

AS and A LEVEL

Delivery Guide

H022/H422

BIOLOGY B ***(ADVANCING BIOLOGY)***

Theme: Respiratory diseases and
treatments: 3.3.2

April 2015



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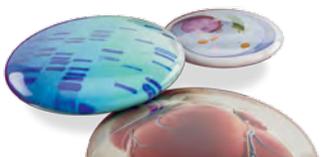
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Introduction

Delivery guides are designed to represent a body of knowledge about teaching a particular topic and contain:

- Content: A clear outline of the content covered by the delivery guide;
- Thinking Conceptually: Expert guidance on the key concepts involved, common difficulties students may have, approaches to teaching that can help students understand these concepts and how this topic links conceptually to other areas of the subject;
- Thinking Contextually: A range of suggested teaching activities using a variety of themes so that different activities can be selected which best suit particular classes, learning styles or teaching approaches.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resourcesfeedback@ocr.org.uk.

KEY



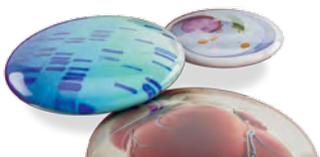
Click to view associated resources within this document.



Click to view external resources



AS Level content only

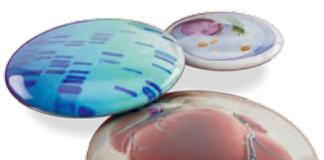


Curriculum Content

3.3.2 Respiratory diseases and treatment

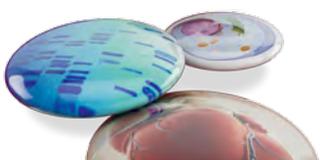
- | | |
|--|--|
| (a) the short-term and long-term effects of pollutants on the respiratory system | To include tobacco smoke, asbestos and fungal spores. |
| (b) the causes and symptoms of chronic bronchitis and emphysema (COPD), asthma and lung cancer | |
| (c) comparisons of acute and chronic diseases | |
| (d) the treatment of asthma | To include the use of beta agonists and steroids. |
| (e) the importance of plants as potential sources of medicinal drugs | To include the use of theophylline (from <i>Theobroma cacao</i>) in the treatment of COPD and asthma, topotecan (from <i>Camptotheca acuminata</i>) in the treatment of lung cancer, aspirin (from <i>Salix spp.</i>) and quinine (from <i>Cinchona spp.</i>). |
| (f) the design and use of clinical trials to assess the value of treatments | To include the role of each phase of a clinical trial and the importance of the recruitment and size of sample, randomisation, placebos and double-blind trials.
<i>M1.5 HSW9, HSW10, HSW11</i> |

Activities	Resources
<p>Recap of the structure and function of the respiratory system card game</p> <p>Students should already understand the structure of the respiratory system from 2.2.3. In order to recap the tissues of the respiratory system and their functions, a card game can be played where each of the tissues are named on separate cards and descriptions of their structure/function are outlined on other cards. The cards should be matched up as a 'memory game' task where they have to turn the correct matching cards over</p>	



Curriculum Content

Activities	Resources
<p>Researching plants for medicine</p> <p>Students should be divided into groups of four to research medicines which have been derived from plants. Each member of the group should be given one of the four drugs to research. They should complete a 'biography' for the drug that contains the following information: drug name, plant it is derived from, the condition it is used to treat, how it was discovered, any side effects of the treatment and any other relevant information such as dose, how it came to be manufactured etc. They should then present their fact sheet findings to the group in order to complete their own summary tables about each of the drugs. Students should then have an individual quiz about all the researched drugs to ensure they have paid close attention to their fellow students' presentations.</p>	
<p>Sorting out lung disease</p> <p>A card sort should be made of the mechanisms and symptoms of bronchitis, emphysema and lung cancer. Students should sort these into each of the three diseases to demonstrate they can attribute each one to the correct disease.</p>	
<p>Medicines and drugs from plants 'top trumps'</p> <p>The medicines and drugs from plants 'trumps' game can be found on the Science and Plants for Schools website: http://www.saps.org.uk/secondary/teaching-resources/871-medicines-and-drugs-from-plants-trumps-card-game</p> <p>This activity is designed to demonstrate the range of medicines derived from plants in the style of a top trumps game. Students play in groups and are dealt their cards, one student picks a category and reads the value from their card, the other members of the group read their value for that category and the highest value wins all the cards. There are 25 cards and a template for making more cards. All drugs from the specification are included. Teacher's notes can also be found on this site, explaining the reasons why so many plants are a source of medicines.</p>	



