Understanding Cancer

A SERIES OF SIMPLE EDUCATIONAL VIDEOS FOR THE GENERAL PUBLIC

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Part 15: Diagnosis - What is the difference between tumour staging and grading?

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Staging and Grading cancers as well as other tests can:

- **Help doctors create a treatment plan for the patient.**
- **Determine how they respond to treatment.**
- **Determine the expected outcome of the disease (prognosis).**

For example:

Surgery or radiotherapy are local treatments and may be suggested if cancer is present in one area or localized.

However, if the cancer has spread, systemic treatments are required to go around the body such as:

- ***chemotherapy***
- ***hormone therapy***
- ***Immunotherapy***
- ***Targeted therapy***

There are DIFFERENT staging systems for different types of cancers.

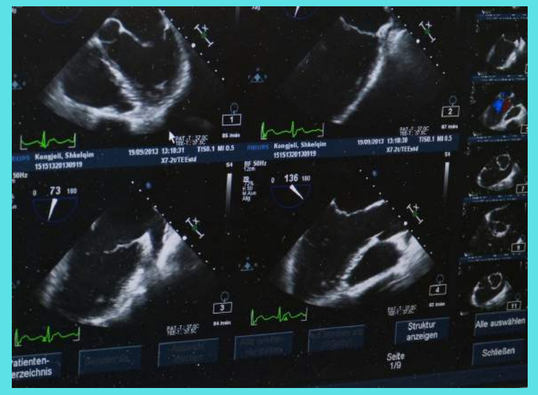
Some cancers do not have a particular staging nor grading system.

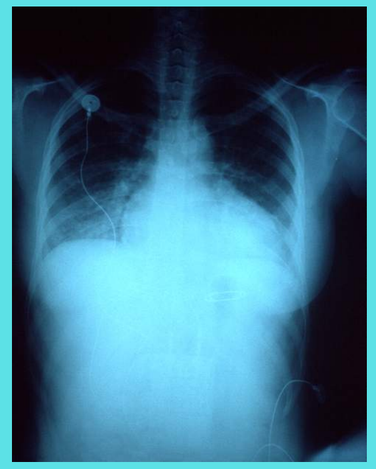
What is staging?

Staging is a way of describing a cancer based on how far it has spread in the body.

This can be done based on radiology tests: i.e X-rays, CT, MRI and ultrasound scans

Laboratory tests: i.e. blood, urine





What to look for when staging:
Where is the tumour?

What is the size of the tumour?

What type of cancer cells?

Has it spread (metastasized)?

If yes, where? Lymph nodes? Different area?

Tumour grade?

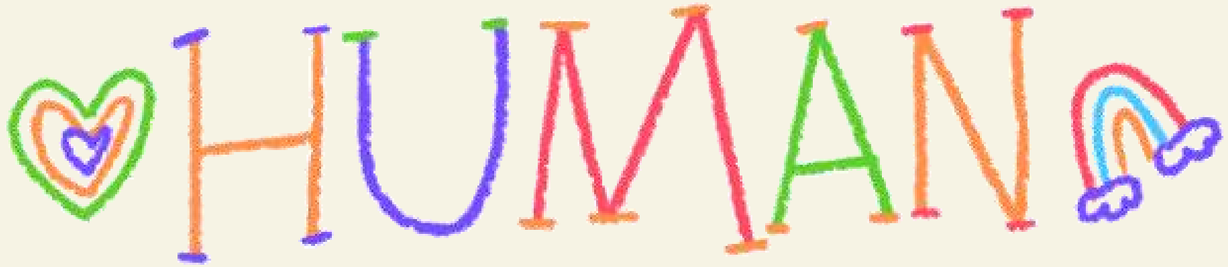
Many types of cancers utilize the TNM staging system.

T *Tumour: size and extent of the tumour.*

N *Node number of lymph nodes with cancer.*

M *Metastasis has it spread from the primary tumour?*

Examples!



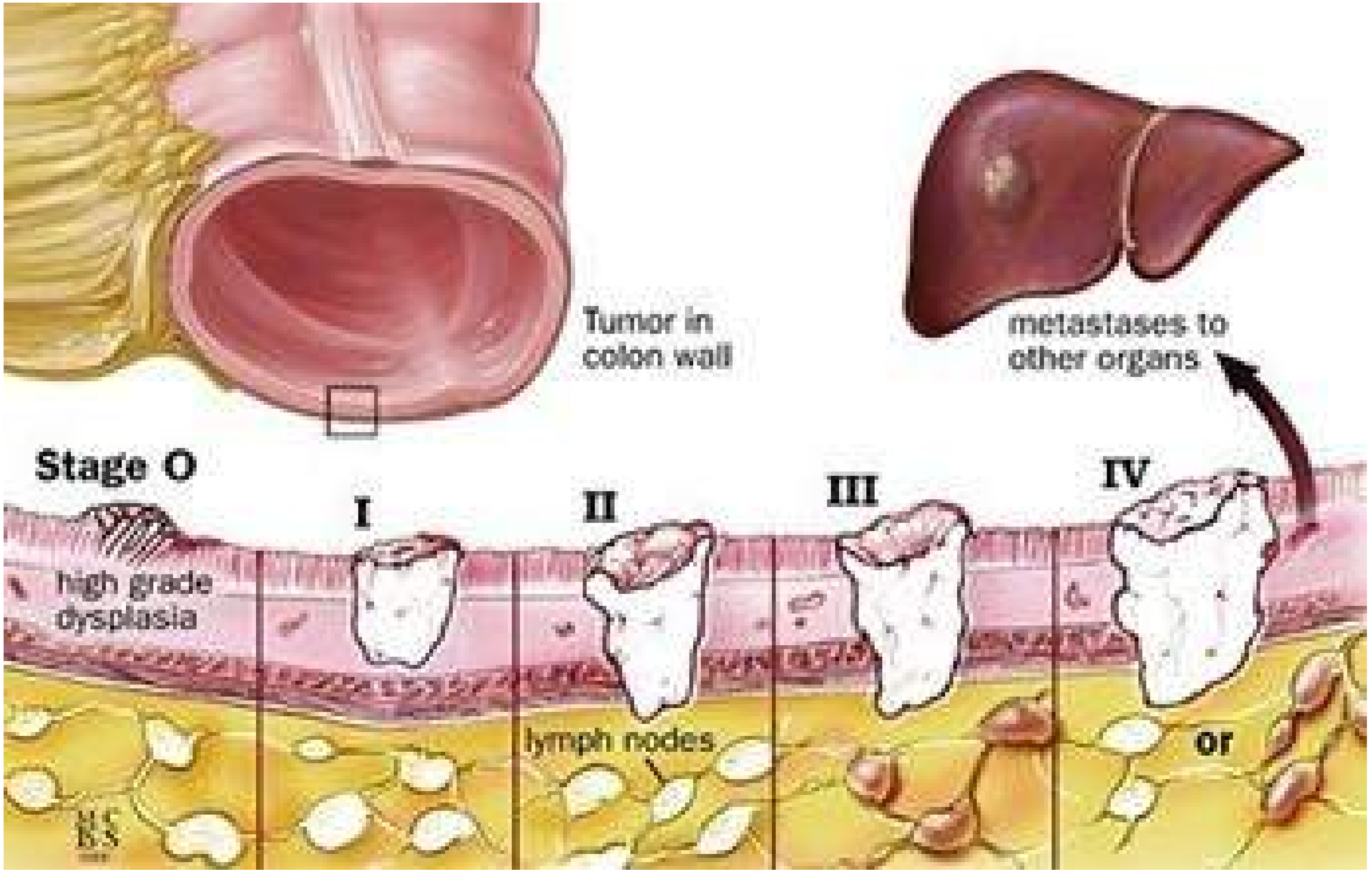
LIVER CANCER

HEAD AND NECK CANCER.

