Tumour Structure and Nomenclature

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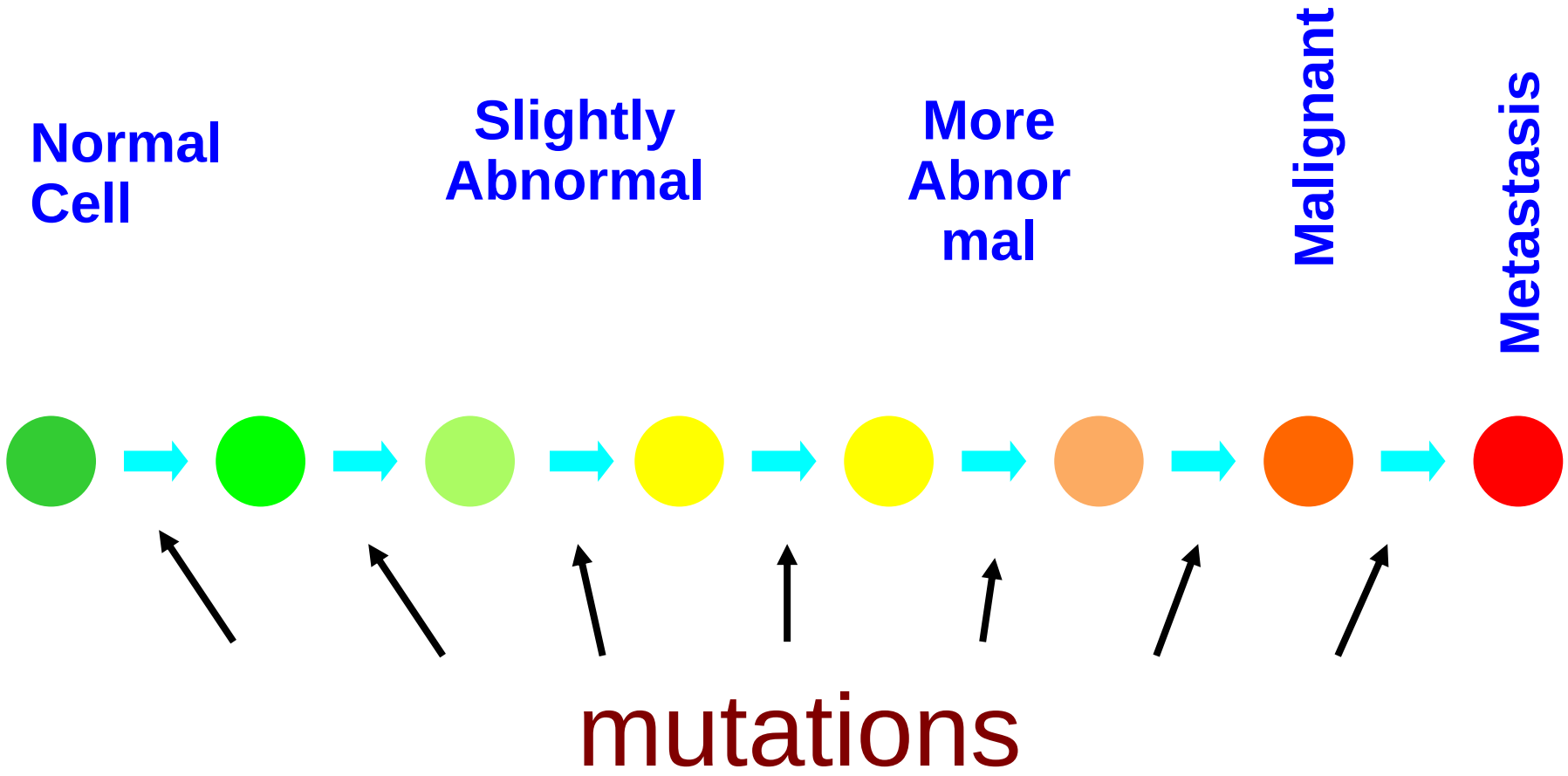
Core idea of cancer



1. Malignancy and Metastasis

the central problem of cancer research,
both clinically and intellectually

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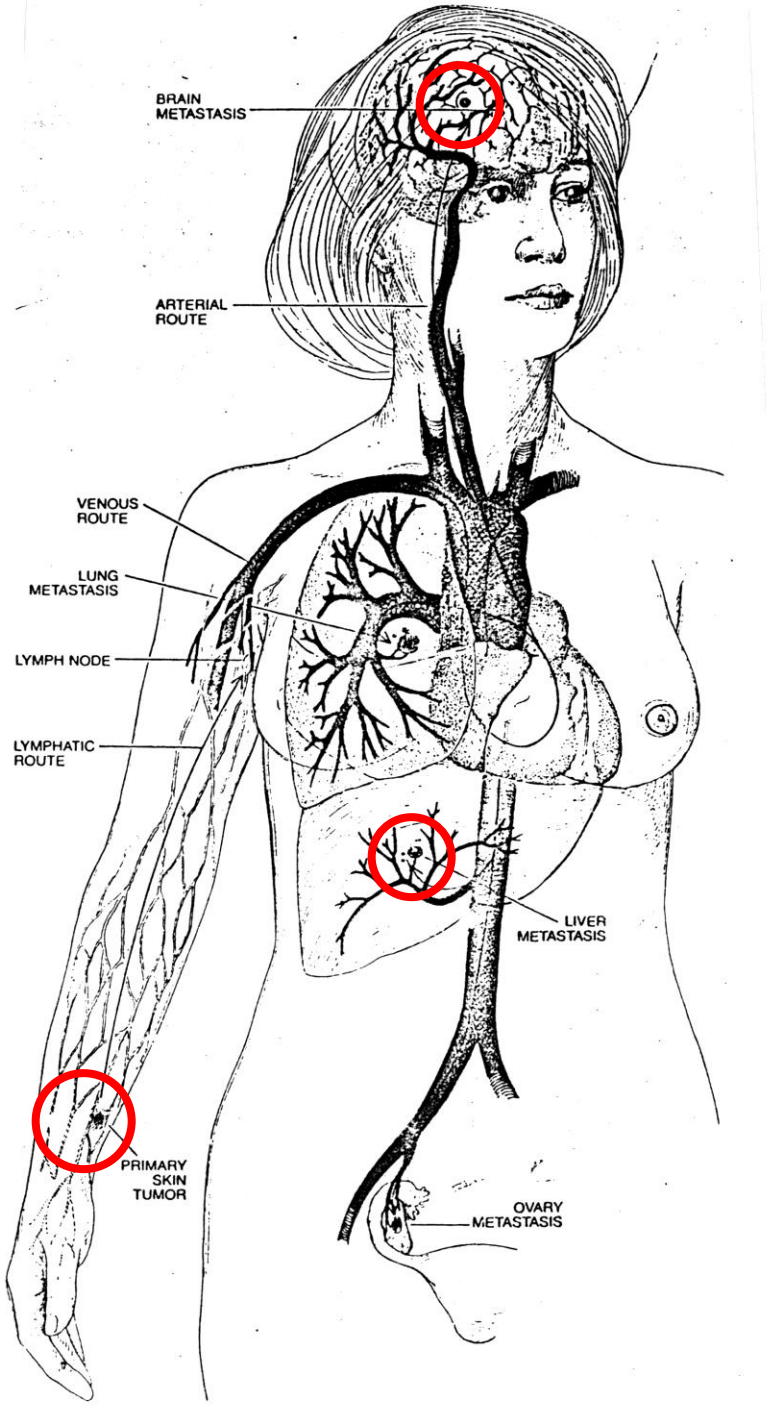
Metastasis is when a cancer forms additional tumours ‘secondaries’ elsewhere in the body. A metastasis is also a secondary tumour, plural metastases

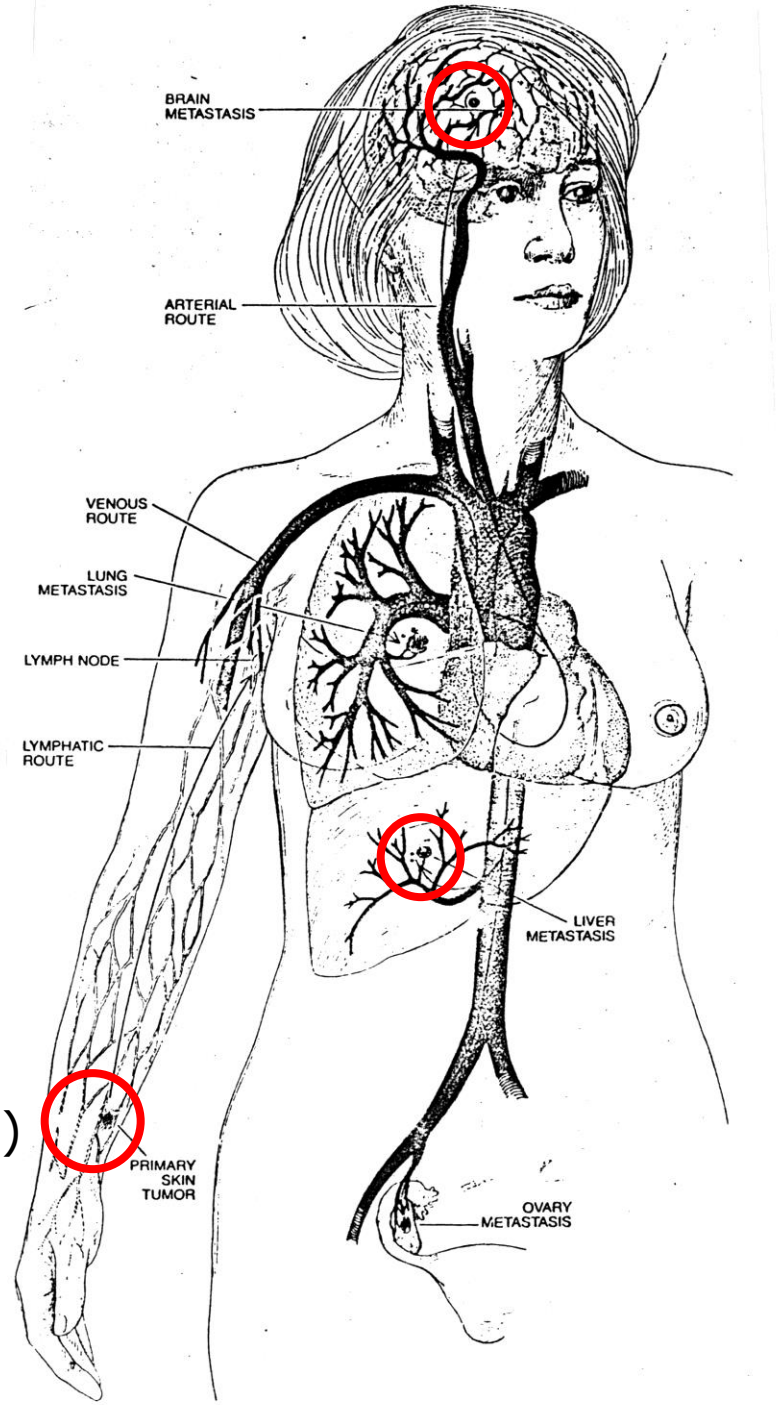
Malignancy definition: the *ability* to form metastases (it doesn’t have to have metastasized yet)

Metastasis


BRAIN METASTASIS
ARTERIAL ROUTE
VENOUS ROUTE
LUNG METASTASIS
LYMPH NODE
LYMPHATIC ROUTE
LIVER METASTASIS
PRIMARY SKIN TUMOR
OVARY METASTASIS

Malignancy

malignant tumour (melanoma)

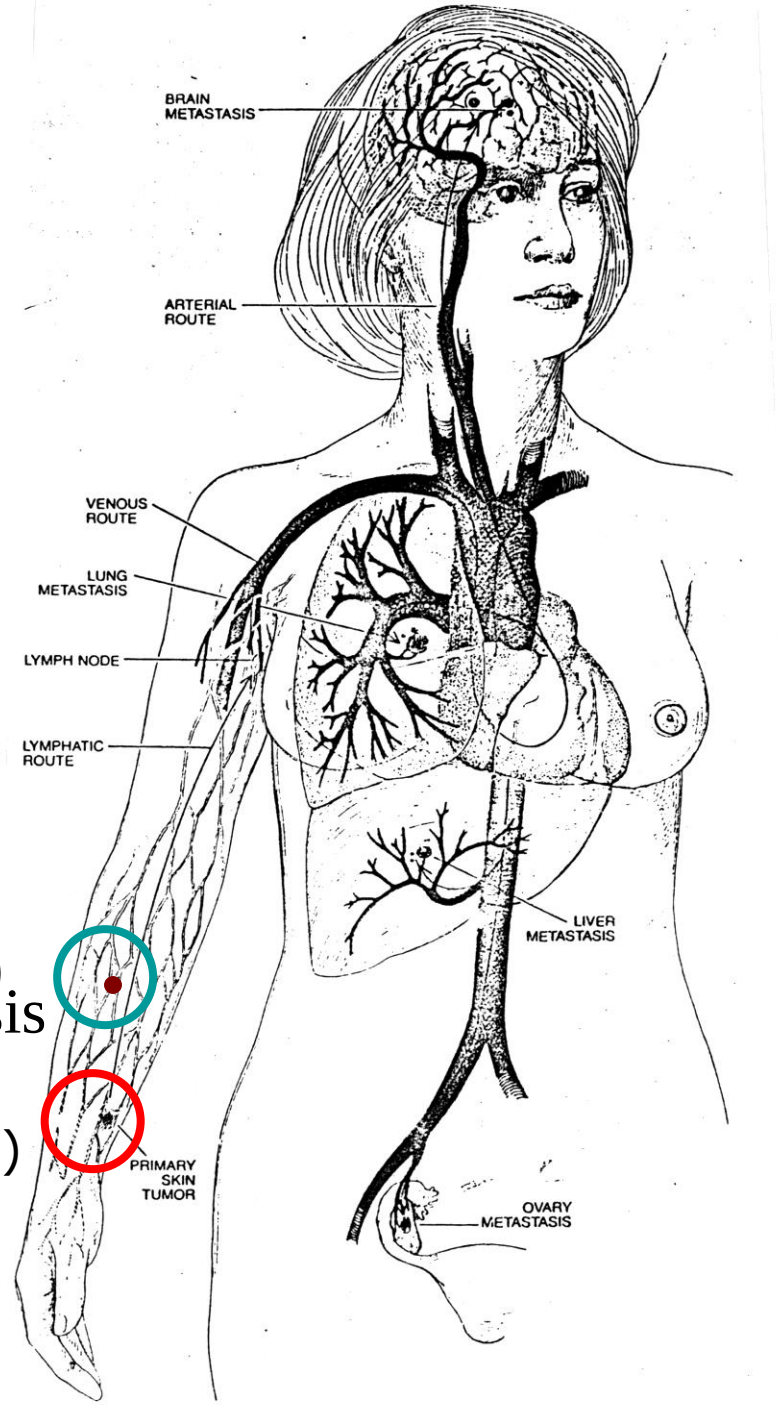


Malignancy

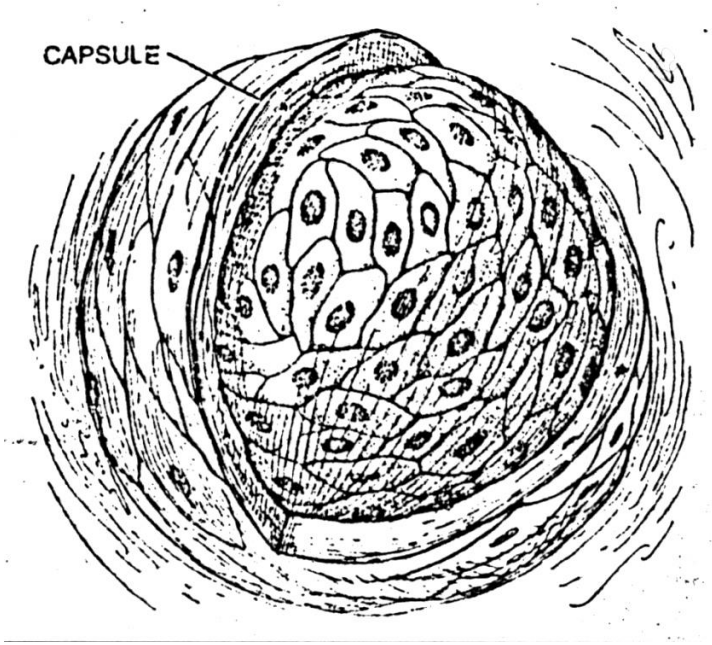
Benign tumour (mole)
NOT capable of metastasis

malignant tumour (melanoma)

capable of metastasis



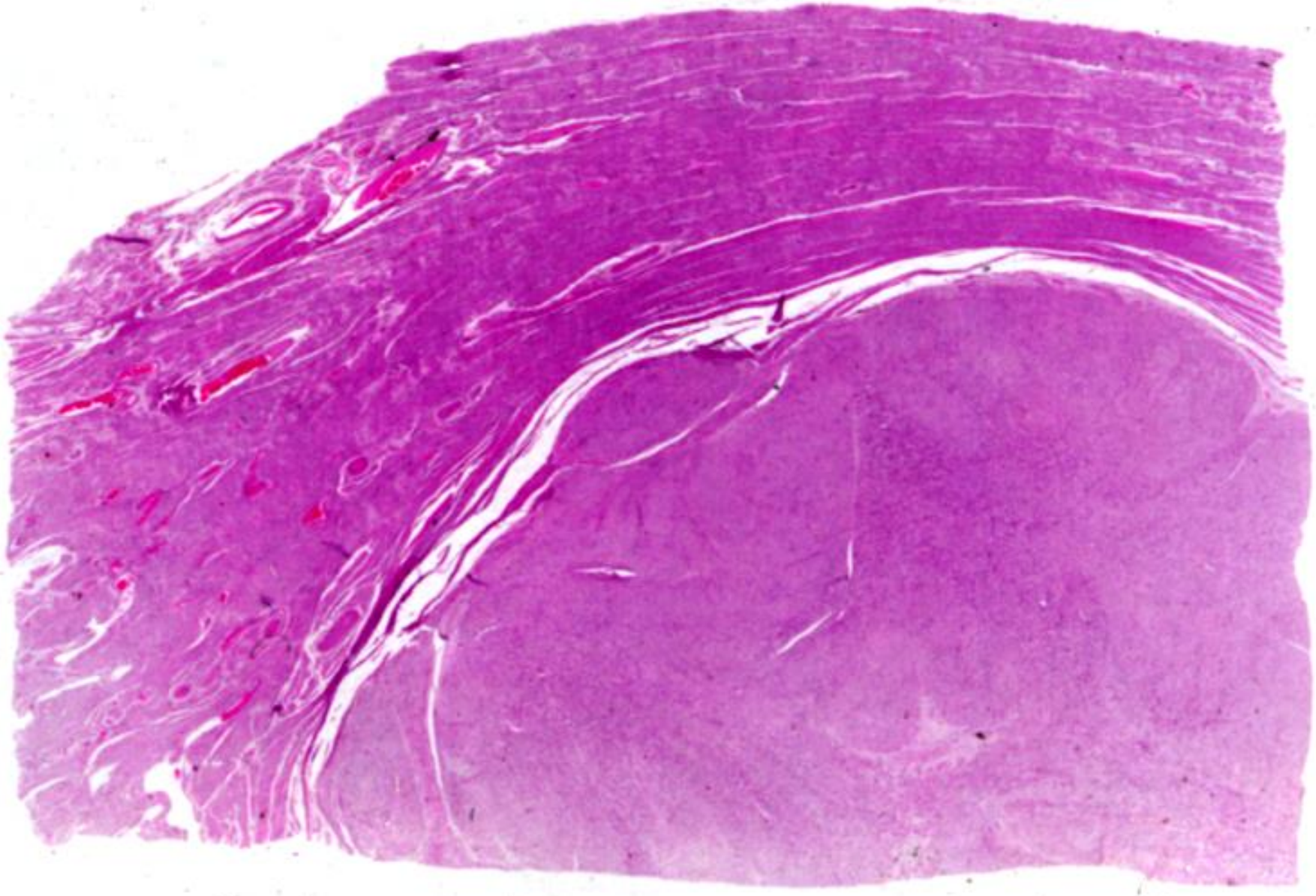
Malignancy
can be identified down the microscope



