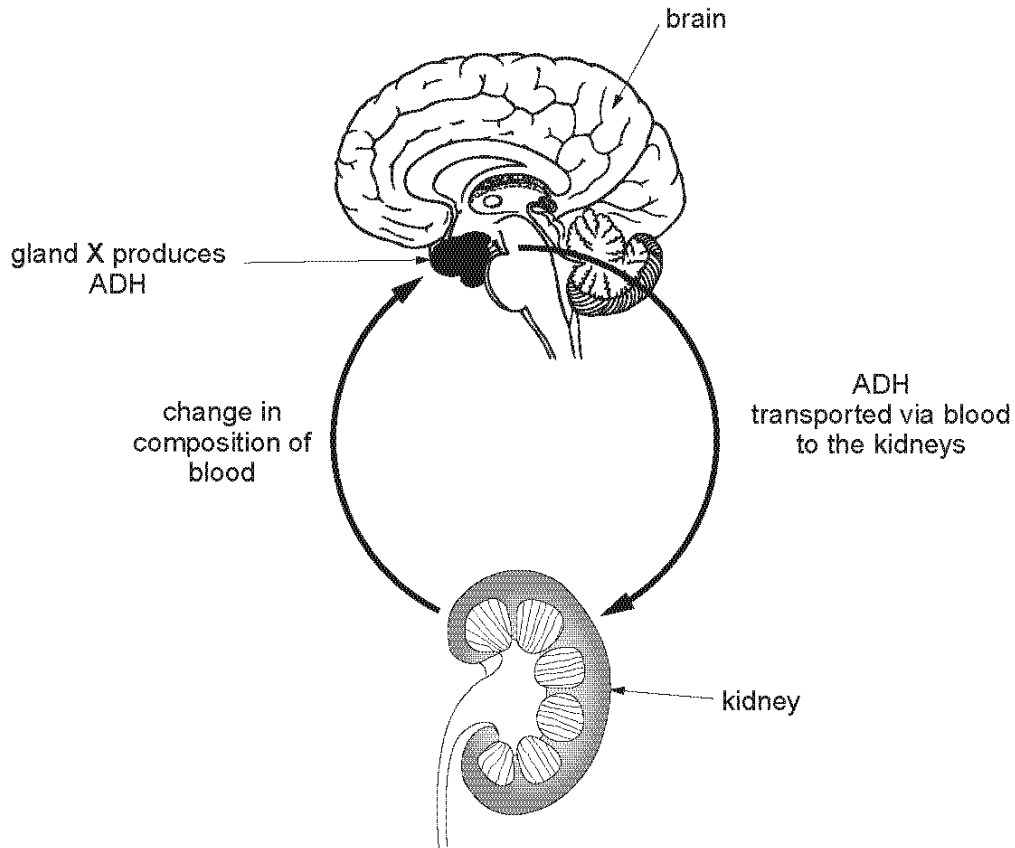


WJEC (Wales) Biology GCSE
Topic 2.6 Kidneys and
Homeostasis
Questions by Topic

1. The diagram below shows some of the processes which control the composition of blood and urine.



- (a) Identify the stimulus which causes gland X to release ADH. [1]

.....

- (b) Describe the effect of an increase in ADH production on the kidney and on the composition of urine. [3]

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2. The presence of protein in the urine is a symptom of a kidney disease called nephrotic syndrome. The drug endaravone is used as a treatment for this disease. Rats with nephrotic syndrome were used to investigate the effects of endaravone. A control group of healthy rats was also used in the investigation.

The results are shown in the table:

group of rats	protein in urine (mg/day/rat)
control	0
with nephrotic syndrome	350
after treatment with endaravone	0.5

(a) (i)

.....

(ii) Give a reason for the absence of protein in the urine of rats which do not show nephrotic syndrome (control group). [1]

.....

.....

(b) State three factors which must be kept the same in this investigation. [3]

(i)

(ii)

(iii)

(c) How would you increase the strength of evidence in this investigation? [1]

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3. Explain how anti-diuretic hormone (ADH) helps the kidneys regulate the water content of the blood. [6 QWC]

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4. Basiliximab is a monoclonal antibody used to suppress the immune system of kidney transplant patients. It works by preventing white blood cells from attacking the cells of donor organs and therefore reduces the probability of rejection.

(a) (i) Apart from rejection, state another disadvantage of kidney transplants. [1]

.....

