OSA if the oximetry outcome was for a trial of continuous positive pressure (CPAP) therapy without additional investigation. The oximetry summary plot was converted to an image file (portable network graphics). A convolutional neural network was created using Spyder (Scientific Python Development Environment version 3.3). Images were split on an 80:20 ratio into the training and test sets. A convolutional neural network was designed using 2 deeply connected layers of 128 'neurons'. The neural network was optimized over 75 epochs. A further validation set of 110 images was scored by two observers and inter-rater reliability tested including the optimized CNN.

Results The optimized CNN achieved an accuracy of 99.3% on the training image set, and 82.4% on the test set. The validation set of images scored by two human scorers achieved an agreement of 86.4%, κ=0.73 (95% CI 0.60, 0.86). Including the CNN classifications an agreement of 77.6%, κ=0.55 (0.43, 0.67) was achieved.

Conclusion A CNN can be trained to identify oximetry traces showing features of OSA, achieving only slightly inferior performance to human interpretation. This technique would allow more efficient triaging of results and could hopefully be developed to allow more detailed interpretation, e.g. significant sleep fragmentation or hypoventilation, mimicking the pattern recognition of a human expert. However there are significant limitations, a large number of images are required to train a model accurately and its advantages over interpretation using the oxygen desaturation index or other algorithm generated data remain to be demonstrated.

S81 USE OF THE DIAPHRAGM ELECTROMYOGRAM TO INVESTIGATE THE EFFECT OF HEALTHY AGEING ON NEURAL RESPIRATORY DRIVE

[1]V Wong, [1]R Shah, [1]W Zhang, [1]A Mohindra, [2]HV Fletcher, [1]GF Rafferty, [1]J Moxham, [1]SDR Harridge, [1]NR Lazarus, [1]CJ Jolley. *[1]Centre for Human and Applied Physiological Sciences, King's College London, London, UK; [2]Department of Respiratory Medicine, King's College Hospital NHS Foundation Trust, London, UK*

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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 neural respiratory drive (NRD). The relationship between age-related changes in lung function and NRD 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) between highly active older adults (HAOA) and recreationally active younger adults (YA). We hypothesized that NRD, quantified as diaphragm electromyogram activity (EMGdi) as a percentage of volitional maximum (EMGdi%max), would be higher in HAOA than in YA and that EMGdi%max would be associated with a decline in lung function and respiratory muscle strength.

Methods 23 YA (median (IQR) age 24 (22 to 29) years) and 20 HAOA (median (IQR) age 60 (52 to 66.50), all male were studied. Participants were instrumented with a multipair oesophageal recording electrode for the measurement of EMGdi, and a dual oesophageal/gastric pressure transducer for the measurement of transdiaphragmatic pressure (Pdi = Poes – Pgas). Mean root mean square (RMS) EMGdi per breath was calculated over a 3-minute period of resting breathing, and normalised to peak RMS EMGdi recorded during maximal inspiratory manoeuvres (EMGdi%max). Sniff nasal inspiratory pressure (Sniff Pnasal), sniff oesophageal pressure, sniff transdiaphragmatic pressure and twitch transdiaphragmatic pressure following bilateral anterolateral magnetic phrenic nerve stimulation (TwPdi) were also recorded and compared between YA and HAOA groups. Relationships between recorded variables were assessed by correlation analysis.

Results Resting EMGdi%max was significantly higher in HAOA compared to YA (median (IQR) EMGdi%max HAOA 12.5 (6.0 to 15.8)%max vs YA 5.9 (5.1 to 8.7)%max, p=0.0073 (table 1). EMGdi%max correlated significantly with age (r=0.4309, p=0.0039), residual volume (r=0.4677, p=0.0035), RV%TLC (r=0.4518, p=0.0050), and bilateral TwPdi (r=-0.4905, p=0.0028).

Abstract S81 Table 1 Demographic, anthropometric, lung function and respiratory muscle function data recorded in the YA and HAOA groups. Data are presented as median (interquartile range)

	YA	HAOA	p-value
n	23	20	
% Male (%)	100%	100%	
Age (years)	24 (22 to 29)	60 (52 to 66.5)	<0.0001*
BMI (kg/m^2)	23.3 (22.7 to 25.9)	25.0 (23.7 to 26.3)	0.1923
Resting EMGdi%max (%)	5.9 (5.1 to 8.7)	12.5 (6.0 to 15.8)	0.0073*
FEV$_1$ (L)	4.60 (4.07 to 5.14)	3.58 (2.97 to 4.45)	0.0021*
%predicted FEV$_1$ (%)	101.4 (91.8 to 112.1)	103.5 (94.6 to 117.2)	0.1649
VC (L)	5.78 (4.90 to 6.39)	4.96 (4.06 to 5.67)	0.0154*
%predicted VC (%)	104.0 (95.2 to 109.1)	110.6 (96.7 to 117.1)	0.1045
FEV$_1$%VC (%)	81.5 (75.9 to 84.3)	72.6 (68.3 to 78.9)	0.4802
TLC (L)	7.40 (6.54 to 7.88)	7.04 (6.61 to 8.22)	0.8340
%predicted TLC (%)	98.5 (92.6 to 106.2)	105.7 (93.2 to 113.9)	0.1984
RV (L)	1.53 (1.38 to 2.11)	2.35 (2.01 to 2.64)	0.0001*
%predicted RV (%)	91.8 (73.5 to 118.0)	94.6 (88.2 to 107.8)	0.9877
RV%TLC (%)	23.0 (19.3 to 25.5)	33.8 (26.3 to 38.4)	<0.0001*
Sniff Pnasal (cmH$_2$O)	85.0 (75.1 to 105.4)	81.6 (65.9 to 95.4)	0.3157
Sniff Poes (cmH$_2$O)	111.8 (88.7 to 126.6)	93.8 (82.6 to 103.1)	0.0329*
Sniff Pdi (cmH$_2$O)	139.4 (118.4 to 156.4)	139.7 (109.7 to 151.8)	0.7291
PImax (cmH$_2$O)	95.5 (77.6 to 112.8)	89.9 (70.1 to 107.3)	0.2928
Bilateral TwPdi (cmH$_2$O)	33.6 (29.5 to 39.2)	24.9 (22.3 to 35.1)	0.0053*

* indicates p<0.05.
YA = younger adults; HAOA = highly active older adults; EMGdi%max = root mean square oesophageal diaphragm electromyogram expressed as a percentage of volitional maximum; FEV$_1$ = forced expiratory volume in 1s; VC = vital capacity; RV = residual volume; TLC = total lung capacity; Sniff Pnasal = sniff nasal inspiratory pressure; Sniff Poes = sniff nasal oesophageal pressure; Sniff Pdi = sniff transdiaphragmatic pressure; TwPdi = twitch transdiaphragmatic pressure following anterolateral phrenic nerve stimulation at 100% of maximum stimulator output.

Conclusions These data collected in a highly-active group of older individuals confirm that healthy ageing is associated with increased NRD. Increases in NRD were associated with age-related increases in gas trapping and reduced diaphragm contractility.