OCR
Oxford Cambridge and RSA

Friday 6 June 2025 – Afternoon

Level 3 Cambridge Technical in Applied Science

05874 Unit 22: Global scientific information

PRE-RELEASE

INSTRUCTIONS
- Do **not** take this copy of the pre-release material into the exam.
- Do **not** take any notes into the exam.

INFORMATION
- A clean copy of this pre-release will be given to you with the question paper.
- This document has **8** pages.

Pre-release research brief

You should carry out your own research on the themes given in this research brief. Your research will help you to prepare for your exam.

Your research is only for your own use. You must not bring your notes into the exam.
A clean copy of this research brief will be provided in the exam.

In your research you should consider the following themes:

- Categories of information holder
- Locations of scientific information
- Characteristics of good quality scientific information
- Consequences of poor quality scientific information
- Classification of scientific information

The questions in Section A of the exam will require you to draw on the knowledge and understanding which you have gained while researching these themes.

Instructions:

Read the following three pages of information.

Carry out your own research on the themes given above.

Source A

Adapted from: Ultra-processed People – by Chris van Tulleken

https://www.penguin.co.uk/books/451300/ultra-processed-people-by-tulleken-chris-van/9781529900057

It is not clear how much or even how many additives we eat. In the EU, there are more than 2000 additives permitted for use. In the US the number is thought to be higher than 10 000. As production has become entirely automated, with computer-controlled robots cutting vegetables, grinding meat, mixing batter, extruding dough and wrapping the final product, many additives are required so that food can withstand the process. If colours or flavours are lost as food is subjected to this use of robots, they can simply be chemically replaced.

There are so many thousands of these additives that I wouldn't even be able to cover all the major categories. There are flavours, flavour enhancers, colours, emulsifiers, artificial sweeteners, thickeners, humectants, stabilisers, acidity regulators, preservatives, antioxidants, foaming agents, bulking agents, carbonating agents, gelling agents, glazing agents, chelating agents, bleaching agents, leavening agents, clarifying agents and so on. I'm going to focus on just a handful as a way of understanding how they affect our bodies and how they are (or are not) regulated.

One of the most common emulsifiers is lecithin (derived from egg, soy or other sources). Lecithins are classified as natural but they are often made up of very unnatural mixtures of naturally occurring chemicals that have been further chemically modified. Polysorbate 80, carboxymethylcellulose and the type found in so much bread in the UK: diacetyl tartaric acid esters of mono- and diglycerides (also known as E472e or DATEM) are examples of such chemicals.

DATEM is produced through the processing of animal or vegetable fats (triglycerides). They don't occur naturally, but like the lecithins, they're similar to biological molecules, and this similarity may be dangerous. In experiments on cells in labs, DATEM seems able to insert itself into cell membranes, which may explain some of the findings about how they damage the gut [1], [2]. Exactly how DATEM works in food is also not fully understood. It strengthens and softens and changes the interaction of the bread's protein, water and carbohydrates, and contributes to the moist springiness and long shelf-life of many commercial ultra-processed breads.

Is there any evidence that the emulsifiers in ultra-processed foods are harmful? Well, yes. And most of the harm seems to be brought about by the changes caused to our microbiome.

When the gut lining is damaged by food, antibiotics or invaders, the population of the microbiome changes: we get new species that we haven't signed a peace treaty with. They destroy the local culture and ecosystem both deliberately and accidentally. This is called dysbiosis. We are increasingly sure dysbiosis is linked to severe inflammatory conditions, autoimmune, allergic and metabolic diseases as well as cancer.

[1] Direct impact of commonly used dietary emulsifiers on human gut microbiota
Sabrine Naimi, Emilie Viennois, Andrew T. Gewirtz & Benoit Chassaing
Microbiome volume 9, Article number: 66 (2021).

https://microbiomejournal.biomedcentral.com/articles/10.1186/s40168-020-00996-6

[2] Emulsifiers and Intestinal Health: An Introduction
Journal of Paediatric Gastroenterology and Nutrition. 2022 Mar 1;74(3):314-319.
Arielle Richey Levine, Joseph A Picoraro, Sally Dorfzaun, Neal S LeLeiko

https://pubmed.ncbi.nlm.nih.gov/35226642/

Source B

Adapted from: Chuckling Goat – The Gut Health Experts [3]

https://www.chucklinggoat.co.uk/

What is a microbiome test?

