Seven out of the first eight patients in the ABCD EndoBarrier® in obstructive sleep apnoea(End-OSA) study no longer require continuous positive airway pressure ventilation(CPAP) after 3 months treatment with EndoBarrier®

M Yadagiri, N Ashman, J Adams, F Kinney, M Lang,
JP Bleasdale, EN Fogden, MR Anderson, M Greenstone,
C Walton, REJ Ryder

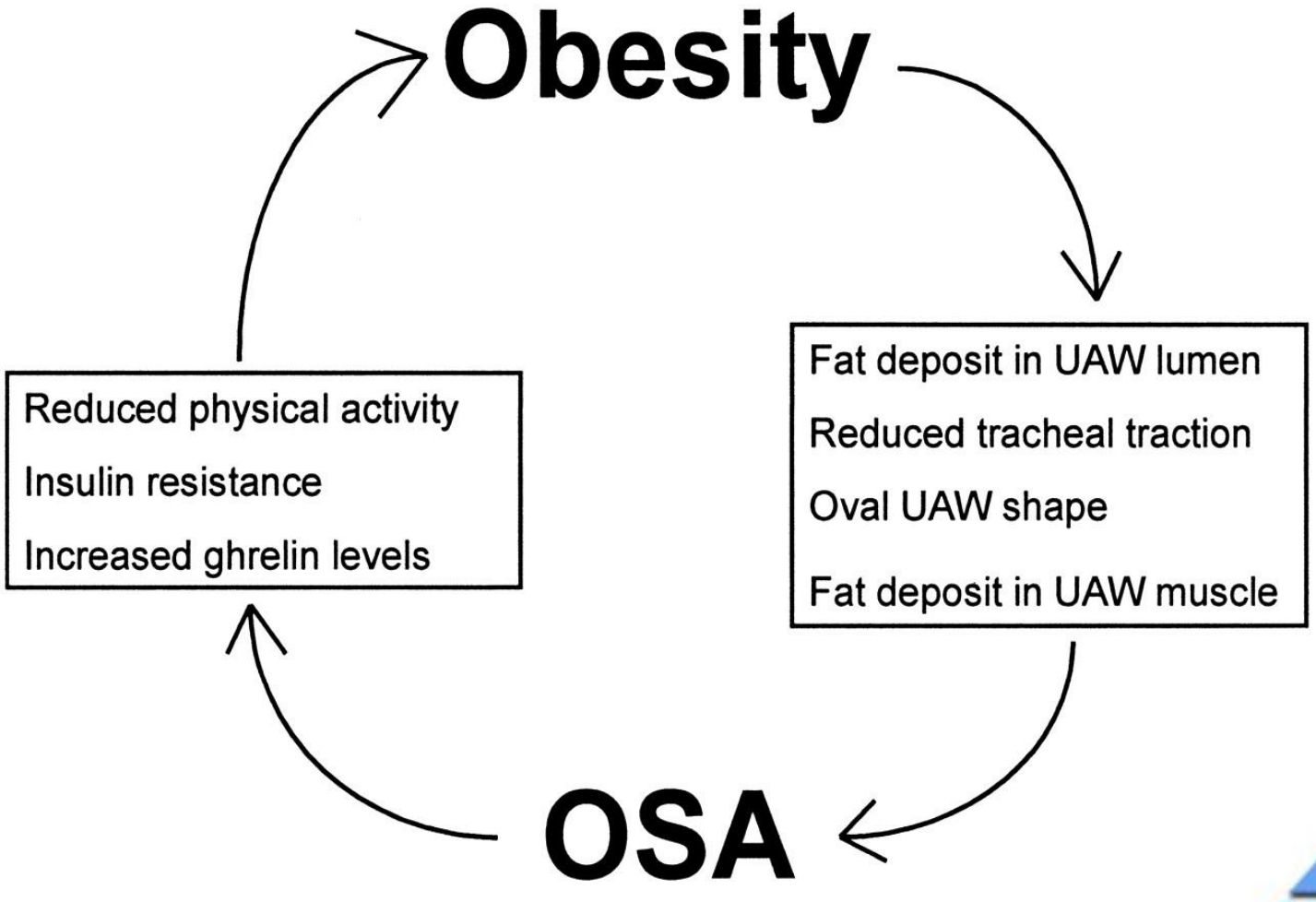
ABCD Autumn Meeting, London
10/11/2017

Sandwell and West Birmingham Hospitals NHS
Where EVERYONE Matters

ABCD

Obstructive sleep apnoea

A Vicious Cycle



G Pillar et al Diabetes care 2008, 31(2)

OSA & Obesity

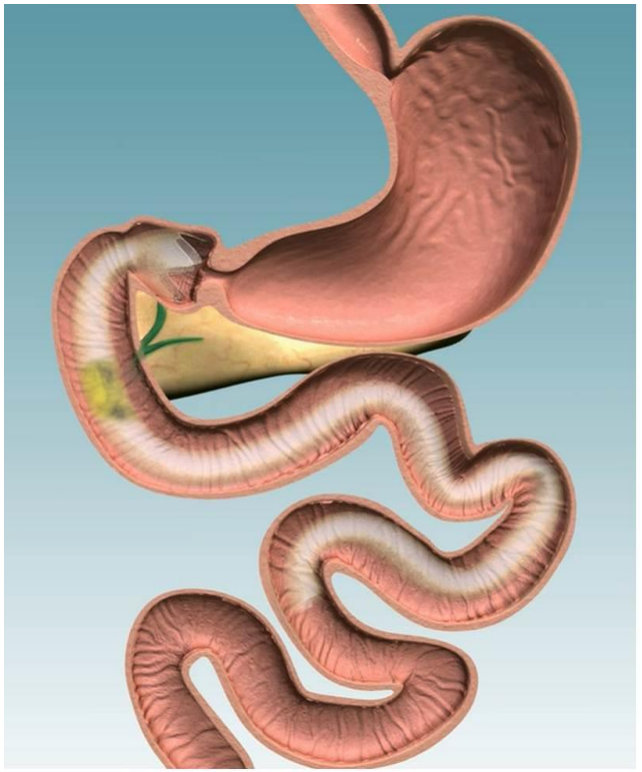
- Weight loss can improve or even cure OSA, though results are variable [1,2,3]
- Bariatric surgery can cause significant weight loss and bring benefit to patients with OSA
- But it is invasive and is not without significant complications and it is relatively expensive

