

Cancer treatments

- Animal – chemotherapy
- Film – radiotherapy
- Music – cancer treatment

What are the main treatments?

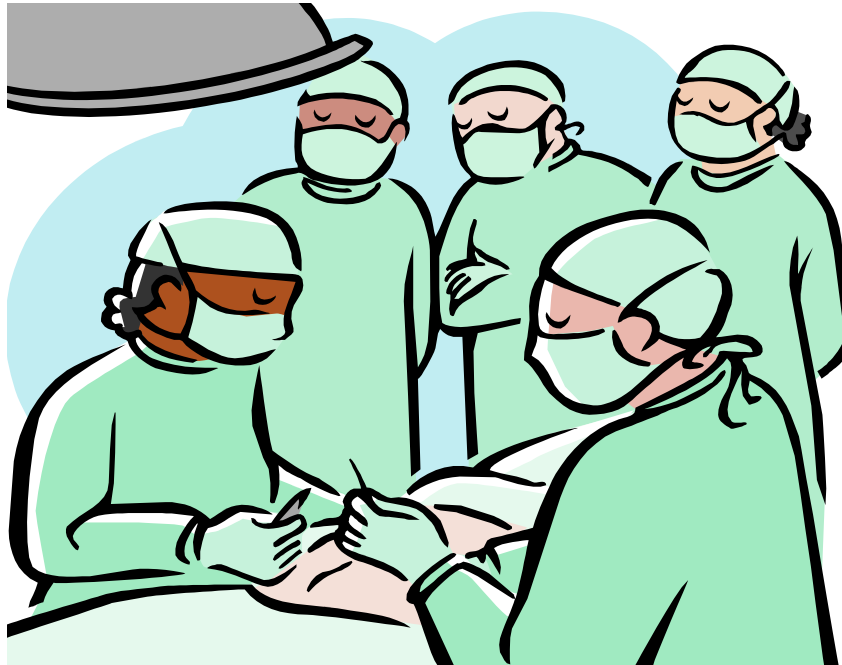
- Hormone therapy
 - Surgery
 - Chemotherapy
 - Radiotherapy
 - Targeted anti-cancer therapy (immunotherapy)
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- Now put them in the order that they were introduced

Date of introduction

- Surgery – 1846
- Radiotherapy – 1896
- Hormone therapy – 1930s (prostate)
1960s (breast)
- Chemotherapy – 1950s
- Immunotherapy – 1970s

Surgery

- What is surgery used for?



Surgery can be used to.....

- Make a diagnosis
 - Biopsy to see the type of cancer and how quickly it might grow (grade)
 - fine needle aspiration (FNA)
 - core biopsy
 - Incisional biopsy
 - excisional biopsy
 - Can be assisted by endoscopy, ultrasound, CT guided
- Stage cancer – size, extent and location of a cancer
- Treat cancer
 - If there is a complete resection/clear margins and it has not spread it can be a curative treatment
 - Regional lymph nodes can also be removed to look for cancer spread

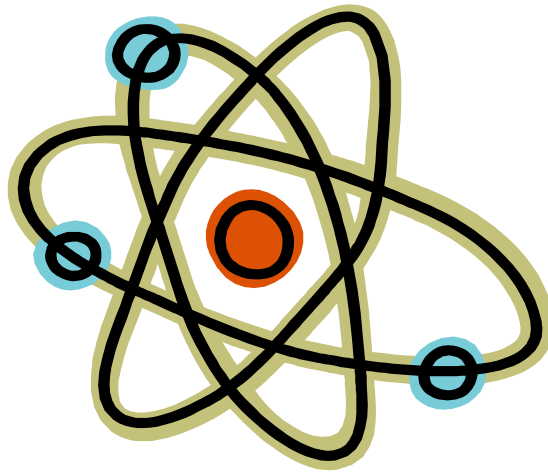
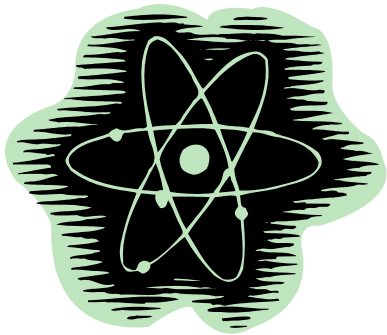
Surgery can be used to.....

