corresponding to diffusion path lengths of up to 8mm. We aimed to determine the microstructural correlates of S_{cond} and S_{acin} in patients with asthma, using ^3He -MRI.

Methods Twenty-nine patients with asthma underwent MBW using sulphur hexafluoride as the inert tracer gas, and the parameters S_{cond} and S_{acin} were calculated. ^3He -MRI was performed and the ADC was calculated at both short (14ms) and long (1.5s, 3s and 6s) timescales. ^3He -MRI data was also fitted to a previously reported geometrical model of the acinus (Yablonskiy DA *et al*, *J Appl Physiol*. 2009;107(4):1258–65), and estimates of the alveolar duct outer radius (R) and alveolar sleeve width (h) were derived.

Results Correlations between MBW and ^3He -MRI parameters are shown in Table 1. The approximate length scales probed by short and long timescale ADC are also indicated for reference. Significant positive correlations were observed between S_{acin} and ADC at 14ms, 1.5s and 3s, but not 6s. In a stepwise linear regression model, ADC at 1.5s was the only significant determinant of S_{acin} , with a model R^2 of 0.334. S_{cond} did not correlate significantly with any of the MRI parameters. Yablonskiy model estimates of alveolar sleeve width and alveolar duct outer radius did not correlate significantly with either S_{cond} or S_{acin} .

Conclusion S_{acin} in patients with asthma is associated with an elevated ADC at 1.5s, corresponding to length scales of the order of 4mm. This suggests that DCDI in asthma is associated with structural asymmetries at the level of the distal acinar airways and/or collateral ventilation between parallel intra-acinar airways.

Abstract S120 Table 1. Correlations between multiple breath washout and ^3He -MRI parameters

	S_{cond}	S_{acin}
ADC 14 ms (0.5mm)	.264	.470*
ADC 1.5s (4mm)	-.080	.578**
ADC 3s (5.5mm)	-.050	.471*
ADC 6s (8mm)	-.058	.214
Alveolar duct outer radius (R)	.113	.273
Alveolar sleeve width (h)	.239	-.002

ADC = apparent diffusion coefficient. Significant correlations are indicated (* $p < 0.05$) or **($p < 0.01$).

S121

ASSESSMENT OF INTERLOBAR COLLATERAL VENTILATION PRIOR TO ENDOBRONCHIAL VALVES TREATMENT FOR SEVERE EMPHYSEMA

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Bronchoscopic lung volume reduction (BVL) with one-way endobronchial valves are employed to reduce hyperinflation to improve symptoms and lung function. The clinical benefits of Zephyr (PulmonX) valves in achieving target lobe volume reduction are most marked in those without collateral ventilation (CV) between ipsilateral non-target and target lobes. The presence of CV can be assessed by visual assessment of fissure integrity on CT scan and by measurement of flow and resistance following balloon catheter occlusion of the target lobe bronchus (Chartis; PulmonX). We have compared these two techniques for assessing collateral ventilation in patients with severe emphysema referred for EBV treatment.

Two respiratory radiologists reviewed the CT images in 19 consecutive patients. Fissure integrity was classified as complete, incomplete minor defect, incomplete major defect. Chartis assessment for CV status was performed on potential target lobes in the same patients, and results compared for the two methods.

There was 57.9% (11/19), 63.2% (12/19) and 78.9% (15/19) agreement between radiologists on fissure analysis of the right horizontal (RH), right oblique (RO) and left oblique (LO) fissures (Table 1).

In 11 patients with no collateral ventilation on Chartis evaluation to the target lobe; Radiologist 1 reported 9 complete and 2 with incomplete minor defects compared to Radiologist 2; 10 complete and one with incomplete major defect.

In 8 found to be CV positive by Chartis, radiologist 1; 3 complete, 3 incomplete major and 2 incomplete minor defects, and radiologist 2; 4 complete, 2 incomplete major and 2 incomplete minor defects.

In conclusion, there was inter-observer difference in reporting fissure integrity particularly for right sided fissures, with better agreement for left oblique fissure. However, when experienced chest radiologists scored fissures as complete, there was a high correlation with CV negative status by Chartis. If radiologists scored fissures as incomplete major only one case was found to be CV negative whilst 2 CV negative cases were incomplete minor. This data indicates that visual assessment of fissure integrity by experienced respiratory radiologists can be used as a screening tool to determine appropriateness for subsequent Chartis EBV assessment.

	Right horizontal	Right oblique	Left oblique
Fissural agreement	11/19	12/19	15/19
Radiologist 1 (complete fissures)	4	9	13
Radiologist 2 (complete fissures)	4	13	16
CV- ^x Rad 1	0	4/4	7/9
Rad 2	0	4/4	8/9

^x refers to no collateral ventilation on chartis evaluation

Abstract S121 Figure 1.

Pulmonary infection: clinical studies

S122

STATIN USE IS ASSOCIATED WITH IMPROVED LONG TERM OUTCOMES AFTER COMMUNITY-ACQUIRED PNEUMONIA

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Introduction Long term outcomes after community-acquired pneumonia (CAP) are poor, with high rates of readmission, cardiovascular events and mortality. No intervention has previously been shown to alter the excess morbidity and mortality associated with CAP. Statins are effective in preventing cardiovascular disease, but may also have beneficial anti-inflammatory effects. We tested the hypothesis that statin users would have improved long term outcomes following CAP.

Methods Secondary analysis of the Edinburgh pneumonia database, a prospective observational study of CAP (2005–2010). All discharged patients were included. Follow-up data were obtained from a database linked to national morbidity and mortality registers. Outcomes were assessed using cox proportional hazards regression adjusting for confounding variables (age, gender, previous cardiovascular events, ACE-inhibitor/anti-platelet use, smoking status and severity of pneumonia).

