

You Are What You Ate

Student Guide

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This resource was produced as part of the National HE STEM Programme



YOU ARE WHAT YOU ATE: THE CHEMISTRY OF THE OBESITY EPIDEMIC.

ASSIGNMENT BRIEF

Aim

The aim of the resource is the acquisition of the following skills:

- Critical analysis of published information on dietary and metabolic chemistry related to obesity
- Team working
- Oral and written communication
- Problem solving

The Subject of the Resource,

The RSC Roadmap identifies food and 'creating and securing a safe, environmentally friendly, diverse and affordable food supply' as a priority for the world. This is usually seen as a strategy to fight starvation in underdeveloped parts of the globe, but in the developed countries a factor of increasing importance in threatening life expectancy is not starvation but obesity – a different aspect of poor nutrition.

There is a general public ignorance of the factors involved in maintaining a healthy diet. It falls to the trained scientist to find ways to inform and enlighten the public about food, nutrition and the risks consequent on a poor diet rich in fats and sugar. The goal for chemists is to attempt to put this information in a format suitable for a lay-audience.

Learning Outcomes

After completing the module you will be able to:

- Describe the nature and breadth of the obesity epidemic
- Discuss the prospective societal impact of the rise in obesity in children
- Discuss the connection between obesity and type 2 diabetes and other pathologies;
- Describe the relative energy content of food, and its composition in terms of carbohydrates, lipids and protein;
- Delineate the metabolic pathways for food constituents and the interconnection between them;
- Prepare from published sources and deliver a short illustrated talk, suitable for schools, on the obesity epidemic and its causes, and propose possible remedial strategies;
- Prepare a poster or short pamphlet on the topic and a short report containing policy recommendations to government.

Objectives (what you have to do)

1. Submit a proposal of no more than three A4 pages to your local authority for support for the preparation and delivery of presentations to sixth-form school children on the obesity epidemic. (30% of the final mark).

You will be assigned to groups of no more than 5, each group to work together to gather scientific and sociological information on the obesity crisis with particular emphasis on the problems these issues pose for children and young adults. You will do this based on information gathered from public sources such as press coverage, government reports, websites and recommended texts. With this information you will write and submit a proposal to your local authority to justify the need for public education on this topic.

Your proposal should demonstrate your understanding of:

- The definition of obesity
- The scope of the crisis especially for young people, your target audience The consequences of obesity
- The need for education on the issue

Your proposal will be accompanied by:

2. A draft of a letter to a head teacher proposing a school visit and presentation. Prepare and deliver a 20 minute presentation and a 2-page leaflet or flier suitable for scientifically literate senior school children. (60% of the final mark)

On the basis of your proposal, its scope and content, and with feedback from tutors, you will gather further information from published sources to construct a 20-minute talk using PowerPoint or any other tutor-recommended means. The presentation should have both scientific and public health content. The leaflet, designed to advertise your visit to the school, should summarise the material in your presentation in a way you feel will be engaging to school children and attract them to your talk.

You may decide on the choice of material you wish to include in the presentation you prepare, but you should make sure that it reflects the focus and balance outlined in your proposal. You should consider:

- Demographic data – the incidence of obesity especially in the young
- The nutritional needs of adolescents and young adults
- Energy content of food types
- Metabolic chemistry relevant to digestion of carbohydrates, fats and proteins and of fat deposition
- Energy balance and storage
- Both dietary and lifestyle issues
- Medical consequences of obesity

3. Prepare a report with a set of policy recommendations for government to address the problem. (10% of the final mark).

The report should take the form of a four-page document summarising your findings followed by whatever policy recommendations you think appropriate. Be as radical as you like – you might never be asked to do this again!

Resources

You will be provided with seminal websites from which to begin, but you are expected to follow links to relevant material that you require and search independently for information, and for clarification of unfamiliar terminology and concepts. The volume of information online is enormous – be critical in appraising the documents you find to enable you to develop thematic consistency for your presentations. The text D.A. Bender: *Nutrition and Metabolism: 4th Edition* CRC Press. Page and chapter references are given at various points to this text but other available sources may be used.

Assessment

- Your proposal letter will be assessed on its first submission. It should demonstrate that you have surveyed a range of public sources and that you have knowledge of the metabolic issues affecting obesity.

