ABSTRACTS

4th World Bronchiectasis
& NTM Conference

Virtual Edition
16–19 December 2020

European
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ABSTRACTS

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Important note:
The abstracts in this book are listed in alphabetical order (first author, last name).

[139] Proteinase-3 as a biomarker of exacerbation in bronchiectasis

Hani Abo-Leyah[1,7]; Yonghua Gao[1]; Hollian Richardson[1]; Holly Keir[1]; Alison Dicker[1]; Kelly Moffitt[2]; Amelia Shoemark[1]; James D Chalmers[1]

[1]University of Dundee, Dundee, United Kingdom; [2]ProAxis, Dundee, United Kingdom

Introduction: Proteinase 3 (PR-3) is a serine protease stored in the primary granules of neutrophils and similar in structure to neutrophil elastase (NE). We sought to investigate the role of PR-3 in exacerbations of bronchiectasis.

Methods: PR-3 activity in sputum supernatant was measured using a proteaseTag immunoassay in 86 individuals in stable state and during an exacerbation. Severity of disease was evaluated using the bronchiectasis severity index (BSI) and FACED, forced expiratory volume in 1 second (FEV1) and correlated with established biomarkers of bronchiectasis severity including neutrophil elastase (NE) and Heparin binding protein (HBP).

Results: Median PR-3 concentration during stable state was 2.81µg/ml (IQR 3.35-2.17) and 3.07 µg/ml (IQR 3.47-2.53). during exacerbation. Mean age of patients enrolled was 65 and 55% were female. Mean BSI score was 8.2 (SD 4.1) and mean FEV1 was 73.3% predicted (SD 22.56). PR-3 concentration was raised by mean of 43% during exacerbations (p=0.047) PR-3 concentrations showed a weak positive correlation to other neutrophilic markers in sputum such as NE (r=0.29, p=0.007) and HBP (r= 0.44, p<0.0001. NE (p=0.01) was also clearly increased at exacerbation. PR-3 measured at stable state did not demonstrate a correlation with severity (BSI or FACED) or radiological scores. It also failed to correlate to FEV1 at baseline or MRC dyspnoea scores. This was in contrast to NE and HBP which were significantly correlated with severity, *Pseudomonas aeruginosa* infection, FEV1 and other markers of severity.

Conclusions: PR-3 measured in sputum is raised during exacerbations of bronchiectasis and further studies should establish its therapeutic implications and to determine its role in the pathogenesis of bronchiectasis.

[67] Association between physical activity and risk of hospitalisation in bronchiectasis

Victoria Alcaraz[1,7]; Elena Gimeno-Santos[3,7,2]; Giulia Scioscia[4]; Albert Gabarrús[1]; Adrià Navarro[5]; Beatriz Herrero-Cortina[6]; Rosanel Amaro[7]; Laia Fernández[1]; Patricia Oscanoa[7]; Antoni Torres[1,2,7]

[1]Fundació Clínic per la Recerca Biomèdica (FCRB), CIBERES. Hospital Clinic de Barcelona, Barcelona, Spain; [2]Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS)., Barcelona, Spain; [3]Barcelona Institute for Global Health (ISGlobal), Barcelona, Spain; [4]Institute of Respiratory Diseases, Department of Medical and Surgical Sciences, University of Foggia, Foggia, Italy; [5]Vitruvi Centre de Biosalut, Barcelona, Spain; [6]Universidad San Jorge, Zaragoza, Spain; [7]Institut Clínic Respiratori, Hospital Clínic de Barcelona, Barcelona, Spain

Background: Patients with bronchiectasis have an inactive lifestyle compared to healthy peers, but its association on hospital admission has not been explored. Therefore, the aim of this study was to investigate the association between (i) steps per day and (ii) sedentary time with hospitalisations due to an exacerbation in adults with bronchiectasis.

Methods: A prospective observational study was conducted. We collected baseline lung function, quality of life, exercise tolerance, severity of bronchiectasis and physical activity (PA). PA was objectively assessed during a week using the SenseWear armband and the results were expressed in steps per day and sedentary time. Number of hospitalisations due to a bronchiectasis exacerbation and time to the first event were recorded after 1-year follow-up.

Results: We analysed 64 patients with bronchiectasis of whom 15 (23%) were hospitalised during the follow-up. Hospitalised patients showed poor baseline clinical and severity outcomes, less number of steps per day walked and more sedentary behaviour in comparison to with non-hospitalised group. Patients who walked ≤6,290 steps per day or spent ≥7.8 hours per day in sedentary behaviour had an increased risk of hospital admission due to an exacerbation of bronchiectasis at 1-year follow-up (*Table 1*). Specifically, ≥7.8 hours spent in sedentary behaviour was associated with 5.9 times more risk of hospital admission in the following year.

Table 1:

Table1. Crude and adjusted associations between level of physical activity in steps per day and sedentary time with bronchiectasis hospitalisations.

	N	Crude OR (95% CI)	p value	Adjusted OR (95% CI) *	p value	Adjusted OR (95% CI) b	p value
Steps per day						-	-
Higher physically active (≥6,290 steps per day)	43	1.00		1.00		-	-
Lower physically active (<6,290 steps per day)	21	4.62 (1.36 to 15.68)	0.014	4.20 (0.82 to 21.47)	0.085	-	-
Sedentary time				-	-		
Sedentary (≥7.8h)	24	7.62 (2.06 to 28.18)	0.002	-	-	5.91 (1.26 to 27.81)	0.024
No sedentary (<7.8h)	40	1.00		-		1.00	
Age (+1 year)	64	1.01 (0.97 to 1.05)	0.646	0.99 (0.94 to 1.04)	0.681	0.99 (0.94 to 1.05)	0.804
Gender							
Male	21	1.00		1.00		1.00	
Female	43	0.66 (0.20 to 2.19)	0.500	0.55 (0.13 to 2.42)	0.432	0.83 (0.19 to 3.68)	0.802
Pseudomonas aeruginosa							
No	45	1.00		1.00		1.00	
Yes	19	8.89 (2.44 to 32.43)	0.001	5.83 (1.35 to 25.16)	0.018	6.82 (1.56 to 29.94)	0.011
Hospitalisations 12 months prior to the study							
No	51	1.00		1.00		1.00	
Yes	13	6.27 (1.66 to 23.62)	0.007	6.70 (1.38 to 32.65)	0.018	5.65 (1.12 to 28.44)	0.036
MRC Dyspnoea Scale			0.347				
1	12	1.00		-		-	
2	39	2.41 (0.27 to 21.81)	0.435	-		-	
3	10	7.33 (0.66 to 81.36)	0.105	-		-	
4	3			-		-	
FEV1 (+1 %)	64	0.97 (0.94 to 1.00)	0.034	-		-	
BSI Stages			0.004				
Mild	23	1.00		-		-	
Moderate	22	1.66 (0.25 to 11.02)	0.601	-		-	
Severe	19	11.67 (2.12 to 64.33)	0.005	-		-	
6MWT (+1 meter)	64	0.99 (0.99 to 1.00)	0.056	-		-	

Abbreviations. OR: odds-ratio; CI: confidence interval; h: hours; MRC: medical research council; FEV1: forced expiratory volume in one second; BSI: bronchiectasis severity index; 6MWT: 6 minutes walking test. Data are shown as estimated ORs (95% CIs) of the explanatory variables in the low level of physical activity group. The OR represents the odds that low level of physical activity will occur given exposure of the explanatory variable, compared to the odds of the outcome occurring in the absence of that exposure. The P-values are based on the null hypothesis that all ORs relating to an explanatory variable equal unity (no effect).

* Initial multivariable model comprised age, gender, chronic colonization by *Pseudomonas aeruginosa*, hospitalisations 12 months prior to the study, MRC Dyspnoea Scale, FEV1 %predicted, BSI Stages and 6MWT. Final multivariable model were adjusted for age, gender, chronic colonization by *Pseudomonas aeruginosa* and hospitalisations 12 months prior to the study. Hosmer–Lemeshow goodness-of-fit test for the multivariable model, p = 0.85. Area under the ROC curve for the multivariable model, AUC = 0.86 (0.76 to 0.97). b Initial multivariable model comprised age, gender, chronic colonization by *Pseudomonas aeruginosa*, hospitalisations 12 months prior to the study, MRC Dyspnoea Scale, FEV1 %predicted, BSI Stages and 6MWT. Final multivariable model were adjusted for age, gender, chronic colonization by *Pseudomonas aeruginosa* and hospitalisations 12 months prior to the study. Hosmer–Lemeshow goodness-of-fit test for the multivariable model, p = 0.78. Area under the ROC curve for the multivariable model, AUC = 0.87 (0.76 to 0.97).

Conclusions: Low levels of PA and high sedentary time at baseline were associated with higher risk of hospital admission due to an exacerbation of bronchiectasis. Further studies are needed to validate these findings and eventually to include them as items of severity scores.

[149] Longitudinal assessment of sputum total bacterial, Pseudomonas aeruginosa and Haemophilus influenzae load in people with bronchiectasis when clinically stable and at the start and end of treatment of an exacerbation: Data from the BRONCH UK Study

Zina Alfahl[1]; Gisli G. Einarsson[2]; Katherine O'Neill[2]; Deirdre F. Gilpin[1]; J. Stuart Elborn[2]; Kathryn Ferguson[3]; Adam Hill[4]; Michael R. Loebinger[5]; Mary Carroll[6]; Timothy Gatheral[7]; Anthony De Soyza[8];

James Chalmers[9]; Christopher Johnson[10]; John Hurst[11]; Jeremy Brown[11]; Judy M. Bradley[2]; Michael M. Tunney[1]

[1]School of Pharmacy, Queen's University Belfast, Belfast, United Kingdom; [2]The Wellcome-Wolfson Institute for Experimental Medicine, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, United Kingdom; [3]Northern Ireland Clinical Research Network, Belfast Health and Social Care Trust, Belfast, United Kingdom; [4]Royal Infirmary and University of Edinburgh, Edinburgh, United Kingdom; [5]Host Defence Unit, Royal Brompton Hospital, Imperial College London, London, United Kingdom; [6]University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom; [7]Department of Respiratory Medicine, University Hospitals of Morcambe Bay NHS Foundation Trust, Kendal, United Kingdom; [8]Institute of Cellular Medicine, Newcastle University and Freeman Hospital, Sir William Leech Research Centre, Respiratory Department, Newcastle upon Tyne, United Kingdom; [9]University of Dundee, College of Medicine, Dundee, United Kingdom; [10]Cambridge Centre for Lung Infection, Papworth Hospital, Cambridge, United Kingdom; [11]UCL Respiratory, University College London, London, United Kingdom

Background/Aim: Patients with bronchiectasis suffer from recurrent infective exacerbations (PEx) with associated increase in morbidity and mortality. The aim of this study was to compare total bacterial load and bacterial load of respiratory pathogens (Haemophilus influenzae and Pseudomonas aeruginosa) in sputum samples, collected longitudinally from people with bronchiectasis over 12 months, when clinically stable, and at the beginning and end of antibiotic treatment of PEx.

Methods: Samples analysed in this study were from the multi-centre BRONCH-UK cohort study of adults (n=106) with bronchiectasis. Participants were recruited from seven hospitals in the UK: Belfast City Hospital; Royal Infirmary of Edinburgh; Royal Papworth Hospital; Ninewells Hospital; University Hospital Southampton; Royal Brompton Hospital and Royal Lancaster infirmary. Favourable ethical opinion was received from the Northern Ireland Research Committee (REC reference 15/NI/0077) and the study was prospectively registered with ClinicalTrials.gov (NCT02468271). The cohort in this study (n=73 patients) represents two patient subgroups who were able to provide sufficient sputum at multiple timepoints for microbiota analysis. The first subgroup were patients (n=53) who remained clinically stable throughout the study and provided a sputum sample at baseline and at a minimum of one further timepoint up to 12 months from baseline. If multiple samples post-baseline were available, the baseline and last available sample were analysed. The second subgroup were patients (n=20) who presented with a PEx and provided a sputum sample at the start and end of antibiotic treatment of the PEx. Total bacterial (16S rRNA), P. aeruginosa (oprL) and H. influenzae (hpd) load in sputum was determined by quantitative polymerase chain reaction (qPCR) using species- specific primers and probe.

Results: Of 53 patients in the clinically stable subgroup, 17 (32.1%) were *H. influenzae* positive, 16 (30.2%) were P. aeruginosa positive, 2 (3.8%) were both *H. influenzae* and *P. aeruginosa* positive and 18 (33.9%) were negative for both organisms by qPCR at baseline. No statistical difference was observed between the baseline and the last stable visit for total bacterial (median Log10 16S rRNA 6.83 [4.9-7.9] and 6.74 [5.2-8.0] copy number/ml, respectively; p= 0.58; n=53 patients), *H. influenzae* (median Log10 hpd 1.86 [0-7.3] and 2.54 [0-7.3] copy number/ml, respectively; p=0.64; n=53 patients) and *P. aeruginosa* (median Log10 oprL 3.0 [1.1-6.7] and 2.35 [0-6.8] copy number/ml, respectively; p=0.46; n=53 patients) load. For the 20 patients in the PEx subgroup, 9 (45%) were *H. influenzae* positive, 3 (15%) were *P. aeruginosa* positive and 8 (40%) were negative for both organisms by qPCR at initiation of antibiotic treatment. No statistical difference was apparent between the start and end of antibiotic treatment samples for total bacterial (median Log10 16S rRNA 6.9 [5.4-8.0] and 7.1 [5.7-8.1] copy number/ml, respectively; p=0.28), *H. influenzae* (median Log10 hpd 6.1 [2.4-7.4] and 3.9 [1.3-7.7] copy number/ml, respectively; p=0.13) and *P. aeruginosa* (median Log10 oprL 6.3 [6.1-6.6] and 6.6 [6.2-7.2] copy number/ml, respectively; p=0.34) load.

Conclusion: Total bacterial, *H. influenzae* and *P. aeruginosa* load did not change longitudinally in patients who remained clinically stable or in patients at the start and end of antibiotic treatment of a PEx.

Figure
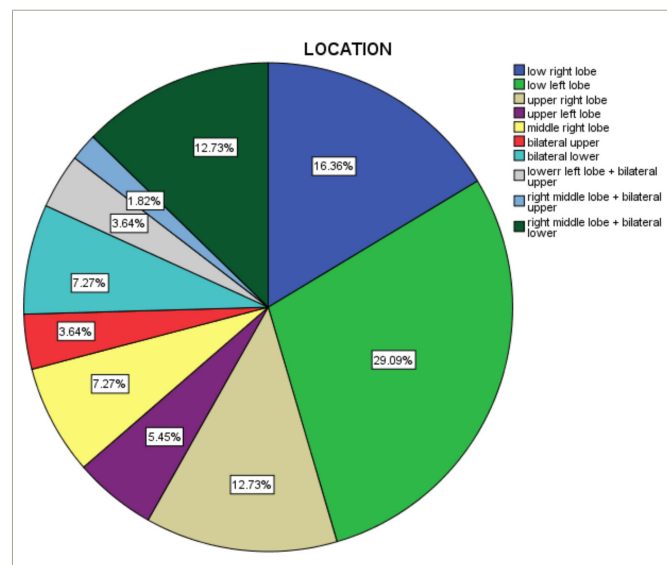
[107] CT findings in patients with Bronchiectasis

Fatima Alhamed Alduihi[1]
[1]Aleppo University, Aleppo, Syrian Arab Republic

Background: Bronchiectasis is one of the most important diseases on the pyramid of lung diseases because of the rate of prevelance on last years.

Methods: A cross sectional one center study was applied in Aleppo University Hospital between 1/8/2017 and 1/1/2018 to patients who admitted with non-cystic fibrosis bronchiectasis, who diagnosed by HRCT. Patients with COPD and asthma were excluded.

Results: 55 patients were included, 36 (65.5% of them were males and 19 (34.5%) were female. 30 patients were smokers and 20 were non-smokers. CT changes were found unilateral in 36 patients and bilateral in 19 patients.

One lobe was affected in 69.09% of all cases, and more than 2 in 18.18%. The most common location was low left lobe, in 16 patients.

Conclusion: CT findings differ between patients and need more studies to confirm.

[179] Neutrophil mediated control of Non Tuberculous Mycobacteria in patients with primary hypogammaglobulinaemia

Meyad Alkarni[1]; Fernando Moreira[1]; Tim McHugh[2]; Marc Lipman[3]; David M Lowe[1]
[1]Institute of Immunity and Transplantation, University College London, London, United Kingdom; [2]Centre for Clinical Microbiology, University College London, London, United Kingdom; [3]UCL Respiratory, University College London, London, United Kingdom

Background: Non-tuberculous Mycobacterial Pulmonary Disease (NTM-PD) is recognised as an increasing global health issue. The recent delineation of how neutrophils kill mycobacteria suggests that these cells may have an important role in controlling NTM infection. However,

neutrophils can also contribute to the pathology of the infection, e.g. through the development of bronchiectasis.

Common variable immune deficiency (CVID) and X-linked agammaglobulinemia (XLA) are severe primary immunodeficiencies characterised by low immunoglobulin concentrations. As a result, many patients develop progressive bronchiectasis. Despite this, NTM-PD is rare within this population. We hypothesised that these patients may have differences in their innate immune response to NTM, especially the function of phagocytes which may be more activated, or that the regular use of prophylactic therapies such as macrolide antibiotics may explain this finding.

Aims: To investigate the low incidence of NTM-PD among CVD/XLA patients by assessing the activation of neutrophils and the ability to phagocytose and kill NTM in CVID and XLA and healthy controls' blood after infecting them with *Mycobacterium avium* and *Mycobacterium abscessus*.

Methods: 14 CVID/XLA adult patients and 7 healthy donors attending the Royal Free Hospital, London provided blood samples. 4 patients were using prophylactic macrolide antibiotics and a further 6 other antibiotics. Slow-growing (*M. avium*) and rapid-growing mycobacteria (*M. abscessus*) were used to infect the blood samples. We assessed neutrophil activation (expression of CD15, CD16, CD62L, CD64, CD66b) and phagocytosis (using FITC-labelled organisms) via flow cytometry. We assessed mycobacterial restriction over 96 hours in a whole blood model using a liquid culture (BACTEC MGIT) readout measuring time to positivity (TTP).

Results: We observed a significant reduction in the expression of CD62L (*Figure 1*) and CD16 with mycobacterial infection, especially with *M. abscessus* (p<0.001). Patients had lower expression of CD15 compared to healthy controls in uninfected samples (p=0.002), infected with *M. abscessus* (p=0.02), and infected with *M. avium* (p=0.02) (*Figure 2*). In addition, increased CD66b expression was observed in patients compared to controls in the uninfected samples. There was no significant difference in phagocytosis of mycobacteria by neutrophils (and monocytes) between the healthy controls' and patients' samples. TTP in healthy controls and CVID/XLA patients for both mycobacterial species were similar in each group; though TTP for M. abscessus was significantly shorter than for *M. avium* (p=0.018). There was no significant difference in TTP between the patients receiving macrolide prophylaxis and those who do not receive.

Figure 1: Expression of CD62L.
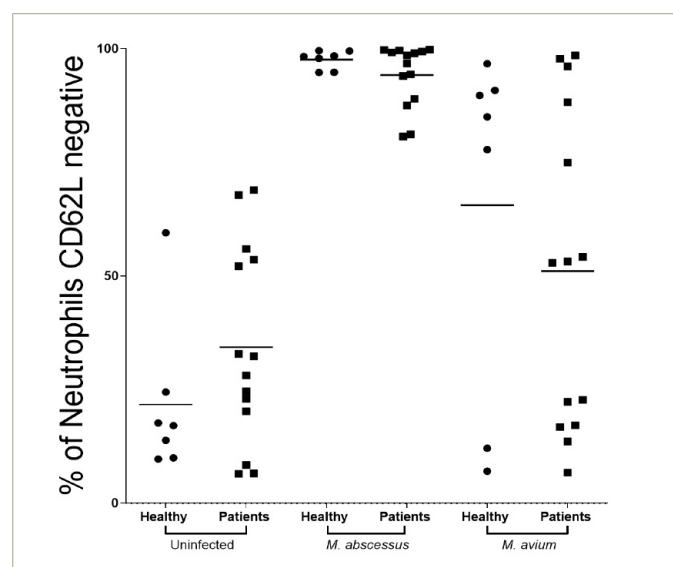
Figure 2: Mean Fluorescence Intensity of CD15.
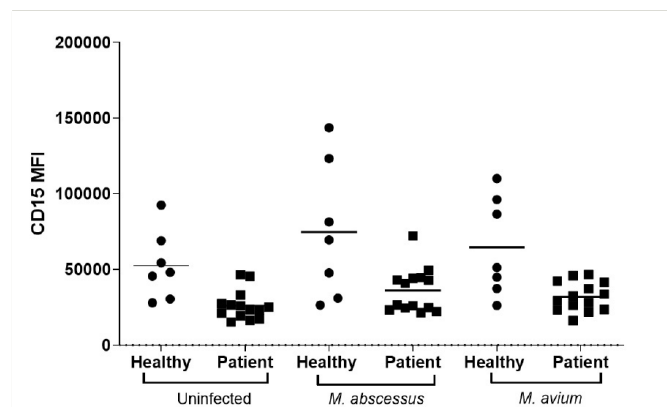
Conclusions: The current study has not demonstrated a clear explanation for the lower frequency of NTM infection in CVD/XLA patients with antibody deficiency. However, there were indications of higher baseline activation in patients' neutrophils and a consistent reduction in expression of CD15 in patient samples. The introduction of mycobacteria, especially *M. abscessus*, caused a distinct perturbation in host neutrophil responses. Further work is required to investigate these findings.

[122] Redesigning Bronchiectasis outpatient services post COVID-19 using patient satisfaction and preference data

Malvika Bhatnagar[1]; Paul McCallion[1]; John Davison[1]; Tony DeSoyza[1]; Katy Hester[1]

[1]Freeman Hospital, Newcastle upon Tyne Hospitals NHS Trust, Newcastle upon Tyne, United Kingdom

Background: As per national guidance during the COVID-19 pandemic, all face-to-face Bronchiectasis outpatient appointments, except those considered essential, were converted to telephone/video consultations. The aim of this study was to evaluate the remote clinic delivery system to inform redesign of service delivery post COVID-19 by capturing patient satisfaction and future preferences.

Methods: All patients with bronchiectasis who had a remote appointment within four predetermined consultant-led clinics, two specialist nurse clinics and one physiotherapist clinic in an 8-week period between 21/4/20 and 17/6/20 were asked a series of questions regarding current and future consultations. Data was collected during the calls, and recorded and analysed using Excel. Thematic analysis was used to analyse open questioning.

Results: A total of 193 remote consultations were made. Median age of patients across clinics was 69 (range 19-94). Median distance travelled to appointments was 7 miles (range <1-76 miles). Median telephone call duration was 15 minutes (range 1-42 minutes). We achieved a response rate of 98% [189/193], with 97% [184/189] of responders being satisfied with their current appointment being held remotely. When asked about preferences for format of future appointments beyond COVID-19 restrictions, 34% of respondents preferred face-to-face appointment; 41% preferred a telephone or video appointment; and 25% had no preference.

'Wanting choice of clinic format' was the overarching theme when patient future preferences were analyzed, with patients wanting a choice to attend either face-to-face or remotely depending on 'perceived wellness'. Being able to alter the format near to the time of the appointment, if required, seemed to be key. Other important themes influencing patient

preferences were 'need for monitoring or tests', particularly sputum sampling or flushing indwelling venous access devices, and 'medical reasons or beliefs', with patients being concerned about increased risk of exposure to infection other than COVID-19 whilst attending face-to-face appointments.

Conclusions: The conversion of bronchiectasis outpatient appointments to remote consultations was well received within our cohort. By collecting data within the consultation, high response rates were achieved and are likely to accurately represent patient preferences.

Most patients (66%) did not necessarily prefer a face-to-face appointment for future consultations, thus indicating that physical footfall in clinics could be reduced significantly, without adversely affecting patient satisfaction. Familiarity with the multidisciplinary team managing their condition may give patients and health professionals more confidence to hold remote consultations. A system whereby we can alter format of appointment dependent on clinical need nearer the time of the appointment rather than predicting this 6 months ahead of time would seem key to developing more effective, efficient and safe ways of working. The ability to provide a significant proportion of appointments remotely across various disciplines would allow for reductions in costs, travel time and environmental impacts. Redesigning services with these features would help improve the efficiency of outpatient services, improve patient experience and potentially reduce risks to patients with bronchiectasis. This work focusses on patient preferences. More work would need to be done to assess safety and clinical effectiveness with such changes in service delivery.

Disclosure: No conflicts of interest to disclose.

[57] Sore and Tired. The symptom experience of young people with bronchiectasis.

Julie Blamires; Annette Dickinson; Cass Byrnes; El-Shadan Tautolo;

[1]Auckland University of Technology, Auckland, New Zealand; 2University of Auckland, Auckland, New Zealand

Background: Bronchiectasis is a significant health issue in New Zealand particularly amongst Māori and Pacific children, young people, and those from lower socioeconomic areas. Awareness of the symptoms and signs of bronchiectasis as well as how these relate to exacerbation is crucial for diagnosis and ongoing management. The most described symptom is a mucous producing cough, however studies in adult patients report other common symptoms such as dyspnoea, wheezing and pleuritic chest pain. In children and young people with bronchiectasis research has focused largely on diagnosis, treatment and management. Little is known about the symptoms experience or impact that bronchiectasis has on young people who live with the condition. This paper will report the findings related to symptom experience from a larger study which examined the day to day experience of young people with bronchiectasis.

Method: Fifteen young people (13-23 years of age) with bronchiectasis participated in one to one semi-structured interviews. These were recorded and transcribed verbatim. Analysis of the participants' experience, using an interpretive description approach, resulted in a conceptual description of life with bronchiectasis as 'Pretty Normal'. This concept of 'a pretty normal life' was influenced by three key thematic elements 'sore and tired' 'life interrupted' and "looking after self '. This presentation will focus on one of these elements 'Sore and Tired'.

Results: Although there was variability in physical symptom patterns, cough, soreness and fatigue were prominent features that impacted significantly on physical, emotional and social aspects of day to day life. Cough and sputum production held the most potential for social embarrassment and induced feelings of inadequacy however most participants considered cough to be part of their normal daily life.

Participants also described chest pain associated with chest infection or exacerbation of bronchiectasis, many associated the location of pain with the location of their bronchiectasis. One of the key findings was the pervasive and profound experience of fatigue which was identified as significant by every participant. The presence of fatigue was a common experience as prodrome to and during an exacerbation of bronchiectasis.

Conclusions: While self-monitoring of symptoms is subjective and individualised in bronchiectasis, certain themes were repeated. Notably the significant reporting of fatigue and chest pain, as well as the more traditionally accepted symptoms of cough and dyspnoea. There was often more weight put on these symptoms by affected youth as heralding an exacerbation than those that are more often discussed in the clinical setting. Fatigue levels and chest pain should be regularly enquired about in the clinical setting.

[71] Burden of non-tuberculous mycobacterial lung disease (NTMLD) in France: a claim database analysis

Stéphane Bouée[1]; Claire Andréjak[2]; Raphaël Chiron[3]; Nicolas Veziris[1]; Marko Obradovic[5]; Jérôme Charillat[6]; Corinne Emery[1]

[1]CEMKA, Paris, France; [2]CHU Amiens, Pneumologie, Amiens, France; [3]Service des Maladies Respiratoires, CRCM, Hôpital A de Villeneuve, Montpellier, France; [4]APHP, Hôpital Saint-Antoine, Pneumologie, Paris, France; [5]INSMED Germany GmbH, Frankfurt, Germany; [6]INSMED France SAS, Paris, France

Background: Non-tuberculous mycobacteria lung disease (NTMLD) is a rare but growing public health concern. It is associated with progressive lung destruction and increased resource use and mortality.

Objective: The objective of the study was to describe the epidemiology, management and cost of NTMLD in France.

Methods: A retrospective analysis was performed using the SNIIRAM database over 2010-2017. Patients with NTMLD were identified based on the ICD10 codes during hospitalizations and/or specific antibiotics treatment regimens. The study population was matched (age, gender and region) to a control group (1: 3) without NTMLD. Both groups were compared for co-morbidities, mortality, and healthcare cost.

Results: 5,628 patients with NTMLD (men: 52.9%) were identified over the study period. The annual incidence rate of NTMLD remained stable over time, with a min of 1.0/100,000 in 2010 (N=662) and a max of 1.1/100,000 (N=732) in 2017. The mean age at inclusion was 60.9 (SD: 19.5) years. Among identified cases, 1,433 (25.5%) were treated with antibiotics. The most common drug combinations were: Clarithromycin + Ethambutol (34.4%), Clarithromycin + Rifampycin + Ethambutol (22.1%), Clarithromycin + Rifampycin (10.3%) and Clarithromycin monotherapy (9.3%). The proportion of patients still treated at 6 and 12 months was 40% and 22%, respectively.