(ii) Explain why and how white blood cells of the recipient would attack the cells of the donor organ therefore leading to rejection. [3]

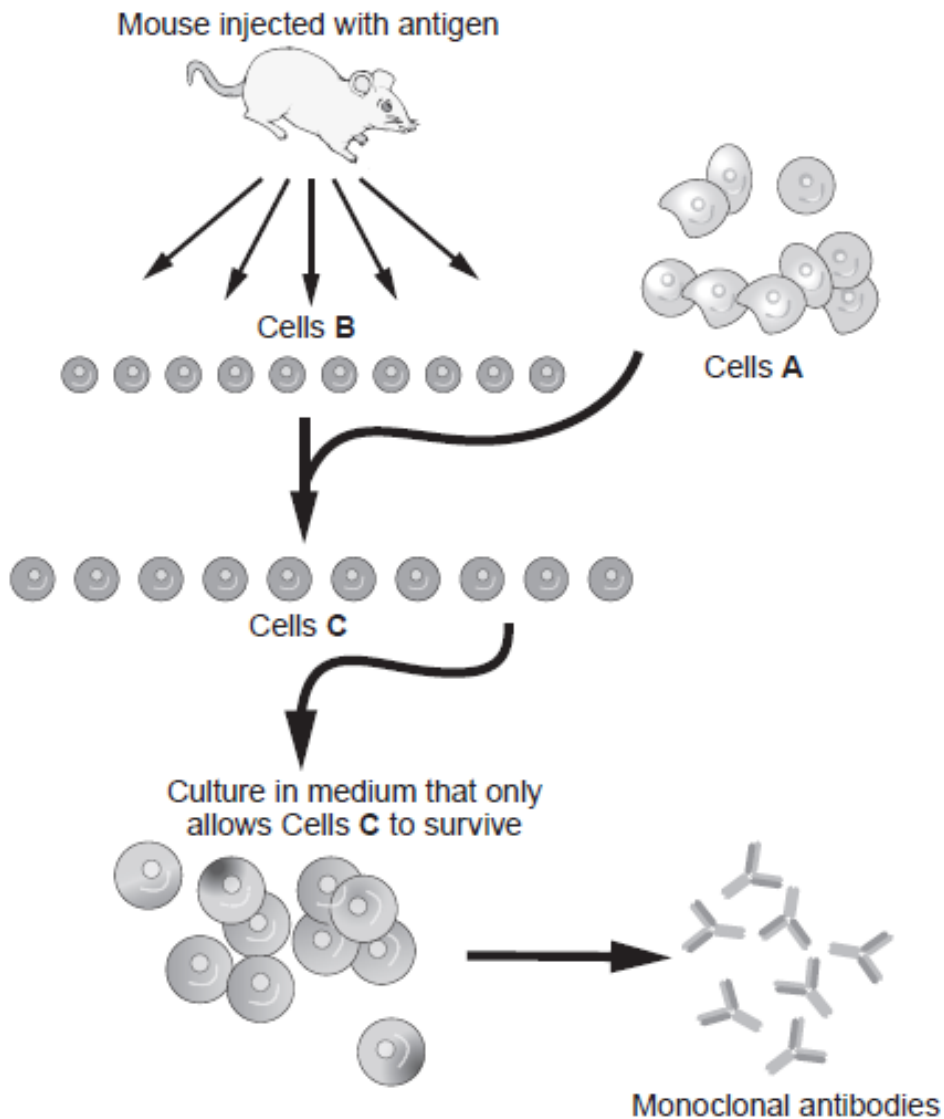
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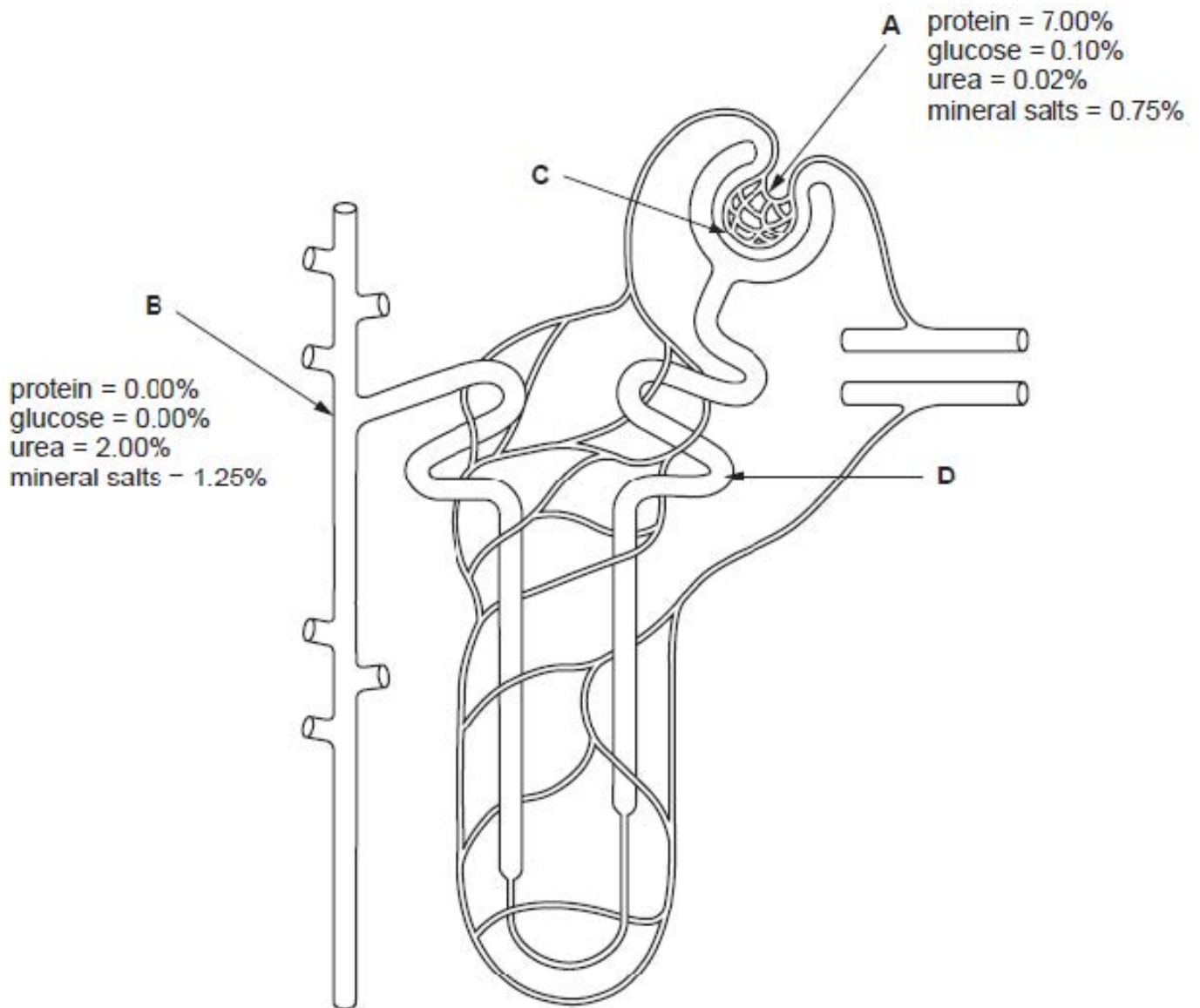
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(b) The diagram below shows a process for producing monoclonal antibodies.