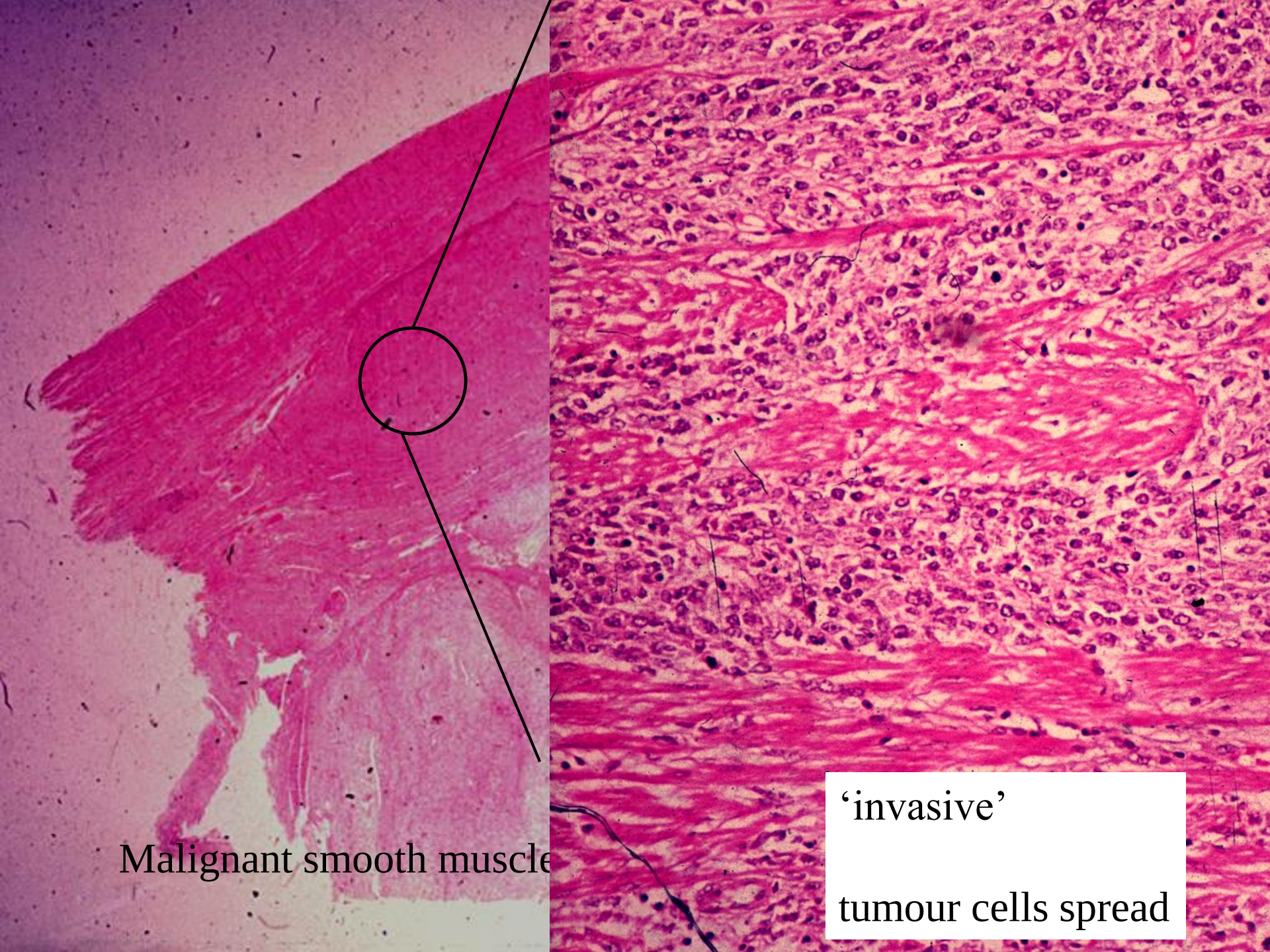
benign

malignant

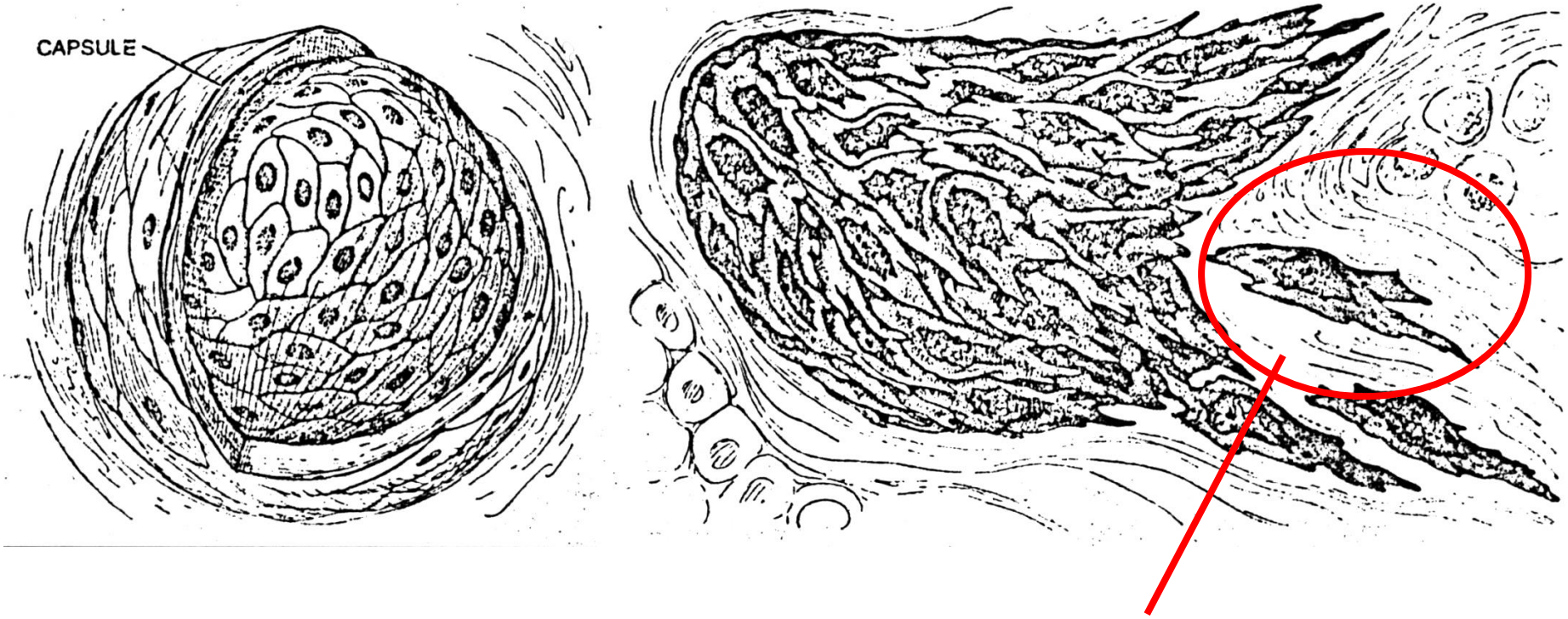
Benign smooth muscle tumour of uterus (common)



Malignant smooth muscle tumour of uterus (v. rare)


Malignant smooth muscle
‘invasive’
tumour cells spread

Malignancy
can be identified down the microscope



benign

invasion = local 'metastasis' ?
(Heresy?)

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 = 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
may include adeno- or squamous, e.g.oesophageal adenocarcinoma; squamous carcinoma of oesophagus

Some Exceptions to the above rules:
malignant melanoma
Neuroblastoma, medulloblastoma (both malignant)

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

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

Benign versus malignant: benign tumours can kill

e.g. meningioma, pituitary adenomas

Incidence

Benign tumours:
very common all tissues
Leiomyoma of uterus, lipoma, wart, mole ….

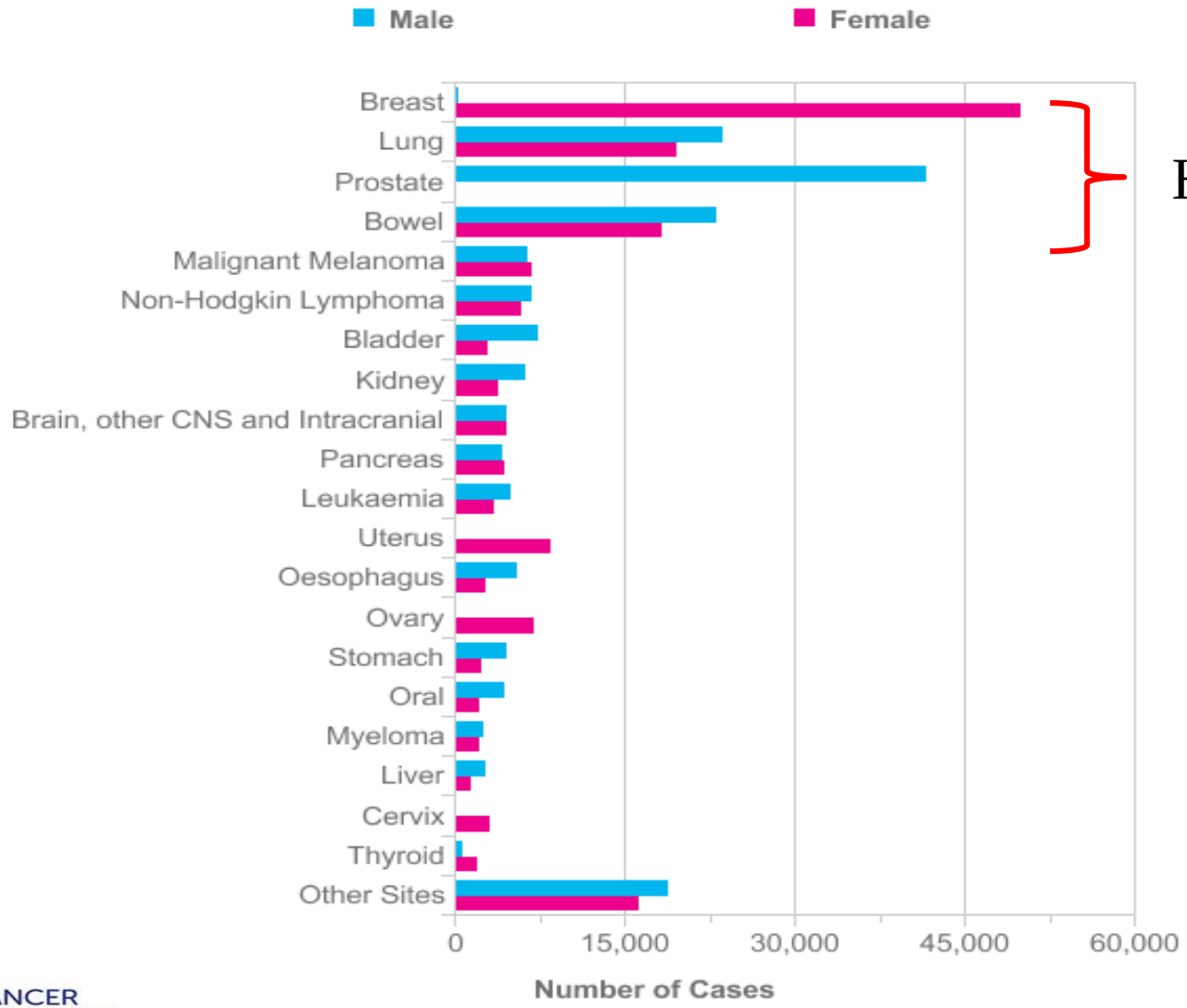
Malignant tumours from mesenchyme
generally rare but often rapidly lethal
-E.g osteosarcoma (malignant bone tumour),

