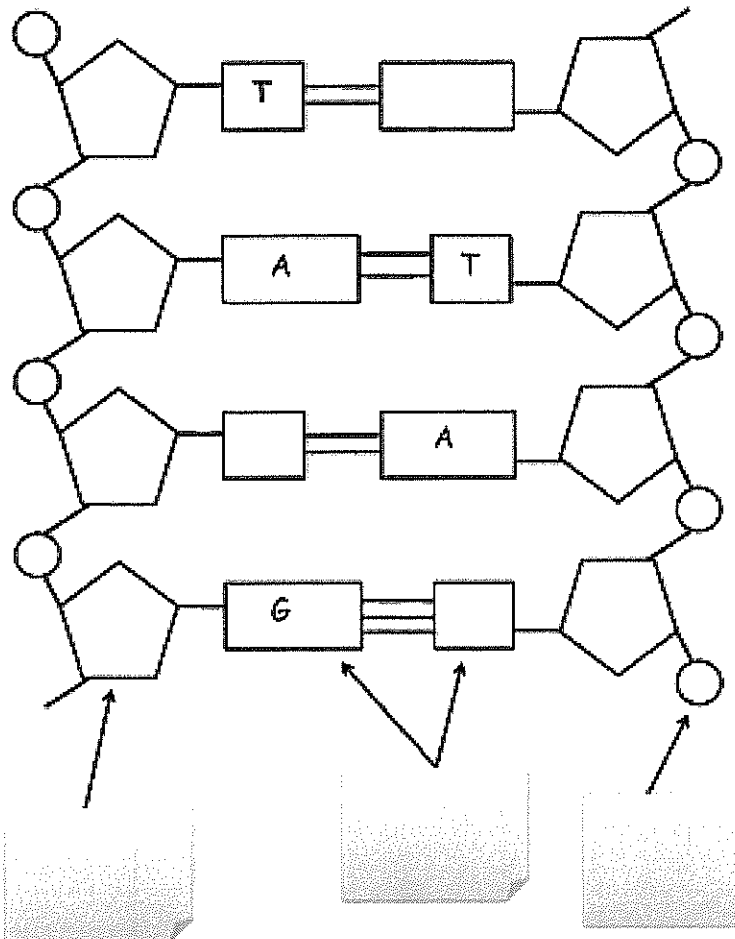


Year 11 PZ Revision

2.

The Structure of DNA



2. What else is needed to understand the DNA molecule?
3. List the steps in DNA replication.
4. Compare and contrast TRANSCRIPTION and TRANSLATION.

1. Label the different components of the DNA as 'base', 'phosphate group' or 'deoxyribose sugar'.
2. Add the missing complementary base pairs to the diagram.

5. Complete the following statements on EPIGENETICS.

(between, heritable, heritable, without, genes, silencing, not, sequence, genotype, fundamental, without, variation, multitude, some,)

Epigenetics refers to the study of _____ changes in our *genome* (the complete set of all our genes) that occur _____ *altering the DNA or genetic code*.

What's the difference between Genetics and Epigenetics?

