Key Stage 3
Beneficial bacteria

Student worksheet

You are actually mostly bacteria. Your body contains around 1 trillion human cells and 10 trillion bacteria, most of which are beneficial and play an important role in keeping you healthy.

Your intestines are home to many different species of bacteria, which all interact with each other in a mini ecosystem called a microbiome. What you eat isn’t just food for you, but food for your bacteria as well; so it is important that you eat foods that keep your bacteria healthy.

Feeding your bacteria

Eating the right foods will help to increase the number of beneficial bacteria in your intestines, as well as the number of different species.

Complex carbohydrates, such as vegetables and wholegrains (called prebiotics) help the bacteria in our body to grow.

Probiotics contain living bacteria. These include live yoghurt and other fermented foods.

Does eating (or drinking) probiotics actually increase the number of bacteria living in your intestines? We are not sure. One reason is that your stomach contains acid, which may kill the bacteria before they even reach your intestines.

Your task

Design an experiment to find out if the bacteria in probiotics can survive their journey to your intestines.

You have the following equipment:

different probiotic foods hydrochloric acid
sodium hydroxide (an alkali) conical flask/beaker
universal indicator paper stirring rod
disposable pipettes measuring cylinder
petri dishes containing nutrient jelly (contains nutrients for the bacteria to grow on)
incubator (a warm place to put the bacteria so it will grow)

Here are some facts to help you:

- Stomach acid has a concentration of around 0.2 mol/dm$^3$ and a pH of 1-2.
- Food stays in the stomach for about 20 minutes, where it is mixed with stomach acid.
- The mixture of acid and food then enters the intestines, where it is mixed with alkaline juices to reach a pH of around 8.
- The average volume of stomach acid in a young person is 50 cm$^3$.
- The temperature of the human intestines is 37°C.