5. The diagram below represents a human nephron. The concentration of various substances is shown at two different points, **A** and **B**.



(a) Use the diagram and your own knowledge to answer the following questions.

(i) Name and describe the process occurring at point **C**. [2]

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(ii) Explain why the concentration of glucose is different at points **A** and **B**. [1]

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(iii) State the name of structure **D**. [1]

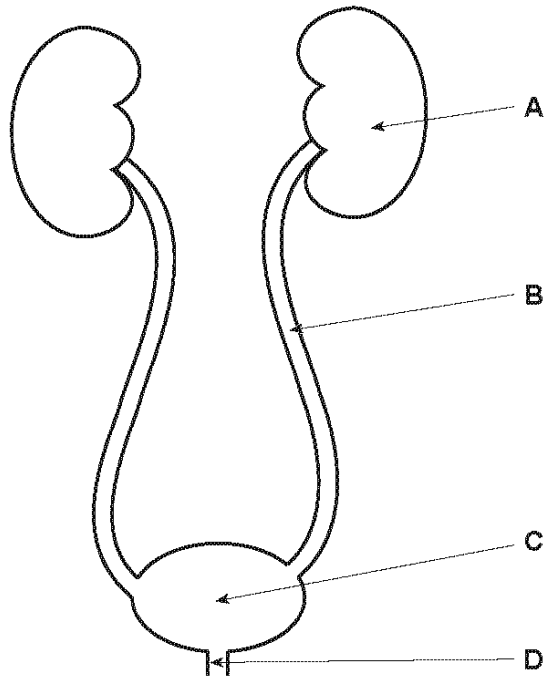
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(b) State a reason for the increase in the concentration of urea and mineral salts between points **A** and **B**. [1]

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6.

