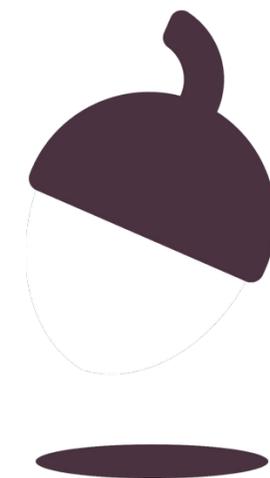


Biology - KS4

Homeostasis and Response

Review lesson - Osmoregulation

Miss Ray



OAK
NATIONAL
ACADEMY

Exam style question

Describe how the water balance in the body is controlled by a hormone released by the pituitary gland. [6]



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Describe how the water balance in the body is controlled by a hormone released by the pituitary gland. [6]

When water concentrations are low, more ADH is released by the pituitary gland into the blood. This increases reabsorption of water in the kidney. Small volumes of concentrated urine is produced, returning water levels back to normal.

When water concentrations are high, less ADH is released which decreases reabsorption of water in the kidney. Large volumes of dilute urine is produced to return water levels back to normal.



Exam style question

Evaluate the use of kidney transplant and dialysis treatments. [6]



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Evaluate the use of kidney transplant and dialysis treatments. [6]

Points in favour of a kidney transplant:

- Patients are able to live a relatively normal life/more convenient/less time consuming;
- Patients do not have to follow a restricted diet;
- There is a lower risk of infection;
- There is a lower risk of developing blood clots;
- Transplants are a longer term treatment;
- Transplants are less expensive for the NHS.

Points in favour of dialysis:

- There may be a long wait for a suitable kidney/there is a shortage of organ donors;
- Risk of rejection;
- Patient must take immunosuppressant drugs for their entire life - increased risk of illness;
- Antigens/tissues of kidney cells must match the patients;
- Risks associated with surgery.



Exam style question

Explain why less urine is produced on a hot day. [5]



Exam style question

Explain why less urine is produced on a hot day. [5]

When it is hot, the sweat gland release more sweat to cool the body down.

This reduces the water concentration of the blood.

When water concentrations are low, more ADH is released by the pituitary gland into the blood.

This increases reabsorption of water in the kidney.

Small volumes of concentrated urine is produced, returning water levels back to normal.



Exam style questions

1. Describe how the kidney produces urine. [4]

Blood enters the kidney at high pressures. This filters water and small molecules out of the blood and into the nephron. Useful molecules such as glucose are selectively reabsorbed back into the blood. Waste products such as excess ions, water and urea form the urine.

2. Explain why urine is more dilute on a cold day. [3]

When it is cold less water is lost as sweat. Therefore, blood water levels are higher and so urine is more dilute as less water is reabsorbed.



Exam style questions

1. What hormone controls osmoregulation and what gland secretes it? [2]
2. Osmoregulation is controlled by a negative feedback loop. Explain how water levels are controlled by a negative feedback loop within the body. [6]



Exam style questions

1. What hormone controls osmoregulation and what gland secretes it? [2]

ADH is secreted by the pituitary gland.

2. Osmoregulation is controlled by a negative feedback loop. Explain how water levels are controlled by a negative feedback loop within the body. [6]

When water concentrations are low, more ADH is released by the pituitary gland into the blood. This increases reabsorption of water in the kidney. Small volumes of concentrated urine is produced, returning water levels back to normal. When water concentrations are high, less ADH is released which decreases reabsorption of water in the kidney. Large volumes of dilute urine is produced to return water levels back to normal.



Substance	Concentration of each substance in the urine (g/dm³)	
	Patient A	Patient B
Protein	0.0	3.0
Glucose	0.0	0.0
Urea	11.0	11.0

Which patient suffers from kidney failure?

Explain your answer. [2]



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Which patient suffers from kidney failure?

B

Explain your answer. [2]

Protein molecules are too large to pass out of the membrane of a healthy person.



Exam style questions

1. Describe how a dialysis machine is used to treat kidney failure. [3]
2. Fibrinogen is a blood protein that is responsible for blood clotting. Explain why fibrinogen concentrations remain the same in the blood before and after dialysis. [2]



Exam style questions

1. Describe how a dialysis machine is used to treat kidney failure. [3]

The dialysis machine restores the concentration of water and mineral ions to normal and removes waste products such as urea.

2. Fibrinogen is a blood protein that is responsible for blood clotting. Explain why fibrinogen concentrations remain the same in the blood before and after dialysis. [2]

Protein molecules are too large to pass through the membrane of the dialysis machine.



Exam style questions

Organ rejection is a risk that patients and doctors must consider before undergoing a kidney transplant.

1. Explain what causes organ rejection. [3]
2. Describe two measures that must be taken to reduce the risk of organ rejection. [2]



Exam style questions

Organ rejection is a risk that patients and doctors must consider before undergoing a kidney transplant.

1. Explain what causes organ rejection. [3]

The immune system produces antibodies which attack the antigens on the transplanted organ, damaging it.

2. Describe two measures that must be taken to reduce the risk of organ rejection. [2]

Patients must take immunosuppressant drugs every day and the antigens on the organ must be matched to the patient's own antigens.



Copy and complete the table

Treatment	Advantages	Disadvantages
Dialysis		
Kidney Transplants		

Risk of rejection
Cheaper for the NHS
Must follow a restrictive diet
Immediate treatment



Copy and complete the table

Treatment	Advantages	Disadvantages
Dialysis	Immediate treatment	Must follow a restrictive diet
Kidney Transplants	Cheaper for the NHS	Risk of rejection

Risk of rejection

Cheaper for the NHS

Must follow a restrictive diet

Immediate treatment



Exam style question

Discuss the pros and cons of dialysis and kidney transplant treatments. [6]



Points in favour of a kidney transplant:

- Patients are able to live a relatively normal life/more convenient/less time consuming;
- Patients do not have to follow a restricted diet;
- There is a lower risk of infection;
- There is a lower risk of developing blood clots;
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