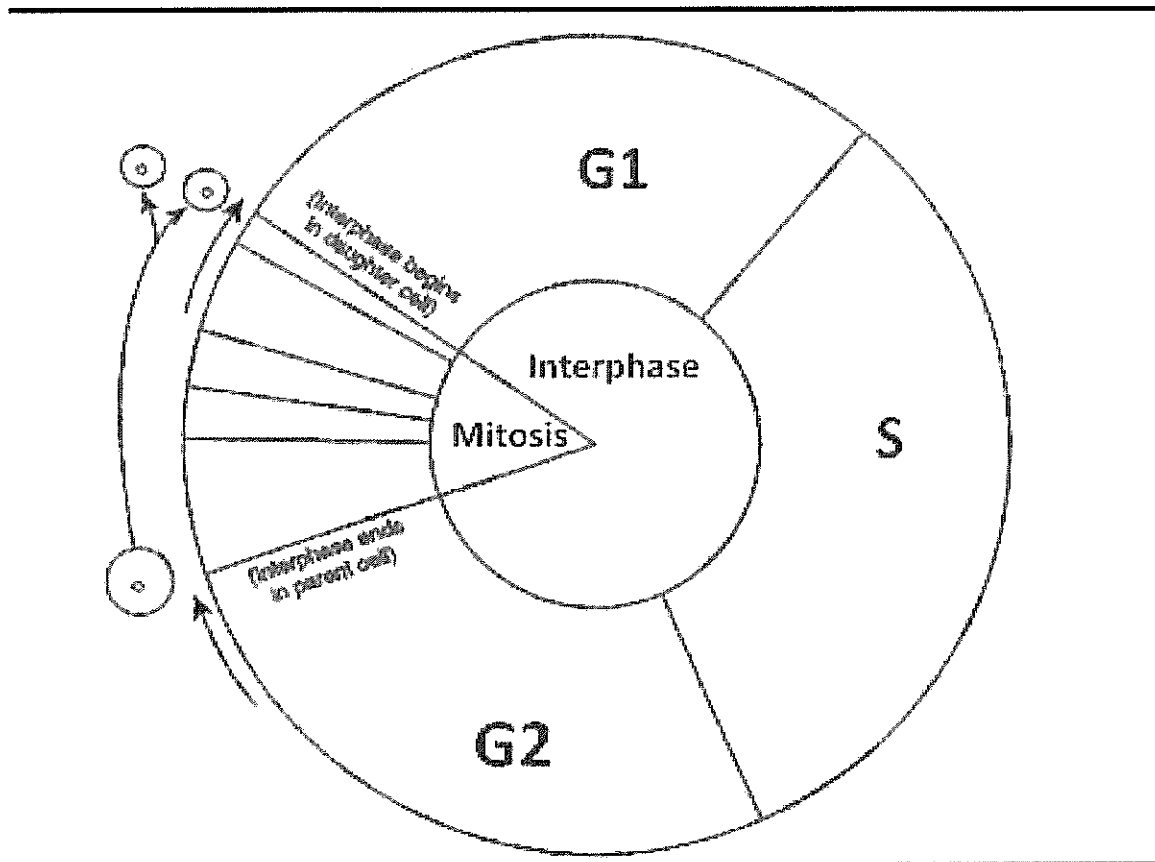
While *Genetics* is the study of _____, and variation in inherited characteristics due to differences in DNA sequence, *Epigenetics* is the study of _____ changes in gene expression that are _____ caused by changes in the DNA _____ – biological mechanisms that cause a change in *phenotype* (observed characteristics) _____ a change in _____ (genetic sequence).

Why is Epigenetics important?

Epigenetic gene regulation is _____ to the life of all eukaryotic organisms; it creates phenotypic _____ not only within an individual, but also _____ individuals. Epigenetic modifications allow cells with precisely the same genomes to adopt a _____ of phenotypes based on the activation of _____ gene regions and the _____ of others. In addition, epigenetic modifications that mediate genome function are responsive to and may be modified by environmental cues.