- Debulk a cancer growth - remove some, but not all, of the cancer
 - done when complete resection is not possible as it could cause too much damage to nearby organs or tissues
- Reconstruct part of the body affected by cancer or its treatment
- Prevent or reduce occurrence in high familial risk of cancer
- Control symptoms or increase quality of life (palliative surgery)
 - Tumour pressing on nerves or other organs causing pain
 - Orthopaedic surgery to support bone affected by metastases
 - Remove obstruction e.g. bowel blocked by cancer growth

Use of surgery will depend on....

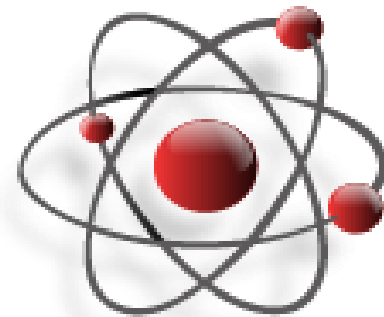
- Type of cancer
- The stage and location
- Aim of treatment
- General health
 - fitness for anaesthetic,
 - managing post-op rehabilitation
- Can be combined with other cancer treatments

Radiotherapy



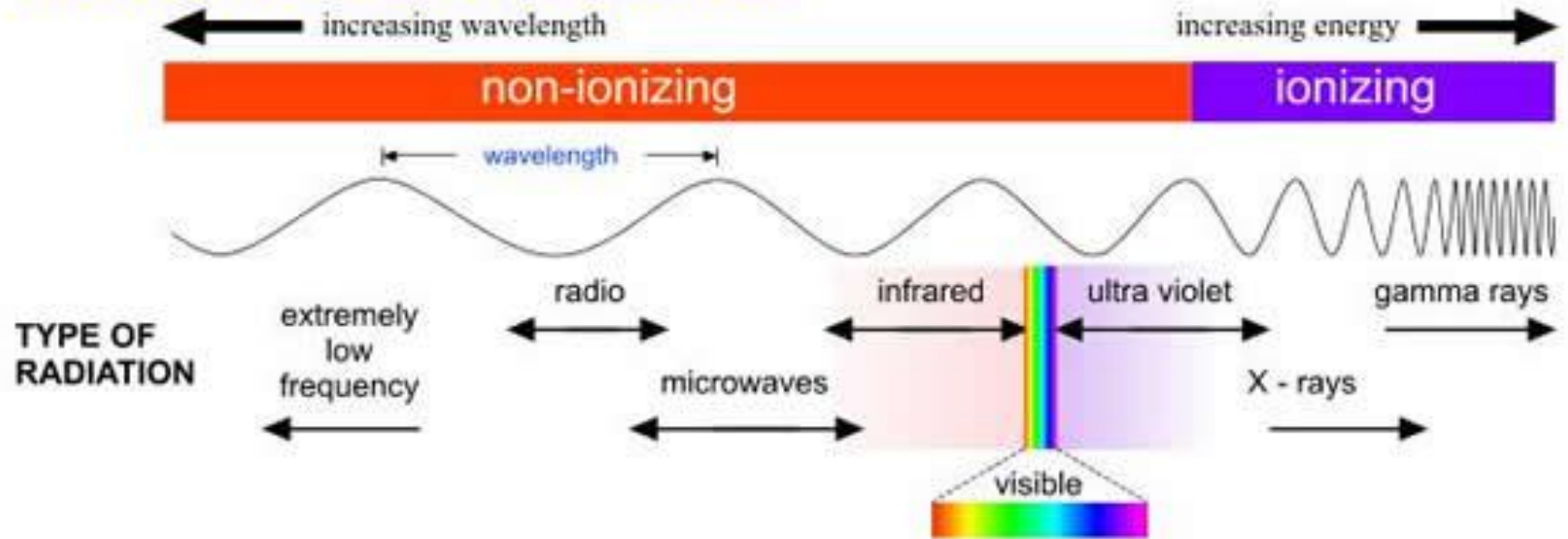
Radiotherapy

- Radiotherapy is a local treatment
 - Targeted to specific sites in the body
- It uses of ionising radiation to damage DNA



<https://www.youtube.com/watch?v=Zw0pHT47AAU>

THE ELECTROMAGNETIC SPECTRUM



SOURCES



Ionising radiation

- Radiation that is able to disrupt the chemical structure of the material that it passes through
- Molecules are basic building blocks for all living and non living things
- They are made of atoms
- Ionising radiation excites cell molecules and changes their atomic and molecular structure
- These changes cause damage to the cell
- The target of damage with radiotherapy is the cell's DNA
- Cells that are dividing are more prone to damage from radiotherapy

How is it given?