Patients with NTMLD had more co-morbidities as compared to controls - the mean Charlson comorbidity index score was 1.6 (versus 0.2 for controls; p <0.0001). All risk factors comparisons between NTMLD cases and control group were statistically significant (p<0.0001): corticosteroids (57.3% vs 33.8%), chronic lower respiratory diseases (34.4% vs 2.7%), other infectious pneumonia (24.4% vs 1.4%), malnutrition (22.0% vs 2.0%), tuberculosis (14.1% vs 0.1%), HIV (8.7% vs 0.2%), lung cancer and graft (5.7% vs 0.4%), tobacco use (3.7% vs 0.8%), cystic fibrosis (3.2% vs 0.0%), gastro-esophageal reflux disease (2.9% vs 0.9%) and bone marrow transplant (1.3% vs 0.0%).

A higher 5-year all-cause mortality rate was observed in subjects with NTMLD: 19.7% versus 5.5% (p<0.0001, Log-Rank). A Cox-regression model accounting for different socio-demographic and comorbidities covariates showed that NTMLD is independently associated with an increased mortality rate with a hazard ratio of 2.8 (95% CI: 2.53; 3.11) (p <0.0001).

Annual total expenses the year following the NTMLD diagnosis in a societal perspective (including hospital and ambulatory costs) were € 24,083 (SD: 29,358) in NTMLD subjects versus € 3,402 (SD: 8,575) in controls (p<0.0001). Main driver of the total expense for NTMLD patients was hospital expense, which accounts for more than 50% of the total expense).

Conclusion: Patients with NTMLD have relatively high comorbidity burden and overall mortality that is mainly driven by NTMLD. Patients with NTMLD also have excess healthcare expenses. Nevertheless, only minority of patients get treated with antibiotics and of those patients treated, many stop therapies before the infection can be successfully eradicated. These results underline the high burden associated with NTMLD and the need for appropriate management of this condition.

Disclosure: This study was sponsored by Insmed.

[143] Clinimetrics properties of objective outcome measures in the BronchUK study

Judy M. Bradley*[1]; Kathryn Ferguson[2]; Katherine O'Neill*[1]; Denise Cosgrove[2]; Adam T. Hill*[3]; Michael R. Loebinger*[4]; Mary Carroll*[5]; James D. Chalmers*[6]; Timothy Gatheral*[7]; Chris Johnson*[8]; Anthony De Soyza*[9]; John R. Hurst*[10]; Andrew Bailey[11]; Joseph S. Elborn*[1]

[1]Wellcome-Wolfson Institute for Experimental Medicine, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, United Kingdom; [2]Belfast Health and Social Care Trust, Belfast, United Kingdom; [3]Royal Infirmary and University of Edinburgh, Edinburgh, United Kingdom; [4]Royal Brompton Hospital and Imperial College London, London, United Kingdom; [5]University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom; [6]University of Dundee, College of Medicine, Dundee, United Kingdom; [7]Department of Respiratory Medicine, University Hospitals of Morecambe Bay NHS Foundation Trust, Morecambe Bay, United Kingdom; [8]Cambridge Centre for Lung Infection, Papworth Hospital, Cambridge, United Kingdom; [9]Institute of Cellular Medicine, Newcastle University, National Institute of Health Research Biomedical Research Centre, Newcastle, United Kingdom; [10]UCL Respiratory, University College London, London, United Kingdom; [11]Frontier Science (Scotland) Ltd., Kincraig, United Kingdom

*On behalf of BRONCH-UK consortium

Background: There are a lack of outcome measures with robust clinimetric properties in bronchiectasis. The aim of this study was to explore the clinimetric properties of a range of outcome measures, in order to make recommendations for their use in clinical trials in bronchiectasis. Specific objectives were (i) to determine the long-term reliability over 1 year during clinical stability and (ii) to determine the responsiveness of these outcome measures over a course of intravenous (IV) antibiotics for pulmonary exacerbation (PEx).

Methods: This study was a multi-centre cohort study in adults with bronchiectasis. Participants were recruited from 7 hospitals in the UK (REC reference 15/NI/0077; NCT02468271). Data were collected from participants during 4 stable visits, 4 months apart over the period of 1 year. If the patient experienced a PEx, 2 further visits were performed: 1 visit within 48 hours of commencement of oral/IV antibiotic therapy; and the second within a maximum of 14 days of completion of the antibiotic. At each visit the following assessments were completed: spirometry (American Thoracic Society/European Respiratory Society guidelines); Multiple Breath Nitrogen Washout (MBN2W, Ecomedics Exhalyzer® D and a published Standard Operating Procedure) and a blood sample for CRP. Reliability was determined using the Coefficient of Variation (CV) between four clinically stable visits. Responsiveness to change was determined by Signal-To-Noise Ratio (SNR) in stable measurements to PEx signal. SNR was calculated as the ratio of the mean difference between measurements at the start and end of the PEx to the between-stable visits standard deviation (SD).

Results: Recruited participants (n=149) had a mean (SD) age 66.0 (10.9) years and 66% (98/149) were female. A mean Bronchiectasis Severity Index (BSI) of 8.5 indicated that the cohort had moderate-severe disease severity. LCI[5] had the lowest (best) CV%, followed by LCI[2.5] and FEV$_1$% predicted. Reliability of lung function measures over a 12 month period are consistent with results reported in shorter term studies. CRP had the largest (best) SNR followed by FEF$_{25-75}$ and FEV$_1$, however CRP 98% CI were wide.

Table 1: CV% and SNR data for all outcome measures

Outcome Measures	CV% and 98% CI	SNR and 98% CI
FEV$_1$ (% predicted)	5.6 (4.8, 6.5) N=113	-1.035 (-1.963, -0.108) N=38
FEF$_{25-75}$ (% predicted)	17.3 (15.0,19.6) N=114	-1.763 (-4.323, 0.797) N=38
LCI $^{2.5}$	6.5 (5.5, 7.5) N=96	0.165 (-0.821, 1.151) N=26
LCI ^{5}	4.9 (4.3,5.6) N=96	0.278 (-0.394,0.95) N=26
CRP	53.1 (44.5, 61.7) N=96	11.67 (-1.593, 24.932) N=31

Conclusion: This is the first study to measure long term intervisit repeatability and the SNR during treatment for PEx, in a range of outcome measures in adults with bronchiectasis.

[147] Clinimetrics properties of patient reported outcome measures to measure health-related quality of life in the BronchUK study

Judy M. Bradley*[1]; Katherine O'Neill*[1]; Kathryn Ferguson[2]; Adam T. Hill*[3]; Michael R. Loebinger*[4]; Mary Carroll*[5]; Timothy Gatheral*[6]; Anthony De Soyza*[7]; James D. Chalmers*[8]; Chris Johnson*[9]; John R. Hurst*[10]; Jeremy Brown[10]; Andrew Bailey[11]; Joseph S. Elborn*[1]

1Wellcome-Wolfson Institute for Experimental Medicine, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, United Kingdom; 2Belfast Health and Social Care Trust, Belfast, United Kingdom; 3Royal Infirmary and University of Edinburgh, Edinburgh, United Kingdom; 4Royal Brompton Hospital and Imperial College London, London, United Kingdom; 5University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom; 6Department of Respiratory Medicine, University Hospitals of Morecambe Bay NHS Foundation Trust, Morecambe Bay, United Kingdom; 7Institute of Cellular Medicine, Newcastle University, National Institute of Health Research Biomedical Research Centre, Newcastle, United Kingdom; 8University of Dundee, College of Medicine, Dundee, United Kingdom; 9Cambridge Centre for Lung Infection, Papworth Hospital, Cambridge, United Kingdom; 10UCL Respiratory, University College London, London, United Kingdom; 11Frontier Science (Scotland) Ltd., Kincraig, United Kingdom

*On behalf of BRONCH-UK consortium

Background: There are a number of disease specific and generic health-related quality of life (HRQoL) tools used in bronchiectasis research. Analyses of their clinimetric properties is important to optimise the selection of HRQoL questionnaires in clinical trials. Specific objectives of the BronchUK clinimetrics study were (i) to determine the long-term reliability and (ii) to determine the responsiveness of the St George's Respiratory Questionnaire (SGRQ), Quality of Life - Bronchiectasis (QOL-B) and EuroQol (EQ-5D-5L) patient reported outcomes (PRO).

Methods: This study was a multi-centre cohort study in adults with bronchiectasis. Participants were recruited from 7 hospitals in the UK

(REC reference 15/NI/0077; NCT02468271). Data was collected from participants during 4 stable visits, 4 months apart over the period of 1 year. If the patient experienced a pulmonary exacerbation (PEx), 2 further visits were performed: 1 visit within 48 hours of commencement of oral/IV antibiotic therapy; and the second within a maximum of 14 days of completion of the antibiotic. At each visit, participants completed all 3 HRQoL questionnaires.

Reliability was determined using the Coefficient of Variation (CV) between four clinically stable visits. Responsiveness to change was determined by Signal-To-Noise Ratio (SNR) calculated as the ratio of the mean difference between measurements at the start and end of the PEx to the between-stable visits standard deviation (SD). SGRQ Total, QOL-B respiratory symptoms domain and EQ-5D-5L VAS results are summarised in table 1.

Results: Recruited participants (n=149) had a mean (SD) age 66.0 (10.9) years and 66% (98/149) were female. A mean Bronchiectasis Severity Index (BSI) of 8.5 indicated that the cohort had moderate-severe disease severity. *Table 1* presents (i) CV% data in patients with valid data at 4 stable visits and (ii) SNR data in patients with valid data at start and end PEx visits for the respective outcome measures. EQ-5D-5L had the lowest (best) CV% and largest (best) SNR followed by QOL-B Respiratory and SGRQ total.

Table 1: CV% and SNR data for all outcome measures

Outcome Measures	CV% and 98% CI	SNR and 98% CI
SGRQ Total	19.9 (16.1, 23.8) N=117	0.584 (-0.419, 1.587) N=44
QOL-B (Respiratory)	14.4 (12.2, 16.5) N=116	-2.501 (-3.547, -1.456) N=44
EQ-5D-5L	13.8 (10.9, 16.7) N=113	-3.166 (-6.791, 0.64) N=42

Conclusion: This is the first study to measure long term reliability over a 1 year period and the SNR during treatment for PEx, in a range of HRQoL PROs in adults with bronchiectasis. These data should inform the selection process for PROs for clinical trials in bronchiectasis.

[106] Longitudinal assessment of health-related quality of life in patients with bronchiectasis colonized by Pseudomonas aeruginosa

Leticia Bueno Freire; Victoria Alcaraz Serrano; Laia Fernández Barat; Giulia Scioscia; Patricia Oscanoa; Nil Vázquez; Alexandre López Gavin; Albert Gabarrús; Rosanel Amaro; Adrián Ceccato; Rubén López Aladid; Antoni Torres

[1]Cellex laboratory, CibeRes (Centro de Investigación Biomédica en Red de Enfermedades Respiratorias, 06/06/0028)- Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), School of Medicine, University of Barcelona, Barcelona, Spain; [2]Institut Clínic Respiratori, Hospital Clínic de Barcelona, Barcelona, Spain; [3]Institute of Respiratory Diseases, Department of Medical and Surgical Sciences, University of Foggia, Foggia, Italy

Background/aims: Patients with non-cystic fibrosis bronchiectasis (BE) colonized by Pseudomonas aeruginosa (PA) tend to have worse health-related quality of life (QoL) when compared with non-colonized, mainly because of higher chronic inflammation and morbidity. The aim of this study was to compare changes in QoL during 1-year follow-up in accordance with: the chronicity of the colonization, pulmonary function and frequency of exacerbations, so as to identify the most vulnerable groups of BE patients colonized by PA.

Methods: A prospective longitudinal observational study of stable adult BE patients, with at least one isolation of PA in the sputum culture in the last 6 months was conducted. At baseline, demographic and microbiological data, etiology of BE and severity scores were recorded. During 1-year follow-up, every three months the following outcomes were evaluated: pulmonary function, QoL using the Quality of Life Questionnaire-Bronchiectasis v3.1 (QOL-B), sputum culture and, number and time to first exacerbation and hospitalization. Changes between the first (V1) and the last visit (V4) were analyzed in the eight domains of the QOL-B (Physical Function, Role Function, Vitality, Emotional Function, Social Function, Treatment Burden, Health Perceptions and Respiratory Symptoms) as well as pulmonary function values (FVC, FEV1, FEV1/FVC). All these variables were contrasted among the following groups: A. Colonization by PA (intermittent vs chronic); B. Pulmonary function (BE vs BE-COPD vs obstructive-BE) and C. Frequency of exacerbations (0 vs 1-2 vs ≥3 exacerbations/year).

Results: Thirty-seven patients were included (27 women, 67±13 years). Changes in QoL are shown in *Table 1*. According to group A: patients with chronic colonization by PA showed worse QoL in two of the eight domains, Vitality and Emotional Function. According to group B: Health Perceptions got worse in BE-COPD vs obstructive-BE vs BE. According to group C, frequent exacerbators were more severe and Health Perceptions were significantly lower in both V1 (median 50.00 vs 33.33 vs 16.67, p=0.008) and V4 (58.33 vs 33.33 vs 16.67, p=0.002) but there were not significant changes over time in QoL. Regarding the lung function, none of the groups evinced significant variations along time.

Conclusions: Chronic colonization by PA, BE-COPD and patients with ≥3 exacerbations/year were the identified vulnerable BE groups, associated with a worsening of QoL after 1-year follow-up. These findings should be validated in future studies with a higher sample size.

[61] High levels of resistance to recommended antimicrobial agents in Pseudomonas aeruginosa from patients with bronchiectasis

Roberto Cabrera; Laia Fernández-Barat; Nil Vázquez; Victoria Alcaraz; Leticia Bueno-Freire; Rubén López-Aladid; Rosanel Amaro; Patricia Oscanoa; Laura Muñoz; Jordi Vila; Antoni Torres

[1]Hospital Clínic, Barcelona, Spain; [1]Cellex laboratory, CibeRes, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), School of Medicine, University of Barcelona,, Barcelona, Spain; [2]Hospital Clínic, Barcelona, Spain; [2]Respiratory Intensive Care Unit Pneumology Department, Hospital Clínic, Barcelona, Spain; [3]Microbiology Department, Hospital Clínic, CRESIB ISglobal, Barcelona, Spain

Background: Non-cystic fibrosis bronchiectasis (BE) is a chronic structural lung condition that facilitates chronic colonization by different microorganisms and courses with recurrent respiratory infections and frequent exacerbations. One of the main pathogens involved in chronic respiratory infection and acute exacerbations is *Pseudomonas aeruginosa*. When not early eradicated during infection, *Pseudomonas aeruginosa (PA)* can accumulate high rates of resistance to the most antipseudomonal agents.

Aims: To determine the antimicrobial susceptibility, the molecular mechanisms of resistance involved and the molecular epidemiology in PA strains isolated from patients with BE.

Methods: A prospective observational study was carried out in Hospital Clinic. A total of 43 strains of *PA* were isolated and characterized from sputum of BE patients. The antimicrobial susceptibility to: Aztreonam, ciprofloxacin, meropenem, imipenem, amikacin, tobramycin, pipertaz, ceftazidime and colistin was performed using the Kirby-Bauer method with the ATCC 27853 strain as a control. Strains were classified according

Table 1. Changes in QoL in specific patient groups with BE colonized by PA (N = 37)

Outcome	A. Colonization by PA			B. Pulmonary function				C. Frequent exacerbator			
	Intermittent	Chronic	p-value	BE	BE-COPD	Obstructive BE	p-value	0	1-2	≥3	p-value
QOL-B											
Physical Function	0.00 [0.00 - 8.33]	0.00 [0.00 - 33.33]	0.967	0.00 [0.00 - 33.33]	0.00 [0.00 - 16.67]	0.00 [0.00 - 33.33]	0.851	0.00 [0.00 - 16.67]	0.00 [0.00 - 33.33]	0.00 [-33.33 - 0.00]	0.118
Role Function	0.00 [-33.33 - 33.33]	0.00 [0.00 - 33.33]	0.599	0.00 [-33.33 - 33.33]	33.33 [-33.33 - 66.67]	0.00 [0.00 - 0.00]	0.848	0.00 [0.00 - 33.33]	0.00 [-33.33 - 33.33]	0.00 [0.00 - 0.00]	0.599
Vitality	33.33 [25.00 - 33.33]	0.00 [0.00 - 33.33]	0.037 *	0.00 [0.00 - 33.33]	0.00 [-33.33 - 33.33]	0.00 [0.00 - 33.33]	0.728	0.00 [0.00 - 33.33]	0.00 [0.00 - 33.33]	0.00 [0.00 - 0.00]	0.226
Emotional Function	16.67 [0.00 - 33.33]	0.00 [-33.33 - 0.00]	0.015 *	0.00 [-16.67 - 16.67]	0.00 [0.00 - 50.00]	0.00 [-33.33 - 16.67]	0.471	0.00 [0.00 - 16.67]	0.00 [-33.33 - 0.00]	0.00 [-16.67 - 16.67]	0.364
Social Function	8.33 [-8.33 - 41.67]	0.00 [-33.33 - 0.00]	0.056 ·	0.00 [-33.33 - 16.67]	0.00 [-16.67 - 66.67]	0.00 [-33.33 - 0.00]	0.577	0.00 [-16.67 - 0.00]	0.00 [-33.33 - 0.00]	8.33 [0.00 - 16.67]	0.354
Treatment Burden	16.67 [0.00 - 33.33]	0.00 [0.00 - 25.00]	0.194	8.33 [0.00 - 33.33]	0.00 [0.00 - 33.33]	0.00 [0.00 - 0.00]	0.452	0.00 [0.00 - 16.67]	0.00 [0.00 - 33.33]	16.67 [-33.33 - 33.33]	0.989
Health Perceptions	8.33 [0.00 - 16.67]	0.00 [-16.67 - 16.67]	0.433	16.67 [0.00 - 33.33]	-16.67 [-33.33 - 16.67]	0.00 [-33.33 - 0.00]	0.007 **	8.33 [0.00 - 16.67]	0.00 [-16.67 - 16.67]	-8.33 [-16.67 - 0.00]	0.538
Respiratory Symptoms	0.00 [0.00 - 16.67]	0.00 [0.00 - 0.00]	0.363	0.00 [0.00 - 0.00]	0.00 [-33.33 - 66.67]	0.00 [0.00 - 0.00]	0.687	0.00 [0.00 - 0.00]	0.00 [0.00 - 0.00]	0.00 [0.00 - 33.33]	0.518

Data is presented as median [Q1-Q3]. Values in Table 1 are the delta of its outcome (V4-V1). Mann-Whitney U test was used for 2 groups and Kruskal-Wallis test for 3 groups. P-values in bold were statistically significant. Abbreviations: QoL: health-related quality of life; BE: bronchiectasis; PA: Pseudomonas aeruginosa; BE-COPD: bronchiectasis and chronic obstructive pulmonary disease; QOL-B: Quality of Life Questionnaire-Bronchiectasis v3.1.

to antimicrobial profiles in: PS (susceptible), MR, MDR or XDR (resistant to one, two or three classes of antimicrobials, respectively). Interpretation of results was carried out according to the European Committee on Antimicrobial Susceptibility Testing (EUCAST). Molecular characterization of each resistance mechanism was screened by PCR, electrophoresis and sequencing. Molecular epidemiology was analyzed by Multi locus sequence typing (https://pubmlst.org/paeruginosa/). Phylogenetic analysis was carried out using eBURST algorithm (http://www.phyloviz. net/goeburst).

Results: The frequency of PA resistant isolates was: Aztreonam (69,76%), ciprofloxacin (44,19%), meropenem (30,23%), imipenem (30,23%), amikacin (18,6%), tobramycin (18,6%), pipertaz (9,3%), ceftazidime (9,3%) and colistin (2,32%). The strains showed different antimicrobial profiles: PS (9,3%), MR (62,79%), MDR (20,93%) and XDR (6,97%). Mutations in *gyrA*, *gyrB*, *ParC* and *ParE* genes were found in ciprofloxacin resistant *P. aeruginosa* strains. The most frequent mutation in *gyrA* was A33G, in *gyrB* S466F, in parC S87W and in *parE* D539E. Our study showed that a higher number of mutated genes was related to the increased of MIC in the QRDR. Regarding resistance to β-lactams the presence of different β-lactamases was detected: Oxa50 (97,67%), ges (44,18%), *imi* (11,62%), and *gim* (2,32%). The *aac(3)-Ia*, *aac(3)-Ic*, *aac(6")-Ib* and *ant(2")-Ia* genes were related to aminoglycoside resistance. The presence of *mcr-1* gene was detected in the strain resistant to colistin. A wide variety of clones were found but, the genetic distance showed a high relationship between them. The most common clones detected were: ST619 (11,62%), ST676 (9,3%), ST532 (9,3%), ST109 (6,97%).

Conclusions: the high level of resistance to first-line antimicrobial recommended in BE guidelines and the great diversity of mechanisms of resistance found, threatens the treatment of BE and the eradication of *Pseudomonas aeruginosa*.

[141] Validation of the Bronchiectasis Impact Measure (BIM) – a novel patient reported outcome measure

Megan L. Crichton[1]; Emily K. Dudgeon[1]; Amelia Shoemark[1]; James D. Chalmers[1]

[1]University of Dundee, Dundee, United Kingdom

Introduction: Existing quality of life and symptom tools used in bronchiectasis trials are either not disease specific or are complex and have not been consistently responsive. We developed a simple patient reported outcome, the bronchiectasis impact measure (BIM) for use in clinical research including clinical trials.

Methods: Patients with bronchiectasis attending a tertiary referral clinic in the East of Scotland were invited to complete the BIM questionnaire and the Quality of Life Bronchiectasis questionnaire at baseline with repeat questionnaires after 2 weeks and 6 months. We assessed internal consistency, test-retest reliability, construct validity and responsiveness by evaluating change during an acute exacerbation.

Results: 173 patients were included. The 8 domains (Cough, sputum, breathlessness, tiredness, activity, general health, control, exacerbations) showed excellent internal consistency (Cronbach 0.93). The intraclass correlation coefficient (ICC) demonstrated excellent reproducibility over a 2-week period, 0.79 (cough), 0.86 (sputum), 0.82 (dyspnoea), 0.88 (tiredness), 0.84 (activity), 0.81 (general health), 0.83 (control) and 0.71(exacerbation). Domains correlated strongly with bronchiectasis severity and lung function. Both distribution and patient-based anchor methods estimated the MCID for each domain as 1.5 points on a 10-point scale. Statistically significant changes in all BIM domains were observed during an acute exacerbation.

Conclusion: The BIM is a simple patient reported outcome. This study validates the internal consistency, reliability, construct validity and response of the tool at acute exacerbation. Further validation of the tool is now required.

[101] Voice of Patients in Bronchiectasis - a social media analysis

Maria Carmela De Vuono; Chiara Carnini; Stefano Aliberti; James D. Chalmers; Soumya Shukla; Sharath C George; Irisz Delestre-Levai

[1]Chiesi Farmaceutici S.pA., Parma, Italy; [2]DRG Digital, Burlington, United States of America; [3]Department of Pathophysiology and Transplantation, University of Milan, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Respiratory Unit and Cystic Fibrosis Adult Center, Milan, Italy; [4]Scottish Centre for Respiratory Research, Ninewells Hospital and Medical School, Division of Molecular and Clinical Medicine, University of Dundee, Dundee, United Kingdom

Background: Although it is of great importance for healthcare professionals to ensure that patients' needs and concerns are valued and that they feel confident in the quality of the care they receive, there have been few studies specifically addressing the opinions, experiences and needs of patients with bronchiectasis, and more importantly the emotional impact of the disease, diagnosis and treatment.

Methods: A comprehensive search around bronchiectasis was performed on different social media platforms in 5 languages to obtain patients' and caregivers' perspectives on symptoms, treatments and burden of the disease. Social media posts between January 2018 to December 2019 from the US, Canada, UK, Spain, France, Italy, Germany, Australia and New Zealand were retrieved using enterprise grade social listening tools. Conversations from open social media channels were anonymously extracted using keywords and phrases related to the disease, as well as possible misspellings, abbreviations and synonyms commonly used by patients and caregivers.

Results: Over 27,000 mentions of bronchiectasis were identified on social media channels, 35% of which were posted by patients and caregivers on multiple social media channels in order to interact with other patients and advocacy groups. Approximately 1,600 posts were found on bronchiectasis symptoms, out of which shortness of breath, persistent cough and mucus production (20%, 22% and 18% of mentions, respectively) were the most commonly discussed among patients online. The research revealed, that existing diagnostic tests (e.g. X-rays, pulmonary function tests, bronchoscopy) often delay diagnosis or provide inaccurate results, which leads to multiple rounds of consults and substantial delays in treatment initiation and management of the disease. Conversations around this topic indicated that the younger population particularly teens and young adults without severe lung conditions are at a higher risk of delayed diagnosis whilst patients who have suffered pneumonia are likely to be diagnosed sooner. Misdiagnosis was common across different age groups, especially among patients without severe symptoms or lung disease and this was associated with an emotional burden of anger, confusion, frustration and anxiety. The research also revealed that patients are concerned about a lack of efficacy of treatments and antibiotic resistance and that having to switch between therapies often creates an emotional and financial burden.

Conclusions: Analysis of social media presents a new approach to derive insights on patients' experiences with bronchiectasis and has the potential to complement more traditional approaches to drive more patient-focused drug development.

[119] Asthmatic traits in a group of patients with non cystic fibrosis Bronchiectasis

Federico Lorenzo Dente[1]; Giulia Lenzini[1]; Elena Bacci[1]; Tiziano Marsi[1]; Marzia Pedreschi[1]; Barbara Vagaggini[1]; Silviana Cianchetti[2]; Cristina Cardini[2]; Laura Carrozzi[1]

[1]PNEUMOLOGY DIVISION, DCTV - UNIVERSITY HOSPITAL OF PISA, PISA, Italy;
[2]PNEUMOLOGY DIVISION, Department of Surgery, Medicine, Molecular Biology, and Critical Care, University of Pisa, PISA, Italy

Aim: To compare several indices of asthmatic traits in bronchiectasis, functional findings, as well as eosinophilic inflammatory indices in blood and airways.

Methods: A group of 241 consecutive patients with non cystic fibrosis bronchiectasis was evaluated for asthma traits as GINA guidelines: broncho-dilator (BD) reversibility test or methacholine (Mch) bronchial challenge test or variation of FEV1 between the visits. Moreover, subjects were evaluated for airway inflammatory indices (cell counts in blood and induced sputum, and FeNO).

Results: Mean age was 65,8 (SD 25.5), 151 female (63%), 57.2% non smokers, 4.3% current smokers, 38.5% ex smoker. All subjects performed spirometry: 58% of subjects showed obstructive pattern. The measurement of RV and TLC was performed in 200 subjects, 35.5% showing isolate increase in VR (air trapping), and 14.2% an increase in both RV and TLC (insufflation). The CO diffusion test (DLCO) was performed in 219 subiects, showing a significant decrease in 24.7%. A broncho-dilator test was performed in 187 subjects, showing a positive response in 33 subjects (18%). The methacholine test was performed in 74 subjects, 34% reached a PD20FEV1. The measurement of the variation of FEV1 between the visits was performed in 134 subjects, 55% reached a significant over-time variation of FEV1 greater than 15% and 200 mL. Eosinophils and FeNO levels were also considered as markers of asthmatic traits: an increase of blood eosinophils >300/mcL was found in 19% of 188 subjects, an increase of sputum eosinophils in 23% (out of 166 subjects) and of FeNO in 40% (out of 200 bronchiectasis subjects). A significant relationship was demonstrated between the magnitude of reversibility test and FeNO (r= 0.15, p=0.04), a well as between the magnitude of reversibility test and sputum Eosinophil % (r= 0.18, p=0.04) or blood Eosinophils (r= 0.27, p=0.001). The response to Methacholine challenge test showed a significant relationship with sputum eosinophils (r=0.37, p=0.008) and FeNO (r=0.29, p=0.03). Long-term variation of FEV1 showed a relationship with FeNO (r= 0.22, p=0.02) but not with eosinophils. The RV but not TLC, showed a relationship with reversibility test (r=0.28, p=0.0002) and FEV1 variation (r=0.23, p=0.01).

Conclusions: In conclusion, we have evaluated a group of consecutive patients with bronchiectasis: a significant subgroup showed an obstructive pattern, some patients had positive response to BD or methacholine or both, the measurement of variation of FEV1 over time resulted in a greater sensibility in bronchiectasis, to evaluate in future studies. Moreover, the response to broncho-dilator and methacoline is related to eosinophil inflammation in the airways, well suggesting asthmatic traits in a significant subgroup of subjects with bronchiecvtasis.

[104] Mucociliary clearance in the healthy trachea occurs in spirals and is impaired in COPD, and absent in primary ciliary dyskinesia and acute viral infection

Poster Winner

James Di Michiel[1]; David Abelson[1]; Lucy Morgan[1]

[1]Department of Respiratory Medicine, Concord Hospital, Sydney, Australia

Background/Aim: Mucociliary clearance (MCC) is a critical mechanism of maintaining lung health. Together with cough, MCC provides the main mechanism for the removal of inhaled pathogens, particles and respiratory secretions. Impaired MCC predisposes to recurrent infection and chronic inflammation and contributes to the pathophysiology of chronic bronchitis, bronchiectasis, and COPD. MCC has previously been described in two dimensions by measuring Tracheal Mucus Velocity (TMV) in the large airways of healthy normals and patients with severe

	obstructive pattern (IT<LLN)	Positive BD response (+12% and 200 mL)	Positive Mch response (PD20FEV1<1 mg)	Long time variation in FEV1 (15% and 200 mL)	Increased Blood Eos. (<300/mcL)	Increased Sputum Eos. (>3%)	Increased FeNO (>25 ppb)
TOTAL SUBJECTS	241	187	74	134	188	166	200
% Pos.	58%	18%	34%	55%	19%	23%	40%

COPD. This pilot project describes tracheal MCC in three dimensions, comparing MCC in healthy controls to patients with COPD, PCD and acute viral illness.

Methods: Subjects received an injection of 0.1mL technetium labelled macro-aggregated albumin (99mTc MAA) into the trachea via a cricothyroid injection using a 25-gauge sterile needle and then lay flat for a 15 minute image acquisition via two gamma cameras which captured lateral and AP images every 10 seconds to record and track the mucociliary clearance in 3-D. The cine files were reviewed and movement within the trachea plotted as distance vs time. COPD patients had 2 studies; pre and post bronchodilator. PCD patients had 2 studies; pre and post Hypertonic saline.

Subjects: 20 patients with mild-mod COPD (mean FEV1 67%), 5 patients with PCD and 2 healthy normals (one on the first symptomatic day of influenza B infection and two weeks later).

Results: In the COPD group, 40 studies were performed (pre- and post-bronchodilator). In 36 studies the distribution of TcMAA was adequate to visualise the trachea and in 4, the radiolabeled droplet was coughed immediately through the vocal cords . In all COPD studies the droplet aggregated on the mucosal surface into a bolus that could be tracked by the gamma cameras. Time compressed cine describe each bolus being cleared in a right handed spiral in 27/36 studies. In 9 studies, due to breakup of the labelled bolus and/or cough, the transit was not linear but spirals were not consistent. TMV in all patients with COPD is slowed compared to healthy controls. All 5 PCD patients were able to lie flat for 15 minutes without cough but the injected TcMAA remained dispersed on the mucosal surface and did not aggregate into a bolus. No clearance was demonstrated. After administration of 10mL nebulised hypertonic saline all PCD patients exhibited significant sputum clearance with minimal residual 99mTc MAA detectable. Both healthy controls also exhibited spiral clearance, with one opportunistically imaged with active influenza B infection showing complete loss of clearance and some recovery two weeks later.

Conclusion: This pilot study uses a novel, safe and well tolerated methodology to describe for the first time that MCC in the healthy trachea occurs in spirals. When the pathophysiology is primarily patchy deciliation, chronic inflammation and mucus hyper secretion (eg COPD) MCC is reduced in speed but the spiral pattern of clearance is maintained. In PCD, where the primary pathophysiology is one of impaired ciliary motility, MCC is absent and cough becomes the dominant clearance mechanism. Lastly, acute influenza appears to abolish MCC, likely reflecting acute deciliation as the mechanism of symptoms of viral infection and post viral bacterial superinfection.

[130] Imaging features encountered in children with cystic fibrosis

Patricia Durand[1]; Viorel Biciusca[2]; Ileana Octavia Petrescu[3]; Sorina Stan[4]; Gabriela Oancea[4]; Mara Balteanu[5]; Beatrice Mahler[5]; Teodora Biciusca[6]

[1]Municipal Clinical Hospital «Filantropia», Craiova, Romania; [2]Departament of Internal Medicine - Pneumology, UMF, Craiova, Romania; [3]Departament of Pediatrics, Faculty of Medicine, UMF, Craiova, Romania; [4]Emergency County Clinical Hospital, Craiova, Romania; [5]Institute of Pneumology «Marius Nasta», Bucharest, Romania; [6]Faculty of Medicine, Goethe University, Frankfurt am Main, Germany

Background: Cystic fibrosis is a genetic disorder with autosomal-recessive transmission, with multiorgan involvement, with the clinical picture dominated by respiratory symptoms.

Aim: The aim of this study was to analyze the incidence of the pulmonary radiological and computer tomographic features encountered in a group of 13 children diagnosed with cystic fibrosis, over a period of 10 years.

Materials and methods: We conducted a retrospective clinical study on a group of 13 patients diagnosed with cystic fibrosis and hospitalized in the Pediatric Clinic II of the Craiova County Emergency Hospital, for a period of 10 years, compared to a group of 10 children with respiratory diseases, but without cystic fibrosis. The positive diagnosis was suggested in base of the anamnesis, clinical evaluation, correlated with paraclinical investigations and confirmed by performing iontophoresis and genetic testing.

Results: All the patients had chloride concentrations above 60 mmol/l, with a mean value of 114.75 ± 18.07 mmol/l, with limits between 80 and 193 mmol/l, compared to the mean value of 54.6 ± 9.64 mmol/l in control subjects.

The genetic testing, performed in 11 patients, revealed the following 6 mutations: ΔF508 (14/22;63.63%), N1303K (3/22; 13.63%), G85E (2/22; 9.09%), 394delTT (1/22; 4.54%), 2184delA (1/22; 4.54%), and polymorphism 5T (4.54%).

Following the general clinical examination, the incidence of the main respiratory manifestations was: cough (69% vs 50%), expectoration (53% vs 40%), dyspnea (53% vs 40%), wheezing (53 % vs 30%). All patients (100%) had exacerbations of chronic lung disease. (*Figure 1*)

Figure 1

Figure 1. Incidence of the respiratory symptoms in CF children vs control subjects
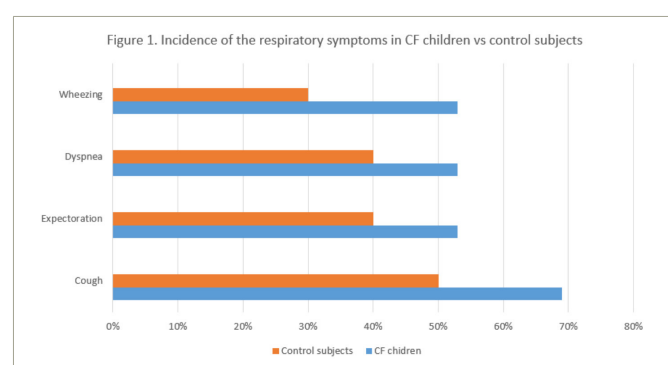
The main radiological features were: accentuation of the peribronchovascular pulmonary interstitium (9/13; 69.23% vs 70%), bilateral apical bronchial dilatations (3/13; 23.07% vs 0%), pulmonary opacities with the appearance of pulmonary condensation (1/13; 7.69% vs 20%), pulmonary hyperinflation (1/13; 7.69% vs 20%) and normal lung appearance (1/13; 7.69% vs 10%). (*Figure 2*)

Figure 2

Figure 2. Incidence of the pulmonary radiological features in CF children vs control subjects
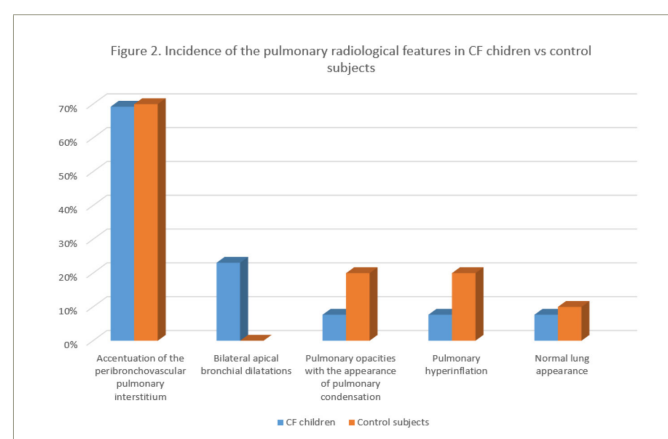
The main pulmonary tomographic features were: bilateral bronchiectasis of the upper lobes (2/4; 50% vs 0%), disseminated bronchiectasis on both lung areas (1/4; 25% vs 0%), peribronchovascular interstitial pulmonary fibrosis (4/4; 100% vs 0%), pneumonic type condensation (1/4; 25% vs 2/4; 50%), lung distension (2/4; 50% v. ¼; 25%), «the signet ring of bronchiectasis" (2/4; 50% vs 0%). (*Figure 3*)

Figure 3

Figure 3. CT scans in cystic fibrosis in a 14-year-old patient. 3A. Axial computed tomography images. Pulmonary hyperinflation. Bronchi with thickened walls. Cylindrical bronchiectasis. 3B. Coronal reformatted CT image in cystic fibrosis. CT images shows corresponding dilated bronchi with thickened walls and dilated bronchi. Cylindrical bronchiectasis.
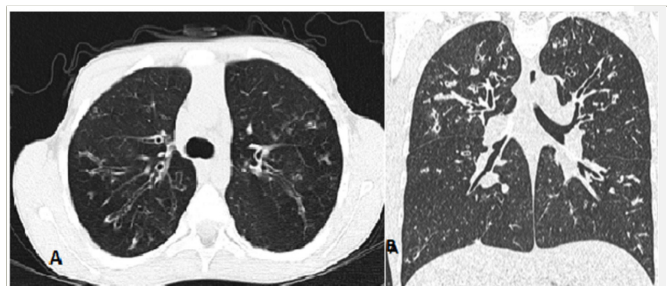
Analysis of the values of spirometric parameters showed obstructive ventilatory dysfunction syndrome (2/6; 33.33% vs 1/5; 20%) and mixed ventilatory dysfunction (1/6; 16.66% vs 0%).

Germs found in the sputum culture during infectious exacerbations were: Staphylococcus aureus (MSSA) 33.15% vs 20%, Pseudomonas aeruginosa (PA) 19.89% vs 0%, Staphylococcus aureus methicillin resistant (MRSA) 9.94% vs. 20%, Klebsiella pneumoniae (KP) 6.63% vs 10%, Burkholderia cepacia 3.31% vs. 0% and Serratia Liquefaciens (SL) 1.65% vs. 0%.

Conclusions: Radiographically, pulmonary hyperlucency and bronchiectasis features appear in middle childhood or adolescence. In the advanced stages, chest tomography showed the presence of bilateral bronchiectasis of the upper lobes and peribronhovascular intestinal pulmonary fibrosis.

The appearance of bronchiectasis on radiography and chest computed tomography correlates with permanent clinical symptoms (cough with expectoration and dyspnea), acute infectious exacerbations with Pseudomonas aeruginosa, mixed ventilatory dysfunction and nonspecific biological inflammatory syndrome.

[124] Detection and Quantification of microbiologic profiles of sputum at exacerbation in patients with bronchiectasis by using BioFire FilmArray Pneumonia Panel

Yong-hua Gao[2,1]; Hollian Richardson[1]; Holly R Keir[1]; Hani Abo-Leyah[1]; Merete Long[1]; Diane Cassidy[1]; Amelia Shoemark[1]; Jeffrey Huang[1]; Alison J Dicker[1]; James D Chalmers[1]

[1]Scottish Centre for Respiratory Research, University of Dundee, Ninewells Hospital and Medical School, Dundee, China; [2]The First Affiliated Hospital of Zhengzhou University, Zhengzhou, China

Background: Timely identification of the microbiologic profile at exacerbation in bronchiectasis might promote better antimicrobial stewardship. This study assessed the performance of the BioFire FilmArray Pneumonia Panel (PN panel), an FDA-cleared sample-to-answer assay, that could detect viruses, atypical bacteria, bacteria and antimicrobial resistance marker genes in sputum at exacerbation.

Methods: Spontaneous sputum was prospectively collected at onset of exacerbations in 96 patients with bronchiectasis from the East of Scotland 2017-2018. The PN panel, which also provided semiquantitative results of bacterial targets, was employed to test the microbiologic profiles in sputum at exacerbation.

Results: A total of 96 sputum specimens were collected at exacerbation (one for each) and run by PN panel. 93 (95.9%) produced a valid result. 154 bacteria were detected from 80 patients (86.0%) with 3 patients carrying antimicrobial resistance gene (all CTX-M positive). The most commonly detected bacteria were *Haemophilus influenzae*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*, which were found in 47 (50.5%), 29 (31.2%) and 21 (22.6%) specimens, respectively. For semiquantitative results, 75 (48.7%), 14 (9.1%), 13 (8.4%) and 52 (33.8%) bacteria were detected at $\geq 10^7$, 10^6, 10^5 and 10^4 genomic copies/ml, respectively. Respiratory viruses were found in 38 (40.9%) sputum specimens, with Rhinovirus/Enterovirus being the most common viruses (28/73.7%). The co-detection of bacteria and virus were found in 32 (34.4%) patients.

Conclusion: More pathogens were detected at exacerbation in bronchiectasis by PN panel than conventional culture that is anticipated to impact patient care and antimicrobial stewardship decisions in the future.

[127] Validation of AMP-activated protein kinase as a therapeutic target in bronchiectasis

Yan Hui Giam[1]; Merete Long[1]; Alex Smith[2]; Holly R. Keir[1]; Diane Cassidy[1]; Hollian Richardson[1]; Simon Finch[1]; Stefano Aliberti[3]; Oriol Sibila[4]; Amelia Shoemark[1]; James Chalmers[1]

[1]University of Dundee, Dundee, United Kingdom; [2]University of Cambridge, Cambridge, United Kingdom; [3]University of Milan, Milan, Italy; [4]Hospital Sant Pau, Barcelona, Spain

Introduction: Neutrophilic inflammation, ineffective bacterial clearance and mucociliary dysfunction are defined features of bronchiectasis (BE). The underlying mechanisms linking these phenomena are still unknown, and it is necessary to identify new therapies that can target multiple components of the vicious cycle. AMP-activated protein kinase (AMPK) is a master regulator of cellular metabolism which may represent a therapeutic target in BE. In this study, we aim to validate the therapeutic potential of AMPK activators for bronchiectasis.

Methods: Sputum was collected from patients participating in the multicentre BRIDGE study (NCT03791086) for airway metabolites analysis. Airway epithelial cells and peripheral neutrophils were treated with AMPK inhibitors (compound C and resistin) and AMPK activators (A769662).

Results: N=296 patients were analysed. Glucose was highly variable in sputum but was not related to BE severity. Lactate associated with increased neutrophil elastase (r=0.19, p=0.015), resistin (r=0.44, p<0.0001), MMP9 (r=0.53, p<0.0001) and CXCL8 (r=0.37, p<0.0001).

Confocal microscopy showed AMPK expression in nasal cilia. AMPK inhibition reduced ciliary beat frequency (CBF) (15.80%, p=0.0161) by compound C and (20.34%, p<0.0001) by resistin. A sustained CBF decrease by blocking glycolysis with 2-deoxyglucose was observed and this effect could be rescued with A769662 (p<0.0001).

Resistin potentiated the effect of the NET inducer PMA to promote neutrophil extracellular trap formation in-vitro (p=0.018), and also significantly reduced migration (p=0.0193) when induced by fMLP.

Conclusions: Our data suggests that the BE airway contains factors such as resistin and high glucose levels that promote AMPK inhibition. This associated with reduced CBF and increased NETosis, which are central features of BE pathophysiology. Targeting AMPK has therapeutic potential in BE.

[102] First Description of Bronchiectasis characteristics in Croatian patients – Data from the European Multicenter Bronchiectasis Audit and Research Collaboration

Goran Glodić[1]; Miroslav Samaržija[1,4]; Ante Marušić[2]; Ivana Kuhtić[2]; Sanja Popović Grle[1,4]; Andrea Vukić Dugac[1,4]; Blaženka Barišić[1]; Lorna Čorak[1]; Feća Džubur[1,4]; Ana Hećimović[1]; Lidija Ljubičić[1]; Blanka Ćuk[3]; Mira Pevec[1]; Matea Škoro[1]; Mateja Janković Makek[4,1]

[1]University Hospital Center Zagreb, Clinic for Respiratory disease, Zagreb, Croatia; [2]University Hospital Center Zagreb, Clinic for Radiology, Zagreb, Croatia; [3]General Hospital dr. «Ivo Pedišić», Department for Respiratory disease, Sisak, Croatia; [4]University of Zagreb, School of Medicine, Zagreb, Croatia

Background and objective: Bronchiectasis is one of the most neglected respiratory diseases. The European Multicenter Bronchiectasis Audit and Research Collaboration (EMBARC) registry was established to address the underinvestment in bronchiectasis research, education and clinical care in Europe. The bronchiectasis severity index (BSI) is an assessment of severity tool that accurately predicts mortality, exacerbations, quality of life and lung function decline in bronchiectasis. We aimed to describe the clinical features and calculate the BSI of bronchiectasis patients treated at University Hospital Center Zagreb enrolled in the EMBARC registry.

Methods: Patients with bronchiectasis treated at the University Hospital Center Zagreb, Croatia were enrolled into the EMBARC registry during regular follow up visits from 2017 - 2020. Data from the registry was used to describe the clinical features and to calculate the BSI. The BSI was calculated with the assistance of an online tool using the following criteria: age, BMI, FEV1 % predicted, number of hospital admissions and exacerbations 12 months prior to study inclusion, MRC breathlessness score, *Pseudomonas aeruginosa* colonization, other chronic colonization and radiological severity.

Results: Out of the 61 patients 29 (47.5%) are female and 32 (52.5%) male, with a mean age of 55.9 years. The FEV1 % predicted was >80% in 29.5%, 50-80% in 34.4%, 30-50% in 21.3%, <30% in 11.5% of patients, while data was missing for 3.3%. Most of the patients (45.9%) didn't require hospital care prior to study inclusion, 41% had 1, 8.2% had 2 and 4.9% had 3 hospital admissions. The majority of patients experienced at least 1 exacerbation before study inclusion (18% had 0, 19.7% had 1, 29.5% had 2 and 32.8% had 3 or more exacerbations). 17 patients are currently colonized with *P. aeruginosa*, 3 patients with *Haemophilus* spp., and 3 more patients have a history of chronic *P. aeruginosa* colonization. 42.6% of patients in our cohort have severe bronchiectasis (BSI 9+), 31.1% have moderate bronchiectasis (BSI 5-8) and 26.2% have mild bronchiectasis (BSI 0-4).

Conclusion: To our knowledge, this is the first description of the clinical features and BSI in bronchiectasis patients from Croatia. The percentage of patients in different severity categories is similar to that of other European cohorts. Most of the patients in our cohort have severe bronchiectasis with a 7.6-10.5% estimated 1 year mortality rate. Long term follow up and further enrollment of patients from Croatia to the EMBARC registry is required to improve our understanding of the disease and improve the quality of care for bronchiectasis patients.

[70] Patient reported burden of Nontuberculous Mycobacterial Lung Disease (NTM-LD) – a patient survey in Germany

Christian Gross; Andreas Reimann; Marina Rempel; Stephan Tyler; Claudia Wiesmann; Roald Van der Laan; Marko Obradovic

[1]admedicum Business for Patients GmbH & Co KG, Cologne, Germany; 2Insmed Germany GmbH, Frankfurt, Germany; 3Insmed Netherlands BV, Utrecht, Germany

Background: Nontuberculous mycobacteria lung disease (NTM-LD) is a rare but growing public health concern, particularly affecting vulnerable groups of patients. NTM-LD is associated with progressive lung destruction and increased resource use and mortality. The healthcare system is challenged to address patients' receiving a delayed diagnosis; this combined with poor adherence to treatment guidelines leads to a greater disease severity. Patients' perspectives must be included to approach these current healthcare challenges efficiently and to detect further gaps.

Objectives: Main objectives were the evaluation of the burden of the disease from the patient's perspective and the detection of patient-related healthcare gaps.

Methods: The recruitment was supported by a social media and Google advertising campaign, both referring people to a short, online pre-screener for the initial contact. Only patients with a clear self-reported NTM-LD diagnosis were included in the interviews. Semi-structured telephone interviews were conducted with 20 NTM-LD patients (15 females and 5 males, average age: 47; 23-66) between Apr'19 and Feb'20. The patient journey and burden of disease were explored.

Results: 30% of patients stated that they were underweight and 17 out of 20 patients had at least one pre-existing pulmonary condition. The most frequent preconditions were Cystic Fibrosis (CF, n=9), pneumonia (4), COPD (3) and asthma (3).

Chronic cough, fatigue and dyspnea were the most commonly reported symptoms (*Figure 1*). Of all the symptoms reported, fatigue was perceived as the most burdensome, followed by dyspnea and chronic cough. Most of the patients (85%) felt limited in their daily life; the most frequently reported limitations were performing work outside the home, doing physical exercises and maintaining relationship with family and friends. Patients also reported negative impact of the disease on the quality of life of their carers.

Figure 1: List of most commonly reported symptoms
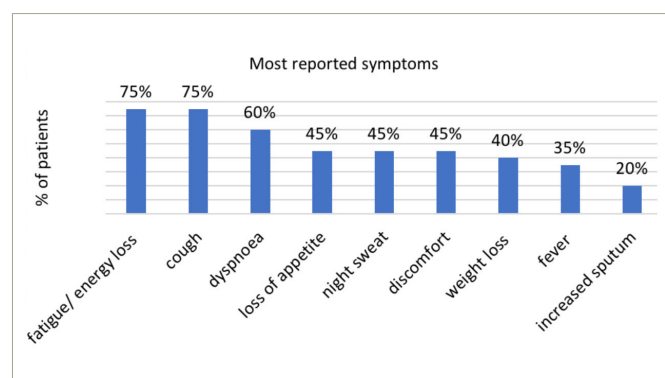
It took, on median, 5 months for patients to receive a diagnosis (range 0-480 months) and that time doubled when excluding CF patients. Patients had on average 3.4 diagnostic contacts and 2.4 different healthcare provider touchpoints before receiving the NTM-LD diagnosis. 90% of patients (n=18) received drug treatment and 3 patients also received surgical treatment. Based on what patients reported, only about 50% received guideline-based therapy schemes. Moreover, only 40% of the patients reported having achieved an improvement of their health status since first symptoms (*Figure 2*). The majority of the patients (n=17) reported having experienced side effects from their treatment.

Patients wished to have more and reliable patient friendly information, guidance in finding NTM expert centers, increased awareness at the physicians' and patients' level, psychological support and the improvement of access to rehabilitation offerings.

Figure 2: Change of health status since first symptoms
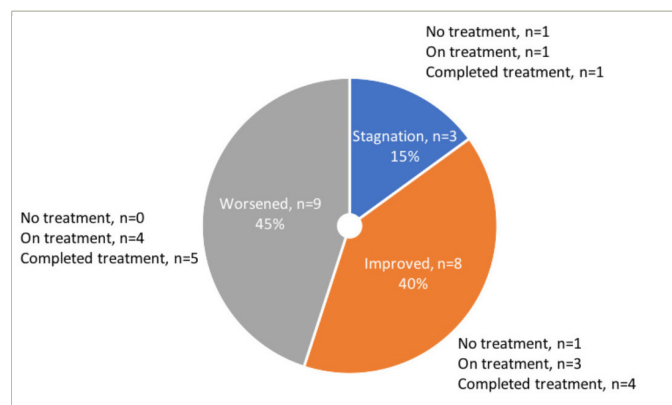
Conclusions: NTM-LD is a disease impairing the lives of patients substantially. The time to diagnosis needs to be shortened and is influenced if pulmonary pre-conditions exist. Treatment seems to be effective in a minority of patients only and often includes side effects. Data suggests that half of the patients in this project received therapy that was not according to treatment guidelines. Referral pathways for NTM-LD should be defined in order to improve management of the disease and patient outcomes.

The research was supported by Insmed Germany GmbH

[103] Diagnostic Challenges in PCD: Need for Multiple Approaches

Kunal Jakharia[1]; Michael Knowles[1]; Maimoona Zariwala[3]; Margaret Leigh[2]; M. Leigh Anne Daniels[1]; - Genetic Disorders of Mucociliary Clearance Consortium[1]

[1]Div. of Pulmonary & Critical Care Medicine, University of North Carolina, Chapel Hill, United States of America; [2]Div. of Pediatric Pulmonology, University of North Carolina, Chapel Hill, United States of America; 3Dept. of Pathology and Laboratory Medicine, University of North Carolina, Chapel Hill, United States of America

Rationale: Primary ciliary dyskinesia (PCD) is a heterogeneous, usually recessive genetic disorder with abnormal ciliary function. Clinical manifestations occur in organs where cilia play a major role. Patients with PCD can present with 4 key features: 1) unexplained neonatal respiratory distress; 2) early onset, year-round nasal congestion; 3) early onset, year-round wet cough; 4) organ laterality defects[1, 2]. PCD results from mutations in genes encoding for outer and inner dynein arms, assembly proteins, and radial spokes. Identification of hallmark ultrastructural abnormalities on electron microscopy (EM) is diagnostic for PCD. However, PCD occurs in patients with normal EM[3]. Nasal NO (nNO) is a helpful screening test but is not confirmatory. Our objective was to assess the accuracy of 'presumptive' diagnosis of PCD made by EM at medical centers in North America.

Methods: We reviewed evaluations from 775 patients referred to the Genetic Disorders of Mucociliary Clearance Consortium (GDMCC). Detailed history, physical exam, chest imaging, nNO measurements, and ciliary ultrastructure were analyzed using a standardized protocol[4]. The EM was repeated if the original EM was unavailable to review or inadequate. Genetic testing ranged from a 29 gene panel to whole genome sequencing. Using available data, accuracy of the PCD diagnosis was assessed. Patients were classified to have: 'definite' PCD if they had a compatible clinical phenotype plus confirmed EM and/or genetics; 'probable' PCD if they had low nNO and phenotype consistent with PCD, but with normal EM and no identified genetic abnormalities; and 'highly unlikely PCD' if another genetic diagnosis was identified or the

clinical phenotype, EM, and/or nNO were not consistent with PCD. A clinical feature mean with a confidence interval at 95% confidence was calculated based on presence of 4 features above. Kruskal-Wallis test was used to evaluate the differences among the three groups (definite, probable and highly unlikely PCD).

Results: Of the 685 referred patients with a presumptive PCD diagnosis, a subset (n = 251; 36.6%) was based on abnormalities reported on prior EM. Of 251, 154 (61.3%) were confirmed to have hallmark PCD EM defects along with classic clinical features (mean number of 4 clinical features 3.62+0.09). The remaining 97 patients (38.6%) had a normal EM. Only 34 of these 97 had PCD-causing genetic mutations (mean number of 4 clinical features 3.47+0.23). Another 13 (5%) patients had probable PCD (mean number of 4 clinical features 3.15+0.36). One in 5 referred with 'diagnostic EM findings' were highly unlikely to have PCD (n = 50; 20%) (mean number of four clinical features, 2.84+0.21). In total, we confirmed a diagnosis of PCD in 188 of the 251 (75%) referred with an EM reportedly diagnostic for PCD (mean number of 4 clinical features of 3.60+0.08). There was a statistically significant difference (p < 0.00001) between the number of clinical features among the three groups.

Conclusions: A combination of key clinical phenotypic features, nNO measurements, supportive EM findings and genetic studies, are necessary to reliably diagnose PCD. Our data demonstrate that the use of ciliary EM in the general community for a diagnosis of PCD is limited by insufficient technical expertise and reader experience, leading to misclassification. Genetic testing is now available at a reasonable cost and can establish a diagnosis in almost 70% of PCD patients.

Supported by U54HL096458; NCATS, RDCRN, ORDR & NHLBI

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[109] Pulmonary hypertension in bronchiectasis: A CT analysis from a cohort of the US Bronchiectasis and NTM Research Registry

Elham Karamooz[1]; Anupama Brixey[2]; Chara Rydzak[2]; Steven Primack[2]; Sheila Markwardt[3,4]; Alan Barker[1]

[1]Division of Pulmonary & Critical Care Medicine, Department of Medicine, Oregon Health & Science University, Portland, United States of America; [2]Cardiothoracic Imaging Section, Department of Diagnostic Radiology, Oregon Health & Science University, Portland, United States of America; [3]Biostatistics and Design Program, Oregon Health & Science University, Portland, United States of America; [4]Portland State University School of Public Health, Portland, United States of America

Background: Pulmonary hypertension (PH) is associated with increased mortality in non-CF bronchiectasis. Although the initial assessment of PH is with echocardiogram, CT based measurements of the diameter of the pulmonary artery (PA) and the ratio of the diameter of the PA to the diameter of the aorta (Ao) can identify PH, with a cutoff of > 0.9 for the PA/Ao. The COPD Foundation created the Bronchiectasis and NTM Research Registry (BRR) to foster research in non-CF bronchiectasis and NTM lung disease. Patients with non-CF bronchiectasis at Oregon Health & Science University (OHSU) often have NTM infections. Our goal was to identify the prevalence of pulmonary artery dilation as a surrogate of PH in these patients by measuring PA/Ao on CT and to determine any association between severity of bronchiectasis and increased PA/Ao.

