Healthcare Disparities in Obesity Treatment

FATIMA CODY STANFORD, MD, MPH, MPA, FAAP, FACP, FTOS

OBESITY MEDICINE & NUTRITION, MGH WEIGHT CENTER

AMERICAN BOARD OF OBESITY MEDICINE DIPLOMATE

MASSACHUSETTS GENERAL HOSPITAL   HARVARD MEDICAL SCHOOL   MassGeneral Hospital for Children

Objectives

|	
Discuss	Discuss racial and ethnic disparities in the prevalence, treatment, and pathophysiology of obesity.
Explore	Explore issues surrounding obesity and socioeconomic status, education level, and provider diagnosis in obesity.
Understand	Understand differences in response to treatment of racial and ethnic minorities with regards to pharmacotherapy and weight loss surgery.

Prevalence¶ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2011
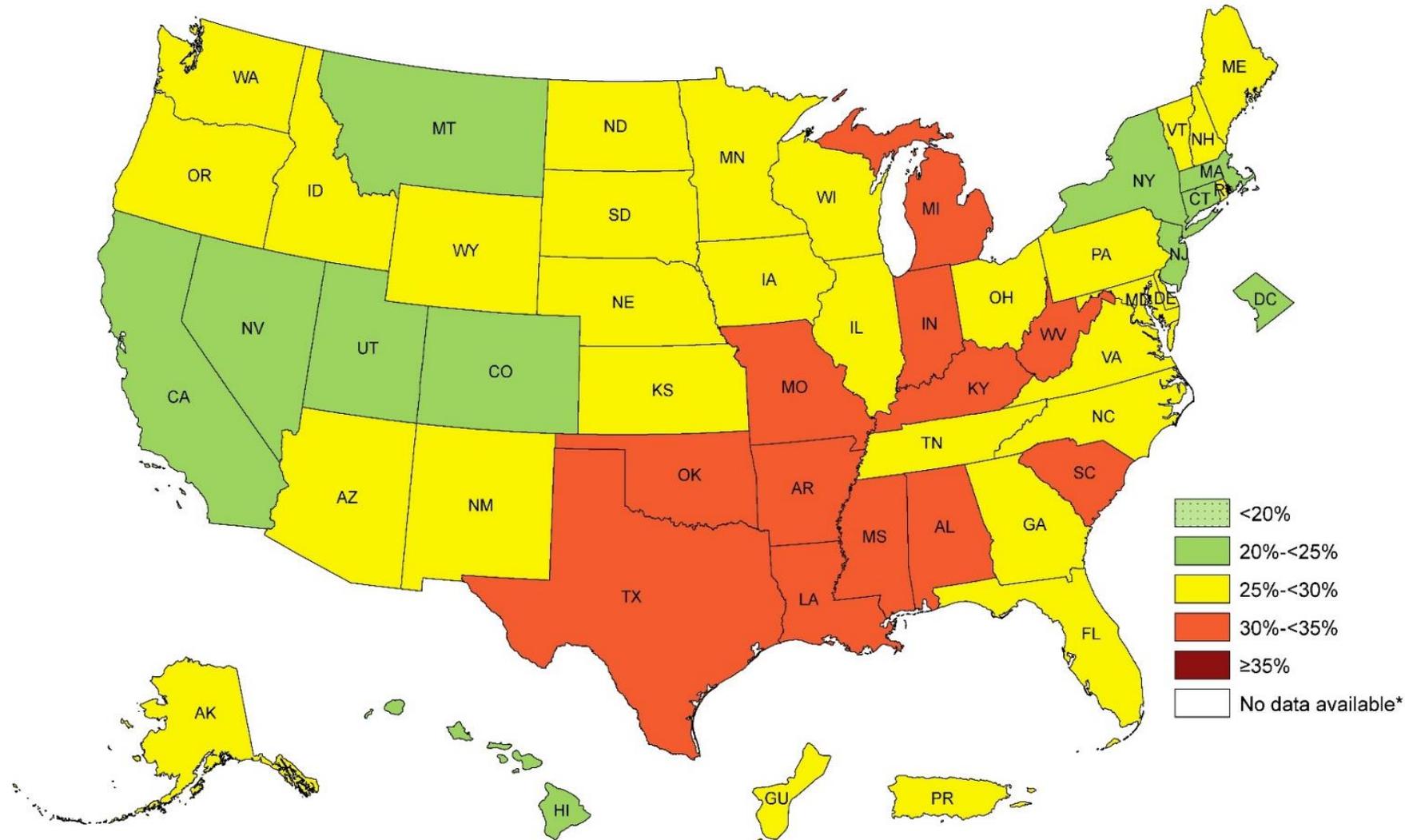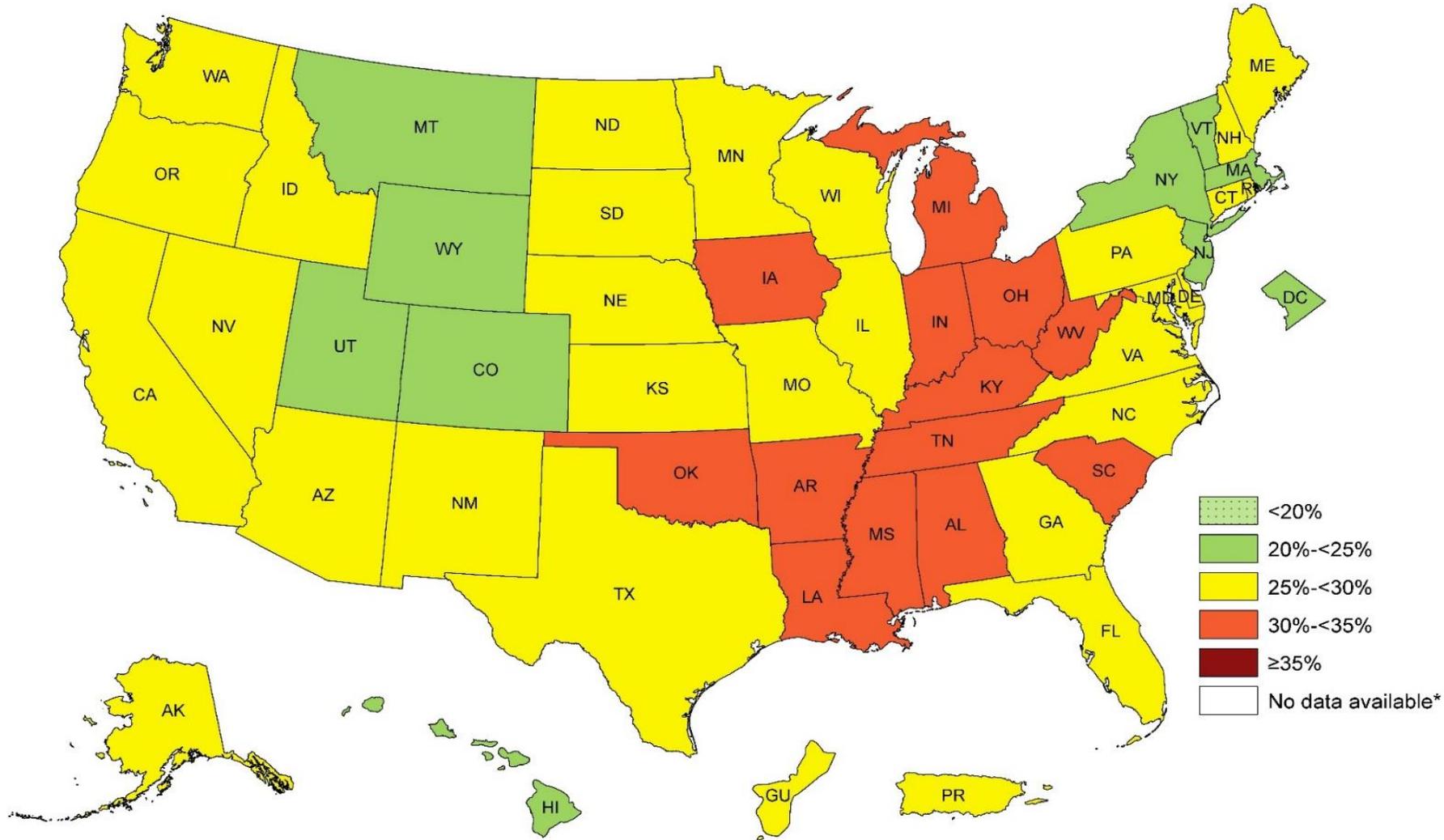
Prevalence¶ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2012