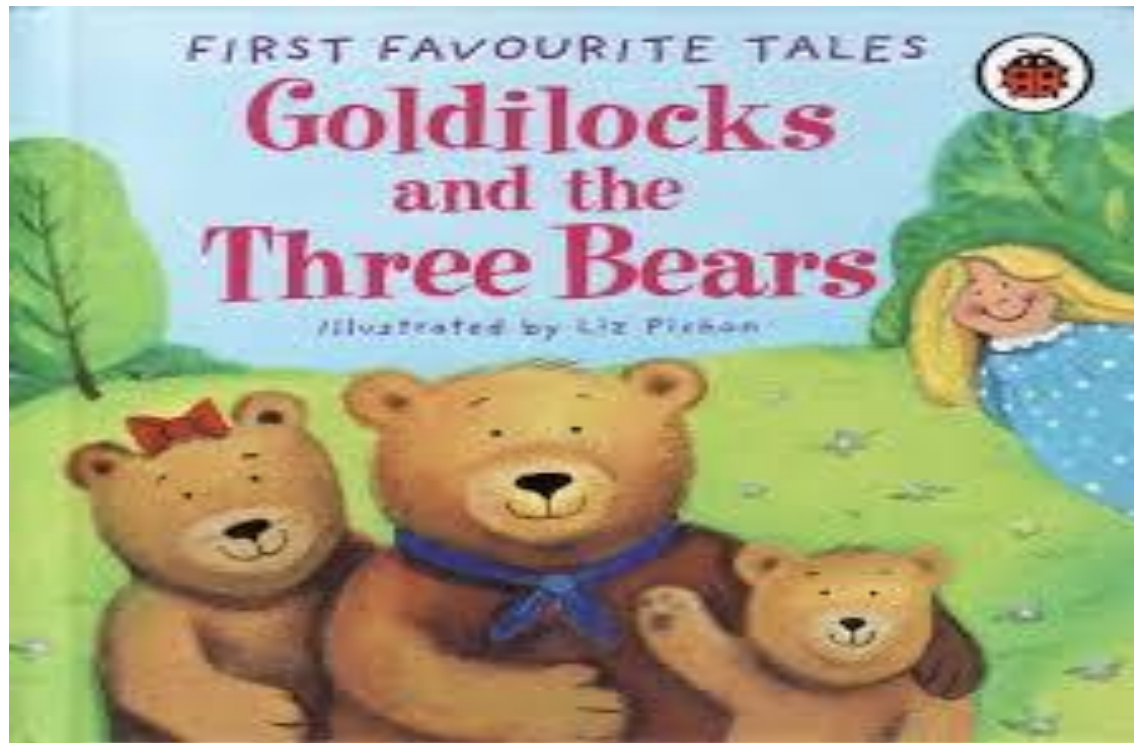
- External beam
 - Linear accelerator (LA)
 - Treatment delivered by therapy radiographers
 - Radiation is created by the machine
 - No radiation present when machine switched off
 - Patient does not become radioactive
- Brachytherapy
 - Sealed and unsealed sources
 - Sealed source – radiation is located in the source
 - Unsealed sources – patient is temporarily radioactive

Linear accelerator



The aims of radiotherapy treatment

Maximise the damage to cancer cells while minimising the damage to healthy cells



How is this achieved?

- Splitting the dose into small parts and giving a little each day
 - This is called fractionation
- Increases the chances of catching cancer cells when they are sensitive to radiotherapy
- Gives normal cells a chance to recover from sub-lethal damage



How is this achieved?

- Control of the treatment field
 - planning, simulation
 - accurate setting up and delivery of treatment



Careful positioning



Side effects of radiotherapy

- Severity related to the dose the patient receives
- Side effects are classified as
 - Acute and chronic
 - Local and systemic
- When do side effects occur?
 - Start to appear in the first 2 weeks
 - increase in severity over the course of treatment,
 - peak 2 weeks after treatment has ended
- Effects experienced by all patients
 - Fatigue
 - Skin reactions
- Other side effects are site specific

