Abstract S26 Table 1

DOMAINS	Pearson correlation coefficient	P-value
OBESITY		
Visceral adipose tissue volume by DXA scan	0.47	0.002
LUNG FUNCTION		
Supine FEV_1 (% Predicted)	-0.40	0.001
SLEEP VARIABLES		
Mean Saturation Overnight	-0.50	<0.001
VENTILATORY CONTROL		
Fall in Oxygen saturation during 15% O_2 challenge	0.46	<0.001
RESPIRATORY MUSCLE STRENGTH		
Sniff nasal inspiratory pressure	-0.28	0.02
METABOLIC MEASURES		
Vitamin D	-0.30	0.01
OVERALL BEST INDEPENDENT PREDICTORS	**Cumulative correlation coefficient**	
Fall in Oxygen saturation during 15% O_2 challenge	0.49	<0.001
Visceral adipose tissue volume by DXA scan	0.71	0.01

The table shows the correlation coefficient for the statistically strongest predictors of a raised BE in each domain by multiple linear regression. The bottom of the table shows the overall outcome of the multiple linear regression, when each of the strongest independent predictors were matched against each other.

individuals, the presence of a raised plasma standard bicarbonate (or base excess, BE – a biomarker of whole body acid-base balance, including overnight $PaCO_2$ levels), without necessarily a raised daytime $PaCO_2$, has been shown by us to be an intermediary stage towards overt obesity-hypoventilation syndrome. Thus we have looked for biologically plausible predictors of a raised base excess in obesity, whether or not there was also a raised $PaCO_2$ awake.

Methods 78 obese subjects (BMI >30, mean 47 (SD 10, range 32 to 74) kg/m^2) were identified from a variety of sources, regardless of their PaCO2 and acid/base status (mean levels 5.6 (SD 0.8, range 4.2 to 9.6) kPa; and 2.1 (SD 2.4, range -3.5 to 10) mmol/l respectively) and a large number of their characteristics measured. Biological plausible domains were constructed that were thought potentially to contribute to any ventilatory failure. First, the best independent predictor of the BE within each domain was found, second, the best overall independent predictors were found. The domains were as follows:

- Obesity and its distribution (BMI, simple surface measures, DXA [a radiographic derivative])
- Lung function (sitting/lying spirometry and forced oscillometry)
- Sleep variables (AHI, ODI, mean overnight SaO2, time below 90% SaO2)
- Ventilatory control (2 point responses to 15% O2 and 5% CO2)
- Respiratory muscle strength (mouth pressures, sniff pressures)
- Metabolic measures (e.g. leptin, adipokines, vitamin D)

Conclusions There are a number of strong predictors for the presence of a raised base excess in obesity. Significant predictors were found in each of the biological domains we studied, suggesting that the cause of ventilatory failure in obesity is likely to be multifactorial. However, reduced hypoxic poikilocapnic ventilatory drive and the presence of intra-abdominal obesity seem to be the most powerful predictors of a raised base excess in obesity.

S27 VENOUS BICARBONATE AS A CLINICAL TOOL FOR IDENTIFYING OBESITY HYPOVENTILATION SYNDROME IN THE SLEEP CLINIC

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10.1136/thoraxjnl-2014-206260.33

Introduction Obesity Hypoventilation Syndrome (OHS) is defined as sleep disordered breathing, obesity, and daytime hypercapnia, without another cause of ventilatory impairment. Literature suggests 10–25% of patients assessed for Obstructive Sleep Apnoea (OSA) have OHS, with significantly increased morbidity and mortality. Early identification may be beneficial. Studies suggest venous bicarbonate ($vHCO_3^-$) ≥27 mmol/l can be used to screen for OHS. We assessed the impact of incorporating this measurement into patient assessments.

Methods Obese out-patients referred for possible OSA had $vHCO_3^-$ measured. Patients with a $vHCO_3^-$ ≥27 mmol/l underwent arterial blood gas (ABG) analysis. Those with pCO_2 >6.2 kPa underwent further assessments to identify the cause of ventilatory impairment. None had been referred specifically for investigation of OHS. Patients had domiciliary or in-patient sleep studies as per standard practice.

