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BIOLOGY

THE CONTROL OF GENE EXPRESSION

Level & Board	AQA (A-LEVEL)
TOPIC:	EPIGENETICS AND RNA INTERFERENCE
PAPER TYPE:	SOLUTION - 1
TOTAL QUESTIONS	6
TOTAL MARKS	31

Epigenetics and RNA interference - 1

1.

(a) 625

2.

(a)

Cell membrane has a phospholipid bilayer.

No need for channel/carrier protein.

(b)

Both are more effective than the control.

SDs do not overlap.

Significant difference in effectiveness between both types.

HBsAg not zero.

Not investigated in humans.

No indication of sample size.

3.

(a) Steroid hormones are derived from cholesterol and therefore can readily diffuse through the lipid bilayer of the cell membrane to reach the intracellular receptor

OR

The cell surface membrane is made up of a phospholipd bilayer.

Hydrophobic molecules are lipid soluble so can easily move through the membrane

(b)

The AR has a specific site which will be complementary to the shape of testosterone hormone.

Because the AR is a protein and proteins fold to have a specific tertiary shape.

(c) Expression of the genes is controlled by transcription factors which binds to specific DNA sites

And activates RNA polymerase so when AR enters the nucleus it could act as a transcription factor

OR

AR is a transcription factor

It binds to the DNA

Which stimulates RNA polymerase

(d)

With 16 or fewer than 16 repeats the association is significant

With 17 or more than 17 repeats the association is not significant

With 16 or fewer than 16 repeats there is less than a 5% or less than 0.05 probability of being due to chance

With 16 or fewer than 16 repeats reject the null hypothesis

4.

(a)

Antisense mRNA is complementary to 'sense' mRNA

Antisense mRNA would bind/base pair to sense mRNA

Ribosomes would not be able to bind

Preventing/less production of SUT1 protein

5.

(a)

DNA is complementary to mRNA

Binds to mRNA for huntingtin

Prevents translation

(b)

Small sample size

Only four months

Huntington protein still produced

Brain already damaged

6.

(a)

Drug will directly reach brain

Drug not destroyed by acid

Drug not digested by enzymes

(b)

Increased methylation of DNA

Inhibits transcription

Decreased methylation of DNA

Stimulates transcription

Decreased acetylation of histones which inhibits transcription

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- Founder & CEO of Chemistry Online Tuition Ltd.
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