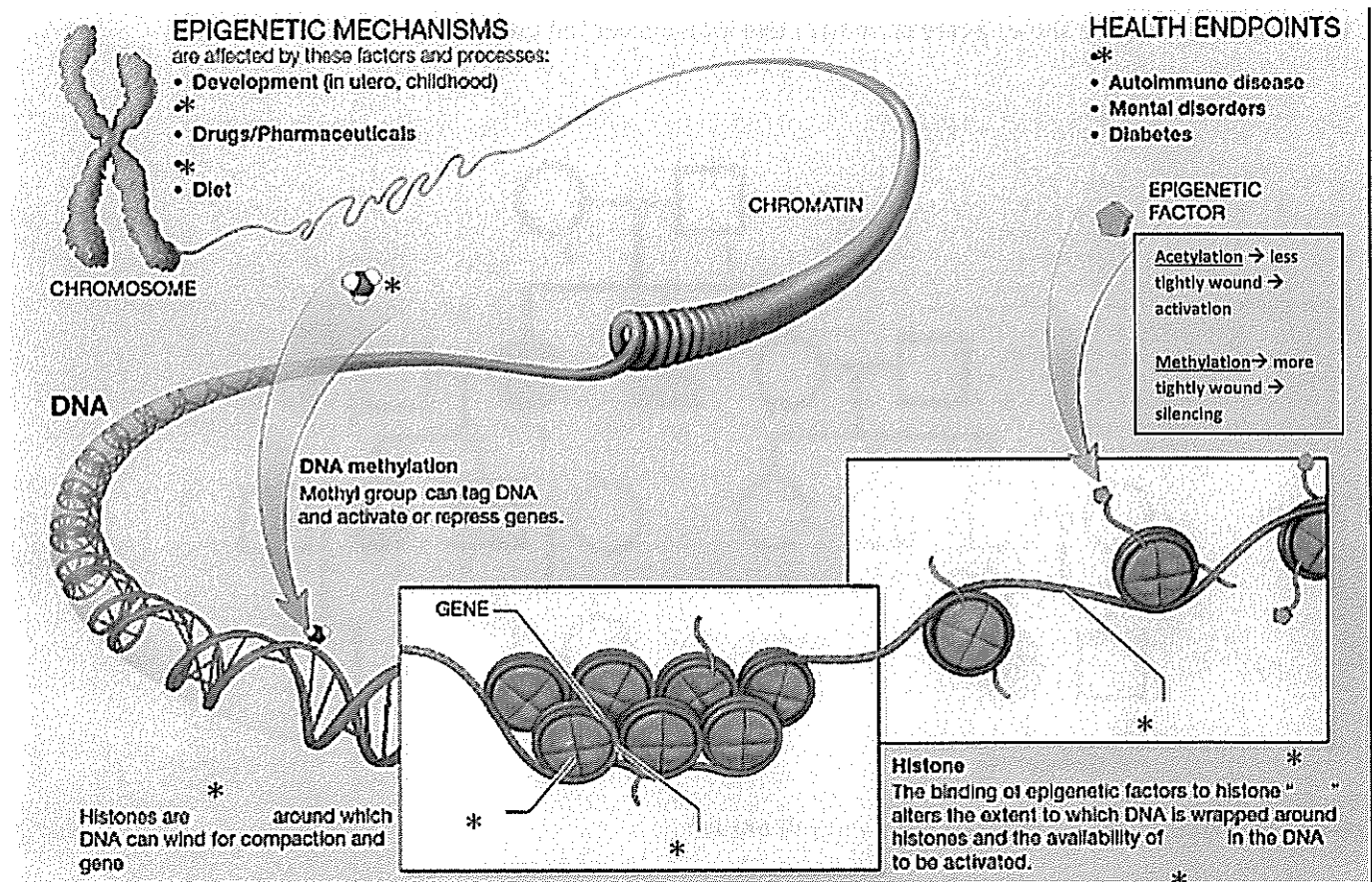
<http://epialliance.org.au/what-is-epi/>

6. Complete the following image on the cell cycle with as much information as possible.



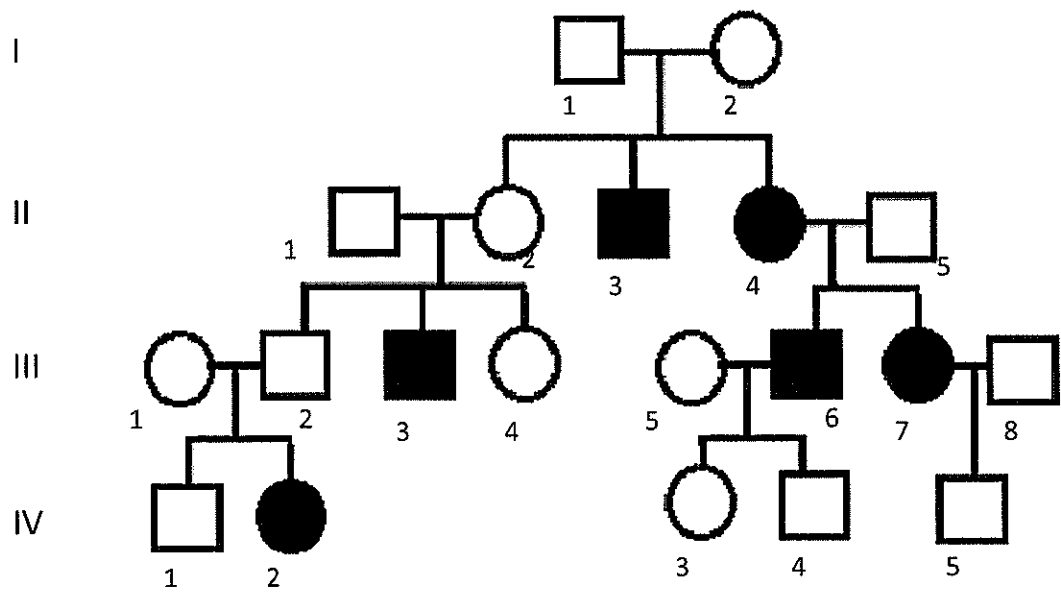
7. Compare and contrast mitosis and meiosis.

