

Why Is Antibiotic Resistance Increasing - A Novel Hypothesis

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Why are bacteria becoming increasingly more resistant to antibiotics? A hypothesis regarding the enigma of antibiotic resistance has been put forward by a researcher from the University of Granada in Spain. He claims this could revolutionize how the pharmaceutical industry goes about targeting superbugs.

Mohammed Bakkali, a geneticist, has demonstrated that using antibiotics can make non-resistant bacteria become resistant because they assume the DNA of already-resistant bacteria.

Our overuse of antibiotics forces bacteria to assume the DNA of other resistant bacteria, because the mere presence of antibiotics exposes them to enormous stress, and this stress triggers random behavior.

Bakkali says:

"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."

Scientists have spent the last few decades investigating when, how and why bacteria take up DNA from other resistant bacteria, and eventually become resistant to antibiotics themselves.

The when (in unfavorable or stressful circumstances) and how bacteria take up the DNA of resistant bacteria is understood. However **"nobody has pinpointed the reason why bacteria ingest this genetic material,"** Bakkali explained in a report published in the March 2013 edition of *Archives of Microbiology*.

In most circumstances, a bacterium would not choose to take up the DNA of another bacterium, because it would have too much to lose. It does not have a *"DNA reader"* which enables it to take up only the molecules that are useful. In most cases, random selection of DNA is a dangerous and even fatal venture for any bacterium.

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

Bakkali argues that bacteria are continuously breaking up DNA - they do not look for DNA to take up -

this uptake is a random event and the sub-product of a kind of bacterial motility which is partly due to a stress response (the bacterium has been subjected to a high level of stress).

Hence, **our widespread 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,"** Bakkali says.

It is the antibiotic itself that causes the resistance by subjecting the bacterium to stress; this stress induces the uptake of genetic material which may bring about antibiotic resistance. In other situations (without stress), no bacterium would have taken up that DNA, and consequently would not have had the chance to become resistant.

Bakkali added that "...this effect is strengthened by its lack of specificity, since it occurs both in the target pathogen and in other bacteria."

Bakkali argues that when a bacterium assumes the DNA of another (antibiotic-resistant) bacterium, and which could have died due to another environmental factor, it becomes resistant to that antibiotic. "Thus, the bacteria can go on adding to their arsenal of resistance to antibiotics and end up being resistant to a wide range of them, such as is the case of the multi-resistant strain of *Staphylococcus aureus*, which creates havoc in many operating theatres."

Antibiotic resistance - a growing menace for human health

[Within the next two decades we may not have any effective antibiotics for simple surgical operations](#), Dame Sally Davies, Chief Medical Officer for England, reported to Members of Parliament on the House of Commons Science and Technology Committee. Quite simply, she added, there will be no antibiotics left that can deal effectively with routine infections.

Antibiotic resistance has become such a serious threat that "it should be added to the government's list of civil emergencies."

Written by Joseph Nordqvist

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References:

["Could DNA Uptake Be a Side Effect of Bacterial Adhesion and Twitching Motility?"](#)

M.Bakkali

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