

LISTENING COMPREHENSION

LISTENING 1

You will hear an interview with dr Elisabeth Klerman, a scientist who studies sleep.

TASK 1. Decide if these statements are true, false or whether these issues have not been mentioned in the recording. Circle T for “true”, F for “false”, and NG for “not given”.

1. Sleep is an active phase of our lives as it enables the body to repair and rejuvenate itself.	T / F / NG
2. The structure responsible for controlling the circadian rhythms lies in the hypothalamus, superiorly to the crossing of the optic nerves.	T / F / NG
3. Klerman claims that the circadian clock usually works on its own, without communication with the environment.	T / F / NG
4. The first study involved a circadian misalignment by simply shortening sleep to 5.5-6 hours.	T / F / NG
5. The results of the first study show that getting used to too short sleep is impossible.	T / F / NG
6. After inadequate sleep, a person’s reaction time becomes increasingly longer.	T / F / NG
7. An example of the influence of insufficient sleep on our lives given in the recording involves road safety.	T / F / NG
8. In the second study described, people were asked to sleep at home for a total time of 16 hours in 24 hours.	T / F / NG
9. The recommended sleeping time ranges from 12.5 hours for the young to slightly under 8 hours for the elderly.	T / F / NG
10. Klerman thinks that her patients were mistaken about how much sleep they needed.	T / F / NG

TASK 2. Listen again and fill in missing words (write the exact words used in the recording).

1. Klerman mentions studies on the circadian clock and on its ability to generate 24-hour rhythms.
2. The tests checking response time performed in the first study did not include or memory tests.
3. The range of the patients in the second study was from 6 to 10 hours.
4. In the second study the subjects were scheduled to have a during the day.
5. Comparing older and younger subjects' sleeping times, Klerman says that older people's than younger ones'.

Source: Harvard Medical School Podcast Library
<https://hms.harvard.edu/podcasts/are-you-getting-enough-sleep>

LISTENING 2

You will hear five conversations about recent advances in medical science.

TASK 3. Match the conversations (1–5) with what the speakers are talking about.

Choose two topics for each conversation. There are five topics too many.

- | | |
|------------------------------|---|
| Conversation 1 _____ , _____ | A. Use of anonymous data in research |
| Conversation 2 _____ , _____ | B. IT technology |
| Conversation 3 _____ , _____ | C. Necessity for further research |
| Conversation 4 _____ , _____ | D. International scientific cooperation |
| Conversation 5 _____ , _____ | E. Cutting-edge research |
| | F. Increase in cancer mortality linked to smoking |
| | G. Large scale research |
| | H. Modified invention |
| | I. Comparison of two approaches |
| | J. Research limitations |
| | K. Different cooking techniques |
| | L. Research involving rodents |
| | M. Need for animals in medical research |
| | N. DNA modifications |
| | O. Adverse reactions |

Source: The Naked Scientists Podcasts
<https://www.thenakedscientists.com/podcasts/naked-scientists>

READING COMPREHENSION

TEXT 1.

The evolution of the Marie Stopes electrocautery no-scalpel vasectomy procedure

Introduction

Vasectomy has been free on the National Health Service since 1972 and provision has been supplemented by private practitioners and charitable organisations. According to Hospital Episode Statistics there were 48203 female and 35609 male sterilisation procedures performed in the NHS in 1998/1999. In some age groups there are more men who have been sterilised than women. In 1998, 19% of men in the 45-49 years of age group had been sterilised compared to 15 % of women, although women were more likely to have had another operation which rendered them sterile. Britain is one of only four countries, together with Bhutan, New Zealand and The Netherlands, with more sterilised men than women.

Launch of the Marie Stopes programme

Dr Marie Stopes opened Britain's first family planning clinic in 1921. Four years later she established the world's first full private family planning centre in Whitfield Street, London, UK, which has been offering services continuously for the last 76 years.

Following the death of Dr Stopes in 1958, vasectomy was added to the contraceptive menu following a successful campaign to promote this procedure by the Simon Population Trust in 1966. In 1976, when the centre came under the new management, the service philosophy was changed from a patient to a customer orientation and vasectomy was actively marketed. A national, small, space advertising campaign using the theme 'a safe, simple, 5-minute, stop babies operation, available without fuss or waiting lists', was launched in male readership magazines and local press. Operating days were changed to Fridays and Saturdays in line with client preference. A comprehensive pre-tested 'Print Counselling' pack for mailing to enquirers was developed. The pre-operative doctor's examination was discontinued in favour of 'same-day' counselling using trained lay counsellors. The mandatory partner's consent was made optional. The traditional surgeon's cap and mask were discarded and the operating environment made less surgical and intimidating.

