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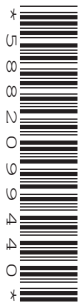
AS GCE HUMAN BIOLOGY

F222/01/ADVANCE NOTICE Growth, Development and Disease

For issue on or after:

13 MARCH 2016

Duration: 1 hour 45 minutes



NOTES FOR GUIDANCE (CANDIDATES)

- 1 This document contains two case studies, which are needed in preparation for questions 1 and 2 in the externally assessed examination **F222/01**.
- 2 You will need to read the case studies carefully and also have covered the learning outcomes for Unit F222/01 (Growth, Development and Disease). The examination paper will contain questions on the two case studies. You will be expected to apply your knowledge and understanding of the work covered in F222/01 to answer these questions. There are 100 marks available on the paper.
- 3 You can seek advice from your teacher about the content of the case studies and you can discuss them with others in your class. You may also investigate the topics yourself using any resources available to you.
- 4 You will **not** be able to take your copy of the case studies, or other materials, into the examination. The examination paper will contain fresh copies of the two case studies as an insert.
- 5 You will not have time to read the case studies for the first time in the examination if you are to complete the examination paper within the specified time. However, you should refer to the case studies when answering the questions.

This document consists of **4** pages. Any blank pages are indicated.

Case Study 1

25 by 25

The World Health Organisation (WHO) has set ambitious targets to reduce the number of deaths caused by non-communicable diseases (NCDs). This plan is known as the '25 by 25' NCD framework. The aim is to bring about a 25% reduction in premature mortality from NCDs between 2010 and 2025. The WHO has produced a list of 25 factors that can be used to assess the implementation of the plan.

The four main categories of NCD are:

- cancers
- cardiovascular diseases (CVD) (including coronary heart disease)
- diabetes
- chronic respiratory conditions (including asthma).

A research team has analysed the likelihood of lowering mortality for each NCD category. The scope for reducing deaths varies considerably between the categories of disease. The researchers have estimated the impact on NCD mortality if the WHO meets its targets for reducing the following six risk factors:

- tobacco use
- alcohol use
- salt intake
- obesity
- raised blood pressure
- raised blood glucose.

The research team predict that a 20% reduction in NCD mortality can be achieved by 2025 if the WHO targets are met for all six of the risk factors. They have calculated that a 34% decrease in deaths from cardiovascular diseases is possible. The researchers have estimated that premature deaths from cancer, however, would be reduced by only 7%, even if all the WHO targets are met. Deaths from cancer are expected to contribute almost 40% to overall NCD mortality by 2025.

What makes cancer different from other NCD categories?

One in six cancers is associated with a chronic infection. In the long-term, therefore, vaccination programmes (e.g. against hepatitis B) may help to further reduce the mortality rate for cancer. Among women over the age of 30, breast cancer represents 20% of all cancer diagnoses. The team of scientists predict that there will be no reduction in breast cancer mortality by 2025. This has been attributed, in part, to rising obesity levels among older women.

Among men, prostate cancer has the highest incidence of any cancer. Improvements to screening programmes may help to reduce the mortality rate for this form of cancer.

References

<http://www.who.int/nmh/ncd-tools/indicators-definition/en/>

http://www.who.int/nmh/global_monitoring_framework/en/

Case Study 2

THE THRIFTY PHENOTYPE

The hypothesis

The thrifty phenotype hypothesis suggests that a fetus receiving poor nutrition and exhibiting a slow growth rate in the womb has a greater chance of developing diabetes, coronary heart disease (CHD) and other chronic conditions later in life. A fetus adapts to an environment with a poor supply of nutrients, and conditions in the womb appear to programme an individual for their adult life. A person who receives poor nutrition as a fetus is less able to deal with an increased supply of nutrients later in life.

The evidence

Both men and women with low birth weight show increased rates of diabetes and CHD. One particularly stark piece of epidemiological evidence comes from the Dutch Hunger Winter. In 1944, populations in west Holland, including pregnant mothers, experienced severe food shortages. These nutritional restrictions during pregnancy had long-lasting consequences for the offspring. In adulthood, the offspring experienced above-average rates of obesity, diabetes, CHD and high blood pressure.

Animal studies have shown that poor nutrition before birth results in persistent changes in metabolic and physiological factors in the offspring of the animals receiving a poor diet.

What can be done?

Fetal growth rates can be monitored to make sure that babies are developing at the expected rates. Mothers can be given advice about their diets during pregnancy. In some cases, nutritional interventions are used, which involve mothers being provided with nutrient supplements during pregnancy. This type of intervention can be especially beneficial in poorer areas of the world.

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