

thebiotutor

Unit F212: Molecules, biodiversity, food
and health

Module 2.2 Food & Health

Answers

1. 24.7;;

If answer incorrect or to the wrong number of dp, then

ALLOW one mark for working: $69 \div 1.67^2$

24.74 = one mark

IGNORE 25 and look for working mark

*If units are given, they **must** be kg m^{-2} (or kg/m^2)*

Max 1 for incorrect units

[2]

2. 1 coronary heart disease / CHD / atherosclerosis / angina /
coronary thrombosis / myocardial infarction / heart attack /
cardiac arrest / cardiovascular disease / stroke;

DO NOT CREDIT heart disease alone / arteriosclerosis

2 (osteo)arthritis;

DO NOT CREDIT rheumatoid arthritis

3 (Type 2) diabetes;

DO NOT CREDIT Type 1 diabetes

4 high blood pressure / hypertension;

5 gallstones;

6 cancer;

ACCEPT any type of cancer

[2]

3. physical;
disease/illness/sickness;
carbohydrates;
animal/saturated;
20; **A** from 20 to 60
70;

6

[6]

4. 1 high level of saturated fat in diet;
2 animal fat / red meat / dairy products;
3 high cholesterol (in blood / body);
4 lack of, vitamin E / antioxidants;
5 high salt in diet;
6 obesity linked to, high blood pressure / hypertension;
7 damage to artery, walls / endothelium;
8 cholesterol transported in lipoproteins;
9 cholesterol deposited in artery walls;
10 in coronary arteries;

- 11 atherosclerosis / atheroma;
 12 formation of, plaques / fatty streaks;
 13 hardening / loss of elasticity (of artery wall);
 14 roughens lining / increases friction;
 15 clot formation / thrombosis / thrombus;
 16 narrows / restricts, lumen;
 17 reduced / restricted, blood flow / oxygen, to heart muscle;
 18 heart (muscle), under stress / works harder;
 19 angina / heart attack / myocardial infarction / heart failure / hypertrophy; **R** CHD
- 20 AVP; e.g. aneurism in aorta
 21 AVP; low density lipoproteins (LDL) associated with deposition
 high density lipoproteins (HDL) associated with less deposition 7 max

QWC – clear well organised using specialist terms;

1

award the QWC mark if four of the following are used in correct context

| | | | | |
|--|-----------------------|-------------|--------------|--------------|
| saturated | coronary | cholesterol | lumen | |
| vitamin E | atherosclerosis | | antioxidants | |
| blood pressure | | | plaque | hypertension |
| endothelium | thrombus | | thrombosis | |
| angina | myocardial infarction | | atheroma | |
| (low density / high density) lipoprotein | | | | |

[8]

5. (i) *any three from the following:*
award mark only if structure related to suitable function

variable region is antigen binding site; **R** receptors / 'sticky ends' / active site

(shape of) variable region specific to antigen / amino acid sequence (of variable region) gives, complementary / matching, shape;

hinge region allows flexibility in binding / AW;

constant region, for binding to receptors on cells / phagocytes / mast cells;

AVP; e.g. disulphide bonds hold polypeptide chains together

3

- (ii) human and chimp are more closely related;
 common ancestor is more recent;
 less time for, mutations / variation, to arise;

2

[5]

6. (i) phagocyte / macrophage / dendritic cell; **A** antigen presenting cell / APC
R white blood cell / lymphocyte / neutrophil 1
- (ii) bacteria in vacuole / phagosome; **A** lysosome
bacterium, cut up / partly, digested / partly broken down / AW
(so antigens still whole);
enzymes / lysins / lysozyme;
AVP; e.g. hydrolysis / hydrolases 2 max
- (iii) receptors / binding sites;
on cell surface membrane (of T helper cell);
complementary to antigen; **R** matching **A** analogy to lock and key 2 max
- (iv) mitosis; **R** cloning 1
- (v) produced during, primary / first, immune response / exposure to antigen;
remain in body; **A** blood / tissue fluid etc
(memory cell or antibody) specific to antigen;
produce secondary response;
more quickly / no symptoms;
divide / clone, to make plasma cells;
(plasma cells) manufacture antibodies;
more antibodies made / antibodies accumulate faster;
gives long term immunity / immunological memory / AW; 4 max
- [10]

