

Cancer - defining a definition

- Insurers have started reviewing Trauma definitions to be “up to date”
- Initial focus on Heart Attack and Severe Rheumatoid Arthritis.
- Limited changes currently being made to cancer despite it being the majority of claims.

Agenda

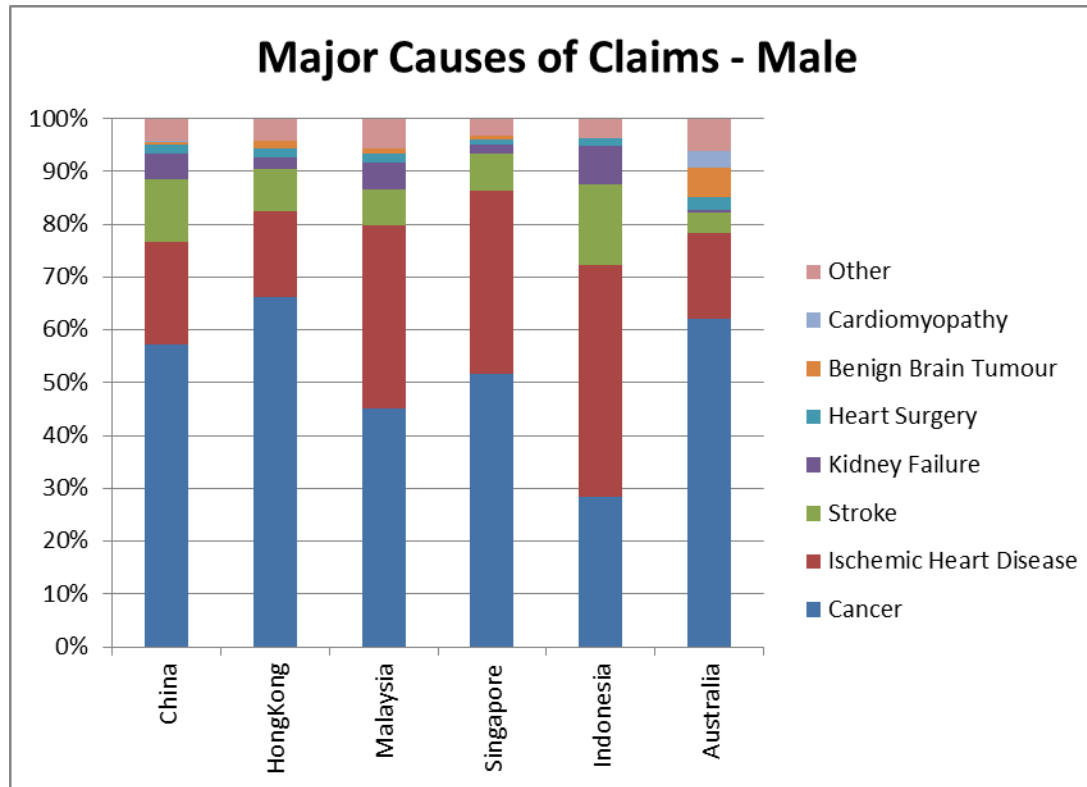
- Gen Re Dread Disease Survey
- What is Cancer ?
- Issues for Insurers in Cancer Definitions
- Cancer Definitions

Gen Re Dread Disease Survey

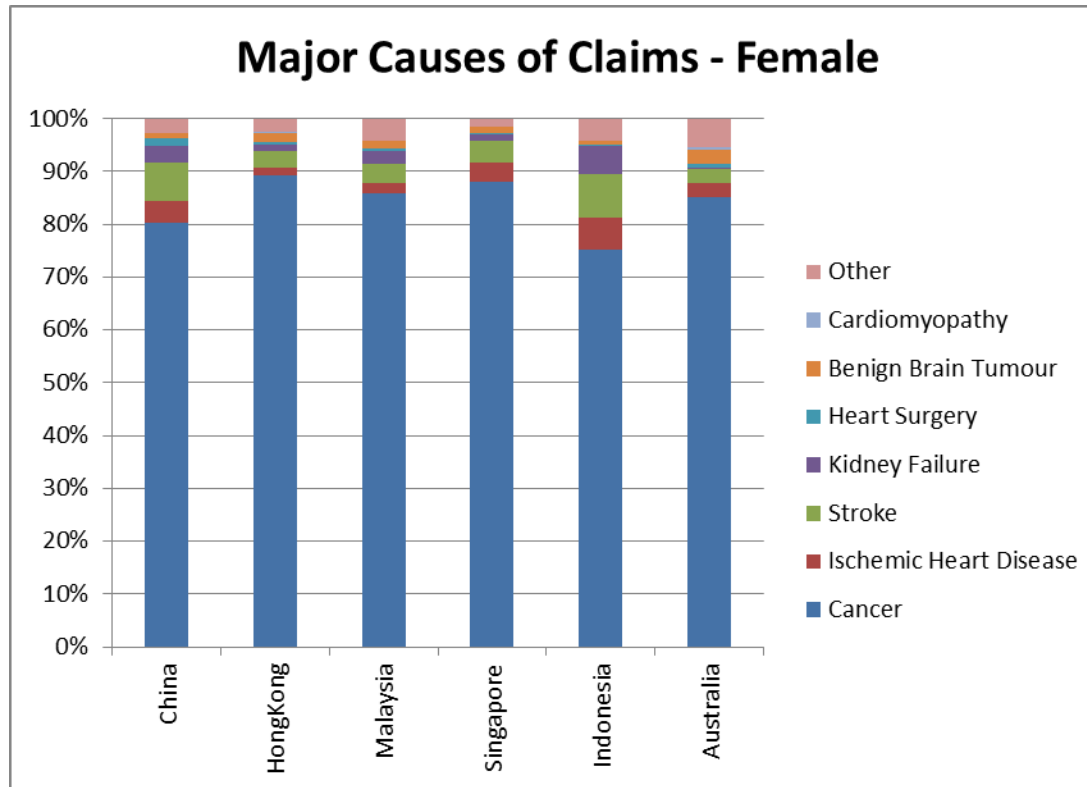
Gen Re Dread Disease Survey

- 6th survey covered 2008-2012
- 84 companies in 7 markets
- 7 companies in Australia