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

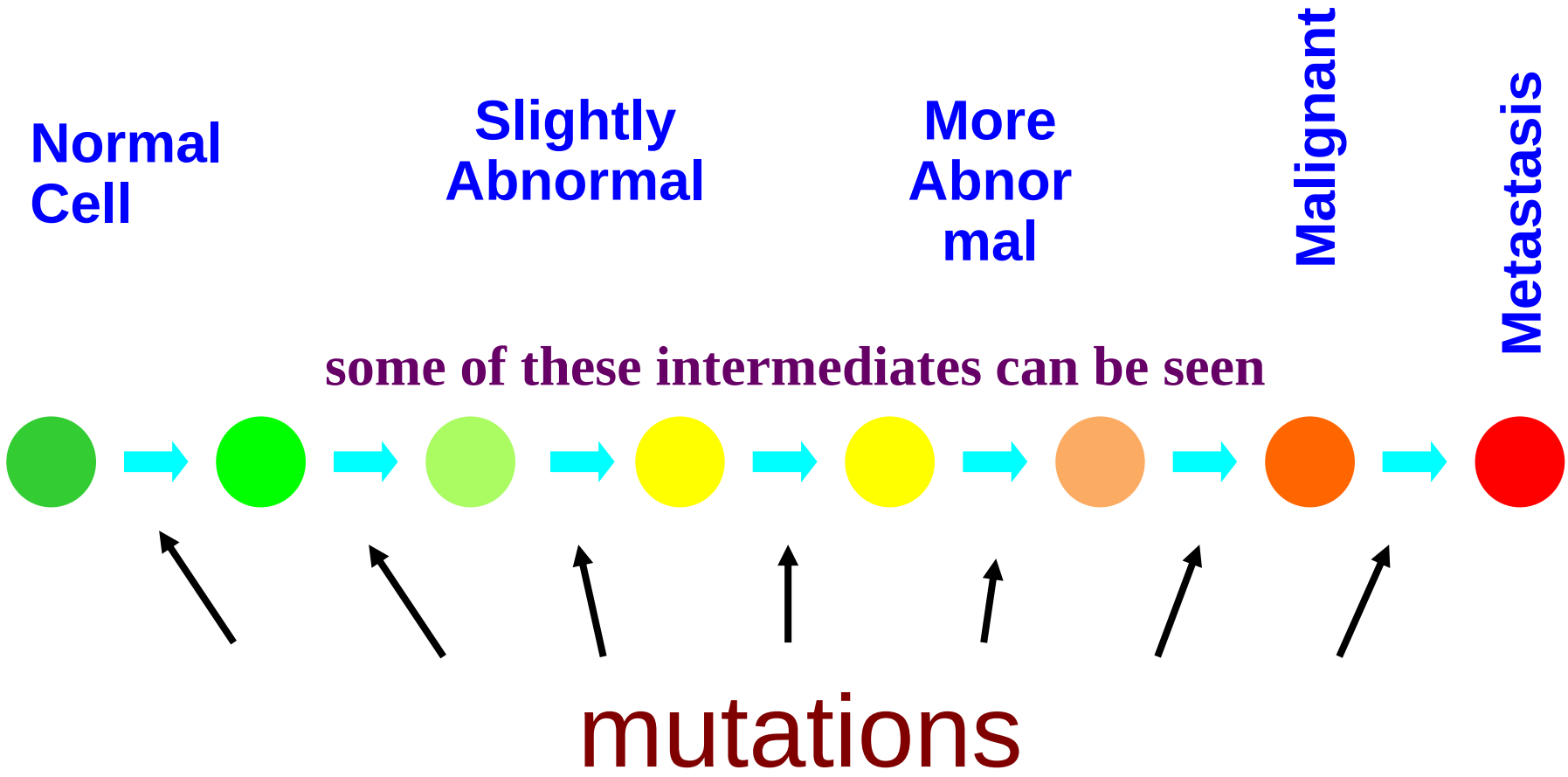


Half of all cases

CANCER RESEARCH UK

http://info.cancerresearchuk.org/cancerstats

Core idea of cancer

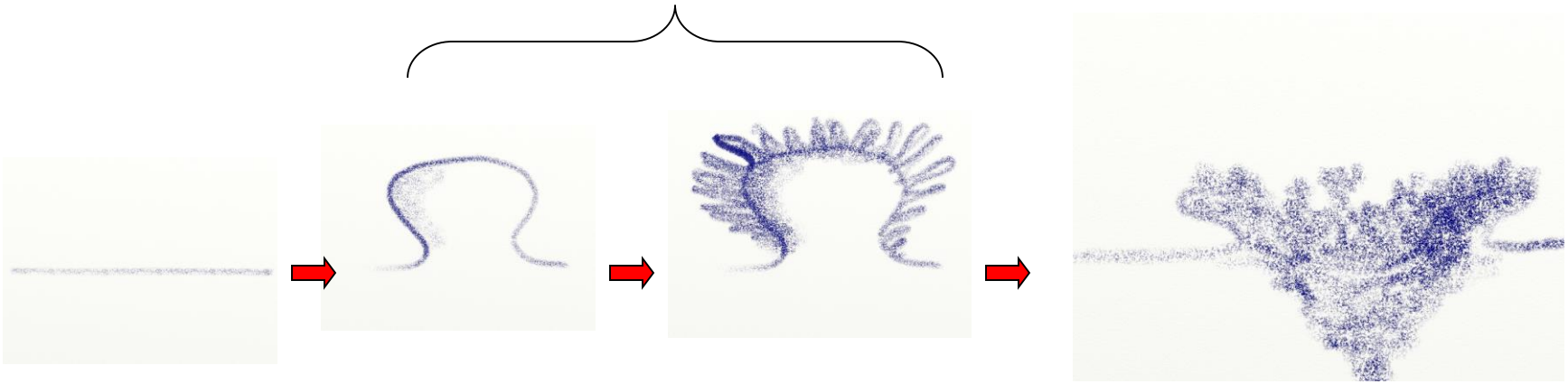


Cancer develops in multiple stages

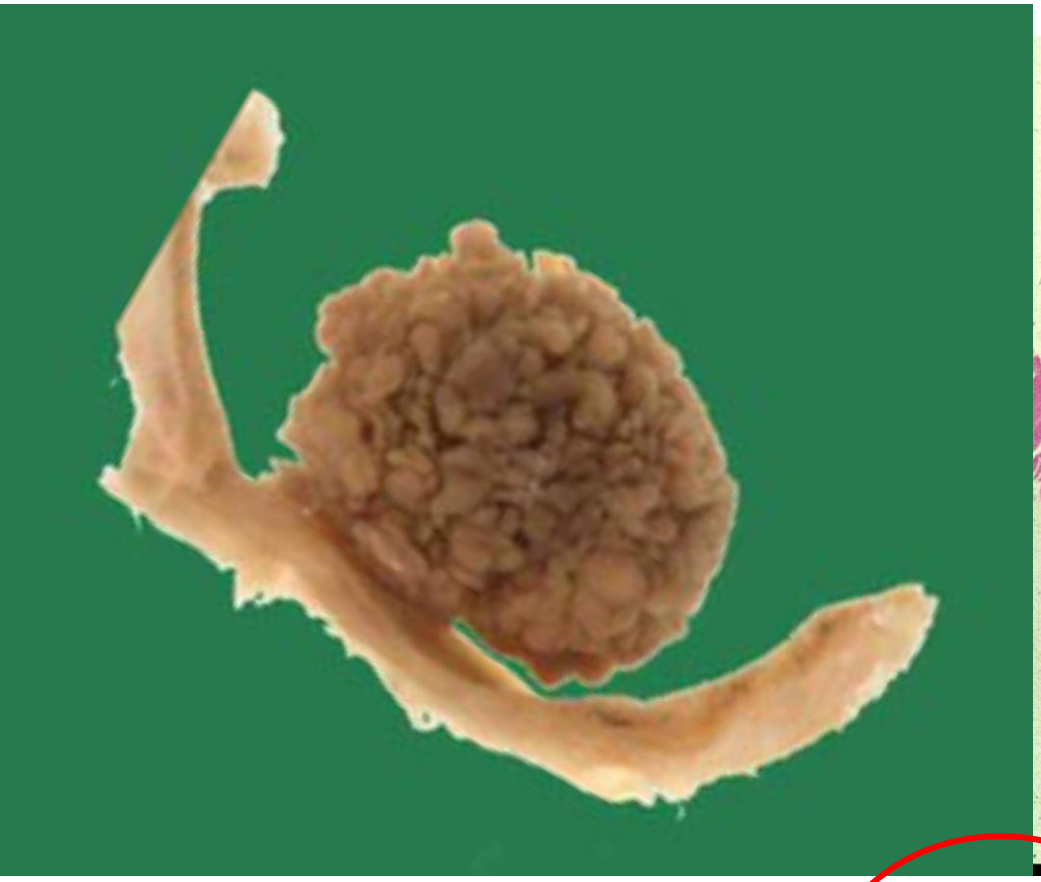
Normal

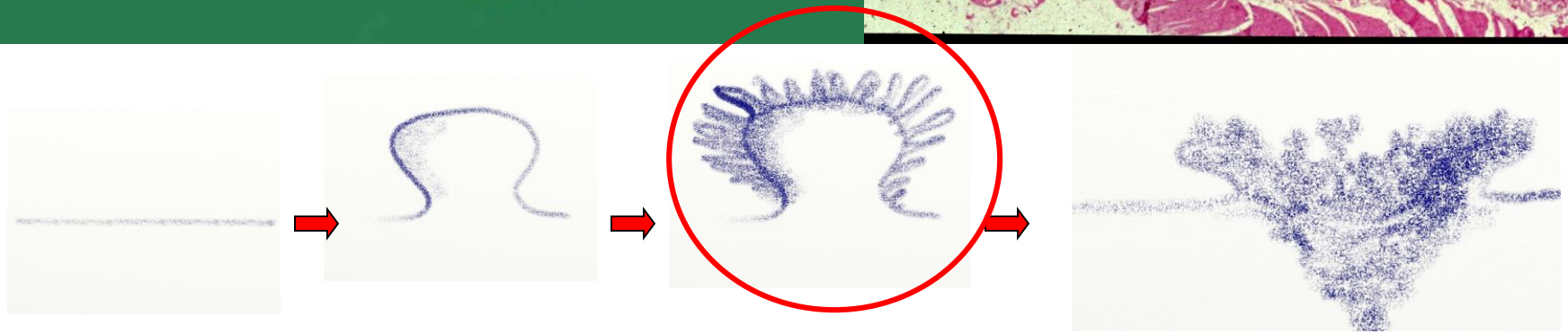
Benign

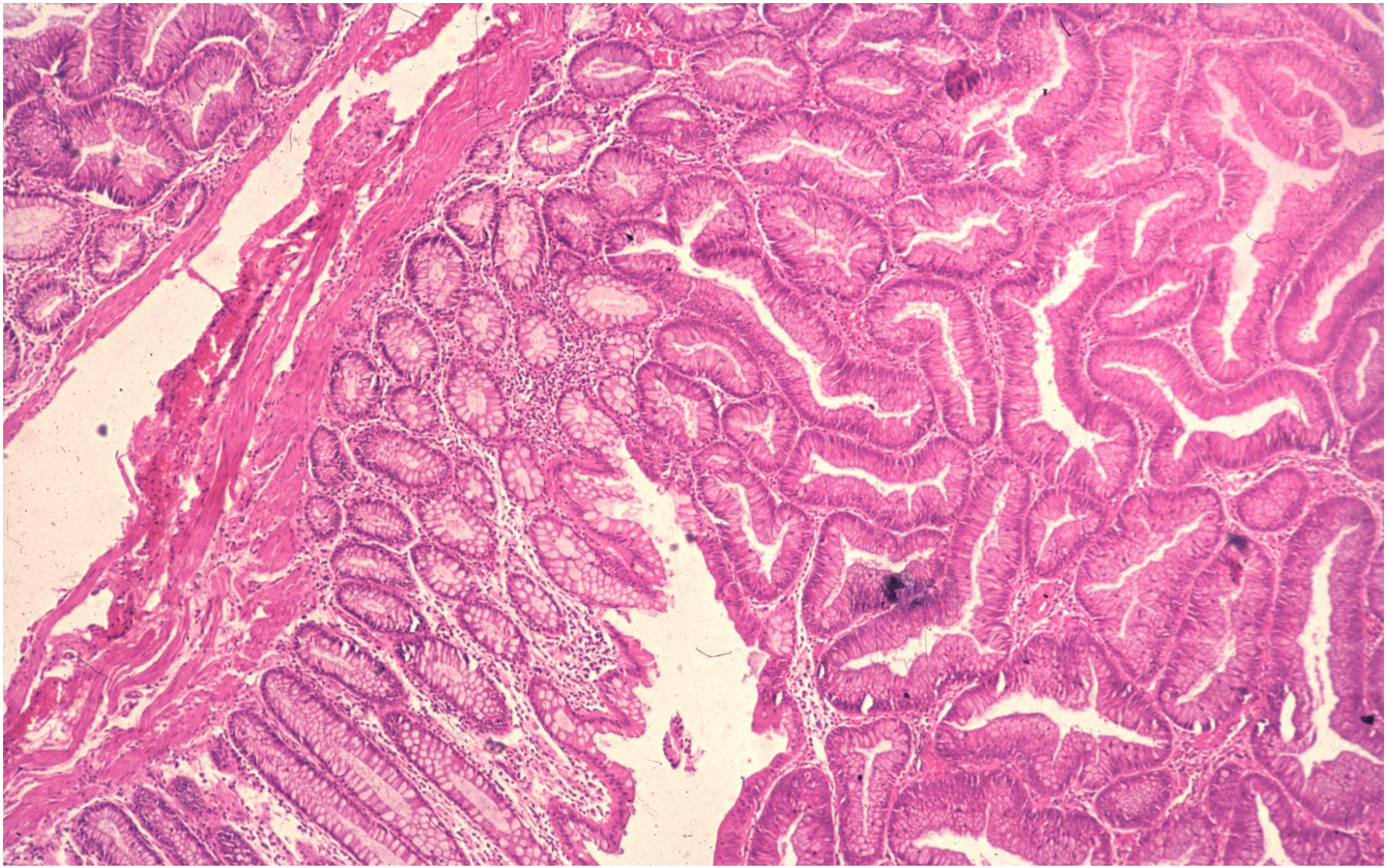
Malignant



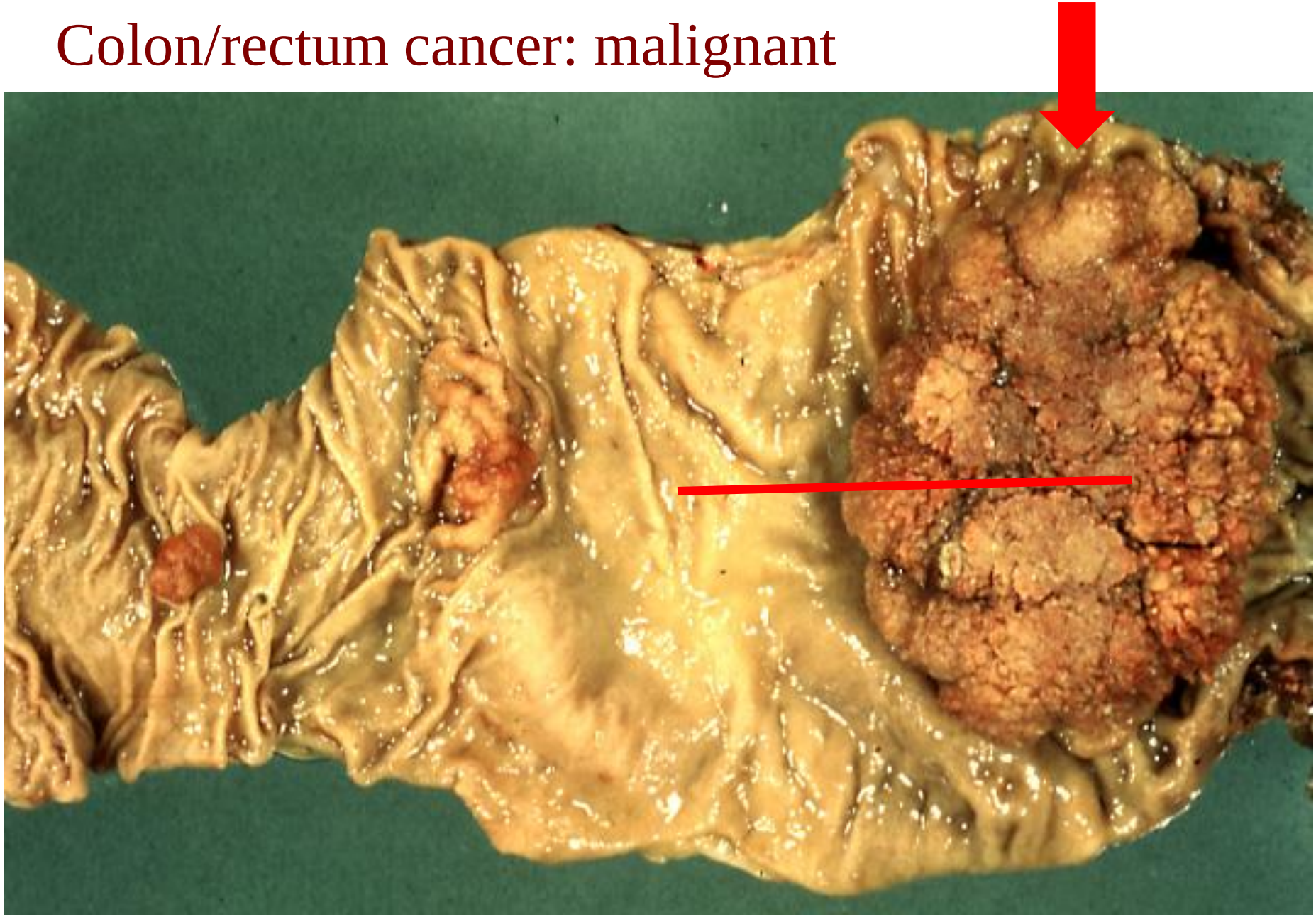
Colon cancer precursor: benign adenoma or polyp



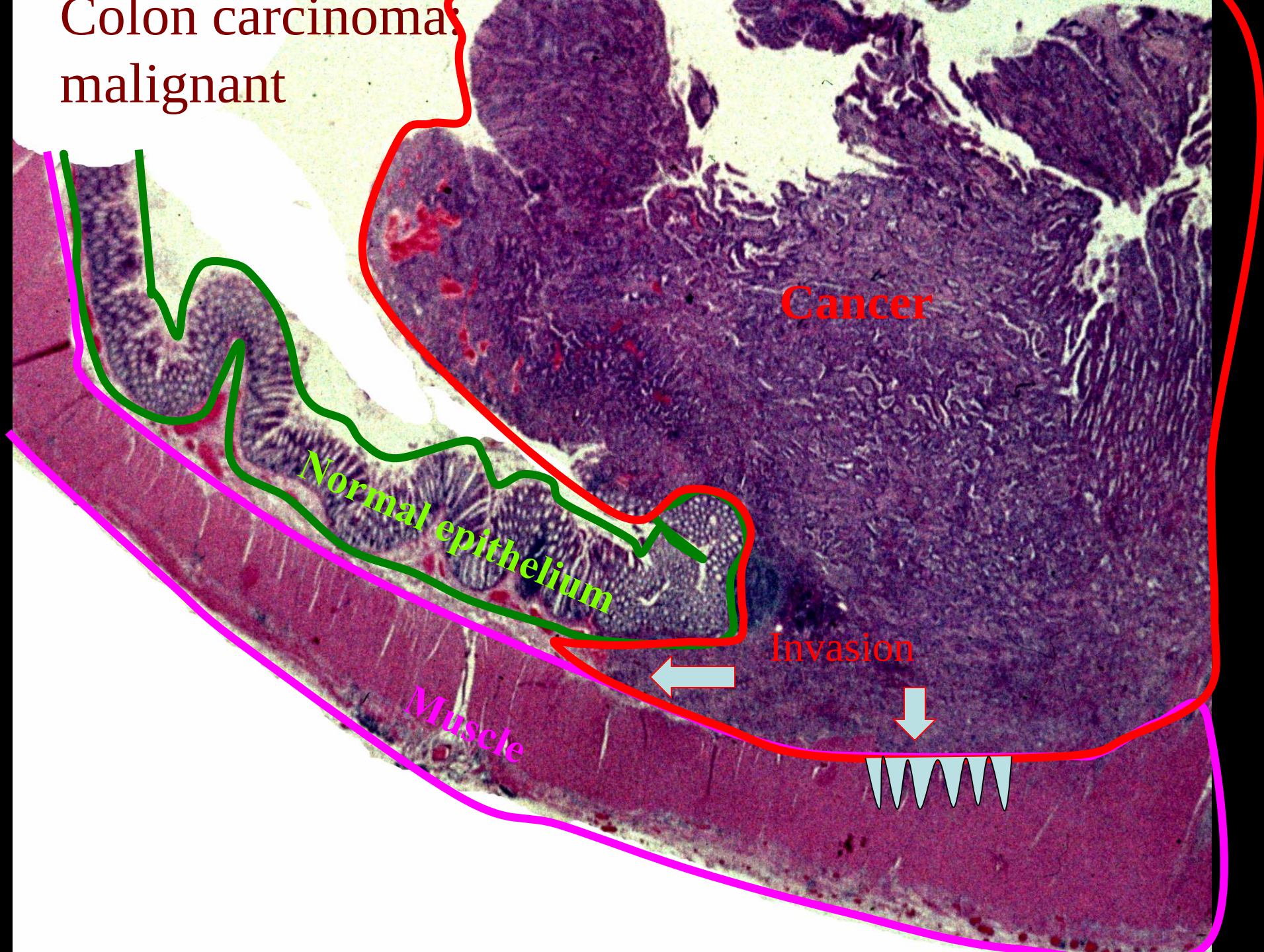




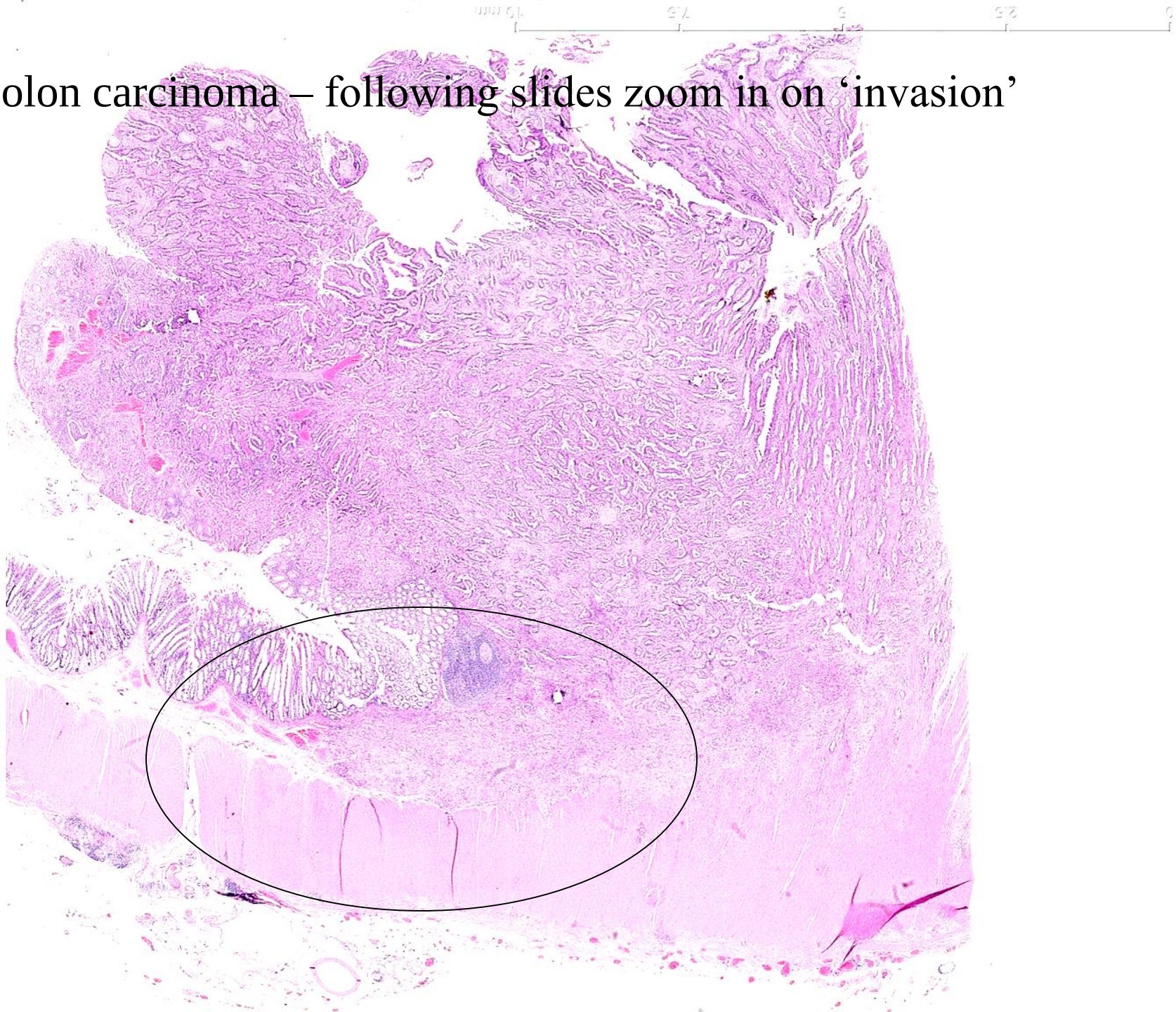
Colon/rectum cancer: malignant

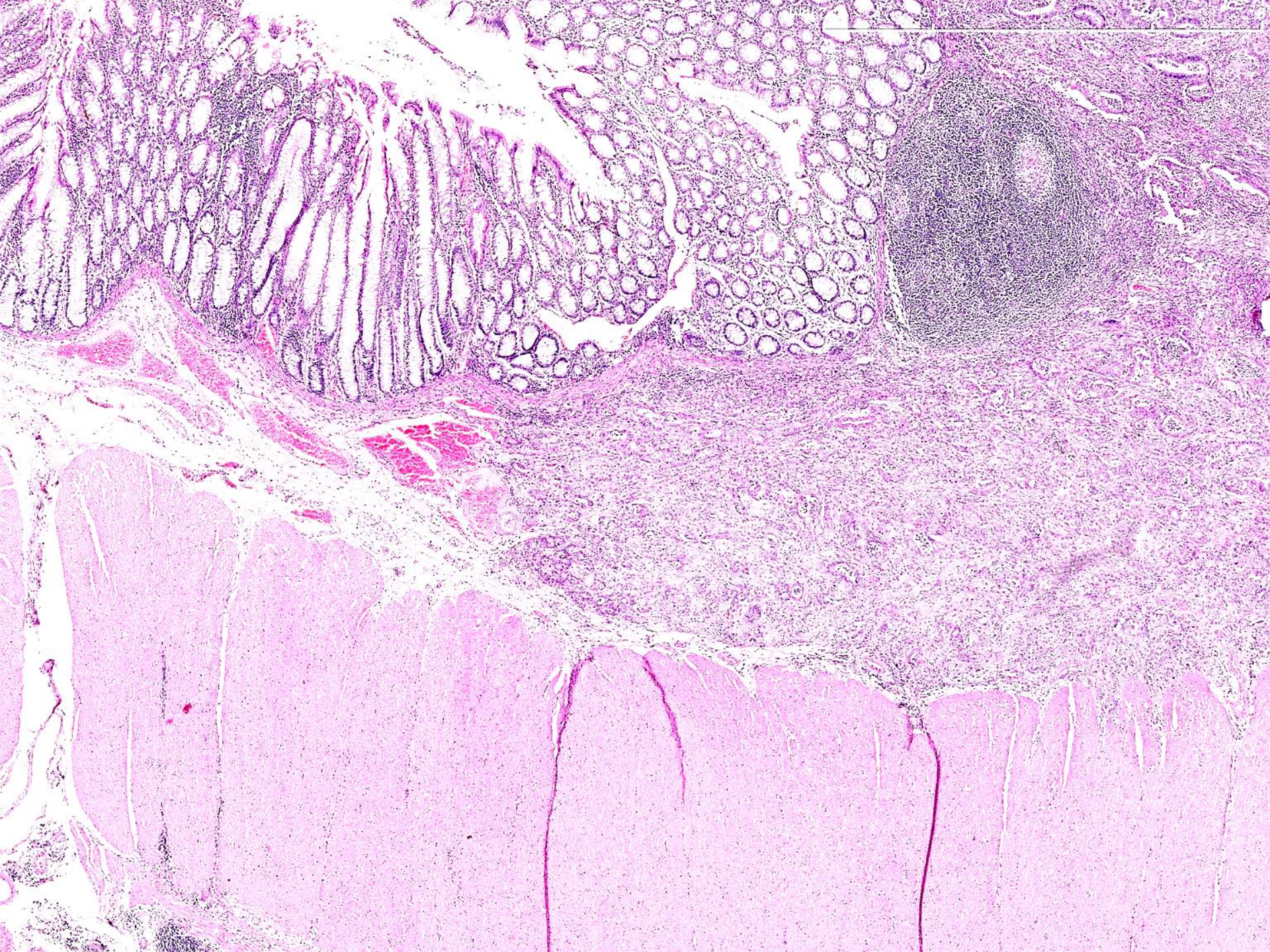


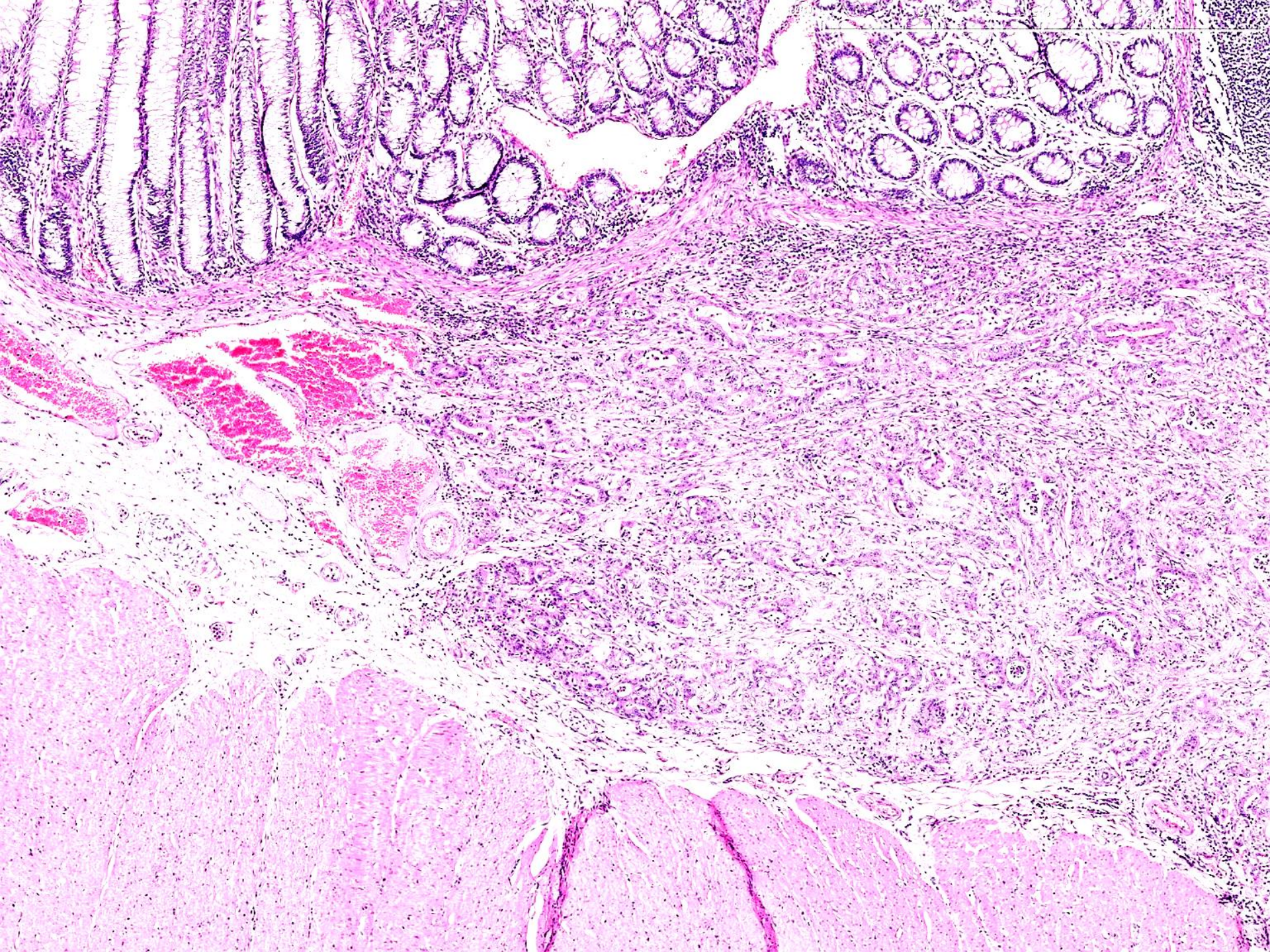
Colon carcinoma: malignant

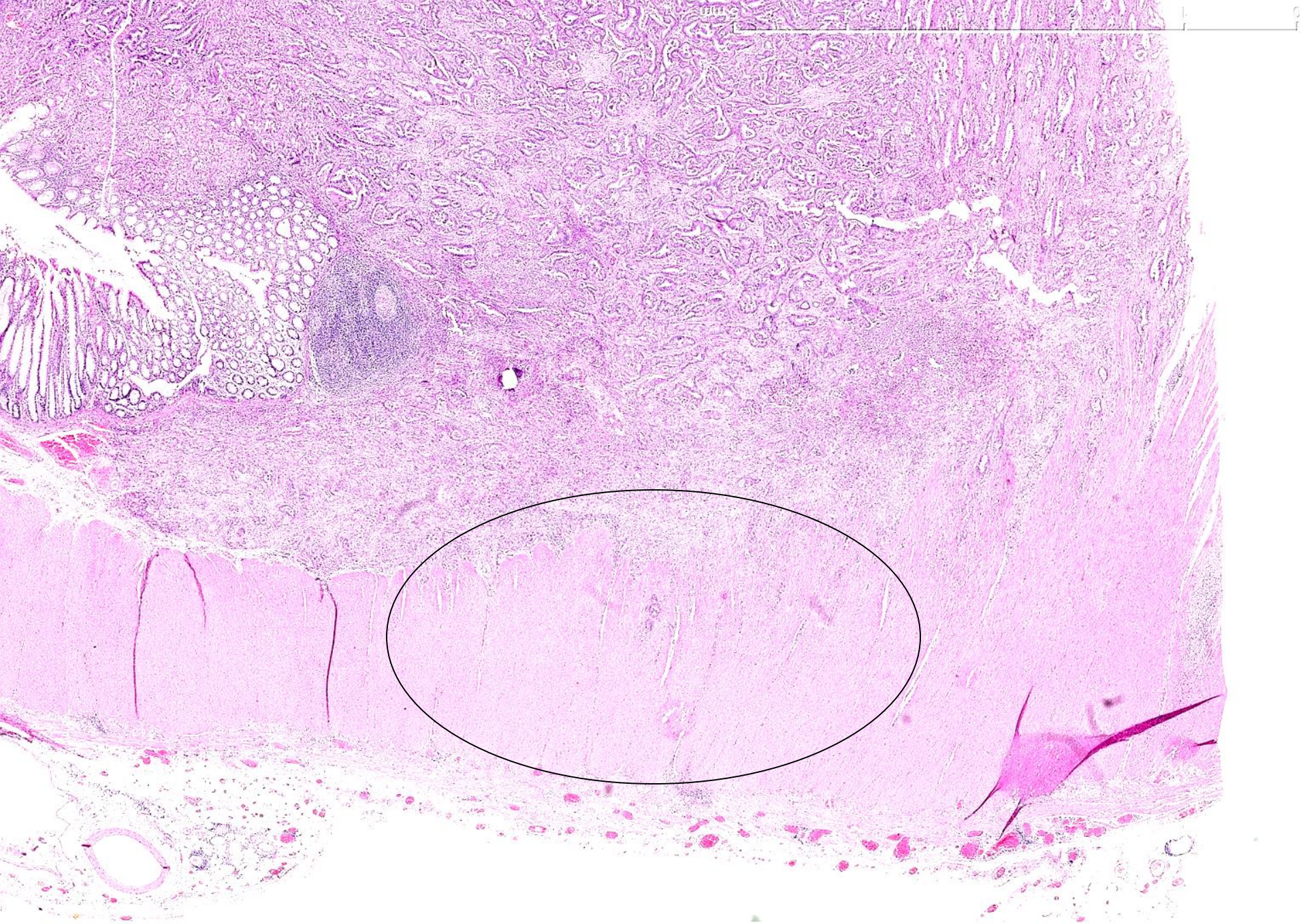


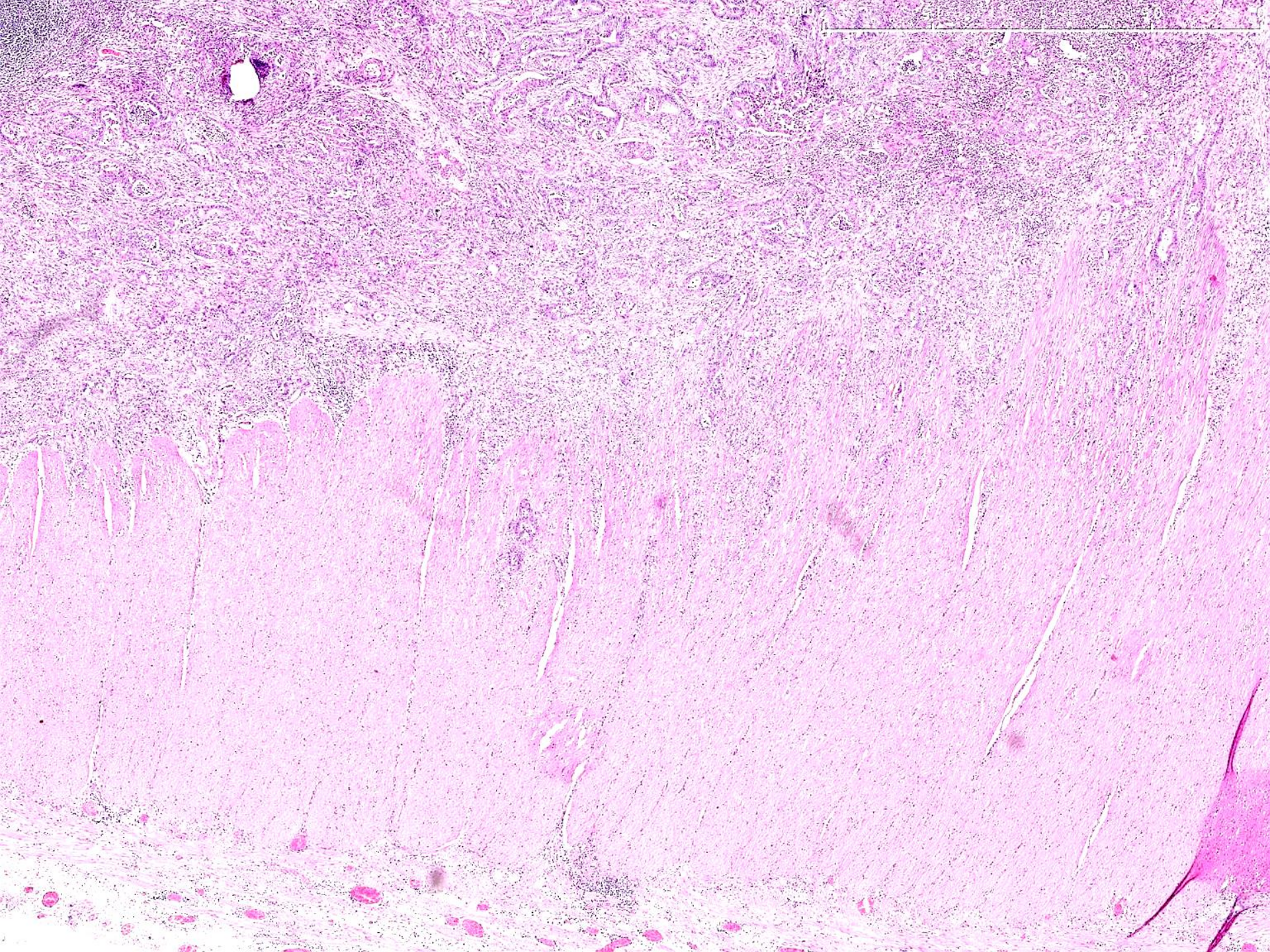
colon carcinoma – following slides zoom in on ‘invasion’

