Diagnosis of bacterial infection with non-invasive imaging

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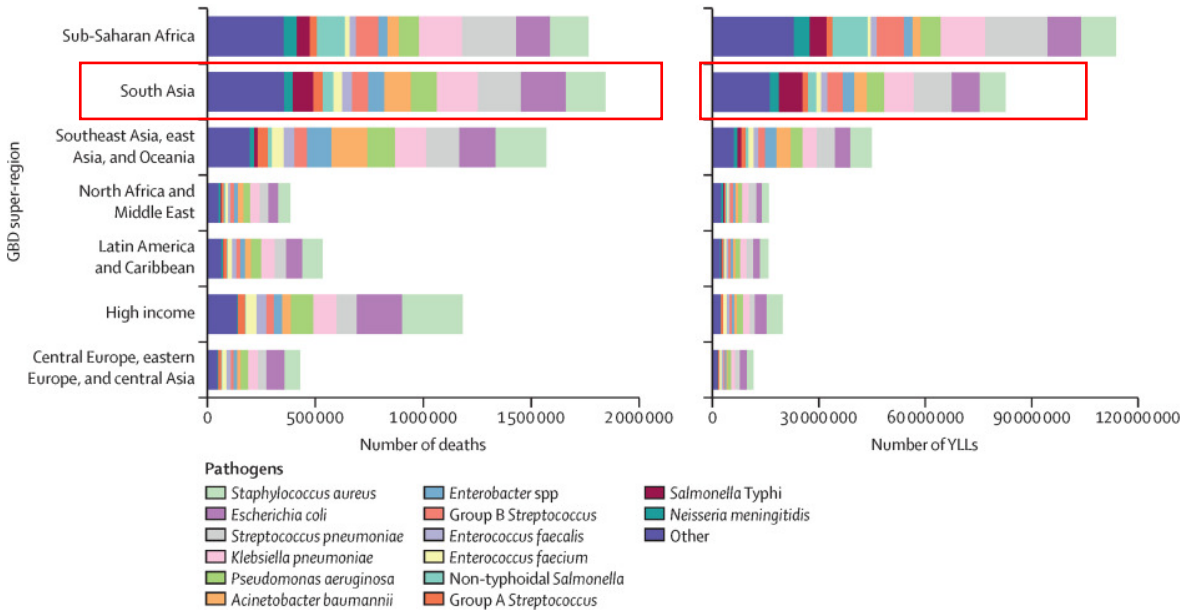
Challenge



Global associated mortality (and years of life lost (YLL) with the reported 33 bacterial pathogens is high in India

Ikuta, Kevin S., et al. *The Lancet* 400.10369 2022: 2221-2248.

Current diagnostic approaches

- Traditional microbiology tests
- Molecular PCR-based methods
- Culture-independent methods (Nucleic acid testing)
- Non-specific imaging and anatomical imaging

Limitations

Sampling challenges.
Poor sensitivity,
Non-specificity,
Non feasibility for routine diagnostics

Project Goal

- Diagnosis of the localized infection site to channel effective tissue site sampling
  -*photoacoustic non-invasive imaging*

- Targeting for specific bacterial infections
  -*identify specific molecular targets (cell wall proteins/metabolic sugars and such)*

Develop expertise in these areas:

- Organic chemistry synthesis
- Mammalian and bacterial culture
- In vitro assay developments
- Mice handling and experiments
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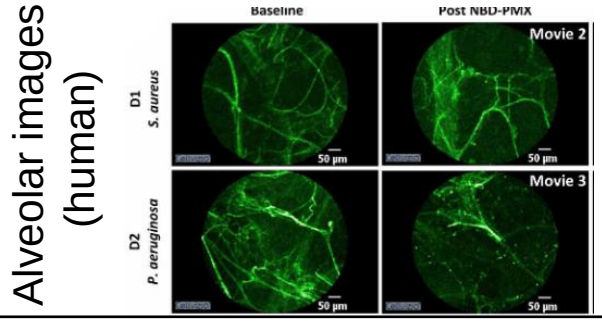
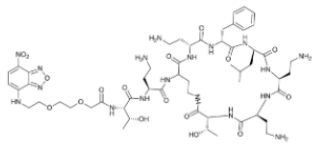
- In vivo photoacoustic imaging
- Image analysis Matlab /Python





Targeted fluorescent probe

Example of using a topical fluorescent peptide targeting lipid A for identification of Gram-negative bacteria in human lungs, Akram et. al. Sci. Trans Med. 2018