Responses to the advertising campaign highlighted many areas of 'unmet need', prompting the launch in 1978 of the first of the nationwide network of Marie Stopes satellite vasectomy centres. Interested general practitioners (GPs) with suitable premises were recruited, trained and equipped. A central call centre was established to handle client contacts. Apart from attendance for same-day counselling and operation all customer contacts were by phone and post- including post-operative sperm tests returned at 12 and 14 weeks. The client-centred programme was, and still is, essentially a 'mail order' vasectomy service. By the mid-1980s there were 18 Stopes vasectomy centres and in 2000 some 25 centres throughout England and Wales.

Evolution of the Marie Stopes procedure

The vasectomy technique practised by the doctors at the Marie Stopes centre from the mid-1960s to 1978 was the conventional local anaesthetic, two-incision 'cut and tie' ligature procedure.

In June 1978, Stanwood Schmidt described the lower complication and failure rates associated with reliance on electrocoagulation and reliant on subsequent fibrosis to occlude the vasa. A model 732 Birtcher Hyfrecator was purchased and the technique adopted. Under local anaesthesia the exposed vasa were divided and 5 mm of the urethral and 5mm on the testicular sides coagulated. The sheath of the vas was then interposed between the vas ends and the skin sutured.

Initial experience confirmed Schmidt's reported reduced incidence of wound infection, haematomas, and lower incidence of sperm granulomas and congestive epididymitis. However, a nil failure rate was never achieved. By 1979, over 400 vasectomies a month were being performed and a number of small innovations aimed at simplifying the procedure were tested and introduced. Pre-operation shaving of the scrotum was dropped, and a small, single, vertical, scrotal incision adopted for which skin sutures were unnecessary. The technique of occluding the vasa was also modified. Vasectomy forceps comparable to a single-toothed Allis forceps were imported for mobilising and teasing out a loop of vas.

Following the adoption of more extensive coagulation, fascial interposition, the value of which had been questioned, was successfully discontinued. Trials of an incisionless percutaneous electrocoagulation technique proved to be popular with clients but had an unacceptable re-operation rate.

Adapted from: <http://jfprhc.bmj.com/content/familyplanning/28/3/137.full.pdf>

TASK 1. Decide if these statements are true, false or whether these issues have not been mentioned in the recording. Circle T for "true", F for "false", and NG for "not given".

1. Donations have never been made to provide for the need of vasectomy clinics.	T / F / NG
2. In most countries the number of female sterilisations is bigger than that of male ones.	T / F / NG
3. Before Dr Stopes died in 1958, various methods of contraception had been known in the UK.	T / F / NG
4. In 1970s vasectomy was turned into a market product.	T / F / NG
5. People who were interested in the procedure were sent special information brochures.	T / F / NG
6. The people who gave pre-operative advice were all medical professionals.	T / F / NG
7. Since 1976, the surgeons were obliged to wear a full surgical gown during each vasectomy procedure.	T / F / NG
8. After 1976, patients' husbands or wives had to agree for the procedure.	T / F / NG
9. The doctor who observed some benefits of electrocoagulation was a urologist.	T / F / NG
10. The coagulation was performed on male both urinary and reproductive organs.	T / F / NG
11. The size of vasectomy forceps was changed over the years.	T / F / NG
12. Extensive coagulation replaced fascial interposition.	T / F / NG
13. The technique which did not involve cuts was better liked by specialists.	T / F / NG

TEXT 2

Drinking Red Wine Before Smoking Can Prevent Short Term Vascular Damage

1)..... A new report in The American Journal of Medicine found that a glass or two of red wine before lighting up a cigarette can counteract some of the short-term negative effects of smoking on blood vessels.

(2)..... . Red wine stimulates the formation of endothelium-dependent relaxation factors such as nitric oxide, which improve endothelial function in coronary arteries possibly because of the high phenol concentration in red wine.

“However, sparse data exist on the short term potential vasoprotective effects of red wine in smoking-healthy individuals,” explained lead investigator Viktoria Schwarz, MD, of the University of Saarland, Homburg, Germany. “The aim of our study was to investigate the acute vascular effects of red wine consumption prior to ‘occasional lifestyle smoking’ in healthy individuals. (3).....”

The study examined the effects of smoking on various biochemical processes in the blood and vessels of 20 healthy non-smokers who volunteered to smoke three cigarettes.

(4)..... . Blood and urine were collected before and after drinking and smoking and continued until 18 hours after smoking.

Smoking is known to cause microparticles to be released into the bloodstream.

(5)..... Researchers found that in subjects who consumed red wine before smoking, these cellular changes did not occur.

Another biochemical process affected by smoking is telomerase activity. Telomeres can be thought of as “protective caps” on chromosomes. (6)..... .

By measuring telomerase activity, investigators determined that the group that smoked without drinking red wine showed a 56% decrease in telomerase activity while the drinking group showed only a 20% decrease.

