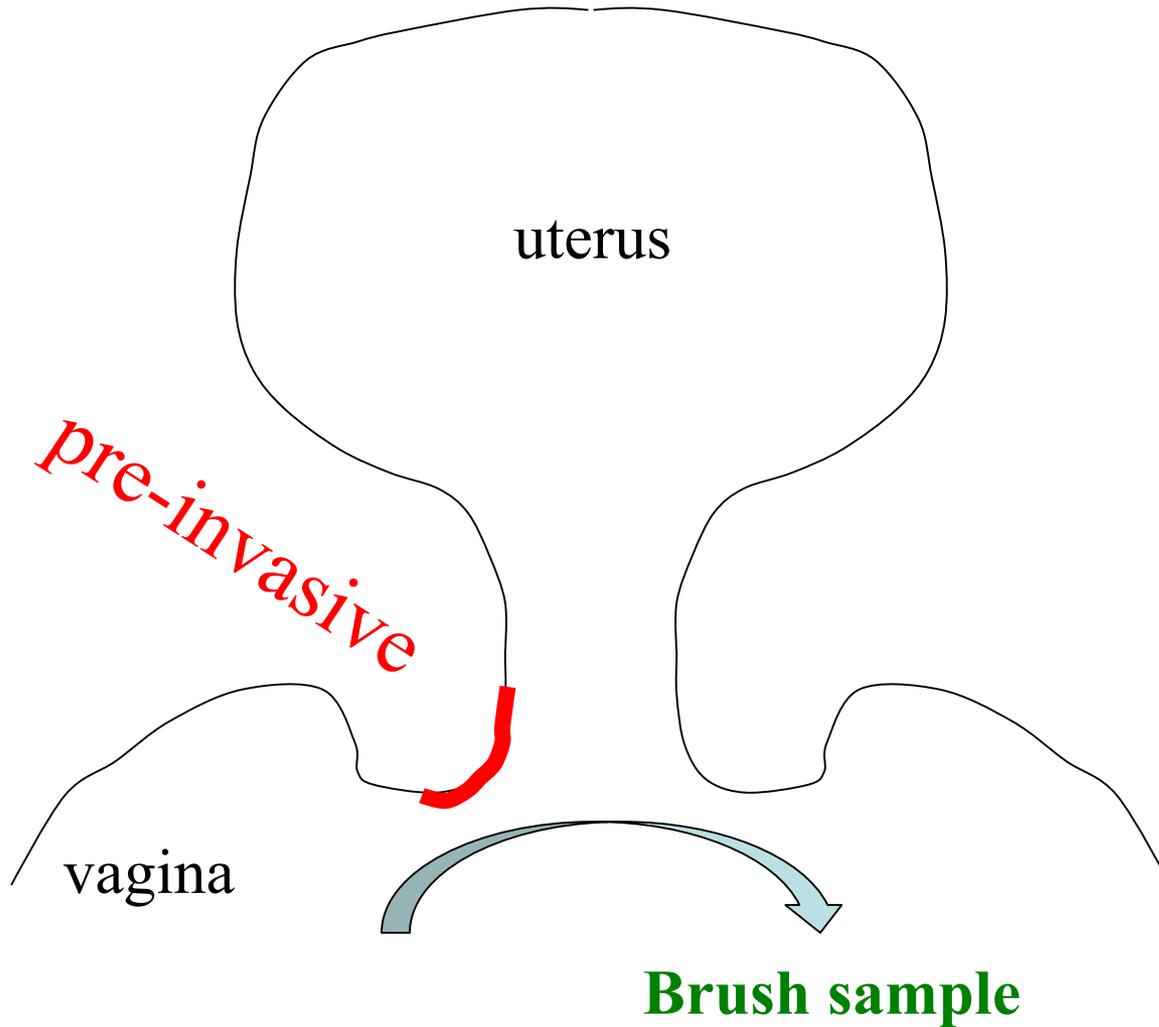
Precursor - detect by screening



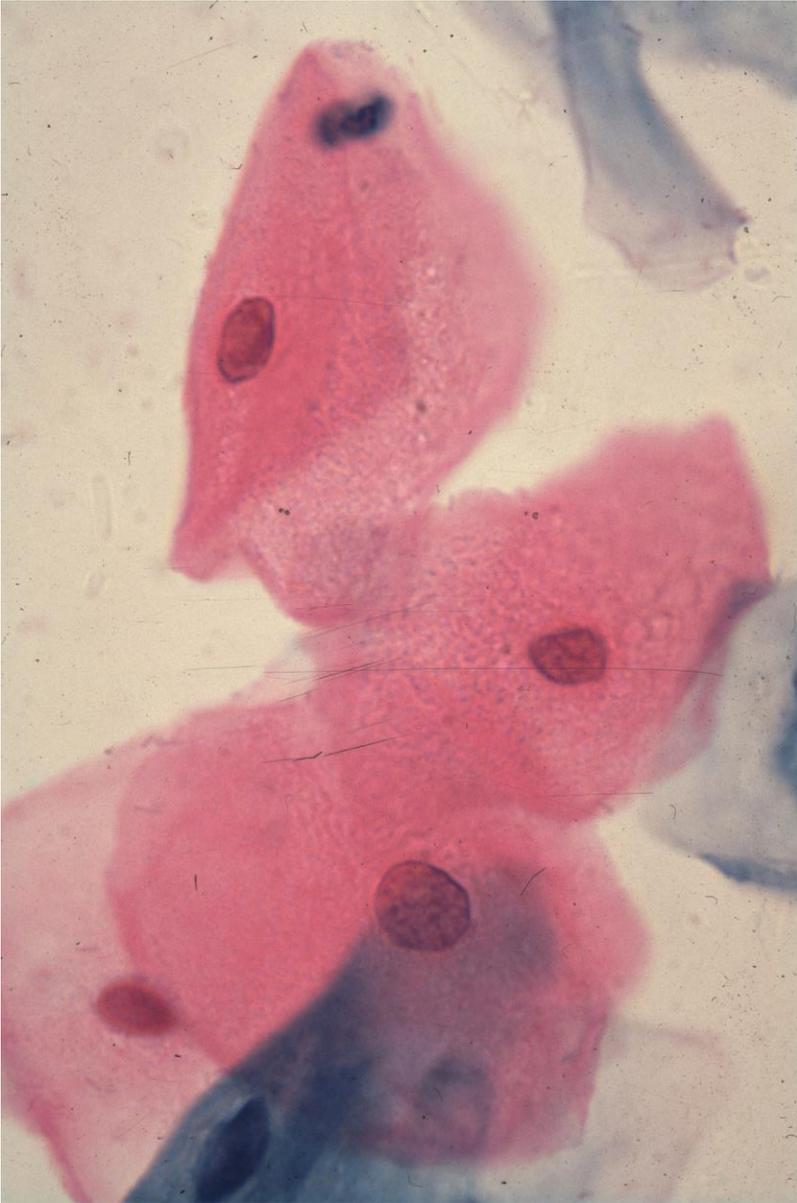
Cervix and cervical Cancer