8. Fill in the following image that has some parts missing. (Found here – environmental chemicals, aging, methyl group, cancer, proteins, regulation, histone, histone tail, DNA inaccessible→gene inactive, DNA accessible→gene active, tails, genes



5. Epigenetic Histone modification is in the same place on DNA as Epigenetic Methylation. – true/false. Explain.
6. What 'islands' are involved in DNA methylation? Are these islands involved in activation or silencing genes?
7. If acetylation of Histones activates genes, and some enzymes have the ability to stop acetylation, could these enzymes be considered 'epigenetic gene promoters'? Explain your answer.
8. Given all the information above, how many basic ways are there where Epigenetics controls gene expression?
9. The normal human female karyotype is...
10. The normal human female karyotype is...

11. The following pedigree shows a rare condition. Use it to answer the questions below.



Is the condition dominant or recessive? Explain your answer.

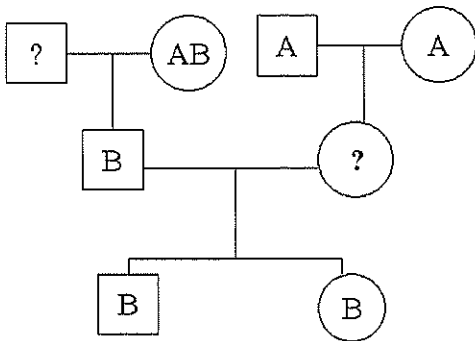
Prove that the condition is not x-linked.

5. Fill in the following punnet square with the correct parental genotypes.

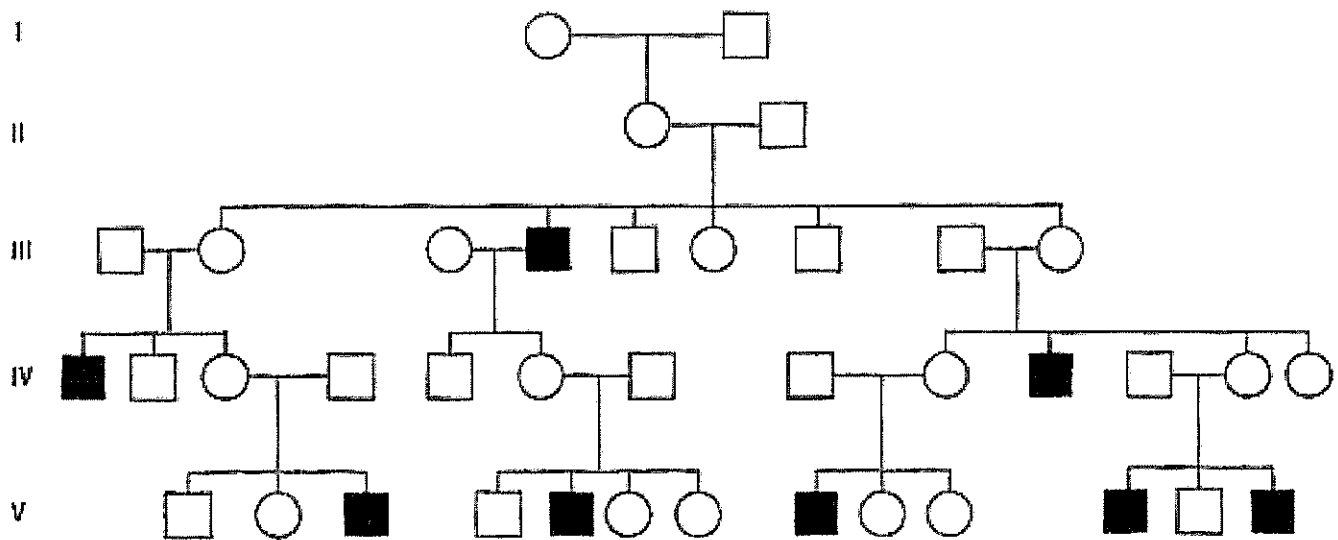
	Aa	aa
	Aa	aa

6. Which of the individuals in the above punnet square could this cross be based on?

7. There are 2 unknown individuals in the following pedigree. Give all the possible genotypes and phenotypes for each unknown individual.