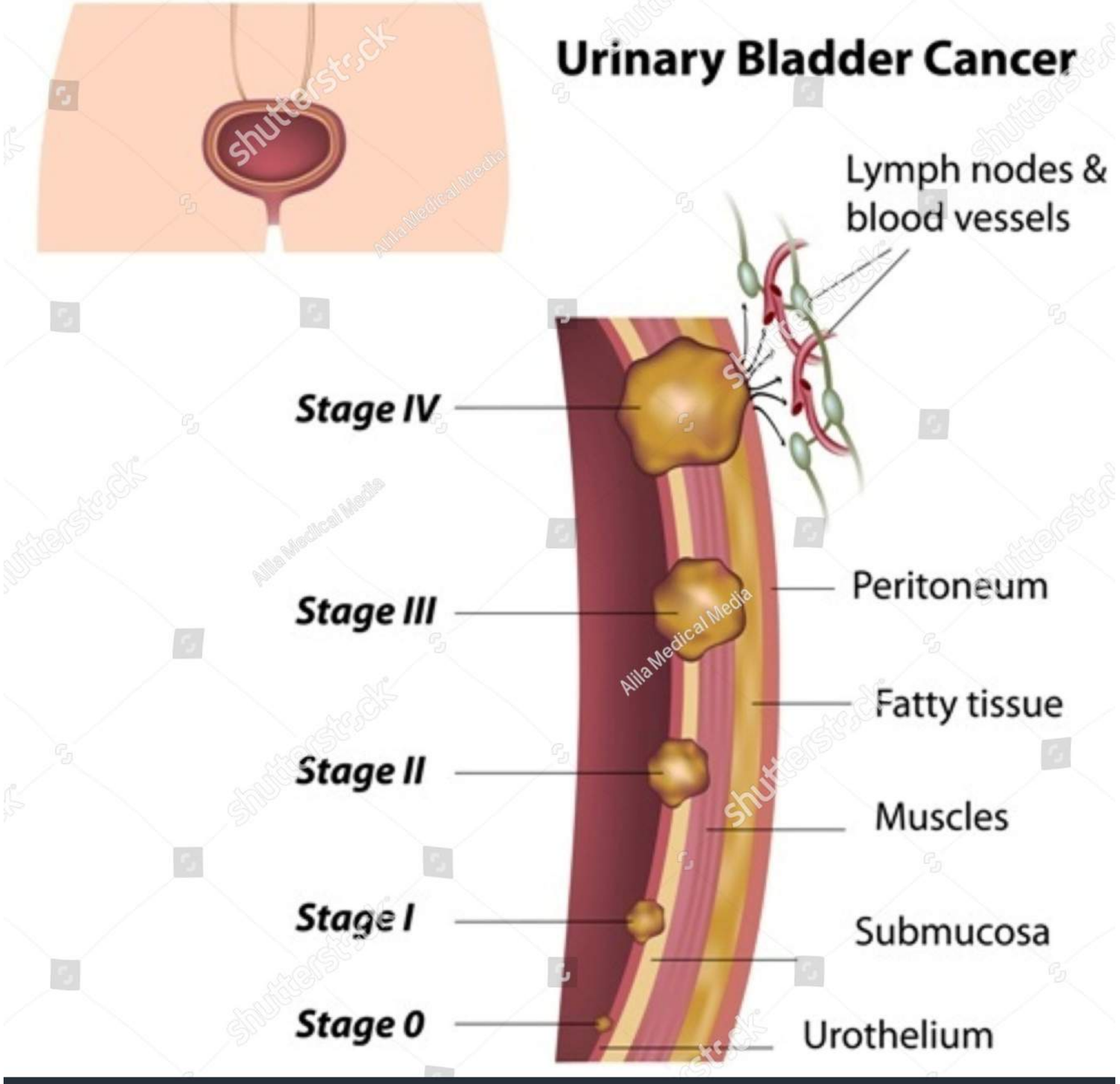
GALL BLADDER

PANCREAS

THROAT

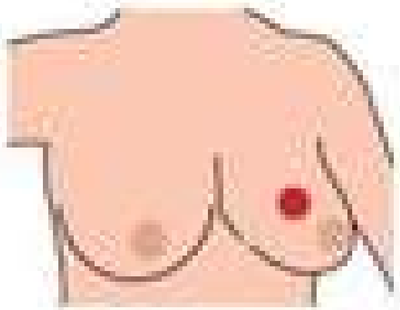

Tumor in
colon wall
metastases to
other organs
Stage O
I
II
III
IV
high grade
dysplasia
lymph nodes
or

Bladder cancer

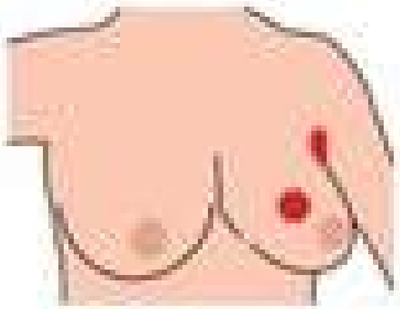


Breast cancer

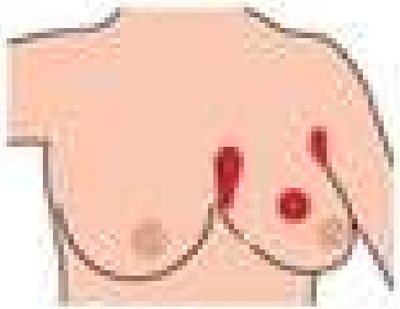
Stage 1
Early disease: tumour confined to the breast (node-negative)

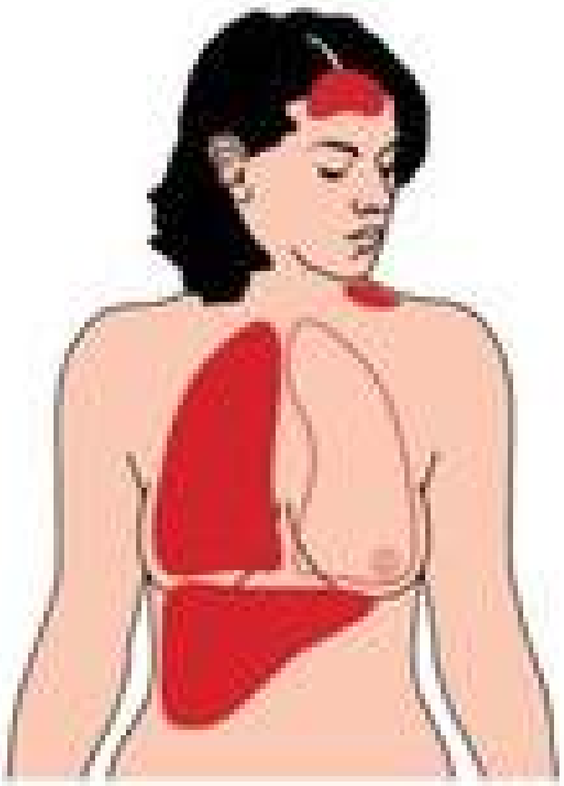


Stage 2
Early disease: tumour spread to movable ipsilateral axillary node(s) (node-positive)