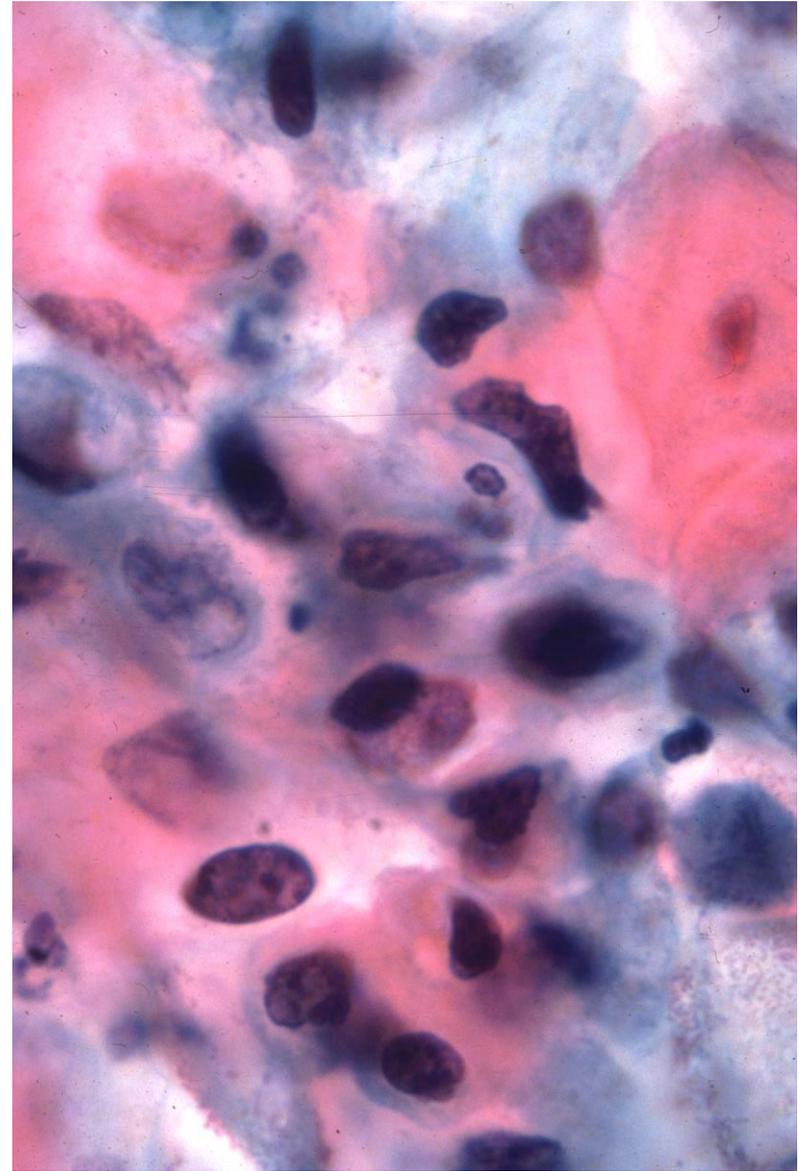
Screening: cervix is ideal



Cervical smears

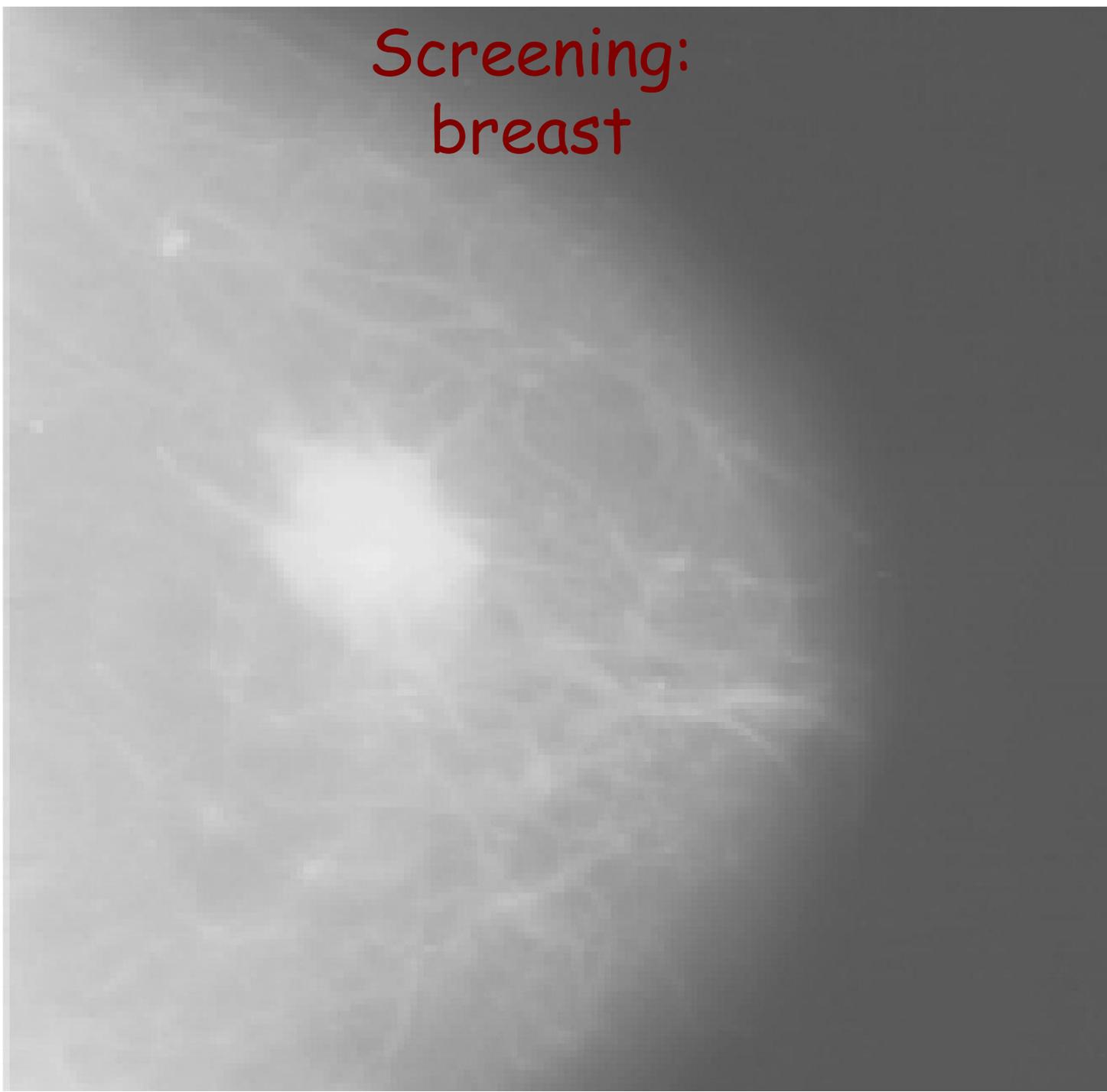


- normal



