NCD Media Training on Cancer

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NCDAK MEDIA TRAINING SESSION

CANCER

TODAY TALK

- Globocan data 2018
- Risk factors
- Treatment and care
- Prevention

Figure 2. 1: Projected trends of cancer and other disease entities to 2030 (Source: Kenya Health Policy 2014-2030)

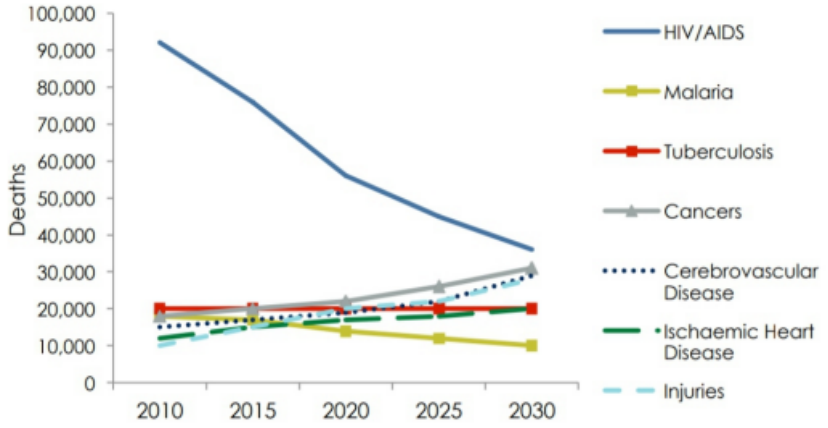
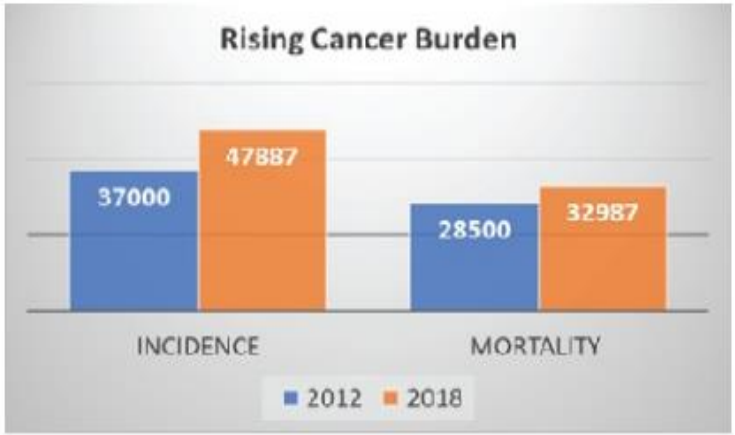
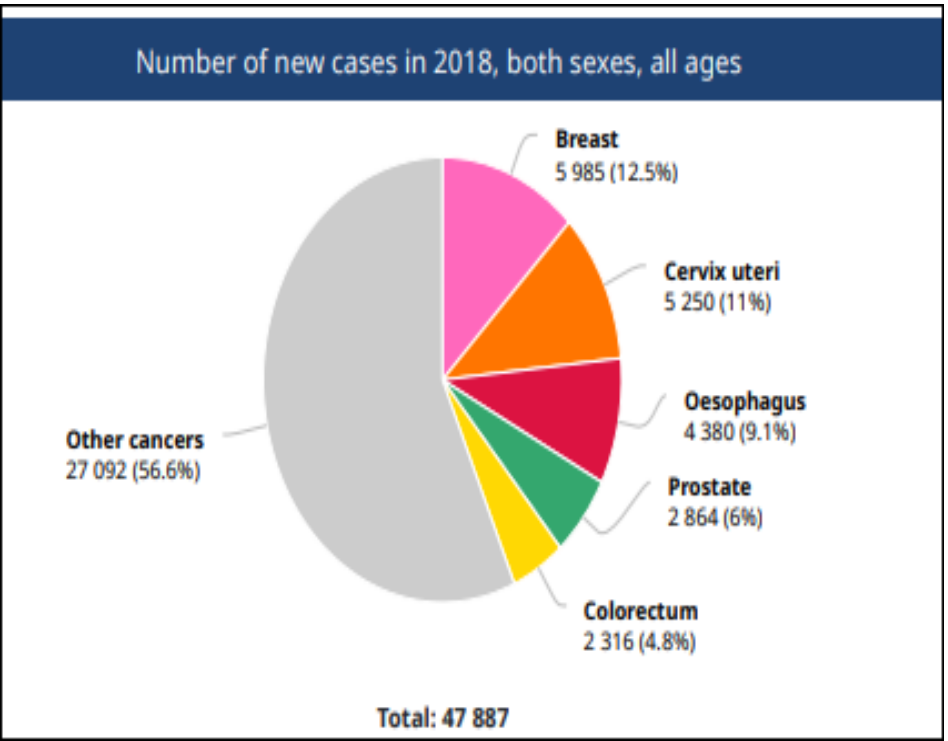
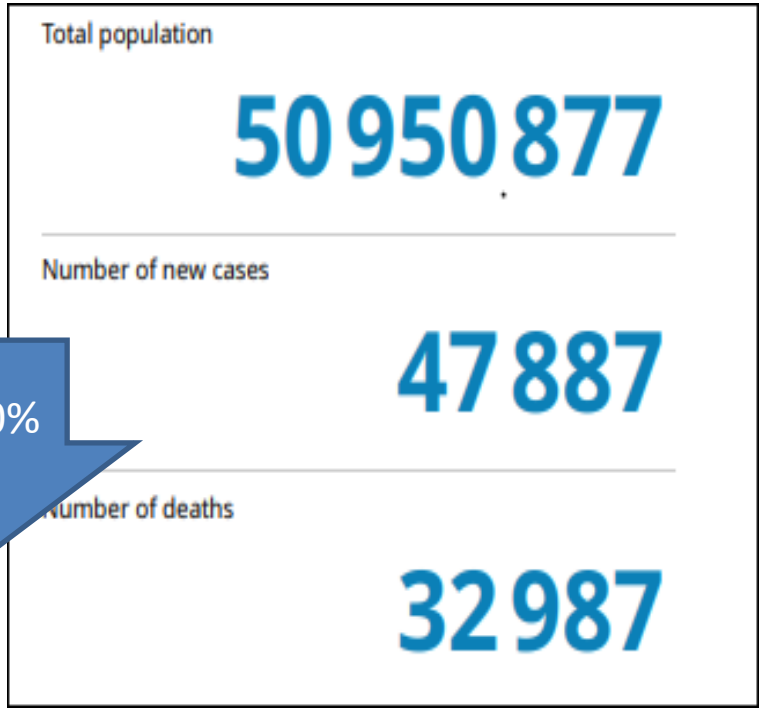