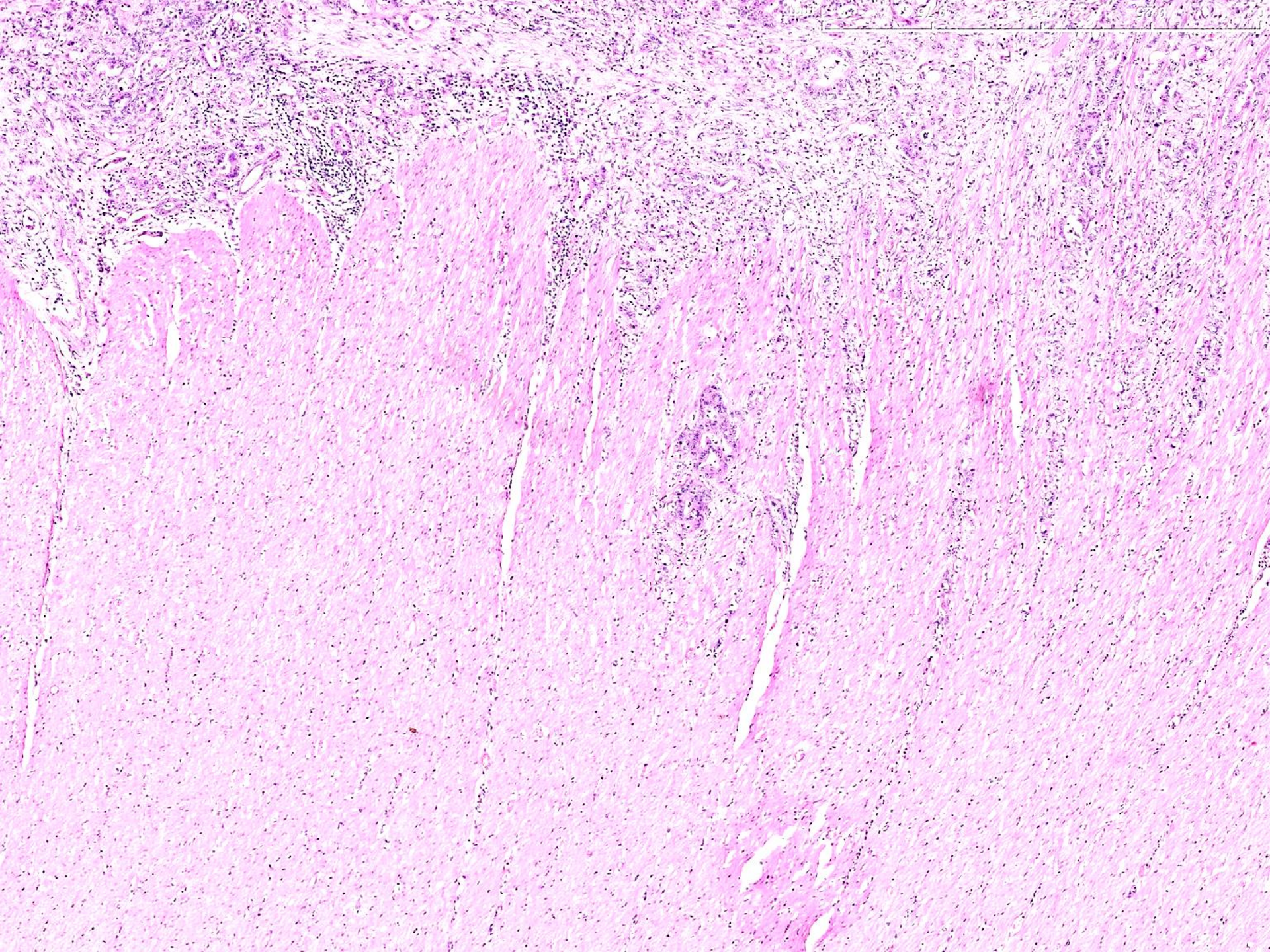


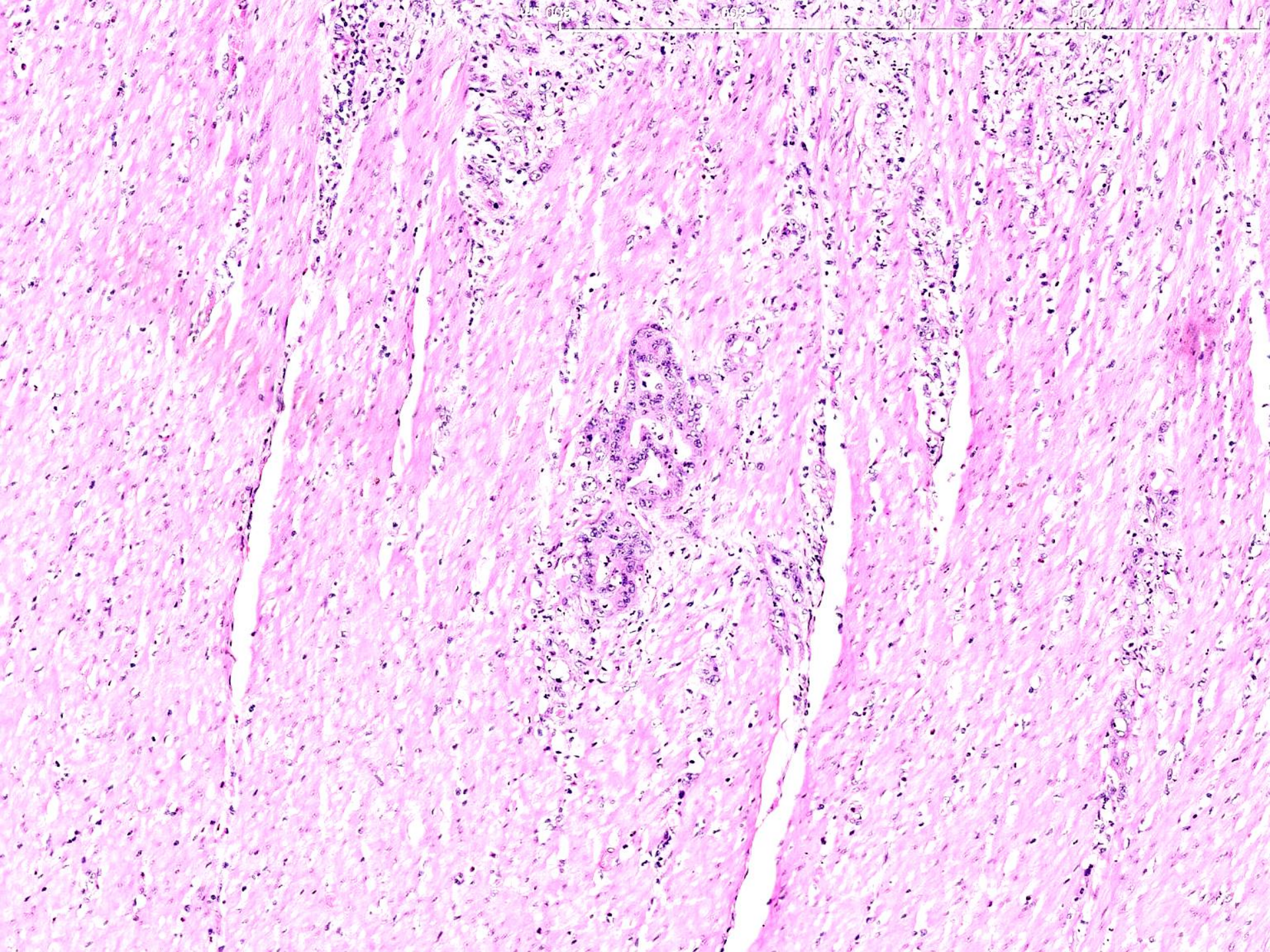


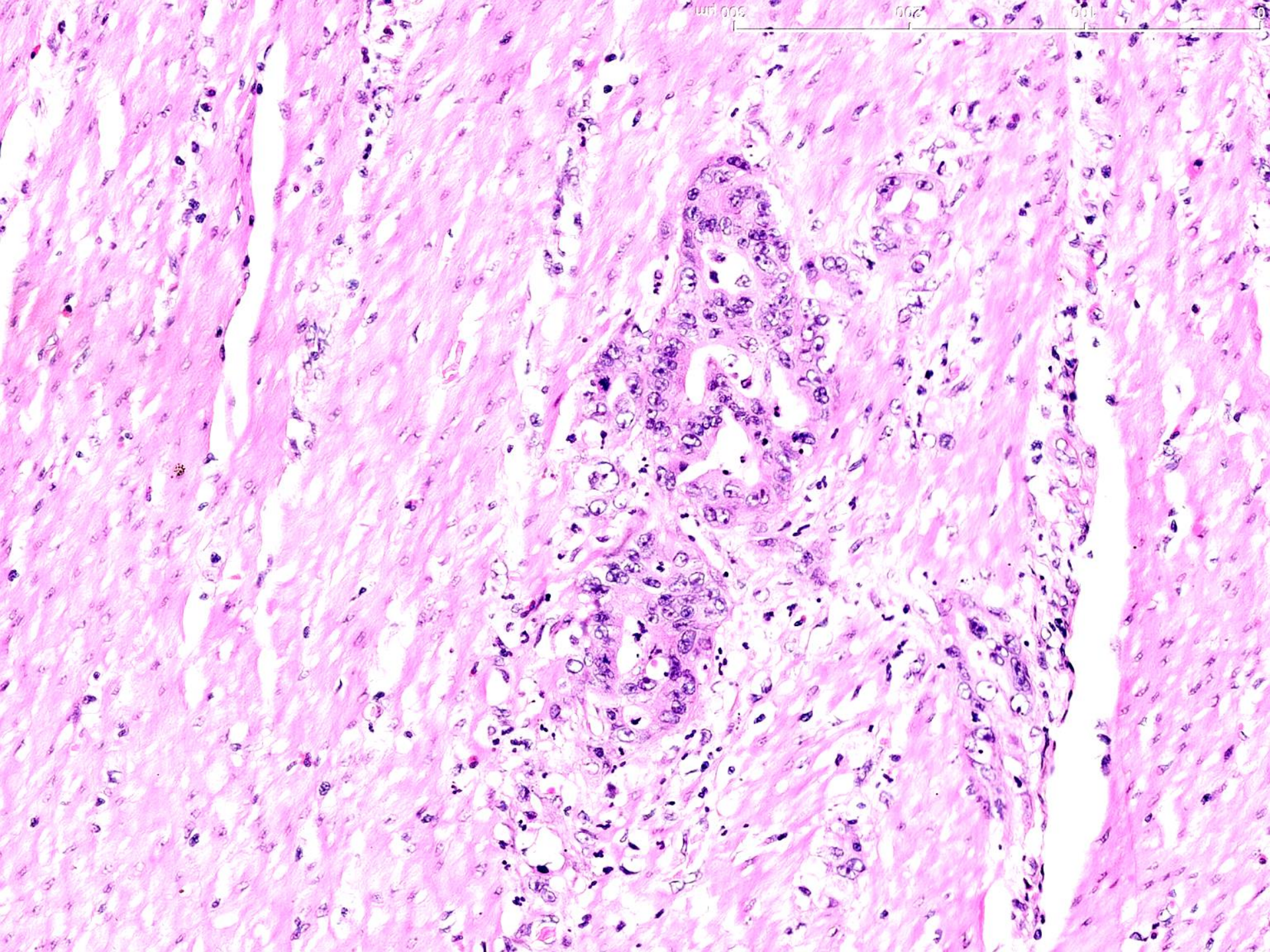


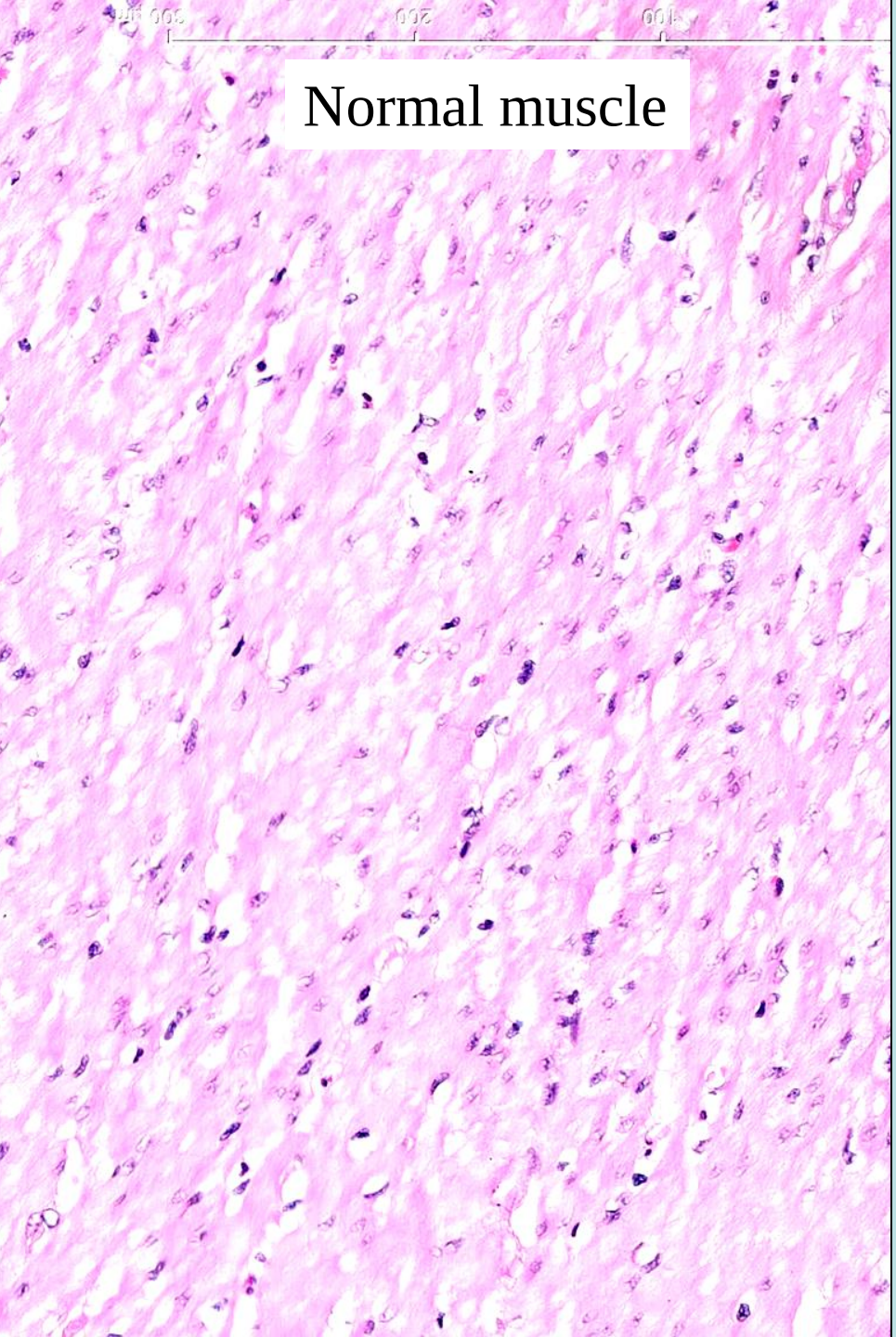


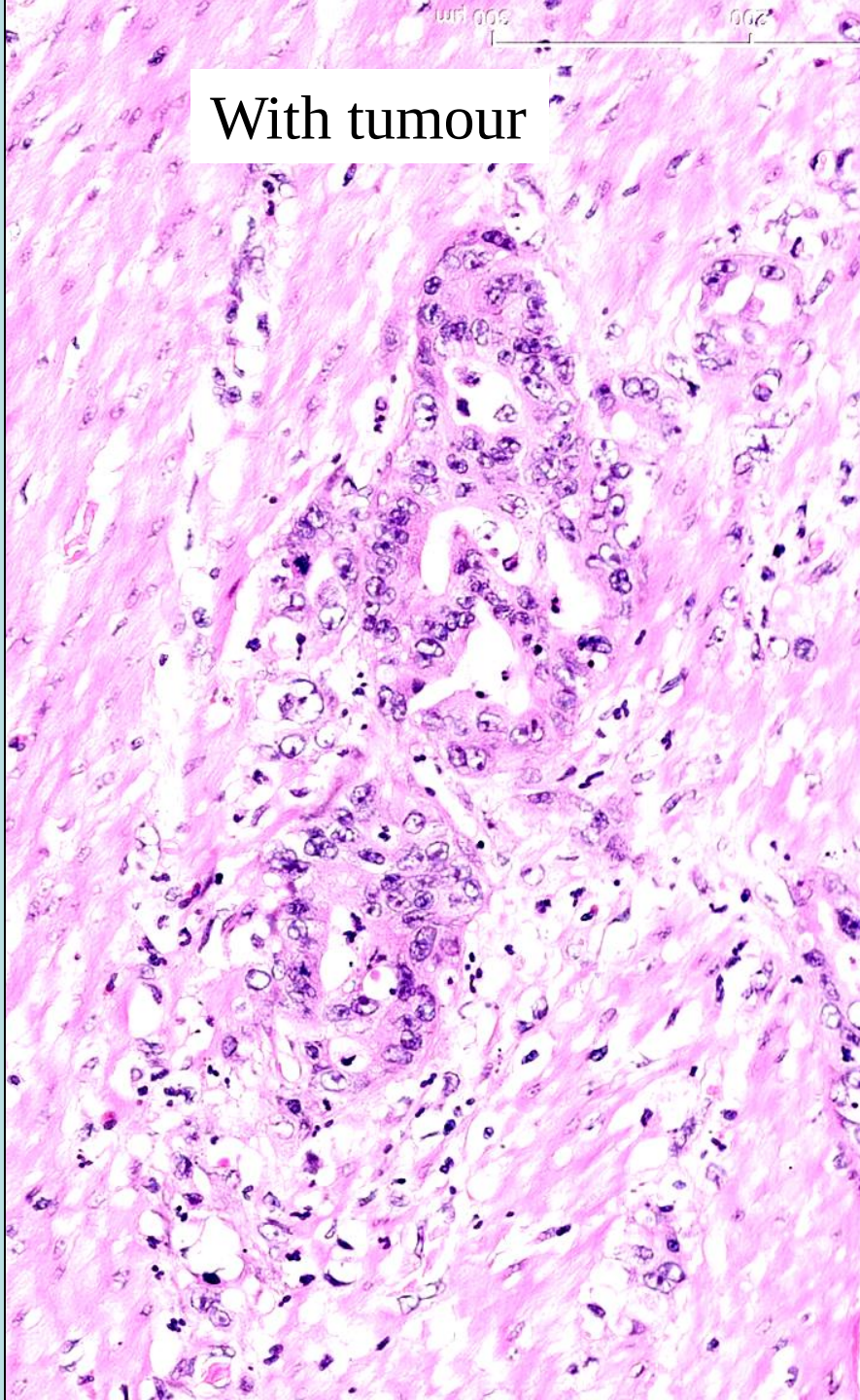




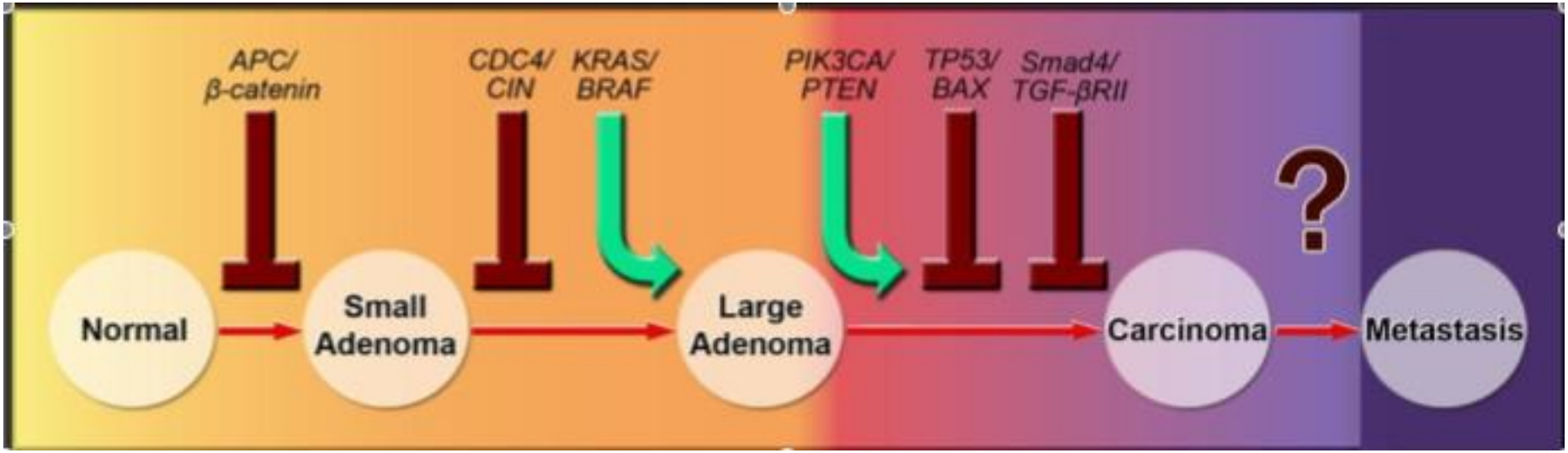


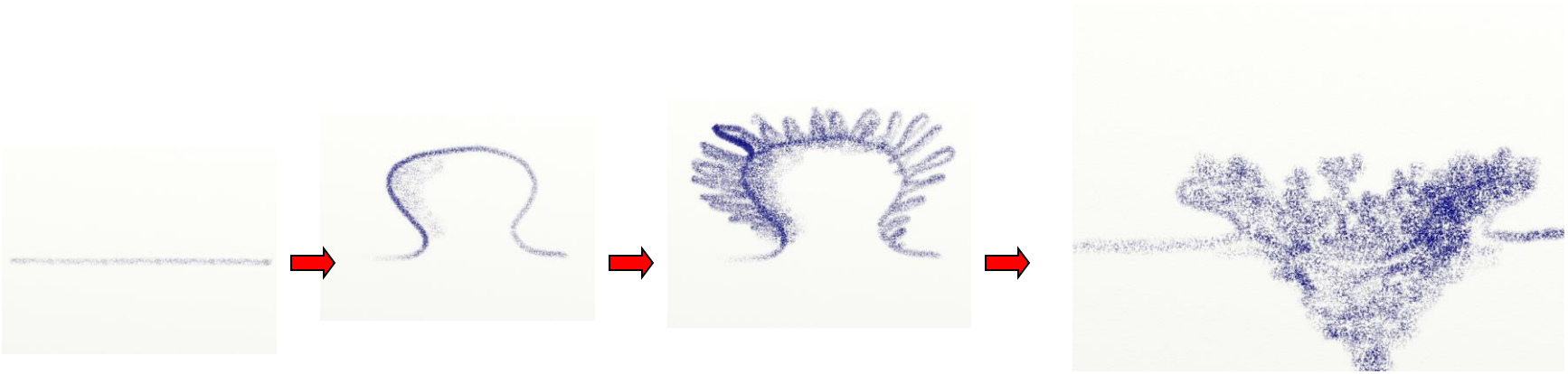

µm 600
300
0


Normal muscle


With tumour

Vogelstein model of colon cancer
- a classic example of stages in cancer development