Thinking Conceptually

Approaches to teaching the content

Before embarking on the teaching of respiratory diseases, it is vital that students have a sound understanding of the structures of the respiratory system and their function (2.2.3 a). This is because in order to fully understand the mechanisms of the diseases studied and their symptoms, they must understand the role of each tissue type and structure in the respiratory system.

It is useful for students to be able to observe the effects of these diseases on the tissues of the respiratory system and so a practical approach to the teaching of this content is recommended. Students should be given the opportunity to diagnose the different diseases based on symptoms and patient history (activity 1) and compare healthy and diseased lung tissues (activity 2).

Common misconceptions or difficulties students may have

Students often find it difficult to separate out the effects of the different components of cigarette smoke and their effects on the respiratory tissues, for example confusing the action of tar and carbon monoxide. They also mistake the action of tar on ciliated epithelial cells as paralysing the cell and not the cilia. Confusion can also occur between the mechanism of disease of bronchitis and emphysema, so this too must be clearly discriminated in teaching.

Explicit teaching of the actions of the two treatments for asthma is fundamental to their understanding. Students frequently confuse the two, failing to understand the mode of action for these treatments, which is fundamental to their ability to explain each treatment.

Care must be taken to ensure that students clearly understand the purpose of each phase of clinical trials and the ethical implications of the use of placebos.

Conceptual links to other areas of the specification – useful ways to approach this topic to set students up for topics later in the course.

This unit is intrinsically linked to 2.2.3 (a).

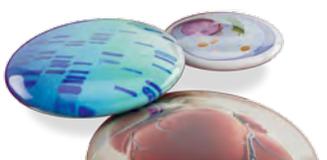
Unit 3.3.1 The cellular basis of cancer and treatment, links to lung cancer and the effects of asbestos and the mechanism by which this occurs. Students should be able to apply knowledge from that unit to the development of lung cancer in this one.

Asthma is also linked to 3.3.1(a) and this should be considered when teaching 3.3.2(d).



Thinking Conceptually

Activities	Resources
<p>General resource for medicines and development Medicines by Design National Institute for General Medical Sciences http://publications.nigms.nih.gov/medbydesign/index.html</p> <p>This is a good resource to show how drugs are discovered and developed. This resource can be ordered as a leaflet or the chapters can be viewed online with an interactive crossword puzzle.</p>	



Thinking Contextually

ACTIVITIES

Activities	Resources
<p>Diagnosis: lung disease. Students should be given cards which represent different patients. These cards should have basic information regarding the patient's age, sex, job etc and a description of their symptoms.</p> <p>Learner resource 1 gives two examples for guidance.</p> <p>Students should make a diagnosis of each lung disease from the information on the card and should write a justification for why they have chosen that disease.</p>	
<p>Pathology lab report (practical skills 1.2.2 d and e) (relates to PAG1) Looking at slides of diseased lungs.</p> <p>Students should use pre-prepared slides from lungs of individuals with emphysema, cancer etc and compare these with slides of healthy lung tissue. They may make biological drawings from these. They should write a 'pathology report' which outlines the major differences observed. If real life slides not available, virtual slides can be found on various internet sites.</p>	
<p>It's a trial Students are to be given a scenario that they work for a pharmaceutical company that has developed a new drug for the treatment of cancer. They are to design a regime of trials to take the drug to the marketplace, justifying their reasons for patient numbers, trial designs etc.</p> <p>As an extension to this activity, students should watch a video of the TGN1412 drug trial (available on youtube) and use this as a case study to analyse what went wrong in this instance. Students should consider what recommendations they would make for future trials to guard against a recurrence of this in the future.</p>	