Figure 2. 2: Comparison of number of new cancer cases and cancer deaths between 2012 and 2018
(Source: GLOBOCAN 2012 and 2018)







Kenya

Source: Globocan 2018

Incidence, Mortality and Prevalence by cancer site

	New cases				Deaths				5-year prevalence (all ages)	
Cancer	Number	Rank	(%)	Cum.risk	Number	Rank	(%)	Cum.risk	Number	Prop.
Breast	5 985	1	12.5	4.54	2 553	3	7.7	2.01	13 246	51.68
Cervix uteri	5 250	2	11.0	3.73	3 286	2	10.0	2.64	10 963	42.78
Oesophagus	4 380	3	9.1	2.23	4 351	1	13.2	2.23	4 184	8.21
Prostate	2 864	4	6.0	3.69	1 663	5	5.0	1.73	4 750	18.76
Stomach	2 127	5	4.4	1.15	2 068	4	6.3	1.13	2 713	5.32
Non-Hodgkin lymphoma	1 952	6	4.1	0.57	1 209	8	3.7	0.42	4 119	8.08
Kaposi sarcoma	1 782	7	3.7	0.38	930	10	2.8	0.20	3 803	7.46
Leukaemia	1 699	8	3.5	0.45	1 311	7	4.0	0.41	3 845	7.55
Colon	1 354	9	2.8	0.66	937	9	2.8	0.46	2 350	4.61
Liver	1 346	10	2.8	0.65	1 331	6	4.0	0.65	1 190	2.34
Nasopharynx	1 103	11	2.3	0.34	732	13	2.2	0.28	2 614	5.13
Lip, oral cavity	1 032	12	2.2	0.52	805	11	2.4	0.44	2 121	4.16
Ovary	971	13	2.0	0.78	765	12	2.3	0.71	1 918	7.48
Rectum	849	14	1.8	0.42	458	18	1.4	0.23	1 567	3.08
Pancreas	735	15	1.5	0.38	719	14	2.2	0.37	536	1.05
Brain, nervous system	675	16	1.4	0.24	582	16	1.8	0.23	1 352	2.65
Lung	673	17	1.4	0.38	659	15	2.0	0.38	695	1.36
Multiple myeloma	607	18	1.3	0.29	501	17	1.5	0.25	1 051	2.06
Corpus uteri	604	19	1.3	0.67	322	20	0.98	0.38	1 438	5.61
Bladder	568	20	1.2	0.30	335	19	1.0	0.18	1 143	2.24
Thyroid	503	21	1.1	0.22	121	26	0.37	0.07	1 253	2.46
Gallbladder	426	22	0.89	0.27	279	22	0.85	0.18	500	0.98

Why cancer is a growing problem in Kenya/ Developing world:

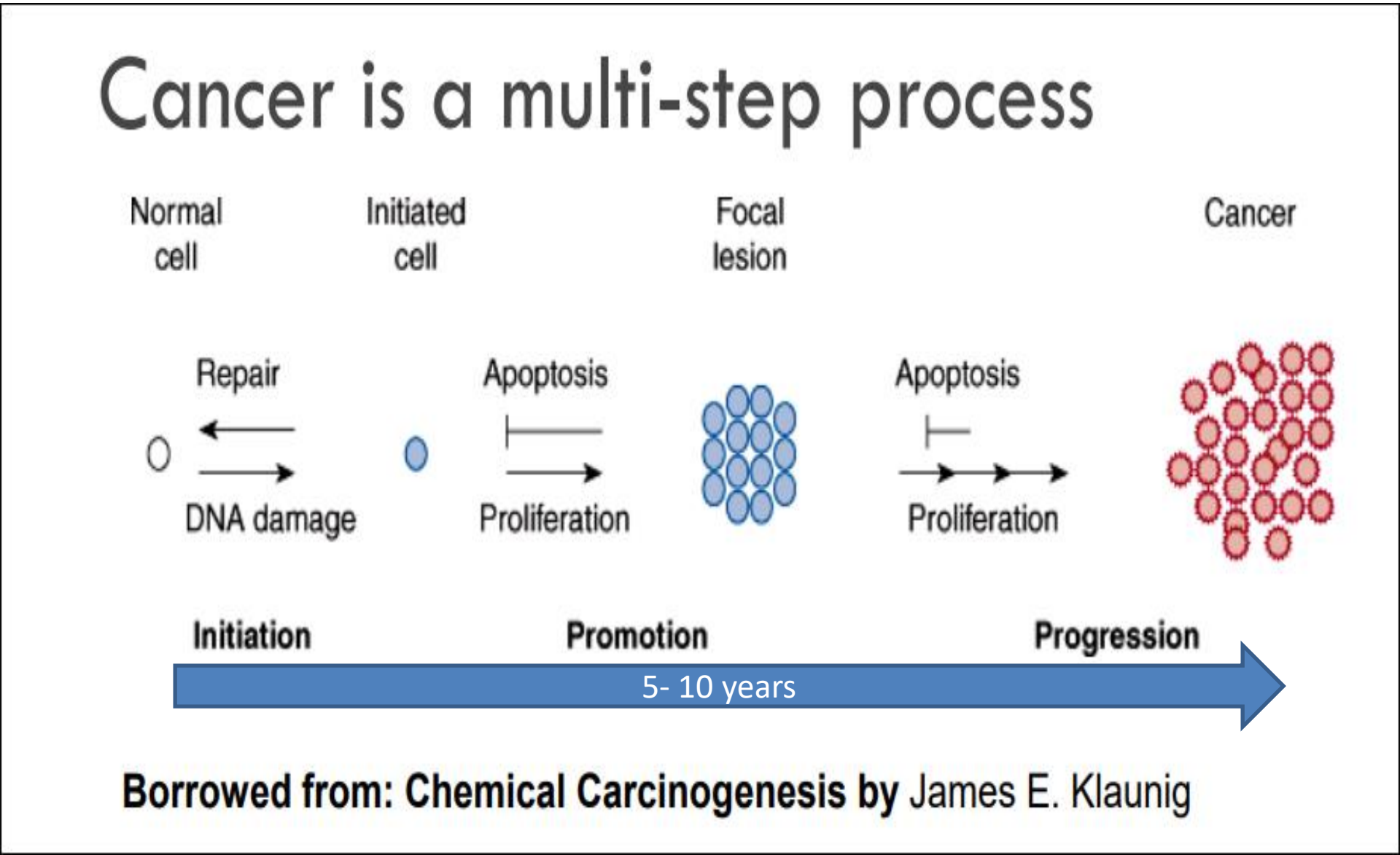
- Poor diagnostic – most cancers diagnosed at **stage IV**
- Lack of treatment options (too expensive/ inaccessible)
- Poor management (follow up)
- **Lack of proper knowledge…e.g. cancer as a disease!**

Cancer is
Not witchcraft!

Table 2. 2: Status of Human Resources for Cancer in Kenya

Cadre	Number	No./target population*	Recommended number
Medical Oncologists	16	0.033/ 100,000 population	1.8/100,000 population (ASCO)**
Oncology pharmacists	9		
Radiation/Clinical Oncologists	17	0.036/100,000 population	1/100,000 population (IAEA)***
Pediatric oncologists	4		
Gynecological Oncologists	9		
Surgical oncologists	10		
Hemato-oncologists	5	0.104/1,000,000 pop	5 hematologists/ 1,000,000 pop (ASH)****
Oncology clinical officers	34		
Oncology nurses	35	0.404/1000 patients	3/1000 patients (IAEA)
Medical physicists	10	0.12/1000 patients	3/1000 patients (IAEA)
Therapy radiographers/ Radiotherapy Technologists (RTTs)	27	0.31/1000 patients	7/1000 patients (IAEA)
Nuclear medicine physician	3		
Nuclear medicine technologists	3		
Palliative care physicians	3		
Palliative care nurses	328		

Development of cancer



Borrowed from: Chemical Carcinogenesis by James E. Klaunig

Carcinogenic dietary components common in Kenya

1. **High carbohydrate load (Staples) and** soft drinks
   -Elevates blood glucose, insulin and insulin-like growth factor 1


Ugali


Chapati


Wali


Matoke


Beans


soft drinks


chai

- **Tomor cells - thrive under high glucose**
- **Glucose, Insulin and growth factors favor prolonged tumor survival**

NB: Gluten – Has been associated with intestinal cancer, BUT even then, gluten only increases risk if a person has **celiac disease**, or true gluten intolerance.

2. Meats

- Kenya staple are usually served with various meats and/ or vegetables.
- Meat is either stewed or roasted


"nyama choma" or Nyam chom

MECHANISM OF CARCINOGENESIS

- High-temperature cooking methods generate compounds that contribute to carcinogenic risk!

- Charred meat[1] (HCAs and PAHs)
  - e.g. in **"nyama choma"**
- Highly processed meat[1]
- Red /organ meat[2A]

HCAs: heterocyclic amines

PAHs: polycyclic aromatic hydrocarbons;

Popular chomas
- Beef
- Goat
- Chicken

3. Reused frying oil

Deep fried foods are becoming increasingly common in Kenya with French fries, wheat products as mandazi and doughnuts, chicken and fish.

To cut costs: venders recycle the cooking fats/oils used in the deep frying process over and over

Repeated high temperature heating - carcinogenic substances which accumulation with every re-use

These includes:

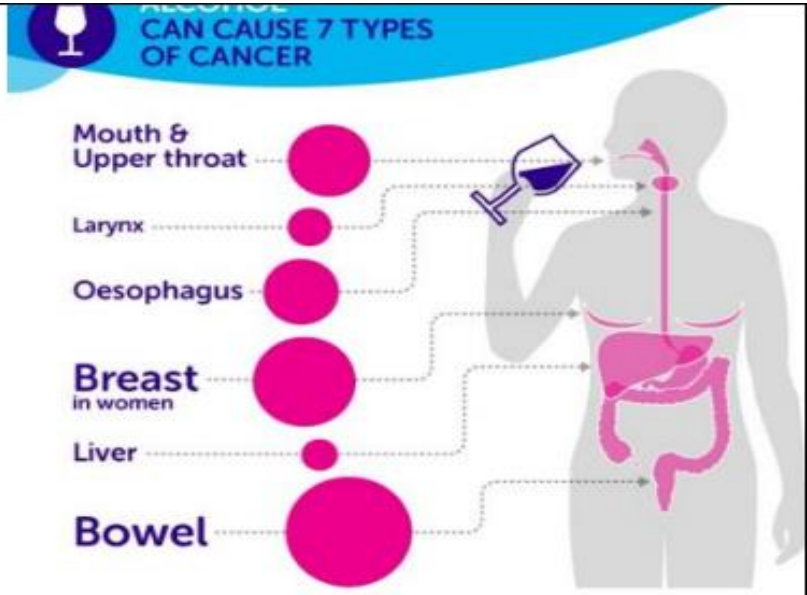
-PAHs (e.g. B[a]P)[1]
-Acrylamide[2A]
-Acrolein[3]