8. What type of inheritance is most likely shown in the pedigree below? Explain why you have made this choice.



9. Indicate on the pedigree which individuals are carriers of the condition by labelling the shapes in the correct way.

10. Write the genotypes of all the individuals in the pedigree.

11. If individual, generation IV #3 is expecting another child, what chance is there that,

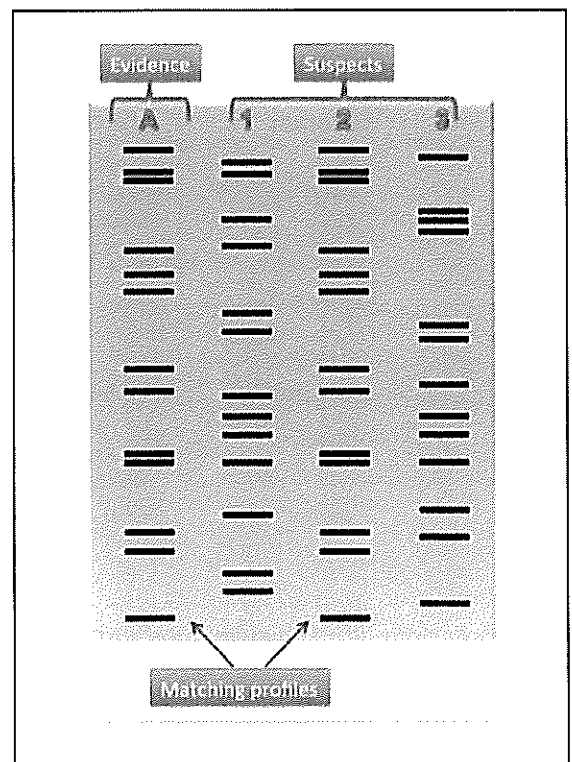
- It will be affected?
- It will be a male and have the condition?

12. Define DNA profiling

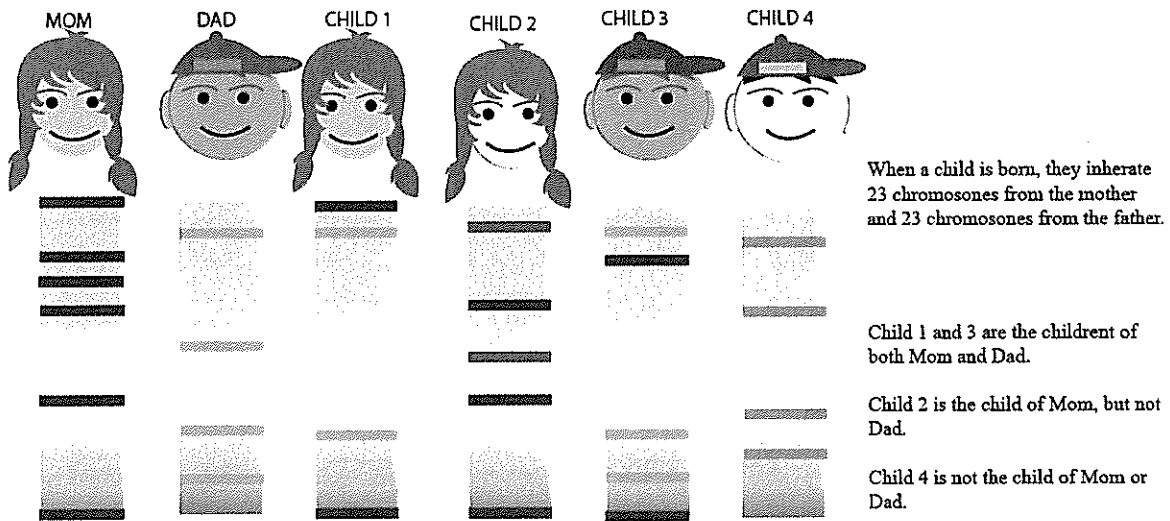
- The bars that you see on the gel right are short tandem repeats. What are STR's?
- Where are these particular 'bars'/STR's found?
- At crime scenes where DNA sources are left behind, the comparisons of STR bands must be the same as those in a suspect for them to be charged with the crime (apart from other evidence)! eg. the example right.