abnormal:
large pleomorphic nuclei

Screening: breast

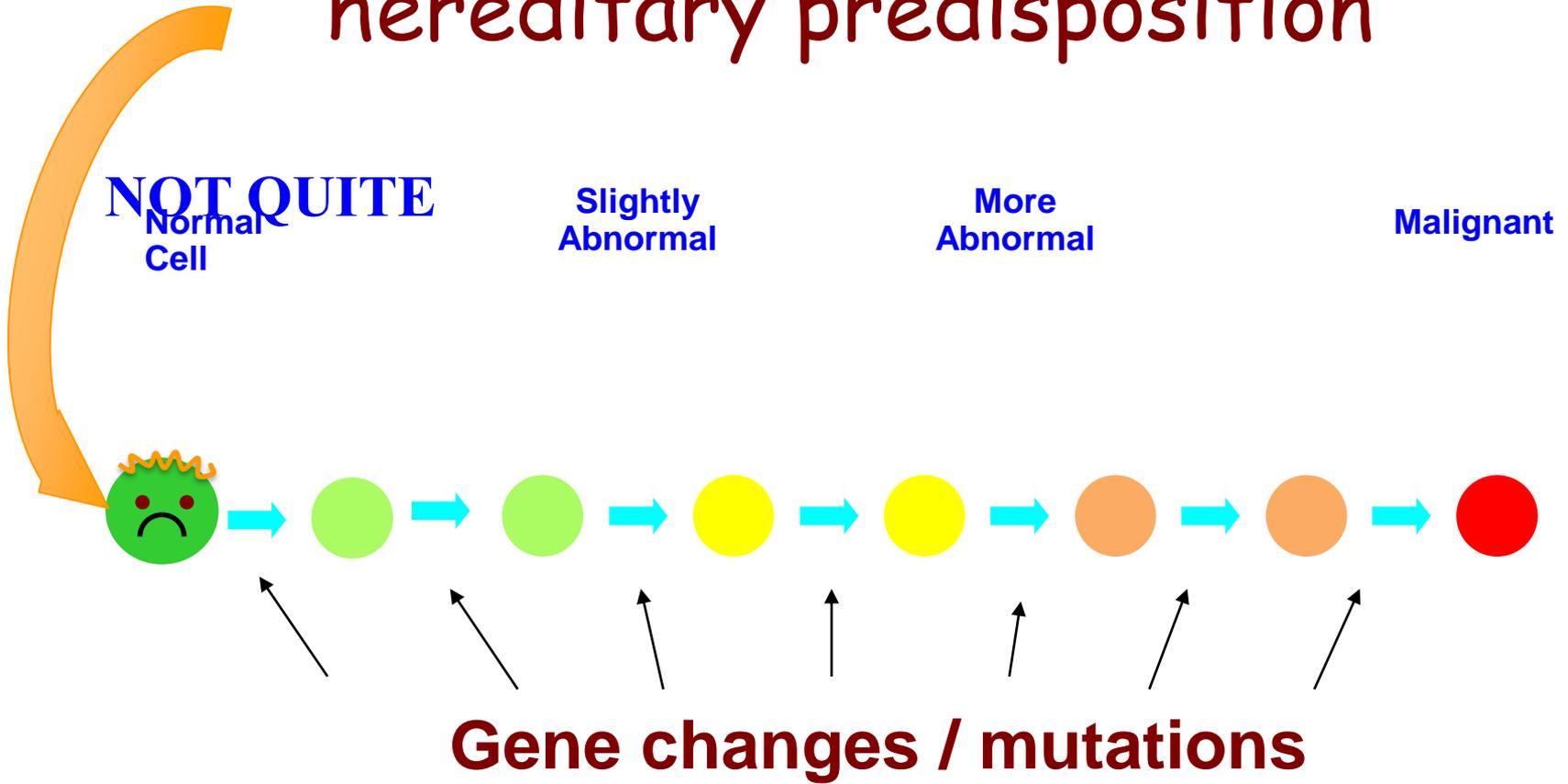


Miscell

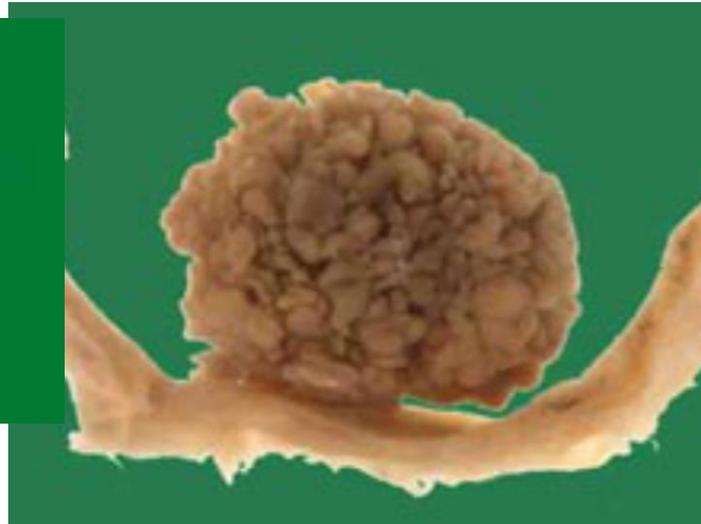
