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Dual Action Defense: Engineering NO-Releasing Ciprofloxacin-SNAP Catheters: *In Vivo* 14-day Infectious Model

The dual-action antibiotic-NO heightens the efficacy of the proposed treatment, while slowing the development of antibiotic resistance. By modifying antibiotics to release nitric oxide, we are synthesizing a dual-action, broad-spectrum antimicrobial solution that can revolutionize the field of antibiotics, reducing the effect of antimicrobial resistance.

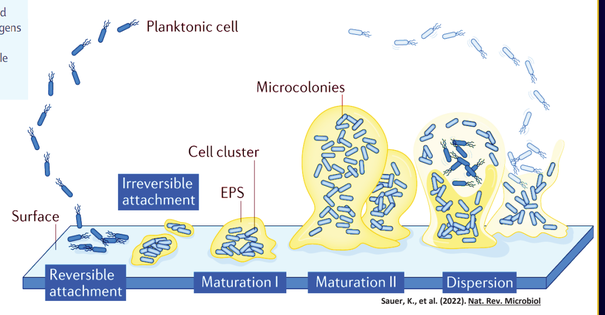
Antimicrobial Resistance and Biofilm Prevalence & Life Cycle

Each year, an estimated 7·7 million deaths are associated with bacterial infections



Antibiotics are not effective against complex forms of bacteria – *biofilms* – attributing to resistance

80% Of all known infections involve biofilms



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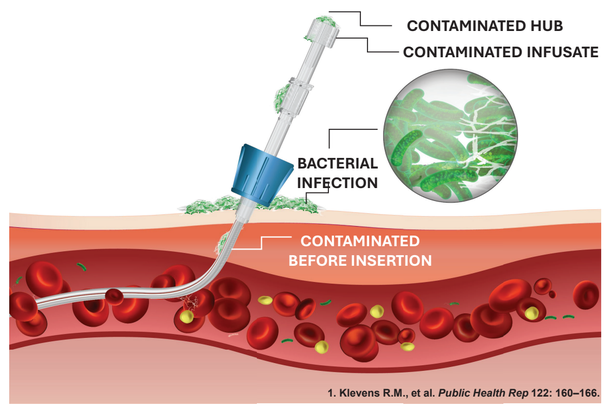
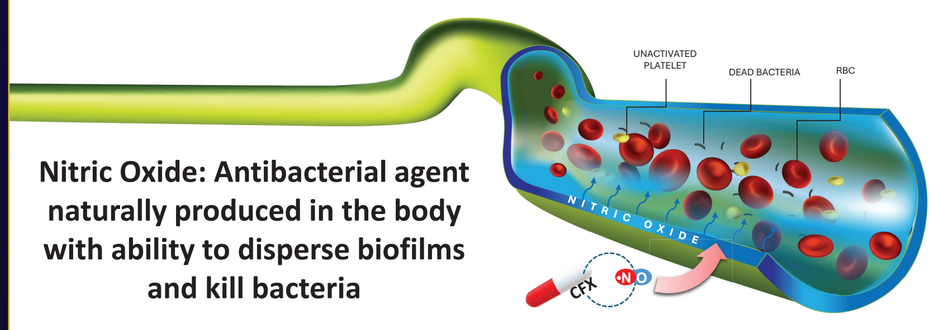
Hospital acquired infections and medical devices are common places for biofilm growth

Catheter-associated UTIs affect 449,334 patients per year in the US.[1]



1. Klevens R.M., et al. *Public Health Rep* 122: 160–166.

Nitric Oxide (NO) to the Rescue



Nitric Oxide: Antibacterial agent naturally produced in the body with ability to disperse biofilms and kill bacteria

Vision for Hemocompatible & Antibacterial Surface

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Antibiotics Modified with Nitric Oxide

Antibiotics

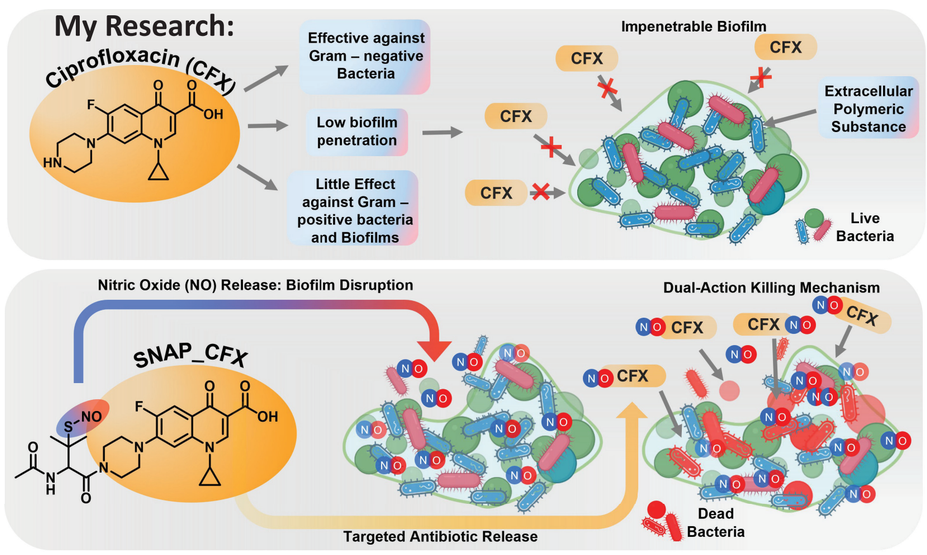
- Cannot penetrate the biofilm alone, reducing the effectiveness

Antibiotics + NO

- NO can **break up the biofilm**, exposing the bacteria to the surroundings, increasing the susceptibility to conventional antibiotics

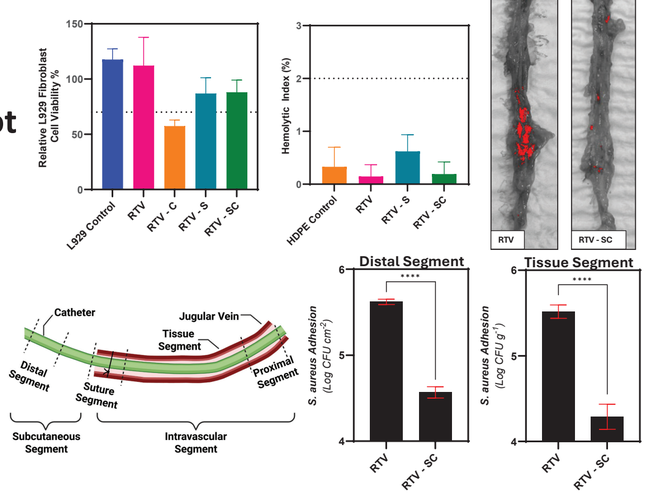
By conjugating a NO-donor to antibiotics, a dual-action biocidal solution is formed





Current Work

- **Biocompatible**
- **14 d NO Release**
- **Reduce blood clot and bacterial adhesion in 14 d Rabbit Model**



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