Inflammation puts stress on cells due to an imbalance in reactive oxygen species production and the body’s antioxidant defenses. According to Dr. Schwarz, “We observed acute proinflammatory changes, namely, leukocytosis, neutrophilia, upregulated levels of IL-6 in serum, and enhanced messenger RNA expression of IL-6 and tumor necrosis factor alpha.

(7)..... .”

Since the study was limited to young, healthy nonsmokers, it is not clear whether these findings apply to the elderly, the ill, or chronic smokers. There was no comparison to different alcoholic and non-alcoholic beverages or whether the results would apply to more than just occasional smokers and drinkers.

These findings underscore the magnitude of acute damage exerted by cigarette smoking in “occasional lifestyle smokers” and demonstrate the potential of red wine as a protective strategy to avert markers of vascular injury. (8)..... .

“Nevertheless, this study identified mechanisms suitable to explore damage and protection on the vasculature in humans, paving the way for future clinical studies.”

TASK 2. Circle the correct alternative (A, B, or C). There is only one option possible.

1. According to the report, drinking some red wine prior to smoking can
 - a) hinder the influence of smoking on arteries, veins etc.;
 - b) diminish most adverse effects of smoking;
 - c) stimulate the formation of nitric oxide.

2. The data on the possible beneficial effects of red wine on the blood vessels in healthy smokers is
 - a) sufficient;
 - b) inadequate;
 - c) unscientific.

3. The results of the research apply to
 - a) people who smoke occasionally;
 - b) people who used to smoke;
 - c) people who do not smoke.

4. It was found that in subjects who consumed red wine before smoking
 - a) telomerase activity escalated;
 - b) the decline in telomerase activity was lower;
 - c) there was no change in telomerase activity.

TASK 3. Eight sentences have been removed from the text. Decide which sentence (A-I) best fits each gap (1-8). There is one extra sentence which you do not need to use.

- A.** We found evidence that pre-consumption of red wine prevented most of the vascular injury caused by smoking.
- B.** Cigarette smoke causes acute endothelial damage, vascular and systemic inflammation, and cellular aging.
- C.** Our study adds to the present evidence that the proinflammatory effects in nonsmokers with ‘occasional lifestyle smoking’ could be prevented by red wine consumption.
- D.** Dr. Schwarz is aware that the study will not help to treat or prevent cardiovascular disorders.
- E.** Half of the subjects drank red wine one hour before smoking, in an amount calculated to result in 0.075% blood alcohol content.
- F.** During aging, these caps can shorten and lose their protective ability.
- G.** Dr. Schwarz and co-investigators emphasized that they do not intend to motivate occasional smokers to drink or occasional drinkers to smoke.
- H.** These particles come from endothelial cells, platelets, and monocytes and indicate that cells in the blood vessels are being damaged.
- I.** Drinking red wine is widely regarded as protective against cardiovascular disease.

USE OF ENGLISH

TASK 1. Read the text below and circle the most suitable option (A, B, C or D) to fill in the gaps.

Autism: Parents face challenges, too

Autism spectrum disorder (1)..... to a set of related conditions that affect social interaction, communication, and behavior. The impact can range from mild to severe. It mostly appears in early childhood, and it normally continues into adulthood. Some people with autism spectrum disorder are highly gifted in a (2)..... field.

Apart from difficulties with social communication, people with autism spectrum disorder (ASD) tend to have restricted interests. Other key features include (3)..... behavior and a need for routine. Bringing (4)..... a child with autism can be challenging for parents, especially when other people do not understand the issues. Parents can find it difficult and embarrassing when their child demonstrates unusual behaviors in public. The website *Parent Coaching for Autism* lists a number of behaviors that might be considered unusual. These include inappropriate touching or (5)..... other people's space, being too honest about someone's appearance, flapping hands or spinning around, being fascinated with a particular item, extreme displays of affection or the opposite. If parents feel stressed and unable to cope, their own health can be (6)..... risk. It is important for parents to address their own needs as well as those of their child. Other people can help by learning about autism and the challenges it (7)..... .

Parents of children with autism sometimes describe themselves as feeling "overwhelmed, guilty, confused, angry, or depressed." Frustration is a common emotion. They may feel frustrated when their child is clumsy, (8)....., angry, or disregarding of others. Frustration can also appear when other people do not understand how ASD affects a child, and when they (9)..... both the child and the parent unfairly. Parents are often anxious, not only about today, but also about how the child will cope in future. Guilty feelings can (10)..... if the parents, wrongly, blame themselves for the disorder, when they lose their (11)....., or when they feel that they are not doing things right. Anger can occur if a parent feels that they are not getting help, say, from the other parent, from family, or from support groups. They may become angry (12)..... the child when the child's behavior is hard to handle. Grief and sadness are also common reactions. When parents first learn that their child will not be able to experience life as other children do, there may be a sense of loss, both of the child's future and of the parents' own hopes and expectations.