The diagram below shows the excretory system of the human body.



(a) From the diagram above, complete the table below.

[3]

Letter on diagram	Name of structure	Function
.....	ureter
.....	carries urine out of the body
C

(b) (i) Name two waste substances excreted in urine.

[1]

.....

(ii) State how the concentration of the urine changes when there is too little water in the blood.

[1]

.....

7.

- (a) Complete the sentence. [1]

The kidneys remove waste products in a process called

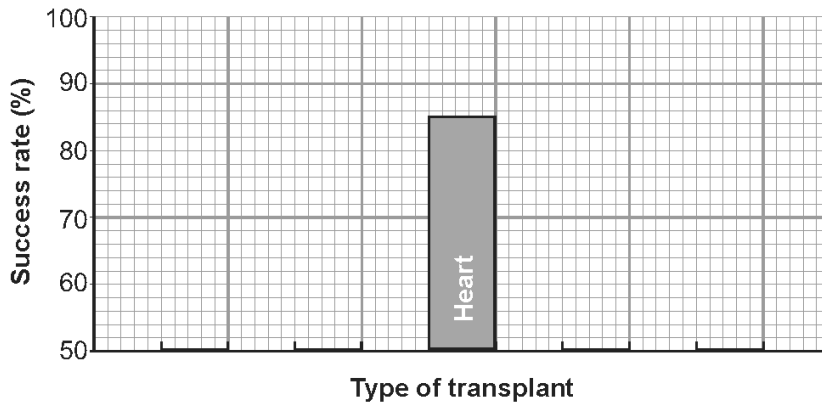
- (b) When a human organ fails to function doctors can carry out a transplant operation using an organ from a donor. The transplant is said to be successful if the transplanted organ functions normally for at least one year.

The table below compares the success rates of some transplant operations.

type of transplant	success rate (%)	year when doctors first started transplants	number of years doctors have been doing transplants (up to 2014)
kidney (family donor)	98	1960	54
kidney (non-family donor)	87	1960	54
lung	77	1986
heart	85	1975
liver	84	1983	31

- (i) Complete the table by writing your answers on the dotted lines. [1]

- (ii) Complete the bar chart below by adding the bars for kidneys, liver and lung. Place the bars in order from the **most** to the **least** successful and label them. *The bar for heart has been completed for you.* [3]



- (iii) Use only information in the table and the bar chart to suggest a reason why the success rates for the various transplant operations are different. [1]

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- (iv) From your own knowledge, explain why a kidney transplant is more likely to be successful when the donor is a family member. [2]

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8. (a) (i) The following information relates to the kidney.
Draw lines to join the scientific terms with the correct descriptions. [2]

scientific term	description
ureter	fluid leaving the kidney
urethra	tube carrying waste solution out of the body
urine	tube carrying waste solution to the bladder

- (ii) Name the process by which waste substances are removed from the blood by the kidneys.
Underline your answer. [1]

excretion elimination egestion

- (b) Kidney failure can be treated by a transplant.
State what can be done to reduce the risk of rejection of a transplanted kidney.

- (i) **Before** the transplant operation. [1]

.....

- (ii) **After** the transplant operation. [1]

.....

(c) Kidney failure can also be treated using a machine, which removes waste from the blood.



(i) Name the process carried out by this machine. [1]

.....

(ii) Give one **disadvantage** of this treatment, compared with a kidney transplant. [1]

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9. (a) What is meant by the term excretion? [1]

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(b) The table below shows mean fluid intake and urine produced in astronauts studied before and during space flights.

sampling period	mean water intake (cm ³)	mean urine produced (cm ³)	percentage of mean water intake that passes into the urine (%)
day before flight	3800	2700	71.0
during flight	2500	1700

(i) Calculate the percentage of mean water intake that passes into the urine during a flight. Write your answer in the table above. Use the space below for your working out. [1]

(ii) During space flights, the kidneys remove unusually high levels of salts from the blood.