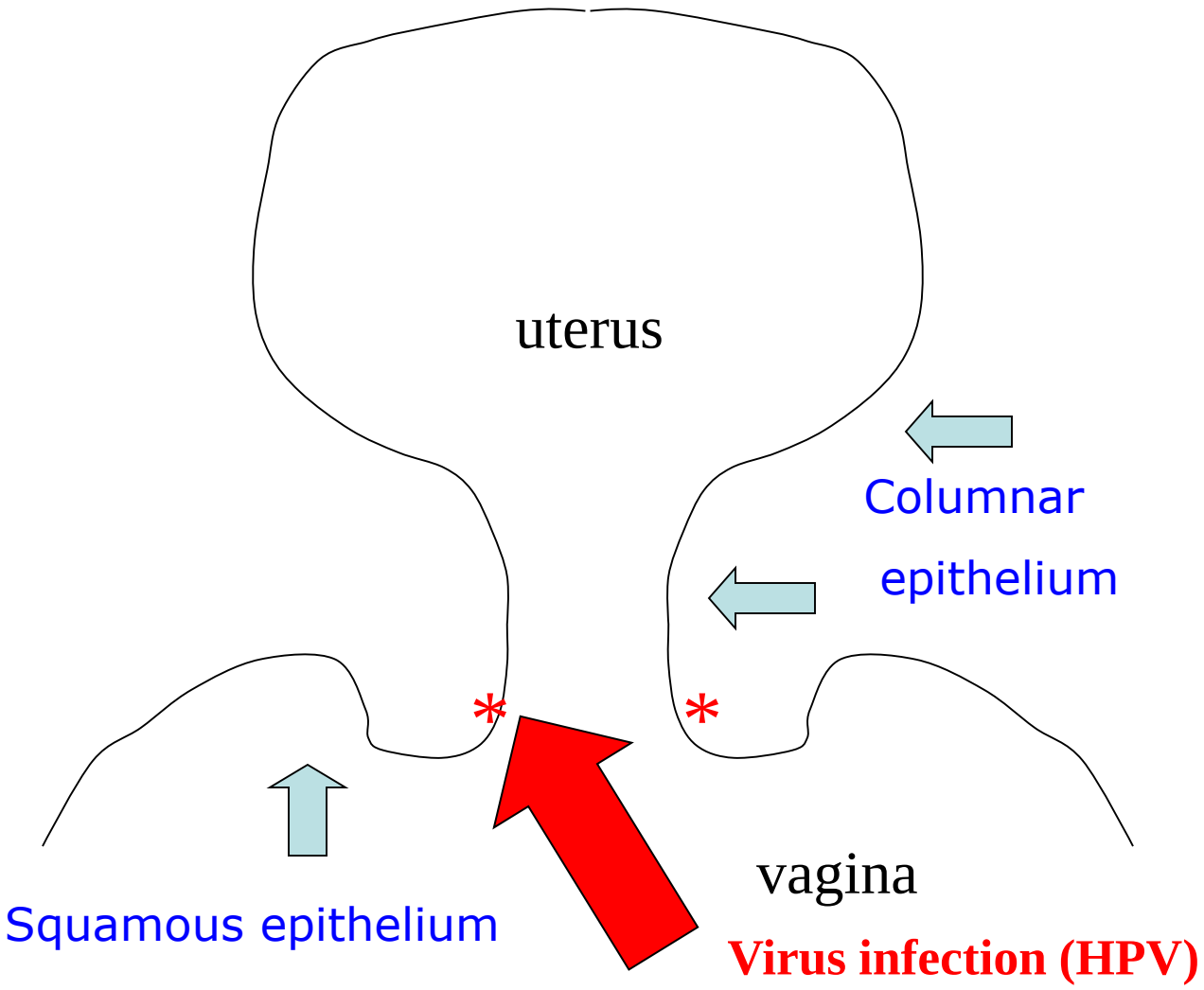
Cervical Cancer: Second Classic multistep example

Illustrates:

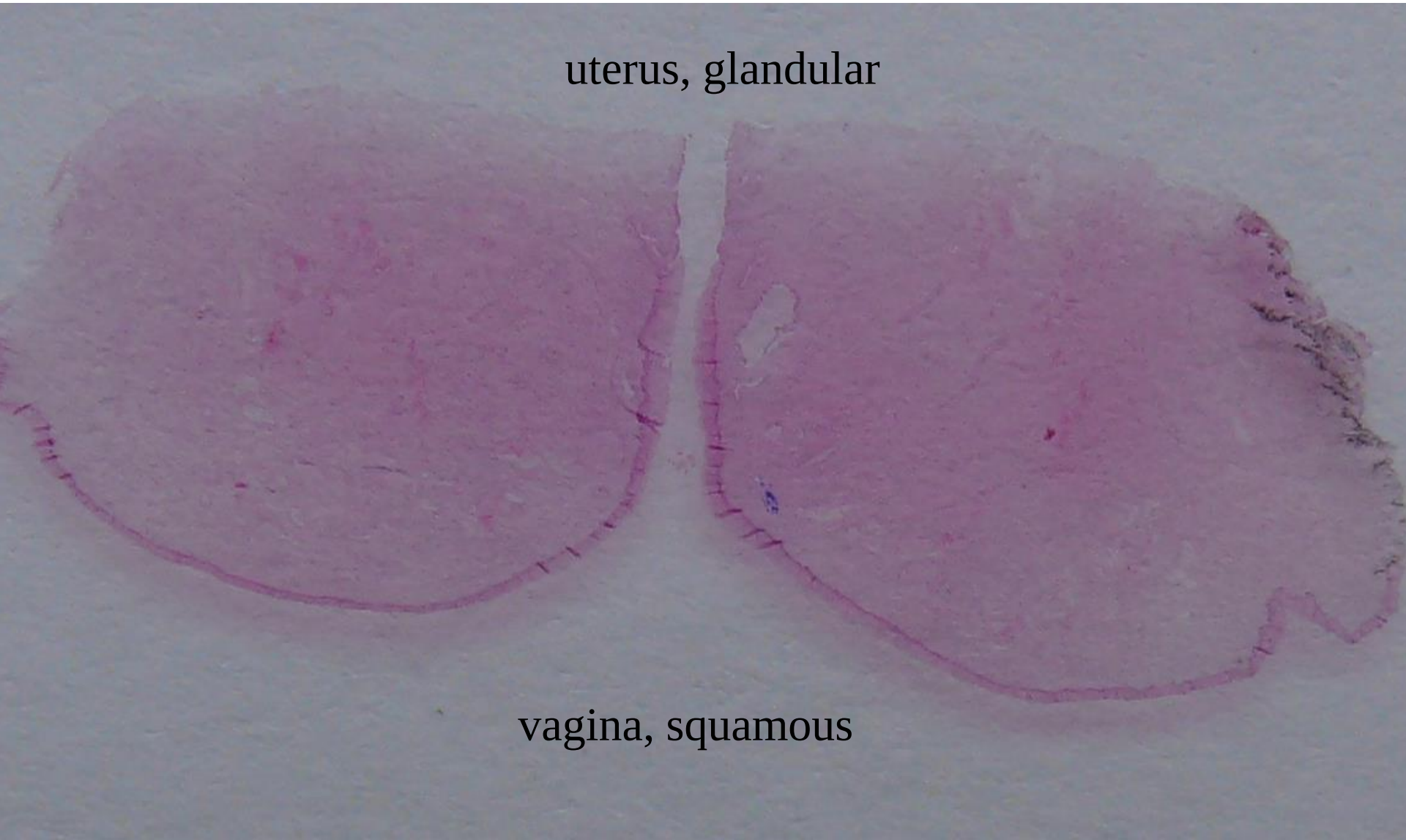
-multiple stages
-Benign to malignant transition

-Metaplasia
-Virus infection
-screening

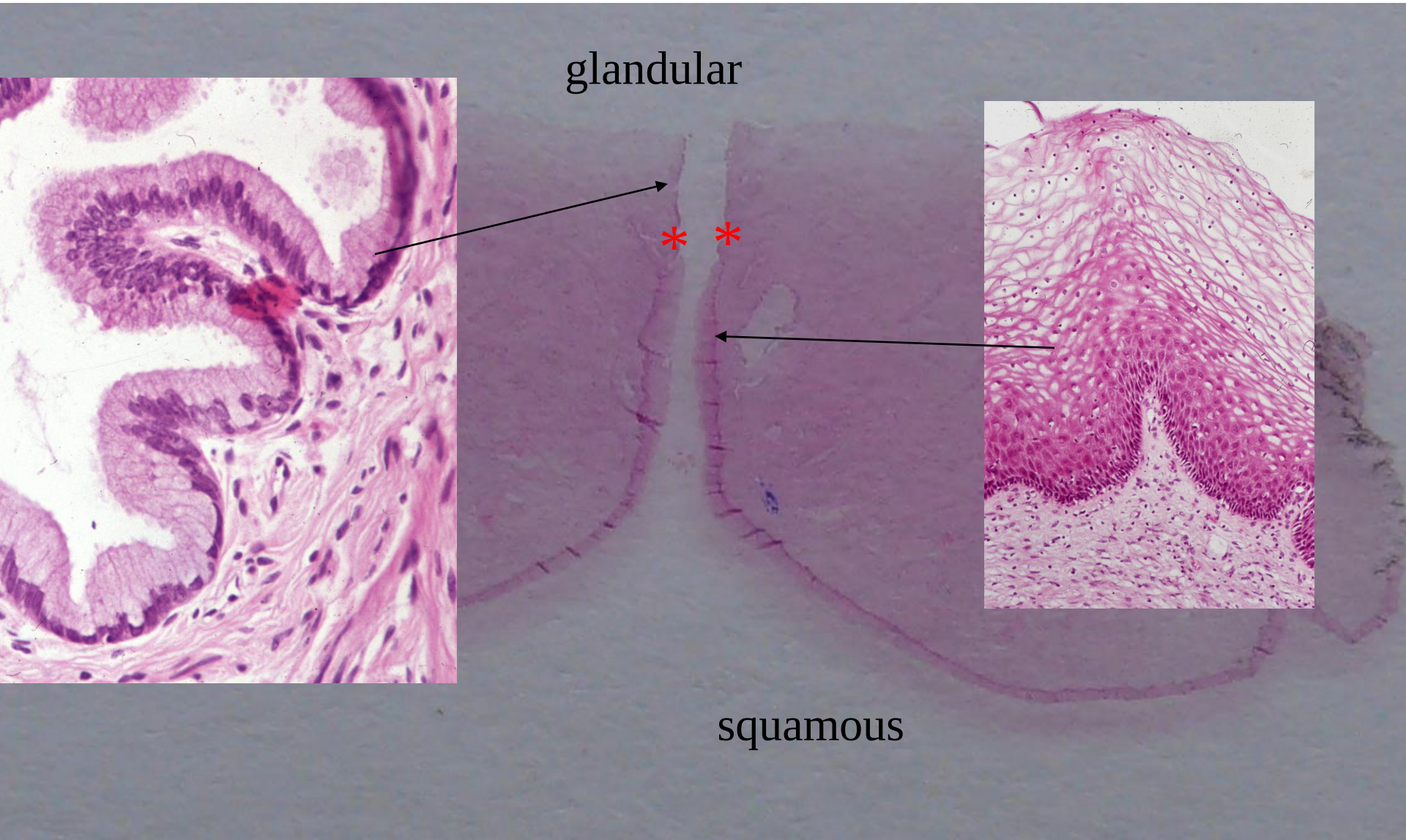
Cervix and cervical Cancer



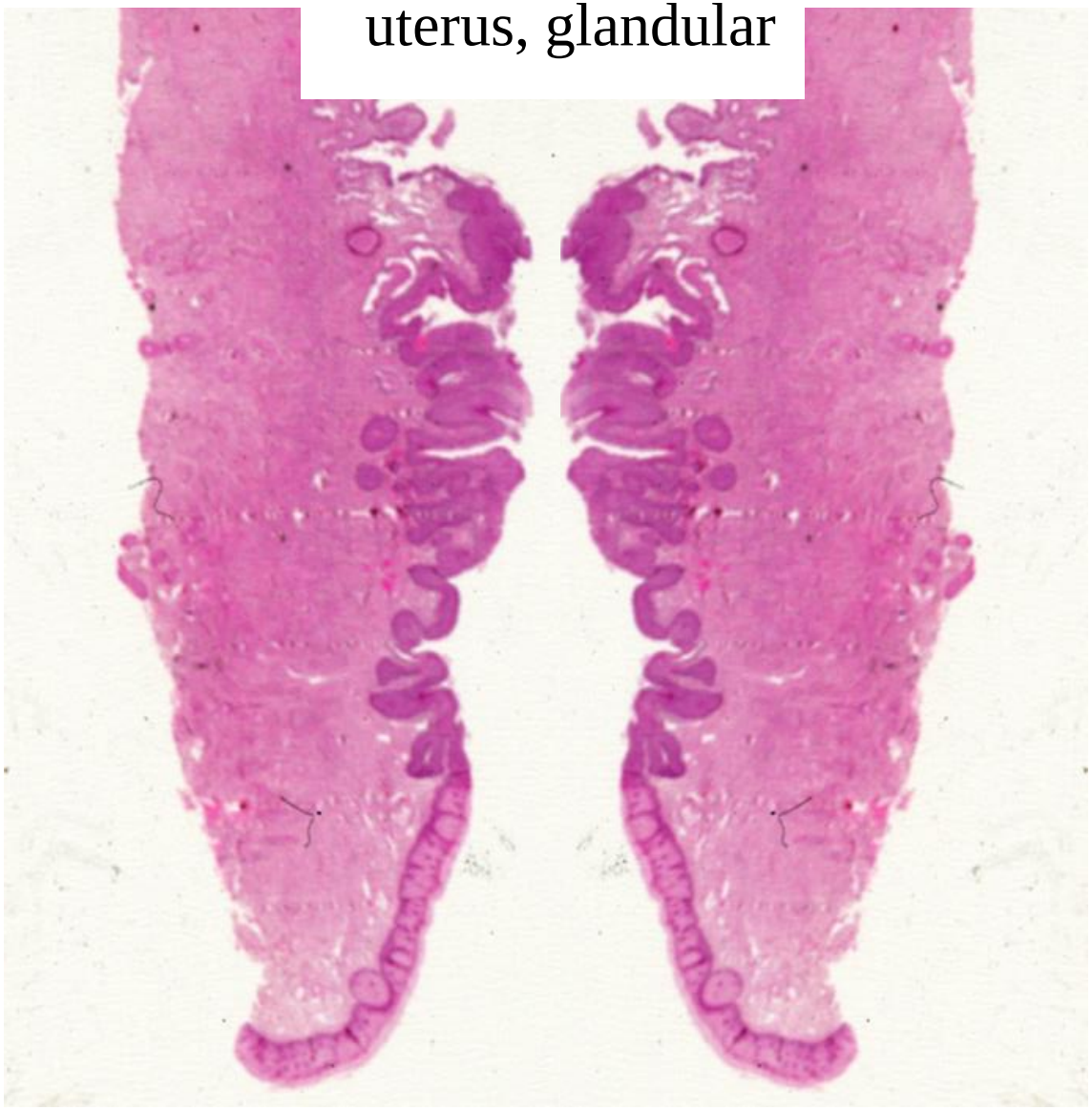
Cervix at low power



Cervix at low power



Very dysplastic but still benign cervix epithelium ‘CINIII’