Cause of Claim



Cause of Claim

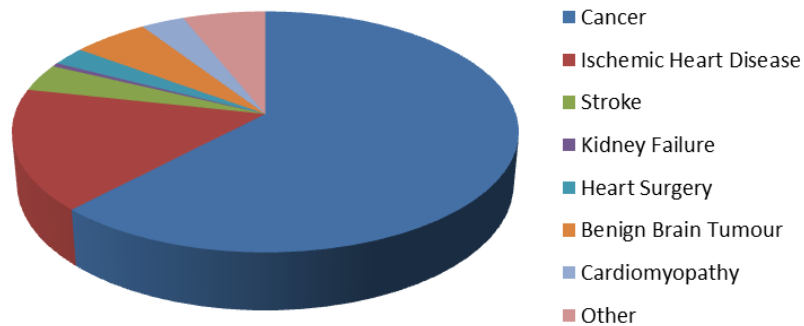


Cause of Claim - Australia

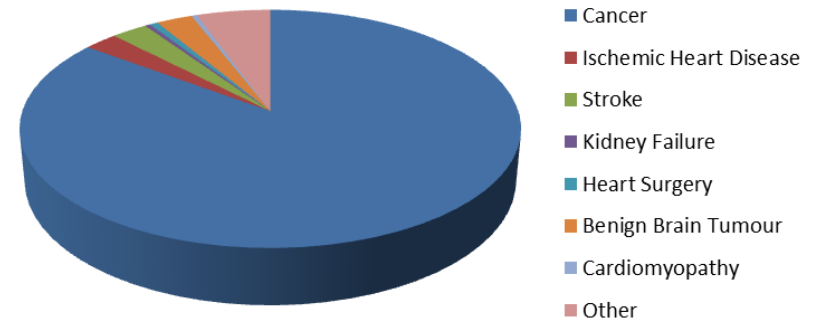
62.1% of Male Claims are Cancer

85.2% of Female Claims are Cancer

Australia - Male

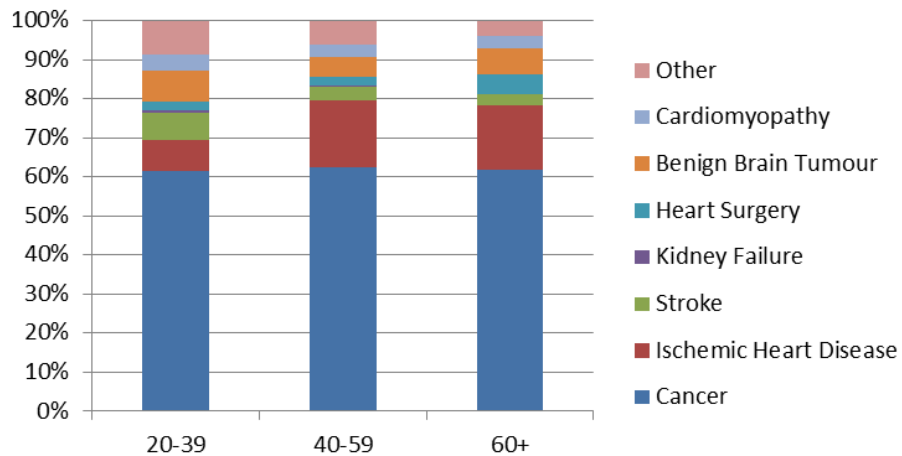


Australia - Female

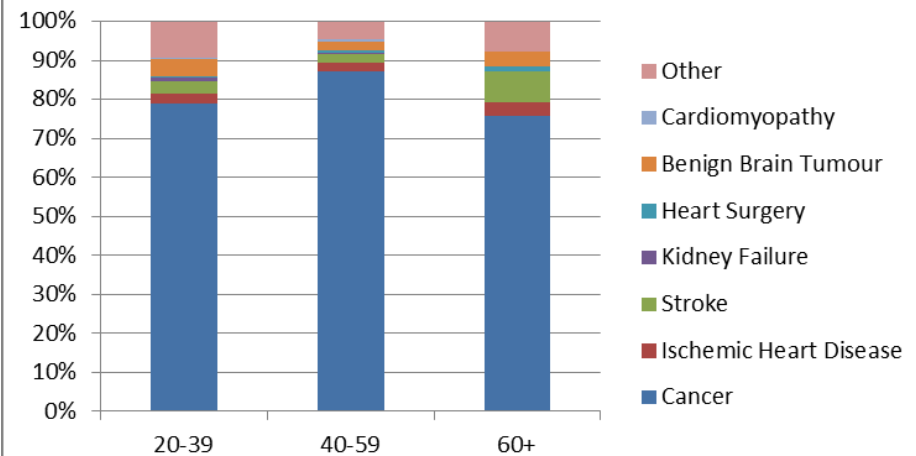


Cause of Claim by Age

