

A non-stick solution to a world-wide problem

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Throughout the world, public health is at risk through the rise of resistance to current antibiotics. Bacteria can rapidly develop mechanisms to make treatment with these drugs partly or completely ineffective. This resistance means that there is a pressing and urgent need to develop alternative approaches to fighting infections now and in the future.

Anti-adhesives are sugar-based molecules that stop bacteria from sticking to human cells, thus reducing their ability to infect humans. Many bacteria also form biofilms, which are thin films of viable bacteria attached to surfaces. In these biofilms, the bacteria stick tightly to each other and to the surface, making the surface very difficult to clean and disinfect. Biofilms are involved in the transmission and persistence of infections, as the bacteria are protected there. Usefully, the anti-adhesives also prevent bacteria from sticking to each other and to surfaces, meaning that they are effective against bacteria in biofilms and prevent their formation. In contrast to antibiotics, which work by killing bacteria, the anti-adhesives offer an interesting solution to treating and reducing infection through reducing infectivity rather than through the traditional bactericidal mechanisms. This radically new approach avoids the mechanisms which enable bacteria to avoid killing by current drugs.

We have developed a set of molecules (a “library”) that bind to the adhesive proteins on the surface of the bacterium *Pseudomonas aeruginosa*. This bacterium is an opportunistic pathogen which is responsible for severe lung infections, particularly in patients who are immunocompromised or who suffer from lung diseases like cystic fibrosis. When the anti-adhesive molecules bind to the adhesive proteins, these proteins can no longer stick to surfaces or to other cells, meaning that the bacterium can no longer form biofilms or infect humans.