

Teaching ideas for Chapter 11, *Human health and physiology II*

This is the largest topic in the HL core and one that most students find very interesting since it extends their work on disease and reproduction studied in Chapter 6, *Human health and physiology I*. There are many opportunities for practical work on movement and the kidney as well as microscopy and ethical issues related to health.

Practical activities

- Demonstrate the use of monoclonal antibodies using a pregnancy test kit. There are many sources of video demonstrations of how pregnancy test kits using HCG work and show positive or negative results. This is useful reinforcement both for 11.1 *Defence against infectious disease* and also 11.4 *Reproduction*.
- Vaccination is a topic that students can research in both a historical and a contemporary context. The discovery of the cowpox vaccine and its testing is interesting from a biological and TOK perspective, the WHO programme to eradicate polio raises interesting new questions, and the recent controversy over the MMR vaccine is useful to discuss in relation to the dissemination of scientific information and misinformation.
- Provide students with chicken feet or pig trotters for dissection to investigate the relationship of tendons, muscles, bones and ligaments. If some students prefer not to dissect, the option to observe provides valuable knowledge of joints.
- Supply students with a lamb's kidney for observation and dissection to reveal the gross structure and main regions of the kidney. Supply hand lenses and a little hydrogen peroxide, which can be dripped on to a half kidney to reveal the nephrons.
- Students can be provided with animal blood from a suitable supplier to investigate the plasmolysis of red blood cells in a series of different concentrations of saline solution. This practical work will reinforce understanding of osmoregulation and the importance of water balance in the blood.
- Students can investigate some medical problems associated with the kidney in a deductive practical. Supply artificial urine (made from weak tea or similar) to which certain substances have been added and ask them to deduce the kidney problem or environmental situation that might have caused the substance to be present in the urine. Protein indicates a filtration problem, glucose could indicate diabetes, and very concentrated urine could indicate dehydration while very dilute urine could result from diabetes insipidus or an excessive intake of water. These investigations provide an opportunity to review diabetes, and useful revision of Benedict's test and the Biuret test.
- Supply photographs or slides of an ovary and testis for students to study the microscopy of spermatogenesis and oogenesis. Animations to support students' drawing can be found at: www.yteach.co.uk
- Show students images of a fetus developing *in vivo* during pregnancy. The photographs produced by Lennart Nilsson are a good starting point and show detail of developing structures from a very early stage: www.lennartnilsson.com

Links to TOK

- The presentation of scientific information on vaccination and other medical matters can form the basis of useful discussion. It can be helpful to include both HL students with a greater understanding of vaccination and others with less knowledge to broaden the discussion.



Links to ICT

- Data logging can be used in the investigation of plasmolysis of blood cells. Colorimeters can be helpful.

Aspects of internationalism

- Students can consider the importance of international cooperation and organisations such as the WHO in vaccination programmes. An abundance of statistics and information on WHO initiatives can be found at:
www.who.int/en