13. How is paternity testing

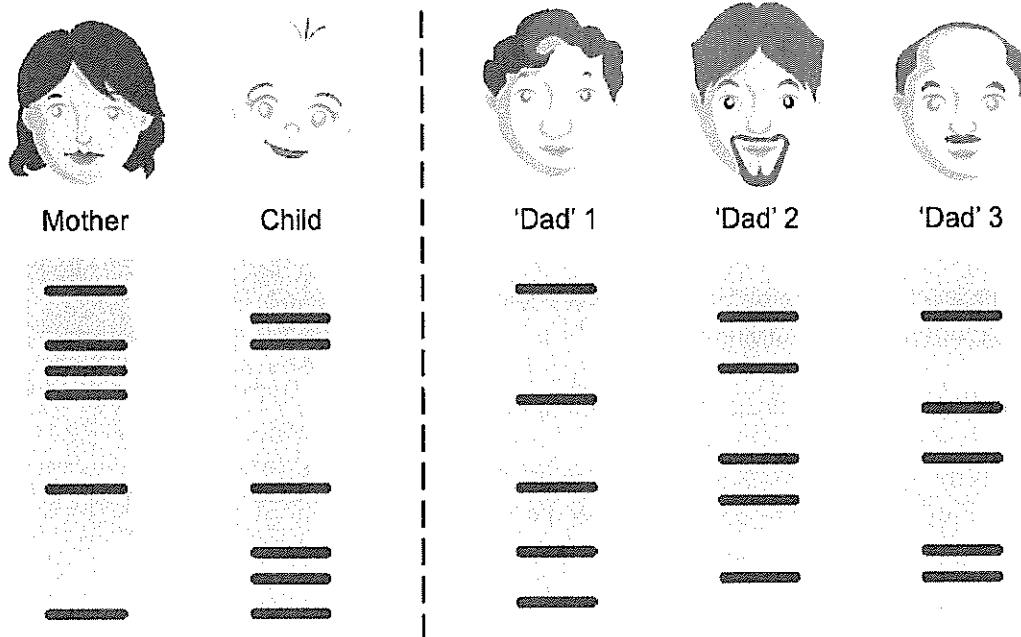
- Similar
- Different (use the images below - paternity matching)



DNA FINGERPRINTING



14. Which of the dad's is the baby's dad? (1. eliminate mum's bars...mum and dad may have some extra bars not in the baby BUT 2. dad must have all of the baby's bars!)



15. Cancer definitions (highlight definition and key word for each);

anemia: a condition in which the body has a low number of red blood cells.

benign: a term used to describe tumors that are slow-growing, noncancerous, and do not spread to surrounding tissue.

biopsy: the removal of a sample of tissue from the body for further examination. A biopsy gives doctors a closer look at what's going on inside to help make a diagnosis and choose the right treatment

breast cancer: a kind of tumor that develops in breast cells.

cancer: cancer is actually a group of many related diseases that all have to do with cells. Cancer happens when abnormal cells grow and spread very fast.

cancer cells: cells that grow and divide uncontrollably, which may spread quickly throughout the body, making someone sick.

carcinogen: substances that can cause cancer, such as tobacco smoke.

CAT scan (also called **computed tomography scan** or **CT scan**): a type of X-ray in which a machine rotates around the patient and creates a picture of the inside of the body from different angles.

chemotherapy: the use of special medicines to treat cancer. Several chemotherapy drugs are often combined to attack the cancer cells in different ways.

clinical trial: a study that evaluates new drugs or procedures. After these new drugs or procedures are tested in laboratories, clinical trials are conducted with human patients under strictly controlled circumstances. Such trials usually last 2-4 years and go through several phases of research.

drug resistance: this refers to when cancer cells don't respond to medicine or treatment.

gene: sections or segments of DNA that are carried on the chromosomes and determine specific human characteristics, such as height or hair color. Because each parent provides one chromosome in each pair, people have two of every gene (except for some genes on the X and Y chromosomes in boys because boys have only one of each).

gene therapy: a new and rapidly growing field of medicine that uses altered and engineered genes to correct specific disorders or genetic defects.

genetics: the study of the way physical traits and characteristics get passed down from one generation to the next. This is also called **heredity**. Genetics includes the study of genes, which have a special code called DNA that determines what you will look like and whether you are likely to have certain illnesses.

genetic counseling: involves studying family history, medical records, and genetics to evaluate and determine potential risk factors and disorders that might be inherited by a child. Genetic counseling can also provide clues as to how a disorder or disease can be prevented.

genetic testing: tests that determine whether someone carries genes for certain inherited disorders. Genetic tests are done by analyzing small samples of blood or body tissues.

hepatoblastoma: a type of liver cancer.

