

Show Me The Science

Building Blocks of Biofilms

Introduction:

What is a microorganism? Well a microorganism, or microbe for short, is a small (micro) living thing (organism) and they can be found EVERYWHERE!!! Most microbes don't bother us; some are beneficial like those that help to make bread, yoghurt, cheese, beer, and also medicines. Only 1% are pathogenic which mean that they can cause harm and illness. Some microbes attach and grow together creating a living habitat called a biofilm; the biofilm is then covered by a slimy matrix which protect the microbes within that biofilm. Although biofilms sound a bit sciency you actually see biofilms in the environment and also your body so you are probably familiar with them without being aware of what they are. When you wake up, before you brush your teeth do they feel a bit rough?? Well the dental plaque that builds up is a biofilm. If you have decking in the garden does that sometimes get a bit slimy during the winter when it rains? Again that's a biofilm. What about when you go to the beach and go rock pooling, are the rocks sometimes covered in a film of slime, yep you've guessed it, it's a biofilm. So you see you probably are already aware of biofilms without realising it.

This activity will help you to understand how biofilms grow and how using the correct antimicrobial medication is important, for example that you only take antibiotics if you have a bacterial infection.

You Will Need:

Building blocks (duplo/mega blocks)

Base plate for the building blocks

5 Ping pong balls

5 Sponge tennis balls

Hypothesis:

This activity is going to show how bacteria grow in a biofilm. The ping pong balls will represent antiviral medication and the sponge tennis balls will represent antibiotic medication. As we are building a model biofilm made up of bacteria we are expecting to see that the sponge balls will break the structure as they are representing antibiotics. We are expecting that as the ping pong balls are representing antiviral medication then they won't be effective on the bacterial biofilm.

Method:

Give yourself 30 second to use the building blocks and start to build an irregular structure on the base plate (as shown in the photo).

The structure must represent a biofilm and therefore you must follow a simple rule. Microbes like us need food and oxygen to survive so therefore do not grow as a tower. They overlap and overhang which produce channels within the structure for food and oxygen to get to the microbes at the centre of the biofilm.

When you have built your building blocks biofilm stand about 2 meters back and throw the ping pong balls at it.

Next throw the sponge tennis balls at it.

Results:

Do the results match the hypothesis? Did more of the biofilm get destroyed by balls that represented antibiotics or antivirals? Why do you think this is? Do you think that the type of antimicrobial medication has different effects on the biofilm depending on the microbes within that biofilm? Did you manage to clear all the building blocks from the base plates?