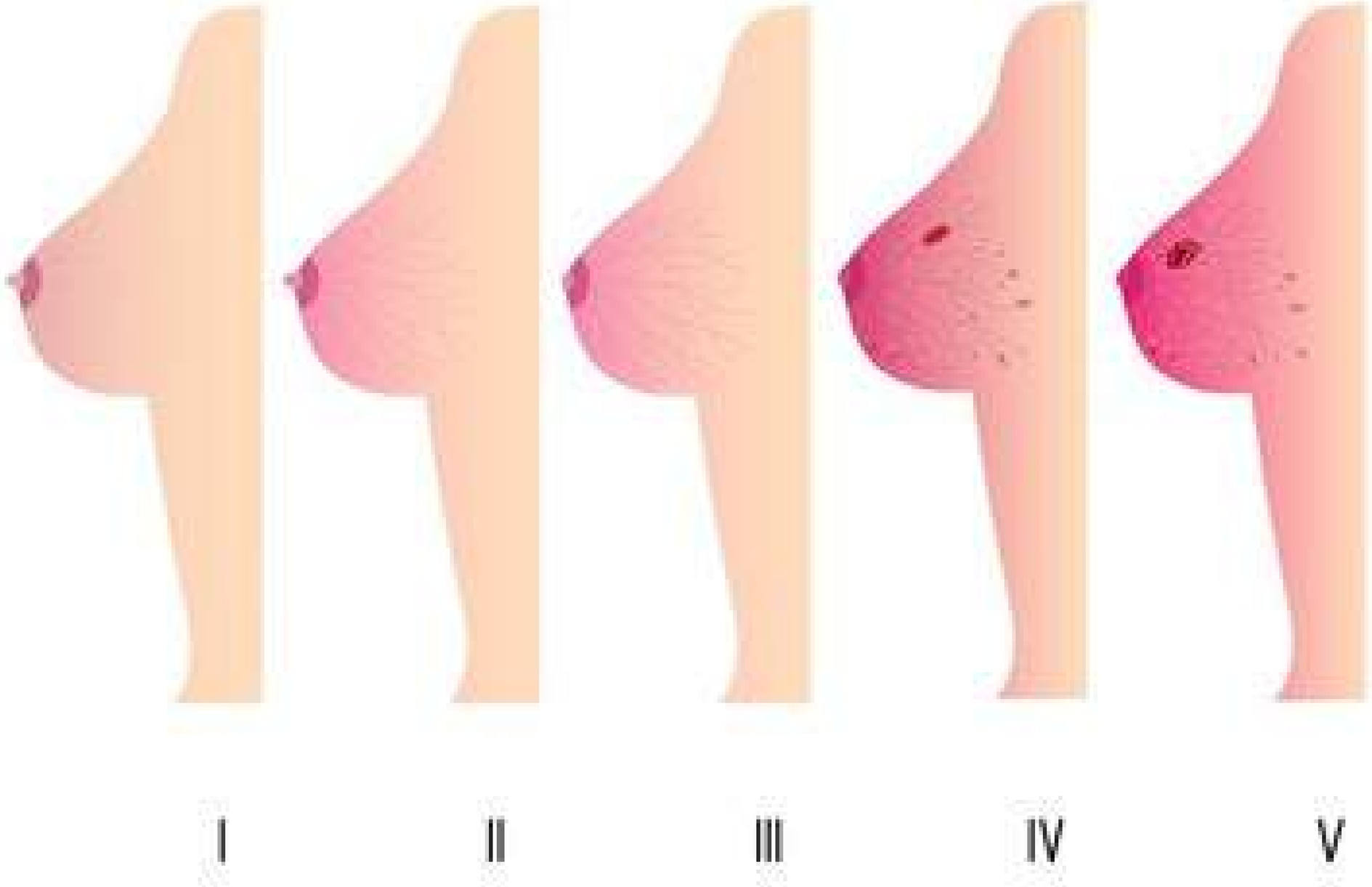
Stage 3
Locally advanced disease tumour spread to the superficial structures of the chest wall; involvement of ipsilateral internal mammary lymph nodes