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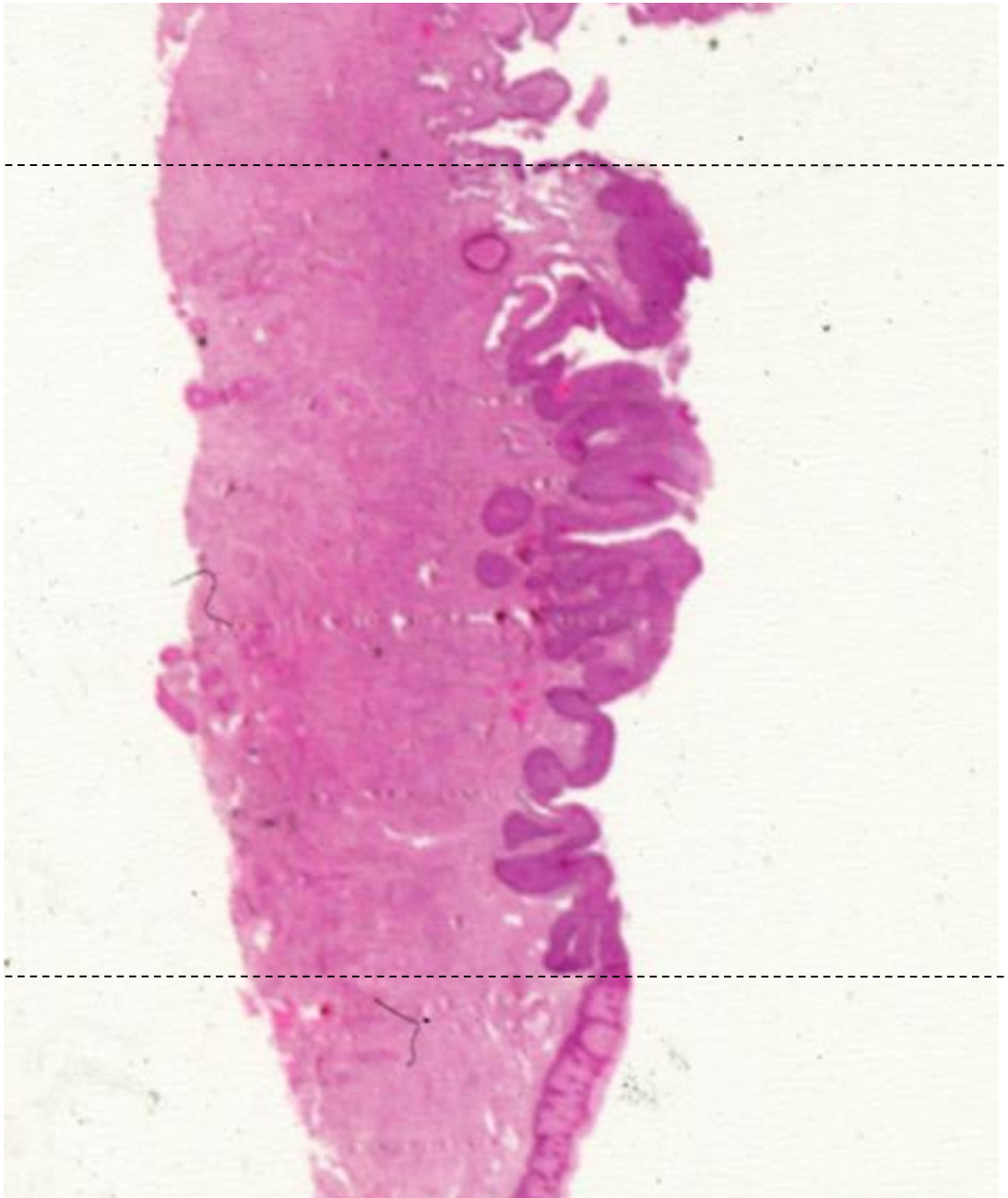
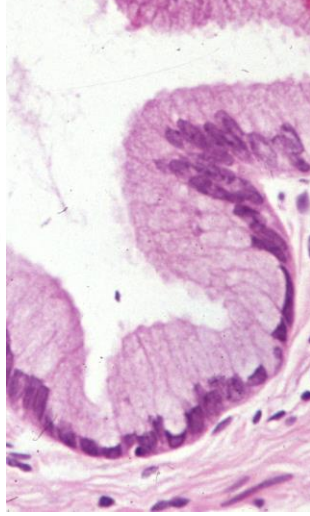


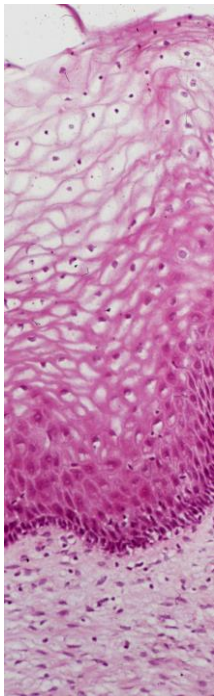
normal glandular



squamous metaplasia
+
severe dysplasia

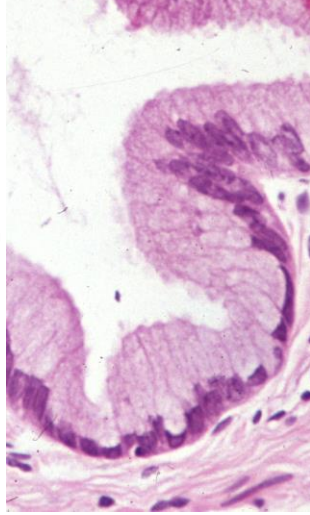
‘CINIII’

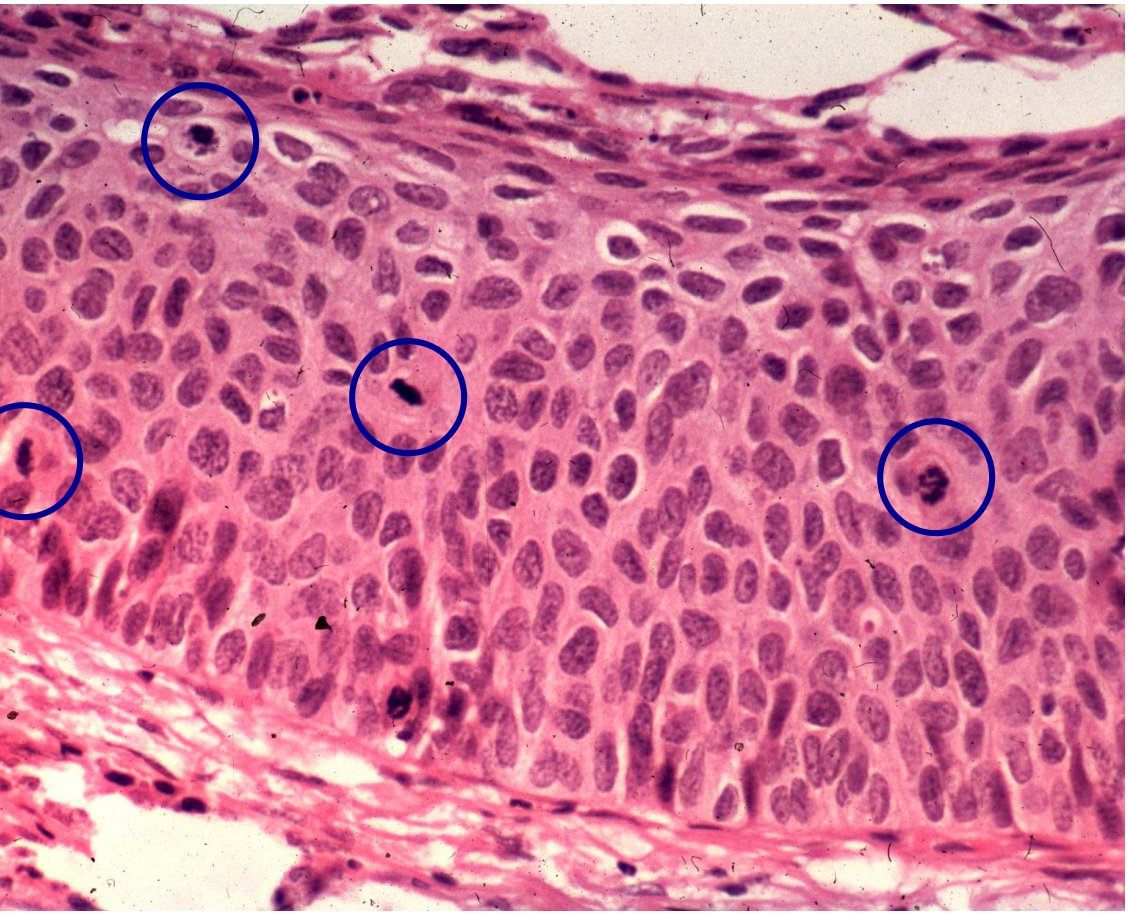
normal squamous



Very dysplastic but still benign cervix epithelium ‘CINIII’

normal glandular

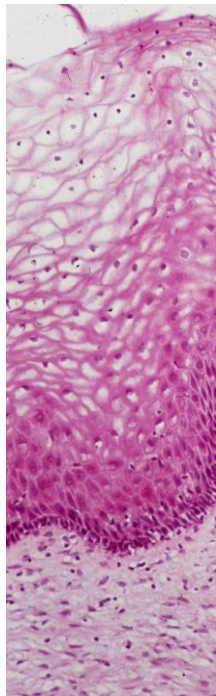




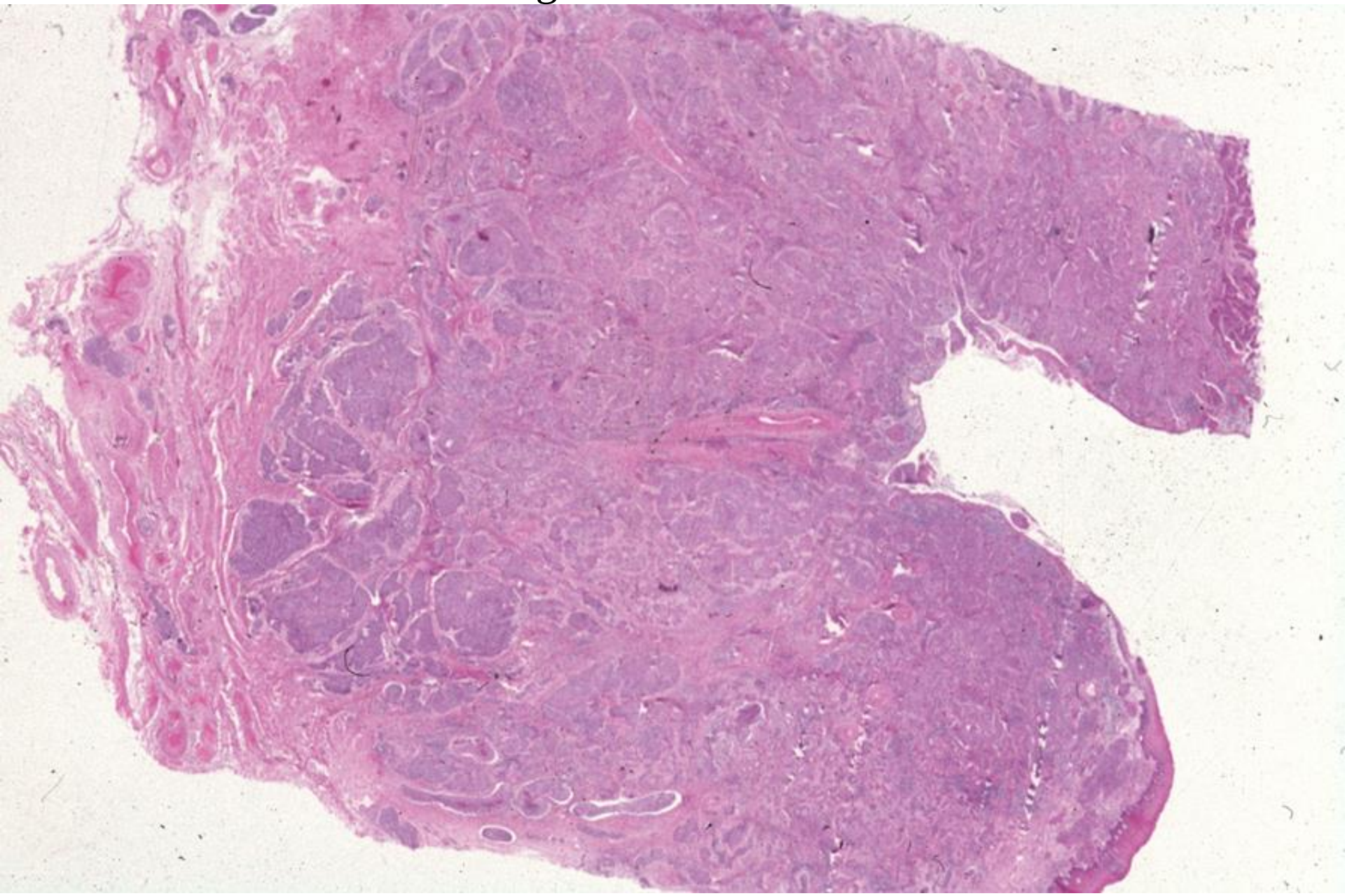
squamous metaplasia
+
severe dysplasia (note mitoses circled)

‘CINIII’

normal squamous

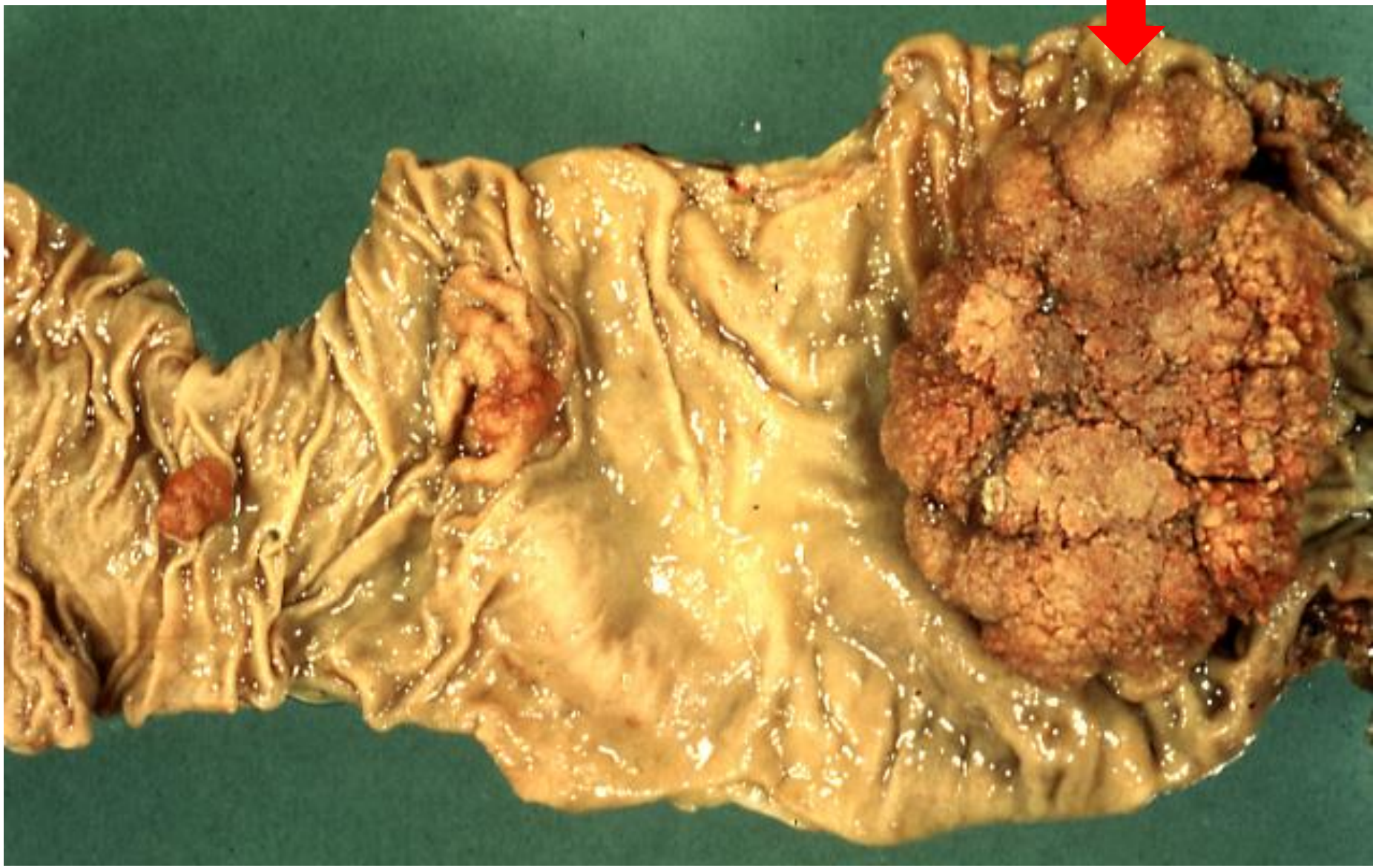


Malignant - Carcinoma



Presentation and screening

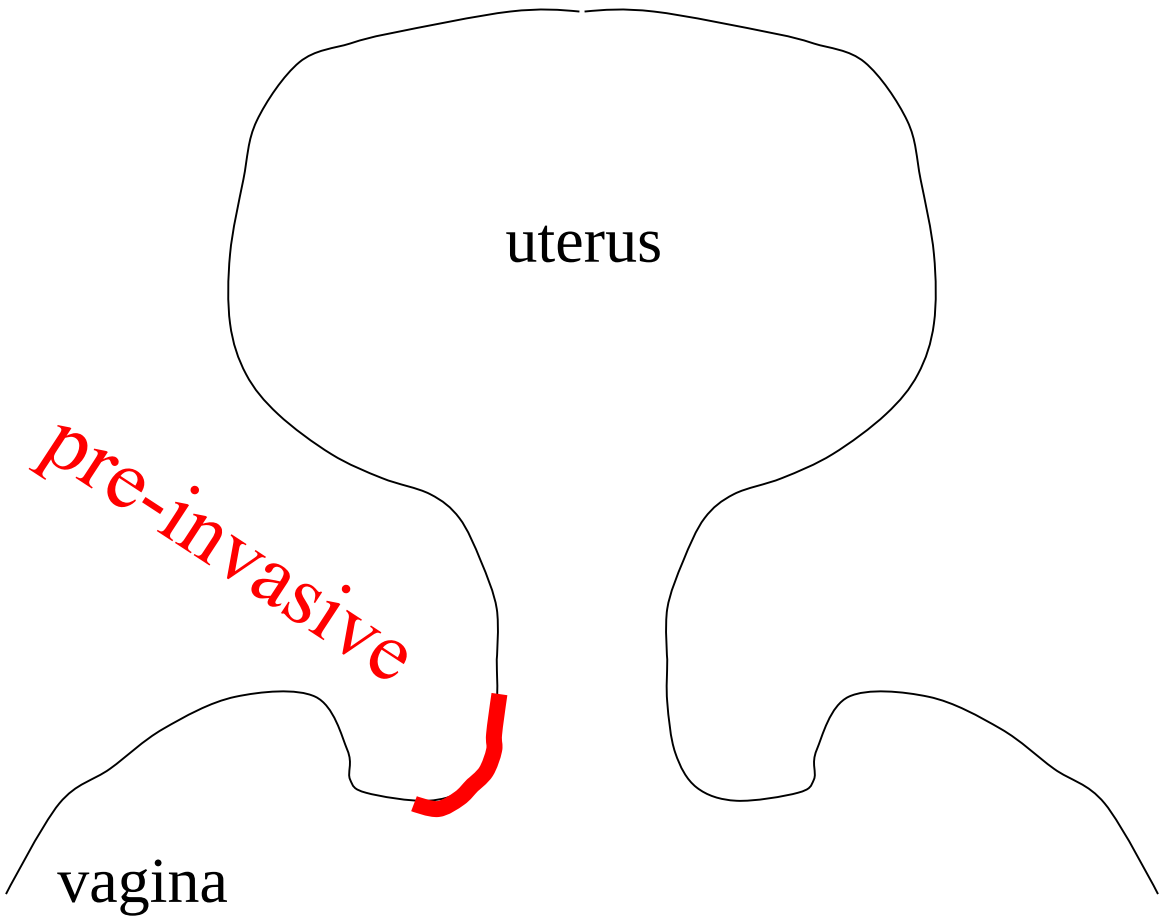
e.g. Colon/rectum cancer: pain, bleeding, strictures...



