Quantitative detection of bacteria associated with lung exacerbations in bronchiectasis

Project team:
LifeArc: Rebecca Holmes, Marie-Jeanne Kempen, Mateja Bchoria, Adam Bell, Carolyn Clarke, Ashley Stolland-Newson, Niall McLaren, Sophie Redwood, Tanja Taylor
University of Dundee: Daniela Alferes de Lima, James Chalmers

Quantitative assay for monitoring infection
LifeArc is partnering with the University of Dundee and the European Multicentre Bronchiectasis Audit and Research Collaboration (EMBARC) to develop tests that quantify bacteria linked to lung flare-ups. These tests will first be used in research studies to provide knowledge to the community, enabling clinicians to make better informed treatment decisions. We also plan to develop our tests for Pseudomonas aeruginosa and non-tuberculosis mycobacteria (NTMs) as clinical monitoring tools to determine if an infection is responding to a given treatment.

Current care
• Antibiotics are given based on previous culture data, if available.
• Treatment decisions are made prior to return of microbiology results.

Project objectives
• Define the bacterial species associated with pulmonary exacerbations in bronchiectasis.
• Design quantitative assays targeting these species and demonstrate success in clinical samples.
• Perform research studies using appropriate samples to understand the relationship between bacterial species, load and pulmonary exacerbations.

Research studies
• When should we treat? Is there a load threshold associated with exacerbation?
• What should we treat? Are some species/combinations associated with exacerbations, and others that are not?
• How long should we treat? Upon treatment, is there a minimal load threshold associated with sustained recovery and can treatment time be reduced?

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Clinical utility of quantitative tests
Virtual clinician round-table group (May 2021):
• Research studies are needed to understand the relationship between bacterial species identity, load and pulmonary exacerbations
• Top bacterial targets for assays were identified.

Clinician round-table at World Bronchiectasis and NTM Conference (July 2022):
• Pseudomonas aeruginosa assay would have clinical utility monitoring infections (e.g. in response to treatment) and in clinical trials for new anti-pseudomonas therapy.
• NTM assays would have clinical utility monitoring infections (e.g. in response to treatment) and assessing patients prior to commencing long-term macrolide therapy.
• Top bacterial targets agreed upon, extended list TBD.

Research studies will be performed using samples available through EMBARC and will be carried out in collaboration with the Chalmers lab, University of Dundee.

Top image: Pseudomonas aeruginosa

The top picture depicts the design principle for the quantitative bacterial assay. Images above (left to right) show Haemophilus influenzae, Staphylococcus aureus, Streptococcus pneumoniae, Moraxella catarrhalis.

Top image: Antibiotic susceptibility testing
Bottom image: Pseudomonas aeruginosa

Top image: Bacterial culture plate.
Bottom: University of Dundee, EMBARC and European Respiratory Society logos.