Methods: We evaluated CT scans from patients enrolled in the BRR at OHSU. One of three attending thoracic radiologists reviewed and scored each CT scan using modified Reiff criteria for each lobe. The main PA and Ao diameter were measured on axial soft tissue images with electronic calipers at the level of the bifurcation of the right main pulmonary artery. Clinical factors were obtained from the BRR. Associations between clinical factors and CT findings were determined with ANOVA, t-test, or linear regression.

Results: We analyzed 321 patients. The mean age was 67 and 83% were female [*Table 1*]. Pulmonary function testing revealed moderate obstruction and 9% used supplemental oxygen. NTM infections were common, with 58% having NTM, and 17% with both NTM and *Pseudomonas aeruginosa*. The CT data revealed a mean pulmonary artery diameter of 24.6mm, a mean PA/Ao of 0.79, and 8.7% had severe bronchiectasis. Bronchiectasis severity was higher in the middle lobe

and lingula [*Fig 1A*]. There was no association between bacterial culture and modified Reiff score. We identified 42 patients with a PA/Ao >0.9. However, neither bacterial culture results nor the modified Reiff score were associated with the elevation of the PA/Ao [*Fig 1B*]. We found a significant association between supplemental oxygen use and PA/Ao and modified Reiff score [*Fig 1C*].

Table 1

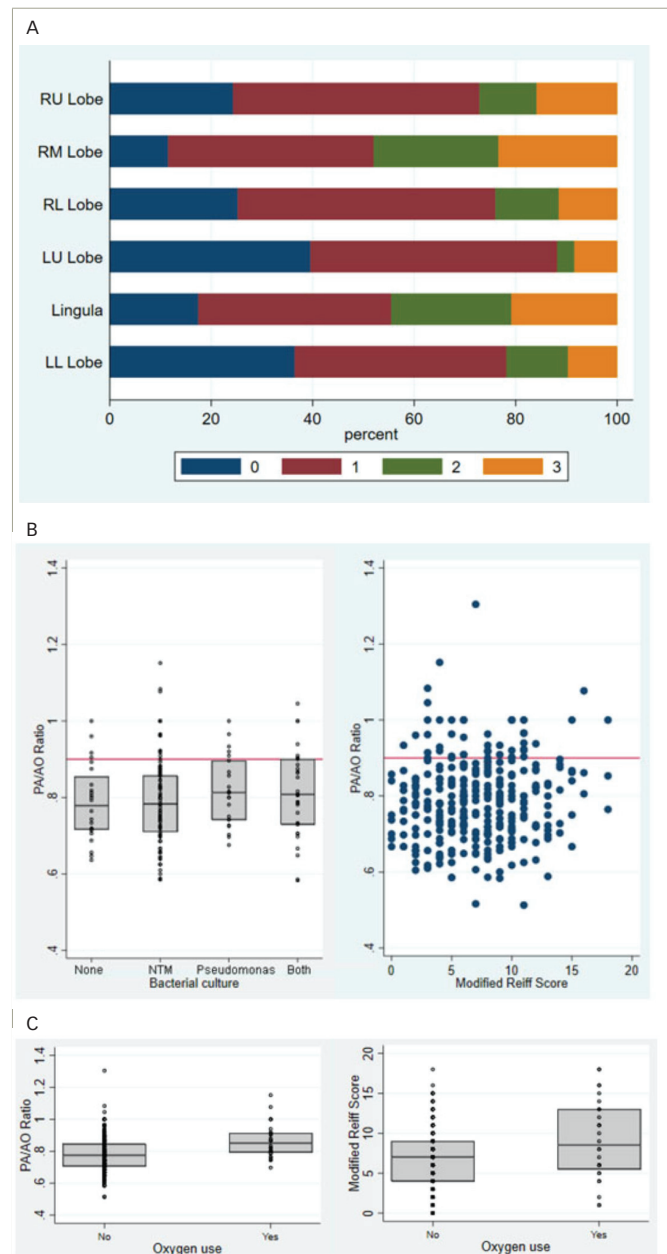| Factor	Value
Age, mean (SD), N= 321	67.3 (13.2)
Gender, N= 321 • Female • Male	 267 (83.2%) 54 (16.8%)
# of exacerbations in the last 2 years, N= 261 • 0 • 1-2 • 3+	 138 (52.9%) 81 (31.0%) 42 (16.1%)
# of exacerbations in the last 2 years, mean (SD)	1.1 (1.5)
Tobacco Use, N= 312 • Non-user • Former user • Current user	 175 (56.1%) 125 (40.1%) 12 (3.8%)
Oxygen use, N= 310 • No • Yes	 282 (91.0%) 28 (9.0%)
FEV1 (L), mean (SD), N= 184	1.91 (0.72)
FEV1%, mean (SD), N= 182	73.5 (23.2)
FEV1/FVC%, mean (SD), N= 182	66.8 (11.1)
Bacterial culture, N= 184 • NTM • Pseudomonas • NTM & Pseudomonas • Neither NTM nor Pseudomonas	 106 (57.6%) 23 (12.5%) 31 (16.8%) 24 (13.0 %)
PA diameter (mm), mean (SD), N=321	24.6 (3.5)
Ao diameter (mm), mean (SD), N=321	31.5 (4.0)
PA/Ao, mean (SD), N=321	0.79 (0.11)
Bronchiectasis Severity (modified Reiff score), N=321 • Normal (=0) • Mild (=1-6) • Moderate (=7-12) • Severe (=13-18)	 7 (2.2%) 143 (44.5%) 143 (44.5%) 28 (8.7%)
Modified Reiff Score, mean (SD), N=321	7.1 (3.8)

Figure 1

Figure 1: Modified Reiff Score by Lobe and Associations Between Clinical Variables and Modified Reiff Score and PA/Ao. A) The distribution of bronchiectasis severity is shown by each lobe, with blue representing a score of 0, red a score 1, green a score of 2 and orange a score of 3. B) Left, Sputum culture was grouped into "Neither", "NTM", "Pseudomonas", and "Both". The plot displays observed values, first quartile, median, and third quartiles, with boxes representing the interquartile range (IQR). Right, total modified Reiff score is plotted with measured PA/Ao. The line is drawn at 0.9. C) Left, oxygen use and PA/Ao. Plots display observed values, first quartile, median, and third quartiles. Boxes represent the IQR. P-value 0.001. Right, oxygen use and modified Reiff Score. Plots display observed values, first quartile, median and third quartile. Boxes represent the IQR. P-value 0.004.

Conclusion: Although PH is a potential complication in non-CF bronchiectasis, only 13% of patients in our cohort had a PA/Ao >0.9. The severity of bronchiectasis amongst this cohort was mild to moderate and there was no significant association between the severity of

bronchiectasis and an elevated PA/Ao. We found no association between bacterial culture from sputum and the PA/Ao. However, supplemental oxygen use was associated with both elevated PA/Ao and modified Reiff score. Based on our data, we conclude that hypoxemic patients with non-CF bronchiectasis have a higher probability of having a PA/Ao >0.9 compared to patients without hypoxemia. This may help stratify patients who need further evaluation for PH.

[145] Elevated sputum neutrophil elastase is predictive of microbiome dysbiosis and disease severity in bronchiectasis

Holly Keir[1]; Alison J Dicker[1]; Jennifer Pollock[1]; Alexandra Smith[1]; Simon Finch[1]; Brandon Tan[1]; Christopher J Fong[1]; Thomas C Fardon[1]; James D Chalmers[1]

[1]Division of Molecular and Clinical Medicine, University of Dundee, Ninewells Hospital and Medical School, Dundee, United Kingdom

Introduction: Sputum neutrophil elastase (NE) has been shown to correlate with disease severity in patients with bronchiectasis. Clinical application of this marker requires the identification of cut-off points which ascertain clinically relevant subgroups of patients. The aim of this study was to establish sputum NE cut-offs which best discriminate between patients with severe vs non-severe disease, and which best identify patients with microbiome dysbiosis.

Methods: Patients were enrolled from a specialist bronchiectasis clinic in the UK. NE was measured using immunoassay. Microbiome was characterised by 16s rRNA sequencing. Receiver operator characteristic curves (ROC) were used to evaluate discrimination of NE with outcomes of the bronchiectasis severity index (BSI) and proteobacteria dysbiosis (defined as >40% OTUs, a cut-off previously shown to be associated with worse outcomes).

Results: 291 patients were included in this study (mean age 68±12 years, 55.3% female). No differences in NE between men and women and no correlation with age were observed. There was strong association between NE and BSI (mean 7, 14 and 29µg/ml in mild, moderate and severe, respectively, p<0.0001), and a weak correlation with FEV1% (r=-0.22, p<0.0001). NE was associated with microbiome diversity evaluated using the Shannon-Weiner Diversity index (r=-0.40, p<0.0001) and was significantly higher in patients with proteobacteria dysbiosis (p<0.0001), with the highest NE levels seen in patients with dominance of *Pseudomonas*, *Moraxella* and *Stenotrophomonas*. The area under the ROC curve for NE to predict proteobacteria dysbiosis was 0.80 (0.75-0.84, p<0.0001). Youdens index suggested a cut-off of 7.4µg/ml best predicted proteobacteria dysbiosis. AUC for severe BSI was 0.70 (0.64-0.77), p<0.0001. A cut-off of 10.7µg/ml was most predictive of severe bronchiectasis. There was a statistically significant increase in mean NE concentrations at exacerbation (mean increase of 12µg/ml, p<0.0001) and subsequent reduction with antibiotic treatment.

Conclusions: This study confirms the relationship between sputum NE and disease severity and proposes a cut-off between 7 and 10µg/ml is likely to be most discriminating for identifying high risk patients.

[142] Sputum proteomics identifies mechanisms of disease severity and treatment response in bronchiectasis

RISING STAR

Holly Keir[1]; Amelia Shoemark[1]; Alison J Dicker[1]; Lidia Perea[2]; Jennifer Pollock[1]; Yan Hui Giam[1]; Guillermo Suarez-Cuartin[3]; Megan L Crichton[1]; Mike Lonergan[1]; Martina Oriano[4,5]; Erin Cant[1]; Elizabeth Furrie[1]; J Stuart Elborn[6]; Christopher J Fong[1]; Simon Finch[1]; Gisli G Einarsson[6]; Geraint B Rogers[6]; Francesco Blasi[8,4]; Oriol Sibila[2]; Stefano Alberti[4,8]; Jodie L Simpson[9]; Jeffrey TJ Huang[10]; James D Chalmers[1]

[1]Division of Molecular and Clinical Medicine, University of Dundee, Ninewells Hospital and Medical School, Dundee, United Kingdom; [2]Respiratory Department, Hospital Clinic. University of Barcelona, IDIBAPS, CIBERES, Barcelona, Spain; [3]Respiratory Department, Hospital Universitari de Bellvitge, IDIBELL, L'Hospitalet de Llobregat, Barcelona, Spain; [4]Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Respiratory Unit and Cystic Fibrosis Adult Center, Milan, Italy; [5]Department of Molecular Medicine, University of Pavia, Pavia, Italy; [6]Centre for Experimental Medicine, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, United Kingdom; [7]Microbime & Host Health, South Australian Health and Medical Research Institute, Adelaide, Australia; [8]Università degli Studi di Milano, Department of Pathophysiology and Transplantation, Milan, Italy; [9]Priority Research Centre for Healthy Lungs, Faculty of Health and Medicine, University of Newcastle, Newcastle, Australia; [10]Division of Systems Medicine, School of Medicine, University of Dundee, Ninewells Hospital and Medical School, Dundee, United Kingdom

Introduction: Neutrophil extracellular traps (NETs) are a form of antimicrobial defence which have been implicated in multiple inflammatory diseases. This study investigated the role of NETs in bronchiectasis, a neutrophilic disease which lacks therapies that directly target neutrophilic inflammation, through a series of UK and international studies.

Methods: LC/MS proteomics was used to compare protein profiles in sputum between severe and mild bronchiectasis (20 vs 20 patients). Microbiome changes, using 16S rRNA sequencing, clinical characteristics and NET levels using a validated histone-elastase immunoassay were analysed. Results were validated in an independent European cohort. Proteomics was used to identify proteins associated with treatment response of acute exacerbations of bronchiectasis in 20 patients treated with intravenous antibiotics for 14 days. Two studies of long-term macrolide treatment, one in bronchiectasis and a post-hoc analysis of the AMAZES trial in asthma, investigated the effect of macrolide treatment on NETs.

Results: 96 proteins were differentially expressed in sputum between severe and mild bronchiectasis, with known NET proteins being the most abundant and discriminating. The relationship between NETs and associated proteins were validated in two independent cohorts, a UK cohort (n=175) and a European cohort (n=275). Sputum NETs were associated with BSI (p<0.0001), a history of severe exacerbations (p=0.0089), quality of life (p<0.0001), time to first exacerbation (p<0.0001) and mortality (p=0.009). High NET levels were associated with reduced microbial alpha-diversity, measured by Shannon-Weiner, and microbial dysbiosis (p<0.0001, PERMANOVA) and elevated IL-8, IL-1beta, TNF-alpha, interferon-gamma and GM-CSF in sputum. Antibiotic treatment (n=20) significantly altered the expression of 39 sputum proteins, with the "neutrophil degranulation" pathway being most strongly implicated in response. Patients with *P. aeruginosa* infection had a blunted proteomic and clinical response to treatment. Treatment with azithromycin was associated with a significant reduction in sputum NETs over 12 months in both bronchiectasis (n=52, p=0.016) and asthma (n=47, p<0.0001).

Conclusion: NET-associated proteins are elevated in bronchiectasis sputum and are associated with disease severity, bacterial infection and mortality. Treatment response is linked to successfully reducing NET levels with intravenous antibiotic or macrolide therapies suggesting that NETs may be an important therapeutic target in bronchiectasis.

[110] The characteristics and risk factors of bronchiectasis based on respiratory symptoms among the subjects who performed a medical check-up in a health-screening center

Soo Han Kim; Soo Han Kim; Young Ju Jung; Sei-Won Lee; Jae Seung Lee; Yeon-Mok Oh

¹Department of Pulmonary and Critical Care Medicine, University of Ulsan College of Medicine, Asan Medical Center, Seoul, Korea (Republic of); ²Health Promotion Center, University of Ulsan College of Medicine, Asan Medical Center, Seoul, Korea (Republic of)

Background/Aims: Bronchiectasis is a chronic respiratory disease characterized by irreversible bronchial dilatation. The prevalence of bronchiectasis has been reported worldwide, but there is a paucity of data on bronchiectasis regarding respiratory symptoms. This study aimed to investigate bronchiectasis based on respiratory symptoms, with emphasis on asymptomatic bronchiectasis.

Methods: This cross-sectional study analyzed data from participants who underwent chest computed tomography (CT) at a single health-screening center in Korea from 2016 to 2017. Patients with bronchiectasis were identified by radiology specialists with their routine CT reading process. Bronchiectasis subjects were classified as symptomatic bronchiectasis subjects and asymptomatic bronchiectasis subjects. As a control group, non-bronchiectasis were defined as absence of bronchiectasis findings on CT and respiratory symptoms. We evaluated the characteristics and risk factors of asymptomatic bronchiectasis subjects in comparison with those of non-bronchiectasis or symptomatic bronchiectasis subjects.

Results: A total of 27,617 participants who performed chest CT from 2016-2017 were included, with male predominance (63.4%) and a mean age of 58.4 (Standard deviation: 8.9) years. Among the participants, 1,005 subjects were diagnosed with bronchiectasis. Non-bronchiectasis group, asymptomatic bronchiectasis group, and symptomatic bronchiectasis group included 16,143, 566, and 439 subjects, respectively. The prevalence of bronchiectasis was 3,639 per 100,000 subjects, while the prevalence of asymptomatic bronchiectasis was 2,049 per 100,000 subjects. Compared with non-bronchiectasis subjects, the risk factors associated with asymptomatic bronchiectasis included female sex (adjusted odds ratio [aOR], 1.41; 95% confidence intervals [CI], 1.18-1.70; p<0.001), older age (aOR, 1.06; 95% CI, 1.05-1.07; p<0.001), the comorbidity of liver disease (aOR, 1.32; 95% CI, 1.07-1.63; p=0.011) and chronic obstructive pulmonary disease (COPD) (aOR, 4.99; 95% CI, 2.88-8.64; p<0.001), the history of tuberculosis (aOR, 1.98; 95% CI, 1.46-2.68; p<0.001), and lower forced expiratory volume in 1s (FEV1) (aOR, 0.99; 95% CI, 0.983-0.998; p=0.011). Compared with asymptomatic bronchiectasis subjects, the risk factors associated with symptomatic bronchiectasis included female sex (aOR, 1.41; 95% CI, 1.05-1.88; p=0.021), the comorbidity of arthritis (aOR, 1.54; 95% CI, 1.01-2.37; p=0.047), asthma (aOR, 3.87; 95% CI, 1.54-9.71; p=0.004) and allergic rhinitis (aOR, 1.73; 95% CI, 1.24-2.42; p=0.001), the history of tuberculosis (aOR, 1.81; 95% CI, 1.17-2.79; p=0.007), lower FEV1 (aOR, 0.97; 95% CI, 0.96-0.99; p<0.001), and higher C-reactive protein level (aOR, 3.06; 95% CI, 1.48-6.31; p=0.002).

Conclusions: Bronchiectasis, along with asymptomatic bronchiectasis, is not a rare disease in Korea. Individuals with female sex, old age, the comorbidities of liver disease, COPD, the history of tuberculosis, or low FEV1 have higher risk of asymptomatic bronchiectasis. Clinical impact of asymptomatic bronchiectasis should be further explored.

[105] Comparative study of Mycobacterium abscessus infection between cystic fibrosis patients and non cystic fibrosis patients

Daniel Laorden; Pablo Mariscal-Aguilar; Andrés Giménez-Velando; Sarai Quirós-Fernández; Carpio Carpio-Segura; Rosa Girón-Moreno; Carlos Toro Rueda; Concepción Prados-Sánchez; Rodolfo Álvarez-Sala-Walther

¹Department Of Respiratory Medicine La Paz University Hospital, Madrid, Spain; ²Department Of Respiratory Medicine Fundación Jiménez Díaz University Hospital, Madrid, Spain; 3Department Of Respiratory Medicine La Princesa University Hospital, Madrid, Spain; 4Department Of Microbiology La Paz University Hospital, Madrid, Spain

Introduction: The aim of this study was to evaluate differences in clinical and radiographic characteristics between cystic fibrosis (CF) patients and non cystic fibrosis patients, all of them presented *Mycobacterium abscessus* infection.

Material and methods: A retrospective study of 42 patients in three referral hospital centers of Madrid between January 2012 and December 2017, divided in two groups: 1) cases 15 (36%) and controls 27 (64%). Demographic data, clinical, microbiological, radiological and therapeutic data were examined in two groups of patients: 1. Cases (CF affected) 2. Controls (Non CF affected).

Results

	CF	NON CF	STATISTICAL SIGNIFICANCE
AGE AVERAGE	27	62	p<0,001
CHARSON INDEX OF COMORBIDITIES	6 ± 0,43	8 ± 1,5	p=0,048
NON SMOKERS	15	17	p=0,007
EX SMOKERS	0	9	p=0,016
ALLERGIC BRONCHOPULMONARY ASPERGILLOSIS	5	0	p=0,004
POSITIVE SAMPLES IN BRONCHOASPIRATE	0	7	p=0,038
TREATED	9	5	p=0,01

Conclusions: Characteristics of groups differ in some aspects:
– There are more comorbidities in non CF group, probably because of their older age. There was higher tobacco use in this group.
– Sputum samples were appropriate in CF patients, therefore it wasn't required turn to bronchoaspirate (BAS) in these patients.
– Number of treated patients because of *Mycobacterium abscessus* is higher in CF, it is probably explained because of basal characteristics of CF.
These autors have no conflict of interest.

[129] Airway Path Tapering and Total Airway Count quantified on CT for Assessment of Bronchiectasis

Rudolfs Latisenko[1]; Leticia Gallardo Estrella[1]; David Lynch[3]; Jean-Paul Charbonnier[1]; Harm Tiddens[2]

¹Thirona, Nijmegen, Netherlands (The); ²Erasmus UMC, Rotterdam, Netherlands (The); ³National Jewish Health, Denver, United States of America

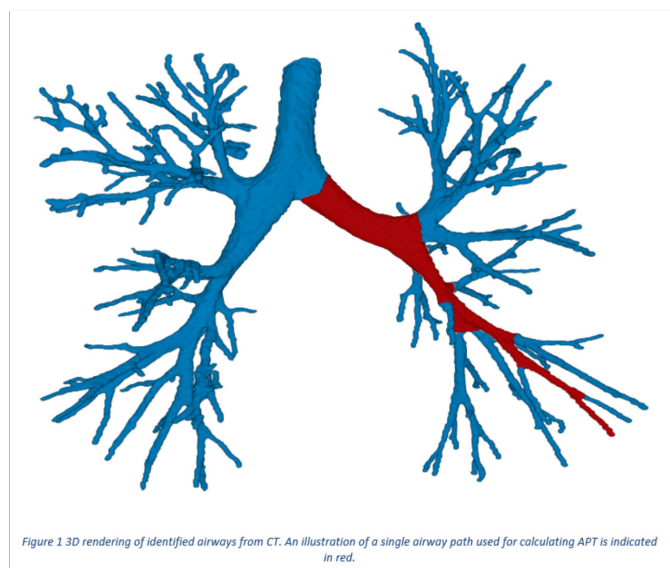**Background**: Bronchiectasis (BE) is an important feature of a wide range of lung diseases. BE is characterized by irreversible enlargement of the airways, which can be identified and quantified using inspiratory chest CT scans. Important radiological features to diagnose BE on CT are a lack of airway tapering and an abnormally high number of visible airways throughout the lungs on the chest CT. Artificial intelligence-

based algorithms can aid in the detection of abnormal tapering and the quantification of the number of airways on chest CT scans.

Aim: To investigate whether automatically extracted markers of airway tapering and total airway count obtained from inspiratory chest CT scans can be used to diagnose BE.

Methods: LungQ® software (Thirona, Nijmegen, Netherlands) was used to automatically extract the lungs and bronchial tree from chest CT scans. The bronchial tree was subdivided into individual airway branches and generations, and the average inner and outer radiuses of each branch were calculated. Based on the identified branches and their generations, all possible bronchial paths were extracted from the main bronchi all the way up to the most distal visible branch (see *figure 1*). Inter-branch tapering was measured for each bronchial path as the percentage of airway radius decrease per generation. The average airway path tapering (APT) of all individual bronchial paths was taken to provide a patient-level airway tapering marker. The total number of identified airway branches (TAC) was extracted to provide a patient-level marker of the extent of visible airways on CT. TAC was additionally adjusted for total lung volume to enable comparison between adults and children.

Figure 1

Figure 1 3D rendering of identified airways from CT. An illustration of a single airway path used for calculating APT is indicated in red.

APT and TAC were assessed on a dataset of spirometer-guided inspiratory CTs from 12 Cystic Fibrosis (CF) patients and 12 age- and sex-matched controls (median age 11years). To obtain a reference for adults, forty never-smoking control subjects from the COPDGene study were included in the analysis (median age 59years). All results are presented as mean±std; ANOVA-tests with Bonferroni-corrections were performed to determine statistical significance.

Results: The CF group showed a significantly lower APT relative to the pediatric and adult controls (P<0.01) both when using the inner radius (8.16±2.60% against 11.71±2.02% for pediatric and 10.52±1.11% for adult controls) and the outer radius (8.90±2.30% against 12.60±1.75% for pediatric and 11.69±1.03% for adult controls). No significant differences were found between the control groups (P=0.10 for inner; P=0.20 for outer). (See *figure 2*)

The CF group showed significantly higher TAC (P<0.01) compared to the pediatric controls (434.8±306.4 against 178.5±66.6). The CF group also displayed a significantly higher volume adjusted TAC (126.2±59.7) compared to both control groups (87.3±20.5 for adult controls; 57.3±29.0 for pediatric controls; P<0.01). A small significant difference in volume

adjusted TAC was also found between the two control groups (P=0.021). (See *figure 3*)
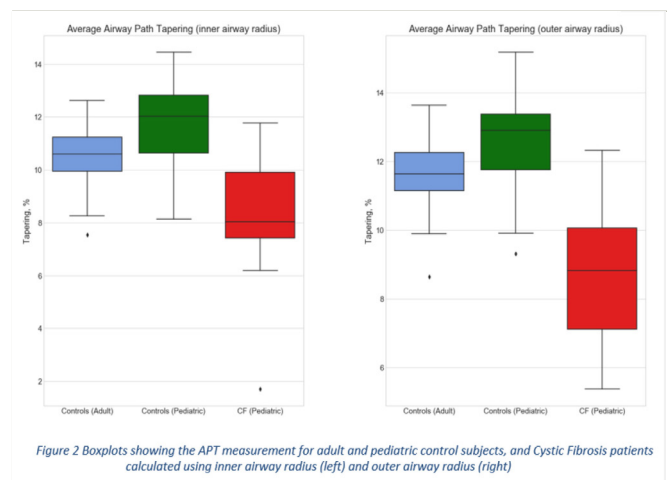
Figure 2

Figure 2 Boxplots showing the APT measurement for adult and pediatric control subjects, and Cystic Fibrosis patients calculated using inner airway radius (left) and outer airway radius (right)

Figure 3

Figure 3 Boxplots showing the TAC measurement for adult and pediatric control subjects, and Cystic Fibrosis patients. On the left TAC not adjusted for lung volume to compare pediatric controls and CF, on the right TAC adjusted for lung volume to enable comparison between pediatric TAC and adults TAC.

Conclusions: APT and TAC measurements showed clear differences between CF and controls. Based on the analysis of this limited number of control subjects, the APT seems to be relatively independent of age. Both APT and TAC could be valuable markers to diagnose and monitor BE.

[13] Acute and sustained IL-17a response in bronchiectasis exacerbations

Raúl Méndez; Victoria Alcaraz-Serrano; Emilia Isabel Amara-Elori; Paula González-Jiménez; Laura Feced; Leyre Bouzas; Soledad Reyes; Rosanel Amaro; Giulia Scioscia; Laia Fernández-Barat; Antoni Torres; Rosario Menéndez

[1]University and Polytechnic La Fe Hospital, Valencia, Spain; [2], , Spain; [2]University Hospital Clínic of Barcelona, Barcelona, Spain; [3], , Spain; [3]University of Foggia, Foggia, Italy

Rationale: Bronchiectasis (BE) is a chronic structural disease that courses with exacerbations provoking systemic inflammation of unknown duration. We aimed to evaluate systemic (IL)-17a (an interleukin involved in chronic inflammation) during exacerbations from day 1 to day 60 with regard severity and Pseudomonas aeruginosa infection in comparison with stable patients.

Methods: Prospective observational study performed in exacerbated and stable patients. Proinflammatory cytokine IL-17a concentration was

determined on days 1, 5, 30, and 60 in exacerbation and day 1 in the stable control group.

Results: One hundred and sixty-five exacerbated patients (93 severe: hospitalized) were recruited. Proinflammatory systemic IL-17a increases at day 1 and day 5 likewise in severe and non-severe episodes. At day 30 and 60, severe exacerbations presented an increase of IL-17a compared to non-severe. The highest level of IL-17a was found in patients with Pseudomonas aeruginosa isolation plus prior chronic infection. Severe exacerbations were associated to a 4.58 (OR)-fold increase of raised IL-17 at 30 days adjusted for age, gender, Bronchiectasis Severity Index, and treatment duration. Exacerbations in patients with chronic *Pseudomonas aeruginosa* infection were associated to a 7.47 (OR)-fold increase of raised IL-17 at 30 days.

Conclusions: Severe exacerbations (hospitalized) present a higher systemic IL-17a concentration sustained until day 30 and 60. Exacerbations in patients with chronic *Pseudomonas aeruginosa* infection was associated to IL-17a impaired reduction. IL-17a could be a target for measuring chronic systemic inflammation aimed at precision medicine.

