Microbe artwork shows the limits of antibiotics

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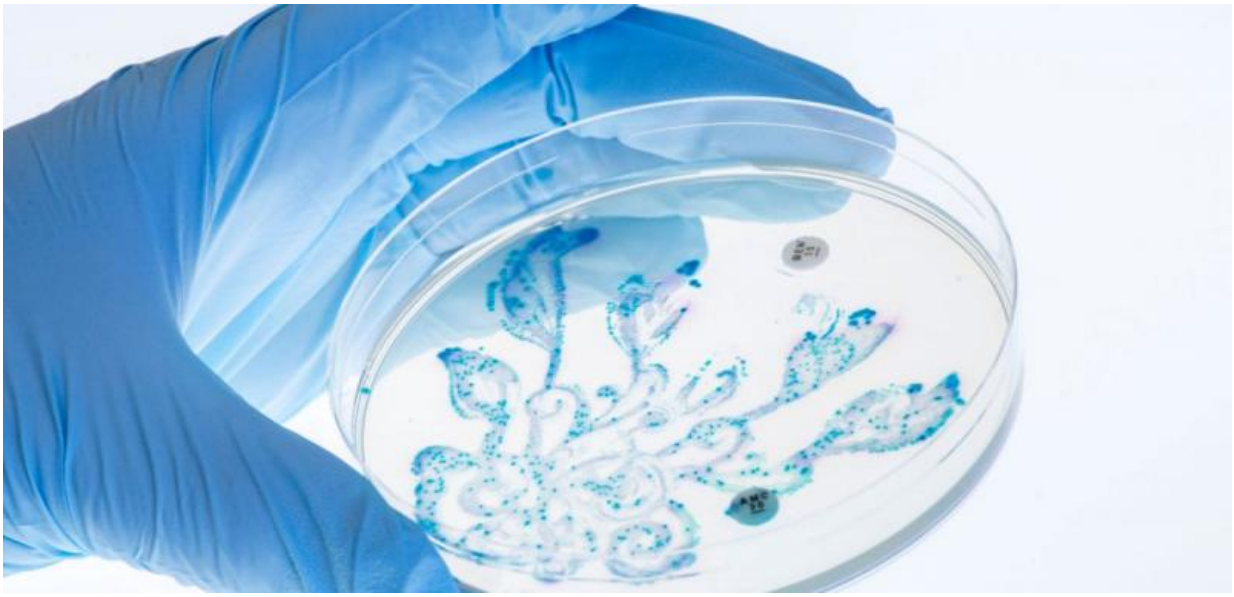

An Oxford University research fellow has been creating art using bacteria found in the human gut and harvested from faecal samples. But while the striking colours and plant like shapes may look beautiful, they also illustrate the increasing issue of antibiotic resistance.

Dr Nicola Fawcett is part of the Modernising Medical Microbiology research group at Oxford University, which is working to find out more about bacteria and viruses in order to control and better manage them,

ultimately improving people's health.

She said: "A healthy, desirable world is portrayed as one free of bacteria – sterile and scrubbed clean. It's increasingly clear that this isn't true and that we need bacteria in order to survive. One of the most important places this happens is in our partnership with the bacteria in the gut.

"Some bacteria are almost always beneficial, some are harmless, and some can be harmful. Some types can get out of control and cause damage if the careful balance between humans and bacterial community is disrupted.

"The artwork was created to help draw attention to the research we are doing into gut bacteria, how they are affected by lifestyle, health care, and by antibiotics, and what that means for our health."

The work was developed from a mixture of three common gut bacteria grown on a material called chromogenic agar, which changes colour in the presence of different bacteria. Purple shows E.coli, turquoise is Citrobacter, and the dark blue was caused by a tiny amount of a multi-drug-resistant Klebsiella (over 500 times less than the other bacteria). The bacteria were stamped onto the agar, and then left to grow overnight.

Each small round 'dot' is a bacterial colony of a few million individual bacteria, growing together. Mostly the colonies are so close, they merge. Generally the more numerous purple and turquoise bacteria can out-compete the dark blue Klebsiella, so that the Klebsiella colonies can only grow as big as pinpricks. This is similar to what happens in the gut, where 'beneficial' bacteria can out-compete more harmful ones and keep them under control.

The discs around the edge have antibiotics in them, which enter into the

agar and spread out, forming a 'halo' where bacteria find it harder, or impossible to grow. One disc, marked AMC, contains Co-Amoxiclav, an antibiotic used frequently in hospitals, which kills the purple E.coli.

Dr Fawcett said: For me, this is a reminder that the antibiotics I prescribe can sometimes cause unintended harm to gut bacteria that are helping to keep my patient healthy. A lot of the time, if my patient has a healthy, robust gut, the antibiotic doesn't cause any noticeable problems. Rarely, it can disrupt the balance so much that one bacteria, Clostridium difficile (or C. diff), takes over as its competition is destroyed and causes life-threatening illness.

The disc marked "MEM' contains Meropenem, one of a range of antibiotics called Carbapenems, the last, really effective antibiotic that can kill a range of bacteria without toxic side effects. The dark blue Klebsiella is able to survive much closer to the Meropenem antibiotic disc, than the purple E.coli, which is killed.

Dr Fawcett said: "The presence of the dark blue Klebsiella bacteria surviving close to the 'last line' antibiotic shows that we are already seeing bacteria which cannot be treated with last line antibiotics. Modern medicine, including surgical operations and cancer treatment, depends on having effective antibiotics to protect people from infection. These are already running out."

Provided by Oxford University