1- Greenstone M, Hack M. Obstructive sleep apnoea. BMJ. 2014 Jun 17;348:g3745
2- Buchwald H et al- Bariatric surgery: a systematic review and meta-analysis. JAMA. 2004 Oct 13;292(14)
3- Lettieri CJ et al. Persistence of Obstructive Sleep Apnea After Surgical Weight Loss. J Clin Sleep Med. 2008 Aug 15; 4(4)

EndoBarrier® – implantable duodenal-jejunal liner

Fluoropolymer wall

Nitinol Anchor



- 60 cm impermeable sleeve
- Minimally invasive

Objectives

Primary objective

- To assess whether a significant number of patients with diabetes, obesity and moderate OSA lose so much weight with EndoBarrier® treatment that their OSA improves to such an extent that they no longer require CPAP treatment

Secondary objectives

- Improvements in AHI, symptoms of OSA and reduction in CPAP pressures
- To assess the extent of improvement in glycaemic control, weight, cardiovascular risk factors, composite scores of **Non-Alcoholic Fatty Liver Disease (NAFLD)** severity and requirement for diabetes treatments, including insulin
- To assess the association of changes in circulating **testosterone** levels and insulin sensitivity before and after EndoBarrier® treatment in males.
- To assess effect on **quality of life** of EndoBarrier® treatment in patients with diabetes and moderate OSA.
- To assess the **sustainability** of primary outcome and of the other secondary outcomes during the year following explantation of EndoBarrier®.

Outcome Measures

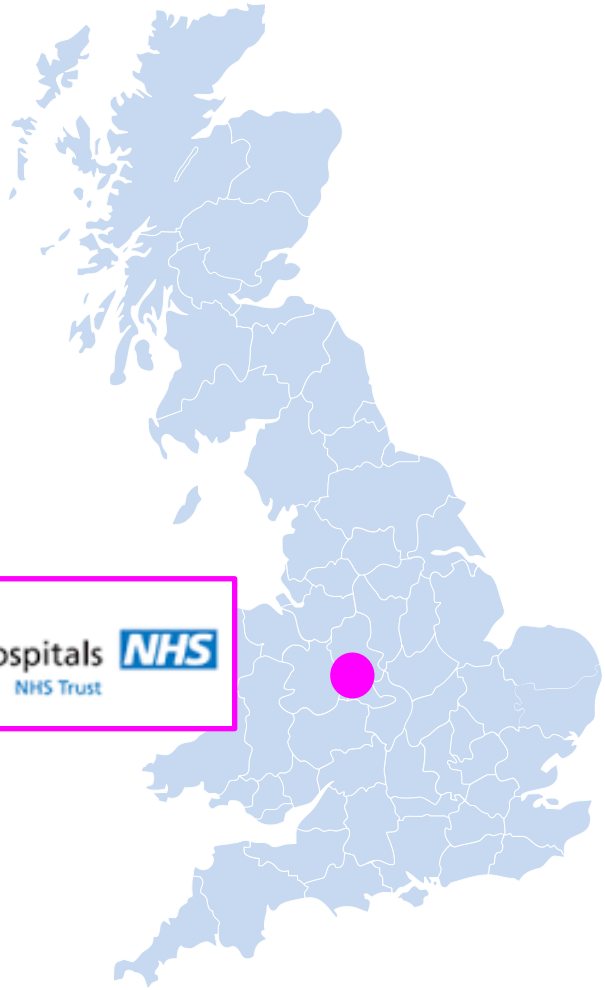
Primary endpoint/outcome

- Patients no longer fulfilling NICE criteria for CPAP treatment

Secondary endpoints/outcomes

- AHI
- OSA symptoms
- CPAP pressures
- HbA1c
- Fasting plasma glucose
- Weight and Body Mass Index (BMI)
- Composite scores of NAFLD severity derived from age, Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST), BMI, platelets, and serum albumen
- Circulating free testosterone, fasting insulin and C-Peptide in males
- Blood pressure
- Diabetes treatment including need for insulin
- Quality of life scores (EQ-5D)
- Sustainability of primary outcome and of the secondary outcomes during the year following explantation of Endobarrier

Study design:
Response to intervention



Sandwell and West Birmingham Hospitals NHS
NHS Trust

Trial Registrations:
ISRCTN33788132
EUDRACT2016-001920-78

ABCD

Study design: Selection Criteria

Inclusion Criteria:

- Moderate OSA on CPAP fulfilling NICE criteria(AHI 15-29events/hr) with symptoms
- Prediabetes (HbA1c 42-48mmol or confirmed T2DM(HbA1c ≥48mmol/mol)
- Obesity BMI ≥30 and ≤45 Kg/m2
- Age ≥ 18 years
- Capable of giving informed consent