Parenting can be stressful, and taking care of a child with special needs is often more so. Negative emotions are normal. Parents should try to keep these feeling in perspective and to avoid (13)..... themselves unnecessarily. If the stress becomes too much, speaking to a counselor may help. It is also important to remember that children with autism can live happy, (14)..... lives. Their experience will just be different.

Apart from getting an early diagnosis from a specialist, Autism Speaks (an organization that raises awareness about the condition) suggests a number of ways that parents can give their child the best possible life chances. Parents, the members say, should learn all they can about autism, but check to make sure the information is correct. Being informed will make them a better (15)..... for their child. Help and opportunities are available in the fields of health, education, and development. Health providers and support groups can help parents to find the right information.

Up to half of all children with ASD experience behavioral problems. The child may have tantrums, become aggressive, injure themselves and refuse to (16)..... with requests. Communication difficulties can (17)..... these problems. Behavioral problems make it harder for the child to access educational and other services, and this can lead to further social isolation and frustration. An autism specialist Dr. Kara Reagon (18)..... the importance of parents noticing what happens immediately before a disruptive or harmful behavior begins. She points out that children with autism cannot always express themselves verbally. Noticing what happens before and after an unwanted behavior starts can help parents identify what caused it.

With this (19)....., the parents are better placed to help the child replace the negative behavior with a more constructive one. Alternative actions could involve pointing to the required item, instead of crying, screaming, or grabbing (20)..... frustration.

Adapted from *Medical News Today*, November 2016

- | | | | |
|--------------------|-----------------|---------------|----------------|
| 1. A) appeals | B) applies | C) refers | D) reiterates |
| 2. A) specific | B) general | C) specified | D) special |
| 3. A) repeated | B) related | C) rehearsed | D) repetitive |
| 4. A) on | B) up | C) along | D) off |
| 5. A) offending | B) invading | C) entering | D) crossing |
| 6. A) in | B) of | C) on | D) at |
| 7. A) arises | B) puts forward | C) strikes | D) poses |
| 8. A) unresponsive | B) unaffected | C) aloof | D) unmoved |
| 9. A) esteem | B) evaluate | C) judge | D) value |
| 10. A) arise | B) flow | C) raise | D) rise |
| 11. A) calmness | B) temperament | C) mind | D) temper |
| 12. A) for | B) with | C) on | D) of |
| 13. A) blaming | B) to blame | C) blame | D) of blaming |
| 14. A) fulfilled | B) completed | C) perfect | D) realized |
| 15. A) judge | B) defender | C) advocate | D) counselor |
| 16. A) comply | B) consent | C) follow | D) submit |
| 17. A) alleviate | B) exacerbate | C) mitigate | D) overcome |
| 18. A) underlies | B) underpins | C) emphasizes | D) enforces |
| 19. A) anxiety | B) conscience | C) awareness | D) realization |
| 20. A) from | B) of | C) inside | D) in |

TASK 2. GRAPH DESCRIPTION

Read the reports below and complete them with appropriate words. Put ONE suitable word in each space. YOU MUST NOT USE THE SAME WORD TWICE.

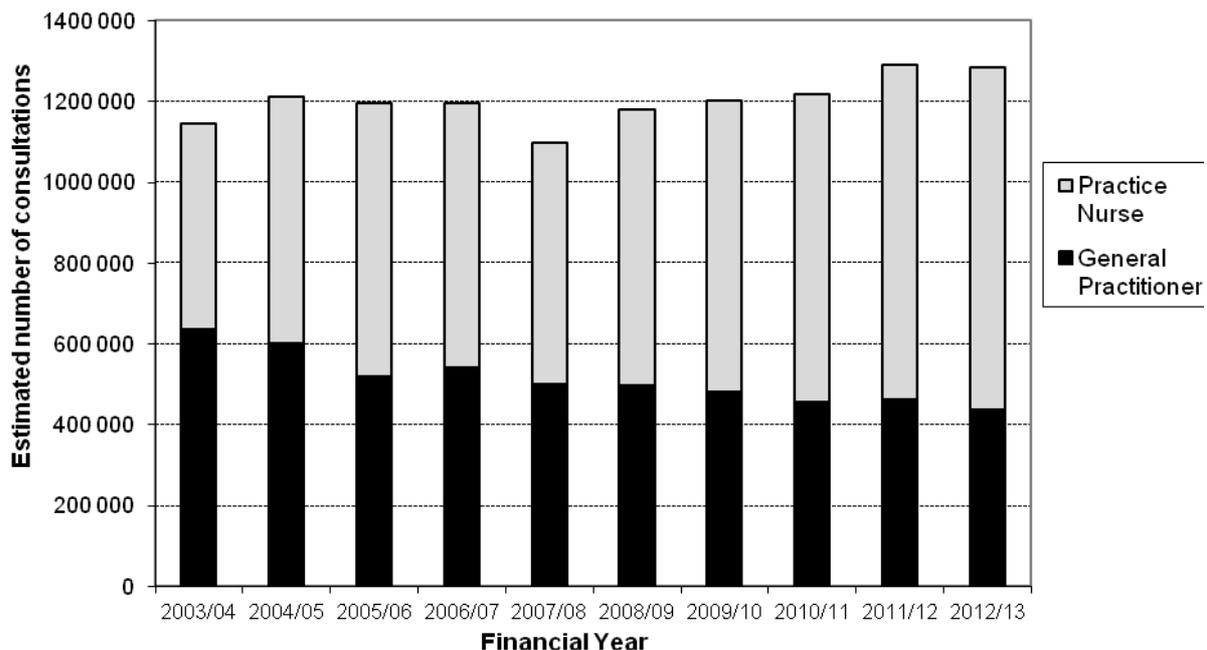
The figure below 1) the estimated numbers of consultations in Scotland for hypertension for the ten financial years 2003/04 to 2012/13.

