CHEMISTRY ONLINE TUITION

Phone: +442081445350

www.chemistryonlinetuition.com

Email:asherrana@chemistryonlinetuition.com

BIOLOGY

THE CONTROL OF GENE EXPRESSION

Level & Board	AQA (A-LEVEL)
TOPIC:	CANCER
PAPER TYPE:	QUESTION PAPER - 1
TOTAL QUESTIONS	6
TOTAL MARKS	34

Cancer - 1

1.

(a) In 2016, there were 525 048 deaths in the UK. In all, 30.4% of deaths were due to cancer. 5% of all cancer-related deaths were due to throat cancer.

Determine the average monthly death toll from throat cancer in 2016.

Display your work**. (2)**

One form of throat cancer in humans is brought on by increased methylation of a tumor suppressor gene's promoter region.

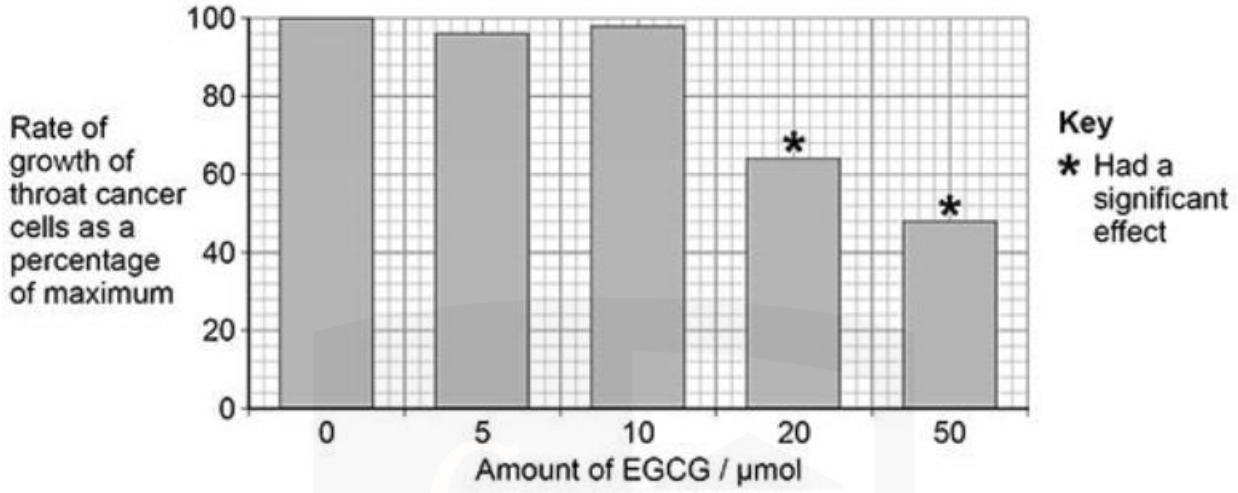
The higher methylation in this type of throat cancer can be transferred to daughter cells by the cancer cells themselves. The DNMT enzyme is the source of the methylation.

Researchers have discovered that EGCG, a compound contained in green tea, is a competitive inhibitor of DNMT. The tumor suppressor gene can be translated into messenger RNA (mRNA) by daughter cells thanks to EGCG.

(b) Explain how EGCG enables daughter cells to produce mRNA. **(3)**

2.

(a) The effect of varying EGCG concentrations on the in vitro growth rate of throat cancer cells was examined by the scientists. The graph that follows displays their findings.



After reading over all of this research, a reporter came to the conclusion that green tea might be able to treat cancer.

(a) Provide three arguments against the validity of his conclusion**. (3)**

3.

(a) Different kinds of gene mutation exist.

Mark the check (✓) next to any sentence that inaccurately explains the impact of a mutation in an exon of a gene. **(1)**

A substitution may not result in a change to the encoded amino acid.	☐
An inversion will result in a change in the number of DNA bases.	☐
A deletion will result in a frame shift.	☐
An addition will result in a frame shift.	☐

(b) Explain how mutations in genes that prevent the growth of tumors can cause tumors to form**. (3)**

(c) Every eight hours, a certain kind of malignant tumor cell divides.

After four weeks, how many tumor cells, starting with one of these cells, will be there?

Suppose that none of these cells perish.

Provide a standard response**. (2)**

I am Sorry !!!!!

4.

(a) A mutagenic agent can occasionally break DNA. The damaged DNA is bound by an additional enzyme known as ATM. This results in the activation of a protein that a tumour suppressor gene codes for. Cell division is halted by ATM binding until DNA repair occurs.

A person may have non-functional versions of the gene that codes for ATM as a result of a mutation.

What consequences might an ATM that isn't working have, in your opinion?

(3)

I am Sorry !!!!!

5.

(a) Explain the meaning of epigenetics. **(2)**

(b) In eukaryotes, several transcriptional factors that go from the cytoplasm into the nucleus can either stimulate or inhibit the transcription of target genes.

Transcription can be initiated by control factors such as oestrogen, methyl groups, and acetyl groups.

Fill in the table to display these control factors' properties.

check the box (✓), If the control factor displays the feature**. (2)**

	Feature	
Control factor	**Binds with DNA**	**Binds with protein**
Oestrogen		
Methyl groups		
Acetyl groups		

(c) Describe the possible link between elevated methylation and cancer. **(3)**

(d) Describe one way that benign and malignant tumors are different from one another. **(2)**

6.

(a) Describe how cancer may result from the methylation of tumour suppressor genes. **(3)**

I am Sorry !!!!!

Researchers looked into potential connections between women's death rates from breast cancer in ten different countries and the quantity of fat in their diets.

The table below displays their data.

Percentage of fat in diet of population	Death rate of women from breast cancer per 100 000 women
9.5	1.5
15.0	7.0
20.0	12.0
25.0	9.0
32.0	15.0
35.0	8.0
35.0	20.0
40.5	18.0
43.0	24.0
45.0	26.0

(b) Explain how you would plot these data on an appropriate graph. Justify your choice of graph type. **(3)**

(c) From these data, what conclusions can you draw**? (2)**

DR. ASHAR RANA

CHEMISTRY ONLINE TUITION

Phone: +442081445350
www.chemistryonlinetuition.com
Email: asherrana@chemistryonlinetuition.com

- Founder & CEO of Chemistry Online Tuition Ltd.
- Tutoring students in UK and worldwide since 2008
- CIE & EDEXCEL Examiner since 2015
- Chemistry, Physics, and Math's Tutor

CONTACT INFORMATION FOR **CHEMISTRY ONLINE TUITION**

- UK Contact: 02081445350
- International Phone/WhatsApp: 00442081445350
- Website: www.chemistryonlinetuition.com
- Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK