Docket #: S17-474

Synthesis and Characterization of a New Antibiotic

Researchers at Stanford and their colleagues have developed new antibiotic compounds that could be used to treat staph infection (caused by Staphylococcus aureus) and TB infection (caused by Mycobacterium tuberculosis). Antibiotic resistance is increasing and has become a global health threat. Thus, there is a great need for new antibiotics.

To help meet this need the inventors have identified two 1,4- benzoquinone derivatives that could serve as new antibiotics. They have isolated the compounds, one red and the other blue, from the venom of the scorpion Diplocentrus melici. Further, they have developed methods to synthesize these compounds from commercially available reagents and have characterized the biological activity of the compounds. The red compound is very effective at killing S. aureus (the cause of staph infections, including MRSA), while the blue compound is very effective against M. tuberculosis (the cause of TB infections and multidrug-resistant tuberculosis (MDR-TB)). This technology provides much needed new antibiotic compounds that can be used to treat staph and TB infections.

Stage of Research
Using mouse models of MDR-TB infection, the inventors have shown that the blue compound dramatically decreases the bacterial load and amount of tissue damage. Additional validation studies are ongoing.

Applications

- Antibiotic for treating:
    - Staph infection
    - TB, including MDR-TB

Advantages

- Solves an unmet need- provides new antibiotics
- Could be used to treat multidrug-resistant TB
- Potency comparable to commercial antibiotics
- Compounds can be synthesized using commercially available reagents
- Non-toxic in animal studies
- Compounds do not damage lung endothelium cells and thus can be directly applied to the lungs
- Can be used to rid the body of dormant infection to prevent recurrence

Publications

- E.N. Carcamo-Noriega, S. Sathyuamoorthi, S. Banerjee, E. Gnanamani, M. Mendoza-Trujillo, D. Mata-Espinosa, R. Hernandez-Pando, J. I. Veytia-Bucheli, L.D. Possani and R.N. Zare. 1,4-Benzoquinone Antimicrobial Agents Against Staphylococcus aureus and Mycobacterium tuberculosis Derived from Scorpion Venom. *PNAS*. June 10, 2019
- Than, K. Stanford researchers synthesize healing compounds in scorpion venom. Stanford News. June 10, 2019

Patents

- Published Application: WO2019231735
- Published Application: 20210214303

Innovators

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