NICE

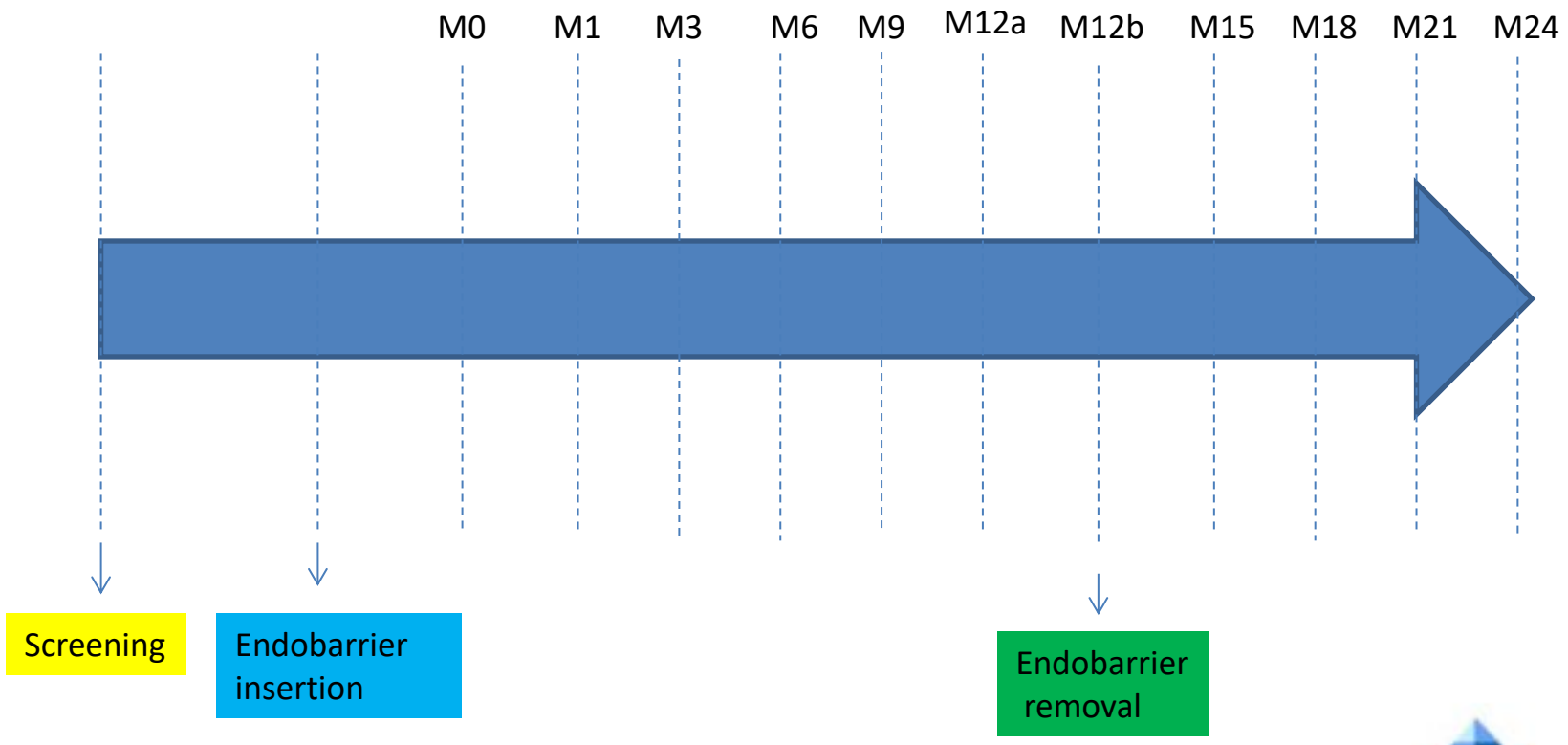
- Mild OSA : AHI<15 events/hr
- Moderate OSA : AHI 15-29 events/hr
- Severe OSA : AHI ≥30 events/hr

NICE TA139 : Obstructive sleep apnoea 2008

Exclusion Criteria

- abnormal intestinal anatomy
- contraindication to oesophagogastroduoenoscopy
- previous bariatric surgery or bowel surgery
- active infection
- anticoagulation therapy
- coagulopathy INR >1.3
- estimated Glomerular Filtration rate (eGFR)<30
- known portal hypertension
- uncontrolled cardiovascular disease
- lactating or pregnant females
- excess anaesthetic risk
- patients on regular non-steroidal anti-inflammatory agents
- Aspirin or other anti-platelets for cardiovascular secondary prevention