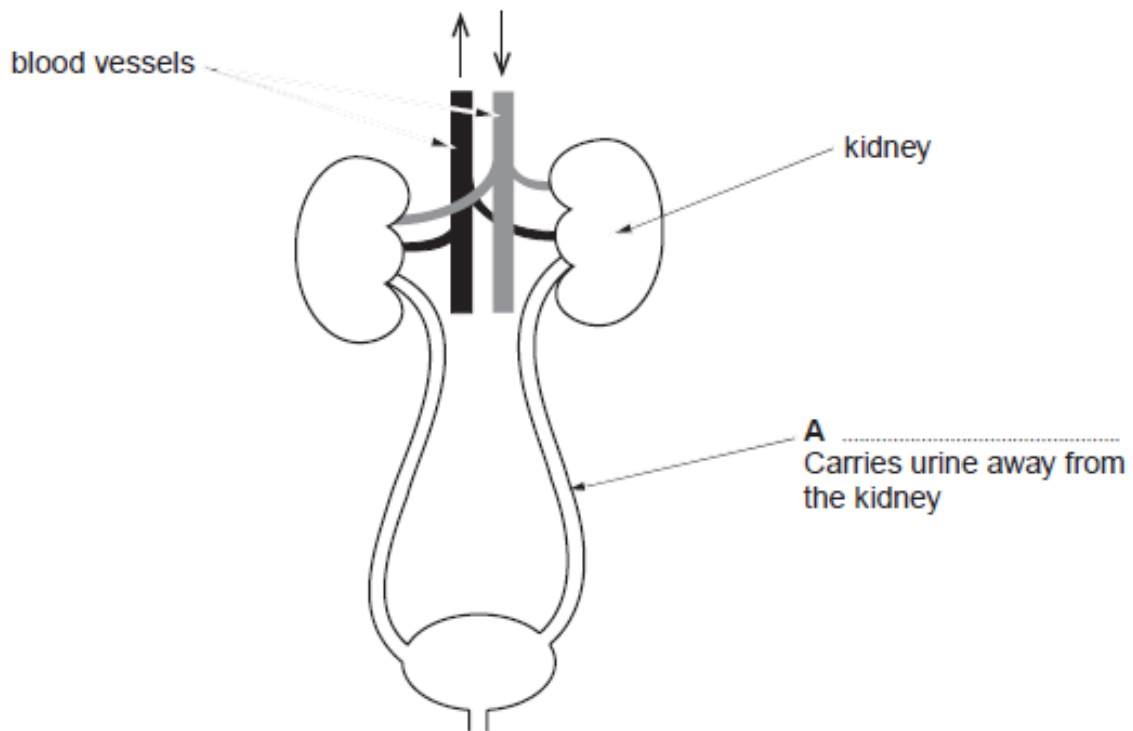
I. What happens to salts removed from the blood by the kidneys? [1]

.....

II. Use data in the table and the information above to describe and explain how the concentration of urine changes during a space flight. [2]

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10. The diagram shows the human excretory system.



- (a) **Complete** label **A** on the diagram. [1]
- (b) A doctor investigated the concentrations of some substances present in the blood entering and leaving a patient's kidneys.

Substance	Concentration in blood (a.u.)	
	blood entering kidney	blood leaving kidney
glucose	168	168
salt (sodium)	35	33
protein	180	150
urea	314	11

- (i) From the table, state the waste substance which would be present in the patient's urine at the highest concentration. [1]