This is a stool test, where you take a stool sample using simple, clear, easy-to understand instructions in the privacy of your own home. This sample is then posted to Cambridge University, where leading scientists use the latest cutting edge technology – called 16s rRNA sequencing – to analyze the trillions of bacteria living inside your gut.

What do I get for my money?

You will receive the test kit itself, the sequencing in the lab, and the data report. Your results are then accompanied by a free 30 minute consultation with a trained Nutritional Therapist who will explain the results to you, answer all your questions and create a Personalized Action Plan for you that can help you begin to improve your gut health immediately.

Our test examines 86 biomarkers and assessment scores across the following areas: diversity, probiotics (the good bugs), pathogens (the bad bugs), prebiotics, postbiotics, mental wellness and systemic wellness.

Is the Chuckling Goat Microbiome Test accurate?

In a word – yes. Our test uses the 16s rRNA sequencing, which is the leading gold standard for reliability in microbiome analysis. Our sequencing and bioinformatics pipeline – co-designed by leading scientists at Cambridge University – delivers unparalleled depth, ensuring comprehensive microbial profiling.

Our new CG Microbiome Test ticks all the boxes:

- Simple, quick and easy to use
- A unique mental wellness section, assessed by scientifically validated questionnaires
- An overall systemic wellness score
- Examination of a full range of short-chain fatty acids: butyrate, acetate, propionate
- A comprehensive Personal Action Plan based on your microbial composition and diversity
- Free consultation offered by gut health expert and nutritional therapist, RRP £45
- Lifelong support and advice
- A rewards system that makes it easy and fun to follow your new gut health programme
- Next-generation nucleic acid collection and preservation tube to guarantee sample stability and accuracy of results
- Advanced analytic pipeline designed by leading microbiologists working in collaboration with Cambridge University
- State-of-the-art online interactive platform to view and track your results

Where's the science?

Here at Chuckling Goat (CG) we love good science, and we are honoured and thrilled to be joined by some of the finest scientists from around the world, on our Scientific Advisory Board. An interdisciplinary mix of doctors, professors, oncologists, pharmacists, biochemists and bioinformaticians, they are all connected by an interest in the human microbiome and a passion for pushing the edges of creative, rigorous science. Have a browse through the bios of the fine minds who are helping us think, plan, create and innovate the next generation of gut health tools!

Source C

Adapted from: LetsGetChecked [4]

https://www.letsgetchecked.co.uk/

Check your C-reactive protein (CRP) levels to identify inflammation in your body, with online lab results in 2 to 5 days.

CRP, which is synthesized by the liver, is one of the most sensitive acute-phase markers of inflammation. Elevated CRP often occurs before clinical symptoms, including fever.

CRP elevations are nonspecific but may indicate the presence of an underlying inflammatory infection. Blood CRP is a marker used to detect inflammation in the body. This may indicate the presence of other conditions or infections and can identify deterioration or damage that you may not be aware of.

Why do I need to activate my collection kit?

On the LetsGetChecked website simply click on the Activate kit link. Activating the kit connects you and your data with the unique alphanumeric barcode within your sample collection kit box. The laboratory cannot process your sample if the kit is not activated and linked to you. You should only activate your kit when you are ready to take your sample.

Are there medical professionals involved in the process?

Yes. LetsGetChecked has a team of doctors, nurses, and healthcare clinicians who will review your order and results and have created detailed result breakdowns for your testing journey.

Our clinical team is on standby throughout the testing process and, if your test results are abnormal, you may receive a call to discuss your results and the next steps.

How is my privacy protected?

Keeping your personal data secure is important to us. We use appropriate technical and organisational measures to ensure security and confidentiality of your information, and only share your information where required to deliver our products and services or where we have a legal basis to do so. All samples are disposed of following analysis.

How accurate is the testing process?

Your samples are analysed with CE-marked tests in the same labs used by primary care providers, hospitals, and government programs.

LetsGetChecked laboratories are CPA-approved and ISO certified, which are the highest levels of accreditation.

Our home sample collection kits are manufactured within our ISO 13485 certified facility, the highest level of accreditation for medical devices.

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