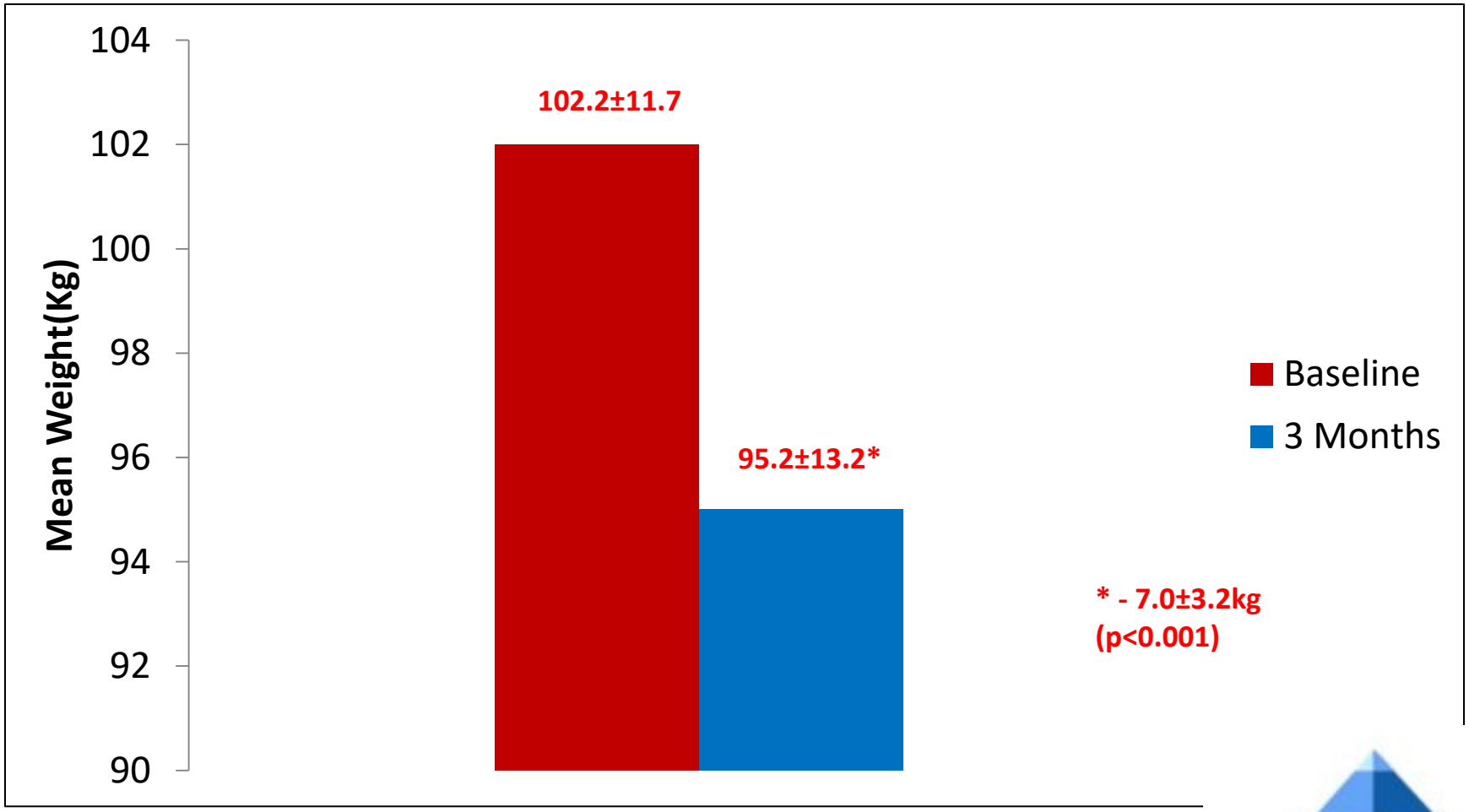
End-OSA Study



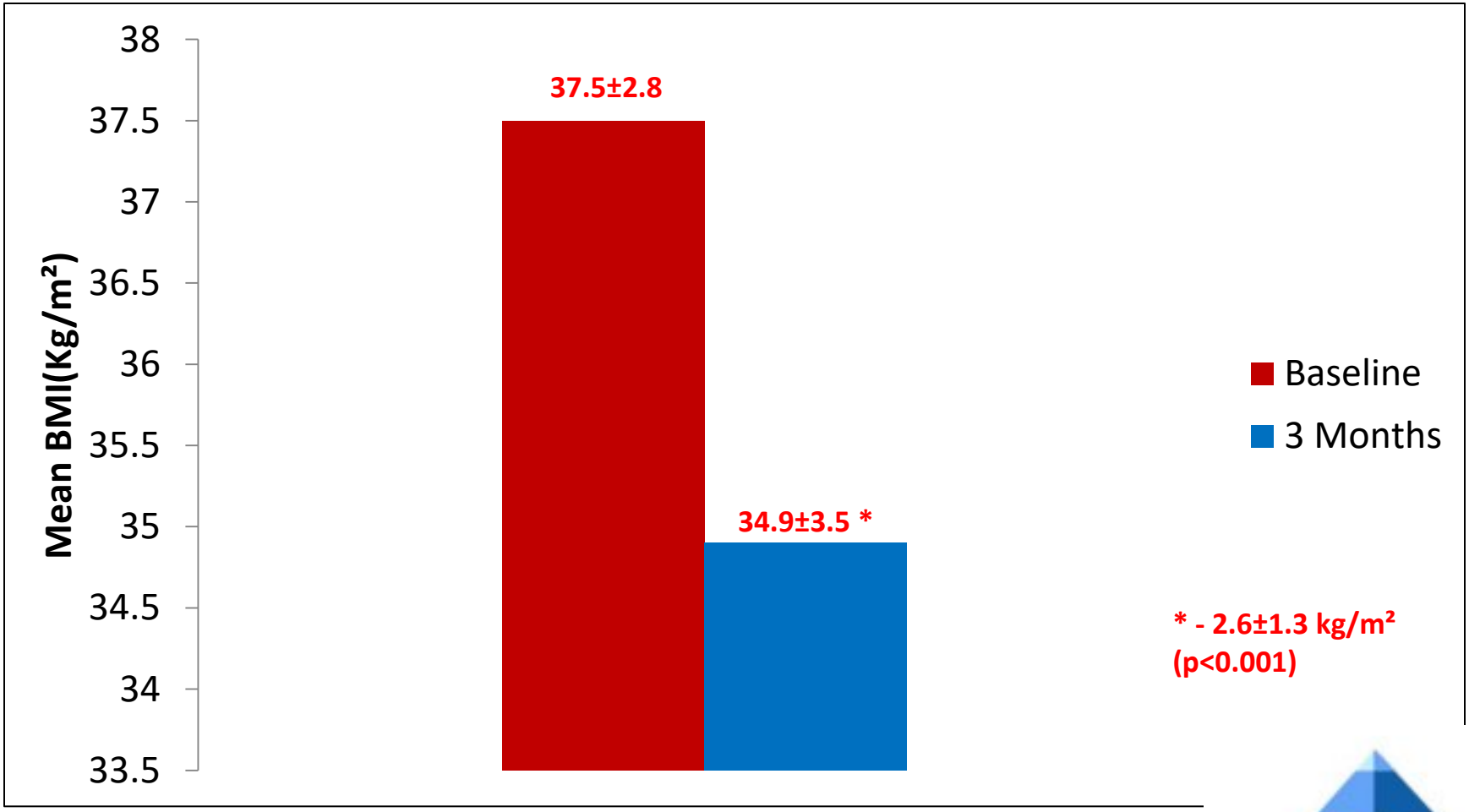
Baseline characteristics(n=10)

Age(years)	53.5±10.5
Sex(%)	Females(80%)
Ethnicity(%)	Caucasian(50%)
T2DM pt's (n)	8
Pre-diabetes pt's (n)	2
Mean Wt(kg)	102.2±11.7
Mean BMI(Kg/m^2)	37.6±2.8
Mean HbA1c (mmol)	66.3±17.7
Mean AHI (events/hr)	19.0±4.0
Duration of OSA {Median(IQR)years}	1.5(1.0-2.4)

