C3.2 Defence against disease: data-based questions

What the Cell · DP Biology · data-based questions

Name _____ **Date** _____ **Total** _____ / 14

Read the data carefully before you answer. The number of marks shows how many separate points to make. Show your working in calculations.

1 Antibiotic peptides on the skin

8 marks

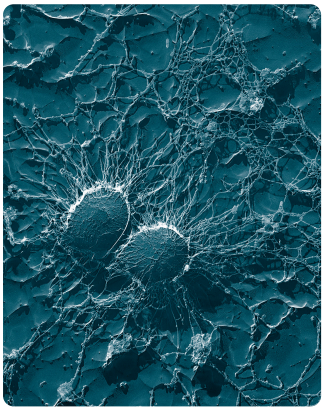
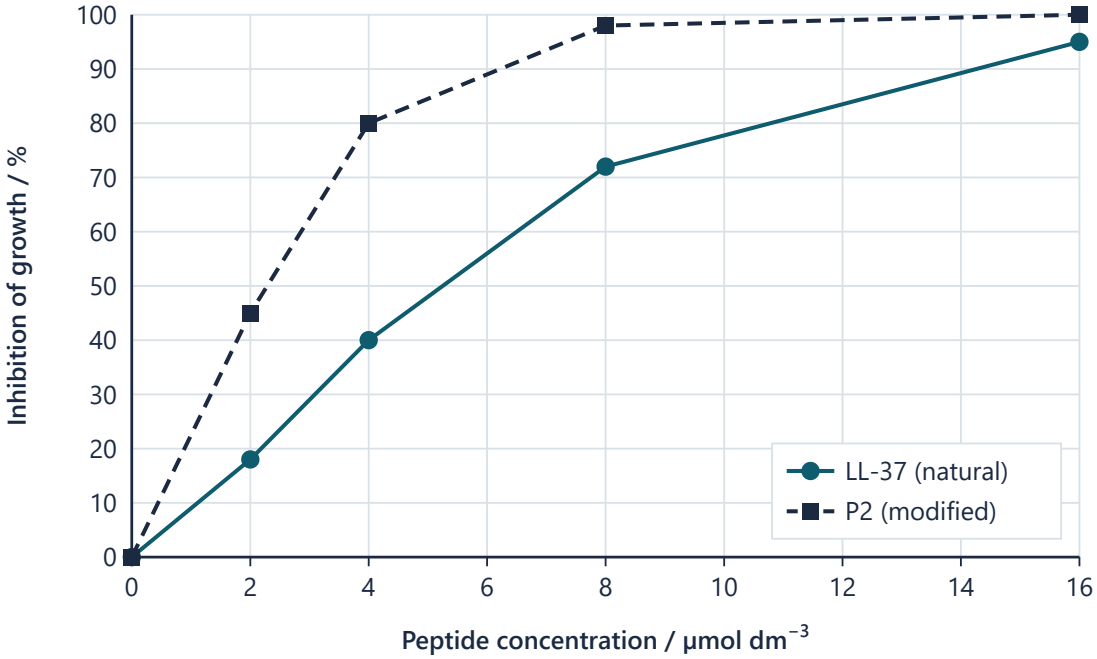


Photo: Eric Erbe, Christopher Pooley, Public domain, Wikimedia Commons.

Human skin makes a peptide, LL-37, that kills some bacteria. A modified version, P2, was designed in the laboratory. Each peptide was added at different concentrations to cultures of *Staphylococcus aureus*, and growth was compared with untreated cultures.



a **State** the inhibition of growth by LL-37 at 8 μmol dm^{-3}. **[1]**

b **Compare** the effects of the two peptides on *S. aureus*. **[2]**

Some antibiotic peptides also damage human cells. Human skin cells were grown with each peptide for 16 hours, and the percentage of cells with broken DNA was measured.

Peptide / μmol dm^{-3}	0	2	6	10
LL-37: cells with broken DNA / %	3	3	8	21
P2: cells with broken DNA / %	3	3	4	6

c **Calculate** the percentage increase in cells with broken DNA when LL-37 rises from 2 to 10 μmol dm^{-3}. **[2]**

d Using all the data, **discuss** whether P2 would be a better treatment than LL-37 for skin infections. **[3]**

2 Gut bacteria and body mass

6 marks

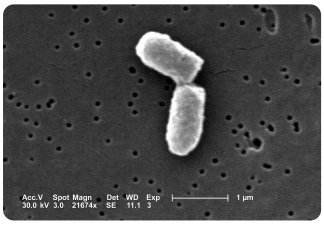
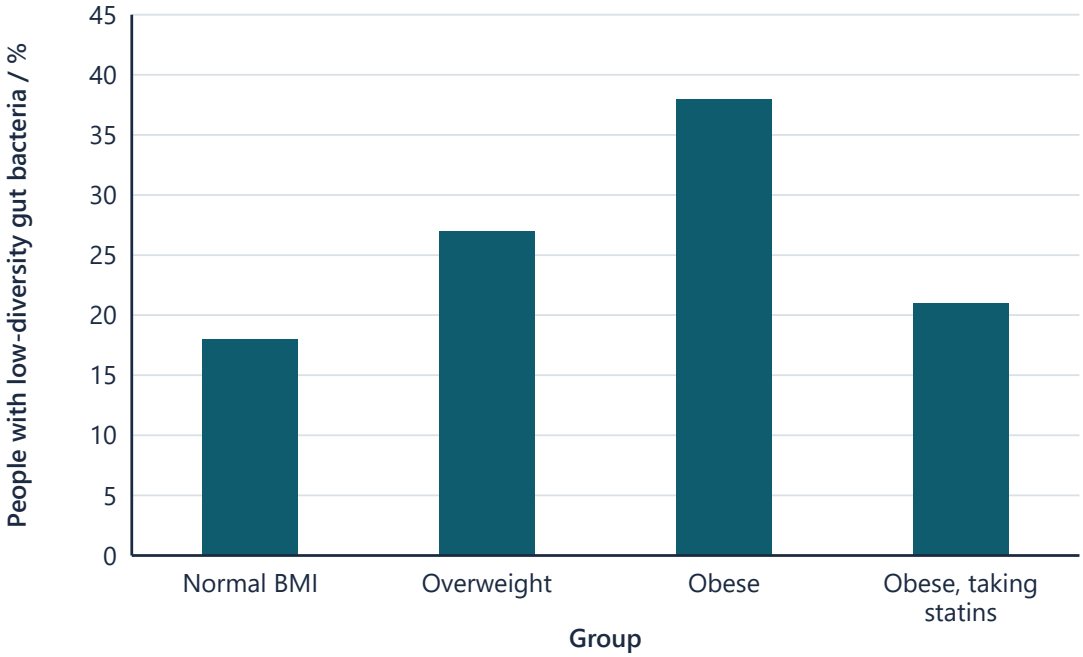


Photo: CDC/ Evangeline Sowers, Janice Haney Carr€, Public domain, Wikimedia Commons.

The human gut contains hundreds of species of bacteria. Some people have a low-diversity type of gut community, which is linked with inflammation. Gut bacteria were identified in 1100 adults, grouped by body mass index (BMI). Some of the people with obesity took statins, drugs that lower blood cholesterol.



a **Describe** the trend in low-diversity gut bacteria with BMI. **[1]**

b **Calculate** how much lower, as a percentage, the proportion is in obese people taking statins than in obese people not taking them. **[1]**

c **Suggest** two ways in which diet could affect the bacteria living in the gut. **[2]**

d **Discuss** whether these data show that statins improve the gut bacteria of people with obesity. **[2]**