Major Cause of Claim - Australia - Male

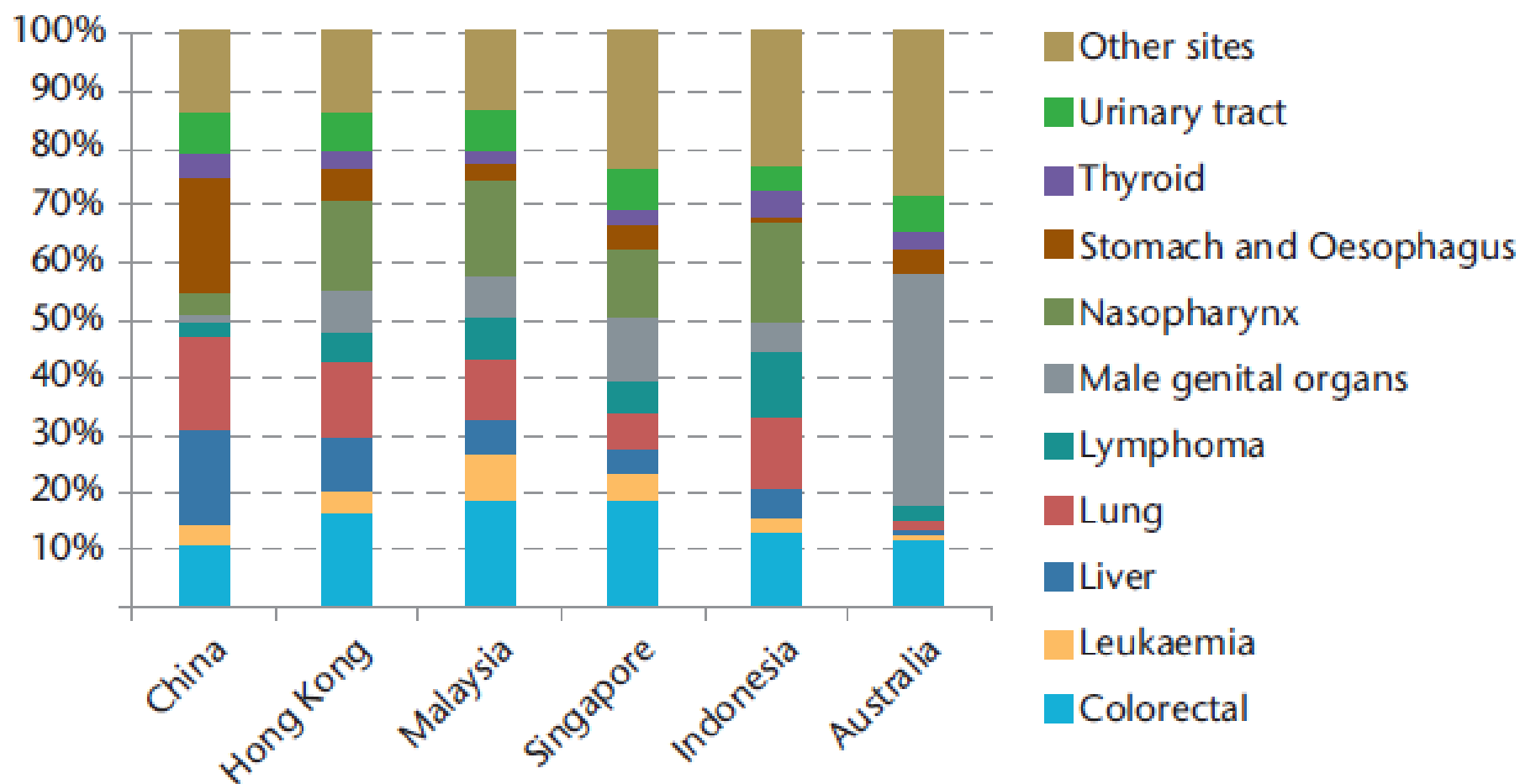


Major Cause of Claim - Australia - Female



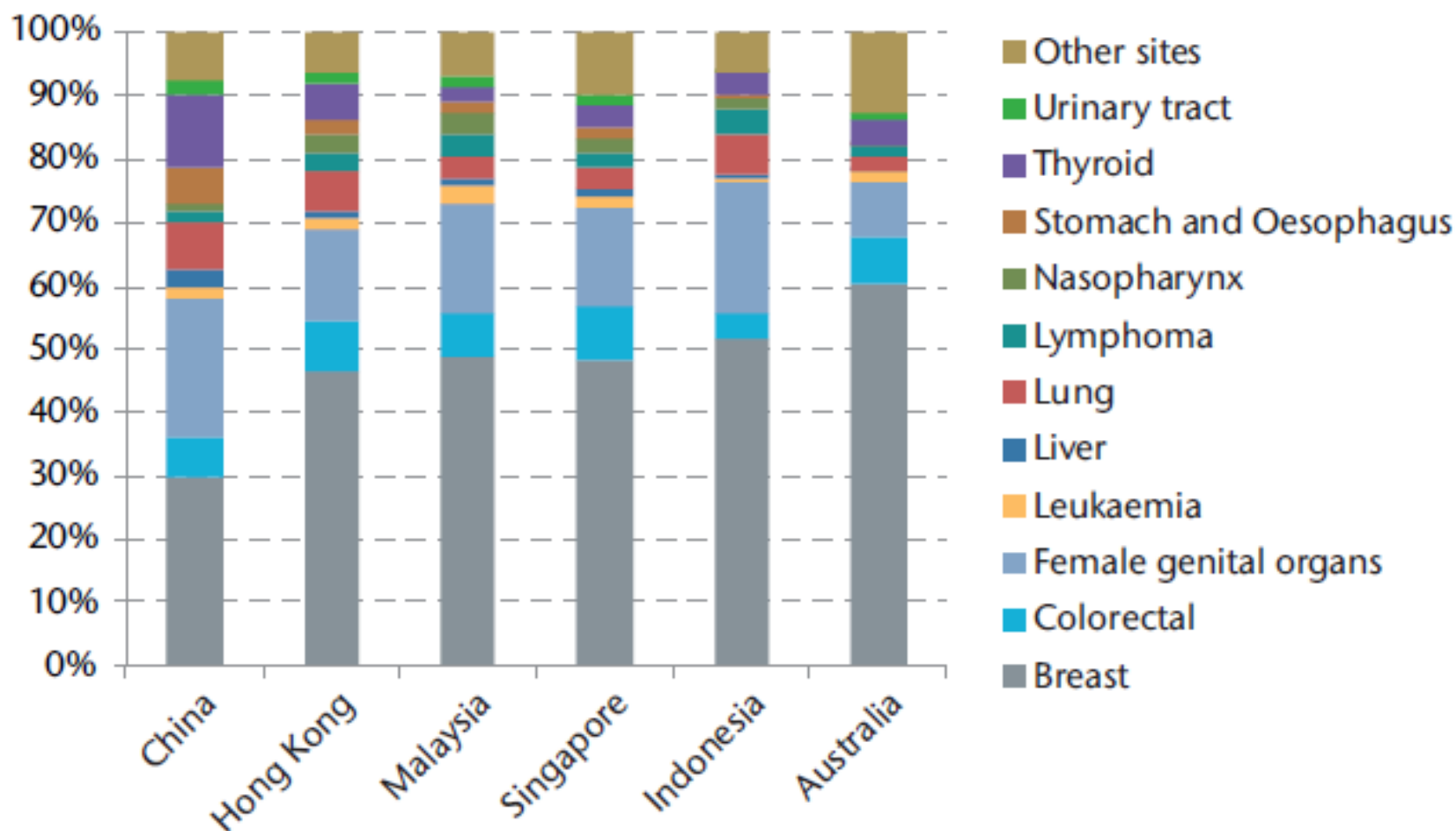
Cancer Claim by Site - Males

Figure 4.11 – Cancer Site Distribution for Cancer Claims by Market – Males

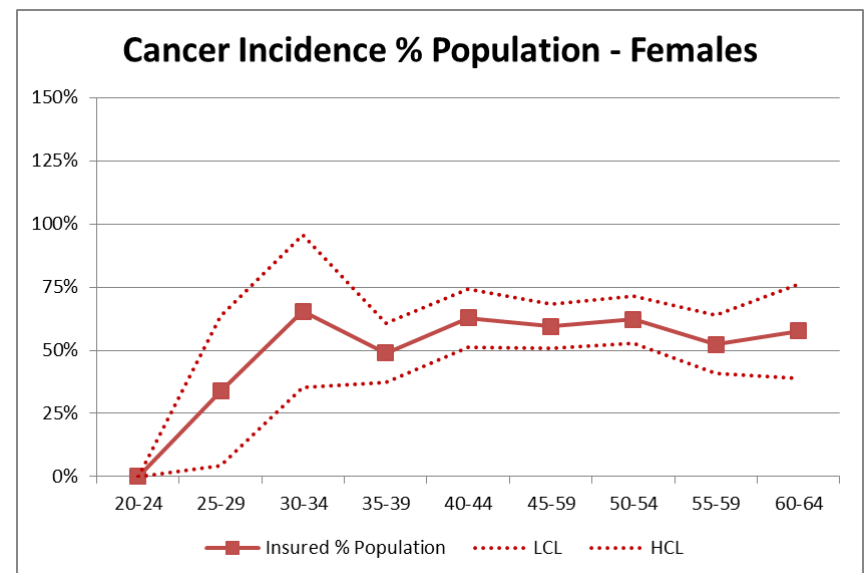
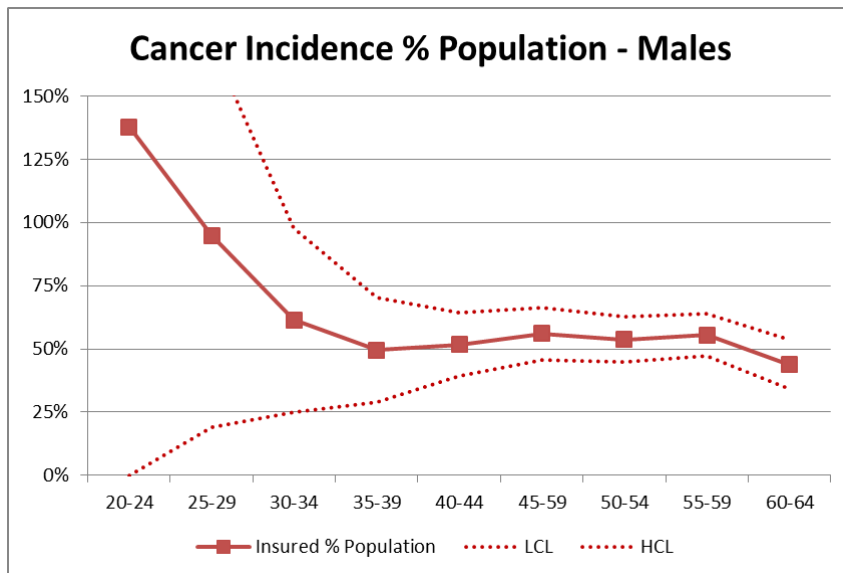