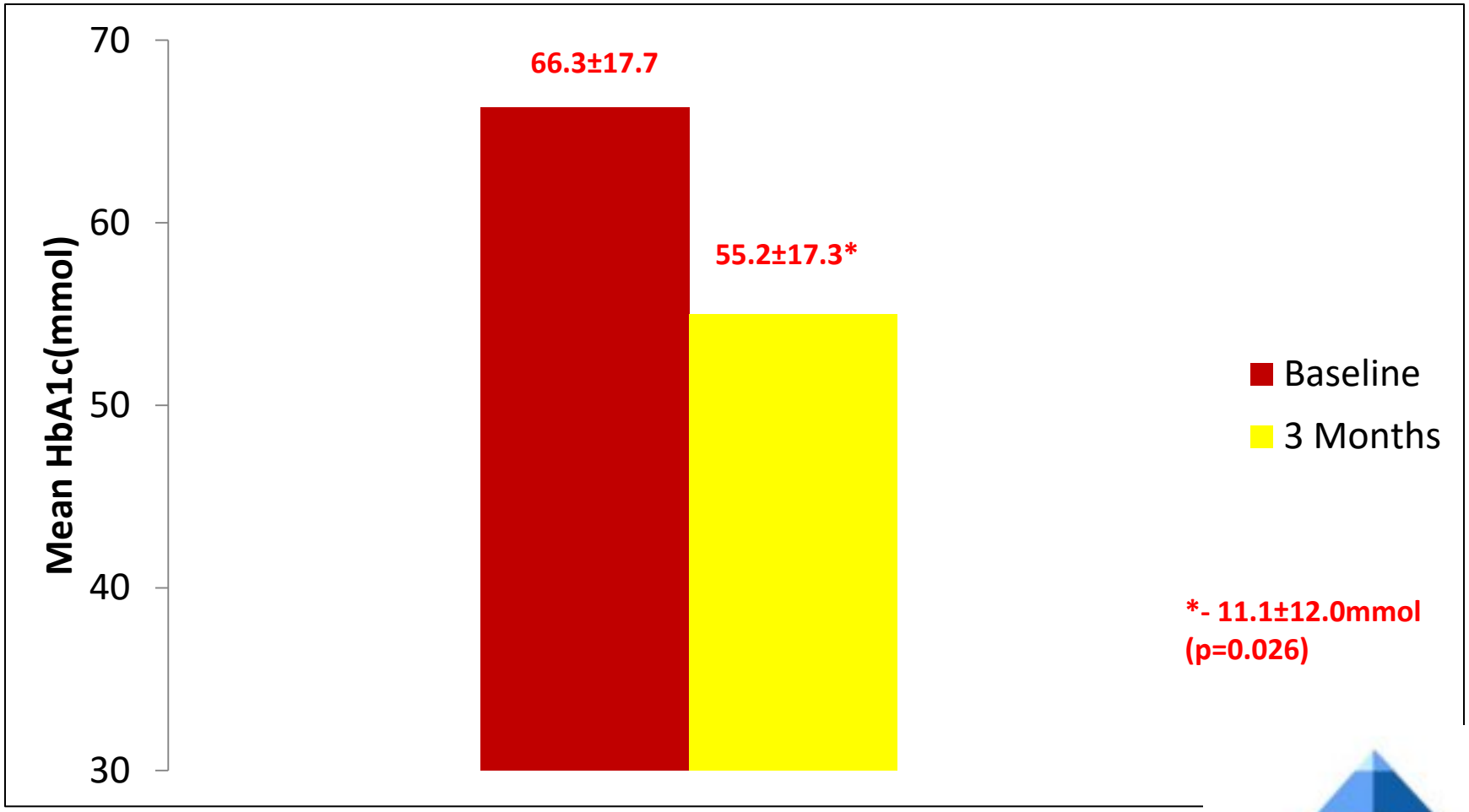
Results: Weight(n=9)



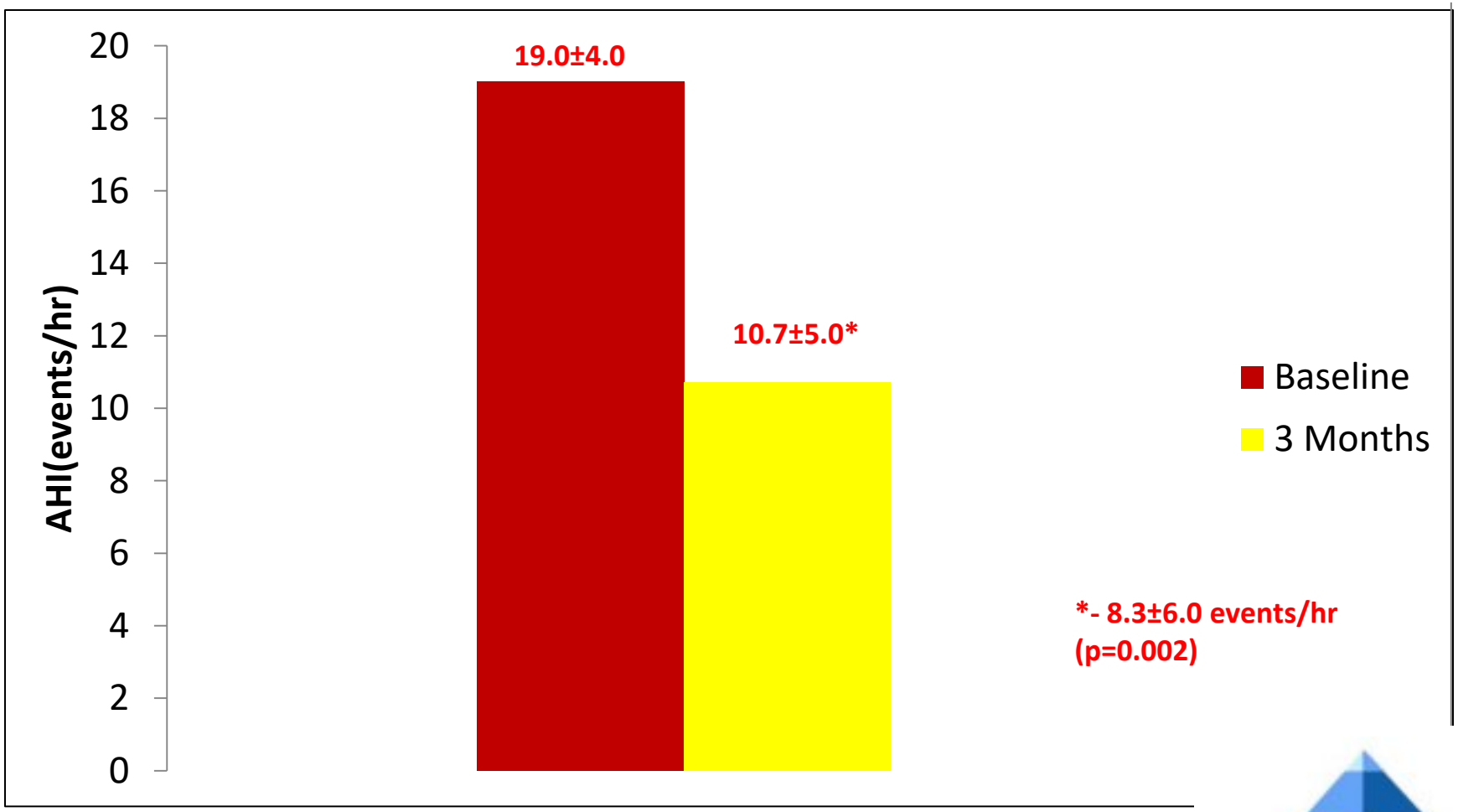
Results: Mean BMI(n=9)