Mandazi

7. Alcohol consumption

MECHANISM OF PATHOGENESIS:

- Alcohol (Ethanol[1]) is metabolized by the enzyme called alcohol dehydrogenase (*ADH*) to acetaldehyde[1].
  - Acetaldehyde causes DNA mutations
  - Further, acetaldehyde results in the damage of the antioxidative defense system (*AODS*).
- NB: Alcohol is the same whether in wine, beer or spirits (CH_3CH_2OH)



http://www.cancerresearchuk.org/sites/default/files/styles/cruk_wide_resp_breakpoint_one/public/alcohol-infographic.jpg?itok=a6ktl-hi

Local brew

- Many impurities
- Intentionally adulterated e.g Kumi kumi

March 1, 2018

8. Salt

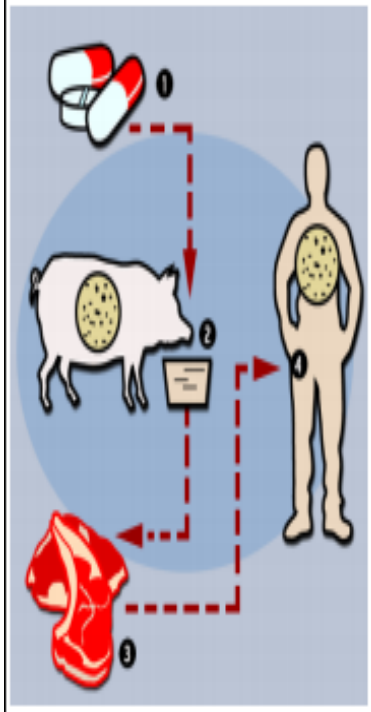
- MECHANISM OF CARCINOGENESIS
  1. Salt strongly enhances gastritis
  2. Salt also facilitates colonization of *H. pylori*
- The above are both risk factors for gastric carcinogenesis [65, 87, 99] as they lead to intestinal metaplasia, dysplasia, early gastric cancer and eventually advanced gastric cancer [180].

March 1, 2018

9. Antibiotics

Agricultural sources (Growth promotion, Disease prevention, Sick animal treatment)

- **MECHANISM OF CARCINOGENESIS:**
- https://www.nature.com/news/scientists-bust-myth-that-our-bodies-have-more-bacteria-than-human-cells-1.19136



Causes Dysbiosis - microbial imbalance on or inside the body.

- Microbiota and host form a complex **'super-organism'**
- The microbiome is often termed as the "forgotten organ"
- Altered microbiome may promote resistance to cell death — one of the hallmarks of cancers — and may trigger cancer-promoting inflammation.
- Altered microbiota may release of carcinogenic molecules;
  - genotoxins,
  - tumour-promoting metabolites.

10. Aflatoxins[1]

Due to poor storage of cereals (maize and wheat)

Fungal toxin

- Most of the research was in the 70's and 80's [109].
- Known risk factor for the development of Hepatocellular carcinoma (HCC)

- MECHANISM CARCINOGENESIS:
  - Aflatoxin causes DNA modification (mutation)
- Aflatoxin contamination could occur indirectly through consumption of animal products such as milk, blood and meat [63].
- In Kenya maize, wheat, rice are dietary staples and major sources of animal feed.
- Complicated by climate change (plant-harvest cycles)

11. Fermented /sour milk

- This is prepared through a fermentation process which yields alcohol and acetaldehyde
- The protocol for the production of **mursik** includes the addition of soot from burnt wood for purposes of flavor and as a preservative [118].
- CARCINOGENICITY:

  -Ethanol[1]

  -Acetaldehyde[1]

  -Soot[1] (in mursik)

  -Cholesterol[3]

Mursik

Environmental carcinogenesis (Kenya)