Hereditary predisposition - polyposis (vs HNPCC)

Benign Teratoma

hereditary predisposition



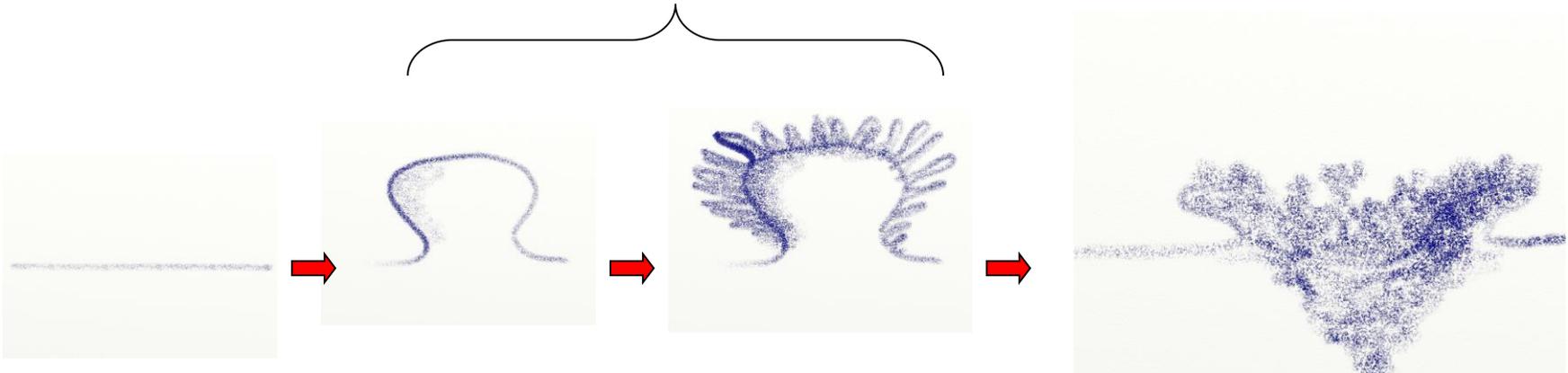
Cancer develops in multiple stages



Normal

Benign

Malignant



Vogelstein model of colon cancer

- a classic example of stages in cancer development