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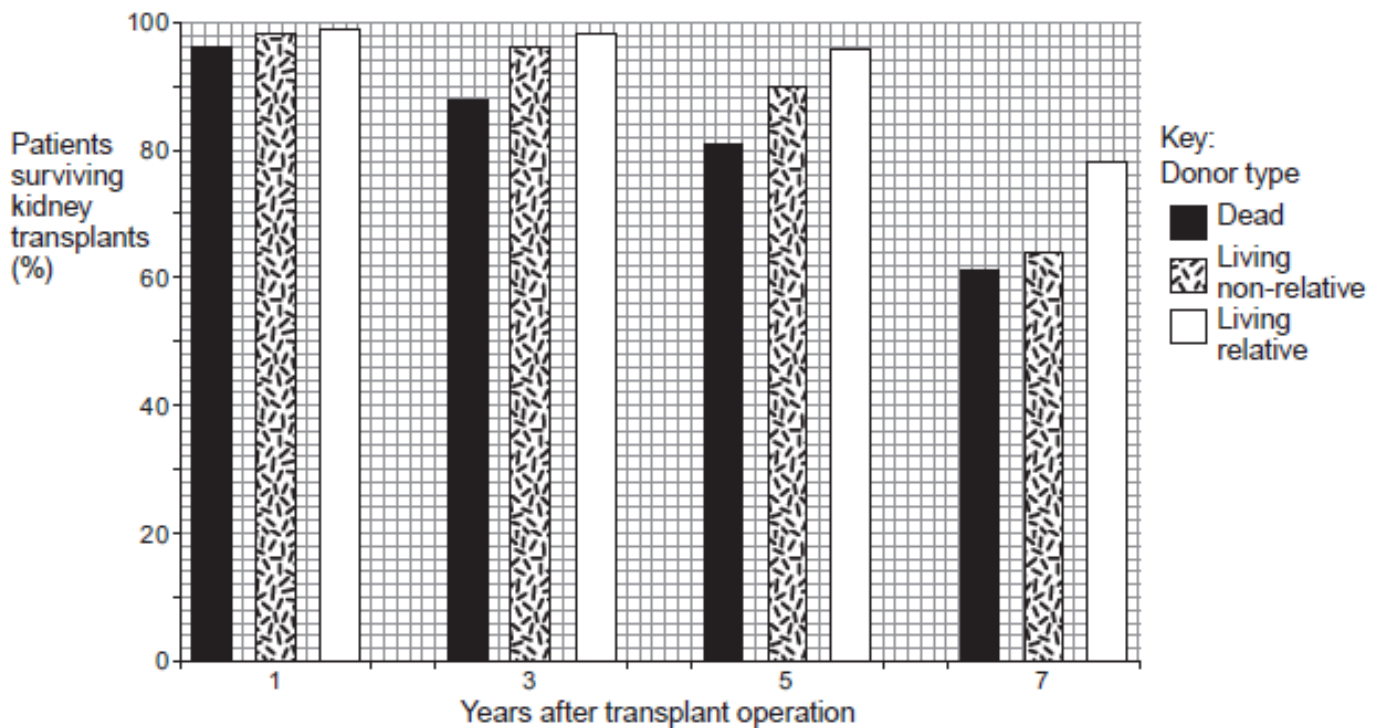
- (ii) The doctor thought that this patient's urine would contain protein but no glucose. What is the evidence in the table to support this? [2]

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.....

- (c) In the case of serious kidney disease a transplant operation can be carried out if a suitable kidney is available from a donor.

The bar chart shows the results of kidney transplant operations with donors of different types. All the recipients and donors were aged 30 – 50 years.



From the bar chart state **three** conclusions that can be drawn to compare the survival of patients after kidney transplant operations with different types of donors. [3]