Cancer Claim by Site - Females

Figure 4.12 – Cancer Site Distribution for Cancer Claims by Market – Females

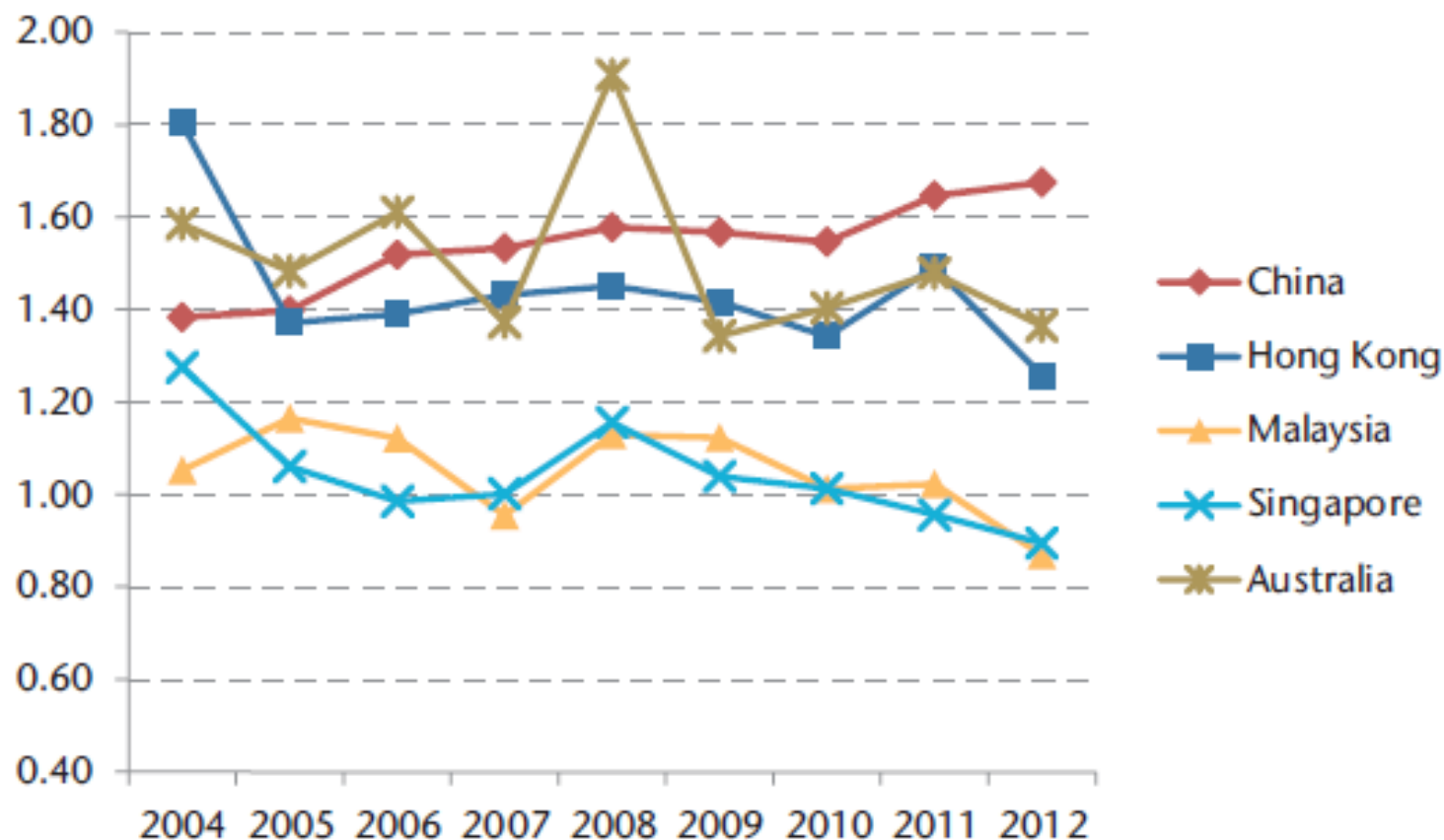


Insured vs Population Incidence



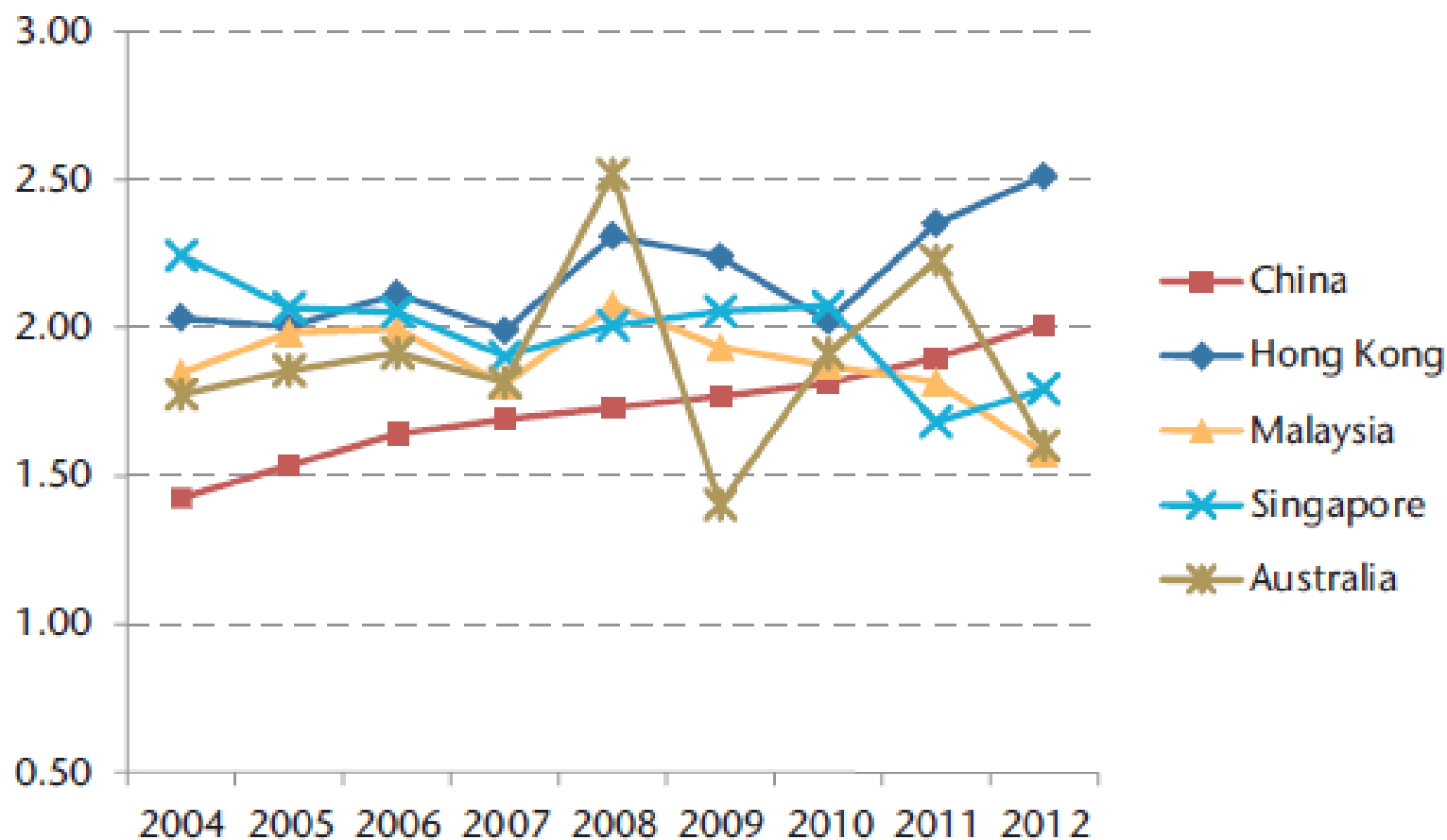
Trends

Figure 4.29 – Age Standardised Cancer Incidence Rates (per 1000). Duration 2+ by Year and Market – Males



Trends

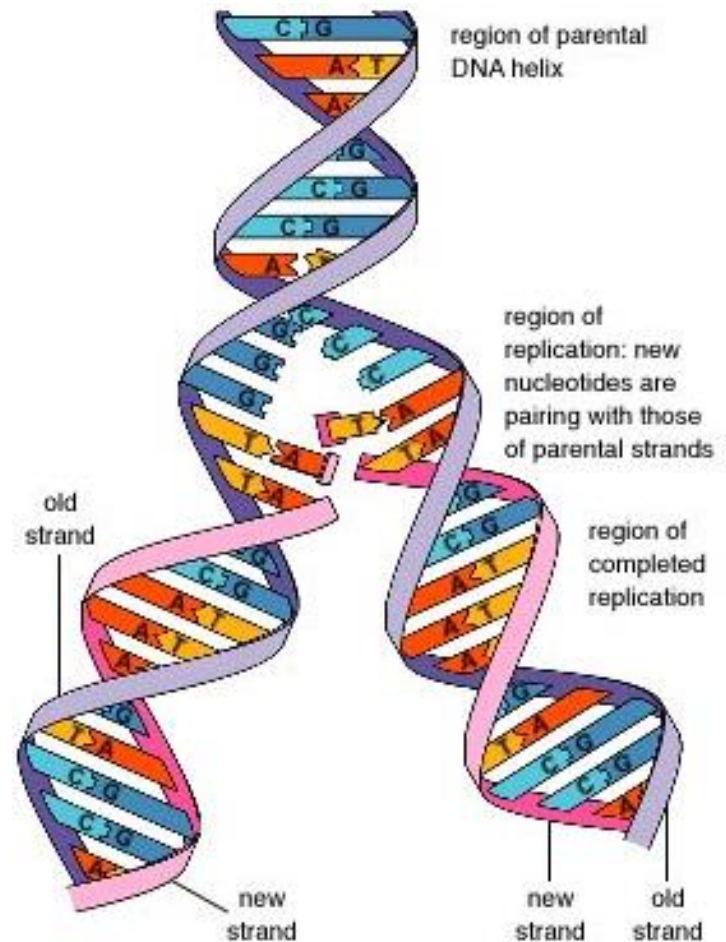
Figure 4.30 – Age Standardised Cancer Incidence (Duration 2+) by Year and Market – Females



What is Cancer?

What is Cancer?

- Normally cells grow and multiply (via mitosis) in a controlled way to replace cells that have died or been damaged.



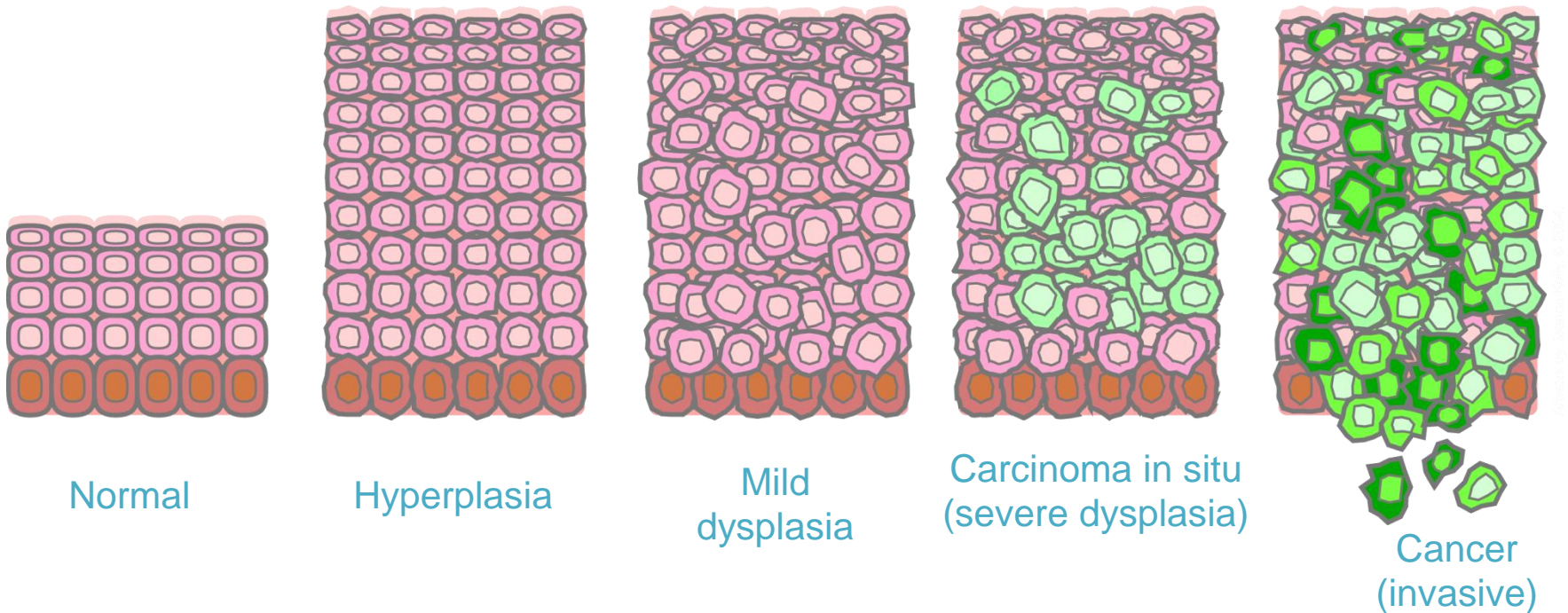
What is Cancer?

