Results A minimum wear time of 11 hours (≥ 1 valid day) allowed 80% of the sample to be retained. All minimum wear time thresholds produced an ICC ≥ 0.80 , resulting in 1 day of wear required to produce representative inpatient PA. Mornings and afternoons were more active than evenings and overnight (32.1% and 32.0% vs. 25.2% and 10.7% of steps/day, respectively, $p < 0.001$) (figure 1). No changes in PA were observed during the hospital stay; ranging 585–707 steps/day and 72–83 min/day of walking. After controlling for wear time, patients admitted for 2–3 days took more steps on average than patients staying 7–14 days (997 ± 125 vs. 597 ± 91 , $p = 0.036$).

Conclusions One full day (24 hours) of monitoring is required at the individual-level to obtain representative inpatient PA. A minimum wear time criteria of ≥ 11 waking hours is recommended for sample-level data. Wear time and LOHS should be accounted for in analyses.

S83 NEURAL RESPIRATORY DRIVE, RESPIRATORY MECHANICS AND BREATHLESSNESS IN HIGHLY ACTIVE OLDER ADULTS

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Introduction and Objectives Ageing is typically associated with progressive deleterious changes in respiratory mechanics which increase the work of breathing and limit ventilatory reserve. The impact on exercise capacity and exertional breathlessness in healthy ageing remains incompletely understood, in part due to a failure of previous research to control for negative effects of physical inactivity. This study aimed to compare neural respiratory drive (NRD), respiratory mechanics and breathlessness between highly active older adults (AOA) and recreationally active younger adults (YA). We hypothesised that NRD, quantified as diaphragm electromyogram activity (EMGdi) as a percentage of volitional maximum (EMGdi% max), would be higher in AOA than in YA and that this would be associated with increased breathlessness intensity during exercise.

Methods 12 YA (mean ($\pm$ SD) age 26.4 ± 4.7 years) and 12 AOA (cyclists, 59.0 ± 10.1 years), all male, underwent incremental cycle ergometry to their symptom-limited maximum. EMGdi was recorded continuously using an oesophageal multi-pair electrode catheter and quantified as EMGdi%max. Breathlessness intensity was quantified each minute and at end-exercise using the modified Borg scale.

Results Absolute FEV₁, FVC, FEV₁%FVC and IC tended to lower values in AOA than in YA (Table 1), without significant differences in baseline EMGdi%max (AOA $10.6 \pm 5.8\%$ max; YA $7.6 \pm 3.7\%$ max, $p = 0.15$). End-exercise EMGdi%max was significantly higher in AOA than in YA (AOA $61.8 \pm 13.7\%$ max; YA: $51.9 \pm 9.1\%$ max $p = 0.049$), with a trend towards higher end-exercise tidal volume (V_T) relative to IC (AOA: $V_T\%IC = 83.1 \pm 16.7\%$; YA: $V_T\%IC = 73.2 \pm 17.1\%$, $p = 0.17$). There were no significant end-exercise differences in V_T (AOA 2.9 ± 0.8 L; YA 2.8 ± 0.6 L, $p = 0.85$), minute ventilation (V_E) (AOA 116.7 ± 35.8 L/min; YA: 110.4 ± 29.3 L/min, $p = 0.64$) or mBorg breathlessness intensity (median (IQR) AOA 5 (3.25–7.75); YA 5 (5–9), $p = 0.5$).

Conclusions Highly active older adults achieved a similar end-exercise V_E to the younger adults despite age-related respiratory constraints. This required higher levels of NRD, which contrary to our hypothesis, was not perceived as increased breathlessness intensity. The contribution of ageing and/or regular physical activity to this apparent blunted perception of breathlessness requires further study.