Prevalence¶ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

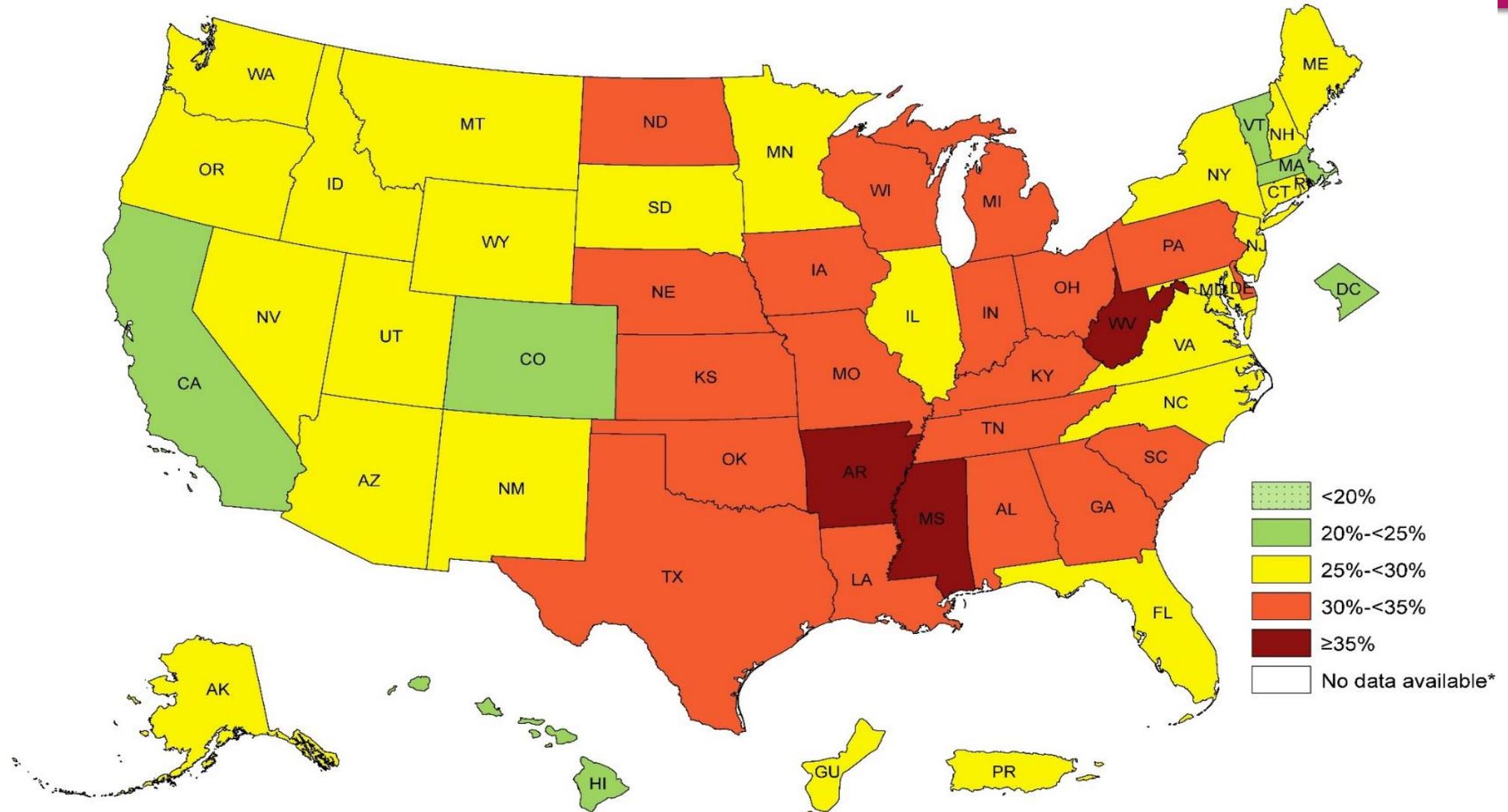