The chart 2) that in the financial years 2011/12 and 2012/13 3) two thirds of the consultations for hypertension were with practice nurses.

The number of GP contacts for hypertension 4) 5) over the years. The contribution of practice nurses 6) 7), although there was a 8) in 2007/08, in line with an 9) 10) in the number of consultations with health care professionals as recorded in 2007/08.

The combined number of consultations 11) 12) 13) over the years, although there was a 14) 15) in the financial years from 2011/12 and 2012/13.

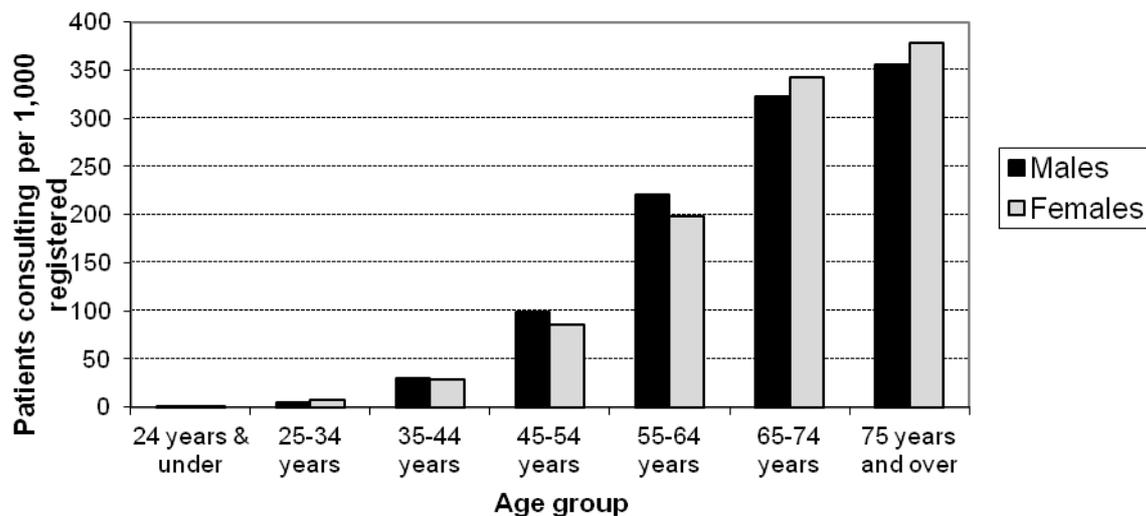
FIGURE 1. Hypertension¹ - estimated number of consultations with a GP or practice-employed nurse in Scotland in the financial years 2003/04 to 2012/13²;



Number of patients consulting

The graph below 16) that the number of patients who consulted 17) a GP or practice-employed nurse for hypertension in the financial year 2012/13 18) 19) with age, and that differences in consultation 20)..... between males and females are small.

FIGURE 2. Hypertension - estimated number of patients in Scotland consulting a GP or practice nurse at least once in the financial year 2012/13² per 1,000 patients registered³



Source: <http://www.isdscotland.org/Health-Topics/General-Practice/GP-consultations/Health-Conditions/Hypertension/index.asp?Co=Y>

TASK 3. Complete each sentence with a word formed from the word in CAPITALS.

