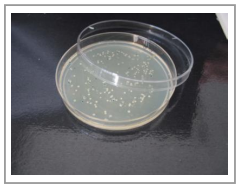
# New hypothesis: Why bacteria are becoming increasingly more resistant to antibiotics

posted on: march 7, 2013 - 2:30pm





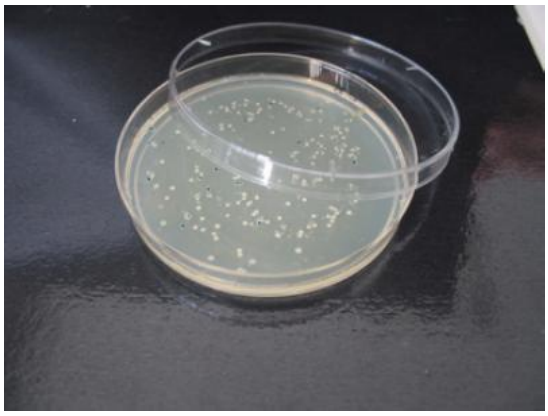
According to his theory, bacteria that are non-resistant to antibiotics acquire said resistance accidentally because they take up the DNA of others that are resistant, due to the stress to which they are subjected.

A University of Granada researcher has formulated a new hypothesis concerning an enigma that the scientific community has still not been able to solve and which could revolutionise the pharmaceutical industry: Why are bacteria becoming increasingly more resistant to antibiotics? His work has revealed that the use of antibiotics can even cause non-resistant bacteria to become resistant because they take up the DNA of others that are already resistant.

Mohammed Bakkali, a scientist in the Genetics Department at the Faculty of Science of the UGR, maintains that our abuse of antibiotics "forces" the bacteria to take up the DNA of other bacteria that are resistant to said antibiotics, since the presence of antibiotics exposes them to a great stress. According to the researcher, "In this way, the non-resistant bacteria become resistant completely by accident on ingesting this DNA and can even become much more virulent, partly due to the stress we subject them to when we make an abusive use of antibiotics".

For decades, scientists from all over the world have been researching into when, how and why bacteria take up DNA from other antibiotic-resistant bacteria, thus becoming also resistant. The answers as to when there is DNA uptake (in unfavourable or stressful circumstances) and as to how the bacteria take it up are clear, but, up until now, "nobody has pinpointed the reason why bacteria ingest this genetic material",as Bakkali points out in an article published in the latest edition of the journal "*Archives of Microbiology*".

Under normal conditions,a bacterium could have a lot to lose if it 'decides' to take up DNA, since it does not have a 'DNA reader' enabling it to take up only those molecules that are of use to it and the most likely isthat this DNA will be dangerous, or even lethal.



*This image shows a petri dish with bacterial colonies growing in a hazardous substrate.*

*(Photo Credit: University of Granada)*

**They do not want that DNA, because they break it up**

In his article, Mohammed Bakkali argues that, in reality, bacteria do not look for DNA to takeup (they appear not to 'want' this DNA, since they are constantly degrading it; in other words, breaking it up) and that this uptake is a chance event and the sub-product of a type of bacterial motility that is part of its response to the stress that the bacteria may be subjected to.

Therefore,our current indiscriminate use of antibiotics "not only selects the resistant bacteria, but also means that the bacteria take up more DNA, due to their increased motility in response to the stress that the antibiotic subjects them to". The result is that the stress caused by the antibiotic itself induces the uptake of genetic material that can bring about resistance to the antibiotic bybacteria that, otherwise, would not have taken up that DNA nor become resistant to the antibiotic. Furthermore, this effect is strengthened by its lack of specificity, since it occurs both in the target pathogen and in other bacteria.

The UGR researcher states that, when a bacterium takes up DNA from another antibiotic-resistantone (and which could have died due to another environmental factor), the bacterium that takes it up becomes resistant to that antibiotic. "Thus, the bacteria can go on adding to their arsenal of resistance to antibiotics and end up being



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resistant to a wide range of them, such as is the case of the multi-resistant strain of a *staphylococcus*, called *Staphylococcus aurius*, which creates havoc in many operating theatres.

Source: **University of Granada**

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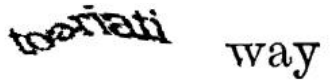

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