

Mark schemes

Q1.

- (a) bind fluorescent dye to mAbs 1
- put (bound) fluorescent mAbs on the slide (and rinse off)
ignore add mAbs and dye to slide (unbound) 1
- mAbs will bind to Candida albicans / pathogens and show up under the microscope
allow mAbs will bind to Candida albicans / pathogens and show up under UV (lamp) 1
- (b) more Candida albicans / pathogens will be engulfed / killed by phagocytes / white blood cells 1
- allow Candida albicans / pathogens will be engulfed / killed by phagocytes / white blood cells more quickly*
do not accept white blood cells produce antibodies
do not accept lymphocytes engulf Candida albicans
- therefore less damage to cells / tissues / organs
ignore less toxin released (by Candida albicans) 1
- (c) Level 2: Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account. 4-6
- Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear. 1-3
- No relevant content 0
- Indicative content
- given first to healthy volunteers
 at (very) low dose
 to test it is safe or to test for toxicity or to check for any side effects
 - then to some patients (with the disease) or people with the

disease

- to test for the correct / optimum dose
- to check for any side effects
- to test for efficacy or to test if it works
- in a double blind trial
- where neither patients nor doctors know who has the mAbs and who has a placebo (or alternative treatment)

- reference to large trial or long duration or control variables

(d) any one from:

- (the body will) not reject the mAbs
or (the body is) less likely to reject the mAbs
do not accept idea of rejection of cells
- mouse mAbs are (more likely to be) rejected
- the human lymphocytes have already responded to that infection / cancer cell so they are known to work against the disease

1

[12]

Q2.

(a) any two from:

- regular hand washing
or
use hand sanitiser / alcohol gel
- cover nose / mouth when coughing / sneezing
allow wear a face mask
- put used tissues (straight) in the bin
- don't kiss uninfected people
allow isolate patient from others
- or
don't share cutlery / cups / drinks with uninfected people
- clean / disinfect / sterilise surfaces regularly
ignore responses referring to infected people

2

(b) any three from:

- stimulate (mouse) lymphocytes to produce antibody
for marking points 1 and 2 lymphocyte must be used at least once
- combine (mouse) lymphocyte with tumour cell
or
(create a) hybridoma
- clone (hybridoma) cell
- (hybridoma) divides rapidly and produces the antibody

3

(c) any two from:

- (monoclonal) antibody binds to virus or antibody binds to antigen on surface of virus

- (monoclonal) antibody is complementary (in shape) / specific to antigen (on surface of virus)
 - white blood cells / phagocytes kill / engulf the virus(es)
- 2
- (d) as a control
or
to see / compare the effects of the treatment (vs. no treatment)
- 1
- (e) $(4.8 + 10.4) \div 2 \div 100 \times 1500$
or
 $(4.8 \div 100 \times 750) + (10.4 \div 100 \times 750)$
- 1
- 114
- an answer of 114 scores 2 marks
allow 228 for 1 mark*
- 1
- (f) (supports the conclusion because)
over double the number / % of patients (in the trial) were hospitalised with the placebo (compared to MAB)
- 1
- (does not support the conclusion because)
no information on patients not hospitalised / still unwell at home
- or
- allow correct named factor e.g. age / gender / other illness*
- other factors may have affected those admitted to hospital
- or
- don't know if it was a double blind trial
- 1
- [12]

Q3.

- (a) A
- 1
- (b) any one from:
- identify / locate specific molecules / other hormones
 - locate blood clots
 - diagnose / treat some cancers
- 1
- (c) (as) urine passes through reaction zone
- 1
- HCG hormone binds to the mobile HCG antibody (in the reaction zone)
- 1
- (passes up the stick) HCG hormone binds to the immobilised HCG antibodies in the results zone
- 1

(the other) antibodies which do not attach to HCG 1

bind to antibodies in control zone 1

blue dye appears in both control and results zones (to show positive result) 1

[8]