



Year: 11

Topic 4.6 DISEASE, DEFENCE AND TREATMENT

Knowledge and Understanding to be developed

This topic explores the relationship between health and disease. It includes the different causes of disease, how communicable diseases can be spread and how disease can be prevented. Natural defence mechanisms are covered; along with how diseases can be treated and how new medicines are developed.

There are also a number of topics where learners will appreciate the power and limitations of science and consider any ethical issues which may arise. The discussion of factors influencing parental decision with regard to vaccination will also develop the skills of recognising the importance of peer review of results and of communicating results to a range of audiences.

Maths skills; the translation of information between graphical and numerical forms, the construction and interpretation of frequency tables and diagrams, bar charts and histograms, the use of a scatter diagram to identify a correlation between two variables. When considering health data, learners should understand the principles of sampling

Key Terms to be learned this topic:

Pathogens protists communicable
aerosol phagocytes
lymphocytes antibodies
antitoxins infectious antigen
vaccination memory cells
immunity antibiotic

**Learning Objectives and Outcomes:
Students should be able to :**

- (a) the harmless nature of most micro-organisms, many performing vital functions; some micro-organisms called pathogens, cause disease
- (b) the fact that pathogens include micro-organisms such as bacteria, viruses, protists and fungi; the basic structure of a bacterial cell and virus
- (c) the types of organisms which can cause communicable diseases: viruses, bacteria and fungi; the means by which they can be spread: by contact, aerosol, body fluids, water, insects, contaminated food
- (d) the means by which the body defends itself from disease: intact skin forming a barrier against micro-organisms; blood clots to seal wounds; phagocytes in the blood ingesting micro-organisms; lymphocytes producing antibodies and antitoxins
- (e) an antigen as a molecule that is recognised by the immune system; foreign antigens triggering a response by lymphocytes, which secrete antibodies specific to the antigens; the function of antibodies
- (f) how vaccination can be used to protect humans from infectious disease; the factors influencing parents in decisions about whether to have children vaccinated or not
- (g) the fact that a vaccine contains antigens derived from a disease-causing organism; how a vaccine will protect against infection by that organism; how vaccines may be produced which protect against bacteria and viruses**
- (h) how after an antigen has been encountered, memory cells remain in the body and antibodies are produced very quickly if the same antigen is encountered a second time; how this memory provides immunity following a natural infection and after vaccination; the highly specific nature of this response**
- (i) the fact that antibiotics, including penicillin, were originally medicines produced by living organisms, such as fungi; how antibiotics help to cure bacterial disease by killing the infecting bacteria or preventing their growth but do not kill viruses
- (j) how some resistant bacteria, such as MRSA, can result from the over use of antibiotics; effective control measures for MRSA
- (k) how some conditions can be prevented by treatment with drugs or by other therapies
- (l) how new drug treatments may have side effects and that extensive, large scale, rigorous testing is required; the associated risks, benefits and ethical issues involved in the development of new drug treatments, including the use of animals for testing drugs and whether this is superseded by new technologies