Results There were 288 patients included: 65% males, mean (SD) age 50 years (range 21–79 years), BMI 39.2 kg/m^2 (7.8), Epworth Sleepiness Scale 13 (6), daytime SpO_2 on air 97% (2.1). Sleep study results showed the Apnoea-Hypopnea Index (AHI) to be ≥5 in 88%, and ≥30 in 49%. Mean $vHCO_3^-$ was 26.2 mmol/l (2.7). $vHCO_3^-$ correlated significantly ($r = 0.3–0.4$, $p < 0.005$) with daytime SpO_2, mean overnight SpO_2, time spent <80% and <90%, but not AHI or ODI.

$vHCO_3^-$ was ≥27 mmol/l in 123 (43%), of whom 80 had an ABG measurement; mean pCO_2 5.4 kPa (0.8), ten patients >6.2 kPa. Ventilatory impairment was due to OHS in four (5% of ABG cohort); there was additional lung or chest wall disease in the other six. Overall, 25 patients had a base excess ≥3. The $vHCO_3^-$ range was 28–36 mmol/l in patients with OHS, with a BMI range of 38–53 kg/m^2.

Three additional outpatients with BMI >50 kg/m^2 were diagnosed with OHS on ABG without $vHCO_3^-$ measurement. In all seven OHS patients, CPAP was initiated. One was non-compliant, four improved and two required home non-invasive ventilation due to non-improvement in ABG.

Conclusions In this large cohort of patients assessed for OSA, 43% had a $vHCO_3^-$ ≥27 mmol/l indicating possible OHS, but only 5% were actually diagnosed with OHS. In isolation this strategy to identify OHS seems inefficient. An increased $vHCO_3^-$ in combination with sleep study data may be superior.

S28 LIRAGLUTIDE 3.0 MG REDUCES SEVERITY OF OBSTRUCTIVE SLEEP APNOEA AND BODY WEIGHT IN OBESE INDIVIDUALS WITH MODERATE OR SEVERE DISEASE: SCALE SLEEP APNOEA TRIAL

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10.1136/thoraxjnl-2014-206260.34

Aims/objectives This randomised, double-blind, parallel-group trial compared the effects of liraglutide 3.0 mg to placebo, both as adjunct to diet and exercise, on obstructive sleep apnoea (OSA) severity and body weight.

Content Obese individuals (n = 359) without diabetes who had moderate or severe OSA and were unwilling/unable to use continuous positive airway pressure therapy were randomised 1:1 to liraglutide 3.0 mg or placebo for 32 weeks (baseline characteristics: 48.5 years, males 71.9%, apnoea–hypopnoea index [AHI] 49.2 events/h, body weight 117.6 kg, BMI 39.1 kg/m^2, HbA_{1c} 5.7%).

Outcomes At end-of-trial, the reduction in AHI was significantly greater with liraglutide 3.0 mg than placebo (Table). Liraglutide

Abstract S28 Table 1 Change from baseline at 32 weeks

	Liraglutide 3.0 mg n = 180 Observed means (LOCF)	Placebo n = 179 Observed means (LOCF)	*p*-value
AHI[3] (events/h)	−12.2	−6.1	p = 0.0150[1]
Oxygen desaturation			
≥4% index (events/h)	−9.5	−5.1	p = 0.0608[1]
Total sleep time (min)	20.7	18.5	p = 0.1629[1]
Wake time after			
sleep onset (%)	−4.0	−3.7	p = 0.0994[1]
Body weight (%)	−5.7	−1.6	p < 0.0001[1]
≥5% body weight			
loss (%)	46.4	18.1	p < 0.0001[2]
>10% body weight			
loss (%)	22.4	1.5	p < 0I.0001[2]
HbA_{1c} (%)	−0.4	−0.2	p < 0.0001[1]
SBP (mmHg)	−3.4	0.4	p = 0.0003[1]

[1]ANCOVA model
[2]Logistic regression model
[3]Definitions of apnoea and hypopnoea from the 2007 AASM Manual for the Scoring of Sleep and Associated Events were used

3.0 mg produced significantly greater weight loss compared with placebo (Table) and enabled more individuals to reach ≥5% and >10% weight loss targets after 32 weeks (p < 0.0001, both). Oxygen saturation, polysomnographic measures, HbA_{1c} and systolic blood pressure (SBP) at 32 weeks are summarised (Table). Nausea and diarrhoea were the most common adverse events with liraglutide 3.0 mg (27% and 17% of individuals, respectively).