Asbestos roof

Aging - carcinogenic potential is exacerbated

Jua kali artisans

no sun block
no sun glasses

Snuff container

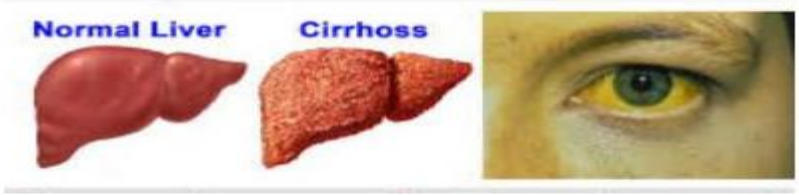
Filter or no filter don't matter

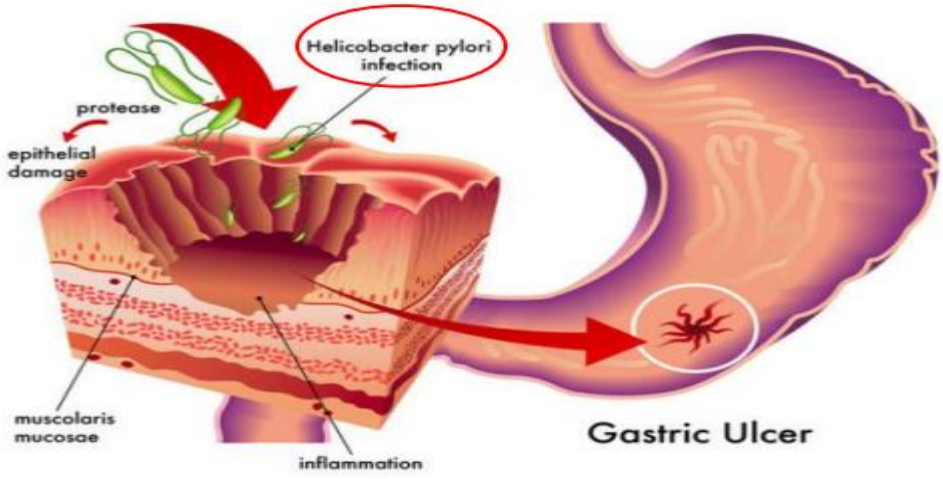
Poor waste management and disposal

- E.g. In Nairobi Kenya - the emergence of one of Africa's largest open dumpsite, the Nairobi's Dandora dump site
- Soil analysis: lead (Pb), mercury (Hg), cadmium (Cd), copper (Cu), zinc (Zn), arsenic (As), silver (Ag), iron (Fe), and chromium (Cr)
- Human exposure - derives from drinking water, air and food
- Arsenic **(As)** is a group 1 carcinogen while lead is group 2A
- Decomposition leads - volatile organic compounds (VOCs) e.g. formaldehyde[1][164].