1. In this study, we that elderly patients may have age-specific genetic abnormalities. HYPOTHETICAL
2. The historical development of the laboratory evaluation of drugs was briefly reviewed. CONVULSION
3. Most research on air pollution has focused on a type of pollutant known as fine matter, which is spewed by power plants, factories and cars. PARTICLE
4. Liver cirrhosis often is listed as a to the use of disulfiram. INDICATE
5. You should not beware of that chemical as it practically does not burn at all. It is almost totally FLAME
6. The Physic Garden is planted with examples of herbs used in Medieval times for purposes. MEDICINE
7. The radiograph proved that the severe pain in the patient's back was caused by a disc. HERNIA
8. To obtain immediate effectinfusion needs to be performed. VEIN
9. The man feltby the amount of blood and vomit he saw. NAUSEA
10. What is the difference in the name of a scientist and a doctor dealing with allergies? Well, the former can be called an allergologist, while the latter an ALLERGY

ANSWER KEY:

LISTENING COMPREHENSION

Listening 1

TASK 1:

1. **NG** (we can infer that sleep is active, but this function of sleep (self-repair) hasn't been mentioned)
2. **T**
3. **F** (It can, but it usually gets an input from the optic nerves).
4. **F** (misalignment was achieved by desynchronizing activity and day-night cycle, that is a non-24-hour day)
5. **T**
6. **T**
7. **T** ("how quickly can you slam on the brakes")
8. **F** (not at home but in a facility)
9. **F** (from 8.5)
10. **T**

TASK 2:

1. Klerman mentions **cellular and molecular** studies on the circadian clock and on its ability to generate 24-hour rhythms.
2. The tests checking response time performed in the first study did not include **mental calculation** or memory tests.
3. The **habitual sleep time** range of the patients in the second study was from 6 to 10 hours.
4. In the second study the subjects were scheduled to have a **4-hour nap** during the day.
5. Comparing older and younger subjects' sleeping times, Klerman says that older people's **average was lower** than younger ones'.

Listening 2

TASK 3:

1. B; I
2. E; L
3. H; O
4. C; K
5. A; G

READING COMPREHENSION

Text 1

TASK 1.

1.F

2.T

3.T

4.T

5.T

6.F

8.F

9.F

11.NG

12.T

15.NG

16.T

17.NG

Text 2

TASK 2.

1.a

2. b

3.c

4. b

TASK 3.

1.I

2. B

3.A

4.E

5.H

6.F

7.C

8.G

USE OF ENGLISH

TASK 1

1. C
2. A
3. D
4. B
5. B
6. D
7. D
8. A
9. C
10. A
11. D
12. B
13. A
14. A
15. C
16. A
17. B
18. C
19. C
20. D

TASK 2. GRAPH DESCRIPTION

Read the reports below and complete them with appropriate words. Put ONE suitable word in each space. YOU MUST NOT USE THE SAME WORD TWICE.

FIGURE 1

The figure below **1) shows/presents/indicates/illustrates/represents** the estimated numbers of consultations in Scotland for hypertension for the ten financial years 2003/04 to 2012/13.

The chart **2) shows/indicates** that **in the financial years 2011/12 and 2012/13 3) almost/nearly/approximately/roughly/some** two thirds of the consultations for hypertension were with practice nurses.

The number of GP contacts for hypertension **4) decreased/declined/fell/dropped/ went (if "down" in 5) 5) gradually/steadily/considerably/markedly/noticeably/consistently / down (if "gone" in 4)** over the years. The contribution of practice nurses **6) markedly/significantly 7) increased/rose/grew**, although there was a **8) decrease/dip/fall/drop/decline/decrease** in 2007/08, in line with an **9) overall 10) drop/fall/decline/decrease** in the number of consultations with health care professionals as recorded in 2007/08.

The combined number of consultations **11) stayed/remained 12) fairly/the (if “same” in 13) 13) constant/steady/stable/same (if “the” in 12)** over the years, although there was a **14) slight 15) increase/rise/ growth** in the financial years from 2011/12 and 2012/13.

6) i 7) mogą być wpisane wymiennie

9) nie akceptujemy przymiotników typu: *interesting, unusual, etc.*

FIGURE 2

Number of patients consulting

The graph below **16) shows/ /indicates** that the number of patients who consulted **17) either** a GP or practice-employed nurse for hypertension **in the financial year 2012/13 18) increases 19) sharply/steeply/dramatically** with age, and that differences in consultation **20) rates** between males and females are small.

TASK 3:

1. hypothesized; hypothesised; hypothesise; hypothesize
2. anticonvulsant
3. particulate
4. contraindication
5. nonflammable
6. medicinal
7. herniated
8. intravenous
9. nauseated; nauseous
10. allergist

SCRIPT

Listening 1:

Why do we sleep?