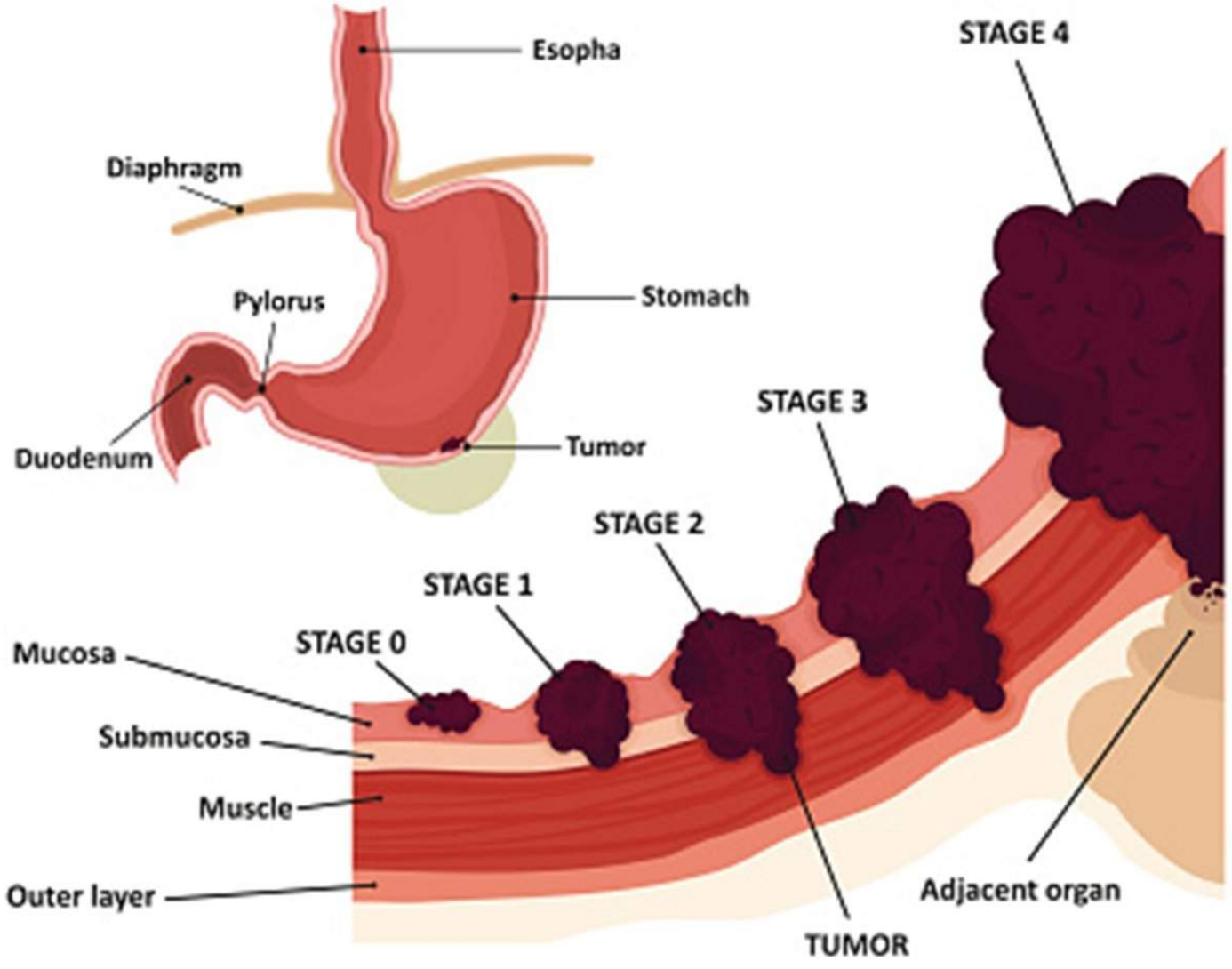


Stage 4
Advanced (or metastatic) disease; metastases present at distant sites, such as bone, liver, lungs and brain and including supraclavicular lymph node involvement

Breast cancer



STAGES OF STOMACH CANCER





Numbers are given after each letter to provide further description of the cancer.

Primary tumour (T)

- ***TX: Tumour cannot be measured.***
- ***T0: Tumour cannot be found.***
- ***T1, T2, T3, T4:***

The higher the number after the T, the larger the tumour or the more it has grown into nearby tissues.

Primary tumour (T)

They can be further divided giving more detail.
For instance T3a and T3b.

Lymph nodes (N)

- ***NX: Cancer in nearby lymph nodes cannot be measured.***

- ***N0: There is no cancer in nearby lymph nodes.***

- ***N1, N2, N3:***

The number and location of lymph nodes that contain cancer.
The higher the number after the N, the more lymph nodes that contain cancer.

Metastasis (M)

- ***MX: Metastasis cannot be measured.***
- ***M0: Cancer has not spread to other parts of the body.***
- ***M1: Cancer has spread to other parts of the body.***

Staging of cancers can also be described with less detail than TNM and may be used by the doctor.

Example 1

- ***Stage 0***

Abnormal cells are present but have not spread to nearby tissue.
This is called carcinoma in situ (CIS). It is not cancer but it has the ability to become cancer.

- ***Stage I, Stage II, and Stage III***

Cancer is present. The higher the number, the larger the cancer tumour and the more it has spread into nearby tissues.

- ***Stage IV***

The cancer has spread to other parts of the body.

Sometimes doctors further divide the cancer by using the letters A, B or C i.e.

3B cervical cancer.

Example 2

- ***Stage 1***

cancer is small and is within the organ it started in.

- ***Stage 2***

Tumour is larger than in Stage 1 but the cancer has not started to spread into nearby tissues.

- ***Sometimes stage 2 is when cancer cells have spread into lymph nodes close to the tumour. This depends on the cancer.***

Example 2

- ***Stage 3***

The cancer is larger but has not spread to surrounding tissues.
There may cancer cells in the lymph nodes nearby.

- ***Stage 4***

The cancer has spread from where it started to another organ e.g. lung or liver.
Metastatic cancer.

Example 3

This staging system is used for all cancers:

- ***In situ***

Abnormal cells are present but have not spread to nearby tissue.

- ***Localized***

Cancer is limited to the place where it started, with no sign that it has spread.

- ***Regional***

Cancer has spread to nearby lymph nodes, tissues, or organs.

Example 3

This staging system is used for all cancers:

- ***Distant***

Cancer has spread to distant parts of the body.

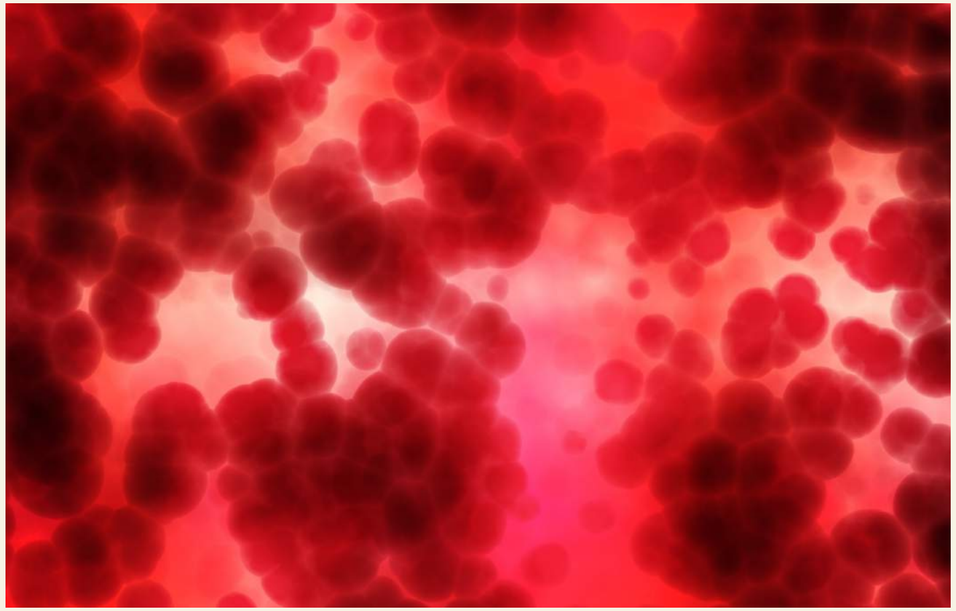
- ***Unknown***

There is not enough information to figure out the stage.