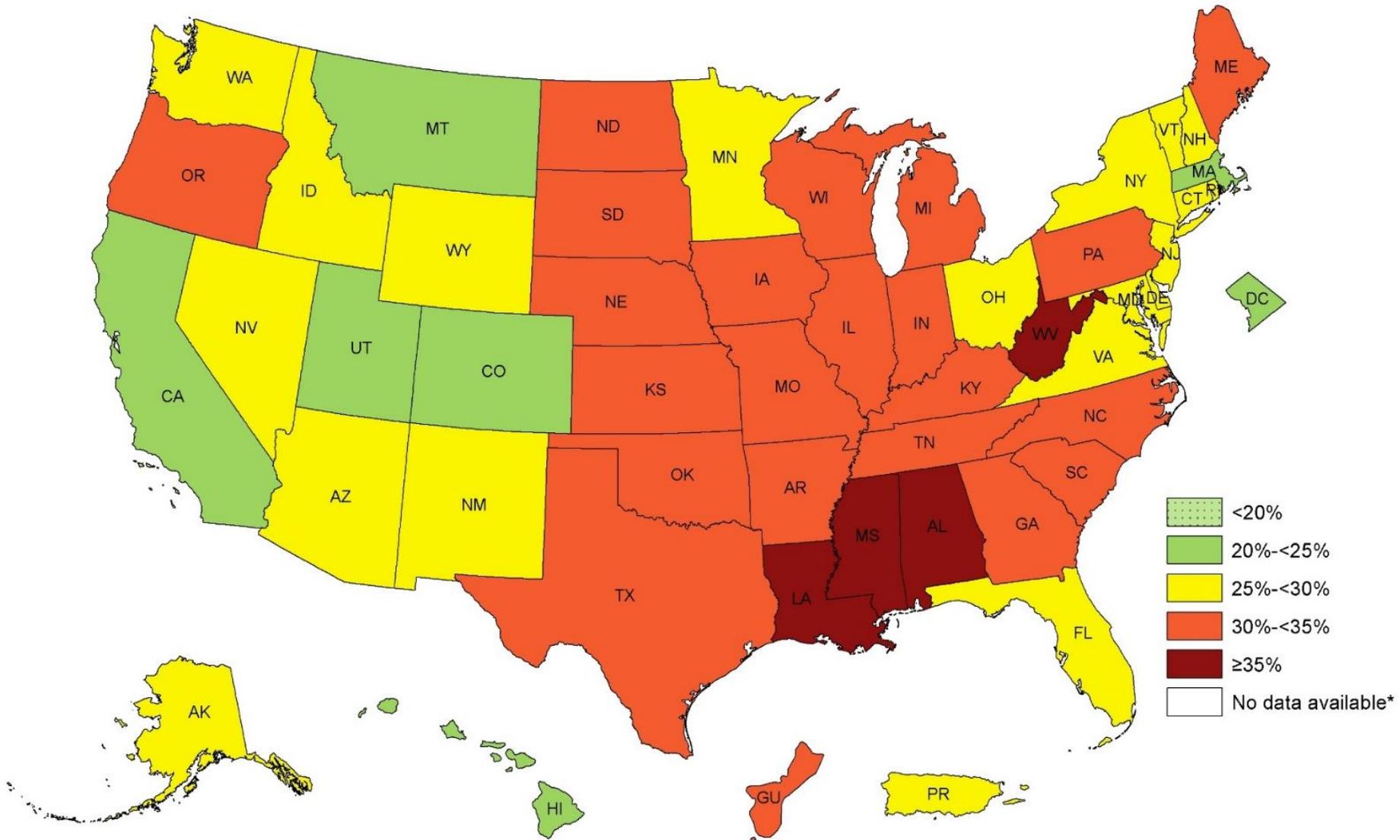|	
<20%	
20%-<25%	
25%-<30%	
30%-<35%	
≥35%	
No data available*	