Hodgkin disease: a type of cancer called a lymphoma, which is a cancer of the lymphatic system.

immunosuppression: a condition that causes the body's immune system to decrease in effectiveness. Immunosuppression can be caused by disease or certain drugs (like chemotherapy).

immunotherapy (also known as biologic therapy): a treatment that stimulates the body's own immune system to fight cancer cells.

implant: in this case, radioactive material that is placed in or near cancer cells or a tumor to directly deliver radiation therapy

leukemia: cancer of the white blood cells, which are also referred to as leukocytes or WBCs.

locally invasive: a tumor that can spread to the tissues surrounding it.

lymphoma: cancer that starts in the lymphatic system, which includes the lymph nodes, thymus, spleen, adenoids, tonsils, and bone marrow.

magnetic resonance imaging (MRI): a safe and painless test that uses a magnetic field and radio waves to produce detailed pictures of the body's organs and structures.

malignant: another word for cancerous.

mammogram: a special kind of X-ray of the breast that helps doctors see what's going on inside.

mastectomy: a breast cancer procedure that involves removing the whole breast. This surgery is done when cancer cells have spread through the breast or into other parts of the body

medical history: information about a person's past health, their family's health, and other issues.

melanocytes: skin cells that produce melanin, the pigment that gives skin its color.

melanoma: a type of cancer that begins in the melanocytes, which are skin cells that produce melanin, the pigment that gives skin its color.

metastasis: the spread of disease (in this case, cancer) from the original site to other parts of the body.

mutation: any change in a gene.

non-Hodgkin lymphoma: a disease in which cancer cells form in the lymphatic system and start to grow uncontrollably.

oncogenes: genes that cause cells to grow and duplicate. Under certain circumstances, oncogenes can mutate and cause cells to grow abnormally, leading to cancer.

oncologist: a doctor who treats patients who have cancer; pediatric oncologists treat kids with cancer.

oncology: the diagnosis and treatment of cancer.

pathologist: a physician who specializes in diagnosing and classifying diseases. Pathologists study cell and tissue samples to identify diseases and conditions.

primary site: in this case, the organ or area in the body where cancer begins. Type of cancer is always identified by its primary site, even it metastasizes, or spreads. For instance, if cancer begins in the liver but spreads to other organs, it is still classified as liver cancer.

prognosis: an estimate of how well a person's treatment is working and how likely or unlikely it is that the cancer will come back.

protocol: a method or plan; in this case, the medications and treatments a patient will receive to help fight cancer.

radiation oncologist: a doctor who specializes in using radiation to kill cancer cells.

radiation therapist: a professional who is specially trained to operate equipment that delivers radiation therapy.

radiation therapy: also called radiotherapy, irradiation, or X-ray therapy, radiation is one of the most common forms of cancer treatment. In radiation therapy, high-energy radiation from X-rays, gamma rays, or other sources is used to kill cancer cells and shrink tumors. Radiation therapy prevents cells from growing or reproducing by destroying them.

radiologist: a doctor who specializes in reading and interpreting X-rays and scans.

risk factor: in this case, anything that increases someone's chance of getting cancer (for example, smoking).

sarcoma: a tumor that grows in the body's connective tissue, like muscle, cartilage, or bone.

secondary tumor: tumors made up of cells that have spread (metastasized) from the primary site to somewhere else in the body.

side effects: unwanted reactions or effects to medication or therapy. In cancer treatment, common side effects include hair loss and fatigue.

stem cells: primitive (early) cells found primarily in the bone marrow that are capable of developing into the three types of mature blood cells present in blood: red blood cells, white blood cells, and platelets.

stem cell transplant: a procedure that involves introducing stem cells (cells found primarily in the bone marrow from which all types of blood cells develop) into the body in the hopes that the new cells will rebuild the immune system.

testicular cancer: cancer that originates in the testicles. The most common cancer in males ages 15-35, testicular cancer is almost always curable if it is caught and treated early.

tumor: abnormal body cells grouped together in a mass or lump. Tumors are classified as benign (not cancerous) and malignant (cancerous).

ultrasound (also called sonography): ultrasound, or ultrasonography, is another way doctors can take a look inside the body. Instead of X-rays, sound waves are bounced off the kidneys, the heart, or other areas of the body.

urologist: a physician who specializes in diseases, disorders, and conditions of the urinary tract.

<https://kidshealth.org/en/kids/cancer-glossary.html>

16. what are the various types of tests/screening available for the most common types of cancer?
17. What are western societies doing to immunize against cervical cancer in females? How does this compare to the screening carried out before the immunization programme started?