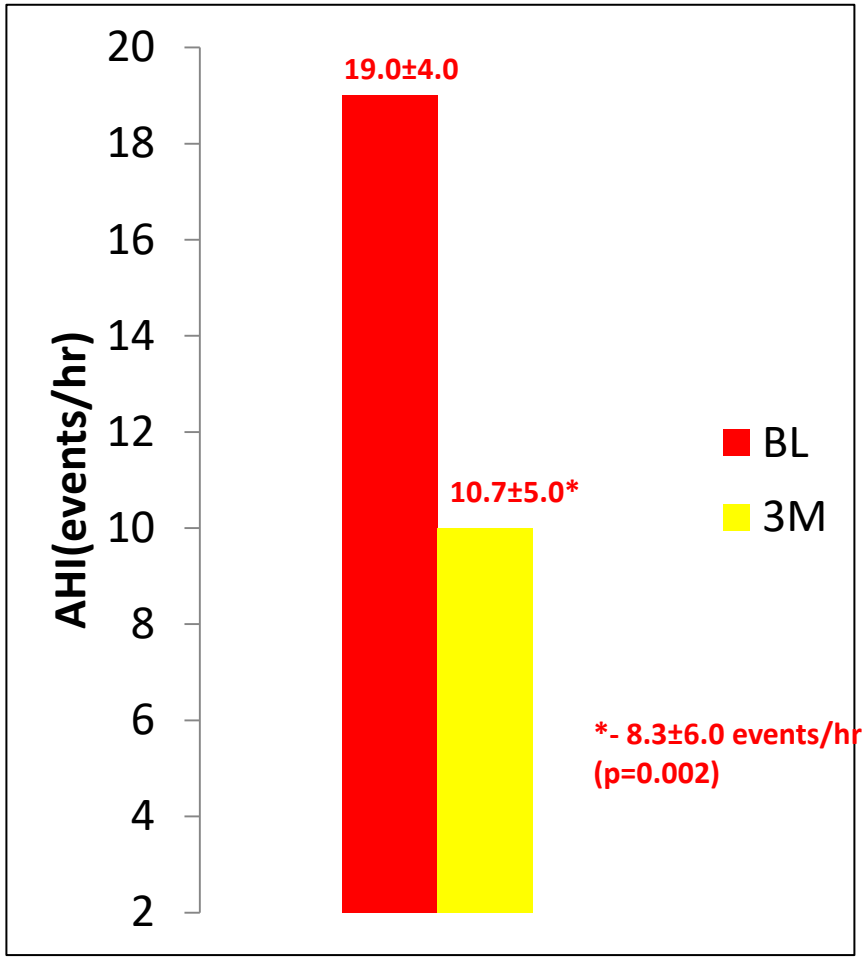
Results- Mean HbA1c(n=9)

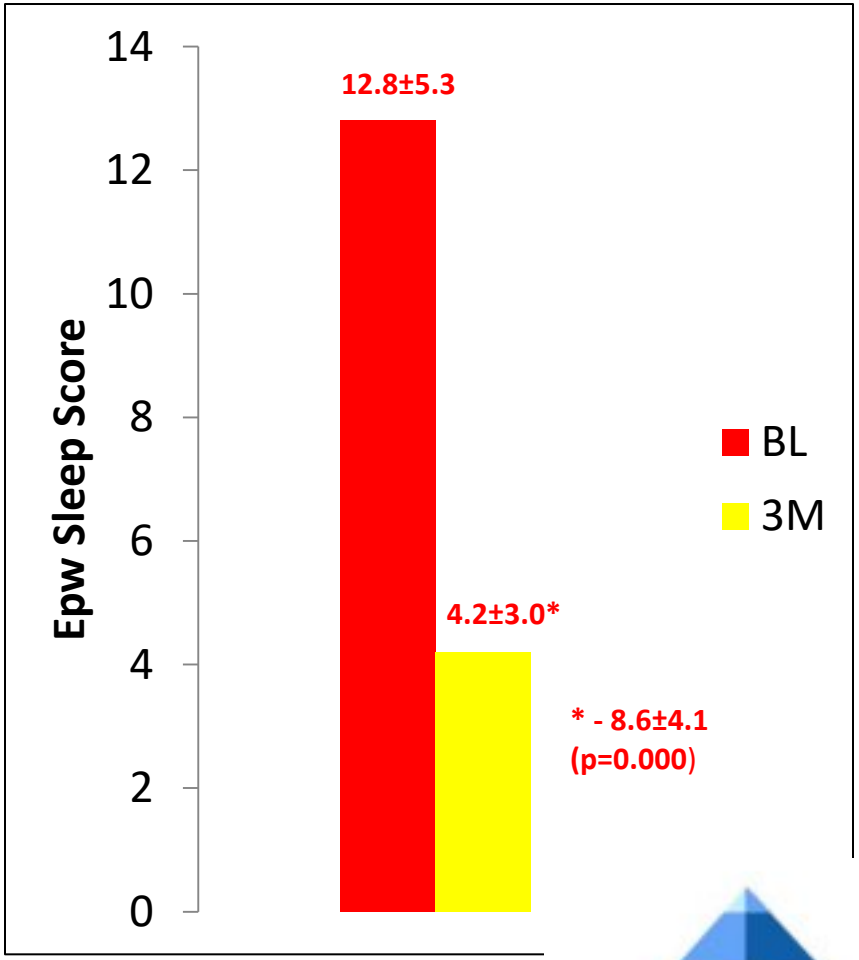


Mean AHI(n=10)