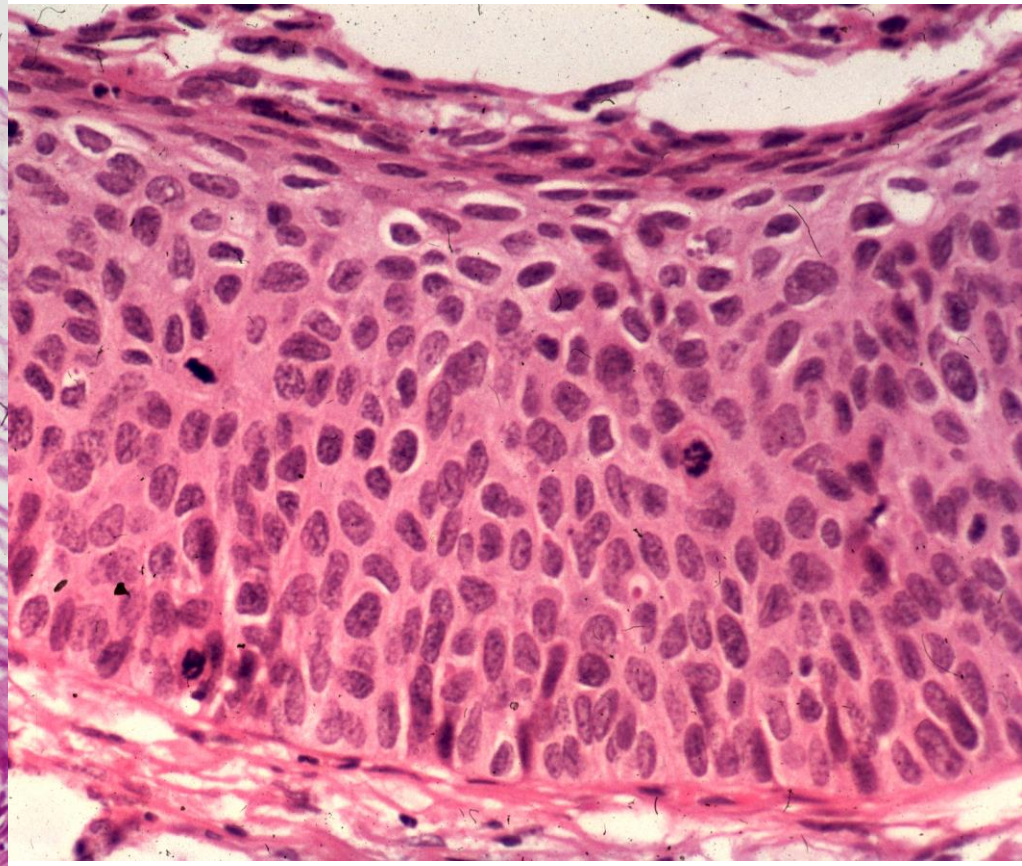
Best example of screening

Cervical Cancer

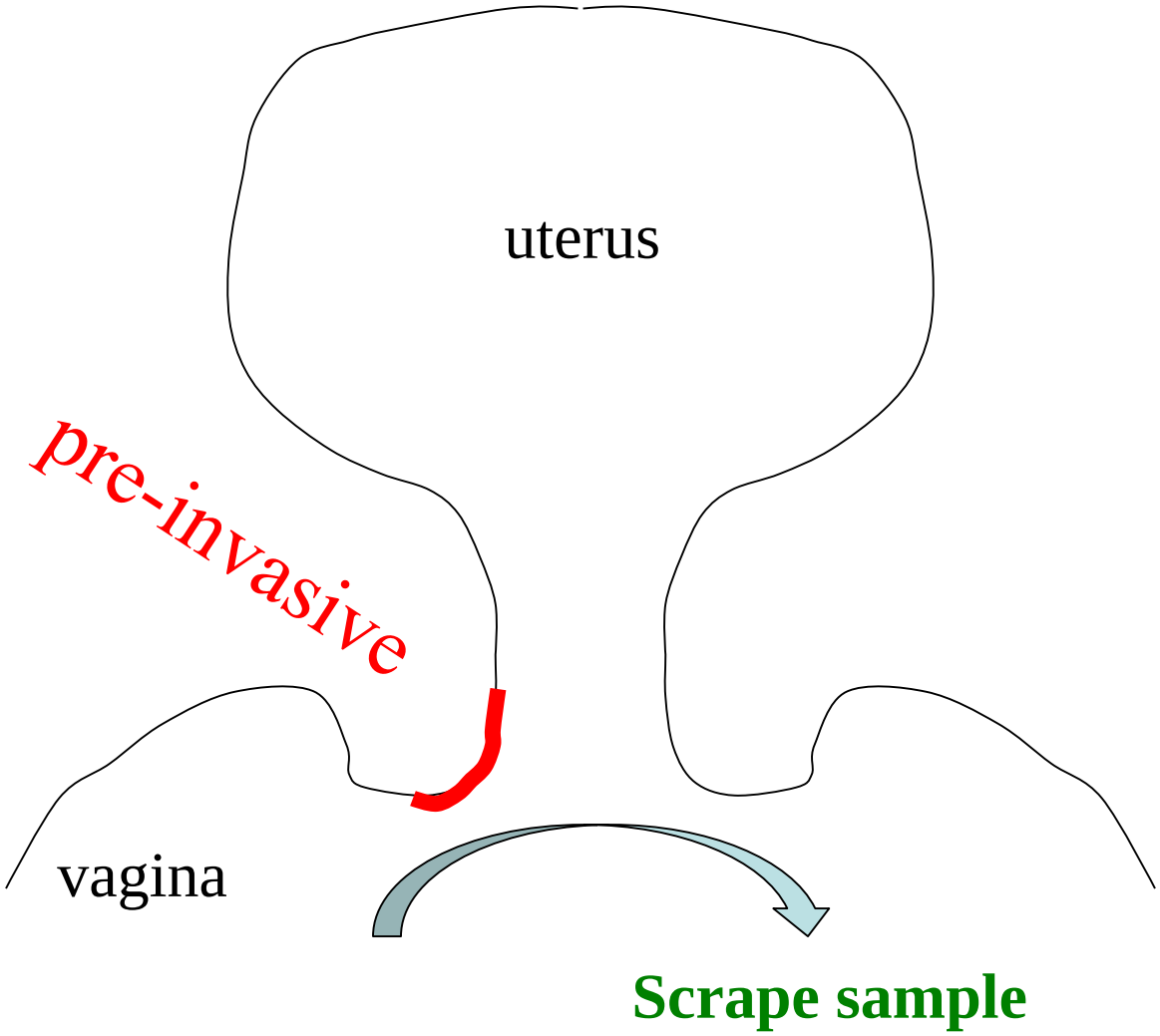
Screening: cervix is ideal



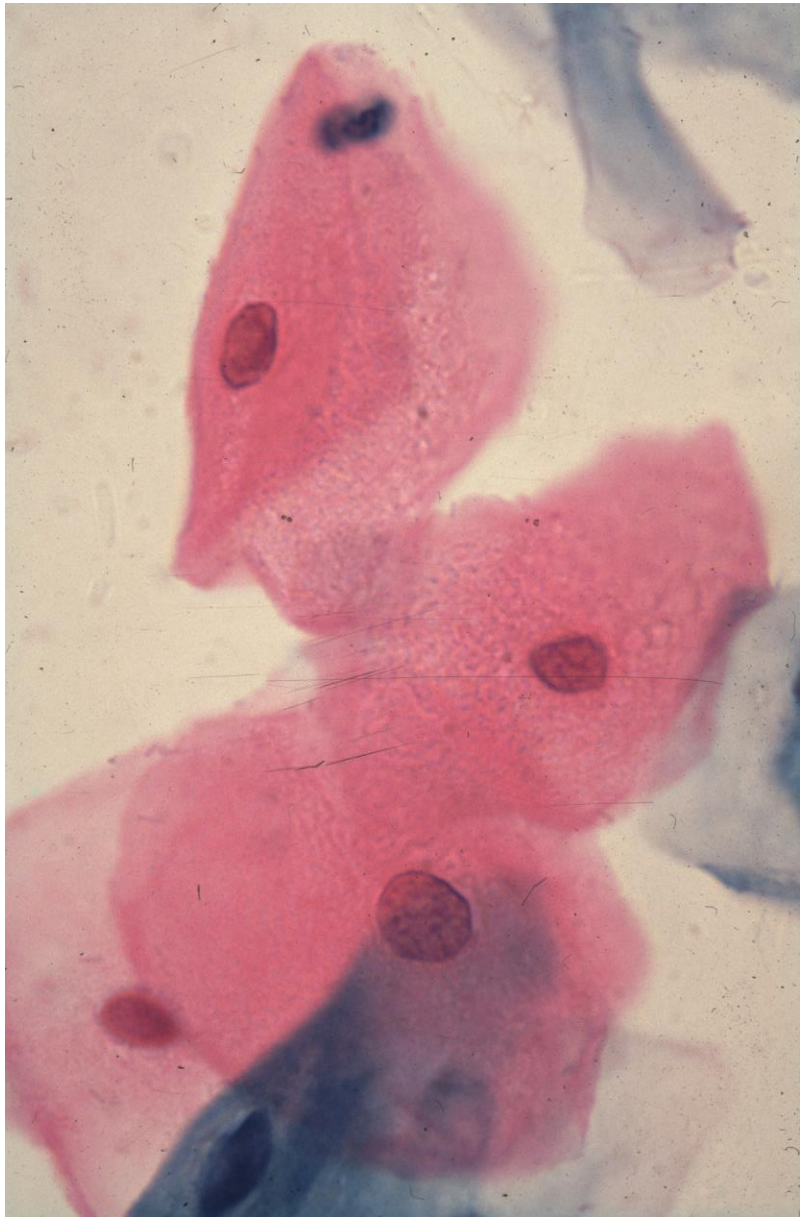
Precursor - detect by screening



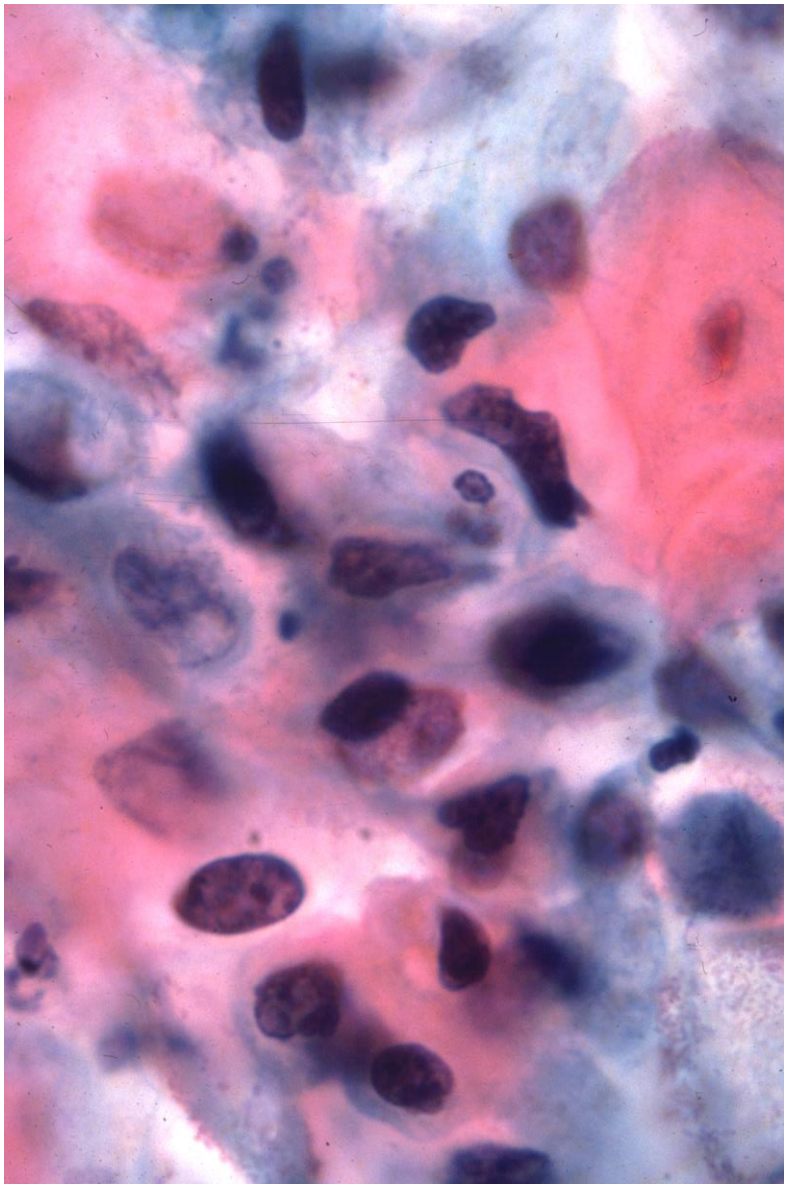
Screening: cervix is ideal



Cervical smears



- normal



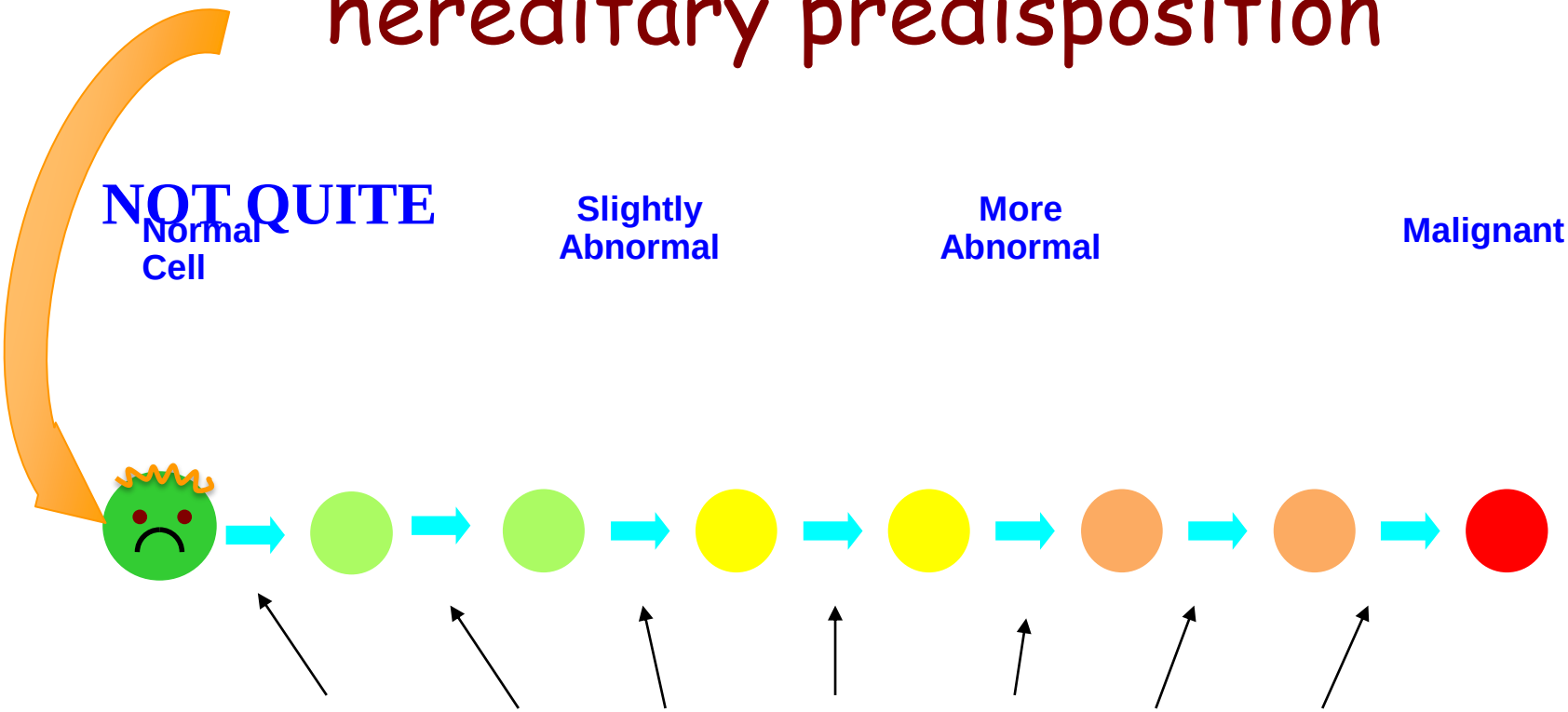
abnormal:
large pleomorphic nuclei

Miscell

Hereditary predisposition - polyposis (vs HNPCC)

Benign Teratoma

hereditary predisposition



Gene changes / mutations