Can you spot a cancer mutation?

Below are traces of sequenced DNA displaying different regions of the KRAS gene. DNA sequence from a healthy cell is shown above that of a tumour cell. Using the key provided, write out the DNA sequence for each trace. Compare the healthy and tumour sequences. If you find a difference, circle the letter(s) that have changed and complete the table below using the banner and codon wheel provided.

### Healthy cell DNA

<table>
<thead>
<tr>
<th>Amino Acid Number</th>
<th>Healthy DNA Sequence</th>
<th>Tumour DNA Sequence</th>
<th>Healthy Amino acid</th>
<th>Tumour Amino Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>GGT</td>
<td>GTT</td>
<td>Glycine (G)</td>
<td>Valine (V)</td>
</tr>
</tbody>
</table>

### Tumour cell DNA

<table>
<thead>
<tr>
<th>Amino Acid Number</th>
<th>Healthy DNA Sequence</th>
<th>Tumour DNA Sequence</th>
<th>Healthy Amino acid</th>
<th>Tumour Amino Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
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**Healthy cell DNA**

```
GTAGTTGGAGCTGGTTGCGTAGGCAGAGAGT
```

**Tumour cell DNA**

```
GTAGTTGGAGCTGGTTGCGTAGGCAGAGAGT
```

**Table: Healthy vs. Tumour Amino Acid Sequences**

<table>
<thead>
<tr>
<th>Amino Acid Number</th>
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</thead>
<tbody>
<tr>
<td>13</td>
<td>GGC</td>
<td>GAC</td>
<td>Glycine (G)</td>
<td>Aspartic Acid (D)</td>
</tr>
</tbody>
</table>

**Key**

C - Cytosine
G - Guanine
T - Thymine
A - Adenine
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**Healthy cell DNA**

```
350  360  370
A A T A A T G T G A T T T G C C T T C T A G A A C A G T A
```

**Tumour cell DNA**

```
350  360  370
A A T A A T G T G A T T T G C C T T C T A G A A C A G T A
```

**Key**

- C - Cytosine
- G - Guanine
- T - Thymine
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</thead>
<tbody>
<tr>
<td>30</td>
<td>GAC</td>
<td>GAT</td>
<td>Aspartic Acid (D)</td>
<td>Aspartic Acid (D)</td>
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</tbody>
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</tr>
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</table>

Amino Acid Table:

- **Healthy cell DNA**
  
  - DNA sequence: AGAACAAAATTAAAGAGTC

- **Tumour cell DNA**
  
  - DNA sequence: TCGACACAGCAGGTCAAGAGAGGTACAGT

Key:

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Healthy cell DNA


Tumour cell DNA


Amino Acid Number | Healthy DNA Sequence | Tumour DNA Sequence | Healthy Amino acid | Tumour Amino Acid
---|---|---|---|---
146 | GCA | CCA | Alanine (A) | Proline (P)
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**Healthy cell DNA**

```
TTTCTTTGTTGTATTTGCCATAAATAATACT
```

**Tumour cell DNA**

```
TTTCTTTGTTGTATTTGCCATAAATAATACT
```

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**Amino Acid**

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<tbody>
<tr>
<td>173</td>
<td>GAT</td>
<td>GAC</td>
<td>Aspartic acid (D)</td>
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**Healthy cell DNA**

- Sequence: ATGACTGAAATATAAACCTTTGGTAGTTGGA

**Tumour cell DNA**

- Sequence: ATGACTGAAATATAAACCTTTGGTAGTTGGA

### Amino Acid Comparison Table

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### Key

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**yourgenome.org**
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**Healthy cell DNA**

![Healthy cell DNA trace]

```
AGTTATGGAAATTCCTTTTATTGAAACATCA
```

**Tumour cell DNA**

![Tumour cell DNA trace]

```
AGTTATGGAAATTCCTTTTATTGAAACATCA
```

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### Healthy cell DNA

**DNA Sequence:**

- 460 to 470: GGTGTGTGGATGATGCTCTTCTATACATTAGTT
- 480: G

### Tumour cell DNA

**DNA Sequence:**

- 460 to 470: GGTGTGTGGATGATGTCTCTTCTATACATTAGTT
- 480: G

### Healthy cell DNA

**DNA Sequence:**

- 320: TCTGAAAGATGTACCTATGGTCCTAGTAGGA
- 330: T
- 340: C

### Tumour cell DNA

**DNA Sequence:**

- 320: TCTGAAAGATGTACCTATGGTCCTAGTAGGA
- 330: T
- 340: C

### Table

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**Healthy cell DNA**

GATTCCTACAGGAAGCAAGTAGTAATTGAT

**Tumour cell DNA**

GATTCCTACAGGAAGCAAGTAGTAATTGAT

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</thead>
<tbody>
<tr>
<td>N/A</td>
<td>GATTCCTACAGGAAGCAAGTAGTAATTGAT</td>
<td>GATTCCTACAGGAAGCAAGTAGTAATTGAT</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Healthy cell DNA**

AAAATCATTTGAAGGATATTACCATTATAG

**Tumour cell DNA**

AAAATCATTTGAAGGATATTACCATTATAG

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<td>AAAATCATTTGAAGGATATTACCATTATAG</td>
<td>AAAATCATTTGAAGGATATTACCATTATAG</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
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