MULTI-HOST BACTERIAL PATHOGENESIS AND ANTI-VIRULENCE THERAPEUTICS

Bacterial pathogens interact with the human host in very sophisticated ways to subvert host defenses, persist in the host, and cause significant morbidities and mortalities. Burn and trauma patients are at increased risk for infections that exacerbate patient suffering and delay healing and recovery. The emergence of multi-drug resistant pathogens and the lack of novel antibiotics is threatening to roll back the significant progress made in burn care.

At Shriners Hospitals for Children — Boston, a team of investigators is studying pathogen and host mechanisms that mediate or restrict bacterial pathogenesis in order to obtain knowledge that can be applied toward the development of host-protective interventions targeting critical pathways. Our combined work enables a paradigm shift towards highly personalized precision therapy and effective prevention of infection.

We have pioneered the development of anti-virulence drugs that block pathogenesis but not cell viability, as well as the use of non-vertebrate hosts to study bacterial-host interactions. Anti-virulence drugs will limit the use of antibiotics and it is believed that they will decrease the development of antibiotic resistance, while preserving the beneficial flora. Moreover, our group pioneered the development of the first pipeline that permits the identification of patients with a high risk of developing multiple infections after burns, days before infection occurs. Prediction of infection days/weeks beforehand would allow personalized therapy, targeted and effective prevention and treatment, that will increase the success of infection control, help stem the emergence of antibiotic-resistant microorganisms, and reduce the costs of care. It will promote healing, speed up recovery and shorten hospital stays. The lab is also driven toward the development of host-targeted therapeutics that could also help win the fight against antibiotic resistant superbugs, significantly reduce cost of care, and improve patient outcomes. As such, our pioneering research is bridging the clinical and basic science gap, and opens new avenues for novel therapeutics that could tackle antibiotic crisis and mitigate the lack of new antibiotics, an area of significant unmet need. Indeed, our anti-virulence technology founded Spero Therapeutics http://sperotherapeutics.com/ in 2013. In 2014, Spero was named as one of the top 15 Fierce Biotech companies http://www.fiercebiotech.com/special-reports/sperotherapeutics-2014-fierce-15. Spero operates in partnership with Roche, Merck, GSK.

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