EXAMPLES OF CANCERS WITH DIFFERENT STAGING SYSTEMS

Brain and spinal tumours

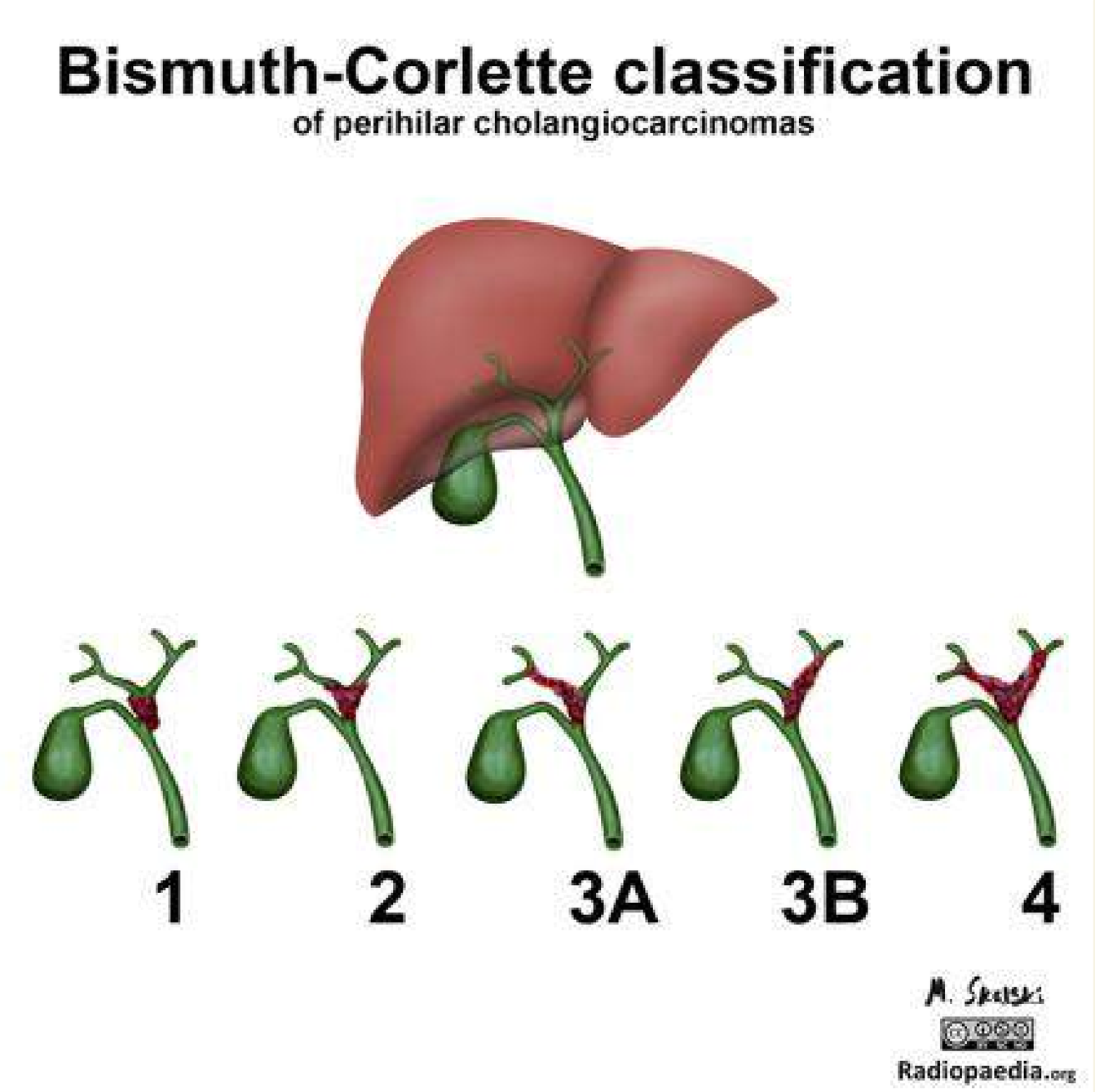
EXAMPLES OF CANCERS WITH DIFFERENT STAGING SYSTEMS



Blood cancers

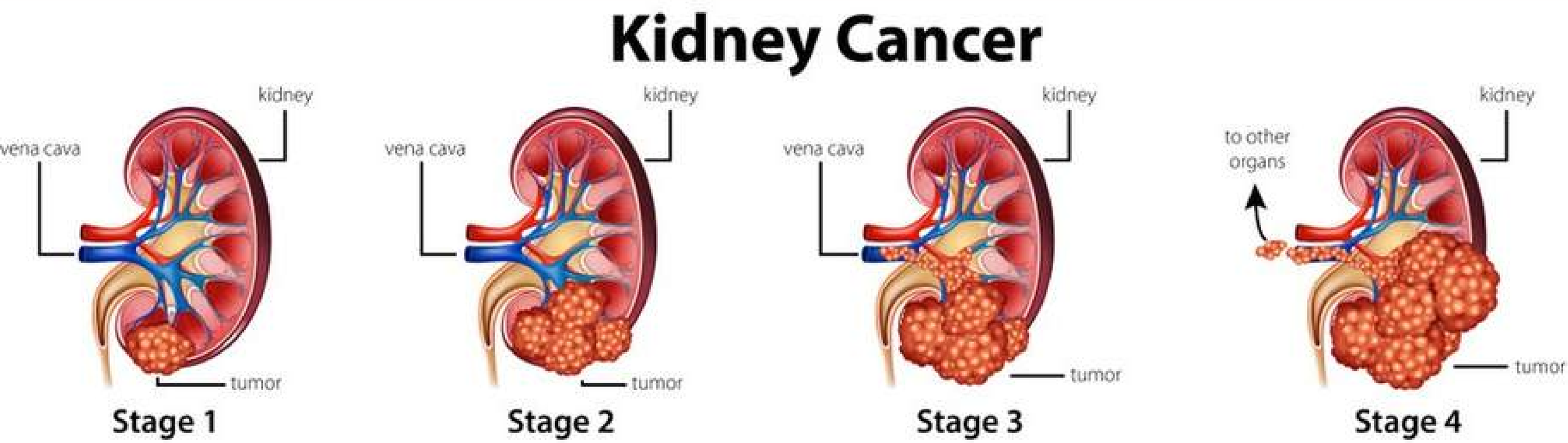
EXAMPLES OF CANCERS WITH DIFFERENT STAGING SYSTEMS

Biliary duct



EXAMPLES OF CANCERS WITH DIFFERENT STAGING SYSTEMS

Robson staging system for kidney cancer.



EXAMPLES OF CANCERS WITH DIFFERENT STAGING SYSTEMS

Robson staging system for kidney cancer.

Tumor stage	Description
Stage I	Confined to the kidney
Stage II	Involvement of the perinephric fat, limited to Gerota fascia
Stage III	
IIIa	Renal vein involvement
IIIb	Nodal involvement
IIIc	Both renal vein and nodal involvement
Stage IV	
IVa	Direct invasion of adjacent structures
IVb	Distant metastasis

Source: RIdge et al .2014

EXAMPLES OF CANCERS WITH DIFFERENT STAGING SYSTEMS

Royal Marsden hospital staging for testicular cancers (non-seminal germ cell tumour NSGCT, seminomas).

Chalya et al. (2014)

