

HSC Biology

Core 3 - Search for Better Health

Focus 1

 What is a healthy organism?

Discuss the difficulties of defining the terms 'health' and 'disease'.

- Disease:
 - Any condition that affects the functioning of any part of a living thing.
 - A state of impaired functioning.
 - Disturbance of homeostasis.
 - Can cover a wide range of conditions.
 - Dependent on individual's normal level of functioning.
 - Expected quality of life.

Eg.

 - A cut finger.
 - An ant bite.
 - Or a more obvious disease.
- Health:
 - The wellbeing of the organism.
 - Biological health:
 - Includes; being active, free from pain.
 - Psychological health:
 - Includes; feeling happy, thinking clearly.
 - Sociological health:
 - Necessary for; getting on with others, ability to work & relax.
 - A state of normal functioning.
 - Varies on a daily basis.
 - Not just absence of disease.
 - Varies with age, susceptibility to disease.
 - State of physical, social, mental wellbeing.

- All body functions, under control of our genes work together to maintain health.
- Difficulties defining '**health**':
 - Varies from day-to-day & with age.
 - Has many components.
 - Some are very subjective.
 - Definition varies from person to person.
 - Science definition vs. community definition.
 - Factors differ due to difference in context, beliefs, perception.
- Difficulties defining '**disease**':
 - State of impaired functioning/health.
 - Individual normal levels of functioning vary
 - Dependent on individual's expectations.
- Difficulties involving defining '**health**' & '**disease**'.
 - Possible for a person to be healthy & have a disease.
 - Terms have a differing social & scientific meaning.
 - Have many components.
 - Meaning of terms differs among people.

Outline how the function of genes, mitosis, cell differentiation and specialisation assist in the maintenance of health.

- Genes:
 - Unit of inheritance.
 - Control protein synthesis.
 - Ensure correct proteins produced.
 - Enable cellular processes to continue.
 - Provide codes.
 - Proteins needed for;
 - Growth.
 - Repair.
 - Assist maintenance of health.
 - Regulate cell cycle.
 - Limit growth & reproduction of cells.
 - Enzymes (produced from proteins):
 - Control all living processes.
 - Proteins.
 - Produced of codes from genes.
- Mitosis:
 - Cell division.
 - Produces identical cells.
 - Required for growth & reproduction.
 - Millions of cells produced daily by mitosis.
 - Enables genetic material to be copied correctly to form new cells.
 - New, genetically correct cells allow for growth & repair.
 - Organism may experience changes/mutations in genetic material.
 - Lead to;
 - Cell death.
 - Improper functioning.
 - Uncontrolled cell growth.
 - Healthy cells have cell cycle regulated.
 - *DNA repair genes* produce enzymes to ensure DNA accurately copied in 'S' phase.
 - If genes mutated, enzymes function incorrectly.

- Replicated chromosomes incomplete, fragments found in cell.
 - *Proto oncogenes & tumour suppressor genes*:
 - Complementary role in regulating cell cycle.
 - Proto oncogenes produce proteins:
 - Stimulate cell growth & division.
 - Tumour suppressor cells produce proteins:
 - Slow down, cease cell growth & division.
 - Balance of these two genes results in control of cell cycle.
 - Control breaks down if;
 - proto oncogenes/tumour suppressor cells damaged/mutated.
 - Mutated proto oncogenes:
 - *oncogenes*.
 - Cause uncontrolled cell replication.
 - Show genetic dominance.
 - Only 1 allele of pair mutated causes abnormality to be expressed
 - Mutated tumour suppressor genes:
 - Lose ability to control cell division.
 - Rate of cell division increases, uncontrolled growth occurs.
 - Tend to be recessive;
 - Both alleles must mutate for trait to be expressed.
- Cell differentiation:
 - Process undergone by cells after mitosis.
 - Each cell has genetic info required to produce a variety of specialised cells.
 - Cells differentiate & become specialised.
 - Specialised structure.
 - Specialised function.
 - Undifferentiated cells form tumours.
 - Many cells specialised in maintaining health.
 - Eg.** Blood cells to produce disease fighting antibodies.

Use Available evidence to analyse the links between gene expression and maintenance and repair of body tissue.

- Gene expression:
 - Obvious factor in development of a zygote to an embryo.
 - It can occur throughout the life of the organism.
 - Repair, maintenance of tissues.
- Gene expression involves;
 - 'Switching on' a segment of DNA to produce a polypeptide.
 - Manipulating polypeptide into required protein.
 - Transporting, manipulating protein to become component of cytoplasm or an enzyme (control production of other cellular molecules).
- Sufficient cellular materials & organelles allow cells to divide.
 - Cells may continue gene expression to develop specialised structures.
 - Differentiated for specific purposes.
- Specialised cells often lack ability to divide.
 - **Eg. Nerve cells;** not easily replaced.
- Stem cells have ability to divide, become specialised.