The challenge of treating antibacterial infections

Clinical Perspective on the Future of the Antibacterial Resistance Landscape

Have we returned to a pre-antibiotic era?

The World Health Organization (WHO) global priority list of antibiotic resistant bacteria to prioritize for research and development of new anti-bacterials includes members of the Enterobacteriaceae: *Klebsiella pneumonia*, *Escherichia coli*, *Enterobacter spp.*, *Serratia spp*., *Proteus spp*., and *Providencia spp*, *Morganella spp*. These species are carbapenem-resistant and 3rd generation cephalosporin-resistant. From a clinical perspective, in countries such as the US, there are cases of older individuals who have been successfully treated of complex diseases like cancer, that later succumb to antibacterial infections; also, younger individuals with drug resistant UTI for which there are no oral treatments and so individuals are hospitalized and miss work or school. In other countries, individuals do not have access to antibiotics.

Can we use diet to combat antibacterial resistance?

Bacteria encounter antibiotics longbefore antibiotic treatment. These antibiotics are a part of the host innate immune response and from other microbes.

Einstein Antibiotic Stewardship Program: <http://www.einstein.yu.edu/departments/medicine/divisions/infectious-diseases/antimicrobial-stewardship/>

Can we get clinical isolates?

Resources:

* <https://grants.nih.gov/grants/guide/pa-files/pa-18-725.html>
* <http://www.einstein.yu.edu/departments/medicine/divisions/infectious-diseases/antimicrobial-stewardship/>

Do these species have a shared metabolic enzymatic core and auxiliary set? Look at their abundance across HMP1 and 2. What enzymes are specialized? What compounds are associated with the specialized enzymes?

Use MicrobeFDT to identify targets

Conduct growth assays to assess tolerance quantitatively.

I need the following negative controls:

* No compound
* A compound that I would expect to have no effect on growth
* A compound that might be metabolic responsive but not directly antibacterial

Resource:

Distinguish resistance, tolerance and persistence : <https://www.nature.com/articles/nrmicro.2016.34>

Tolerance: <https://www.sciencedirect.com/science/article/pii/S0092867418301144#fig1>