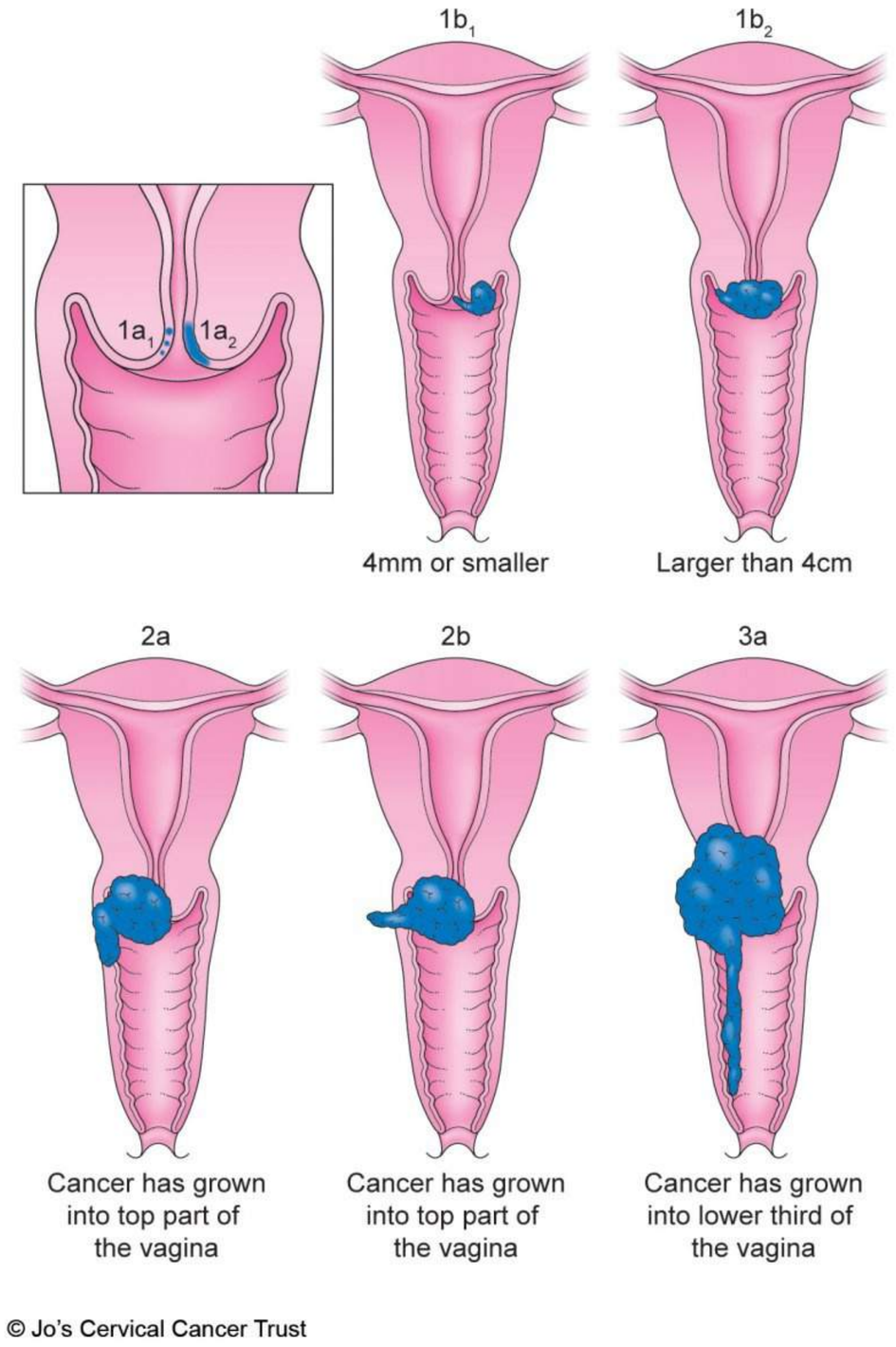
Stage	Description
I	No evidence of metastasis
IM	Rising concentrations of serum markers with no other evidence of metastasis
II	Abdominal node metastases
A	<2 cm diameter
B	2 to 5 cm diameter
C	>5 cm diameter
III	Supra-diaphragmatic nodal metastasis
M	Mediastinal
N	Supraclavicular, cervical or axillary
O	No abdominal node metastases
ABC	Node sizes as for definition in stage II
IV	Extra-lymphatic metastases
Lung	
L1	<3 metastases
L2	≥3 metastases, <2 cm diameter
L3	≥3 metastases, one or more of which is >2 cm diameter

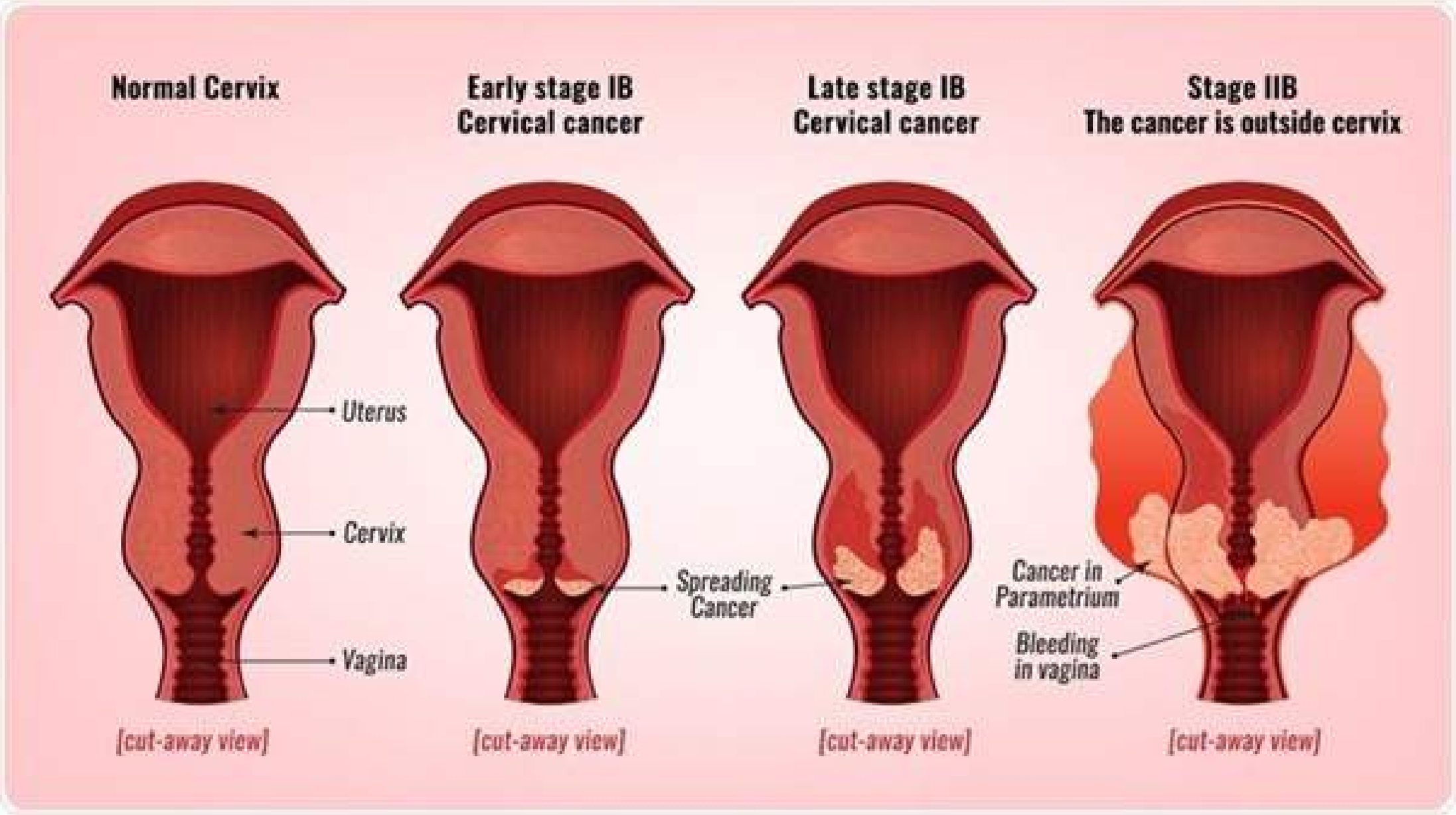
EXAMPLES OF CANCERS WITH DIFFERENT STAGING SYSTEMS

FIGO staging system for cervical cancer.

How far it extended from primary tumours and the metastatic effect on lymph nodes?

Source: Jo Trust




Normal Cervix
Early stage IB
Cervical cancer
Late stage IB
Cervical cancer
Stage IIB
The cancer is outside cervix
Uterus
Cervix
Vagina
Spreading
Cancer
Cancer in
Parametrium
Bleeding
in vagina
[cut-away view]
[cut-away view]
[cut-away view]
[cut-away view]

Grading is a way of classifying a cancer.