Prevalence¶ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2014

Prevalence¶ of Self-Reported Obesity Among U.S. Adults
## by State and Territory, BRFSS, 2015

Legend:
- <20%
- 20%-<25%
- 25%-<30%
- 30%-<35%
- ≥35%
- No data available*

Prevalence of Self-Reported Obesity Among Non-Hispanic White Adults, by State and Territory, BRFSS, 2013-2015

Prevalence of Self-Reported Obesity Among Hispanic Adults, by State and Territory, BRFSS, 2013-2015
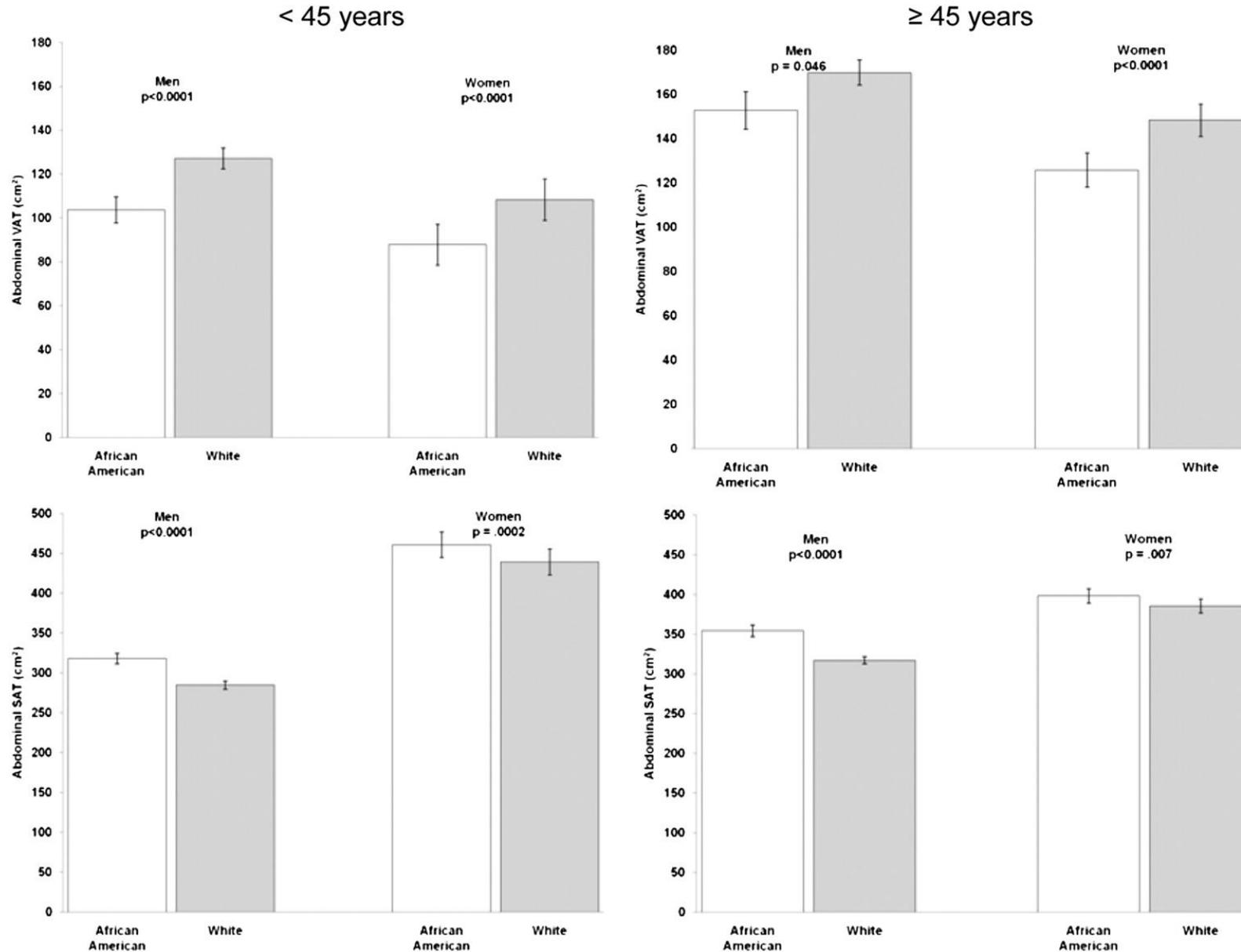
Prevalence of Self-Reported Obesity Among Non-Hispanic Black Adults, by State and Territory, BRFSS, 2013-2015
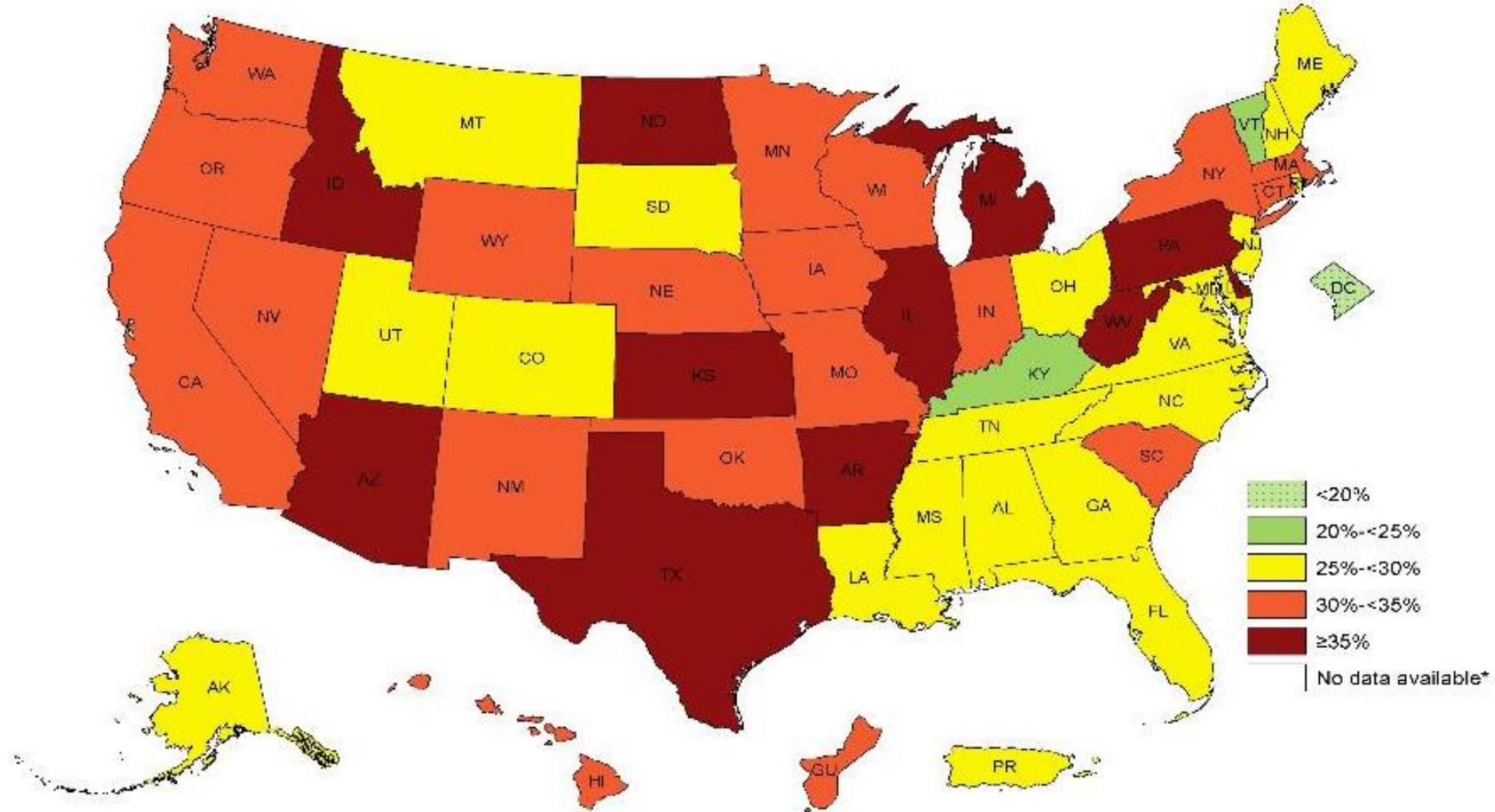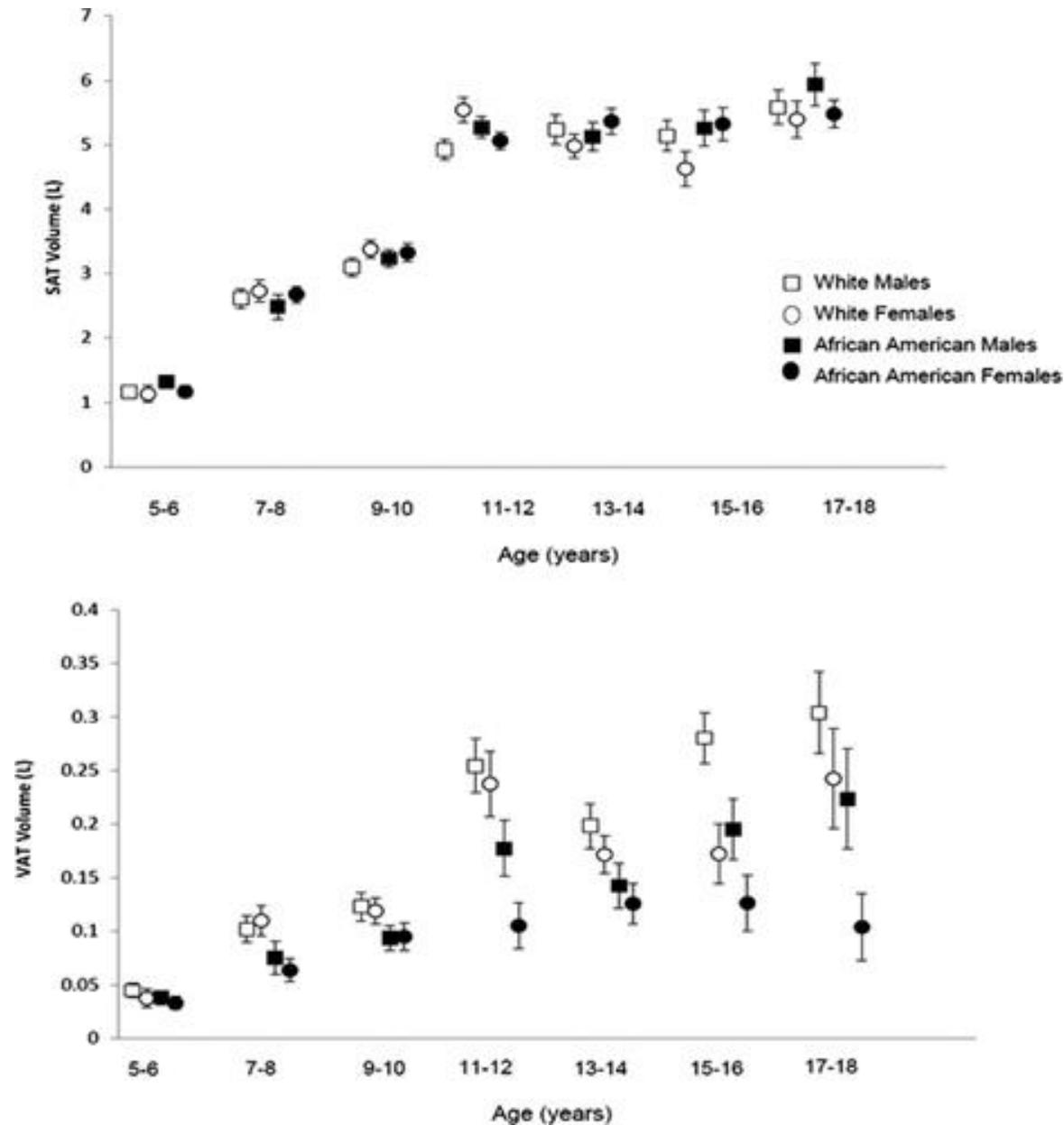
Mean (95% CI) abdominal visceral adipose tissue (VAT) area (top panels) and subcutaneous adipose tissue (SAT) area (bottom panels) in African American and white men and women aged <45 and ≥45 y.