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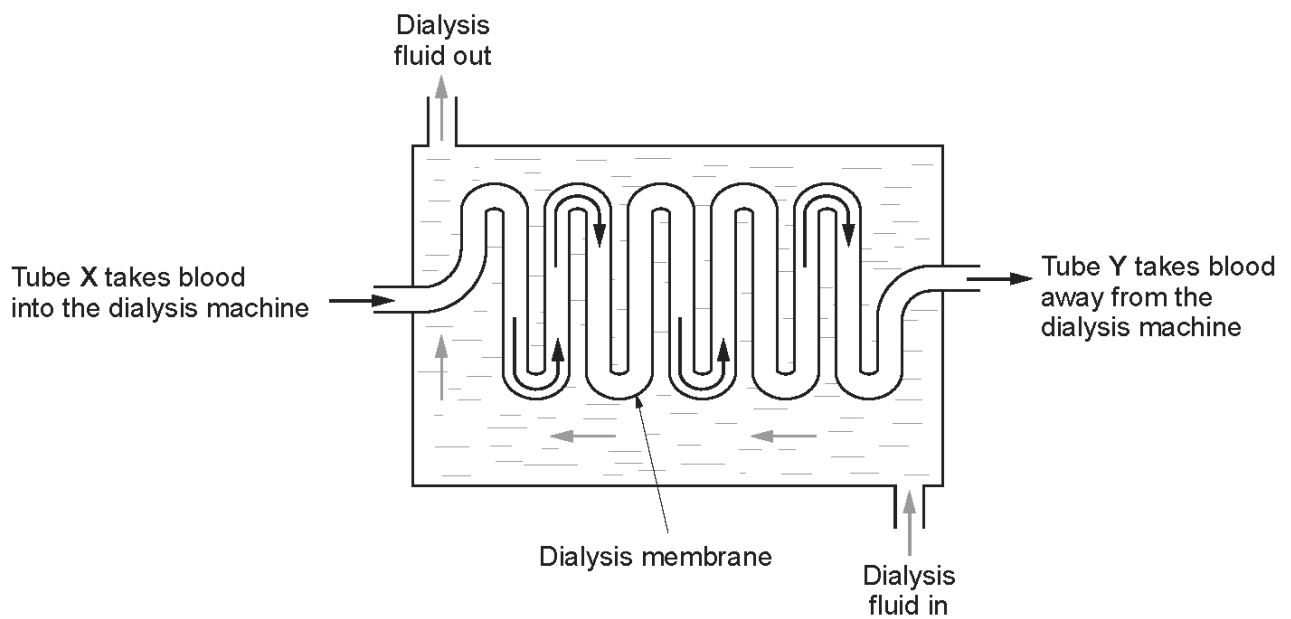
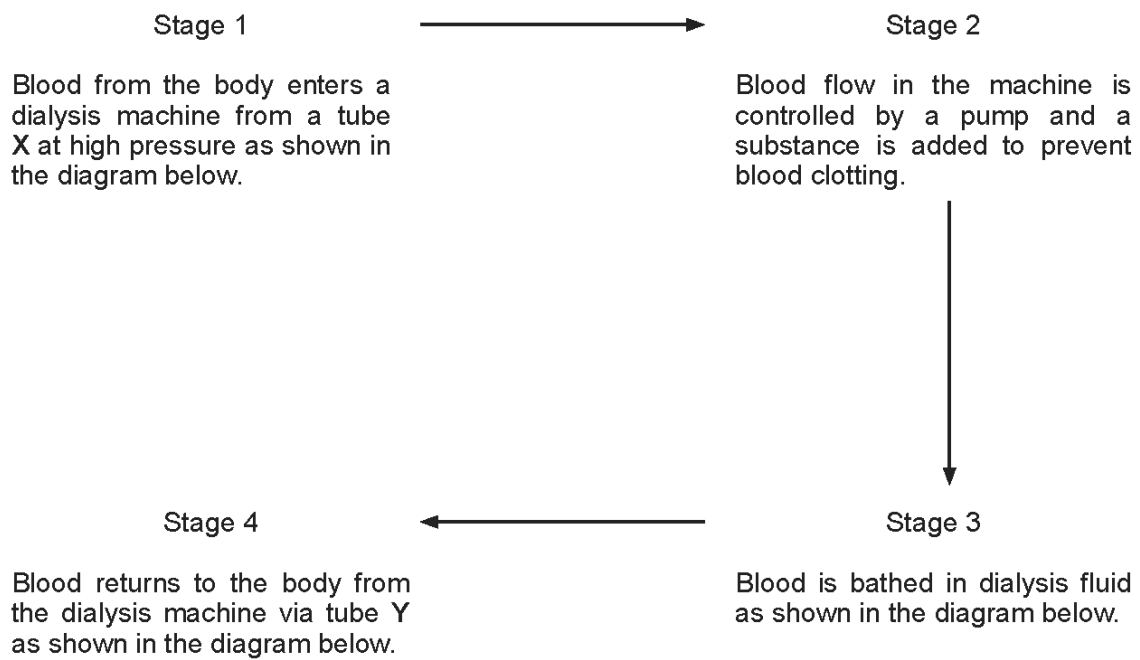
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- (d) Insufficient donor kidneys are available. What other form of treatment can be offered to people with kidney disease? [1]

.....

11. When the kidneys fail to function, treatment may be necessary using a kidney dialysis machine. The flow diagram below outlines a procedure of kidney dialysis.



(a) (i) What blood vessels in the body are equivalent to tubes X and Y shown in the diagram on page 14? [2]

X

Y

(ii) Suggest why it is necessary to prevent blood clotting in stage 2. [1]

.....
.....

(iii) State the process by which molecules, other than water, will filter from the blood into the dialysis fluid. [1]

.....

(iv) Suggest why the blood and the dialysis fluid are flowing in opposite directions in stage 3. [1]

.....
.....

(b) What other treatment might a person have if their kidneys fail to function? [1]

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