- Your presentation will be assessed on several criteria:
 - Structure of the talk (was the theme clear from the beginning and were ideas developed logically);
 - Presentation style (was the talk articulated clearly, did the speaker connect well with the audience);
 - Content (was there a good balance between scientific and societal and public health issues; was the talk consistent with your proposal letter);
 - Question and answer (were questions answered convincingly and with confidence);
 - Quality and impact of the flier (did the flier give a good idea of the importance of the talk).
- Your report, which is a slightly longer version of the proposal letter, will be assessed on balance of content (scientific vs societal issues) and how well it presents the arguments you have made in your presentation.

STUDENT RESOURCES FOR PROPOSAL LETTER AND PRESENTATION PREPARATION

General comment on the use of web-based sources

The websites and text references provided to you throughout this resource are suggested to enable you to make an entry into the vast amount of information available on this important topic. It will immediately become apparent that you cannot read all of it. However, by reading summaries and abstracts of longer documents and following links in these documents that look promising for your team's approach, and looking critically at the content, you will form your own unique picture of the issue, and this will inform the output you produce. A good starting point for a search of the Internet can be a Wikipedia entry that a search will produce.

The following websites will introduce you to some government reports (which are very long), some specialist websites on the topic (e.g. The National Obesity Observatory), the academic journal literature (e.g. *The Lancet*) and serious reporting in the press (e.g. *The Guardian*). You should not try to read the *Foresight* report in its entirety – the Executive Summary is sufficient, and that is quite long itself. Similarly for the NHS site. *The Lancet* "Series Comments" will give you a serious academic point of view. *The Guardian* articles are easily readable and give you the perspective of serious reporting in the national press.

It is important that you try following some of the links in these resources for more information, especially the links in the media stories. The recommended text throughout is *DA Bender: Nutrition and Metabolism: 4th Edition* CRC Press. (2008), and analogous information at greater or lesser levels of complexity can be found by searching online. You should by now feel comfortable in developing your online search strategy. As you come across terminology you haven't seen before, search online for definitions and information. In this way build up your knowledge of the topics. Be careful to appraise critically your sources – an article in *The Lancet* carries much more weight than an article in the tabloid press.

The information you will consider comes under three headings

- The incidence of overweight and obesity

- The causes and consequences of obesity
- Dietary issues and metabolic chemistry

Resources for Incidence of Overweight and Obesity

- Executive summary of the Foresight report “*Tackling Obesity...*”
http://www.bis.gov.uk/assets/foresight/docs/obesity/obesity_final_part1.pdf NHS Statistics on Obesity at
http://www.ic.nhs.uk/webfiles/publications/003_Health_Lifestyles/opad11/Statistics_on_Obesity_Physical_Activity_and_Diet_England_2011_revised_Aug11.pdf
- Four “Series Comments” in the Obesity issue of *The Lancet* at
<http://www.thelancet.com/series/obesity>. To access the pdf files for these articles you need to register when prompted on the *Lancet* website. It’s free. The *National Obesity Observatory* website at http://www.NOO.org.uk/NOO_about_obesity
- Articles from the national media, e.g. *The Guardian* at for example at
<http://www.guardian.co.uk/society/2011/oct/10/diabetes-the-epidemic> and
<http://www.guardian.co.uk/business/2012/jun/11/why-our-food-is-making-us-fat> and the BBC at http://www.bbc.co.uk/health/physical_health/conditions/obesity.shtml
- *Bender* Ch 7, and sections of Ch 6.
- The National Obesity Observatory website at
http://www.noo.org.uk/NOO_about_obesity/child_obesity/epidemiology
- Desirable body weight. Distribution of body fat – thoracic and abdominal fat as the risk factor. *Bender* p214
- A site for Body Mass Index (BMI) and desirable ranges for boys, girls, adults and the aged is
http://www.bbc.co.uk/health/treatments/healthy_living/your_weight/whatis_bmi.shtml
- Trends in BMI (UK) (*Bender* fig 7.6).

Resources for the Causes, Symptoms and Consequences of Obesity

- Look again at the summary in the Foresight Report “*Tackling Obesities*” [Tackling Obesity](#)
Note the projected increase in obesity in your geographic area and variations with region for both men and women.
- Sweetened drinks, insulin resistance, metabolic syndrome and type 2 diabetes
<http://care.diabetesjournals.org/content/33/11/2477.abstract>
- BMI and mortality
<http://www.nejm.org/doi/full/10.1056/NEJMoa1000367>
- The connection between childhood obesity and lifestyle, income/social class
<http://pediatrics.aappublications.org/content/early/2011/06/23/peds.2011-1066.abstract>
- Children’s diets
[Report on children's cereal US](#)
- Data on weight gain among young people over the past 10 years in the above context.
[Foresight Report](#)
- Low-income dietary habits. [Obesity in Children NOO](#)