That's an excellent question. When I first started in the field, people thought that we slept basically to immobilize ourselves, because we don't function well at night, and the thought was that we just need to immobilize ourselves so that those creatures at night couldn't find us and attack us and eat us. But it's becoming increasingly evident by multiple **lines** of research that many things happen during sleep, sleep is necessary for multiple functions. For example, during sleep the brain processes information learnt during the day, so if you learn something and then you stay awake all night, you haven't really learnt it, your brain needs it to actually encode it appropriately so that it becomes a part of your long-term memory.

That's interesting. So, I know that your lab studies circadian rhythms, and so forth. Explain the circadian clock.

The circadian clock you can think of as a little pacemaker or clock inside your brain, it's located in the hypothalamus, just above the optic chiasm, which is where the nerve fibers go from between your eyes, so that it can get light input from the outside world. It generates its own approximately 24-hour rhythm and there have been cellular and molecular studies to show that all by itself it can generate these approximately 24-hour rhythms.

So, what are you trying to learn about this circadian clock?

I study a variety of things related to circadian clocks and their effects on either sleep or their effects on hormones and performance and alertness. So, one study that I recently did, was we looked at people getting insufficient sleep and what was the effect on performance. We put people on the equivalent of having five and a half to six hours of sleep for three weeks. However, we put them on a not 24-hour day, so that we could see the circadian effect. So, does it make a difference if you wake for thirty hours starting it basically six o'clock in the morning, or three o'clock in the afternoon or eleven o'clock at night. The results of that study showed that, first of all, you couldn't acclimate to getting insufficient sleep. So, people got worse from week one to week two, they didn't get better from week two to week three, that's not what we've seen.

We don't adjust.

We don't adjust. We can't adjust. The second thing that the data showed was that for the first few hours, like 4 to six hours after the people woke up, they did fine. Even after insufficient sleep over many days. We think this is why people think they do OK on insufficient sleep because for the first few hours after they woke up their performance was basically normal.

Ok.

As you would expect. Even without caffeine, because we didn't let them have caffeine.

Ok, how cruel!

However, after the first 4 to 6 hours, the rate of decline got worse and worse, so that people were taking up to 3 seconds to respond to a stimulus on the screen. We're not talking about mental calculation or memory test. We're talking about how quickly can you respond, how quickly can you slam on the brakes, how quickly can you do something that requires just a reaction.

Yeah.

That's how slow they were. After this insufficient sleep. And it also depended on circadian time at which it happened. If it happened at night, the circadian system was making things worse. So, that's an example of one of the aspect of research that we're doing. Another project that I've worked on recently is looking at how much sleep people get at home versus how much they're given if we bring

them into the facility and give them extra opportunities for sleep and basically don't allow them out of bed. Because they wanted to get out of bed, so we took healthy younger people and older people, whose habitual sleep time range from 6 to 10 hours. We brought them into the facility and we recorded their sleep. Then, we put them on a schedule which included 12 hours of sleep at night and a 4-hour nap during the day, so 16 hours of sleep opportunity. The average amount of sleep on the first night was 12 and a half hours.

For the young and the old?

For the young, for the old that wasn't that much, but for the young it was 12 a half hours. And we're talking about people who said no, no I only need 6 hours of sleep! So, we continued this protocol for multiple days.

Did it decline at all?

It declined, exactly, perfect, it declined to a, it declined for the younger subjects to around 8 and a half to 9 hours.

Were they making up?

They were making up, but that's exactly a homeostatic response. You haven't got enough of something, you first overshoot because you have to make up. And then you come back to the level you would expect if everything were balanced. We tell people we'd like them to aim for that.

It almost seems impossible.

It seems impossible. But that's what people did fifty years ago, fifty years ago, a hundred years ago, people were getting significantly more hours of sleep than they do now. Interestingly, for older people the final level reached was slightly under 8 hours.

You mean like senior citizens?

Healthy, 65- to 85-year-old people, on no medications, with no medical illness, with no sleep disturbances. In them the average was lower than younger subjects'. We don't know whether that's because older people need less sleep or whether they can't sleep when they need to.

Listening 2:

Conversation 1 - Artificial intelligence detects skin cancer

Engineers in America have developed a computer programme that trains itself to spot skin cancers in photos from a patient's skin and, in tests, it does it as successfully as a panel of trained skin specialists. Stanford PhD student Andre Esteva is the inventor...

Andre - What we've done is to build a computer algorithm, like a computer programme that can match the performance of board certified dermatologists at identifying whether or not an image of a skin lesion is benign or malignant. And we've tested it across three really important medical diagnostic use cases, which include identifying carcinomas, including basal and squamous carcinomas from their benign counterparts as well as identifying malignant melanoma from normal ordinary moles.

Chris - And you do this by showing the computer programme images of these respective lesions?

Andre - That's correct. We use a data driven approach which, in contrast to previous computer programmes where you would tell the computer do step one, do step two, to step three, instead what we do is we feed the computer a massive amount of data. We show it images and we tell it what those images are of, for instance, malignant melanoma and it learns through a training process how to distinguish between benign and malignant all on its own.

