

Advanced Subsidiary GCE

F222

HUMAN BIOLOGY

Unit F222: Growth, Development and Disease:
Advance Notice Material

Specimen

May be opened and given to candidates upon receipt.



INSTRUCTIONS TO CANDIDATES

- Take this information away and read it carefully. Spend some time looking up any technical terms or phrases you do not understand. You are not required to research further the topic described.
- For the examination on you will be given a fresh copy of this Advance Notice, together with a question paper. You will not be able to take your original copy into the examination with you.

INFORMATION FOR CANDIDATES

- Some of the questions in Paper F222, Growth, Development and Disease, will refer to material in this Advance Notice.

This document consists of **5** printed pages and **3** blank pages.

Advance Notice 1

MISTLETOE IN MEDICINE

Mistletoe, *Viscum album*, is a parasitic plant which grows on other plants such as apple trees. The mystical properties of mistletoe have been recognised since the time of the druids, who called it 'all heal'.

As an ancient herbal remedy, many people have researched and documented the medical uses of mistletoe and its extracts since the 18th century. Mistletoe tea, dried leaves soaked in water, is available in many continental pharmacies where it is used to alleviate a range of conditions including hypertension.

In the 1920s, Rudolph Steiner made an extraordinary prediction about the plant. He believed that, as a parasitic plant, mistletoe should have medicinal value as an anti-cancer agent and he formulated a variety of extracts for anti-cancer use. The prediction is based on the assumption of homeopathy that 'like cures like'. He perceived cancers to be parasitic on the human body and hence extracts of a parasitic plant, such as mistletoe, should be suitable as homeopathic remedies for cancer.

Such extracts are still being manufactured, for example Iscador. They are widely used as part of complementary and alternative medicine (CAM) in cancer treatment.

In Germany, for example, more than £20 million is spent each year on mistletoe extracts to fight cancer.

Several different chemicals have been isolated and purified from such mistletoe extracts. Furthermore, some have been shown to have potential anti-cancer properties. One such group of chemicals are the mistletoe lectins. These have been shown to be possible modifiers of the immune response.

normally identifies and destroys these cells before they develop into tumours. Mistletoe lectin 1 is thought to enhance this process by activating macrophages and stimulating the multiplication of T-helper lymphocytes.

Trials on mistletoe extracts have reported a reduction in the mass of solid tumours and an improved quality of life. As with many other CAM therapies, these trials are often unreliable. In a review of 11 trials, only one was found to be reliable and this was the only one reporting no improvement from using mistletoe.

The continued wide use of CAM therapies in cancer treatment is emphasised by a July 2000 study in the *Journal of Clinical Oncology*. This reported that, of 453 cancer patients, 69% had used at least one CAM therapy.

Acknowledgements:

Briggs, J, 2003. Christmas curiosity or medicinal marvel? *Biologist*, **50**

Franz, H, 1986. Mistletoe lectins and their A and B chains. *Oncology*, **43** (Supplement 1) pp. 23-34

Unknown, 1988. Isolation and identification of a tumour reducing component from mistletoe extract (Iscador). *Cancer Letters*. **30** 41(3) pp. 307–314

National Centre for Complementary and Alternative Medicine Website.
<http://nccam.nih.gov>

Advance Notice 2

IMMUNISATION IN SCHOOL

Some students in a school are about to have their 'booster' vaccination for tetanus, diphtheria and polio. Chris, student, has been asked to interview Sarah, a school nurse, to prepare a short article to go into the school magazine.

Chris: *So which jabs will the students get?*

Sarah: We don't use the word jab! It tends to frighten the students and it's not really very accurate. The students will receive three different **vaccines**. The polio vaccine is given orally and the tetanus and diphtheria are given as an injection. Polio is a viral disease. Tetanus and diphtheria are both bacterial. This is the final dose for diphtheria and polio, but lots of people will need to boost their tetanus; particularly if they are travelling, or in a risky occupation.

Chris: *This is what confuses me a bit. When my brother cut himself playing rugby, they gave him a tetanus jab but then he had to come back for another one!*

Sarah: This is another reason we avoid the word jab. Your brother was probably given the anti-tetanus antitoxin. The tetanus bacterium produces a toxin which can be fatal even in tiny amounts. The first 'jab' your brother got was probably antibodies which would neutralise this toxin. The second 'jab' would have been a proper vaccine like students will get – so he can make his own antibodies next time. You see what I mean? A 'jab' tells you how you get it – it doesn't tell you what's in it.

Chris: *So, the first injection he had was not really a vaccination and he needed to get a proper vaccination done afterwards. I suppose all three of the diseases can be pretty bad – but I don't know anybody who's ever had any of them!*

Sarah: Well they are all notifiable diseases, but it's not surprising you don't know anybody who has had them. Vaccines have been really successful. Just look at the polio vaccine. There used to be panic about epidemics every summer, even in this country in the 1950s. Even nowadays there are still parts of the world where polio is endemic. But the oral vaccine story is a really interesting one. Not only does the vaccine produce antibodies in the blood but because it's given orally, it produces a local immune response in the intestines. This is where the virus multiplies, so the immune response stops the disease being passed on!

It's a live vaccine so you do get some of this virus in the faeces which can contaminate water supplies but then this can be enough to stimulate immunity in other people.

Chris: *Vaccination programmes obviously work, so can I ask, why do you send the forms out weeks before asking for parent's permission?*

Sarah: Well, we need lots of information before we vaccinate. For a start, we want to know how many doses of vaccine we need; particularly for polio. All vaccines can lose their effectiveness if they get too warm. And don't forget not everyone will agree to be vaccinated.

Chris: *That's another thing I was going to ask. I missed my BCG vaccine when I was 14. Does it matter?*

Sarah: Well we should have caught up with you by now. We do them when you are 14 so we have two more years to 'mop up' the ones we miss. But to

be honest we get most people, so herd immunity should mean you are unlikely to get TB but I will make a note and catch you next time!

Chris: *Herd immunity?*

Sarah: It just means that if we vaccinate most people, most people will be immune. So you are unlikely to meet anybody with the disease, and if **you** get it, most of the people you meet will be immune – it breaks the infection cycle. It's been a bit of a problem with the uptake of the MMR vaccine. We still have to check in antenatal clinics for immunity to rubella and you probably heard on the news about the rise in mumps cases in young adults.

Chris: *So why not just vaccinate us all as babies?*

Sarah: Well some vaccines are given as early as two months. But again, it's an interesting story. Remember your brother's anti-tetanus? Some antibodies can cross the placenta or can be in breast milk. Some of these appear in the baby and provide immunity but they will mop up some of the vaccine – it just won't be effective. Plus of course, it does take time for a baby's immune system to develop – you can see that by comparing the growth of the lymphatic tissue.

Chris: *So when will the students need another booster?*

Sarah: As long as they are fully up to date with the NHS recommended immunisation schedule, diphtheria and tetanus immunity should last for 10 years and polio protection is life long. The other vaccines vary – but most are long lasting and very probably life long.

Chris: *Thanks Sarah – at least that should reassure everyone!!*

Acknowledgements:

<http://news.bbc.co.uk> – health links– for information on reported mumps cases.

<http://www-nt.who.int> – Vaccines, Immunisations and Biologicals

<http://www.polioeradication.org/disease.asp>

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