



Dr. Bernard Churchill

A PALI NOISEMAKER

Urologist Bernard Churchill Challenges the Antibiotic Resistance Crisis

By TRILBY BERESFORD
Reporter

When Alexander Fleming won the Nobel Prize for his discovery of penicillin in 1945, he gave an interview with *The New York Times* and anticipated a troubling vision for the future: "Excessive use of penicillin could lead to the propagation of mutant forms of bacteria that would resist the drug."

In Bill Gates' book "The Road Ahead," published in 1995, the Microsoft mogul predicted immense scientific changes—and issues—in medical diagnosis.

In 2014, the British charity Nesta revealed six major world problems desperately in need of innovation to be the focus of the Longitude Prize.

Then-Prime Minister David Cameron announced the winner: antibiotics. It beat out water, food, paralysis, flight and dementia.

Now the year is 2018. Antibiotics have revolutionized modern medicine, no question. Since 1950, they have increased the global life expectancy by 15 years and controlled the spread of infectious diseases.

Antibiotics are used for common illnesses caused by bacteria, like strep throat and urinary tract infections. (The medicine is not designed for viral infections.)

But along with widespread use, there is a tremendous overuse of antibiotics. Too often, drugs are prescribed unnecessarily or inappropriately, and this has caused a global challenge: Antibiotic-resistant bacteria have emerged.

That's where Dr. Bernard Churchill comes in. He's a professor of urology at UCLA (and Palisadian for 20 years and counting).

After coming to UCLA to work in pediatric

urology, Churchill noticed that pediatric patients were developing urinary tract infections caused by bacteria that were progressively more resistant to the antibiotics designed to kill them.

Looking further into this issue with his colleague, Dr. David Haake, Churchill concluded that there is an inherent issue in the process of diagnostic testing and subsequent direction of treatment: Antibiotics are prescribed "empirically."

"Empiric therapy, based on physician guesswork, is a very inaccurate way to determine which patients need antibiotics, and if so, which antibiotics they need," Churchill explained to the *Palisadian-Post*.

"This inaccuracy is illustrated by the fact that almost 50 percent of the 280 million outpatient antibiotic prescriptions in the U.S. have been found by the U.S. Centers for Disease Control to be unnecessary, inappropriate or incorrect," he added.

Current processes to identify harmful bacteria can take 48-72 hours, during which time the patient's condition is given time to worsen.

It's worth noting that few classes of antibiotics have been discovered since 1962 for the most dangerous types of bacteria. One of the reasons for this is because of the meticulous clinical testing that must take place in order to class chemicals into drugs appropriate for human use. The path is long and fraught with hurdles.

According to the National Institute of Allergy and Infectious Diseases, gram-negative bacteria are the vicious beasts.

"Some strains are now resistant to many, most or all available treatments, resulting in increased illness and death from bacterial infections and contributing to healthcare costs," the website states.



Dr. David Haake

Photos courtesy of Erik Haake

E. coli is a strain of gram-negative bacteria that might ring a bell.

But here's where it gets really gnarly. "Antibiotic resistance is rapidly increasing. If present trends continue, bacterial infections will surpass cancer as the leading cause of death by 2050."

Those are Churchill's words, echoed by many in the medical community.

In 2001, Churchill and his team formed a research group at UCLA to address the crisis of antibiotic resistance. He received over \$1 million in funding from local philanthropic donors.

Their mission is to "develop rapid, accurate, cost-effective bacterial testing that allows for the correct antibiotic therapy from the first dose."

The molecular technology they have developed uses ribosomal RNA (essential molecules that form proteins in our body) to identify and measure offending bacteria and get a reading on their susceptibility to antibiotics, all in a time frame that makes sense: testing in 30-45 minutes, prescriptions in under three hours.

Their process eliminates the need for specimens to be transported to other labs, ensuring that critical information can be quickly relayed from doctor to patient.

For cost-effectiveness, the procedure utilizes disposable cartridges.

Churchill and his team have formed a private company called MicrobeDx to commercialize their technology and bring it to widespread clinical application.

Recently, MicrobeDx was one of 368 global companies that applied to receive funding through CARB-X (Combating Antibiotic Resistant Bacteria-Accelerator).

CARB-X is a small group of researchers

based at Boston University in the Faculty of Law. It was established in response to the U.S. and U.K. governments' call for organizations to address the drug-resistance crisis as a matter of public health.

They receive applications from companies around the world, and currently have 33 active projects in seven countries. There are nine in California alone.

Every project targets the worst bacteria and emphasizes rapid diagnosis.

MicrobeDx is among five diagnostic companies to receive the CARB-X grant.

"One of the biggest challenges of treating antibiotic-resistant bacterial infections is being able to diagnose the infection quickly in the first critical hours and prescribe the right treatment," said Jennifer Robinson, spokesperson for CARB-X.

"The kind of diagnostics that MicrobeDx is working on have the potential to truly transform the way serious infections are diagnosed and treated, and improve results for patients."

A quick Google search of "antibiotic resistance" will summon countless pages of results, most of them legitimate and many of them scholarly.

Aside from the questionable prescribing of antibiotics, experts are investigating whether environmental factors influence the spread of antibiotic resistance.

Suddenly, I remember being a teenager in hospital with a horrendously painful, methicillin-resistant *Staphylococcus* infection in my left knee. I didn't understand it at the time, but that was my jarring introduction to this all-encompassing issue.

Thankfully, it's being attacked from all angles.



Artist rendition of the MicrobeDx device

Photo courtesy of Bernard Churchill