Infectious agents and cancer

Hepatitis B virus



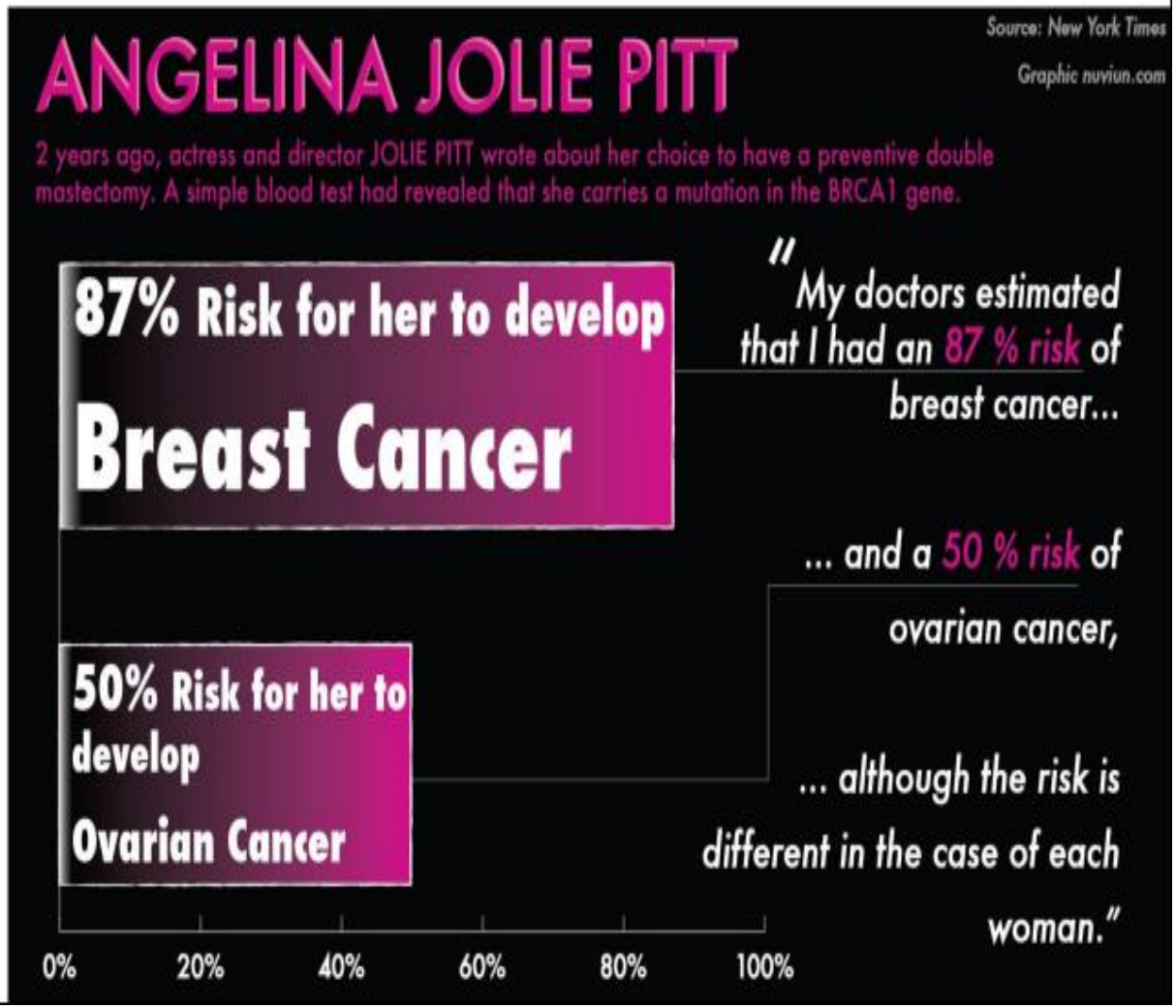


HPV AND CERVICAL CANCER

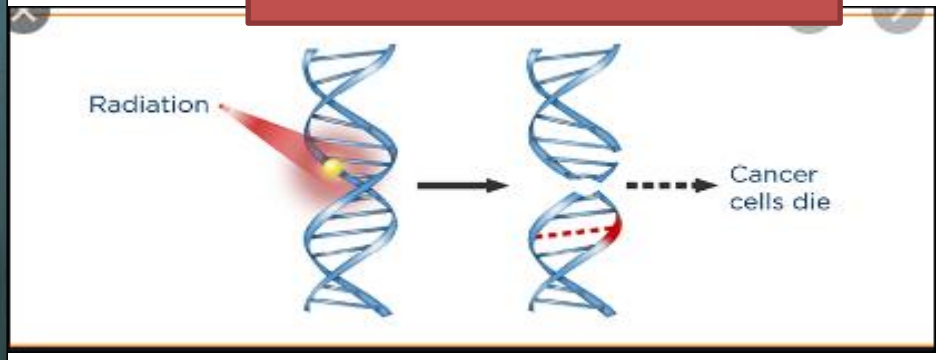
Untreated parasitic infections	• E.g. Schistosomiasis or bilharzias • one of the so called "neglected tropical diseases"	serious and irreversible lesions in the urogenital tract - may eventually lead to squamous cell carcinoma of the bladder	Bladder cancer 

HEREDITARY/GENETIC 5%

- On Feb 16, 2013 Jolie underwent double mastectomy
- Family tree warranted genetic testing for BRCA mutation
- Found out 87% of risk in developing cancer
- Mastectomy lowered this risk to under 5%



RADIOTHERAPY

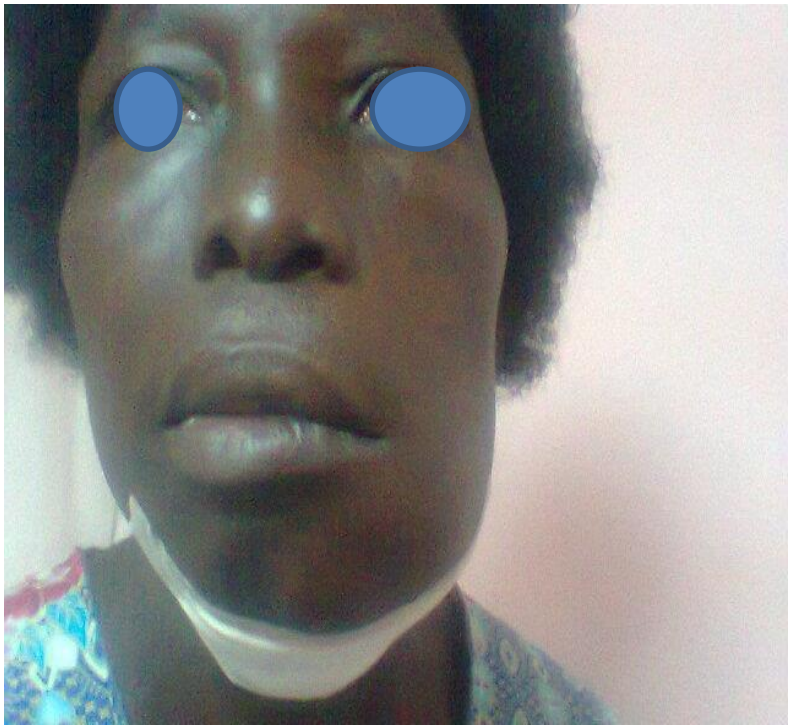


After Treatment

Multiple treatment
1to 35

Comprehensive Cancer Facility	Ownership	Number of Radiotherapy machines	Number of Brachytherapy machines	Deficit
Kenyatta National Hospital	**Public**	**3**	**1**	**1 LINAC; 1 brachytherapy machine**
Kenyatta University Hospital	**Public**	**1**	**0**	**1LINAC, 2 brachytherapy machines**
Moi Teaching and Referral Hospital	**Public**	**0 (Delivery ongoing)**	**0(Delivery ongoing)**	**-**
Aga Khan University Hospital	Private	2	1	
The Nairobi Hospital	Private	2	1	
Cancer Care Kenya-HCG	Private	2	0	
Texas Cancer Centre	Private	2	0	
Equra Cancer Centre, Eldoret	Private	1	1	
Nairobi West Hospital	Private	1	0	

