Microbiology professor discusses lab's efforts to fight antibiotic-resistant infections

February 15 2017, by Rosalind Early

Gautam Dantas, associate professor of molecular microbiology and pathology and immunology, both in the School of Medicine, and associate professor of biomedical engineering in the School of Engineering & Applied Science, studies how physicians can treat antibiotic-resistant infections. Credit: Washington University School of Medicine in St. Louis

More than any other discovery in the modern era, antibiotics have changed the world. Once-deadly infections are easily treatable, surgeries

are safer, and other life-saving treatments—such as chemotherapies—are only possible with antibiotics.

Unfortunately, the use (and oftentimes abuse) of antibiotics has also helped bacteria develop new ways to resist treatment. Already, antibiotic-resistant infections cause tens of thousands of deaths across the country each year, and scientists predict that the problem will worsen.

Fighting this trend is Gautam Dantas, associate professor of molecular microbiology and pathology and immunology, both in the School of Medicine, and an associate professor of biomedical engineering in the School of Engineering & Applied Science. His efforts are helping physicians come up with new ways to fight antibiotic-resistant infections .

What is driving antibiotic resistance in America?

Quite often when kids get sick, their parents will effectively go and demand antibiotics from their pediatricians, even though there's a lot of evidence to suggest that when these kids are getting sick what they really have are viral infections. Antibiotics really are antibacterials. They do nothing against viruses. Now, you've got this issue where kids are sick due to a viral infection but because of a misperception they've been given lots of antibacterials, which can be causing lots of collateral damage. So they do nothing good for the infection, but they [could make the kids become] resistant to antibiotics.

What is something your lab is doing to treat resistance?

There's this awesome collaboration with Carey-Ann Burnham; she's the director of the clinical micro lab here at Barnes. We've got this awesome suite of collaborations where effectively if Carey-Ann comes across a really hard-core, drug-resistant pathogen, which would dare modern

molecular methods and they can't elucidate what the resistance mechanism is—so basically, the reason they care about this is because this thing made some patient very sick here.

And that's when we come onboard, Carey-Ann then shares that information and then, eventually, the isolates with our lab. And then we throw effectively the -omics kitchen sink at it. So we take genomics and transcriptomics and lipidnomics; it doesn't matter. This idea of measuring as many physiological or metabolic properties in these drug-resistant organisms as possible compared to their susceptible counterparts, to try to in real time to figure out not theoretically what resistance exists in the soil, but what resistance is in this emerging pathogen.

That's been a super-exciting area for the lab. It actually moves very, very rapidly. It's also easy to get graduate students and post-docs involved. If they were able to figure out what that resistance mechanism was, within a short period of time, Carey-Ann's lab could develop a molecular diagnostic and save the next life. And to have that kind of impact over the course of a PhD—I wish I was so lucky when I did my PhD.

What motivates your work?

It's crazy what microbes can do. There's just a sort of discovery aspect of wanting to study how do microbes respond to the challenges that we throw at them? So antibiotics thrown at a microbe is a challenge and it's remarkable how quickly they adapt and evolve. So there's just a basic science component of wanting to understand how that occurs.

But then the parallel motivation, perhaps the greater motivation for this specific area, is I really think it's terribly under appreciated how close we might be to this precipice of running out of chemotherapeutics.

We're so dependent on antibiotics. It's kind of a weird thing, but if you had access to a time machine and if you were able to take one thing back with you to say the 1800s, the one thing that you should take with you is antibiotics. Right? Just think of the number of people who just dropped dead because they got some, what is now an easily treatable, infection. We're entering an era where that's no longer going to be true. And we have to do something about that.

Provided by Washington University School of Medicine in St. Louis

Citation: Microbiology professor discusses lab's efforts to fight antibiotic-resistant infections (2017, February 15) retrieved 13 May 2024 from https://medicalxpress.com/news/2017-02-microbiology-professor-discusses-lab-efforts.html