Results Data from 1631 patients with complete follow-up were analysed. Readmissions occurred in 728 patients (44.6%) with 157 readmissions within 30 days of discharge. 133 patients had a further hospitalisation with CAP. The 1 year mortality rate was 12.8%.

523 patients were current statin users. There were significant differences between statin and non-statin users. Statin users were older, suffering more cardiovascular disease, stroke, diabetes, renal disease, COPD and a greater severity of pneumonia.

1 year mortality rates were similar in statin and non-statin users. After adjusting for baseline differences, statins were associated with a non-significant trend towards lower 1 year mortality HR 0.78(0.55–1.1). When adjusted for the propensity score, the difference in mortality became statistically significant HR 0.70 (0.50–0.98).

In the fully adjusted analysis, statins were not significantly associated with readmissions HR 0.85(0.70–1.03) but were associated with a significantly lower risk of recurrent pneumonia HR 0.60 (0.37–0.96). There was no association with reduced cardiovascular hospitalisations HR 0.94(0.65–1.34). There were no beneficial effects seen with either antiplatelet or ACE-inhibitor use following CAP.

Conclusion Statins are associated with reduced 1 year mortality and a significantly lower rate of recurrent pneumonia. This is the first study to show that statins may improve long term outcomes in CAP, and that the associated morbidity and mortality can be modified.

S123 INCREASED RISK OF UPPER RESPIRATORY INFECTION WITH ADDITION OF INTERMITTENT BOLUS-DOSE VITAMIN D SUPPLEMENTATION TO A DAILY LOW-DOSE REGIMEN

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Introduction and Objectives Meta-analysis of clinical trials of vitamin D supplementation for the prevention of acute respiratory infection (ARI) shows a protective effect in the general population, but there is controversy regarding the optimal dosing regimen. Low-dose vitamin D supplementation is already recommended in older adults for prevention of fractures and falls, but clinical trials investigating whether higher doses could provide additional protection against ARI are lacking.

Methods We conducted a double-blind cluster-randomised placebo-controlled trial of high- vs. low-dose vitamin D supplementation in residents and staff of sheltered accommodation schemes in London, UK. 108 schemes were allocated to receive the intervention (vitamin D₃ 2.4 mg 2-monthly + 10 µg daily for residents; 3 mg 2-monthly for staff) or control (vitamin D₃ 10 µg daily for residents, nil for staff) over the course of one year. The primary endpoint of the trial was time from first dose of study

medication to date of first ARI, determined by a validated acute respiratory symptom score recorded prospectively in a symptom diary. Secondary outcomes included time to first upper / lower respiratory infections (URI/LRI) and mean serum 25-hydroxyvitamin D (25[OH]D) concentration.

Results 240 participants were included in the intention-to-treat analysis (137 participants in 54 schemes allocated to intervention, mean baseline 25[OH]D 43.8 nmol/L vs. 103 participants in 54 schemes allocated to control, mean baseline 25[OH]D 43.8 nmol/L). Median time to ARI was 203 days in the intervention arm and 227 days in the control arm (adjusted HR 1.18, 95% CI 0.80 to 1.74, *p* = 0.42). Allocation to the intervention arm of the trial was associated with increased risk of URI (adjusted HR 1.48, 95% CI 1.02 to 2.16, *p* = 0.04), but not with altered risk of LRI (adjusted HR 1.12, 95% CI 0.73 to 1.70, *p* = 0.61). Mean serum 25(OH)D concentration at 1 year was 84.8 nmol/L vs. 58.5 nmol/L in intervention vs. control arms (*p* < 0.0001).

Conclusions Addition of intermittent bolus-dose vitamin D supplementation to a daily low-dose regimen improved vitamin D status in older adults and their carers, but it did not influence risk of ARI, and was less effective at preventing URI.

S124 DERIVATION AND VALIDATION OF THE BRONCHIECTASIS SEVERITY INDEX: AN INTERNATIONAL MULTICENTRE OBSERVATIONAL STUDY

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Introduction There are no risk stratification tools for morbidity and mortality in bronchiectasis. As more treatments become available, it is important to identify patients at risk of exacerbations, hospital admissions and mortality to target novel therapies.

Methods A prospective observational study at a specialist bronchiectasis clinic in Edinburgh, UK was used to derive a bronchiectasis severity index using cox-proportional hazards regression to identify independent predictors of mortality and hospital admission over 4 years follow-up. Averaged β-coefficients were used to award points for each independent variable and the discrimination of a derived score was tested using the area under the receiver operator characteristic curve (AUC). The score was validated in independent cohorts from Dundee, UK (N = 218), Leuven, Belgium (N = 253), Monza, Italy (N = 105) and Newcastle, UK (N = 126).

Results 608 patients were included in the derivation cohort. Independent predictors of future hospital admissions were prior hospital admissions hazard ratio (HR) 13.5 (9.40–19.46), MRC dyspnoea score > 4, HR 2.42 (1.66–3.52), FEV₁ <30% predicted HR 1.52 (1.03–2.25), *Pseudomonas aeruginosa* colonisation HR 2.16 (1.36–3.43), colonisation with other organisms HR 1.66 (1.12–2.44) and > 3 lobes involved on HRCT HR 1.48 (1.02–2.15). In the model for mortality, independent predictors were Age >70 years 8.57 (1.15–63.63), FEV₁ <30% predicted HR 4.47 (1.60–12.53), prior hospital admissions HR 2.43 (1.30–4.53) and 3 or more exacerbations per year prior to the study HR 2.03 (1.02–4.03).