This is normally done by a pathologist who is a specialized doctor in examining cells and tissues.

They give the cancer a grade based on:

DIFFERENTIATION

How different does the cancer cells look from normal cells?

ACTIVITY

How quick is the cancer dividing and growing?

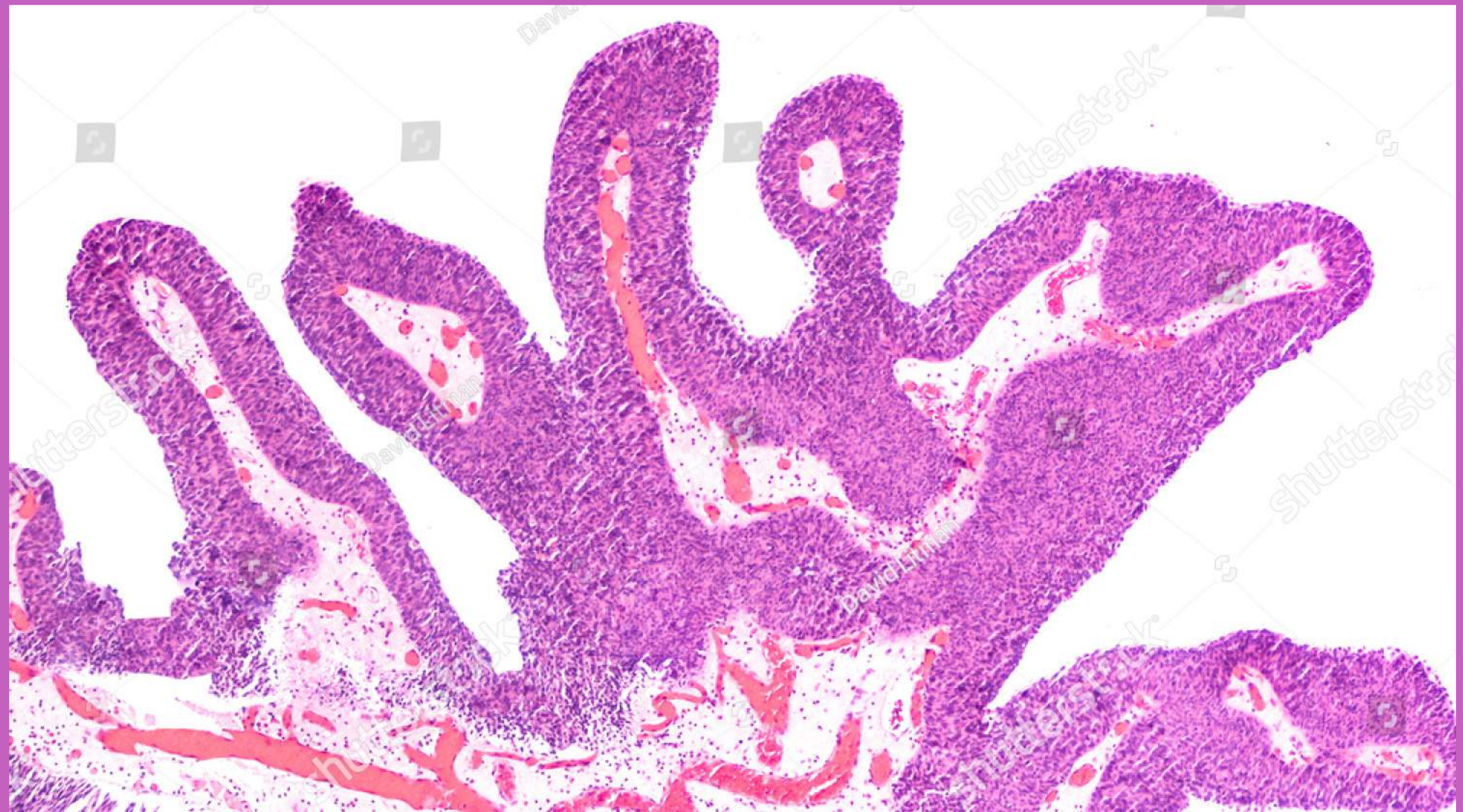
SPREAD

How aggressive is the cancer for it to spread?

Low grade cancer cells are SLOW growing and are normally well differentiated.

BLADDER CANCER

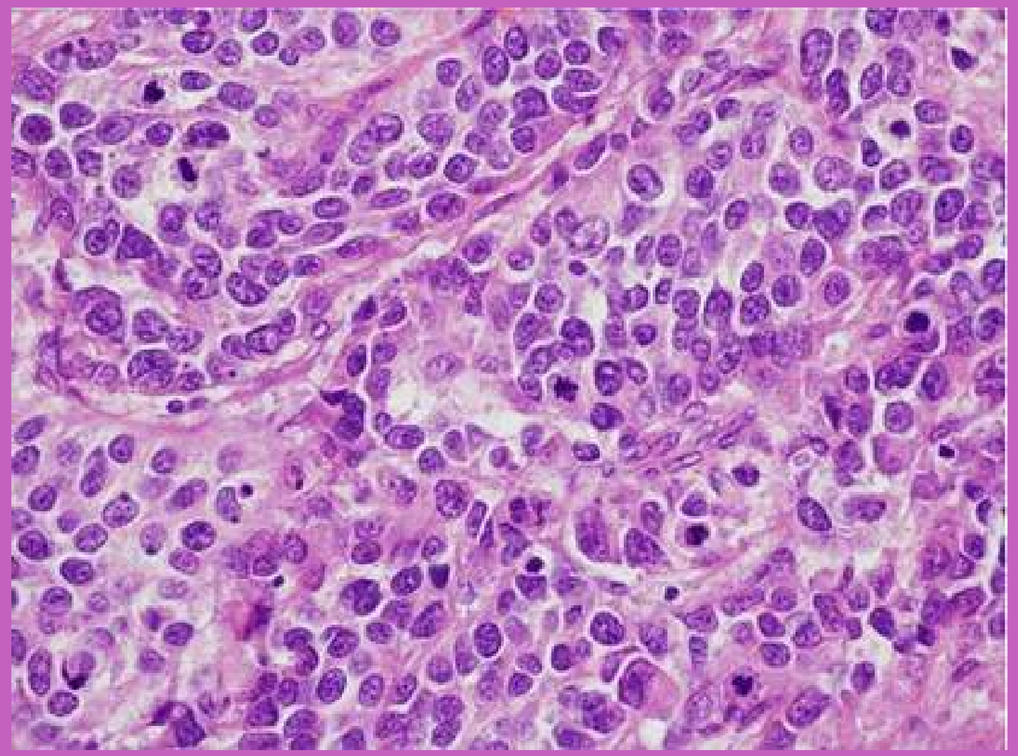
Source: Shutterstock



High grade cancer cells are FAST growing, SPREAD and are normally poorly differentiated or do not have differentiation.

BLADDER CANCER

Perez-Montiel, D., Wakely, P., Hes, O. Michal, M and Suster, S. (2006) High-grade urothelial carcinoma of the renal pelvis: clinicopathologic study of 108 cases with emphasis on unusual morphologic variants. Modern Pathology 19, 494–503.