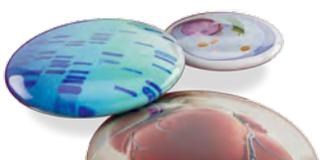
Thinking Contextually

Activities	Resources
<p>Asthma and COPD case studies</p> <p>Once students understand the use of steroids and beta agonists, they can apply their knowledge using a number of asthma case studies. These can be found at Real Respiratory Clinic (Education for health) http://real.educationforhealth.org/case-studies.php</p> <p>This site has a number of different case studies in a quiz format where the students should answer questions based on the presentation of patients in a clinic. The site is aimed at doctors, but can just as easily be used by students to further their understanding of respiratory illness. After each question, the answer is given, with an explanation of why this is correct. Duncan, Phillip, Anne and Carol are particularly useful for asthma and Bill, Gemma and Margaret are of use in COPD.</p>	
<p>Epidemiology, smoking and lung cancer</p> <p>The work of Professor Sir Richard Doll and other epidemiologists in discovering the link between smoking and lung cancer can be investigated. There are many articles giving an overview of the work of Doll, Hill and Peto which can show students how research was carried out to establish this ground-breaking discovery. This links to HSW12.</p> <p>The National Centre for Biotechnology Information has a very accessible obituary about Doll's work at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1181278/</p> <p>There is also a video lasting just under 10 minutes to be found on youtube which summarises the work of Doll, with footage of him speaking about his findings at http://www.youtube.com/watch?v=VBWGM630zG0</p> <p>An original article from the Journal of Epidemiology and Community Health by Doll and Peto from 1978 can be found on the BMJ site at http://jech.bmj.com/content/32/4/303.full.pdf+html</p> <p>This could be used to show students original published research and could be used to develop maths skills around the subject as it includes tables of data graphs (M1.3 M1.7). There is also good statistical analysis to show students.</p> <p>These sources could be used to form a basis for discussion on analysis and interpretation of data, linking to 3.2.1 (g) or ethics.</p>	



Thinking Contextually

Activities	Resources
<p>Supplemental Oxygen Therapy</p> <p>The role of supplemental oxygen therapy in emphysema and COPD can be discussed. As an extension into A Level content it may be linked to 4.1.2(h) with oxygen therapy, the effect on pO₂ and relating this to the oxygen dissociation curve.</p> <p>WebMD has explanatory information about the use of this therapy. http://www.webmd.com/lung/copd/oxygen-treatment-for-chronic-obstructive-pulmonary-disease-copd</p> <p>It could also be used to discuss how patients with COPD no longer rely on high carbon dioxide levels to trigger an increase in breathing rate, but instead become reliant on low levels of oxygen in the blood as the stimulus for increasing breathing rate. They could discuss what problems this may pose when considering using supplementary oxygen as therapy.</p>	
<p>Interactive lung disease case studies</p> <p>Interactive case studies for COPD, asthma and asbestosis can be found on the McGraw Hill Higher Education website. The third case study includes reference to the dangers of supplemental oxygen therapy as discussed in activity 6. Students can type their answers to the questions asked and then select to reveal the answers. Some questions are beyond the scope of the AS and A level specifications, however, these questions could be discussed with the class to extend knowledge. http://www.mhhe.com/biosci/ap/ap_casestudies/cases/ap_case13.html</p> <p>A lung cancer case study of the same type is available here: http://www.mhhe.com/biosci/ap/ap_casestudies/cases/ap_case01.html</p>	



Learner resource 1.1 Diagnosis: lung disease

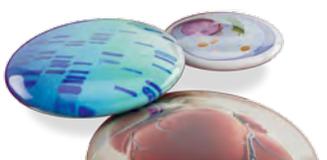
Fred Manford

Fred is a 65 year old former mechanic, he has presented at your clinic complaining of an increased shortness of breath in the last 10 days and an increase in coughing up mucus. Until recently, he had difficulty coughing up mucus. He has felt increasingly short of breath over the past five years.

When questioned, he says he has not previously suffered from asthma or any allergies.

Susan Childs

Susan is a 55 year old receptionist. She presents at your clinic complaining of a cough that has recently worsened. She has difficulty in coughing up sputum and has become hoarse in recent weeks. She has been to her GP before to ask for antibiotics for her cough, but this has not helped her symptoms. When questioned, she reveals that she has smoked 20 cigarettes a day since the age of 14.





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