[86] Feasibility and benefits of an innovative airway clearance device in COPD patients hospitalized for acute exacerbation

Laurent Morin; Ivan Solovic; Alena Bodnarova;

[1]Physio-Assist, Montpellier, France; [1]National Institute for TB, Vysne Hagy, Slovakia; [2]Catholic University, Ruzomberok, Slovakia; [3]Physio-Assist, Montpellier, France

Introduction: Airway clearance devices (ACDs) may improve symptoms and lung function in Chronic Obstructive Pulmonary Disease (COPD) with mucus hyperproduction or bronchiectasis but innovation needs to be evaluated.

Aim: Aim of study was to assess feasibility and effects of a new ACD in the management of severe acute exacerbation of COPD in patients suffering from chest congestion despite optimal medical treatment.

Methods: 32 patients with AECOPD and symptoms of excessive mucus congestion were treated during 6 days with medical treatment, pulmonary rehabilitation and airway clearance with either manual chest physiotherapy (control; n=13) or new ACD (Simeox, Physio-Assist; n=19) that facilitates bronchial drainage by generating pulses of negative air pressure during relaxed exhalations. Usability, spirometry, CAT score, safety and tolerance were evaluated.

Results: Baseline: age 67.3±6.7, 69% male, GOLD 2/3/4: 19%/31%/50%, GOLD B/C/D: 3%/19%/78%, 31% bronchiectasis (BE), 66% had ICS/LABA/LAMA, CAT score 29.0±3.3. Control and device group have similar baseline data, except more often ICS therapy in control (92% vs 58%).

Patient training required 15 min during the first session. No adverse event nor pain was reported.

In the global cohort, FEV1 increased respectively by 19±10% (p<0.001) and 14±5% (p=0.0017) in device and control group, but the diffference between groups was not significant. However, improvement of CAT score was higher in device group (Simeox: -34±9% vs control: -24±4%; p<0.001).

In very severe COPD (GOLD 4D subgroup), FEV1 (Simeox: +24±10% vs control: +15±5%, p<0.05) and CAT Score (Simeox: -33±9% vs control: -24±4%; p<0.05) were significantly more improved with device therapy. COPD with bronchiectasis seemed to benefit the most from device therapy (FEV1: +28±6%, CAT -38+9%; p<0.05 vs baseline).

Conclusion: These results confirmed the feasibility of this new technology to manage mucus problems in COPD and suggested that it may contribute to improve lung function, respiratory symptoms and quality of life in the most severe patients including COPD-bronchiectasis overlap.

[59] Innovative! Bronchiectasis! Education! Primary Care!

Isabelle LeClerc[1]

[1]Bruyere Academic Family Health Team, Ottawa, Canada

Background/Aim: In Canada, bronchiectasis is not rare but is currently a neglected disease which poses a significant burden to the health care system. In Primary Care, we need to recognize signs and symptoms, understand etiologies and establish early diagnosis.

Chronic disease self-management education is an evidence-based approach to care that helps people better manage their symptoms and daily lives.

Over the past 8 years, our Academic Family Medicine Centre has developed expertise in Registered Nurse-led self-management programs for other diseases including hypertension, heart failure and chronic non-cancer pain.

In 2016, we used this experience to build an innovative nurse-led self-management program for bronchiectasis with the goal of improving the quality of care and patient experience.

Setting and Population: Setting: Interdisciplinary primary care practice in Ottawa, Canada with 18,000 patients.

Population: Adult bronchiectasis patients.

Methods: A registry of adult patients was built using our Electronic Medical Record. This registry is reviewed by the nurse to identify patients eligible for the Self-Management Program.

Patients who participate are offered an initial visit with the nurse and then follow up visits are planned. Patients are provided education on bronchiectasis, the definition of a bronchiectasis exacerbation, and when to take their rescue antibiotic to prevent visits to the emergency department and hospitalization. Topics about lifestyle changes that will improve their quality of life such as; nutrition, caffeine, hydration, exercise, smoking, alcohol, airway clearance techniques, travel recommendations, and prevention of environmentally acquired antibiotic resistant bacteria are discussed. Patients are also provided with a bronchiectasis action plan.

The nurse provides educational sessions to clinic physicians and family medicine residents on the evidence-based care of patients with bronchiectasis.

Results: Outcome measures include: age, gender, number of visits, quality of life, bronchiectasis severity, body mass index, patient satisfaction, FEV1 and the use of an OPEP device pre and post program participation.

In early 2019, the bronchiectasis self-management program was offered to all adult patients outside our Family Medicine Centre that are part of the greater Ottawa area (207.27 km2 (80.03 sq mi).

In 2016, our EMR registry identified 36 adult patients (0.24%) with bronchiectasis and in 2020,111 patients (0.6%) were identified.

- 69% participated in the program
- 46% were referred by local respirologists
- The average age of the patients is 70 years and 71% are female
- 37% of patients used and OPEP device prior and 78% are using an OPEP device after participating to the nurse-led education program
- The average score of the Bronchiectasis Severity Index is 6 for moderate bronchiectasis and the average score for the Bronchiectasis Health Questionnaire is 58% indicating patients' perception of moderate bronchiectasis.

Conclusion: Improvement of quality of life, by decreasing symptoms and increasing capacity for physical activity, has encouraged and motivated patients to continue their ongoing daily therapy.

Ongoing support by a qualified Registered Nurse in Primary Care is valuable for patients during this lifelong deteriorating condition until the time and during palliative care.

In November 2019 Ottawa held the first Bronchiectasis and nontuberculosis mycobacteria workshop for health care professionals. The Registered Nurse now provides bronchiectasis educational workshops and webinars for health care professionals in Canada.
Information on financial support: NIL

[87] "Teach me how to look after myself" - what people with bronchiectasis want from education in a pulmonary rehabilitation setting

Annemarie Lee; Rebecca Smith; Lucy Burr; Anne Chang; Chien-Li Holmes-Liew; Lata Jayaram; Paul King; Peter Middleton; Middleton Peter; Morgan Lucy; Nguyen Tu; Smith Daniel; Stroil-Salama Enna; Thomson Rachel; Waring Justin; Waterer Grant; Wong Conroy; McAleer Rachael

[1]Monash University, Melbourne, Australia; [2]Monash Health, Melbourne, Australia; [3]Australian Bronchiectasis Registry, Sydney, Australia; [4]La Trobe University, Bendigo, Australia; [5]Cabrini Health, Melbourne, Australia

Background: Pulmonary rehabilitation is recommended for people with bronchiectasis. A mix of education topics are generally included but subject choice is largely informed by focal areas of interest or management strategies relevant for people with chronic obstructive pulmonary disease or interstitial lung disease. Establishing the needs of people with bronchiectasis maximises the educational opportunity within a pulmonary rehabilitation setting. However, the topics of education relevant to this population are unknown. This study aimed to explore the perspective of people with bronchiectasis on educational topics of interest which could be included within pulmonary rehabilitation.

Methods: Participants with bronchiectasis who were included in the Australian Bronchiectasis Registry were invited to undertake a semi-structured interview. Interview transcripts were coded independently and themes established by consensus between two investigators.

Results: Twenty-one people participated (mean (SD) age 75(12) years, FEV1 83.3(26.4) % predicted). Major themes from the interviews were greater clarity on the underlying cause of their condition and its prognosis. Most participants sought knowledge about self-management strategies and treatment suggestions to address extra-pulmonary symptoms. Participants required more information on the various options for airway clearance therapy and the role of exercise therapy and physical activity outside of a rehabilitation program. Preferences were mixed for the education delivery model, with some preferring a group setting with mixed diagnosis, others favouring those with a similar diagnosis and a small proportion desiring one to one education sessions.

Conclusions: The unmet education needs of people with bronchiectasis provides a foundation for the development of education topics and material which could be offered within a pulmonary rehabilitation setting.

[131] Effects of long-term Tobramycin Inhalation Solution (TIS) once daily on exacerbation rate in patients with non-cystic fibrosis bronchiectasis The BATTLE Randomized Controlled Trial

Lotte Terpstra[1]; Inez Bronsveld[2]; H.J. Doodeman[1]; W. Rozenmeijer[1]; H.G.M. Heijerman[2]; W.G. Boersma[1]

[1]North West Clinics, Alkmaar, Netherlands (The); [2]Utrecht university, Utrecht, Netherlands (The)

Background: Long-term inhaled antibiotics are the standard care in cystic fibrosis (CF) bronchiectasis. However, in patients with non-CF bronchiectasis, studies with long-term inhaled antibiotics are limited, and particularly long-term treatment with tobramycin inhalation solution (TIS). We investigated the efficacy and safety of maintenance TIS in the frequent exacerbating bronchiectasis patients colonized by different pathogens sensitive for tobramycin.

Objective: The primary outcome of the study was a 50% reduction in number of exacerbations using maintenance TIS as compared to placebo. Secondary endpoints were time to exacerbation, change in lung function and QoL, microbiological evaluation and safety assessments.

Study design: The BATTLE study is a randomized, double blind placebo controlled, multicenter trial in patients aged ≥ 18-year-old withconfirmed bronchiectasis, at least two exacerbations in the preceding year, and one positive sputum culture for gram negative pathogens or *Staphylococcus* aureus in the preceding year and at baseline. Patients were treated with TIS once daily (OD) or placebo (saline 0.9%) OD for 52 weeks followed by a run-out period of 4 weeks after the last dose.

Results: A total of 58 patients were included (*figure 1*). A non-significant decrease in number of exacerbations in patients treated with TIS (before 3.81 vs. after 1.58) as compared to placebo (before 3.85 vs. after 2.23) was found in the mITT-population (p= 0.147), with a risk reduction of 26% for TIS. Time to first exacerbation in weeks differed between TIS (mean 29; sd 19.6) and placebo (mean 21; sd 18.7) with a hazard ratio of 0.64 (95% CI 0.35-1.19) for patients receiving TIS compared with placebo (*figure 2*). Results of the other secondary endpoints will be evaluated before the start of the virtual WBC.

Discussion: Although the primary endpoint was not significantly reached, this study showed that TIS OD is an treatment option for bronchiectasis patients with frequent exacerbations infected by different pathogens.
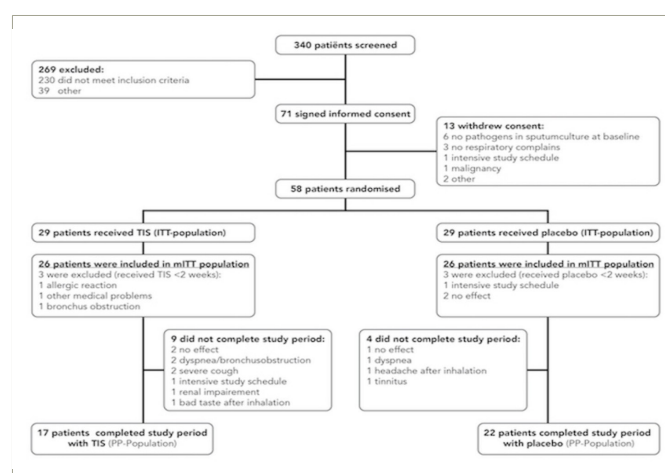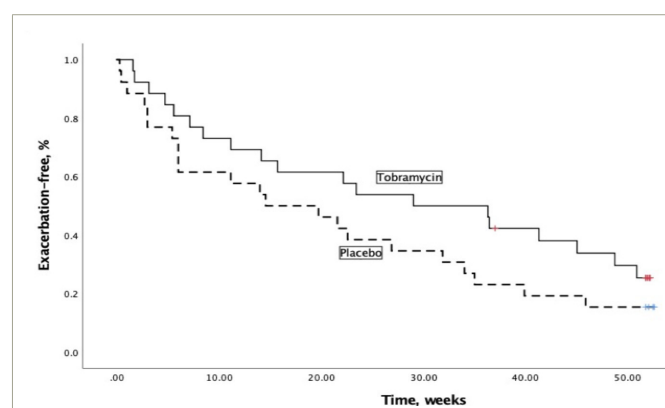
Figure 1

Figure 2

[117] Computer aided diagnosis (CAD) for monitoring CF airway disease (CAD), the CAD-CAD method

Qianting Lv[1,4]; E.R. Andrinopoulou[2]; L. Gallardo Estrella[3]; M.P.C. Kemner - van de Corput[1,4]; J.P. Charbonnier[3]; E.M. van Rikxoort[3]; P. Ciet[1,4]; M. de Bruijne[5]; H.A.W.M. Tiddens[1,4]

[1]Erasmus MC-Sophia Children's Hospital, department of Pediatric Pulmonology and Allergology, Rotterdam, Netherlands (The); [2]ErasmusMC Department Biostatistics, Rotterdam, Netherlands (The); [3]Thirona, Nijmegen, Netherlands (The); [4]Erasmus MC Department of Radiology and Nuclear Medicine, Rotterdam, Netherlands (The); [5]ErasmusMC, Department of Biomedical Informatics, Rotterdam, Netherlands (The)

Background: Cystic Fibrosis (CF) lung disease is characterized by progressive diffuse airway wall thickening and widening leading to bronchiectasis. Manual measurement of all visible airway artery (AA) pairs on chest Computed Tomography (CT) scans of CF patients has been shown to be a sensitive method to detect and monitor airways disease in CF (Kuo et al). Unfortunately, this method is very time consuming.

Aim: To develop and validate an automated AA-method for objective and sensitive assessment of AA dimensions on chest CTs of CF patients for the detection and monitoring of airway wall thickening and bronchiectasis.

Methods: The AA-method of Thirona's lung quantification software LungQ (Thirona, Nijmegen, Netherlands) was used to 1) Identify the airway tree and matching arteries (AA-pairs) 2) identify the generation (G) of all identified AA-pairs, 3) automatically compute the following dimensions for each AA-pair: outer airway wall diameter (Aout), inner airway wall diameter (Ain), airway wall thickness (Awt) and diameter of the paired artery (A); and 4) compute the following ratios for each AA-pair: Aout-A, Ain-A, Awt-A ratios. Results are presented starting at the first segmental bronchi (G1). A subset of 40 out of 70 CT scans with slice thickness less than 1.5mm from the Erasmus MC Sophia Children's Hospital CF cohort scans (Bouma et al) was added to the internal training dataset to make the algorithm more robust against CF abnormalities. For validation, LungQ results were compared against a manual AA-method analysis of a set of spirometer controlled inspiratory chest-CT scans. This set consisted of 11 randomly selected children with CF (median age 11 years, range 7-16 years) and of normal CTs of 12 age matched control subjects (Kuo et al). We investigated the ability of the LungQ and the manual method to discriminate between airway dimensions and AA-ratios of CF and control subjects for each segmental generation (G1-G7). Then, we compared the area under the curve (AUC) between the two methods using the DeLong's test using the median value of all G locations in each patient.

This study was sponsored by the Dutch CF foundation through a PPP grant.

Results: LungQ was able to detect 4693 AA pairs against 4814 AA pairs by manual measurement in 23 subjects. For Aout/A ratio, and Awt/A ratio outcomes there was no significant difference between the AUC of LungQ and manual method from G4 to G7. AUC of Aout/A ratio (from G5 to G7) and Awt/A ratio(from G3 to G7) were above 0.8 for LungQ, which reflects excellent discrimination of CF from controls.

Conclusions: We developed an automated method to measure AA-dimensions and compute ratios of a large number of AA-pairs. Our automatic AA-method showed in some cases a higher accuracy to detect bronchiectasis and airway wall thickening in the lung periphery compared to the manual method. Further validation will be done in several independent younger and older CF cohorts and in bronchiectasis patients to assess its performance in different age groups and its ability to track disease.

[128] Poor Physical Capacity in Bronchiectasis Patients Is Correlated with Poor Quality of Life

Jarkko Mäntylä[1,2]; Witold Mazur[2]; Tanja Törölä[2]; Paula Bergman[3]; Paula Kauppi[1]

[1]University of Helsinki and Helsinki University Hospital, Inflammation Center, Department of Allergy, Helsinki, Finland; [2]University of Helsinki and Helsinki University Hospital, Heart and Lung Center, Department of Respiratory Diseases, Helsinki, Finland; [3]University of Helsinki, Biostatistics consulting, Department of Public Health, University of Helsinki, Helsinki, Finland

Backround: To study the risk factors associated with quality of life (QoL) in a cohort of Finnish non-cystic fibrosis bronchiectasis (BE) patients. We aimed to evaluate which of the clinical characteristics were risk factors for poor quality of life, how patients with frequent exacerbations differed from those with only few exacerbations and if QoL symptom domains were correlated with dyspnoea or severity of BE. The study included 95 adult patients with (mean age was 69 (SD± 13) years). Seventy nine percent of the BE patients were women.

A cross-sectional study and part of the EMBARC study including questionnaire data and medical record data. Study participants were recruited between August 2016 and March 2018 from three different pulmonary clinics in Helsinki University Central Hospital (HUH) catchment area, Finland. The ethics committee of HUH approved the study (registration number 214/13/03/01/2016).

Methods: A Finnish translation of the disease-specific quality of life-bronchiectasis (QoL-B) questionnaire was applied, and scores in the lowest quarter (24%) of the scale were considered to indicate poor QoL. The bronchiectasis severity index (BSI) and FACED (including FEV1, age, pulmonary bacterial colonization, effected lobes and dyspnoea) score were used. The severity of dyspnoea was examined using the modified Medical Research Council (mMRC) dyspnoea scale.

Results: Almost all (82%) presented with chronic sputum production and exacerbation, with a median rate of 1.7 (SD ±1.6). Exacerbations (OR 1.7), frequent exacerbations (OR 4.9, p < 0.01), high BSI score (OR 1.3, p < 0.01) and extensive disease (OR 3.7, p = 0.05) were predictive of poor QoL. Frequent exacerbations were associated with bronchial bacterial colonisation, low forced expiratory volume in one second (FEV1) and radiological disease severity. Based on the BSI, 34.1% of our cohort had severe disease, whereas 11.6% were classified as severe according to the FACED score. The mMRC dyspnoea score (r = -0.57) and BSI (r = -0.60) were negatively correlated with physical domain in QoL-B questionnaire.

Conclusion: Frequent exacerbations, radiological disease severity and high BSI score were predictive of poor QoL. Reduced physical capacity was correlated with dyspnoea and severity of disease. Interventions to reduce bacterial colonisation and to maintain physical functioning should be used to minimize exacerbations and to improve quality of life in BE patients.

[181] Comparison of spirometric changes in two different groups of patients with microbiological culture of Mycobacterium Abscessus

Pablo Mariscal Aguilar[1]; Daniel Laorden Escudero[1]; Andrés Gimenez Velando[2]; Sarai Quirós Fernández[1]; Carlos Carpio Segura[1]; Rosa Girón Moreno[3]; Concepción Prados Sánchez[1]; Rodolfo álvarez-Sala Walther[1]

[1]Hospital Universitario La Paz, Madrid, Spain; [2]Hospital Universitario Fundación Jiménez Díaz, Madrid, Spain; [3]Hospital Universitario La Princesa, Madrid, Spain

Introduction: The aim of this study was to evaluate the differences in lung function between patients who had microbiological isolation of

Mycobacterium abscessus by differentiating in this case those who were diagnosed with cystic fibrosis compared to other pathologies.

Material and methods: Retrospective study carried out in three hospitals of the Comunidad de Madrid, between January 2012 and December 2017. Lung function tests adjusted by size, weight and age of individuals in two groups were reviewed: cases (patients with cystic fibrosis) and controls (patients with other pathologies) all with microbiological isolation in three types of respiratory samples (sputum, bronchoalveolar washing or bronchial aspiration) of Mycobacterium abscessus. Spirometric variables were collected before and after the first isolation. Microbiological, clinical and radiological data were collected to differentiate between isolation, colonization and disease.

Results: Forty two patients included: 15 (36%) cases and 27 (64%) controls, whose measured ages were: 1) CF patients: 27.13±13.94 years versus 2) controls 61.59±18.55 years, with the difference being significant (p 0.001). Measured spirometric values were higher in the group without CF, finding significant differences in the case of FEV1 (p-0.002) and in the case of HCF (ml) (p-0.025). Based on the last measurement of FEV1 and HCF in 2017 in ml, it was significantly higher in CF patients for both HCF (ml) (p-0.015) and FEV1 (ml) (p-0.022).

Conclusion: Considering that they are not comparable groups, we found that pulmonary isolation-disease by M. abscessus produces less decline in patients with CF. The disparity of the compared groups would explains the initial difference between them. Differences after infection would indicate that it is more aggressive in those not affected by CF

[146] Small Airway Disease and Emphysema are Associated With Future Exacerbations in Smokers With Bronchiectasis

Poster Winner

Diego Maselli[1]; Andrew Yen[2]; Yuka Okajima[3]; Wojciech Dolliver[5]; Christina Mercugliano[5]; Marcos Restrepo[1]; Kendra Young[6]; Gregory Kinney[6]; Raul San Jose Estepar[7]; Alejandro Diaz[4]

[1]Division of Pulmonary Diseases and Critical Care, UT Health, San Antonio, United States of America; [2]Department of Radiology, University of California, San Diego, United States of America; [3]Department of Radiology, St. Luke's International Hospital, Tokyo, Japan; [4]Division of Pulmonary and Critical Care Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, United States of America; [5]Quinnipiac University School of Medicine, Hamden, United States of America; [6]Department of Epidemiology, Colorado School of Public Health, University of Colorado, Aurora, United States of America; [7]Department of Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, United States of America

Background: Exacerbations are important clinical events in bronchiectasis patients and linked to poor outcomes. COPD and bronchiectasis overlap and share pathologic features, such as small airway disease. Whether small airway disease and the presence of emphysema in smokers with bronchiectasis is associated with exacerbations is unknown.

Aim: To assess whether small airway disease and emphysema in smokers with radiographic bronchiectasis are associated with an increased exacerbation rate.

Methods: Small airway disease (SAD) and emphysema (EMPH) were quantified using the parametric response map (PRM^{SAD} and PRM^{EMPH}) method in 387 former and current smokers with radiographic bronchiectasis from the COPDGene study. Exacerbations were assessed through a bi-annual follow-up of 9 years. The association of small airway disease and emphysema to future exacerbations was assessed with generalized linear mixed models.

Results: After adjustment for age, sex, race, body mass index, current smoking status, pack-years, exacerbations before study entry, FEV1,

and bronchiectasis severity CT score; PRM^{SAD} and PRM^{EMPH} were each associated with an increased future exacerbation rate (estimate [95% Confidence Interval], 1.38 [1.26 - 1.50] exacerbations/year per 1-Standard Deviation [SD] increase of PRM^{SAD}; estimate, 1.20 [1.12 - 1.29] exacerbations/year per 1-SD increase of PRM^{EMPH}). Similarly, in radiographic bronchiectasis subjects who met criteria for COPD (N=197) there was an increased rate of future exacerbations (estimate, 1.47 [1.31 - 1.64] exacerbations/year per 1-SD increase of PRM^{SAD}; estimate, 1.25 [1.16 - 1.35] exacerbations/year per 1-SD increase of PRM^{EMPH}).

Conclusion: In smokers with radiographic bronchiectasis, structural changes to lung parenchyma and small airways disease were associated with higher number of future exacerbations..

[140] Psychometric properties of health-related quality of life questionnaires for use in bronchiectasis clinical trials: A systematic review and meta-analysis

Rebecca H. McLeese[1]; Arietta Spinou[2]; Zina Alfahl[3,1]; Michail Tsagris[4]; Joseph S. Elborn[5]; James D. Chalmers[6]; Anthony De Soyza[7]; Michael R. Loebinger[8]; Surinder S. Birring[9]; Konstantinos C. Fragkos[10]; Robert Wilson[8]; Katherine O'Neill[1,5]; Judy M. Bradley[5,1]

[1]Northern Ireland Clinical Research Facility, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, United Kingdom; [2]Population Health Sciences, Faculty of Life Sciences and Medicine, King's College London, London, United Kingdom; [3]School of Pharmacy, Queen's University Belfast, Belfast, United Kingdom; [4]Department of Economics, University of Crete, 74100, Rethymnon, Greece; [5]Wellcome-Wolfson Institute for Experimental Medicine, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, United Kingdom; [6]Scottish Centre for Respiratory Research, University of Dundee, Dundee, United Kingdom; [7]Institute of Cellular Medicine, Newcastle University and Freeman Hospital, Sir William Leech Research Centre, Respiratory Department, Newcastle upon Tyne, United Kingdom; [8]Host Defence Unit, Royal Brompton Hospital, London, United Kingdom; [9]Centre for Human & Applied Physiological Sciences, School of Basic & Medical Biosciences, Faculty of Life Sciences & Medicine, King's College London, London, United Kingdom; [10]Division of Medicine, University College London (UCL), London, United Kingdom

Background: There are a number of tools used to assess health-related quality of life (HRQoL) in bronchiectasis. Analyses of the psychometric properties is important in order to optimise the selection of HRQoL questionnaires in clinical trials. The objective of this systematic review and meta-analysis was to assess the psychometric properties of all HRQoL questionnaires available for use in bronchiectasis.

Methods: A literature search in five electronic databases was conducted to identify relevant studies. HRQoL questionnaires were assessed for psychometric properties including reliability (internal consistency, test-retest reliability), validity (translation validity, convergent and discriminant validity), responsiveness including effect size, minimal clinically important difference (MCID) and floor and ceiling effects. Meta-analyses assessed the associations of HRQoL with clinical measures and responsiveness of HRQoL in clinical trials.

Results: A literature search identified 130 relevant studies and 12 HRQoL questionnaires (2 bronchiectasis specific, 7 respiratory specific, and 3 generic). There was evidence of cross-cultural validity for 6 HRQoL questionnaires. There was evidence of good internal consistency (Cronbach's >0.7) and short-term test-retest reliability (intra-class correlation coefficient (ICC) >0.7) for all HRQoL questionnaires in at least some domains. HRQoL questionnaires were able to discriminate between important markers of clinical status, disease severity, exacerbation status and bacteriology. Responsiveness was reasonable; the meta-analysis

showed a difference between the treatment and placebo effect which was statistically significant.

Conclusion: All HRQoL questionnaires had good internal consistency and short-term test-retest reliability for at least some domains, however there was limited evidence of long-term test-retest reliability, which is important for clinical trials. St. George's Respiratory Questionnaire (SGRQ) had good psychometric properties and was the most widely used HRQoL questionnaire in bronchiectasis studies. Data are emerging on bronchiectasis specific HRQoL questionnaires. Studies are needed which specifically explore the medium-long term test-retest reliability, responsiveness and MCID in commonly used HRQoL questionnaires in bronchiectasis.

[68] Time-to-detection as a pre-treatment predictor for culture conversion in patients with Non Tuberculous Mycobacteria Pulmonary Disease

Christina Mingora[1]; Bryan Garcia[1]; Kevin Mange[2]; Dayton Yuen[2]; Patrick Flume[1]; Susan Dorman[1]

[1]Medical University of South Carolina, Charleston, United States of America;
[2]Insmed Incorporated, Bridgewater, United States of America

Background/Aims: Studies have demonstrated that the prevalence of non-tuberculous mycobacterial pulmonary disease (NTM-PD) is increasing in multiple territories. Research in pulmonary tuberculosis has demonstrated that mycobacterial time-to-detection (TTD) in liquid culture media, a fully automated and highly objective system, has predictive value for longer term clinical outcomes. We sought to assess whether this methodology has utility in the study of therapeutics for NTM-PD.

Methods: We analyzed existing data collected in the CONVERT trial (NCT02344004) that compared amikacin liposome inhalation suspension (ALIS) added to background guideline-based therapy versus guideline-based therapy alone in patients with refractory NTM-PD caused by *Mycobacterium avium* complex (MAC). Using a subset of this data, we evaluated TTD measures at each monthly visit assessing reproducibility of measures performed at individual visits and between visits, as well as the association of TTD with culture conversion.

Results: CONVERT enrolled 336 participants. Microbiologic testing for the study was conducted at 3 laboratories; data from one laboratory were available for this analysis. Among 71 participants with at least 1 screening TTD value, 87.3% were Caucasian, 63.4% were female, and mean age was 65.6 years. The mean duration NTM disease was 4.9 years. Mean screening TTD was 7.9 days (standard deviation [SD] 4.58 days, range 2.5 to 24.6 days). There was little variation between screening and baseline TTD within subjects. Ten (14%) participants in this subset achieved culture conversion. Longer screening TTD was found in participants who achieved culture conversion (using screening TTD > 5 days versus screening TTD < 5 days; OR 15.4, 95% CI 1.9, 716.7, p = 0.0037).

Conclusions: Patients who achieved culture conversion during treatment had a longer screening TTD than patients who did not achieve culture conversion. While this study was conducted retrospectively in a small population with refractory disease, these data suggest that TTD does associate with treatment response in patients with NTM-PD due to MAC. These data support investigations to validate TTD as a prognostic measure in future studies of treatment of NTM-PD.

Disclosure: The authors have no competing interests to disclose related to this abstract.