CHEMOTHERAPY



CHEMOTHERAPY SIDE EFFECTS

- alopecia
  - Capecitabine
  - Vinorelbine
  - Carboplatin

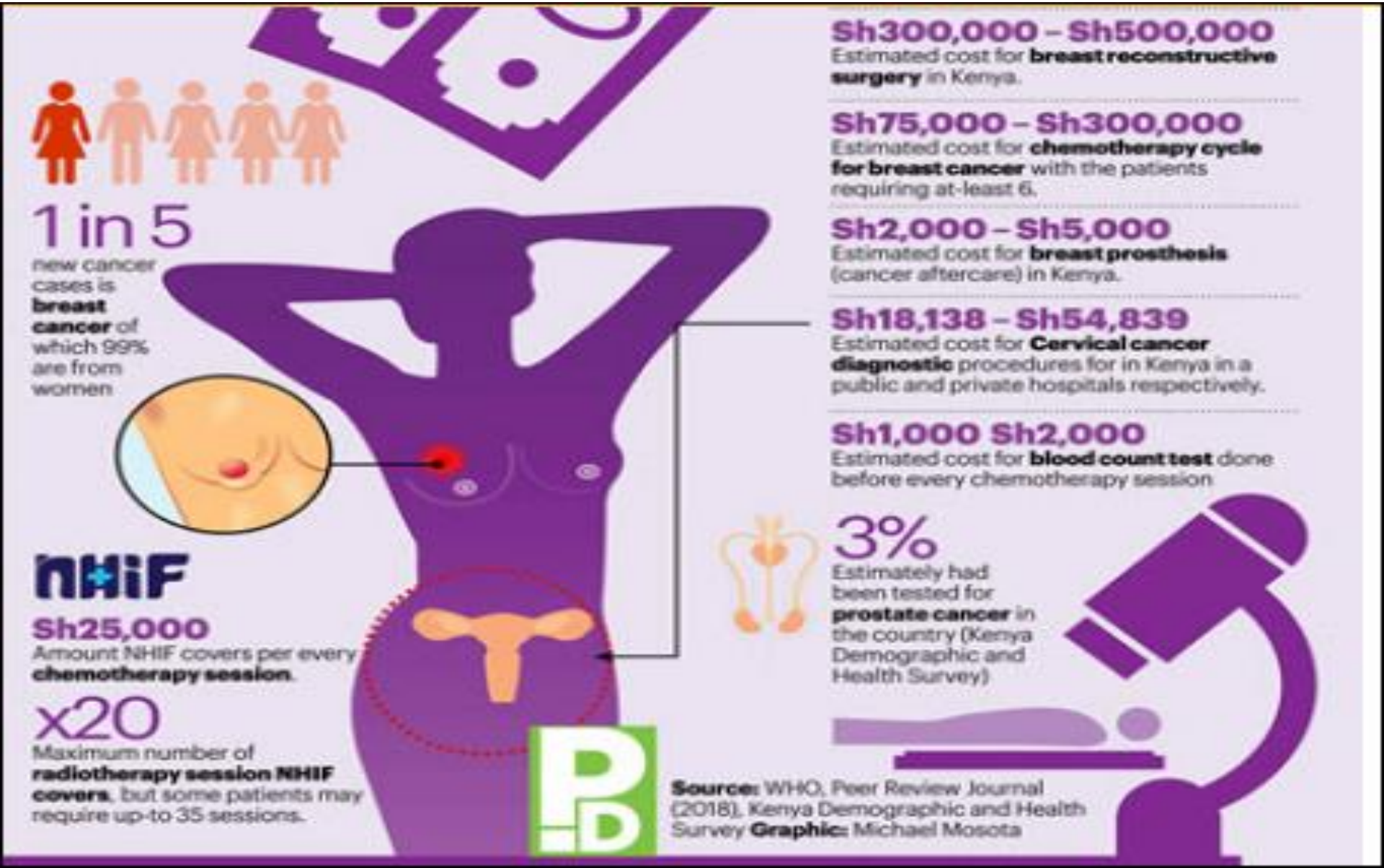
- GI symptoms
  - Taxanes
  - Gemcitabine

- neuropathy
  - Capecitabine
  - Anthracyclines
  - Gemcitabine

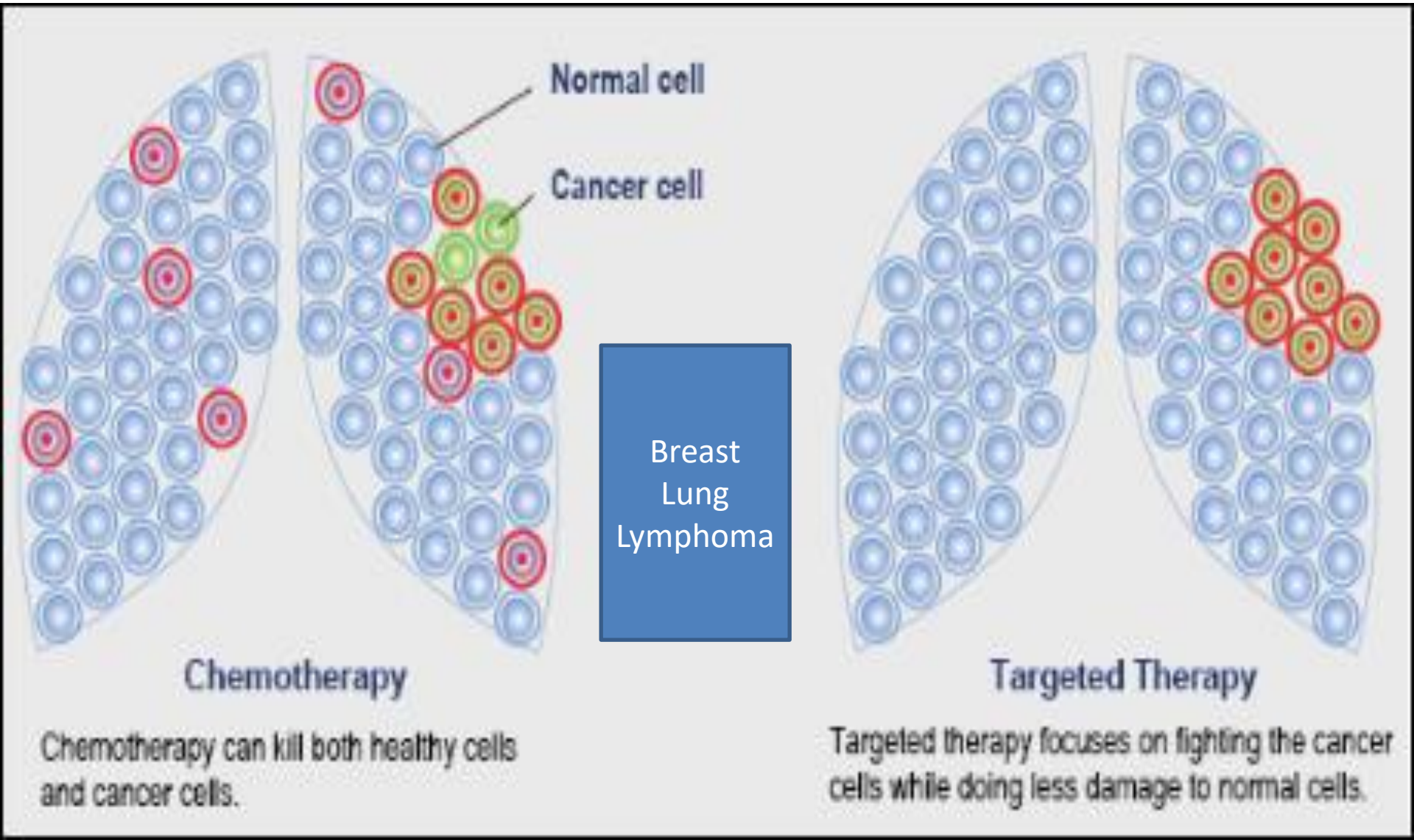
- myelosuppression
  - Taxanes
  - Capecitabine