Grades have a number system between 1 to 4 based on differentiation.

The LOWER the number, the LOWER the grade.

The HIGHER the number, the HIGHER grade.

- GX – grade cannot be assessed
- G1 – well differentiated – low grade
- G2 – moderately differentiated – intermediate grade
- G3 – poorly differentiated – high grade
- G4 – undifferentiated – high grade

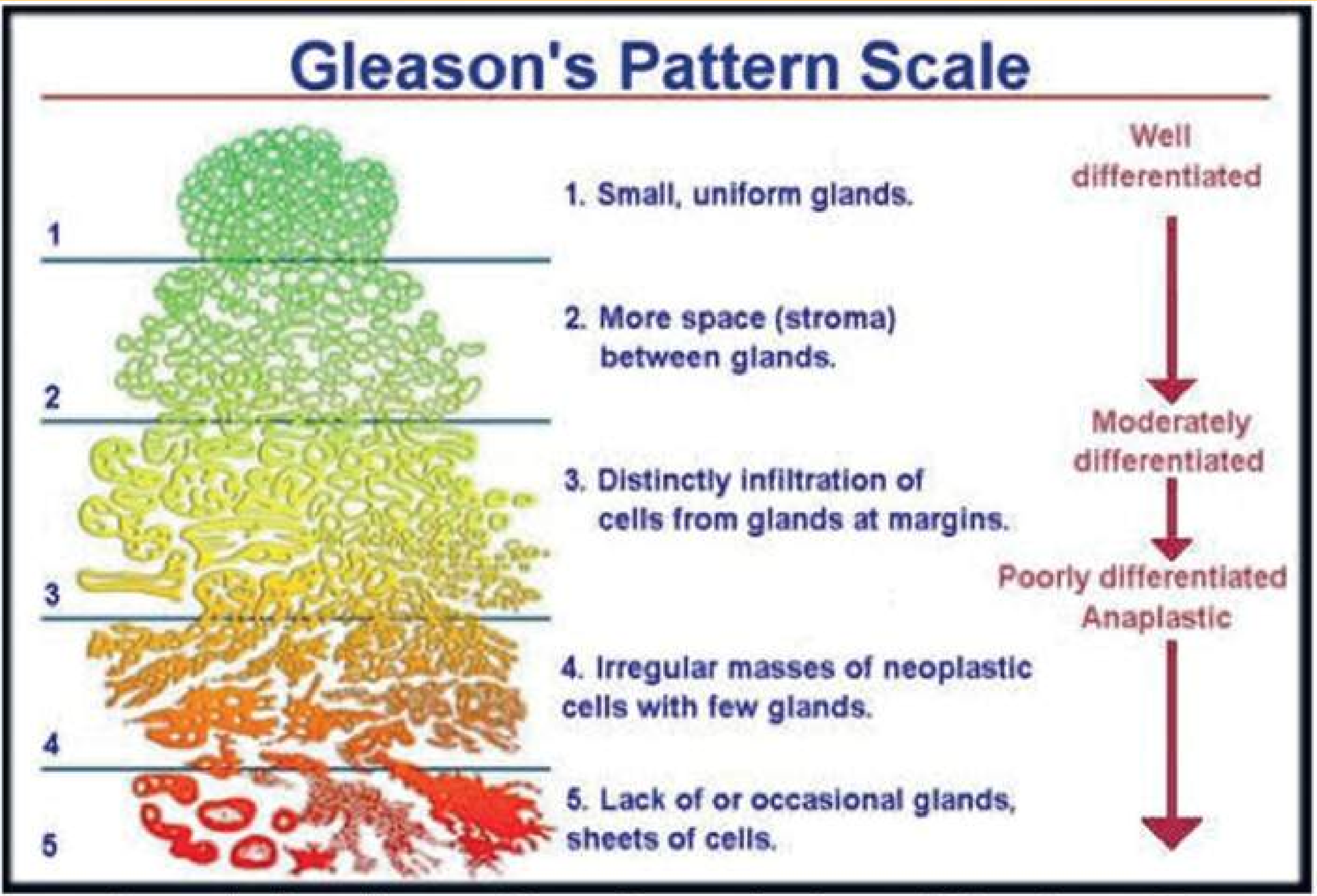
Some tumours are LARGE and have DIFFERENT grades.

Prostate cancer.

- *This is assessed by Gleason score.*
- *Gleason 6 - Low grade cancer. It is small and slow growing in prostate gland.*
- *Gleason 8 to 10 - Higher grade cancer. It grows faster and invade outside the prostate to areas such as the seminal vesicles, bladder, rectum, lymph nodes.*

Further invasion to the bone, liver and lung through the vascular system.

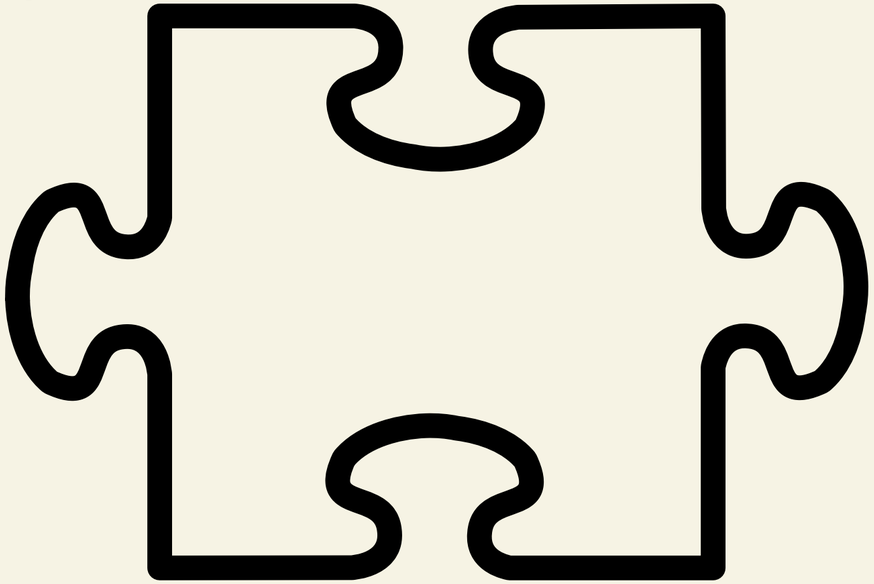
Prostate cancer.



Source: John Murtagh, Jill Rosenblatt, Justin Coleman, Clare Murtagh: *John Murtagh's General Practice*, 7e

Some cancers are difficult to grade:

- ***gastrointestinal stromal sarcomas***
- ***stomach cancer***
- ***large bowel cancer***
- ***oesphagus***



Overall, staging and grading cancer helps with providing the right treatment for the patient.

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Part 16: Diagnosis and Prevention: Screening

UPCOMING VIDEO RELEASING SOON!

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Acknowledgements

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Ridge, C.,Pua, B. & Madoff,. (2014). Epidemiology and Staging of Renal Cell Carcinoma. Seminars in interventional radiology. 31. 3-8.

Jo Trust.

Chalya, P., Simbila, S. and Rambau, P. (2014). Ten-year experience with testicular cancer at a tertiary care hospital in a resource-limited setting: A single centre experience in Tanzania. World journal of surgical oncology. 12. 356.

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