[112] The Australian Bronchiectasis Registry: revision and improvement of a critical data collection platform to inform clinical care of bronchiectasis in Australia

Tu Quan Nguyen; Enna Stroil-Salama; Jack M Roberts; Lucy C Morgan; Australasian Bronchiectasis Consortium

[1]Lung Foundation Australia, Milton, QLD, Australia; [2]Concord Clinical School, The University of Sydney, Sydney, NSW, Australia; [3]Metro South Hospital and Health Service, Queensland Health, Brisbane, QLD, Australia; [4]Cough, Asthma and Airways Research Group, Queensland University of Technology, Brisbane, QLD, Australia; [5]Department of Respiratory Medicine, Concord Repatriation General Hospital, Sydney, NSW, Australia

Nguyen TQ, Stroil-Salama, E, Roberts JM, Morgan LC on behalf of the Australasian Bronchiectasis Consortium

Background: There is a paucity of high-quality, nationally representative data in Australia with which to inform clinical management of patients with bronchiectasis. The Australian Bronchiectasis Registry (ABR) is a national, multi-centre research data registry established by Lung Foundation Australia and the Australasian Bronchiectasis Consortium in 2015 with expertise and support from the US COPD Foundation and the European Multicentre Bronchiectasis Audit and Research Collaboration (EMBARC). Data collection began in March 2016 and to date, the ABR has collected data on both adult and paediatric patients from 17 participating centres across Australia. Since its inception, the ABR was hosted on two servers. Clinical data was collected using data definitions, standards and supported IT infrastructure from EMBARC to aid comparability between datasets. In compliance with Australian legislation, identifiers and demographic data were entered into a REDCap database hosted by The University of Sydney, Australia.

Methods: There were issues having data collected across two platforms. These included server delays, difficulties analysing data exports, duplicate fields, and fields not applicable to Australian patients. To streamline data entry, the goal of the Australasian Bronchiectasis Consortium since 2018 has been to move data collection to one platform only. A multidisciplinary, collaborative approach was taken to migrate and improve on data capture in REDCap, notably data validations, branching logic, capability to record microbiology results, addition of data specific for NTM culture results and treatment episodes and refining Australian-specific data fields. The ABR ceased collecting clinical data using the EMBARC system in July 2020. The transfer of records from the existing databases was implemented in careful stages, using REDCap's in-built data import functions. The existing demographic and clinical data were migrated across to an upgraded REDCap project known as ABR-REDCap v2. Quality of life questionnaires were enabled as surveys in REDCap to allow users to email questionnaires directly in REDCap. All existing data fields were mapped to a revised data dictionary and data were systematically cleaned in STATA 16 (StataCorp, College Station, TX). The revisions were formally communicated with all stakeholders to ensure a smooth transition and minimise the disruption to end users.

Results: ABR-REDCap v2 officially 'went live' in September 2020. Due to alterations in the coding, branching logic and adjustment of data entry fields and forms, not all fields could be mapped precisely. The ABR data dictionary maintains alignment with the European and US Bronchiectasis Registries and to ensure interoperability and comparability between datasets, with alterations to demographic and clinical data fields applicable to an Australian context.

Conclusions: The ABR's upgraded data collection platform carries enormous potential to improve data quality. However, further work is needed to ensure new data fields and forms are reviewed and updated. Ongoing and regular consistency checks, data validation, reports using in-built data

quality functionality in REDCap and source data verification is required.

Conflict of Interest/Disclosure: The ABR is supported by research grants from Insmed and Zambon. These sponsors have no input into the Registry's data collection or the interpretation of data.

[63] Dynamic Hyperinflation and Exercise Intolerance in Bronchiectasis: Clinical, Radiological and Functional Correlation

Maria Cecília Nieves Teixeira Maiorano Nucci; Frederico Leon Arrabal Fernandes; João Marcos Salge; Regina Maria Carvalho-Pinito; Rafael Stelmach; Alberto Cukier; Rodrigo Abensur Athanazio

[1]Pulmonary Division, Heart Institute (Incor) – HC-FMUSP, University of São Paulo, São Paulo, Brazil

Background: Exercise intolerance is a frequent finding in patients with bronchiectasis. Since it is an airway disease, dynamic hyperinflation (DH) may be one of the mechanisms involved. The prevalence of DH in bronchiectasis is unknown, as are factors associated with its occurrence.

Objective: To evaluate the prevalence of DH and reduced aerobic capacity in adults patients with bronchiectasis. As secondary objectives we aimed to investigate factors associated with its occurrence and to analyze mechanisms responsible for reduced exercise tolerance in this population.

Methods: 114 patients diagnosed with bronchiectasis underwent a cardiopulmonary exercise test (CPET), complete pulmonary function test, forced oscillometry and high-resolution computed tomography (evaluated by Reiff score). Inspiratory capacity (IC) during exercise and aerobic capacity were evaluated and correlated to clinical, functional and tomographic data. Severity of bronchiectasis were measured by different prognostic scores (FACED, E-FACED and BSI). DH was defined as a drop in inspiratory capacity by more than 10% during CPET.

Results: In a bronchiectasis population with a mean age of 43 ± 15 years, a FEV1 average of 48.7 ± 19.8 (predicted%), the prevalence of DH was 68.4%. The group of patients who presented with DH had worse pulmonary function, a higher degree of air trapping and more small airways involvement assessed by forced oscillometry. FEV1 was the main factor associated with this condition. The majority of patients presented a reduced aerobic capacity (71.9% with VO2 <80% predicted). They were younger and had worse lung function, with DLCO being an independent marker of reduced VO2 peak. Patients with reduced VO2 peak have reduced tidal volume and minute ventilation, lower IC values at rest and during exercise, and more advance disease assessed by severity scores. The extent of radiological involvement was not associated with the presence of DH nor to worse aerobic capacity.

Conclusion: The prevalence of DH during CEPT in patients with bronchiectasis is high and associated with worse lung function and disease severity. FEV1 was the main factor associated with this condition. The reduction of exercise tolerance is also frequent in this population. Understanding the mechanisms involved in exercise limitation of these patients is essential to identify new therapeutic targets for the management of bronchiectasis.

[182] The design and implementation of a Bronchiectasis Discharge Care Bundle

Aisling O' Donoghue[1]; Jessica Ma[1]; Genevieve Price[1]; Vicky Newey[1]; Georgina Russell[1]; Vijay Padmanaban[1]

[1]Imperial College Healthcare NHS Trust, London, United Kingdom

Background: Bronchiectasis is caused by inflammatory damage to the airways, characterised by recurrent exacerbations and chronic sputum retention. The use of discharge care bundles improves patient care and outcomes, as they focus on best consistent and standardised practice (Resar et al, 2012). Discharge care bundles for Chronic Obstructive Pulmonary Disease (COPD) developed by the British Thoracic Society (BTS) have shown to be feasible and positively impact processes of care and clinical outcomes, but not currently used for bronchiectasis patients. Therefore, we aimed to develop a bronchiectasis discharge care bundle incorporating the BTS Quality Standards and evaluate its implementation and effect on hospital readmission rate.

Methods: A local audit of the BTS Bronchiectasis guidelines was completed and key areas of improvement identified. Based on this, and the BTS Bronchiectasis Quality Standards, we designed a discharge care bundle with input from multidisciplinary stakeholders (*figure 1*). The key interventions included airway clearance optimisation, individualised self-management plan provision, arrangement of secondary care follow-up and assessment for pulmonary rehabilitation referral. Physiotherapists were educated on the delivery of bundle interventions and best practice care as per the BTS guidelines.

Results: All patients admitted with bronchiectasis exacerbations over a four-month period (October 2019-February 2020) were included (n=19, Female 87%, mean age 74years ±10.17) and compared to a data sample from the previous six months (n=21, Female 81%, mean age 68.85 years ±10.72). Discharge bundles were completed for 79% of patients (n=15). Improvement was observed in the number of patients seen daily for airway clearance (75% vs 79%) and referrals to pulmonary rehabilitation increased from zero to four. Airway clearance was deemed optimised for 100% of patients on discharge and patients were provided with individual self-management plans. Follow-up plans were documented in 100% of care bundles completed. Bronchiectasis 28-day readmission rate reduced to 13% (n=2) from 33% (n=7) post bundle introduction.

Conclusions: The use of a care bundle helped meet the BTS Quality Standards for patients with bronchiectasis, specifically airway clearance optimisation, provision of self-management plans, secondary care follow-up and increased pulmonary rehabilitation referrals. Furthermore, a notable reduction in hospital readmission rates was observed. The initial results are encouraging, however are limited to a single site and small sample number. Going forward, we plan to implement and evaluate this across multiple sites.
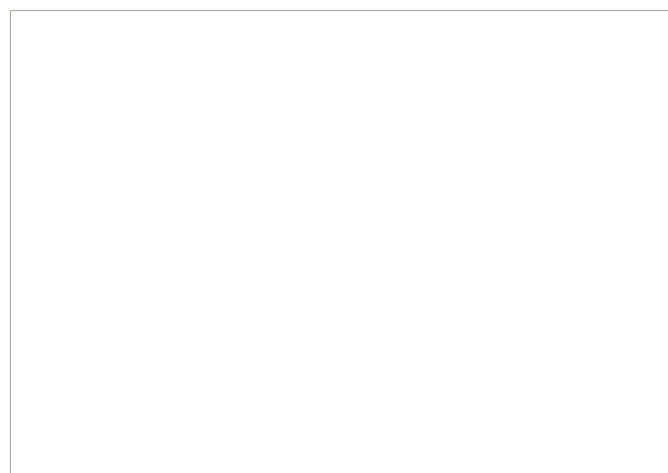
Figure 1.

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[134] Follow-up respiratory physiotherapy in bronchiectasis: A Northern Ireland survey

Katherine O'Neill[1]; Rebecca McGrath[1]; Brenda O'Neill[2]; Jeanette Boyd[3]; James D. Chalmers[4]; Anthony De Soyza[5]; Judy M. Bradley[1]

[1]Wellcome-Wolfson Institute for Experimental Medicine, School of Medicine, Dentistry and Biomedical Sciences Queen's University, Belfast, United Kingdom; [2]Ulster University, Belfast, United Kingdom; [3]European Lung Foundation, Sheffield, United Kingdom; [4]University of Dundee, College of Medicine, Dundee, Dundee, United Kingdom; [5]Institute of Cellular Medicine, Newcastle University, National Institute of Health Research Biomedical Research Centre, Newcastle, United Kingdom

Background: Clinical guidelines recommend that a follow-up review of airways clearance techniques in adults with bronchiectasis should be undertaken within 3 months of the initial appointment (Hill, Sullivan et al. 2019) . Follow-up within 3 months can be challenging due to increasing patient numbers. Surveying current physiotherapist perspectives is important to identify factors that influence ACT follow-up.

Aim: To summarise physiotherapist perspectives on follow-up review of airways clearance techniques in adults with bronchiectasis using an online survey.

Method: The Airways Clearance Treatments in adults with BronchiEctasis (ACT-BE) survey aims to determine current practice in NI in both people with bronchiectasis and the physiotherapists who treat them. The online survey content and format was developed and finalised with patient and clinician groups. The data presented in this abstract is an interim analysis of data collected from n=31 physiotherapists who treat people with bronchiectasis in Health and Social Care Trusts throughout Northern Ireland. Survey responses on follow-up practice were summarised. The ongoing survey is funded by Northern Ireland Chest Heart and Stroke.

Results: On 22nd September 2020, survey responses from 31/66 (47%) physiotherapists who received an invitation to complete the survey were available for analysis.

In terms of access to a physiotherapist, the factors rated as most important for bronchiectasis patient follow-up visits were access to a physiotherapist who works with respiratory patients generally (45% of respondents rated this as most important). Access to a physiotherapist who is a specialist in bronchiectasis rated was rated as second most important (35% of respondents). The patient having a visit in a location of their choice was rated as least important.

The factor rated most important in prioritising patients for follow-up visits were the patients symptoms (51% of respondents rated this as most important). Patient understanding and competence with the technique was rated as second most important (40% of respondents). The least important factor in prioritising patients for follow-up visits was local tariffs/ prescriptions (91% of respondents rated this as least important).

Physiotherapists were asked which new ways they would use to follow-up people with bronchiectasis for airway clearance techniques. *Figure 1* displays the responses. "Other" ways included patient reported adherence data.

Conclusions : In alignment with guidelines, physiotherapists in NI rated access to a respiratory physiotherapist or a bronchiectasis specialist physiotherapist as important for follow-up. These results emphasise the importance of the physiotherapist's respiratory expertise in the follow-up of bronchiectasis patients, specifically in understanding patient symptomology and in the assessment of ACT competence. Physiotherapists were open to new ways to follow-up patients beyond routine face-to-face outpatient appointments. Innovations in delivery of respiratory physiotherapy should be properly evaluated taking into account the supporting evidence, patient acceptability and satisfaction.

The authors declare no competing interests

Figure 1: % of physiotherapists who would use this method to follow-up patients
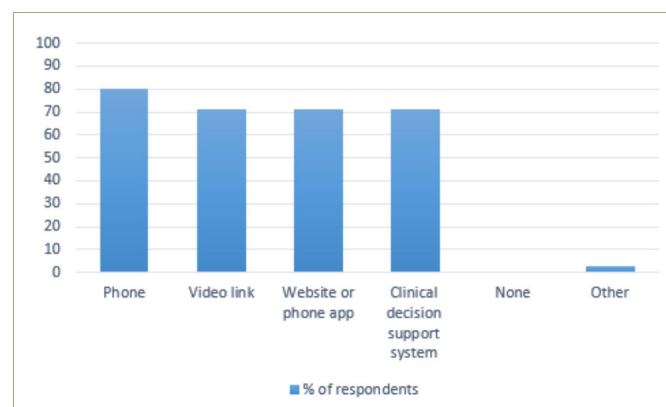
[136] Changes in Lung Clearance Index in the iBEST-1 study

Katherine O'Neill*[1,9]; Kathryn Ferguson[2]; Denise Cosgrove[2]; James D. Chalmers*[3,9]; Michael R. Loebinger*[5,9,4]; Gerhild Angyalosi*[6,9]; Charles S. Haworth*[7,9]; Gisli G. Einarsson*[1,9]; J. Stuart Elborn*[1,9]; Michael M. Tunney*[8,9]; Judy M. Bradley*[1,9]

[1]Wellcome–Wolfson Institute for Experimental Medicine, Queen's University Belfast, Belfast, United Kingdom; [2]Belfast Health and Social Care Trust, Belfast, Belfast, United Kingdom; [3]University of Dundee, College of Medicine, Dundee, Dundee, United Kingdom; [4]National Heart and Lung Institute, Imperial College London, London, United Kingdom; [5]Royal Brompton and Harefield NHS Foundation Trust, London, United Kingdom; [6]Novartis Pharma AG,, Basel, Switzerland; [7]Cambridge Centre for Lung Infection, Royal Papworth Hospital NHS Foundation Trust, Cambridge, United Kingdom; [8]School of Pharmacy, Queen's University Belfast, Belfast, United Kingdom; [9]*on behalf of the iBEST-1 study team, Belfast, United Kingdom

Introduction: Lung Clearance Index (LCI) was an exploratory outcome measure in a subgroup of sites recruiting patients to the Innovative Medicines Initiative (IMI) sponsored iBEST-1 study (a phase II dose-finding study, to assess the efficacy, safety and tolerability of tobramycin inhalation powder in patients with bronchiectasis and pulmonary Pseudomonas aeruginosa infection (ClinicalTrials.gov Identifier: NCT02712983) (Loebinger, Polverino et al. 2018). LCI as measured by Multiple Breath Washout (MBW) is a sensitive measure of lung disease severity in bronchiectasis (Rowan, Bradley et al. 2014).

Aim: To explore the change in LCI and FEV1% predicted between the baseline screening visit (day 1) and the end of treatment visit (EOT) or a follow up visit. To explore the correlation between LCI and FEV1% predicted at both time points in the subgroup.

Methods: Participants in the study were randomised to one of three treatment arms: TIP, TIP/placebo cyclical or placebo. Participants with valid LCI and FEV1 data at day 1 and EOT/follow up visit were included in the analysis. The first valid EOT/follow up visit was summarised. LCI was derived from MBN2W using the Exhalyzer D system. Data were centrally over-read for quality control using pre-defined criteria (Jensen, Stanojevic et al. 2016). FEV1% predicted was derived from spirometry carried out to ATS/ERS standards.

Data was summarised in all patients (TIP, TIP/placebo and placebo groups) and in patients in any treatment arm (TIP, TIP/placebo cyclical) using median (IQR). Time points were compared using a Wilcoxon test. Spearman's rank correlation coefficient (r_s) was calculated to assess the

strength and direction of association between variables.

Results: A subgroup analysis of patients (n=14) that had valid paired LCI and FEV1 data for day 1 and EOT/follow-up visit. Of the 14 patients, 12 received treatment (TIP, TIP/placebo cyclical) and 2 received placebo. Median (IQR) LCI = 13.0 (6.7) at day 1 and 13.6 (5.4) at EOT/follow-up visit. There was no difference between visits in the combined group (p=0.71) (*Figure 1*) or in those in the treatment group only (p=1.00).

Figure 1: Change in LCI between day 1 and EOT/follow-up visit
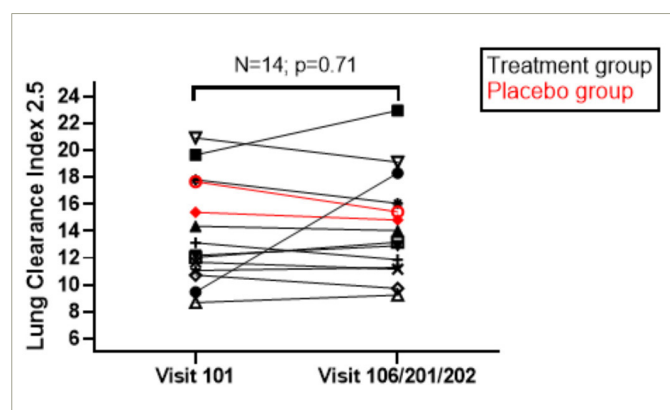
Median (IQR) FEV1% predicted = 66 (36) at day 1 and 60 (36) at EOT/follow-up visit. There was no difference between visits in the combined group (p=0.76) (*Figure 2*) and those in the treatment group only (p=0.62). The correlation between LCI and FEV1% predicted at day 1 (rs=-0.61; p=0.019) and EOT/follow-up visit (rs=-0.69; p=0.008) was significant.

Figure 2: Change in FEV1% predicted between day 1 and EOT/follow-up visit.

Conclusion: In this small subgroup of patients from the iBEST-1 study, LCI and FEV1% predicted did not change between day 1 and EOT/follow-up. There was moderate correlation between LCI and FEV1% predicted at both time points indicating agreement between measure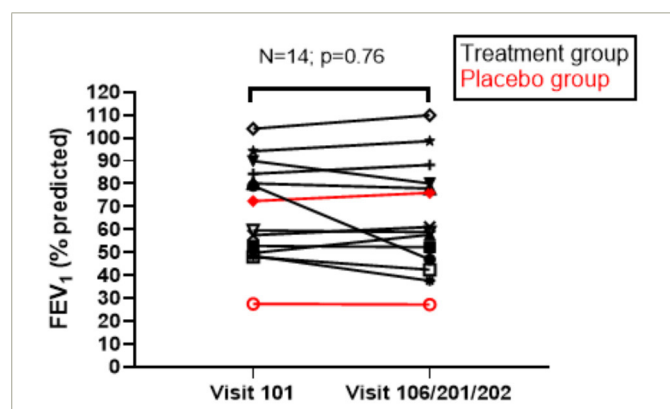s. Larger studies using LCI to measure treatment effect are needed to determine the responsiveness of this outcome measure in bronchiectasis.

[135] Clinical characteristics associated with low sputum microbiome diversity in bronchiectasis

Martina Oriano[1,2,3]; Andrea Gramegna[1,2]; Margherita Ori[1,2]; Tommaso Pilocane[1,2]; Clara Ceruti[1]; Laura Saderi[4]; Giovanni Sotgiu[4]; Leonardo Terranova[1]; Francesca Grande[1]; Luca Ruggiero[5]; Paola Marchisio[5]; Francesco Blasi[1,2]; Stefano Aliberti[2,1]

[1]Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Respiratory Unit and Cystic Fibrosis Adult Center, Milan, Italy; [2]Università degli Studi di Milano, Department of Pathophysiology and Transplantation, Milan, Italy, Milan, Italy; 3Department of Molecular Medicine, University of Pavia, Pavia, Italy; 4Clinical Epidemiology and Medical Statistics Unit, Department of Biomedical Sciences, University of Sassari, Sassari, Italy; 5Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Paediatric Highly Intensive Care Unit, Milan, Italy

Introduction: Airway infection is one of the major components of bronchiectasis pathophysiology. New molecular techniques, able to study the complexity of microbial community in lungs were recently developed and identified airway dysbiosis as associated with disease severity and inflammation in bronchiectasis. Moreover, preliminary data from previous experiences suggested an association among microbiome inter patients' diversity and bronchiectasis aetiology. The aim of this study was to identify single clinical characteristics independently associated with low microbiome diversity in sputum of bronchiectasis patients.

Methods: Adults (>=18 years) with bronchiectasis referring to the Bronchiectasis Program of the Policlinico Hospital, Milan, Italy, were enrolled during stable state between March 2017 and March 2019 for this observational, cross-sectional study. Sputum samples along with clinical and aetiological characteristics were collected from these patients and microbiota analysed through 16S rRNA gene sequencing. Airway inflammatory markers were analysed in soluble sputum. Patients were classified on median level of Shannon diversity and underwent univariate and multivariate analysis for low diversity including bronchiectasis aetiology and patients' clinical variables. Moreover, compositional characteristics along with local inflammation analysis were correlated with diversity-based groups. The study was approved by the ethical committee of the hospital (255_2020, Comitato Etico Milano Area 2), and all subjects provided written informed consent to participate.

Results: A total of 178 patients (74.2% females, median age: 63 years) was enrolled for the study. FEV1< 50%predicted, a radiological involvement of 4+ lobes on HRCT scan, and diagnosis of primary ciliary dyskinesia (PCD) were identified first from univariate and then through multivariate analysis as independent factors associated with a low sputum microbiome diversity with an OR (95% CI) of 5.4 (1.6, 24.3), 2.6 (1.4, 5.0), and 3.6 (1.2,12.1), respectively at multivariate test. A sensibility analysis excluding patients with PCD confirmed FEV1<50%predicted and radiological involvement of 4+ lobes being associated with low sputum microbiome diversity. Moreover, microbiota of low-diversity samples was characterized by an enriched in *Pseudomonas*, *Streptococcus*, and *Staphylococcus* at DESeq2 analysis, with a high predominance of *Proteobacteria* at phylum level. Analysis of local inflammation identified high levels of active neutrophil elastase [low 23.2 (16.1-34.3) ug/mL VS. high 15.6 (5.2-31.6) ug/mL; p-value= 0.0001], IL-6 [low 177.9 (119.1-286.4) pg/mL VS. high 147.5 (27.8-238.0) pg/mL; p-value= 0.04], and IL-10 [low 31,411.7 (16,861.9-64,290.2) pg/mL VS. high- 22,284.4 (8,551.5-34,587.2) pg/mL; p-value= 0.004] were detected in sputum of patients with low microbiome diversity.

Conclusions: This experience reported data on the association of microbiome diversity and dysbiosis to radiology, respiratory function and PCD as aetiology of bronchiectasis and described both the high presence of *Pseudomonas*, *Staphylococcus* and *Streptococcus* genera and the

high inflammatory environment in low-diversity samples. It underlined the need of new specific interventions aimed at treating airway dysbiosis that might help in stabilizing or slowing the functional and radiological progression in bronchiectasis patients and especially those affected by PCD. The synergic treatment of these clinical characteristics may lead to a new personalized medicine approach in bronchiectasis.

Authors have to diclare neither conflict of interest nor financial support for this study

[60] Salivary SLPI and disease severity in Bronchiectasis

Lidia Perea; Elisabet Cantó; Jordi Giner; Stefano Aliberti; James D Chalmers; Silvia Vidal; Oriol Sibila;

[1]Inflammatory Diseases Department, Institut de Recerca de l'Hospital de la Santa Creu i Sant Pau, Biomedical Research Institute Sant Pau (IIB Sant Pau), Barcelona, Spain; [2]Respiratory Department, Hospital de la Santa Creu i Sant Pau, Biomedical Research Institute Sant Pau (IIB Sant Pau), Autonomous University of Barcelona, Barcelona, Spain; [3]Pathophysiology and Transplantation Department, Università degli Studi di Milano, Internal Medicine Department, Respiratory Unit and Adult Cystic Fibrosis Center Fondazione IRCCS Cà Granda Ospedale Maggiore Policlinico Milan, Milan, Italy; [4]Scottish Centre for Respiratory Research, Ninewells Hospital and Medical School, Division of Molecular and Clinical Medicine, University of Dundee, Dundee, United Kingdom; [5]Respiratory Institute, Hospital Clinic, Barcelona, Spain

Introduction: Sputum Secretory Leukocyte Protease Inhibitor (SLPI) and LL-37 are antimicrobial peptides related to disease severity in bronchiectasis. However, spontaneous sputum samples are not as easy to obtain as saliva samples in clinical practice. Therefore, we aimed to determine salivary SLPI and LL-37 levels to assess their association with disease severity and their relationship with sputum levels in patients with bronchiectasis.

Methods: Unstimulated saliva samples from 157 adult patients with clinically stable bronchiectasis [mean age 69 ± 12, FEV1 72 ± 23%, Bronchiectasis Severity Index (BSI) 6.4 ± 3.7] were collected. At the same time, spontaneous sputum was obtained from 66 patients. SLPI and LL-37 levels were measured in supernatants of saliva and sputum by ELISA. Saliva total protein was determined using Qubit fluorometer to adjust salivary levels by the total protein content. The study was approved by the local institutional review board and all subjects gave signed informed consent.

Results: Patients with severe BSI showed lower salivary SLPI levels compared to patients with moderate and mild disease [0.4 (0.2-1.2) vs 1.4 (0.3-2.7) vs 0.8 (0.4-2.6), p=0.02]. Lowest levels were observed in patients with chronic *Pseudomona aeruginosa* infection, although differences were not statistically significant [0.6 (0.2-1.6) vs 1.4 (0.4-3.2), p=0.1]. No relationship among salivary LL-37 levels and disease severity was observed. A weak but statistically significant correlation between salivary and sputum SLPI (rho=0.28, p=0.03) and LL-37 (rho=0.25, p=0.04) were found.

Conclusions: Salivary SLPI levels are related to disease severity in bronchiectasis. In addition, a weak correlation among salivary and sputum antimicrobial peptides are found. Further studies are needed to determine the role of salivary biomarkers in bronchiectasis.

*None of the authors have any conflict of interest.

[111] A study on the diagnostic accuracy of CT parameters for identification of recurrence of tuberculosis in post-tubercular bronchiectasis patients: Data from follow-up of 223 patients over 5 years

Animesh Ray[1]; Pankaj Jorwal[1]; Surabhi Vyas[1]

[1]AIIMS,New Delhi, New Delhi, India

ackground: Post-tubercular bronchiectasis is a significant complication in patients with pulmonary tuberculosis. A significant proportion of these patients have exacerbation of symptoms, which amongst others, may be due to recurrence or re-infection with tuberculosis. Clinical examination, radiological features along with microbiological evidence are important in confirming the diagnosis of tuberculosis. Some of these patients may be microbiologically negative, but after ruling out alternate diagnoses and clinically following up these pateints, a diagnosis of pulmonary tuberculosis may be made. However, the diagnostic accuracies of different radiological parameters for diagnosis of recurrence/re-infection has not been extensively studied in these population. In this study, diagnostic accuracies of various Computed tomography(CT) findings for identifying recurrence/re-infection of pulmonary tuberculosis have been computed.

Objective: To study the diagnostic accuracy of various CT chest features as compared with Composite Reference Standard(CRS) in diagnosing recurrence among post-tubercular bronchiectasis who are tuberculosis suspects.

Methods: It was a retrospective observational study amongst the symptomatic post-tubercular bronchiectasis patients presenting to Medicine OPD/ Chest clinic over the last 5 years. Post-tubercular bronchiectasis patients who presented with any of the symptoms suggestive of recurrence of tuberculosis like fever, cough, expectoration, hemoptysis, weight loss or anorexia without any other apparent diagnoses were included. People living with HIV, pregnant females and patients aged <18 years were excluded. All these patients underwent chest radiography, CT chest along with sputum/broncho-alveolar lavage examination ,which was scrutinized. The CT scans of these patients were blindly screened for the features mentioned in *Table 1* by a trained pulmonologist/radiologist, with more than 10 years of experience. The CT scan features were labeled as active, healed or indeterminate type for tuberculosis.The follow-up details with final diagnosis and outcome of the patients were also noted from central repository of medical records.