Dietary Issues and Metabolic Chemistry

In order to provide the chemistry content for your presentation you will need to look in some detail at the metabolic chemistry of carbohydrates, fats and proteins. Your proposal letter need not go into this in detail, but your presentation must include some aspects of this. The recommended text *Nutrition and Metabolism: 4th Edition* DA Bender: CRC Press. (2008) is useful for this, but as before you will be able to accomplish your goal based on information you find using the search strategy you have established using the sites already suggested and links in them. The result of your study should

enable you to focus on how the body stores metabolites, (from digestion and metabolism of carbohydrates, fats and proteins) which are excess to energetic needs, as fat deposits, the central issue in overweight and obesity. This will require a thorough understanding of these issues in order to prepare a useful presentation for non-specialists. For this, you will need to familiarise yourself with:

- The energy content of food and the energy requirement for maintaining body weight
- Glycaemic index
- The balanced plate – the ideal composition of a main meal
- How food components are metabolised
- How the metabolic pathways for carbohydrates, fats and proteins are interlinked
- Energy storage
- How hormones instruct the body what to do with the molecular components of digested food
- How and why fat is deposited and consumed.
- The effect of stored abdominal fat on metabolism

As your team begins to form a view of the type of content you want for your proposal letter, divide up the searches between the team members, each member being responsible for a defined aspect of the problem. Combine your findings for preparing the proposal letter, keeping in mind that your final presentation will reflect the scope you describe in the proposal letter

Preparing the presentation.

Keep to the themes and goal you developed in the proposal letter that you submitted to the Education Authority. Keep in mind the level of chemistry that you need in order to prepare the presentation you have outlined in your proposal letter. Keep in mind also the fact that you are preparing 20-minute talks. This limits the number of slides you can usefully include in the presentation to about ten. Make sure that your talk is appropriate for an audience of 16-18 year-olds who have some understanding of chemistry.

An introduction slide and a summary slide are important. A useful rule of thumb is “Tell them what you’re going to tell them, then tell them, then tell them what you’ve told them”.

Keep the amount of information on each slide to that needed for what you want to say – crowded slides are counterproductive as they make an audience tune out, especially in the age group you will be addressing. Plan on spending approximately two minutes on each slide and practice delivering the talk with your team to get the timing right.

Avoid dark and complex “artistic backgrounds” – they might appeal to you but the audience wants to see clearly the information on the slide, not to be impressed with the background. Animations should be avoided unless you are an expert.

Practice transitioning between slides so you know what the next slide is going to say.

When delivering your presentation, speak to the audience, making eye-contact, so that you are seen to be convincing and persuasive.

Avoid attempts at humour – they usually look foolish and detract from the message of your talk.

Policy Recommendations

During this course you will have formed opinions about what government could do to help fight the obesity epidemic. In your report you are to include some policy recommendations to government.

Here are a few suggestions to start you off:

- What do you think about the inclusion of fast food and soft drinks manufacturers in making government policy? (<http://www.guardian.co.uk/politics/2010/nov/12/mcdonalds-pepsico-help-health-policy>)
- Should the exposure of children to junk food advertising in the media be limited?" (<http://pediatrics.aappublications.org/content/early/2011/06/23/peds.2011-1066.full.pdf+html>)
- Would taxation of fatty and sugary food help? <http://www.guardian.co.uk/world/2011/oct/02/denmark-fat-tax-obesity>
- Food labeling http://www.theboltonnews.co.uk/news/9856455.Food_labelling_bid_to_fight_obesity_epidemi
[c/](#)

Proposal letter model (3 sides A4)

Address of Local Education Authority

Student names
Address of your department and University

Date

To whom it may concern,

We are [Name of Degree] students in the Department of [XXXX] at the University of [YYYY] studying [Subject]. As part of our coursework we have been assigned the task of preparing a 20 minute presentation aimed at 16-18 year olds on the topic of 'The Chemistry of the Obesity Crisis', with emphasis on how the crisis affects adolescents and young adults. We would like the opportunity deliver this presentation to student audiences in schools in the local area.

We believe that educating adolescents about the science of obesity is important because...[write the justification for the need of education in this area of science].

We would like to propose a presentation that will include the following topics: [List the topics on which your team will focus. You should include a description of the incidence and causes and consequences of overweight, obesity and type 2 diabetes, and also mention some aspects of metabolic chemistry that you plan to include in more detail in your presentation.]

The presentation will be delivered using the following approach: [a flier or pamphlet, a PowerPoint presentation or any other means you choose]

Signatures