Abstract S83 Table 1 Demographics, anthropometrics and lung function data for active older adults (AOA) and younger adults (YA). BMI, body mass index; FEV₁, forced expiratory volume in 1 s; FVC, forced vital capacity; TLC, total lung capacity; RV, residual volume; IC, inspiratory capacity. Values presented are mean $\pm$ SD. * Indicates statistically significant difference between groups, $p < 0.05$

	Younger adults	Active Older Adults	p-value
Age (yrs)	26.4 $\pm$ 4.7	59.0 $\pm$ 10.1	<0.0001*
BMI (kg/m ²)	24.5 $\pm$ 3.5	25.7 $\pm$ 2.4	0.35
FEV ₁ (L)	4.70 $\pm$ 0.80	3.82 $\pm$ 0.86	0.023*
FEV ₁ % pred. (%)	105.0 $\pm$ 17.9	109.1 $\pm$ 12.8	0.53
FVC (L)	5.88 $\pm$ 0.95	5.23 $\pm$ 1.20	0.16
FVC% pred. (%)	105.6 $\pm$ 15.9	112.1 $\pm$ 16.8	0.11
FEV ₁ %FVC (%)	79.5 $\pm$ 5.0	73.1 $\pm$ 6.1	0.01*
IC (L)	3.80 $\pm$ 0.47	3.47 $\pm$ 0.86	0.26
IC pred. (%)	89.4 $\pm$ 17.8	97.6 $\pm$ 21.6	0.40
TLC (L)	7.68 $\pm$ 1.12	7.76 $\pm$ 1.78	0.91
TLC% pred. (%)	105.0 $\pm$ 13.6	106.4 $\pm$ 17.2	0.84
RV (L)	1.95 $\pm$ 0.26	2.41 $\pm$ 0.70	0.09
RV% pred. (%)	110.1 $\pm$ 17.9	97.6 $\pm$ 25.0	0.24
RV% TLC (%)	26.0 $\pm$ 4.2	31.3 $\pm$ 6.0	0.043*

S84 DO PATIENTS GAIN AS MUCH KNOWLEDGE AROUND THEIR CONDITION FROM A WEB-BASED PULMONARY REHABILITATION PROGRAMME?

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Introduction The educational components of Pulmonary Rehabilitation (PR) are fundamental to the format and success of the programme.¹ All patients enrolled onto a PR programme should have access to a structured education programme. However the ideal mode of delivery is unknown and delivery can be varied. It has previously been demonstrated that a web-based programme is feasible.² However the gains in knowledge have not previously been reported for a digital programme compared to face-to-face contact. The Bristol COPD knowledge questionnaire (BCKQ) is a 65 item self-completed questionnaire often used to assess the effectiveness of education delivered.

Methods A single blinded, randomised, controlled feasibility trial comparing a web-based PR programme with a conventional PR programme for 7 weeks was conducted. Patients completed a BCKQ at their initial assessment or online when registering and again at their discharge appointment following completion of the PR programme or online at the end of the web programme.

Results Fifty two patients completed the BCKQ questionnaire: 36 conventional PR programme [20 male, MRC 3 (IQR 2–4), age 67 (± 8.5) years, BMI 30 (± 6.6) kg/m², FEV₁ (% predicted) 53 (± 21), pre ISWT 280 m (± 163), pre HADS anxiety 6.6 (± 4.8), pre PRAISE 45 (± 8.4)] and 16 online [14 male, MRC 3 (IQR 2–4), age 67 (± 7.4) years, BMI 25 (± 5.0) kg/m², FEV₁ (% predicted) 47 (± 27), pre ISWT 365 m (± 201), pre HADS anxiety 7.5 (± 5.1), pre PRAISE 49 (± 7.9)]. There were no significant differences in baseline characteristics. A statistically significant difference was seen in knowledge within each group following either the conventional PR programme (change=5 points, $p \leq 0.001$) or the web programme (change=11 points, $p \leq 0.001$). The change in scores between the groups was also significantly different ($p \leq 0.01$) in favour of the web-based programme (Table 1).

Discussion Patients are able to gain improvements in knowledge around their condition using a website programme as an alternative to the traditional spoken sessions in a PR programme.