Ethnic and sex differences in visceral, subcutaneous, and total body fat in children and adolescents

Markers of Inflammation in African-American versus Non-Hispanic White Patients

- 126 healthy, premenopausal women, BMI 27-30 kg/m^2

- Placed on a weight-loss intervention consisting of diet and/or exercise until a BMI <25 was achieved

- Fat distribution was measured with computed tomography, and body composition with dual-energy X-ray absorptiometry.

- Serum concentrations of tumor necrosis factor-a (TNF-a), soluble TNF receptor-I (sTNFR-I), sTNFR-II, C-reactive protein (CRP), and interleukin-6 (IL-6) were assessed.

- All markers of inflammation decreased following weight loss among NHW, whereas only IL-6 and CRP decreased following weight loss in AA.

Adiponectin and Leptin in African-American versus Non-Hispanic White Pre-menopausal Women
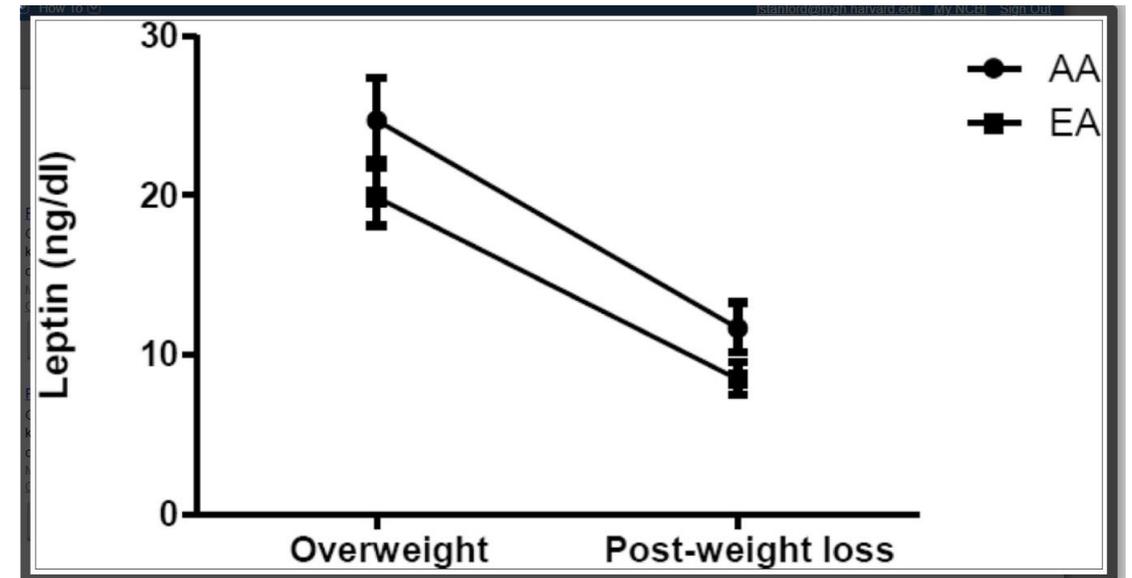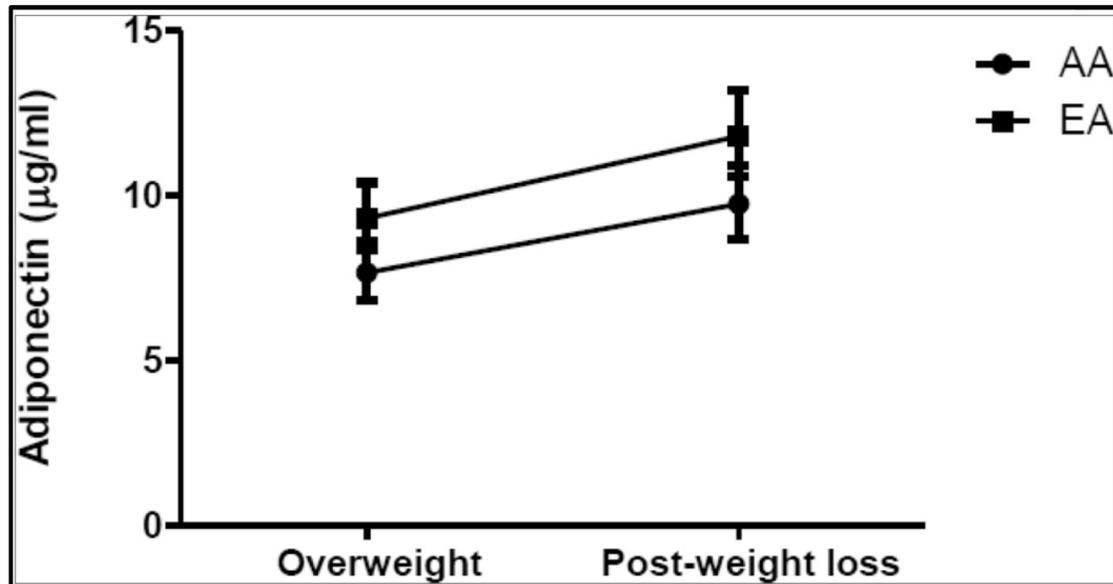
Insulin, Estrogen, and Fat Mass in African-American vs. European American adolescent girls

TABLE 1. Descriptive statistics at baseline and ages of menarche and adrenarche for all children combined and by race

	EA (n = 80)	AA (n = 57)	Total (n = 137)
Age (yr)	8.1 ± 1.4	7.9 ± 1.9	8.0 ± 1.6
Total fat mass (kg)	9.6 ± 5.6	11.0 ± 7.1	10.2 ± 6.3
Lean tissue mass (kg)	20.0 ± 4.2	20.9 ± 5.8	20.4 ± 4.9
BMI	22.39 ± 1.0	21.04 ± 0.76	21.78 ± 0.64
BMI z-score	0.87 ± 0.18	0.84 ± 0.17	0.86 ± 0.12
Height (cm)	145.25 ± 2.2	146.40 ± 2.6	145.77 ± 1.7
Fasting insulin (μIU/ml)	10.5 ± 2.2 [a]	15.4 ± 9.0 [b]	12.4 ± 8.3
SI ($\times 10^{-4}$ min^{-1}/(μIU/ml))	5.65 ± 1.4	3.42 ± 0.51	4.46 ± 0.75
AIRg (μIU/ml $\times$ 10 min)	732 ± 346 [a]	1639 ± 361 [b]	1216 ± 654
E2 (pg/ml)	2.1 ± 6.2	3.8 ± 4.0	2.8 ± 5.3
Age at menarche (yr)*	11.2 [a]	10.7 [b]	11.6
Age at adrenarche (yr)*	9.3 [a]	8.5 [b]	9.1

[a,b] Means with *different superscripts are significantly different* ($P < 0.05$).