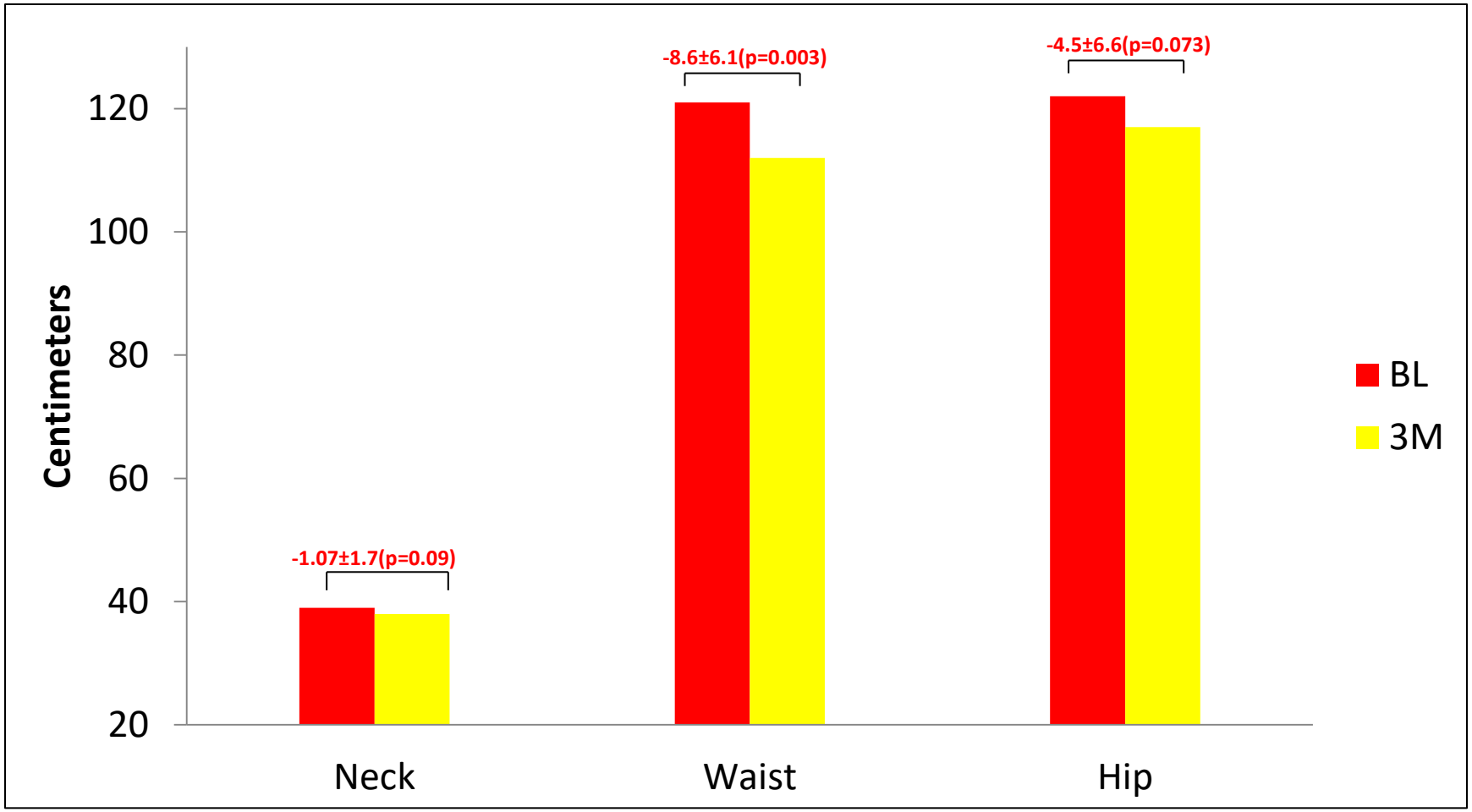

AHI(events/hr)
20
18
16
14
12
10
8
6
4
2
0
19.0±4.0
10.7±5.0*
Baseline
3 Months
*- 8.3±6.0 events/hr
(p=0.002)

Sleep Studies(n=10)

