New UCL discovery in the fight against antibiotic-resistant bacteria

Researchers at the UCLouvain have made a major new discovery in the research on bacteria. Jean-François Collet, professor at UCL's de Duve Institute, and his team have shown that when you change the structure of a bacterium, you decrease its ability to detect environmental stress and to activate stress responses against antibiotics. A breakthrough that opens the door to promising new treatments.

Bacteria have always existed. They appeared on earth long before us, millions of years ago. For several centuries, man has been constantly exploring them to understand how they work and, above all, to try to fight them. To better explain bacteria, Jean-François Collet, a researcher at the de Duve Institute of UCL, likes to compare them to a castle with a double protective enclosure. Three years ago, he and his team elucidated one of the defence mechanisms that bacteria use against antibiotics: they demonstrated that, to protect themselves, bacteria use sentinels that give warning signals as soon as, for example, an antibiotic appears. They then organize their defence and this is why medication sometimes is unable to fight them effectively.

The goal of the UCL research is to understand how bacteria defend themselves, in order to find ways to better attack them. Abir Asmar, a young doctoral student, and Jean-François Collet have modified the architecture of the bacterial cell by increasing the distance between the two protective walls. The result was that communication between the two walls no longer worked. The increased distance does not allow the sentinels to alert the bacterium that it is in danger and to transmit the message that it must activate its defensive weaponry. The UCL researchers then tried to compensate the size of the sentinels to see if, when they become larger, they would start communicating again. And the answer is positive: after proportionally increasing the sentinels, the information passes again. This indicates that altering the distance between the membranes of bacteria could be a new way to fight against these microorganisms. This work was done in collaboration with colleagues from the University of Utah (USA) and the Imperial College London (UK). It was published in the prestigious American journal PLOS Biology and funded by Welbio, UCL and the FNRS.

The interest of this discovery? If the UCL researchers are able to find a molecule that changes the distance between the two membranes of bacteria, they could identify new antibacterial compounds and thus take an important step in the fight against resistant bacteria (like Escherichia coli, for example). This next step is underway since Jean-François Collet and his team have developed a concrete strategy to identify these new molecules.

Currently, the resistance of some bacteria to antibiotics is a major health problem. More and more bacteria are becoming resistant to available antibiotics as they acquire new defence mechanisms. In this sense, the UCL discovery contribute to answering this growing problem.

Article : [http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.2004303](http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.2004303)

Contact (presse) : Jean-François Collet, professor at the de Duve Institute (UCL) : 02 764 75 62 ou 0484 61 77 39