

# Will humans lose the battle with microbes?

August 7 2012, By Daniel J. Stone

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Consider an all-too-common scenario: You're burning up from a high fever after a routine surgical procedure, and an infection specialist is called to help treat your problem. You assume that a short course of antibiotics will quickly turn things around. But the specialist candidly admits: "I'm sorry, I can't treat your infection. You've got a resistant bacteria, a super bug."

Any of us might hear those frightening words sooner than we think.

[Antibiotics](#) once seemed like a miracle weapon in our fight against microbes that have plagued mankind for millenniums, killing untold numbers of people with wounds and serious infections. But we're in danger of losing that weapon. Over the years, bacteria have grown increasingly resistant to these drugs. We've squandered an invaluable resource that we've overused - some might say abused. The drug industry is spending too little to develop alternatives. Only a concerted effort by government, [private industry](#) and the public can avert a crisis.

The antibiotic era started less than a century ago with the discovery of the antibacterial drug sulfa. After World War II, the emergence of penicillin allowed doctors to cure a vast range of potentially crippling, if not fatal, infections of the urinary tract, the [respiratory system](#) and other parts of the body. These antibiotics did not target a specific infection site but unleashed a lethal attack on the body's trillions of bacteria. Of course, some bacteria survived. These Darwinian "fittest bugs" not only persisted but had the uncanny ability to pass on their genes, which allowed them and other bacteria to survive the next antibiotic assault.

The battle was on: humans versus the bugs.

Each side started with substantial advantages. The bugs enjoyed staggering numbers, boosting [genetic variability](#) that fuels selection of increasingly resistant bugs. Medical science responded with novel antibiotics to kill the hardiest of these bugs. Who will win this epic struggle between genetic diversity and human ingenuity? After nearly a century, the bugs are emerging with the upper hand.

And we bear the blame.

Our first mistake has been the failure to respect our opponent or even to recognize the landscape of the battlefield. Doctors have fueled resistance to the drugs by their willingness to prescribe antibiotics for non-infectious medical problems such as colds, viral syndromes or other conditions for which antibiotics are useless. We also have allowed agribusiness interests to routinely feed antibiotics to livestock, a practice that increases animal growth. The U.S. livestock industry uses nearly 30 million pounds of antibiotics annually, or about four times the amount prescribed by doctors for their human patients, according to the U.S. Food and Drug Administration. Not surprisingly, resistance that takes hold in livestock crosses eventually into humans.

The workings of the free market have given the bugs another big break. Development costs for major drugs routinely reach into the hundreds of millions of dollars. Pharmaceutical companies are reluctant to invest these huge sums to produce antibiotics, which doctors prescribe for a short time until an infection clears up. Instead, drug companies prefer to sink their research dollars into drug treatments for chronic conditions, such as diabetes or heart disease, that patients may use for decades, making it much easier to recoup development costs and generate profits. As a consequence of this misalignment between profit incentives and clinical needs, it has been many years since the development of a game-

changing class of antibiotics.

Preventing the bugs from winning will require prompt action. We need government to reduce regulatory barriers to the development of new drugs and to subsidize new antibiotic research. President Obama recently moved in this direction by signing legislation that will extend antibiotic patents an additional five years. That small step will help, but much more needs to be done to give industry incentives to reopen the research pipeline to discover and market new and effective antibiotics.

We also need to take smarter, more cautious approaches to protect the fading usefulness of our current crop of drugs. The government can help on this front by restricting agro-business antibiotic use to the treatment of sick animals and eliminating the use of antibiotics for enhancing growth.

Like many primary-care doctors across the country, I struggle with the antibiotic resistance issue every week, as I explain to patients that antibiotics just won't help their viral cold or flu symptoms. But doctors should not have to fight alone. If we want to prolong the antibiotic era for our children and grandchildren, we need to do more. It's time for government and industry to call up the heavy artillery before the battle is lost.

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