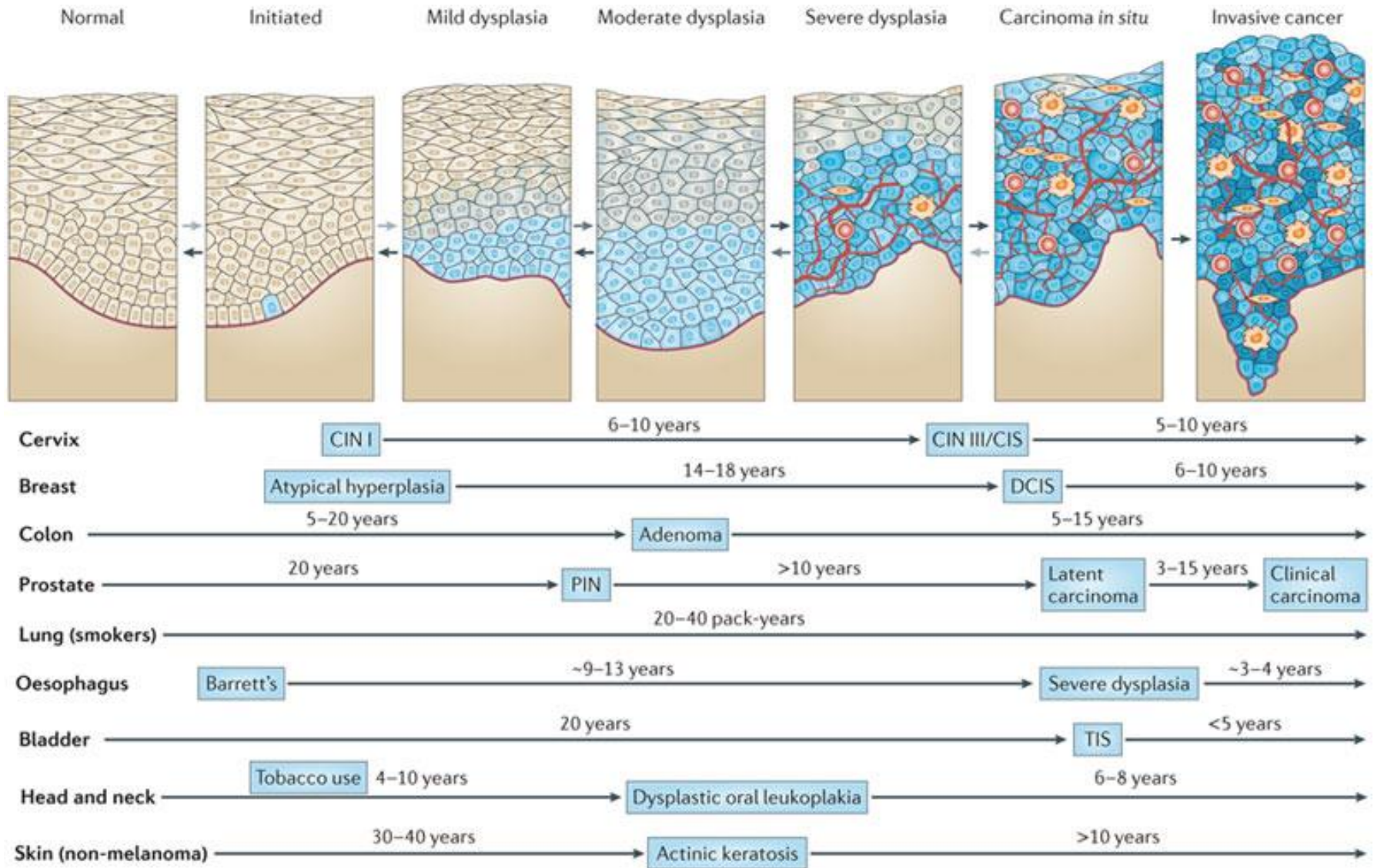
- Sometimes the copying of DNA can go wrong and create damage known as a mutation.
- Most times cells can repair damage or the cell undergoes “programmed cell death” or apoptosis

Contributing Causes

- Individuals may have certain inherited genetic defect
- Infections can assist in the process of causing mutations
- Environmental factors such as smoking, alcohol etc can assist in the process of causing mutations

Development of Cancer





Benign vs. Malignant

Benign	Malignant
Grow slowly	Grow rapidly
Well-defined capsule	Not encapsulated
Not invasive	Invade locally
Well differentiated	Poorly differentiated
Low mitotic index	High mitotic index
Do not metastasize	Can spread distantly (metastasis)

Mitotic index = how fast cells divide

TNM Tumour Staging

- Staging is about size and spread

The TNM staging system :

- T (Tumour) - within its organ of origin , how large is it, and the extent it has invaded LOCALLY
- N (Node) - absence or presence and extent of lymph node metastases
- M (Metastases) - absence or presence of distant (non lymph node) metastases e.g. prostate spreads to bone, lung to brain etc



Staging example: Breast Carcinoma

	TNM	Description	Risk Class
0	Tis N0 M0	Tis: carcinoma in situ, Intraductal carcinoma, lobular carcinoma in situ, or Paget's disease of the nipple with no tumour	BC5
IA	T1 N0 M0	T1: Tumour ≤ 20 mm in greatest dimension	
IA	T1mi N0 M0	T1mi: Micro-invasion ≤ 1 mm	BC5
IA	T1a-c N0 M0	T1a: Tumour > 1 mm but ≤ 5 mm T1b: Tumour > 5 mm but ≤ 10 mm T1c: Tumour > 10 mm but ≤ 20 mm	BC4
IB	T0-1 N1mi M0	T0: no evidence of primary tumour N1: Metastases to movable ipsilateral level I (low-axilla), II (mid-axilla) axillary lymph nodes pN1: Micrometastases; or metastases in 1-3 axillary lymph nodes; and/or in internal mammary lymph nodes with metastases detected by sentinel lymph node biopsy but not clinically detected pN1mi: Micrometastases (> 0.2 mm and/or more than 200 cells, but ≤ 2 mm)	BC3
IIA	T0-1 N1 M0 T2 N0 M0	T2: Tumour size > 20 mm but ≤ 50 mm in greatest dimension pN1a: Metastases in 1-3 axillary lymph nodes, at least one metastases > 2 mm pN1b: Metastases in internal mammary nodes with micrometastases or macrometastases detected by sentinel lymph node biopsy but not clinically detected pN1c: Metastases in 1-3 axillary lymph nodes and in internal mammary nodes with micrometastases or macrometastases detected by sentinel lymph node biopsy but not clinically detected	BC3
IIB	T2 N1 M0 T3 N0 M0	T3: Tumour > 50 mm in greatest dimension	BC2

Tumour grading

Grading is a microscopic term used to qualify how “aggressive” a tumour is

Grading systems vary by type of cancer

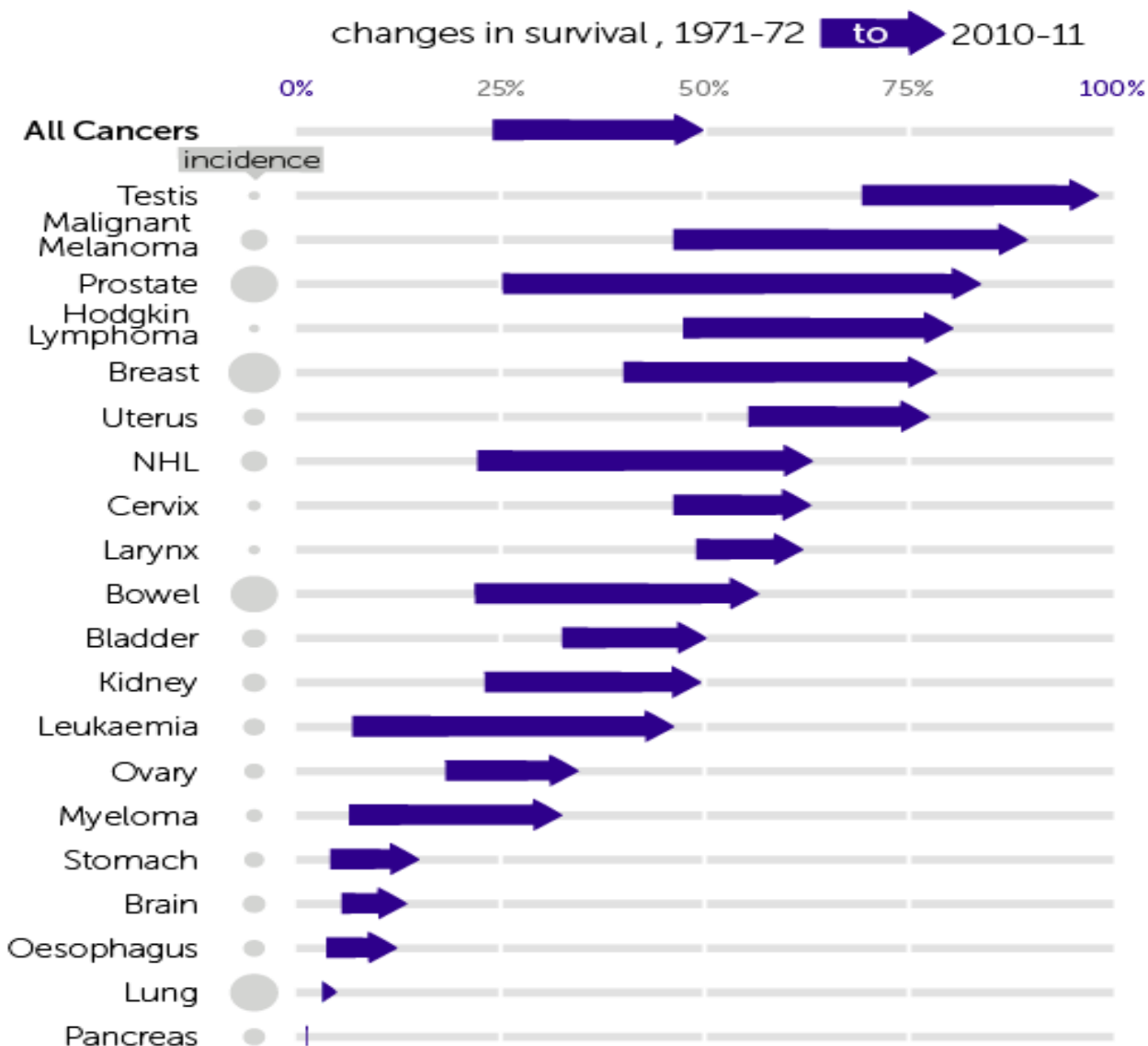
AGGRESSIVENESS / GRADING



SIZE / STAGING

Age-Standardised Ten-Year Net Survival, Selected Cancers, Adults (Aged 15-99), England and Wales, 2010-2011

