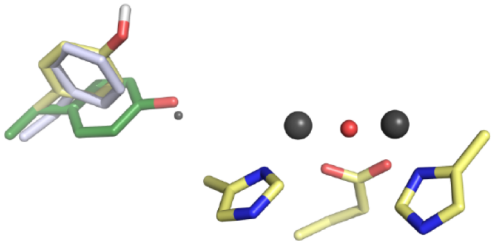
RNRbiotics: a new antimicrobial family of compounds for the treatment of infectious diseases

The Challenge

Infectious diseases constitute a tenacious and major public health problem worldwide. For many years, antibiotic-resistant pathogens have been recognized as one of the primary threats to human survival. The annual impact of antibiotic resistant infections on the USA economy reaches $2035 billion in excess direct healthcare costs, plus costs to society due to loss of productivity of $35 billion/year and 8 million for additional days in hospital. Thus, our society is demanding new antibiotic strategies, especially for patients suffering from bacterial biofilm lung infections.



The Market

Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of chronic morbidity and mortality. According to WHO, 4-6% of people have COPD and caused the death of more than 3 million people in 2012, being 6% of all deaths globally and projected to increase by more than 30% in the next 10 years (3rd cause of death). Around 15% of smokers will acquire COPD and it is increased in lung cancer (40-70%). Together with Cystic Fibrosis (CF), they present severe airway inflammation and poor prognosis. Moreover, when they are caused by multi-resistant bacteria, there is an irremediably death of the patient. RNRbiotics is focused on fighting against multi-resistant bacterial infections, especially in chronic lung infections.

The Asset

RNRbiotic is a proprietary library of compounds showing antibacterial activity against several pathogenic species (*S. aureus*, *P. aeruginosa*, *B. anthracis*, *E. faecalis* and *S. epidermidis*). RNRbiotic compounds target the bacterial enzyme Ribonucleotide Reductase (RNR), responsible for the synthesis of the deoxyribonucleotides, the building blocks for DNA synthesis and repair. Interestingly, it has shown significant activity against formed bacterial biofilms and consequently, show great promise to become excellent therapeutic agents for bacterial chronic infection in lung diseases such as chronic obstructive pulmonary disease and cystic fibrosis.

Product Opportunity

RNRbiotics are highly active molecules with the capacity to inhibit bacterial RNR, thus blocking bacterial growth. This new mechanism of action is key, as it permits to treat multi-resistant bacteria with a different mode of action compared to inefficient existing therapies. Moreover, most major antibiotics such as colistin, tobramycin or ciprofloxacin present diffusion limitations against biofilm matrix, which act as a barrier to delay molecular diffusion and permit changes on bacterial metabolism to counterpart the antibiotic activity RNRbiotics molecules have demonstrated the unique capacity to diffuse smoothly inside the biofilm and destroy and killing the whole bacterial population.

Scientific Project Leader

Eduard Torrents
(http://ibecbarcelona.eu/bactinf)

Stage of development

Library of >35 molecules and their synthetic routes characterized.

3 top-leading compounds detected and characterized.

Lack of toxicity in murine macrophages tested

Toxicology in vitro and in vivo.

Preliminary ADME.

Intellectual Property Status

PCT/EP2015051755

Exploitation Plan

Licensing

Contact

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