Conversation 2 - Inter-species transplant reverses diabetes

A replacement pancreas that cures diabetic mice has been grown successfully in an animal of a different species by scientists in Japan. Tomoyuki Yamaguchi and his colleagues injected mouse stem cells into developing rat embryos. Once the rat had developed they were able to transplant the pancreas tissue into a group of diabetic mice, fixing their blood sugar levels for more than a year. Qiao Zhou, a stem cell biologist at Harvard University but who wasn't involved in the research, took Chris Smith through what the Tokyo-based team have achieved...

Zhou - What it did essentially is we managed to grow a mouse pancreas in a rat. Then we subsequently harvested this mouse pancreas from the rat and transplant it into a diabetic mouse and was able to show that this can reverse the diabetes of the recipient mouse.

Chris - Now why is that a breakthrough?

Zhou - First of all this has never been done before. This whole process, I think, points to a potential way to grow organs for future clinical use in human organ transplantation. I think that's the exciting part of it. It's a proof of concept.

Conversation 3 - Soft robotic heart pump

40 million people are affected worldwide by heart failure. This is where the heart muscle is diseased and cannot pump sufficient amounts of blood. It's very debilitating and it robs sufferers of their quality of life. At the moment, the only effective long-term solution is a transplant, but only a tiny minority of people are lucky enough to receive one. This prompted researchers to develop gadgets called ventricular assist devices that can be plumbed into the heart to help it to pump, but they're not without problems. Now Ellen Roche has designed a better one, which fits around the heart like a glove, as she explained to Chris Smith...

Ellen - This is a sleeve made of rubber with embedded balloons that can contract and beat with the heart to help the heart to pump additional blood the body. The advantage of this type of technology is that the sleeve goes around the outside of the heart and it doesn't contact the blood like the existing ventricular assisted devices.

Chris - Why is it a problem if these devices contact blood?

Ellen - Because blood is pumped through foreign materials and in contact with foreign components it can clot, and clotting can lead to events such as stroke. So patients who have these devices are on blood thinners and this medication can itself have complications.

Conversation 4 - Do roast potatoes give you cancer?

Jasmine - Acrylamide is essentially a naturally occurring chemical so that means we don't add it to foods, it just naturally is produced. It's mainly found in foods when those goods are cooked at high temperatures and for particularly long periods of time so it's usually when foods are baked, or fried, or roasted or toasted.

If we're looking at the foods that acrylamide is found in most commonly, it's in things like crisps, chips, biscuits, bread, and cake. These foods that I've mentioned contain the building blocks for this acrylamide to form basically. There's a special reaction, it's got quite a long name, it's called the malide reaction, so basically that's a chemical reaction that occurs between sugars and amino acids that are in the foods. When these two things, the sugars and amino acids, react and also with water, that produces this reaction and it creates acrylamide. That's what give the brown colour to food and it can also change the taste of food as well, so it gives it that roasted, charred taste that you might know.

Tom - So we're thinking roast potatoes or brown toast?

Jasmine - Yes, that's right. That the malide reaction.

Tom - Why is acrylamide bad? What's the potential issue here?

Jasmine - The concern has basically come from a number of animal studies that have found that acrylamide has the potential to damage our DNA inside ourselves and, basically, DNA damage can lead to cancer. It's really important though that people remember that the same process hasn't been established in humans. So we don't have the data, we don't have the evidence to say that's there's also a link between acrylamide and cancer risk at the moment, so we need more research in that area.

Conversation 5 - Obesity blamed for 12,000 cancers a year

Kat - When you think about things that increase the risk of cancer, you probably list things like smoking, UV rays from the sun or air pollution. But in fact, like the inflation of the nation's waistlines, there's a growing number of cancers that are linked to obesity and being overweight. A new study published in The Lancet this week from scientists at London School of Hygiene and Tropical Medicine has looked at more than 5 million people in the UK and concluded that around 12,000 cancers every year can be put down to excess weight. I spoke to lead researcher Krishnan Bhaskaran to find out more.

Krishnan - So, this was a very large study. We were able to include data from over 5 million people. The way that we did that was to access anonymised GP records from across the country. What we did was we put together the height and weight measurements that have just been made in regular GP consultations as part of routine care. We also looked forward in those anonymised records to see later on whether there are any diagnoses of cancer in the same people.

Kat - What sort of timescale are we talking from those measurements being made to then a diagnosis of cancer, 5 years, 10 years, 20 years?

Krishnan - Well, it varied, but the data source that we had access to, the earliest kind of records from that were in the late '80s, early '90s. So for some people, we had about 20 years. So, on average, I think we had I think 6 to 7 years of follow up for the average person in the study.