Discussion Liraglutide 3.0 mg produced significantly greater reductions than placebo in AHI, body weight, SBP and HbA_{1c} in obese individuals with moderate/severe OSA and was generally well tolerated.

'Blood and spit' – what to measure in AECOPD

S29 PROGNOSTIC VALUE OF PLATELET COUNT IN PATIENTS ADMITTED WITH AN ACUTE EXACERBATION OF COPD (AECOPD)

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10.1136/thoraxjnl-2014-206260.35

Introduction In an observational cohort of patients admitted with AECOPD, thrombocytosis was associated with inpatient and 1-year mortality.[1] We aimed to validate, and explore mechanisms for, this association within our original DECAF cohort (n = 920).[2]

Methods Admission platelet counts were categorised as low (<150), normal (150–400), or high (>400) $x10^9$ cells/mm^3 and odds ratios assessed for inpatient and, among those surviving to discharge, 1-year mortality (normal platelet count=reference). For inpatient mortality, platelet category and DECAF indices were included in multivariate logistic regression. The areas under the ROC curves for DECAF and DECAF+Platelets were compared by the method of DeLong. Associations with thrombocytosis were analysed using Mann-Whitney or Fisher's exact test. Causes of death at 1-year due to respiratory, cardiac or malignant disease were recorded.

Results Thrombocytosis was associated with inpatient (OR 1.83, 95% CI 1.12–3.00, p = 0.016) and 1-year mortality (OR 1.62 95% CI 1.09–2.30, p = 0.017). Thrombocytopenia was associated with inpatient (OR 3.5, 95% CI 1.51–8.12, p = 0.004), but not 1-year mortality (OR 1.81, 95% CI 0.76–4.312.08, p = 0.181). On multivariate analysis, thrombocytosis (OR 1.85, 95% CI 1.03–3.33 p = 0.039) and thrombocytopenia (OR 3.00 95% CI 1.09–8.24 p = 0.033) independently predicted inpatient mortality, but did not improve predictive power of DECAF (AUROC: DECAF=0.86, DECAF+Platelets=0.86; p = 0.93).

Thrombocytosis was associated with a higher white cell count (p<0.001) and eMRCD score (i.e. more breathless when stable; p = 0.001), lower: albumin (p = 0.004), BMI (p = 0.002), FEV1 (p = 0.010), haemoglobin (p<0.001), and a lower proportion of women (p = 0.004), and patients with eosinopenia (<0.05 x 10^9/l) (p = 0.008), cardiac death (p = 0.044), current smoking (p = 0.046), AF (p = 0.029) and diabetes (p = 0.006). Thrombocytosis was not related to cardiovascular disease, prior exacerbation and readmission rates or LTOT use, admission PaO_2, pH or NIV, or length of stay.

Discussion Thrombocytosis was an independent predictor of both inpatient mortality and, amongst survivors to discharge, 1-year mortality. Thrombocytosis was not associated with cardiovascular disease and the higher 1-year mortality was not due excess cardiovascular or cancer deaths, suggesting that other mechanisms are responsible. Whilst thrombocytosis was not associated with LTOT use or PaO_2, it was associated with other indices of disease severity, including breathlessness and lower FEV1, BMI and albumin level.

REFERENCES

1 Harrison *Thorax* 2014
2 Steer *Thorax* 2012

S30 RED CELL DISTRIBUTION WIDTH AS A PREDICTOR OF HOSPITAL MORTALITY IN ACUTE EXACERBATIONS OF COPD (AECOPD)

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10.1136/thoraxjnl-2014-206260.36

Introduction An increased red cell distribution width (RDW), a routinely available index of the variability of erythrocyte size,

Abstract S29 Table 1 Platelet category and cause of death

Platelet count ($x10^9$ cells/mm^3)	Total patients	Inpatient deaths, n (% of total)	Deaths at 1 year, n (% of total)	Respiratory deaths, n (% of all deaths at 1 year)	Cardiovascular deaths, n (% of all deaths at 1 year)	Cancer deaths, n (% of all deaths at 1 year)
		8	16	13	2	1
<150	32	25.0	50.0	81.3	12.5	6.3
		62	203	153	24	15
150–400	713	8.7	28.5	75.4	11.8	7.4
		26	72	61	3	5
>400	175	14.9	41.1	84.7	4.2	6.9