- IVs
  - Capecitabine

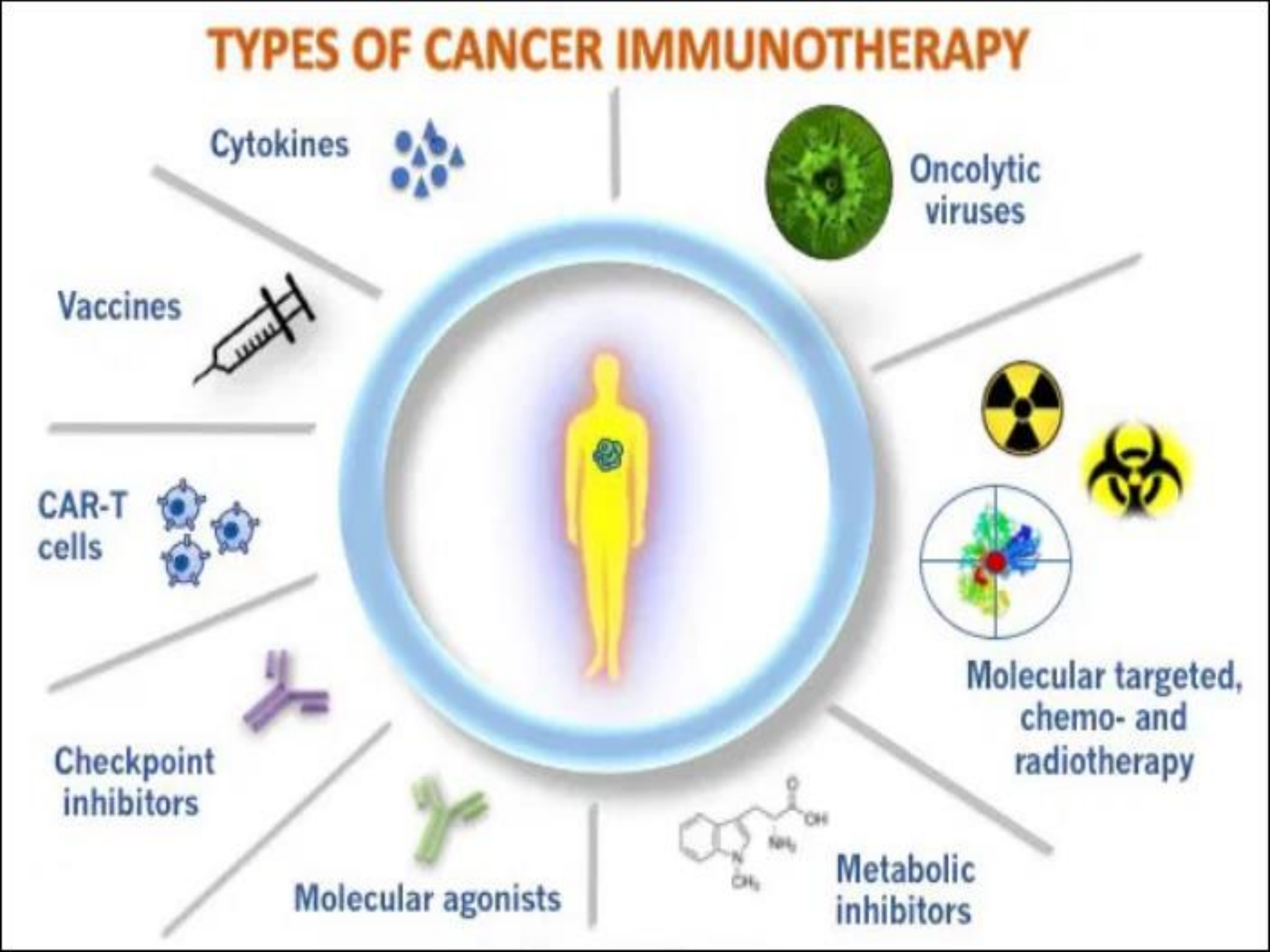
Cost of treatment of cancer



Targeted therapy



TYPES OF CANCER IMMUNOTHERAPY



PREVENTION

Organization of Cancer Health Service Delivery

Level of Care	Scope of Services
Level 1 (Community)	Health Promotion; Education and Awareness Creation on symptom recognition; Prevention, Palliative Care
Level 2(Dispensaries)	Health Promotion; Education and Awareness; Screening for breast and cervical cancer; Early detection; Palliative care
Level 3 (Health Centres)	Health Promotion; Screening for Breast, Cervical, Oral and Colorectal Cancer; Early detection; Palliative care
Level 4 (Sub county Referral/Primary Referral facilities)	Health Promotion; Screening for Breast, Cervical, Oral and Colorectal Cancers; Early detection; Treatment (Surgical, Supportive); Palliative care
Level 5 (County Referral/Secondary Referral facilities)	**Health Promotion; Screening; Early detection; Treatment (Surgical, *Chemotherapy in ten regional cancer centres, *Radiotherapy in 4 of the ten regional cancer centres by 2022, Supportive); Palliative care**
Level 6 (Tertiary Referral facilities)	KNH, MTRH, KUTRRH as National Centres of excellence (Hubs for the regional cancer centres)

THANK YOU