Many cancers becoming long term conditions..... Without necessary cure



Breast is for female only. Laryngeal is for male only

Ten-year survival for 2005-2006 and 2010-2011 is p
Survival for bowel cancer is a weighted average deri

Source: cruk.org/cancerstats

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Issues for Insurers in Cancer Definitions

Issues for Insurers in Cancer Definitions

- New Diagnostic techniques
- Changing Approaches to Prostate Cancer Treatment
- Thyroid Cancer

NEW DIAGNOSTIC TECHNIQUES

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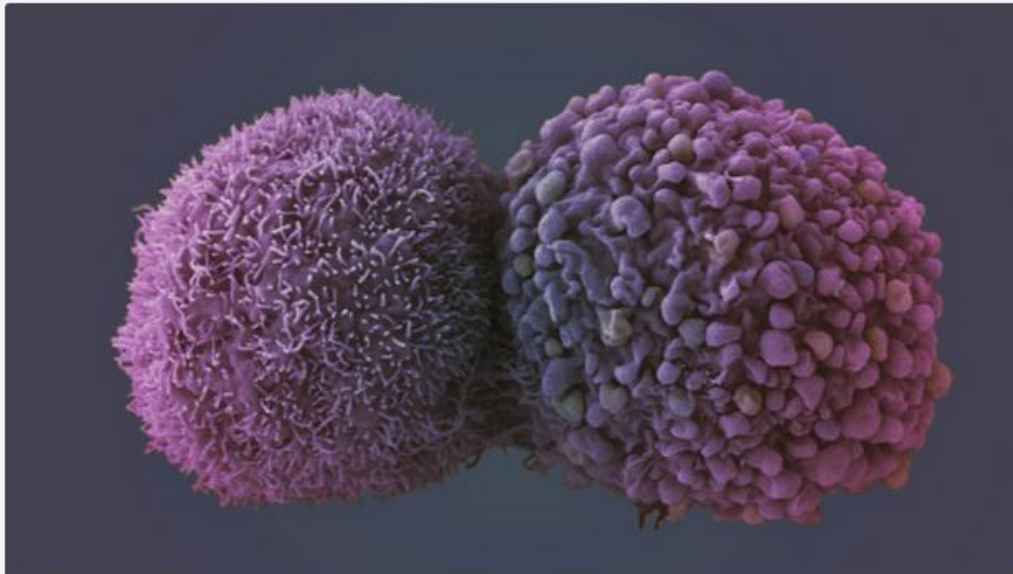
A Blood Test for Early Cancer Detection Sparks Debate

A new 'liquid biopsy' detects bits of DNA common in several cancers, though critics question its value



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Fishing for clues – how 'liquid biopsies' are uncovering cancer's secrets

Category: [Science blog](#)  July 1, 2015 Nick Peel

Lung cancer cells (image courtesy of the London Research Institute EM unit)

It takes just three minutes for a precious 10 millilitre blood sample to be carried from the specialist cancer wards of the Christie Hospital in Manchester, down a corridor, and into a lab housing several large, white machines.

But before arriving in the fluorescent light of the [Cancer Research UK Manchester Institute](#), the blood was on a different journey: flowing around a cancer patient's body – and potentially

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New Diagnostic Techniques

- Early days!
- No new techniques tailored for cancer diagnosis
- Currently trialled in participants where initially diagnosed by conventional methods
- Lot of marketing hype from manufacturers

New Diagnostic Techniques

- Liquid biopsy not used for screening
 - Accuracy is not known
 - Possible false positives/negatives
- Some correlation between blood test and tumour size
- Most medical research is tailored to specific tumour site and no “catch all” technique in pipeline

New Diagnostic Techniques

Cancer definition:

“...diagnosed with histological confirmation..”

- Unlikely to be replaced in the near future
- Would lead to Trauma definitions “being out of date”

New Diagnostic Techniques

- + Could detect cancers earlier leading to better treatment and survival
- + Could be used for measuring severity
- Could put pressure on to pay out new cancers detected.

Changing approaches to Prostate Cancer treatment

Prostate Cancer

- Almost 3000 Australian men die from prostate cancer each year and more than 19,000 new cases diagnosed annually
- The lifetime risk of developing prostate cancer is 16% percent
- but the risk of dying of prostate cancer is only 2.9%
- More than 80% occur in older men (over the age of 60) and 97% of deaths occur in this age group

Prostate prognosis

– 5 year survival (US)

**Stage Distribution and 5-year Relative Survival by Stage at Diagnosis
for
2003-2009, All Races, Males**

Stage at Diagnosis	Stage Distribution (%)	5-year Relative Survival (%)
Localized (confined to primary site)	81	100.0
Regional (spread to regional lymphnodes)	12	100.0
Distant (cancer has metastasized)	4	27.9
Unknown (unstaged)	3	72.9

Source: US National Cancer Institute

Prostate Cancer

Typical Australian Definition:

The following are specifically excluded:

prostatic tumours which are histologically described as TNM classification T1 (including T1a, T1b and T1c), or characterised by **Gleason Score of less than 6**, or are of another equivalent or lesser classification.

Prostate cancer is covered if it results directly in total prostatectomy. This procedure must be performed specifically to arrest the spread of malignancy and be considered the appropriate and necessary treatment.

Gleason's Score/System for Microscopic Grading of Prostate Cancer



- A pathologic *Grading* classification
- Biopsy with a probe of typically 20 samples
- Each sample is graded from between 1 to 5
- The scores are added to give the Gleason Score
- Gleason scores of 2 to 4
 - 15 year risk of death 4% to 7%
- Gleason scores of 8 to 10
 - 15 year risk of death 60% +

Clinical Treatment

Procedure	Indication	Complications **
Prostatectomy	Usually at least T2B ; Any Gleason 7 or >50% one lobe at least	Incontinence 6-16% Impotence 83-88% *
Radiotherapy +/- Brachytherapy	Usually at least T2B ; Any Gleason 7 or >50% one lobe at least	Incontinence 3 % Impotence 42-66%*
Active surveillance	T1c-T2A ; < Gleason 7 , and one lobe	Anxiety , intervention in up to 60 % after 10 years

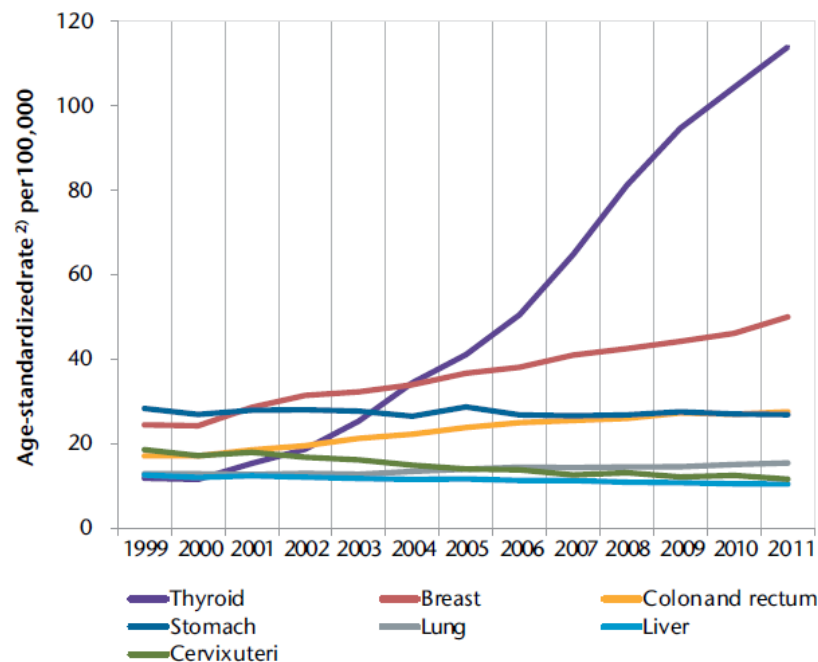
Active Surveillance Trails

- 10-year overall survival for the entire cohort was 68%
- 10-year prostate cancer specific survival was 97%
- Treatment required for 30%

Thyroid Cancer

Thyroid Cancer – South Korea

Figure 1 – Trend in age-standardised incidence rates for major cancers in Korean females