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Abstract S84 Table 1 Between group changes of the Bristol COPD knowledge questionnaire following either conventional PR or a web-based programme

	WEB	PR	Difference Between groups (p value)
Pre BCKQ	35 $\pm$ 10	38 $\pm$ 10	0.3
Post BCKQ	46 $\pm$ 6	43 $\pm$ 7	0.2
Change in BCKQ	11 $\pm$ 8	5 $\pm$ 7	0.009*

* $p \leq 0.01$

Mechanisms of asthma

S85 CORTICOSTEROID-RESISTANT NEUTROPHILIC AIRWAY INFLAMMATION AND HYPERRESPONSIVENESS CAUSED BY IL-13

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Rationale Severe corticosteroid refractory asthma is a significant unmet medical need. It accounts for 10% of the asthma population and 50% of the health economic burden. Recent understanding of asthma heterogeneity has evolved beyond clinical characteristics, allowing definition of distinct disease phenotypes such as those defined by levels of Type 2 inflammation (Type-2 high 'eosinophilic' disease and Type-2 low 'neutrophilic' disease). However, a recent study using dupilumab (an antibody that blocks the common IL-4 and IL-13 receptor chain, IL-4R α) as an add-on therapy in adults with uncontrolled persistent asthma showed efficacy irrespective of baseline eosinophil count (Wenzel *et al.*, Lancet 2016). The

aim of this work was to use IL-13 transgenic mice to test the hypothesis that a subset of IL-13 mediated airway responses are corticosteroid-unresponsive and contribute to ongoing airways symptoms.

Methods IL-13 expression in the lungs was induced using Doxycycline (DOX) in *Ccsp-rtTA/Otet-IL-13* double-transgenic (*Ccsp/IL-13*) mice. Littermate control single transgenic mice also received DOX. Where indicated, mice received daily intra-peritoneal injections of 3 mg/kg Dexamethasone (Dex) for 3–7 days and control mice received saline. Methacholine challenge and lung function measurements were performed and lungs harvested for mRNA analysis and immunohistochemistry (IHC). BALF was obtained for ELISA and differential cell counts.

Results Compared to controls, *Ccsp/IL-13* mice showed significantly increased airway hyperresponsiveness (AHR) to methacholine and IHC revealed increased bronchial smooth muscle and goblet cell metaplasia. The BALF of these mice contained mixed eosinophilic and neutrophilic inflammation, but neutrophils predominated. Characteristic Th2-responsive genes (*IL-13*, *Eotaxin*, *Muc5ac*, *Periostin* and *SerpineB2*) as well as genes more characteristic of Th17 responses (*Cxcl1/Kc*, *Cxcl2* and *Csf3*) were significantly elevated. Treatment with Dex did not abrogate AHR, even though eosinophilia and the 'Th2' gene signature were significantly reduced. However, neutrophils and the 'Th17' signature remained elevated.

Conclusion Although IL-13 promotes eosinophilic airways disease, it can also drive corticosteroid refractory inflammation characterised by persistent neutrophilia, Th17 cytokines and maintenance of AHR. These findings may help explain the beneficial effect of dupilumab in uncontrolled asthma. The *Ccsp/IL-13* mouse may be a useful model for dissecting the molecular pathways and mechanisms associated with predominant neutrophilic, corticosteroid refractory disease.

S86 EXTRACELLULAR MATRIX DEPOSITED BY ASTHMATIC HUMAN AIRWAY SMOOTH MUSCLE CELLS ENHANCES BASAL ACTIVATION OF TGF β

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TGF β is a widely distributed, pleiotropic cytokine implicated in tissue remodelling in many diseases including severe asthma. It is secreted in a latent form that requires activation for function. Mechanotransduction of intracellular forces through cell surface integrins can lead to TGF β activation. We have previously shown that human airway smooth muscle (HASM) cells can activate TGF β via $\alpha v \beta 5$ integrins. In the present study we have investigated the effect of extracellular matrix (ECM) on basal TGF β activation in primary asthmatic and non-asthmatic HASM cells. We assessed basal TGF β activation in non-asthmatic (n=9) and asthmatic (n=7) HASM cells. TGF β activation was assessed using a TGF β reporter cell assay and a phosphorylated Smad2 ELISA. Cell contractility was assessed using a collagen gel contraction assay and traction force microscopy. ECM was isolated from HASM cells and cross-over experiments performed where non-asthmatic cells were cultured on asthmatic ECM and vice-versa then TGF β activity determined. Expression of ECM crosslinking enzymes was