Table 1

Table 1: Indicators of CTB disease activity on CXR and CT

Features of active TB	Features indeterminate for TB	Features of healed TB
1. Airspace nodules/centrilobular nodules/clustered nodules in apical and posterior segments RUL, apicoposterior segment LUL, RML, lingula, superior segment any LL	1. Consolidation/centrilobular nodules in other segments	1. Thin walled cavity
	2. Ground glass opacities: may suggest superimposed secondary infections or aspiration related	2. Bronchiectasis ± bronchial wall thickening
2. Consolidation in above mentioned regions with ipsilateral LN enlargement	3. Cavity with air☐fluid level: usually indicates secondary infection	3. Fibroparenchymal opacities
3. Miliary nodules	4. Borderline enlarged discrete LNs with homogeneous enhancement or preserved perinodal fat	4. Thick-walled cavity Atelectasis/collapse
4. Cavity with surrounding consolidation		5. Well defined small nodules ± calcification
5. Enlarged mediastinal LNs with central necrosis (rim enhancement) or heterogeneous enhancement		6. Subcentimetric LNs ± calcification
6. Conglomeration of LNs or obscuration of perinodal fat Pleural thickening/calcification		

Results: After screening 312 patients, a total of 223 patients who fulfilled the inclusion and exclusion criteria were included in the final analysis. Mean age of the patients was 37.6 ± 12.3 years and 52.9% patients were male. Recurrent PTB was present in 29% of patients. Median duration between 2 episodes of PTB was 1.5 years. Cough was the most common symptom (87%) followed by breathlessness (52.9%) and hemoptysis (38.9%). Compared to CRS, tree-in-bud configuration and consolidation had diagnostic accuracy of 67.74% & 69.35% respectively (p = <0.05). Necrotic mediastinal lymph nodes had good diagnostic accuracy of 88.71% with AUC of 0.806 (p < 0.001) in diagnosing recurrent TB. In comparison, sputum/BAL GeneXpert and MGIT had good sensitivity (83.33% & 84.62% respectively), specificity (100% for both) and excellent diagnostic accuracy (95.16% & 96.36% respectively) for diagnosing recurrence, (p<0.001) when compared with CRS.

Conclusion: Presence of mediastinal necrotic lymph node is the most accurate CT finding that can differentiate recurrent TB from other causes in post-tubercular bronchiectasis patients. No other single chest CT scan finding (air-space nodules, tree-in-bud pattern, consolidation, thick-walled cavity, thin-walled cavity, cavity with surrounding consolidation, pleural effusion) in isolation or in combination, has reliable diagnostic accuracy in comparison to microbiological tools/CRS in diagnosing recurrence in this population.

We have no competing interests to disclose.

[144] Short-term stability of the lung microbiome in bronchiectasis and cystic fibrosis

Hollian Richardson[1]; Holly R. Keir[1]; Megan L. Crichton[1]; Sandrine Nitza[1]; Alison J. Dicker[1]; James D. Chalmers[1]

[1]Scottish Centre for Respiratory Research, University of Dundee, Dundee, United Kingdom

Introduction: Microbiome characterisation is increasingly used to investigate bronchiectasis pathophysiology and to advocate for personalised medicine. The ability to use a single microbiome profile from sputum in order to guide therapy is dependent on demonstrating that there is stability within individuals in their microbiome profile over the short-term in the absence of antibiotic treatment. The objective of this study was to investigate the stability of microbiome parameters over two weeks in patients with bronchiectasis and cystic fibrosis.

Methods: Observational cohort study of 10 subjects (5 with bronchiectasis and 5 with cystic fibrosis). Patients were enrolled while clinically stable and provided spontaneous and 24 hour sputum samples for 16S rRNA sequencing at baseline, day 3, 5, 7 and day 14 following enrolment. 16S rRNA sequencing was performed on the Illumina MiSeq platform with data analysis in QIIME. We assessed alpha and beta diversity.

Results: Bronchiectasis patients aged from 59-75 years were predominantly male (4 out of 5).3 patients were receiving chronic macrolide therapy. 1 was classified as mild, 2 as moderate and 2 as severe using the Bronchiectasis Severity Index. The FEV1% predicted ranged from 45% to 110%. 4 were never smokers and 1 was an ex-smoker. Cystic fibrosis patients aged from 21-38 years (3 female, 2 male) and 80% were receiving prophylactic antibiotic treatment. The FEV1% predicted ranged from 46-84%. Using principal co-ordinate analysis using the Bray-Curtis index we show that microbiome profiles are highly individual, with clustering within individual and limited overlap between individuals (PERMANOVA p<0.0001). Alpha diversity parameters were also relatively stable within individuals. The coefficient of variation for the Shannon-Weiner diversity index within individuals ranged from 1.6% to 89.9% (mean 25%). There was no difference in alpha diversity between 24 hour and spontaneous sputum samples (p=0.44) and the coefficient of variation for 24-hour sputum samples ranged from 3.7% to 72.9%

(mean 24%). Using random forest analysis, we observed loss of specific taxa in 24-hour sputum samples compared to spontaneous samples; specifically Prevotella, Actinomyces, Rothia and Pseudomonas. Stability of microbiome profiles was greater in cystic fibrosis vs bronchiectasis.

Conclusion: We demonstrate relative stability of microbiome profiles within individuals with cystic fibrosis and bronchiectasis over short term follow-up. This suggests that single high-quality sputum samples are representative of individual patients' microbiome profiles in clinical research studies.

[69] Baseline characteristics and real-world treatment patterns of non-tuberculous mycobacterial lung disease (NTMLD) patients in community care setting in Germany

Diel Roland; Marko Obradovic; Roald Van der Laan; Stephan Tyler; Julia Siede; Johanna Engelhard; Karel Kostev

[1]Institute for Epidemiology, University Medical Hospital Schleswig-Holstein, Kiel, Germany; [2]Insmed Germany GmbH, Frankfurt, Germany; [3]Insmed Netherlands BV, Utrecht, Germany; [4]IQVIA, Frankfurt, Germany

Background/Aims: Non-tuberculous mycobacterial lung disease (NTMLD) is a progressive chronic disease, the prevalence of which has increased worldwide in recent decades. Epidemiological studies on the treatment of NTMLD, particularly in Germany, are limited. Therefore, the goal of this retrospective study was to analyze the baseline characteristics and management of NTMLD in community care setting in Germany.

Methods: This retrospective study is based on data from the IMS Disease Analyzer database (IQVIA), which compiles drug prescriptions, diagnoses, and basic medical and demographic data obtained directly and in anonymous format from computer systems used in the practices of general practitioners and office-based specialists in Germany. It includes data for total of about 15 million patients in the past three years. The sampling methods used for the selection of physicians' practices are appropriate for obtaining a representative database of general and specialized practices. This study included patients with an initial confirmed diagnosis of pulmonary mycobacterial infection (ICD-10: A31.0), other mycobacterial infection (ICD-10: A31.8), or unspecified mycobacterial infection (ICD-10: A31.9) that was documented between October 1, 2014 and September 30. 2019 by general practitioners (GP) or pulmonologist (PN). Further inclusion criteria were an observation time of at least 12 months prior to and a follow-up time of at least 12 months after the index date.

The outcomes of the study included baseline characteristics of NTMLD patients, as well as treatment patterns (proportion of patients receiving guideline-based treatment (GBT), time to therapy initiation, and therapy duration). GBT was defined as combination therapy with macrolide (Azi-/Clarithromycin) + Ethambutol + Rifabutin/Rifampicin.

Results: A total of 395 different patients (159 patients treated by 125 GPs and 236 patients treated by 31 PNs) were available for analyses. The mean ages of patients were 59 (GPs) and 62 (PNs) years; 51% and 58% of patients managed by GPs and PNs, respectively, were female. COPD was the most common respiratory comorbidity in NTMLD patients (22% in patients treated by GPs and 47% in patients treated by PNs), followed by asthma and bronchiectasis. A total of 40% and 45% of study patients diagnosed by GPs and PNs, respectively, received any antibiotic therapy for NTMLD. In 42% of treated NTMLD patients, the therapy lasted more than 6 months, only 24% of the patients received medications for at least 12 months, and only 8% were still on therapy after 18 months (*Figure 1*). The average therapy duration was longer in patients treated by PNs (241 days) than in patients treated by GPs (113 days). 27% and 45% of treated NTMLD patients managed by GPs and PN, respectively, received GBT at

least once; however, almost all treated patients (100% in GP, 96% in PN practice) also received a non-GBT regimen.

Figure 1: Treatment persistence over time (for patients with at least 18 months follow-up time)
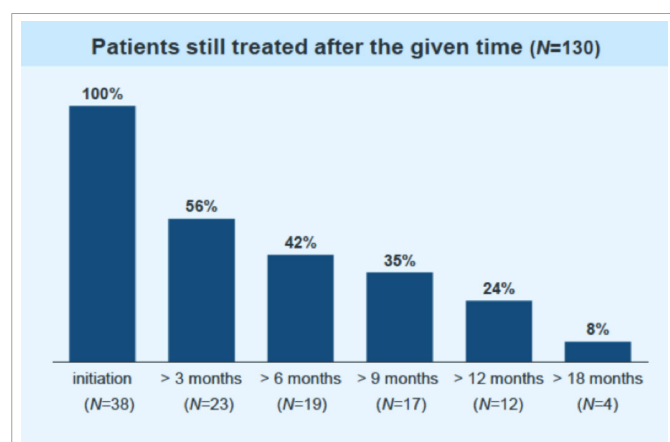
Conclusions: This is the first study to provide insights into management of NTMLD in community care setting in Germany. Many patients are not managed according to the guidelines and also discontinue therapy prematurely. NTMLD management should be improved through appropriate referral pathways and collaboration between expert centers and community care physicians.

Disclosure: The study was supported by Insmed Germany GmbH.

[58] Risk Factors fors All-Cause Mortality in Patients with Chronic Obstructive Pulmonary Disease:a 10-year follow-up study

Alizaman Sadigov[1]

[1]Medical University,Education and Therapeutic Clinic,Pulmonary Medicine Department, Baku, Azerbaijan

Background: Interest in non-tuberculous mycobacterial lung disease(NTM-LD) is increasing due to its prevalence of non-HIV populations. It can occur in the context of lung disease caused by, for example, bronchiectasis, chronic obstructive pulmonary disease (COPD or cystic fibrosis(CF), and also in people with apparently normal lung. The patients with COPD have an increased risk for NTM-LD and also an increased risk of mortality. It would be interesting to the determination of risk factors for all-cause mortality in patients with NTM-LD associated with COPD in terms of further modification of theirs.

Purpose: The aim of this study was to evaluate the risk factors for all-cause mortality in patients with NTM-LD associated with COPD.

Methods: We have assessed the mortality rate and risk factors for that in 112 patients with NTM-LD associated with severe COPD up to 30 December 2019who were admitted to the pulmonary medicine department of a university hospital. For comparison , we have included 178 patients with severe COPD. In all patients have been documented the exacerbation of the COPD and all were current and/or former smokers.

Results: The pooled estimate of ten-year all-cause mortality was 31%(90 of 290 patients) and subgroup analysis has been shown that in patients with NTM-LD associated with severe COPD the all-cause mortality rate was significantly higher compared with severe COPD patients (45% vs 23%;p<0.05).The in-hospital mortality rate also was higher in patients with comorbidity(18% vs 6.7%;p<0.05). Risk factors for in-hospital mortality were an acute hypercapnic respiratory failure (p<0.001); the need for non-invasive and invasive ventilation(P<0.001);

the need for ICU department admission for any cause(p<0.002) and radiologically cystic type of widespread bronchiectasis(p<0.01).On multivariable analysis, the following factors were associated with long-term mortality in NTM-LD patients associated with severe COPD: old age (>_70 years), low body mass index(<18.0kg.m-2)current smoking, and the long term use of inhaled corticosteroids(ICS)in high doses (in equivalent to fluticasone propionate at a dose >_1000 mcg/per day).Co-infections such as *Aspergillus fumigatus* and *Pseudomonas aeruginosa* was associated with the increased risk of long-term mortality rate(OR 1.51[0.85-3.32]95% CI;p<0.05).The subgroup analysis has been shown that the MAC (*Mycobacterium avium complex*) was common findings in patients with NTM-LD associated with severe COPD(52 of 112 patients[46%]) and was also mean causative agent associated with high mortality in patients(p<0.05).The number of patients chronically used to ICS in comorbidity non-survival patients was higher compared to survival comorbidity and non-survival and survival severe COPD patients(64% vs 30%,34%, and 31% respectively; p<0.01).The type of radiological changes in the lung significantly differed between non-survival and survival comorbidity patients: in non-survival patients, the incidence of cavitary nodular bronchiectatic and fibrocavitary radiological pattern was significantly higher compared to survival comorbidity patients(p<0.004).Upper lobes cavities most commonly associated with chronic pulmonary aspergillosis and often complicated with hemoptysis(p<0.01).In such patients, long term use of antibiotics led to the development of aspergilloma inside of cavitations. Low lung function also was independently associated with high mortality in patients with comorbidity.FEV1 has significantly differed in patients with NTM-LD and COPD compared to patients with severe COPD(40.32+_10.26 vs 48.85+_9.32;p<0.001).The subgroup analysis suggested that in non-survival patients with NTM-LD and COPD the lung function was significantly lower compared to the survival patients with NTM-LD and COPD(p<0.05).

Conclusion: In patients with NTM-LD and COPD overall mortality rate is high and is differ compared with patients with severe COPD. In patients with NTM-LD associated with COPD, the risk factors for in-hospital and long term mortality are differ and a major risk factor for in-hospital mortality was acute hypercapnic respiratory failure.among the long-term mortality risk factors responsible for the death of patients was co-infection associated with comorbidity, the chronic use of ICS, MAC-associated NTM-LD, cavitary nodular bronchioectatic and fibrocavitary radiological pattern of NTM-LD, and severe lung function impairment.the modification and correction of risk factors for death of patients may help reduce the mortality rate in patients with comorbidity.

[138] Nontypeable Haemophilus influenzae drives airway inflammation upon chronic infection

Fabio Saliu[1,2,3]; Giulia Rizzo[1,2,3]; Alessandra Bragonzi[3]; Lisa Cariani[4]; Cirillo Daniela Maria[1]; Carla Colombo[5]; Valeria Daccò[5]; Daniela Girelli[4]; Sara Rizzetto[4]; Barbara Sipione[3]; Cristina Cigana[3]; Lorè Nicola Ivan[1,2,3]

[1]Division of Immunology, Transplantation, and Infectious Diseases, Emerging bacterial pathogens, IRCCS San Raffaele Scientific Institute, Milan, Italy; [2]Università Vita-Salute San Raffaele, Milan, Italy; [3]Division of Immunology, Transplantation, and Infectious Diseases, Infections and cystic fibrosis unit, IRCCS San Raffaele Scientific Institute, Milan, Italy; [4]Cystic Fibrosis Microbiology Laboratory, Fondazione IRCCS Ca' Granda, Milan, Italy; [5]Cystic Fibrosis Regional Reference Center, Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico, Milan, Italy

Background: Nontypeable *Haemophilus influenzae* (NTHi) is a bacterium commonly isolated from the airways of Cystic fibrosis (CF) and Chronic obstructive pulmonary disease (COPD) patients, who display high

prevalence of bronchiectasis. Chronic bacterial lung infection is often associated with a pulmonary inflammatory status that aggravates the progression of chronic respiratory diseases. However, to what extent NTHi persistence contributes to the lung inflammatory burden during chronic airway disease is controversial. Here, we aimed at determining the pro-inflammatory role of NTHi persistence in a cohort of CF patients and in a newly generated mouse model of NTHi chronic infection.

Methods: Nasopharyngeal aspirates from 19 CF patients with variable genotypes were collected from the Regional CF Center in Milan during routine care visits, and levels of CF pro-inflammatory cytokines were evaluated by ELISA. Long-term chronic infection was established with NTHi-embedded agar beads by adapting a murine model previously described for other pathogens (Lorè NI et al, Sci. Rep. 2016). Cytokines levels and lung infiltrating cells were evaluated by ELISA, flow cytometry and histological analysis during the development of chronic infection (2 and 14 days).

Results: In our study cohort, we found significantly higher levels of IL-8 and CXCL1 in CF patients chronically colonized by NTHi compared to those who were not colonized. To better define the impact of NTHi persistence in fuelling the airway inflammatory response, we developed a novel mouse model using both laboratory and CF clinical strains. NTHi persistence was associated with a sustained inflammation of the lung, characterized by recruitment of neutrophils and by the release of related pro-inflammatory cytokines (KC, Mip-2, G-CSF, IL-6) at 2 and 14 days post-infection. Moreover, an increased burden of T cell mediated response (CD4+ and γδ T cells) was observed in the lungs at 14 days post-infection. We also found that both CD4+IL-17+ cells and levels of IL-17A cytokine (IL-17A and IL-17F) were enriched in mice at advanced stage of NTHi chronic infection, in association with higher levels of the tissue remodelling marker Matrix Metalloproteinase 9. In addition, we were able to demonstrate by immunohistochemistry that that CD3, B220 and CXCL-13 expressing cells co-localized in bronchus-associated lymphoid tissues (BALT)-like structure in infected lungs at day 14 post-infection.

Conclusion: Our results demonstrate that NTHi persistence exerts a pro-inflammatory activity, mediated by type 17 immunity, and could therefore contribute to the exaggerated burden of lung inflammation in patients with chronic respiratory diseases.

[62] Automated computed tomography lung densitometry in bronchiectasis patients

Marcio Valente Yamada Sawamura; Rodrigo Abensur Athanazio; Maria Cecília Nieves Teixeira Maiorano Nucci; Samia Zahi Rached; Alberto Cukier; Rafael Stelmach; Assunção Junior Assunção Junior; Marcelo Straus Takahashi; Cesar Higa Nomura

[1]Pulmonary Division, Heart Institute (Incor) – HC-FMUSP, University of São Paulo, São Paulo, Brazil; [2]Radiology Department, Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo (HC-FMUSP), University of São Paulo, São Paulo, Brazil; [3]Diagnósticos da América S.A. (DASA), São Paulo, Brazil

Introduction: Bronchiectasis is a heterogeneous disease as is its pulmonary involvement and related tomographic findings. Visual computed tomography (CT) scoring systems are used to assess disease severity and predict outcomes in bronchiectasis although they have limitations such as subjectivity, requirement of previous training and are time-consuming.

Objective: To correlate quantitative CT lung densitometry measurements with lung function and multidimensional prognostic scores in patients with bronchiectasis and compare their accuracy in comparison to a visual CT score system.

Methods: Adult patients with non-cystic fibrosis bronchiectasis

underwent inspiratory and expiratory volumetric chest CT, spirometry, plethysmography and diffusing capacity test. Disease severity was assessed by multidimensional prognostic scores (BSI and FACED). CT lung densitometry parameters (kurtosis, skewness and E/I MLD) were calculated for all patients and compared to a valid visual CT score (CF-CT).

Results: 100 patients were included with mean age of 43±15 years-old, 57% female and 34% diagnosed as idiopathic. Automated computed tomography lung densitometry was faster than visual CT score to be analyzed (2.5±0.5 x 14.0±4.0 minutes). CT lung densitometry parameters (kurtosis and skewness), correlated with forced expiratory volume in 1 second (FEV1) (R=0.32 and R=0.34; p<0.001) and DLCO (R=0.41 and R=0.43; p<0.001), comparable to CF-CT score. Automated CT air trapping quantification (Expiratory/Inspiratory (E/I) mean lung density) showed good correlation with plethysmography residual volume (RV), RV/total lung capacity (TLC) and both FACED and BSI scores (R=0.63, R=0.68, R=0.53 and R=0.29; p<0.001). E/I mean lung density showed better accuracy than the CF-CT score to discriminate patients with more severe disease (mild versus moderate/severe FACED groups) and more important air trapping (RV/TLC > 60).

Conclusion: CT densitometry is a fast and simple method of automatic quantification of lung disease in bronchiectasis. This method correlated well with multiple lung functions tests and multidimensional prognostic scores. Finally, E/I mean lung density performed better than visual scoring system to discriminate more severe patients.

[150] Dual RNA-Seq of M. avium infected human macrophages identifies characteristic host-pathogen interactions

RISING STAR

Jodie Schildkraut[1]; Valerie Koeken[2]; Jordy Coolen[1]; Reinout van Crevel[2]; Jakko van Ingen[1]

[1]Department of Medical Microbiology, Radboudumc, Nijmegen, Netherlands (The); [2]Department of Immunology, Radboudumc, Nijmegen, Netherlands (The)

Background: *Mycobacterium avium* (*M. avium*) is a species of nontuberculous mycobacterium (NTM). Despite widespread environmental exposure, most individuals are able to prevent *M. avium* exposure from progressing to disease. However, although *M. avium* is not as virulent as Mycobacterium tuberculosis (Mtb), it is also able to survive in host macrophages. In addition to locally decreased immunity caused by underlying lung pathology it remains unclear what other factors contribute to the progression of *M. avium* to disease in certain individuals. In this study we aim to characterize the interplay between host and pathogen cells using dual sequencing of *M. avium* infected human monocyte derived macrophages (hMDMs) to gain further understanding of the pathways involved in *M. avium* infection. In addition, we aim to elucidate the effect of clarithromycin, the most important antibiotic in *M. avium* and simultaneously an immunomodulatory drug, on this interplay.

Methods: Human peripheral blood mononuclear cells (PMBCs) were isolated from 3 healthy donors and differentiated into hMDMs using granulocyte macrophage colony stimulating factor (GM-CSF). Following differentiation hMDMs from each donor in were infected with *M. avium* ATCC 700898 in duplicate at a mode of infection (MOI) of 5. Clarithromycin was added to one replicate from each donor at a final concentration of 1 mg/mL. Uninfected hMDMs and *M. avium* bacteria alone with and without clarithromycin were included as controls. Following 24 hours of infection, extracellular bacteria were washed away to ensure only phagocytosed bacteria were included and RNA isolation including an enrichment for bacterial RNA was performed followed by RNA sequencing.

Results: Following infection for 24 hours, hMDMs had phagocytosed an average of approximately 2 bacteria per cell and little to no cell death had occurred. Our findings show that following infection with *M. avium* the largest increase is seen in genes related to interleukin signaling, specifically IL-10, IL-4 and IL-13. In *M. avium*, an increased expression of genes involved in nitrate respiration and coding *M. avium* antigens is seen. In addition, we found that despite huge transcriptomic responses following extracellular clarithromycin exposure, almost no effect of clarithromycin was seen in intracellular *M. avium*.

Conclusion: The increase in IL-10, IL-4 and IL-13 signaling-related genes following infection is similar to what has been described in Mtb. Previous studies have shown that IL-10 suppresses the antimycobacterial immunity, thereby facilitation pathogenic survival. In *M. avium*, an increased expression of genes involved in nitrate respiration is seen, likely contributing to detoxification of NO produced by hMDMs in response to infection. This is accompanied by an increase in mRNAs coding for antigens recognized by human cells is seen, indicating *M. avium* actively stimulates recognition by host cells to exert the subsequent immunomodulatory effects seen in the hMDMs. Interestingly, our findings indicate that the drastic difference in response to clarithromycin between intra- and extracellular *M. avium* is due to this host-pathogen interplay. In the presence of host-derived NO, the WhiB-iron-sulphur cluster protein is nitrosylated, thereby likely inhibiting normal transcriptional adaptation to clarithromycin and altering the antibiotic response.

[121] Exploring factors associated with acquisition and chronicity of infection in bronchiectasis: a population based study

Michal Shteinberg[1,3]; Saliba Walid[3,2]; Shakiri Rasched[1]; Stein Nili[2]; Adir Yochai[3,1]

[1]Pulmonology Institute and CF center, Carmel Medical Center, Haiha, Israel; [2]Department of Community Medicine and Epidemiology, Carmel Medical Center, Haifa, Israel; [3]Technion- Israel Institute of Technology, the B. Rappaport Faculty of Medicine, Haifa, Israel

Introduction: In people with bronchiectasis, chronic infection with Pseudomonas aeruginosa (PA) and to a lesser extent other bacterium are associated with adverse outcomes. It is not known which factors are associated with acquisition of bacterial infection and with persistence of the infection after first isolation. We aimed to determine factors associated with a first appearance, and with chronic infection after a new isolation of PA or H. influenzae (HI).

Methods: Using the computerized database of the largest health care provider in Israel we identified all individuals with a diagnosis of 'bronchiectasis' with at least three (for the 'new isolation analysis) or four (for chronic infection analysis) bacterial cultures of respiratory specimens. New isolation was defined as at least one isolation PA or HI after two or more negative culture. Chronic infection was defined as two or more positive cultures at least 3 months apart within one year. Cox proportional hazard models were used to assess risk factors for first isolation and for chronicity of infection after a first isolation for each of the two species examined.

Results: Between 1.1.2007-31.12.2018 we identified 4,439 patients with bronchiectasis. After excluding patients with less than 4 sputum samples, previously established PA/HI infection, and less than 1 year of follow up after 1st isolation, we included 1,305 people had a median of 7 sputum samples (IQR, 5; 10.5) . We identified a first isolation of PA in 297 people, of these 97 (33%) developed chronic PA infection. HI was newly identified in 169 people, of these 39 (23%) developed chronic infection (p=0.029 for comparison between PA and HI). (*Figure 1*)

Figure 1
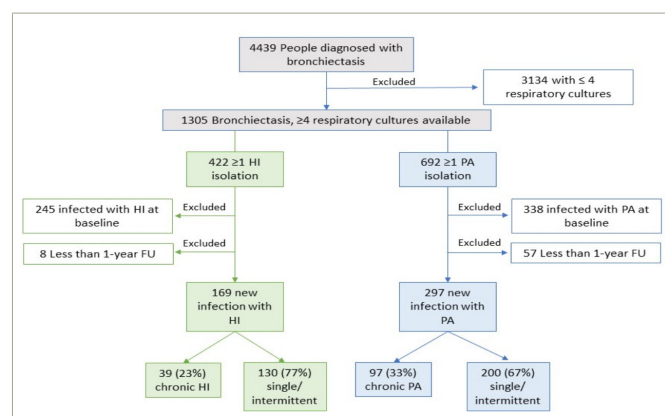
In a multivariate analysis, factors associated with a new infection with PA were presence of COPD (HR 1.76 [1.4-2.1], p<0.0001), Primary Ciliary Dyskinesia (PCD) (HR 2.7[95% CI 1.5-4.9], p=0.001), a previous isolation of HI (HR 1.48 [1.1-1.9] , p=0.003), and alcohol abuse (HR 1.9 [1.01-3.8], p=0.045). Age greater than 50 years and COPD were associated with lower risk of new HI isolation; (HR 0.48 [0.36-0.64], p=0.001), and (HR 0.7 [0.51-0.88], p=0.004), respectively.

After a new infection, the only factor associated with PA becoming chronic was prescription of anti-PA antimicrobials (HR= 1.8 [1.09-2.9], p=0.02). Factors associated with HI becoming chronic were younger age (HR= 0.97 [0.95-0.98], p<0.0001) and absence of COPD (HR= 0.28 (0.12-0.64), p=0.003). Survival was worse in people with chronic PA infection vs. infections not meeting criteria for chronicity (RR=1.56 [1.03-2.36], p=0.036) (*Figure 2*).

Figure 2

Survival of chronic *Pseudomonas* chronic infection vs. single isolation
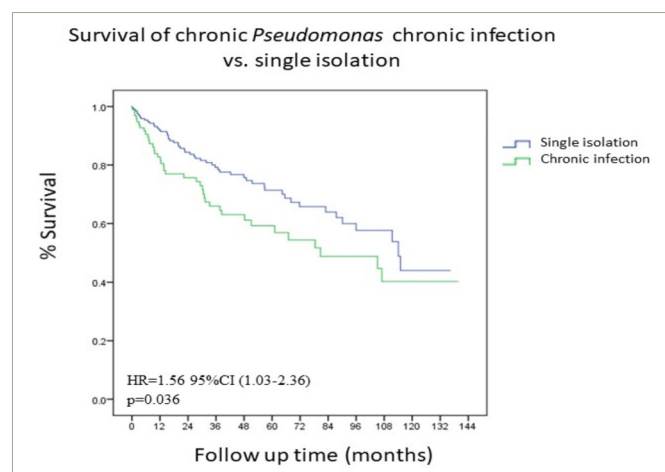
Conclusions: A new isolation of HI is associated with a younger age and presence of PCD, while a new infection with PA is associated with previous HI infection, PCD, COPD, and alcohol abuse. Infection with PA is more likely to become chronic than with HI and is associated with increased mortality. Unexpectedly, treatment with appropriate anti-PA antimicrobials was associated with increased risk of PA chronicity but this is most likely explained by reverse causality bias.

