**Q1.**Metastatic melanoma (MM) is a type of skin cancer. It is caused by a faulty receptor protein in cell-surface membranes. There have been no very effective treatments for this cancer.

Dacarbazine is a drug that has been used to treat MM because it appears to increase survival time for some people with MM.

Doctors investigated the use of a new drug, called ipilimumab, to treat MM. They compared the median survival time (ST) for two groups of patients treated for MM:

•        a control group of patients who had been treated with dacarbazine

•        a group of patients who had been treated with dacarbazine and ipilimumab.

The ST is how long a patient lives after diagnosis.

The doctors also recorded the percentage of patients showing a significant reduction in tumours with each treatment.

The total number of patients in the investigation was 502.

The table below shows the doctors’ results.

|  |  |  |  |
| --- | --- | --- | --- |
|   | **Treatment** | **Median survival time (ST) / months** | **Percentage of patients showing significant reduction in tumours** |
|   | Dacarbazine | 9.1 | 10.3 |
|   | Dacarbazine and ipilimumab | 11.2 | 15.2 |

(a)     The doctors compared median survival times for patients in each group.

How would you find the median survival time for a group of patients?

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**(2)**

(b)     In many trials of new drugs, a control group of patients is given a placebo that does not contain any drug.

The control group in this investigation had been treated with dacarbazine.
Suggest why they had not been given a placebo.

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**(1)**

(c)     A journalist who read this investigation concluded that ipilimumab improved the treatment of MM.

Do the data in the table support this conclusion? Give reasons for your answer.

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**(Extra space)** ................................................................................................

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**(4)**

(d)     MM is caused by a faulty receptor protein in cell-surface membranes.
Cells in MM tumours can be destroyed by the immune system.

Suggest why they can be destroyed by the immune system.

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**(Extra space)** ................................................................................................

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**(3)**

**(Total 10 marks)**

 **M1.**(a)     1.      Rank all STs in ascending order;

2.      Find value with same number (of people) above and below.

*Accept find middle value*

**2**

(b)     Not ethical to fail to treat cancer.

**1**

(c)     Yes since with ipilimumab:

1.      Median ST increased by 2.1 months;

2.      Percentage of patients showing reduction in tumours increased from 10.3% to 15.2%;

No because:

3.      No standard errors shown / no (Student) t- test / no statistical test carried out;

4.      (So) not able to tell if differences are (statistically) significant / due to chance (alone);

5.      Improvement might only be evident in some patients / no improvement in some patients;

6.      Quality of (extra) time alive not reported;

*If answers relate only to ‘Yes’ or ߢNo’, award 2 marks max*

**4 max**

(d)     1.      Faulty protein recognised as an antigen / as a ‘foreign’ protein;

2.      T cells will bind to faulty protein / to (this) ‘foreign’ protein;

3.      (Sensitised) T cells will stimulate clonal selection of B cells;

4.      (Resulting in) release of antibodies against faulty protein.

**3 max**

**[10]**