Support during treatment

Times for support

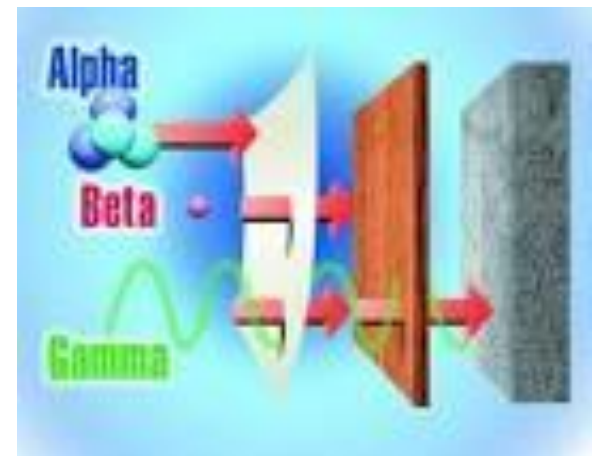
- Deciding to have treatment
- The first treatment
- The treatment experience
 - Arduous, requires patience, can be embarrassing
 - Inconvenience - travelling, delays, waiting
- Side effects
- Consequence of diagnosis (uncertain outcomes)

Radiation safety



- Use of ionising radiation very carefully controlled and regulated
- Measures in place to prevent exposure to radiation
- Staff are monitored if they are likely to be exposed on a regular basis
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Radiation protection – safety principles

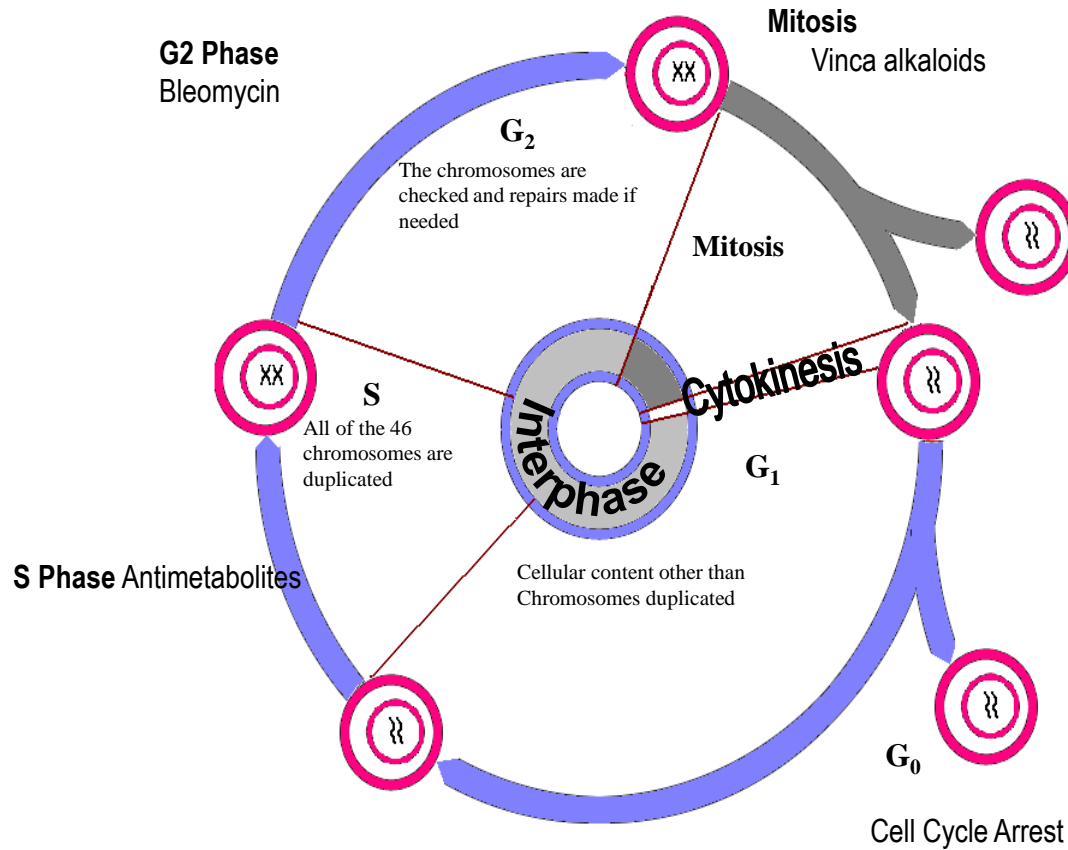


Chemotherapy

How does chemotherapy work?

- Chemotherapy is a systemic treatment
 - This means it can effect all the cells in the body
- Chemotherapy drugs stop cells from dividing or make it difficult for them to do so
- Different chemotherapy drugs do this in different ways
- Many work at particular points when the cell is dividing
 - This is often referred to as the cell cycle

The cell cycle



How does chemotherapy work?

- Some drugs work at specific parts of the cell cycle, others can work at any point
- Actions include
 - Stopping cell division (M phase) by fusing the old and new cells together
 - Preventing the products needed make the new DNA from getting to where they need to be
 - Directly damaging DNA

The aims of chemotherapy

Maximise the damage to cancer cells while minimising the damage to healthy cells, getting it just right!



How is this achieved?

- Giving combinations of drugs
 - Increased cancer cell kill if more than one type of drug is given – they attack in different ways



- Giving drugs with different side effects means you can get more impact and fewer side effects

How is this achieved?

- Cycles of administration
 - Giving a small amount each time
- Increases the chance of catching cells when they are sensitive to chemotherapy
- Allows healthy cells to repair



Side effects

- The incidence and occurrence of side effects is drug and dose related
- It is essential to know the regime specific facts

Side effects

- Bone marrow depression
 - Infection (neutropenia)
 - bruising/bleeding (low platelets)
 - red blood cells (anaemia)
- Nausea and vomiting
 - ematogenic potential
- Fatigue
- Sore mouth
- Hair loss
- Altered bowel habit



Hormone therapy

- A hormone is a chemical messenger
- It is produced in one part of the body and affects cells in another part
- Examples of hormones include insulin, steroids, thyroxine
- The main hormones involved in cancer and cancer treatment are oestrogen, testosterone and progesterone

Hormone therapy

- Some cancers are hormone dependant
- This means they use hormones to help them divide and survive
- Prostate and breast cancer can be hormone dependant
- Tests need to be carried out for each patient to identify if it is hormone dependant
 - If it is then hormone treatment can be started
 - This can also be called endocrine therapy

Types of hormone treatment

- Hormone treatments work by blocking the pathway through which hormones get to the cancer
- They work in one of two ways
 - Stopping or lowering the secretion of the hormone
 - Block the receptor on the cancer so the hormone can't get to it
- This can slow the growth or shrink the cancer for a time
 - Not a cure but can be very effective over a long period of time

How do hormone therapies work?

- Surgical removal of the organ that produces the hormones
 - Orchiectomy, Oophorectomy
- Analogues
 - Copy the hormone and fool the body into thinking it doesn't need to make and release any more
- Antagonists
 - Sit on the receptors and stop the hormone from getting to the cancer
- Hormone releasing blockers
 - Stop the organ that usually produces the hormone from making and releasing it

Side effects

- Hot flushes
- Reduced libido
- Impotence
- Osteoporosis
- Weight gain
- Fatigue



Targeted therapies

- New treatments in cancer therapy
- Number and use are increasing
- Is it the new frontier!!!!

Traditional chemotherapy



Targeted therapy



Working together to increase effectiveness



How do they work?

- They work in lots of different ways to
 - slow or stop tumour growth
- They can
 - Put up barriers to the signalling pathway that causes cancer cell division
 - Prevent the formation of tumour blood vessels
 - Stop the production of growth factors and enzymes tell the cells to divide
 - Alert the immune system to the cancers presence so it can be targeted

When are they used?

- They are often used when a cancer “over expresses” a particular growth factor
- Tests are done to see if the growth factor is being produced by the cancer
 - If it is then targeted immunotherapy treatment is given
- For example some breast cancer over-express a growth factor called HER2
 - Tests are done to assess the HER2 status to see if it is over-expressed
 - If it is then they may receive Herceptin as part of their treatment

Examples of targeted therapy

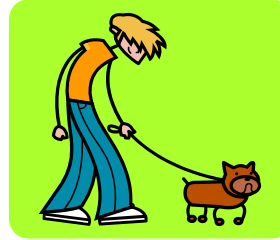
- They often end in the letter MIB or MAB!
- **Tyrosine kinase inhibitors (TKI's)**
 - Erlotinib, imatinib, sunitinib
- Monoclonal antibodies
 - Rituximab, Cetuximab, Bevacizumab
- Side effects
 - As many as there are different treatments!

The context of treatment

- The type and range of treatments patients receive will depend on many factors
- Terms you might hear
 - Curative and palliative
 - Adjuvant and neo-adjuvant
- Patient's experience of cancer and its treatment is shaped by contextual factors

Context of treatments

- The treatment environment
 - Welcoming, friendly and helpful
- Previous treatment
- Diagnosis/prognosis
- Knowledge and understanding
- Relationship with staff
- Symptoms and side effects
- Home situation
- Family and friends
- Stage in life
- Work and social life
- Financial situation
- Body image
- Past experience
- Physical functioning
- Other illnesses



- Thank you for listening.....
- Hope you found the journey interesting!