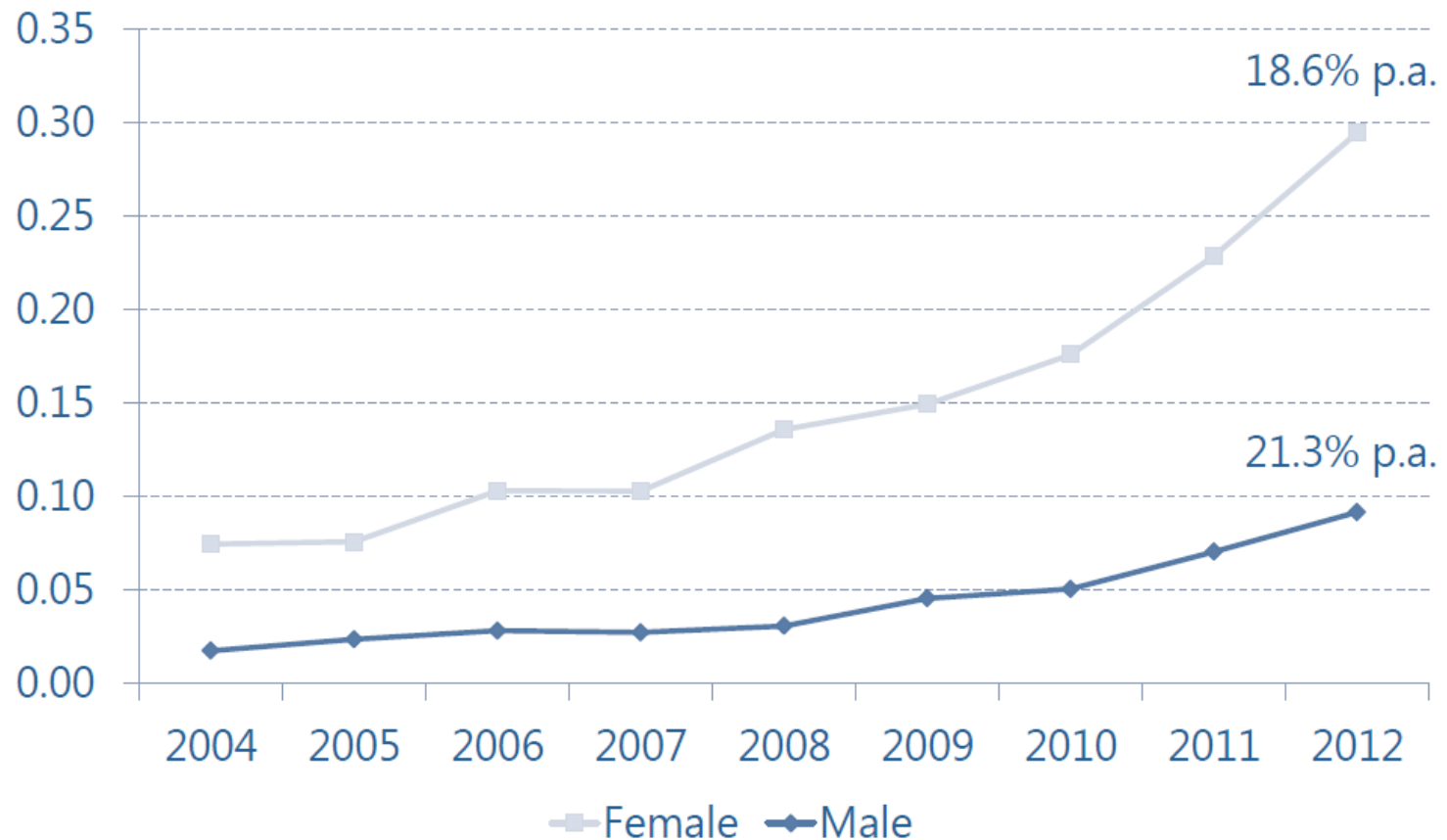


- Incidence increasing 20% each year
- Over 1 per mille

1) Major cancers selected based on 2011 crude rates

2) Age-standardized incidence Rate (ASR) uses "mid-year population in 2000" as standard population

Thyroid Cancer - China



Worldwide Annual Increase Rates in Thyroid Cancer

		Male	Female
Australia	2000-2007	4.0%	13.8%
Canada	2002-2008	8.4%	7.3%
UK	2002-2011	6.0%	5.7%
US	2001-2011	5.5%	
China (Shanghai)	2003-2007	14.4%	19.9%
South Korea	1999-2010	24.2%	23.3%

Note: population incidence

Thyroid Cancer

- Increase due to Papillary Thyroid Cancer (PTC).
- The size of these PTC tumours is predominately less than 2 centimetres (cm) in size with most below 1cm
- Many specialists label these small tumours “microcarcinomas”.

Thyroid Cancer

"The increase in cases coincided with claims that hospitals are forcing patients to undergo unnecessary treatment for profit. The five-year survival rate for thyroid cancer after diagnosis is close to 100 percent.

from fatal. In many cases, surgery is unnecessary."

people increased from 6.9 in 2000 to 81 in 2011. The death rate from the conditions, however, remained virtually unchanged at around 0.5.

Recent Thyroid operations
fell 35%

What caused jump in thyroid cancer cases?

 Listen

By Jung Min-ho, Jung Sung-eun

There has been a dramatic increase in the number of Koreans diagnosed with thyroid cancer in recent years. But is the growth, which has been significantly faster than the world average, a result of better health checkups or over-diagnosis?

Lee Jae-ho, a medical school professor at the Catholic University of Korea, is one of the experts who believe that healthy people are being harmed by the culture of greed at hospitals which create their own epidemics. Patients too frequently are being put under painful and costly treatment for small, slow-growing tumors that would never cause problems, he said.

"When crunching the number for every case out of 100,000 people, the thyroid cancer rate in Korea is now about 10 times larger than the world average," Lee said.

"The increase in cases coincided with technological development that enabled doctors to detect tumors they could not find by feeling the throat of a patient. The problem, however, is that these tumors are mostly far from fatal. In many cases, surgery is unnecessary."

The thyroid gland, located near the front of the throat, serves an important role in regulating the body's metabolism. Cancer in this area is now the most common type of cancer reported among Koreans.

According to the National Cancer Information Center, thyroid cancer cases per every 100,000 people increased from 6.9 in 2000 to 81 in 2011. The death rate from the conditions, however, remained virtually unchanged at around 0.5.

The numbers seem to support Lee's claims that hospitals are forcing patients to undergo unnecessary treatment for profit. The five-year survival rate for thyroid cancer after diagnosis is close to 100 percent.



Price vs Protection

- Most tumors have an excellent prognosis:

C73 Distribution in Korea - 2015 Estimate (Women)					
	Papillary	Follicular	Medullary	Anaplastic	
<1cm	63.7%	1.2%	0.7%	0.02%	65.7%
1-2cm	23.7%	2.1%	0.5%	0.04%	26.4%
2-4cm	5.5%	1.2%	0.2%	0.03%	7.0%
>4cm	0.6%	0.3%	0.03%	0.06%	1.0%
	93.6%	4.6%	1.4%	0.2%	100.0%

5-Year Survival	Distribution
100% - ε	98.73%
28%-93%	1.11%
7%	0.16%

Thyroid cancer is clearly overtreated:

~70% with complete thyroidectomy

vs.

~1.3% with dangerous prognosis

DEFINING A CONDITION

Defining a condition

Typical parts

- Heading
- Diagnosis
- Prognosis
- Evidence
- Exclusions

Objectives in setting a definition

- Clarity
 - Understood by experts – medical and insurance
- Up to date medical tests
 - But long term contract
- Sustainable pricing

Heading

- Clarity
 - Plain English
 - Clear not all cases may be covered
- Cancer – excluding less advanced cases
- Major Cancers

Diagnosis

UK Definition:

Any **malignant** tumour positively diagnosed with histological confirmation and characterised by the uncontrolled growth of malignant cells and invasion of tissue.


Malignancy is essential to the description of cancer; there are also benign tumours, which are not covered.

The term malignant tumour includes leukaemia, sarcoma and lymphoma except cutaneous lymphoma (lymphoma confined to the skin).

Diagnosis

UK Definition:

Any malignant **tumour** positively diagnosed with histological confirmation and characterised by the uncontrolled growth of malignant cells and invasion of tissue.



Tumour does strictly speaking not include non-solid cancers like leukaemia.

The term malignant tumour includes leukaemia, sarcoma and lymphoma except cutaneous lymphoma (lymphoma confined to the skin).

Diagnosis

UK Definition:

Any malignant tumour positively diagnosed with histological confirmation and characterised by the uncontrolled growth of malignant cells and invasion of tissue.

The term malignant tumour includes leukaemia, sarcoma and lymphoma except cutaneous lymphoma (lymphoma confined to the skin).

Leukaemia is the name given to blood cancers

Sarcoma is the name given to cancers of connective tissues such as muscle

Lymphoma is the name given to cancers of the lymphatic system

Evidence

UK Definition:

Any malignant tumour **positively diagnosed with histological confirmation** and characterised by the uncontrolled growth of malignant cells and invasion of tissue.