[73] Co-designing a digital self-management plan for bronchiectasis

Katelyn Smalley[1,2]; Clarissa Gardner[2]; Adam Lound[3]; Vijay Padmanaban[4]; Georgina Russell[4]; Fran Husson[5]; Seth Frempong[5];

Kate Hall[5]; Sarah Elkin[4]; Lisa Aufegger[1]; Kelsey Flott[1,2]; Erik Mayer[1,2]; Ara Darzi[1,2]

[1]NIHR Imperial Patient Safety Translational Research Centre, London, United Kingdom; [2]Institute of Global Health Innovation, London, United Kingdom; [3]Patient Experience Research Centre, London, United Kingdom; [4]Imperial College Healthcare NHS Trust, London, United Kingdom; [5]Patient Research Partner, London, United Kingdom

Background: People with bronchiectasis rely on self-management to minimise symptoms, prevent exacerbations, and halt disease progression. Bronchiectasis is especially well-suited to self-management, as the cycle of infection and inflammation that characterises the disease provides an opportunity for patients to become intimately acquainted with their symptoms, and to learn over time how best to manage them. The increasing availability of digital health tools provides an opportunity to support patients in this self-managment process.

A collaboration was developed between Imperial College London, Imperial College Healthcare NHS Trust, and three patient partners to transform the Trust's current paper-based self-management plan into a digitised tool embedded in the personal health record.

The aims of this project are to improve the appropriateness of healthcare utilisation, provide easy access to care information, share information across the care team, and digitise routine patient education (e.g. airway clearance).

Methods: We convened a series of codesign workshops with representatives of the bronchiectasis multidisciplinary team and three public partners who live with bronchiectasis. Participants developed an idealised self-management webpage, in terms of contents, practical use, and potential patient safety risks. The contents of the plan were also informed by an expert panel with national representation.

A priority-setting exercise with the entire multidisciplinary team identified highest-priority features. The prototype was then adapted for inclusion in the patient-facing record. A process evaluation will guide revisions to the plan. Correlations between engagement, health status, and demographic variables will also be explored.

Results: The expert panel produced a list of 20 key skills and information for effective self-management. There was a high degree of consensus on what should be included, with 97.2% of participants agreeing on the final set. Topics included: airway clearance, shared decision-making, antimicrobial resistance, and knowing when to seek medical help.

Figure 1 summarises the key features of the digital self-management plan, as identified by the codesign group. Highest priority features were 1) the exacerbation action plan, 2) videos demonstrating proper airway-clearance techniques, and 3) goal-setting. These three priorities were taken forward for the initial launch.

The self-management plan is interactive, personalised, and responsive to changes in baseline symptoms. Patients are able to log their symptoms daily, and when these worsen they are given guidance on determining if they have an infection. Finally, step-by-step instructions for initiating a rescue pack are provided in the event of an infection. The GP surgery will also have access to the plan, and will be notified when changes to the plan are made.

Conclusion: Previous implementation research suggests that digital interventions fail when they neglect to account for user experience (van Gemert-Pijnen et al. 2011, DOI: 10.2196/jmir.1672). This project produced a digital self-management plan in collaboration with both patient partners and the multidisciplinary team who will use the plan. We plan to quantify the impact of this tool through patient and clinician feedback, as well as engagement data.

Figure 1. Wireframe of Digital Self-Management Plan with Priority-Setting Results
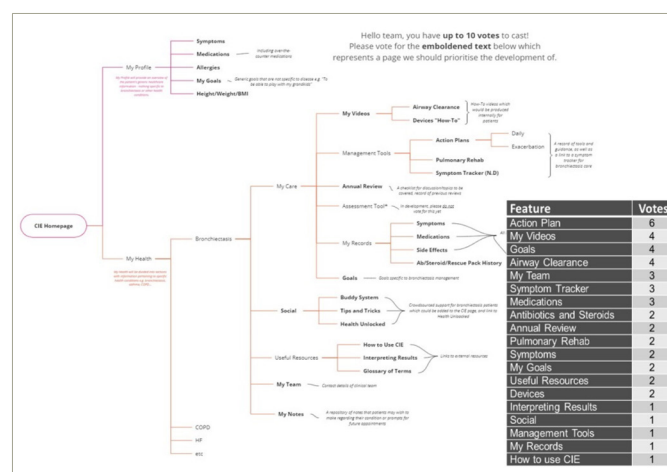
[133] Use of nebulized medications in people with bronchiectasis: a questionnaire for respiratory specialists

Arietta Spinou[1]; Stephanie Gallant[2]; Michael Lonergan[2]; Megan Crichton[2]; Pieter Goeminne[3]; James Chalmers[2]; Michal Shteinberg[4]

[1]King's College London, London, United Kingdom; [2]University of Dundee, Dundee, United Kingdom; [3]AZ Nikolaas, Sint-Niklaas, Belgium; [4]Technion-Israel Institute of Technology, Haifa, Israel

Introduction: People with brononchiectasis are often prescribed medications by inhalation. However, there are no strict recommendations regarding the optimal inhalation device. In 2001, the ERS published guidelines for the use of nebulization devices that list some criteria for choosing nebulizers, but prescribers are often limited by availability and cost of nebulization devices. We sought to investigate specialists' preferences and practices for the method of administration of inhaled medications in people with bronchiectasis.

Methods: We conducted a survey regarding prescribing preferences of different inhaled drugs and inhalation devices among respiratory specialists. The survey was administered through email and answers were submitted between 6th December 2019 and 6th Feb 2020. Participants were respiratory professionals, recruited from the multicentre European Bronchiectasis Registry EMBARC. The survey consisted of eleven items, with mainly multiple-choice responses.

Results: One hundred thirty specialists completed the survey. Participants were from 27 countries (42.3% Western Europe, 8.5% Eastern Europe, 40.8% United Kingdom and 8.5% non-European countries). Their professions were: 73.8% physicians, 18.5% nurses, 6.2% physiotherapists, and 1.5% other. *Table 1* presents the prevalence of medication use, preferred delivery mode per type of medication and preferred nebuliser devices. When choosing inhaled antibiotics, specialists were more likely to request specialized nebulizers than when using other inhaled medications. Participants often recommend using a mouthpiece (59.2%). The most important factors when choosing a nebulizer were: suitability of prescribed medication (60.8%), ease of use and cleaning (52.3%) and compliance with standards for particle size (43.1%).

Conclusions: Specialists prescribe bronchodilators, corticosteroids, antibiotics and isotonic or hypertonic saline for patients with bronchiectasis, but not mannitol. Jet and mesh nebulisers are the preferred choice for inhaled antibiotics, whilst other medications are usually delivered via any commercially available nebuliser.

Table 1. Use of medications and preferred delivery.

	Nebulizer (%)	MDI (%)	MDI+spacer (%)	DPI (%)	MDI/DPI (%)	Any commercially available nebulizer (%)	Jet nebulizer (%)	Ultrasonic nebulizer (%)	Vibrating mesh nebulizer (%)
Bronchodilators (n=115)	41.2	22.8	45.6	32.5	51.8	51.1	42.5	14.9	23.4
ICS ±LABA (n=106)	14.2	17.9	46.2	36.8	58.5	46.7	53.3	3.0	3.0
Isotonic saline (n=86)	-	-	-	-	-	55.3	33.0	8.2	8.2
Hypertonic saline (n=108)	-	-	-	-	-	45.3	36.7	10.4	9.4
Antibiotics (n=99)	78.4	-	-	5.2*	-	27.8	52.2	8.9	27.8
Mannitol (n=9)	-	-	-	-	-	-	-	-	-

*Nebulizer or DPI: 16.5%.
-: not applicable.
Percentages do not add up to 100%, as respondents could select more than one answers.
ICS: corticosteroids; LABA: long-acting beta agonists; MDI: meter-dosed inhalers; DPI: dry-powdered inhalers.

[148] Visceral fat as a predictor of the development of the T-helpers Type 2 airways inflammation in Bronchiectasis

Kseniia Suska[1]; Kateryna Gashynova[1]; Valeriia Dmytrychenko[1]; Olena Kovalenko[1]

[1]State Institution "Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine", Department of Occupational Diseases and Clinical Immunology, Dnipro, Ukraine

Background: It is recognized that the visceral adipose tissue is an active participant in immunopathological process. In turn, the measurement of the FeNO today is the one of the biomarker of the T-helpers type 2 airways inflammation. The study aimed to determine if there is an effect of the fat tissue on the type of airways inflammation in stable patients with bronchiectasis (B).

Matherials and methods: 17 patients with confirmed by HRCT B while stable were included in the study. Patients with asthma and ABPA in anamnesis and with a history of ICS use were excluded. Parietal fat (PF), muscles (M) and visceral fat (VF) were measured by «Body composition monitor Omron BF511» for the static weighing by Bio-Electrical Impedance Analysis and body mass index (BMI) was calculated. FeNO value was determined by using a conventional chemiluminescence analyzer (NIOX VERO; Circassia Ltd, Sweden). Eosinophils amount was calculated. The methods of descriptive and non-parametric statistics were used to process the results.

Results: The median age was 51 (37; 59) years, 8 were women (47%). The median BMI was 22.1 (19.8; 25) kg/m^2, 1 patient (5.9%) had underweight, 5 patients (29.4%) had overweight. According to the body impedance analysis: the median PF 22.3 (12.6; 32.9) %, the median M 32.2 (30.1; 38.9) %, the VF was from 1 to 16 %, the median was 5 (2; 8) %. FeNO was from 6 to 33 ppb, the median was 10 (6;16) ppb. The median amount of eosinophils was 0.07 (0.039; 0.118). Correlation analysis was carried out: there was found a strong direct interconnection between the level of FeNO and BMI – R=0.54, p=0.001; between the level of FeNO and VF – R=0.7, p=0.002. In turn, the interconnection between the level of FeNO and PF was not revealed – R=0.4, p=0.08; and between the level of FeNO and the amount of eosinophils – R=0.03, p=0.9.

Conclusions: Increased the percentage of the visceral adipose tissue contributes to the macrophagal activation by T-helper 2 dependent mechanism in stable patients with B. Based on this, we propose to include a measurement of the percentage of the visceral fat into the patient examination plan for the purpose of subsequent personification of therapy and correcting the lifestyle.

[115] Exploring the relationship between Pseudomonas aeruginosa, inflammation and bronchiectasis in a lung explant from a patient with primary ciliary dyskinesia

Steven Taylor[1]; Sarah Sims[1]; Geraint Rogers[1]; Lucy Morgan[2]

[1]Microbiome and Host Health Programme, South Australia, South Australia, Australia, Adelaide, Australia; [2]Department of Respiratory Medicine, Concord Hospital Clinical School, University of Sydney, Sydney, New South Wales, Australia, Sydney, Australia

Background/Aims: Primary ciliary dyskinesia (PCD) is a rare genetic disease characterised by abnormal ciliary function. Impaired mucus clearance from the lungs, as a result of ciliary dysfunction, can lead to chronic productive cough, persistent bacterial infection, and bronchiectasis. In cases of advanced lung disease and respiratory failure, double lung transplant is the only intervention available. A major risk factor for decline in lung function is chronic infection by *Pseudomonas aeruginosa*, with isolate morphology related to disease trajectory. However, within the lungs of an individual with PCD, the variability in *P. aeruginosa* abundance and phenotype, as well as the relation between *P. aeruginosa* and localised lung pathophysiology and inflammation is poorly understood. Using longitudinal sputum samples from an individual with PCD in the 18 months preceding lung transplant, as well as tissue from the explanted lung, we report the relationship between *P. aeruginosa* and site-specific lung radiography and inflammation.

Methods: This study was approved by the Sydney Local Health District Human Research Ethics Committee (14/02/2018). PCD diagnosis was performed by ciliary biopsy and electron microscopy following recurrent lung infections and low nasal nitric oxide levels. Two spontaneous sputum samples were collected 12 months apart and complete lung transplantation was performed 5 months following the second sputum sample. 24 lung segments were collected from each lobar bronchus, starting at the hilum and going to the periphery, and stored at -80 °C. 16S rRNA amplicon sequencing and *P. aeruginosa* specific quantitative PCR was performed on both sputum and lung DNA extracts. *P. aeruginosa* was isolated from lung tissue and sputum. Isolate whole genome sequencing (WGS) and tissue inflammatory mediator quantification is planned.

Results: PCD was confirmed at aged 18 showing immobile ciliary movement and inner dynein arm defect. Lung CT at aged 25, when the subject was placed on a lung transplant waiting list, showed marked cylindrical bronchiectasis predominantly involving the right upper lobe and bilateral lower lobes and dense consolidation of the left lower lobe. Sputum molecular microbiology at the time of CT identified *P. aeruginosa*

at 1.7 x 10^{8} copies/mL and as the predominant organism, representing 90% of the microbiota. Twelve months later, sputum showed an increase in *P. aeruginosa* to 2.6 x 10^{8} copies/mL, while microbiota predominance lowered to 75%, with *Streptococcus* as the second most abundant taxa. Five months later, transplantation was performed. From the excised lung, *P. aeruginosa* was isolated in all five lobes, consistent with diffuse bronchiectasis. However, while *P. aeruginosa* was detected at >10[7] copies/g in all 24 tissue segments, it was most abundant in proximal right upper lobe at 8.3 x 10^{9} copies/g, where bronchiectasis was most severe. Interestingly, *P. aeruginosa* isolates from the same tissue segments displayed multiple morphologies. WGS is currently underway to assess functional and clonal relatedness.

Conclusions: In keeping with reports from other chronic lung diseases, *P. aeruginosa* abundance relates to radiographic evidence of lung damage. Further investigation into the relationship between differences in *P. aeruginosa* isolates within-patient and radiological signs of disease, as well as measures of local inflammation, is ongoing.

[84] Screening non-tuberculous mycobacteria in patients with non-cystic fibrosis bronchiectasis

Anna Torrente[1]; Gerard Munoz Castro[2,3,1]; Marta Plana Pes[1]; Pilar Segovia Calero[1]; Maria Buxo Pujolras[4]; Montserrat Motje Casas[5]; Maria Jose Redondo Martin[1]; Montserrat Vendrell Relat[3,1]

[1]Dept of Pneumology, Dr Josep Trueta University Hospital, Girona, Spain; [2]Physical Therapy Department. EUSES/Dept of Pneumology, Girona, Spain; [3]Bronchiectasis Group IDIBGI, Girona, Spain; [4]Girona Biomedical Research Institute, Girona, Spain; [5]Dr Josep Trueta University Hospital, Girona, Spain

Background/Aims: The isolation of non-tuberculous mycobacteria (NTM) has been described in 2 to 63% of non-cystic fibrosis bronchiectasis patients, depending on the country and the criteria for searching. Our aim had been to determine the prevalence of NTM isolations in a cohort of patients with bronchiectasis over a 20-year period.

Method: A single-centre retrospective cohort study of adults with non-cystic fibrosis bronchiectasis seen between January 1998 and December 2018. None had a previous history of NTM. Since 1998 our protocol has required that a mycobacterial culture be ordered for all patients with sputum production at the initial visit, annually, during hospitalization, in the event of poor clinical control, and before initiating the long-term use of macrolides.

Results: 290 out of 358 patients were included (175 women (60%), mean age at last control 66.2±16.3 years, follow-up 6.3±5.5 years, 1.2 mycobacterial cultures per patient per year. 15 patients (5.2%) had one or more positive cultures for NTM, 7 women, mean age 69.6±16.6 yrs, follow-up 9.6±6.6 yrs. 2 women had M.avium complex (MAC) pulmonary infection, which was eradicated in one case but persists in the other 20 years after treatment. Persistent colonisations of M.abscessus were detected in 2 men after 10 years: both cases were treated and colonisation was eradicated in one whereas the other patient died. MAC was intermittently isolated in 3 patients. On single occasions MAC was isolated in 3 patients, M.gordonae in 3, M.peregrinum in 1 and M.fortuitum in 1. M.tuberculosis was incidentally isolated in 3 patients.

Conclusion: NTM isolations are low in our area. As well as revealing the true prevalence in each area, routine screening for NTM in bronchiectasis permits early detection and treatment.

Acknowledgement: the authors declare no conflict of interests.

[100] Insight into a Romanian group of bronchiectasis patients

Panciu Traian Constantin; Baiceanu Dragos; Ibraim Elmira; Mahler Beatrice

[1]Marius Nasta Institute, Bucharest, Romania; 2Carol Davila University, Bucharest, Romania

Background: Bronchiectasis is a chronic airway disease characterized by persistent airway infection and frequent exacerbations, associated with irreversible alteration of bronchial structure. Cause of chronic symptoms - cough, expectoration, reduced effort capacity - and exacerbations, bronchiectasis bring persistent suffering for most patients and a heavy financial burden for them, families and health care system, by many medical care needs and work disability. The prevalence of disease increases with ageing; it is not known in Romania, as in most countries of the world as well.

Aims: To describe the profile of a group of bronchiectasis patients assessed in Marius Nasta Institute, Bucharest, Romania, in 2017.

Methods: We performed a cross-sectional observational study on 19 bronchiectasis cases randomly selected, for whom clinical, imagistic and functional data have been registered and analyzed. Approval of the local Ethics Committee has been obtained and an informed consent form has been signed in by each participant before initiation of any study procedure. Identification of patients has been avoided by the allocation of a study number to each case.

Results: Out of 19 subjects, aged between 47 and 76 years (median age 66), 13 (68.4%) were females and 14 (73.68%) had a BMI>25 kg/m^{2}. The most frequent comorbidities were obstructive pulmonary diseases and blood hypertension (47.4% each), depression (31.6%) and type II diabetes (21.1%). CT scan revealed cylindrical dilatations in 14 cases (73.7%), cystic in 3 cases (15.8%) and combined in only 2 (10.5%), most of them in lower lobes (78.9%). A discrepancy has been noticed between mMRC Dyspnea Scale and FEV1: despite 16 patients (84.2%) declared grade 2 or more on mMRC Dyspnea Scale, just 4 (21.1%) had an FEV1<50%. All patients had episodes of exacerbation in their history and 11 (57.9%) required hospitalization, even though 6 of them (55.5%) had seasonal vaccination for influenza virus.

Conclusion: More accurate evaluation should be ensured through careful use of the mMRC Dyspnea Scale. Influenza vaccination is not enough to avoid severe exacerbation requiring hospitalization. To have a real picture of prevalence and characteristics of the disease in Romania, it is necessary to have a permanently maintained National Register for Bronchiectasis and all practitioners should follow the same guideline countrywide. In this way, the quality of diagnostic and management will be ensured, as the data uploaded into the register, allowing more extended and quality studies.

The study has been approved by the institutional ethical committee. None of the authors has something to disclose.

[85] The Incremental Burden of Nontuberculous Mycobacterial Lung Disease (NTMLD) Among Patients with Bronchiectasis (BE): Hospitalizations and ER Visits Among US Medicare Beneficiaries

Ping Wang[1]; Theodore K Marras[2]; Evo Alemao[1]; Mariam Hassan[1]; Anjan Chatterjee[1]

[1]Insmed Incorporated, Bridgewater, United States of America; [2]University of Toronto, Toronto, Canada

Background/Aims: NTMLD is an uncommon mycobacterial infection characterized by worsening lung function and increased healthcare resource utilization (HCRU). Many patients with NTMLD have comorbid respiratory diseases such as BE. Management of NTMLD in patients with BE may not get adequate attention, as the clinical management of BE is often prioritized. There is a lack of data quantifying the incremental
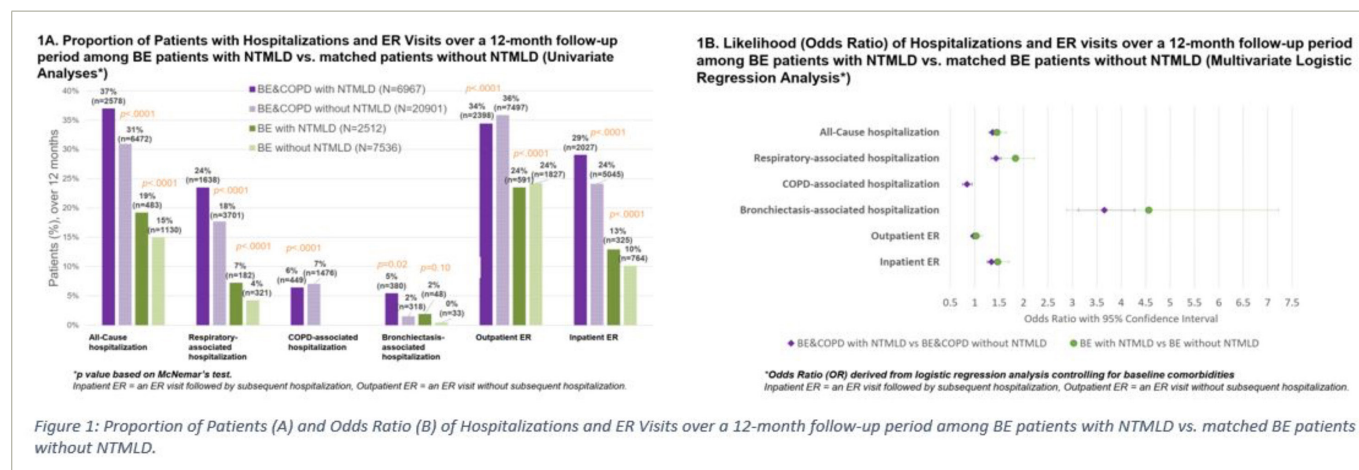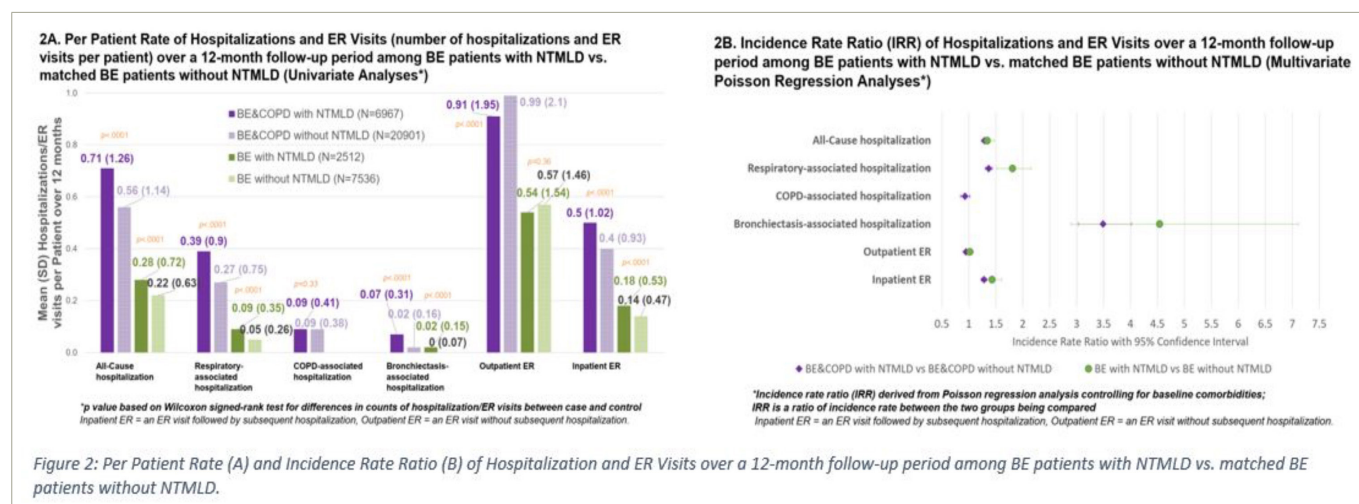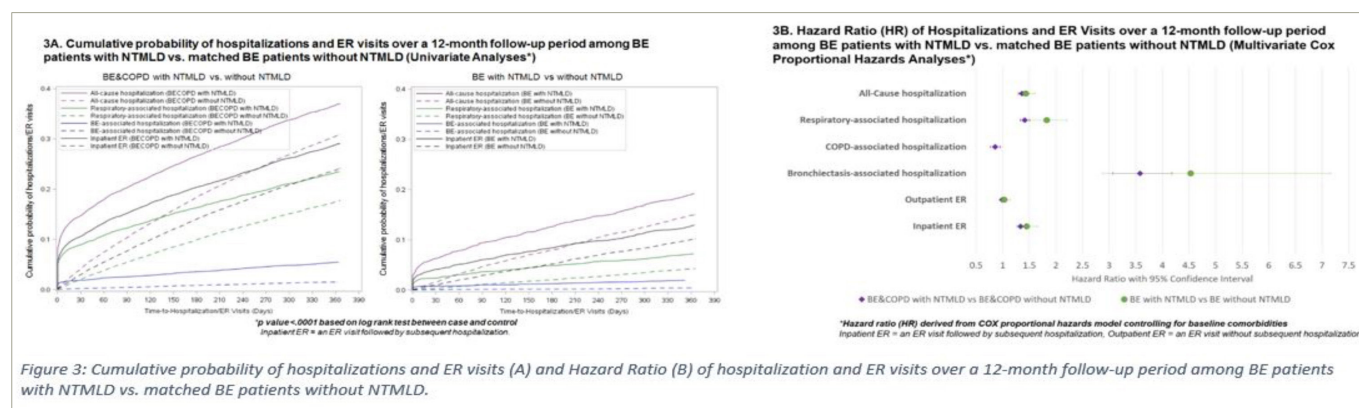
Figure 1.

Figure 1: Proportion of Patients (A) and Odds Ratio (B) of Hospitalizations and ER Visits over a 12-month follow-up period among BE patients with NTMLD vs. matched BE patients without NTMLD.

Figure 2.

Figure 2: Per Patient Rate (A) and Incidence Rate Ratio (B) of Hospitalization and ER Visits over a 12-month follow-up period among BE patients with NTMLD vs. matched BE patients without NTMLD.

Figure 3.

Figure 3: Cumulative probability of hospitalizations and ER visits (A) and Hazard Ratio (B) of hospitalization and ER visits over a 12-month follow-up period among BE patients with NTMLD vs. matched BE patients without NTMLD.

burden of NTMLD among patients with BE. We assessed the incremental burden of NTMLD in patients with comorbid BE by comparing their HCRU, in terms of hospitalizations and emergency room (ER) visits, with that of the matched controls (patients with BE and no NTMLD).

Methods: This retrospective, matched cohort study used the US Medicare claims databases (2010-2017). Based on the existence of comorbid chronic obstructive pulmonary disease (COPD), patients with BE and NTMLD were grouped into two cohorts: patients with NTMLD and preexisting BE and COPD (BE&COPD), and patients with NTMLD and preexisting BE alone. These patients were matched 1:3 to patients without NTMLD (BE&COPD without NTMLD and BE alone without NTMLD, i.e. controls) by age and sex. HCRU was assessed in terms of hospitalizations (all-cause, respiratory-associated, COPD-associated, and BE-associated) and ER visits (with and without subsequent hospitalization) over a 12-month follow-up period. The incremental burden of NTMLD was assessed by comparing HCRU between the BE groups with NTMLD and

corresponding controls using both univariate and multivariate analyses adjusting for baseline comorbidities.

Results: A total of 6967 patients with NTMLD and BE&COPD were matched to 20,901 controls, and a total of 2512 patients with NTMLD and BE were matched to 7536 controls. In univariate analyses, three metrics on all-cause, respiratory-associated and BE-associated hospitalizations and ER visits with subsequent hospitalization were consistently and significantly ($p<0.05$) greater in NTMLD than control groups: higher proportion of patients with these events (*Fig 1A*), higher mean number of events per patient (*Fig 2A*), and greater hazard of these events (*Fig 3A*) during follow up. This incremental NTMLD burden was also reflected in subsequent multivariate analysis after adjusting for baseline comorbidities (*Fig 1B, 2B, 3B*). NTMLD groups were significantly more likely to have respiratory-associated hospitalizations. Odds ratios associated with NTMLD relative to controls were: BE&COPD cohort, 1.4 (95% CI, 1.3-1.5); BE-alone cohort, 1.8 (95% CI, 1.5-2.2) (*Fig 1B*). Similarly, NTMLD groups had significantly higher incident rates than controls for respiratory-associated hospitalizations. Incidence rate ratios associated with NTMLD relative to controls were: BE&COPD, 1.4 (95% CI, 1.3-1.4); BE-alone, 1.8 (95% CI, 1.5-2.2) (*Fig 2B*). The hazards to respiratory-associated hospitalizations were also significantly higher in NTMLD groups. Hazard ratios associated with NTMLD relative to controls were: BE&COPD, 1.4 (95% CI, 1.3-1.5); BE-alone, 1.8 (95% CI, 1.5-2.2) (*Fig 3B*).

Conclusions: Patients with NTMLD and preexisting BE had significantly more hospitalizations and ER visits with subsequent hospitalization than BE patients without NTMLD. The substantial incremental burden associated with NTMLD in addition to BE highlights the acute need for attention and appropriate management that may reduce excess hospitalizations and ERs in patients with NTMLD. ❑