7. (a) *Plasmodium* / *P. vivax* / *P. falciparum*;
Anopheles;
 infected;
 blood;
 vector; **R** carrier
 (blood) transfusion / shared needle / across placenta / at birth / AW;
R mixing blood unless qualified 6
- (b) *reduce mosquito numbers*
 stock ponds with fish (*Gambusia*) to eat larvae; **R** kill mosquitoes
 oil on surface;
 spray bacteria (*Bacillus thuringiensis*) to kill mosquito larvae;
 DDT / pesticide spray;
 release of sterile male mosquitoes;
 draining, ponds / bodies of water;
- avoid being bitten by mosquitoes*
 wear insect repellent;
 long sleeved clothes;
 sleep under nets;
 nets soaked in, insecticide / repellent;
 sleep with, pigs / dogs;
- use drugs to prevent infection*
 use, prophylactic drug / quinine / chloroquine / larium / artemesinin /
 vibrimycin / tetracycline / antimalarial;
 use malaria vaccine; 2 max
 [8]
8. (a) *mental*
 Alzheimer's / schizophrenia / phobia / anorexia / depression / Parkinson's /
 Huntington's / CJD / AVP;
- self-inflicted*
 alcoholism / cirrhosis / smoking addiction / drug addiction / lung cancer /
 obesity / CHD / anorexia / AVP; **R** unnamed cancer
- inherited*
 sickle cell / haemophilia / cystic fibrosis **A** CF / diabetes / Huntington's /
 Down's syndrome / AVP; 3
- (b) (i) to find out where, rates are highest / people are most at risk;
 to keep track of infection rates over time;
 to see where, disease is likely to spread / epidemic most likely;
 to help research (into how it is spread / into effectiveness of drugs);
 to allow organisations to provide aid where it is needed most;
 to allow organisations to provide education (about disease)
 where it is needed most;
- AVP; e.g. tourist industry
 e.g. limit potential spread by migration or imports 3 max

- (ii) education on HIV/AIDS less effective in Africa;
 sexual attitudes / number of partners;
 availability of condoms; **R** general reference to contraceptives,
 not used / refused
 poverty / poorer / less money;
 sex industry;
 less primary health care / less likely to be diagnosed;
 AVP; e.g. ref. to unsterilised or untreated blood
 unsterilised needles or surgical apparatus
 civil war / rape
 no alternative to breast feeding
R access to drugs for treatment
R no vaccine
R ref to intravenous drug addiction

2 max

- (c) find person who is immune;
 isolate gene that provides immunity;
 identify protein (receptor) that provides immunity;
 develop drug (to fit normal receptor) that provides immunity;

(gene used to) manufacture, drug, protein / antibody / immunoglobulin,
 giving immunity;
 protein used as, vaccination / cure / AW;

gene therapy used in at risk groups / AW;

AVP;
 AVP;

2 max

[10]

9. (a) (chronic) bronchitis;
 emphysema;
 COPD;
 heart disease;
 stroke;
two marks available for the following
 lung / mouth / throat / breast / bladder / oesophagus / prostate other
 named cancer;;
 AVP; e.g. gangrene, erectile dysfunction
 AVP;

2 max

(b) *max 3 for each named component*

carbon monoxide (no mark)

- c1** binds to haemoglobin / forms carboxyhaemoglobin;
- c2** irreversibly / permanently; **A** greater affinity than for oxygen
- c3** less effective oxygenation of haemoglobin; **R** oxidation
- c4** shortage of breath;
- c5** damages lining of arteries;
- c6** AVP;

max 3

nicotine (no mark)

- n1** addictive;
- n2** adrenaline released;
- n3** increases heart rate;
- n4** reduced circulation to extremities / vasoconstriction;
R contract **A** narrow lumen
- n5** sticky platelets;
- n6** cause blood clotting / thrombosis;
- n7** AVP; e.g. ref to effect on synapse / brain function

max 3

tar (no mark)

- t1** coats the (internal) surfaces of breathing system; **A** lungs
- t2** reducing efficiency of exchange;
- t3** irritation of mucous membranes;
- t4** goblet cells stimulated / over secretion of mucus;
- t5** inactivation of, cilia / ciliated epithelium;
A destroys / damages **R** kills
- t6** mucus not moved;
- t7** coughing;
- t8** carcinogenic / cancer-causing / causes mutations;
- t9** causes emphysema / described; **R** ref to elastin damage alone
- t10** AVP; e.g. ref to more infections / increased risk of chronic bronchitis

max 3

may be awarded anywhere

AVP; strain on heart / heart disease

AVP; raised blood pressure / hypertension

8 max

QWC – clear well organised using specialist terms;

1

award the QWC mark if four of the following are used in the correct context

| | | |
|------------------|--------------------|--------------|
| haemoglobin | carboxyhaemoglobin | affinity |
| oxygenation | addictive | adrenaline |
| vasoconstriction | lumen | platelets |
| thrombosis | mucous membranes | goblet cell |
| cilia | epithelium | carcinogenic |
| emphysema | bronchitis | hypertension |

[11]