The term malignant tumour includes leukaemia, sarcoma and lymphoma except cutaneous lymphoma (lymphoma confined to the skin).

Do not need “Confirmed by a oncologist or pathologist” as histological confirmation already implies diagnosed by a specialist and hospital reports not always signed by oncologist or pathologist

Prognosis

UK Definition:

Any malignant tumour positively diagnosed with histological confirmation and **characterised** **by** the uncontrolled growth of malignant cells and invasion of tissue.

Important to explain what
“Malignant Tumour “means
Three parts

The term malignant tumour includes leukaemia, sarcoma and lymphoma except cutaneous lymphoma (lymphoma confined to the skin).

Prognosis

UK Definition:

Any malignant tumour positively diagnosed with histological confirmation and characterised by the **uncontrolled growth** of malignant cells and invasion of tissue.

“Uncontrolled” separates this process from normal cell multiplication and is a necessary part of the definition.

The term malignant tumour includes leukaemia, sarcoma and lymphoma except cutaneous lymphoma (lymphoma confined to the skin).

Prognosis

UK Definition:

Any malignant tumour positively diagnosed with histological confirmation and characterised by the uncontrolled growth of **malignant cells** and invasion of tissue.




Not benign

The term malignant tumour includes leukaemia, sarcoma and lymphoma except cutaneous lymphoma (lymphoma confined to the skin).

Prognosis

UK Definition:

Any malignant tumour positively diagnosed with histological confirmation and characterised by the uncontrolled growth of malignant cells and **invasion of tissue**.



The invasion into surrounding tissue is necessary and is a difference between malignant and benign tumours.

The term malignant tumour includes leukaemia, sarcoma and lymphoma except cutaneous lymphoma (lymphoma confined to the skin).

Exclusions

Singapore Definition

For the above definition, the following are excluded:

- All tumours which are histologically classified as any of the following:

Pre-malignant;

Non-invasive;

Carcinoma-in-situ;

Having borderline malignancy;

Having any degree of malignant potential;

Having suspicious malignancy;

Neoplasm of uncertain or unknown behavior; or

Cervical Dysplasia CIN-1, CIN-2 and CIN-3;

Not really required as definition states malignancy and invasion are required.
However these can all aid clarity

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Pre-malignant;

Non-invasive;

Carcinoma-in-situ;

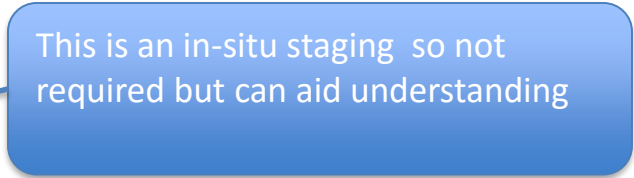
Having borderline malignancy;

Having any degree of malignant potential;

Having suspicious malignancy;

Neoplasm of uncertain or unknown behavior; or

Cervical Dysplasia CIN-1, CIN-2 and CIN-3;



This is an in-situ staging so not required but can aid understanding

Exclusions

Singapore Definition

- Any non-melanoma skin carcinoma unless there is evidence of metastases to lymph nodes or beyond;
- Malignant melanoma that has not caused invasion beyond the epidermis;
- All Prostate cancers histologically described as T1N0M0 (TNM Classification) or below; or Prostate cancers of another equivalent or lesser classification;
- All Thyroid cancers histologically classified as T1N0M0 (TNM Classification) or below;
- All tumours of the Urinary Bladder histologically classified as T1N0M0 (TNM Classification) or below;
- All Gastro-Intestinal Stromal tumours histologically classified as T1N0M0 (TNM Classification) or below and with mitotic count of less than or equal to 5/50 HPFs;
- Chronic Lymphocytic Leukaemia less than RAI Stage 3; and
- All tumours in the presence of HIV infection.

Non-melanoma skin cancers have a very high prevalence the prognosis is excellent.

Those which have affected lymph nodes or distant metastases are higher stage.

Exclusions

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- Chronic Lymphocytic Leukaemia less than RAI Stage 3; and
- All tumours in the presence of HIV infection.

This is an in situ melanoma as it has not invaded beyond the epidermis.

Common in other markets to exclude unless it has a thickness of 1mm as measured by Breslow – equivalent to staging T2N0M0

Small tumours account for half of melanomas and have excellent prognosis.

Exclusions

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Excluding minor prostate cancers with excellent prognosis. Other markets use a Gleason Score measure.

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- Chronic Lymphocytic Leukaemia less than RAI Stage 3; and
- All tumours in the presence of HIV infection.

No in-situ stage for thyroid cancer
all abnormalities are classified as
thyroid cancer.

Excluding T1N0M0 excludes minor
cancers.

Exclusions

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- All tumours in the presence of HIV infection.

Very early cancers that can be may not need any treatment just observation

Summary

- Cancer is complex
- There are lots of developments in detection, and diagnosis.
 - Detection is earlier
 - Survival improving

Summary

- Need to ensure we pay for only the cases where there is poor prognosis.

Summary

- This makes the definitions
 - Complex
 - Open to significant debate

Thank You



Exclusions

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- All Gastro-Intestinal Stromal tumours histologically classified as T1N0M0 (TNM Classification) or below and with mitotic count of less than or equal to 5/50 HPFs;
- Chronic Lymphocytic Leukaemia less than RAI Stage 3; and
- All tumours in the presence of HIV infection.

Gastrointestinal stromal tumours (GIST) were previously not completely recorded in cancer registries.

Current studies indicate very low case numbers

Small GIST with low mitotic (rate of division) limits the risk of a strong increase in the future.

Exclusions

Singapore Definition

- Any non-melanoma skin carcinoma unless there is evidence of metastases to lymph nodes or beyond;
- Malignant melanoma that has not caused invasion beyond the epidermis;
- All Prostate cancers histologically described as T1N0M0 (TNM Classification) or below; or Prostate cancers of another equivalent or lesser classification;
- All Thyroid cancers histologically classified as T1N0M0 (TNM Classification) or below;
- All tumours of the Urinary Bladder histologically classified as T1N0M0 (TNM Classification) or below;
- All Gastro-Intestinal Stromal tumours histologically classified as T1N0M0 (TNM Classification) or below and with mitotic count of less than or equal to 5/50 HPFs;
- Chronic Lymphocytic Leukaemia less than RAI Stage 3; and
- All tumours in the presence of HIV infection.

For non-solid tumours, there is no equivalent to an in-situ stage.

For CLL, both RAI and Binet staging is used.

RAI III requires anaemia and is more in line with other severity levels for cancer.

In markets where RAI is not common, Binet staging can be used instead. RAI III is comparable to Binet stage B or C.

Exclusions

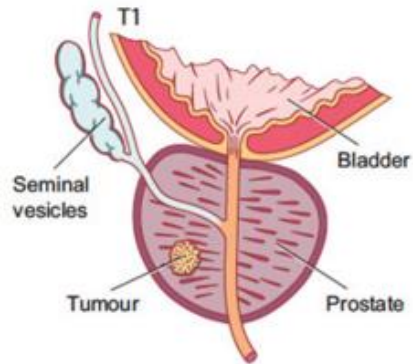
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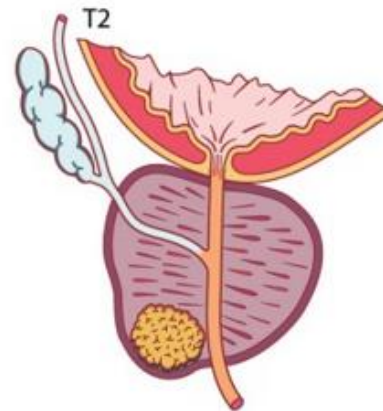
Karposi sarcomas occur in cases of severe immune deficiency and are nowadays almost exclusively seen in combination with an HIV infection.

Not appropriate for Australia

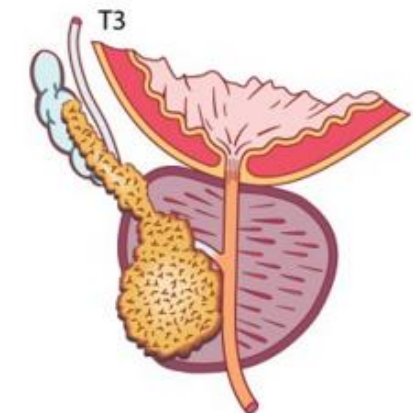
Prostate TNM Staging



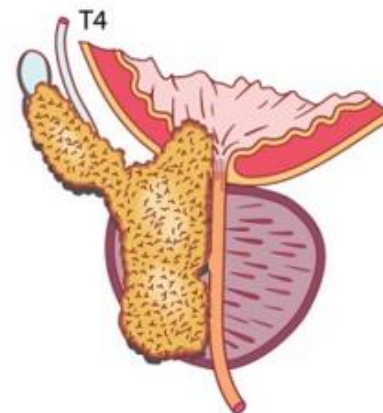
T1
The tumour or cancer cannot be felt by the doctor during examination



T2
The cancer can be felt but it has not spread outside of the prostate



T3
The cancer has spread outside of the prostate into nearby tissues



T4
The cancer has spread into nearby organs such as the bladder