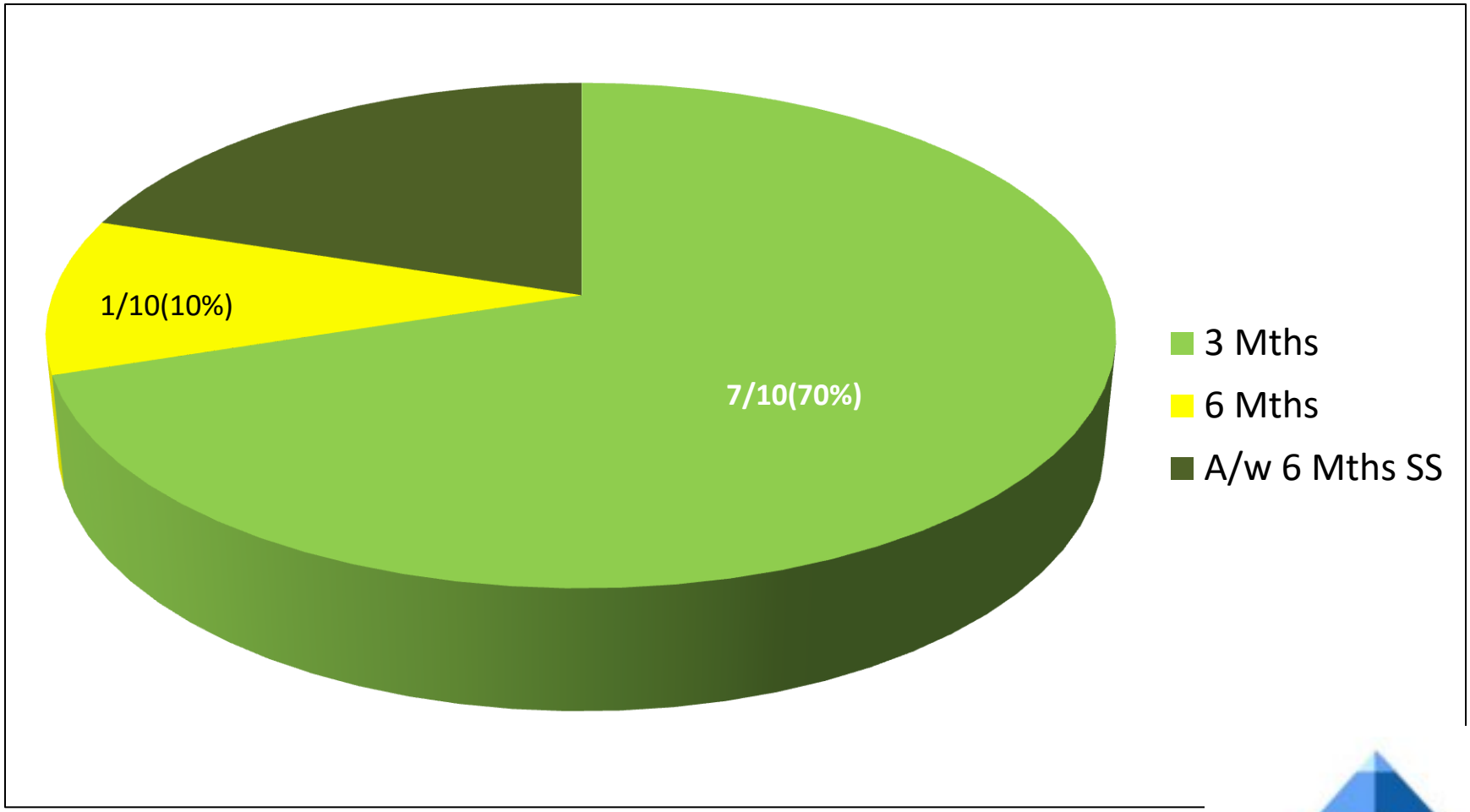




Body Fat Measurements(n=9)



CPAP Discontinued



SAE

- Small perforation of Oesophagus in one participant at 6 months during Endobarrier removal

Conclusion

- Although these are preliminary results, EndoBarrier® has been effective in OSA pts in allowing 8 out of the first 10 patients to discontinue their CPAP
- Associated glycaemic and weight benefits

Before

- HbA1c 77 mmol/mol (9.2%)
- Weight = 105.6 kg
- BMI = 35.3 kg/m²
- Insulin 100 units

12 months After

- HbA1c 40 mmol/mol (5.8%)
- Weight 80.0 kg
- =Weight loss 25.6 kg (over 4 stone)
- BMI 26.7 kg/m²
- Insulin no longer required

24 months After

- HbA1c 33 mmol/mol (5.2%)
- Weight 81.02kg
- BMI 27 kg/m²
- Still off insulin - improvement sustained

Before

- HbA1c = 69 mmol/mol (8.5 %)
- Wt = 92.4 kg
- BMI = 36 kg/m²
- Insulin 147 units daily
- Creatinine 153 umol/L
- eGFR 30 mL/min/1.73m²

12 months

- HbA1c = 50 mmol/mol (6.7 %)
- Wt = 73 kg
  - weight loss 19.4 kg (3 stone)
- BMI = 27.1 kg/m²
- Insulin no longer required
- Creatinine 106 umol/L
- eGFR 46 mL/min/1.73m²

24 months

- HbA1c = 55 mmol/mol (6.7 %)
- Wt = 74.6 kg
- BMI = 27.7 kg/m²
- Remains off insulin
- Creatinine 116 umol/L
- eGFR 41 mL/min/1.73m²

Before

- Pre-endobarrier
- HbA1c = 61 mmol/mol (7.7%)
- Wt = 86.6 kg
- BMI = 35.1 kg/m²
- Insulin 120 units daily
- Obstructive sleep apnoea requiring CPAP

12 months

- 12 months Endobarrier
- HbA1c = 43 mmol/mol (6.1%)
- Wt = 65.6 kg
  - Wt loss 21.0 kg (over 3 stone)
- BMI = 26.2 kg/m²
- Insulin 12 units daily
- CPAP no longer required

24 months

- 12 months after Endobarrier
- HbA1c = 57 mmol/mol (6.1%)
- Wt = 66.2 kg
- BMI = 27.2 kg/m²
- Insulin 16 units daily
- Remains off CPAP

Before

- Pre-endobarrier
- HbA1c = 70 mmol/mol (8.6%)
- Wt = 82.9 kg
- BMI = 33.6 kg/m²
- Obese BMI

12 months

- 12 months Endobarrier
- HbA1c = 51 mmol/mol (6.8%)
- Wt = 62.2 kg
  - =Wt loss 20.7 kg (over 3 stone)
- BMI = 24.7 kg/m²
- Normal BMI

24 months

- 12 months after Endobarrier
- HbA1c = 43 mmol/mol (6.1 %)
- Wt = 64.2 kg
- BMI = 26.4 kg/m²
- Improvement sustained

For many more examples see: http://www.diabetologists-abcd.org.uk/Endobarrier/Birmingham_Endobarrier_patients.pdf

If you would like to discuss more about starting an NHS EndoBarrier service at your hospital conta
Dr Bob Ryder (bob.ryder@nhs.net) or talk to him at this meeting