* Adjusted for age, race, body composition, E2, and AIRg.

Insulin, Estrogen, and Fat Mass in African-American vs. European American adolescent girls
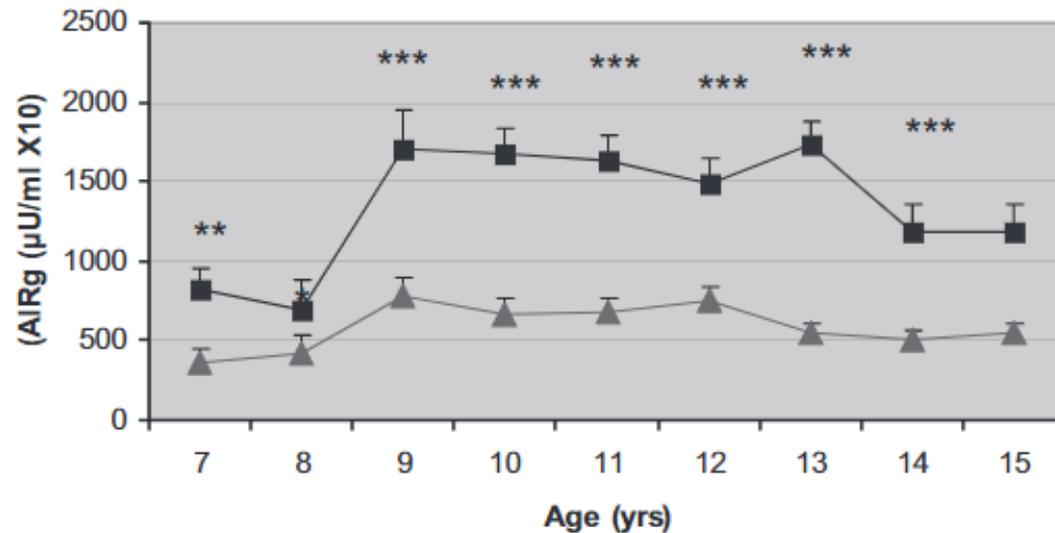

FIG. 1. Comparison by age for AIRg in AA (■) and EA (▲) girls. Multivariate linear regression modeling indicated significant age ($P < 0.001$) and race ($P < 0.001$) effects. *Error bars*, SEM. **, $P < 0.01$; ***, $P < 0.001$.
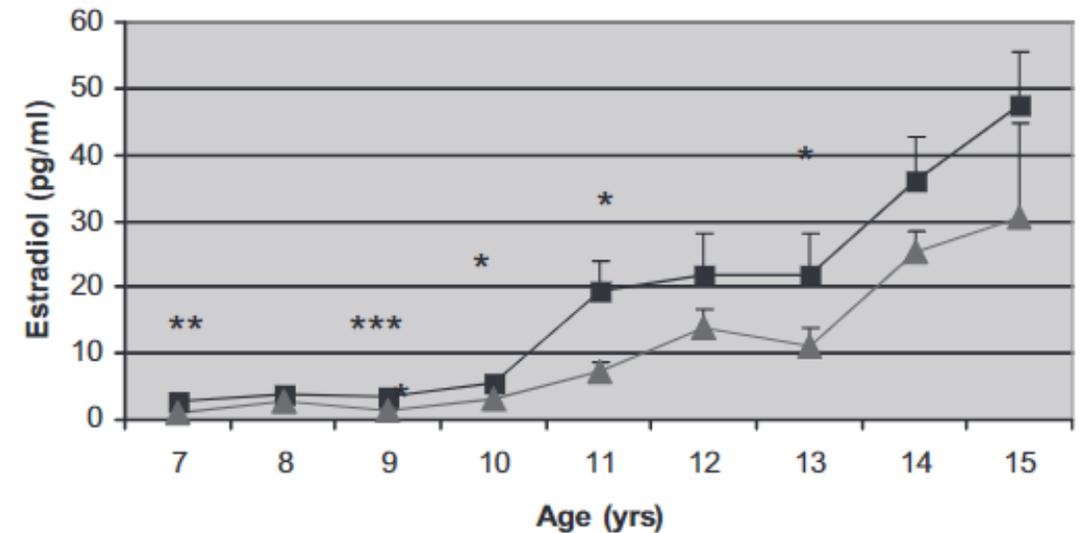
FIG. 2. Comparison in serum E2 concentration by age in AA (■) and EA (▲) girls. Multivariate linear regression modeling indicated significant age ($P < 0.001$) and race ($P < 0.05$) effects as well as age by race interaction ($P < 0.001$). *Error bars*, SEM. *, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$.

Insulin, Estrogen, and Fat Mass in African-American vs. European American adolescent girls
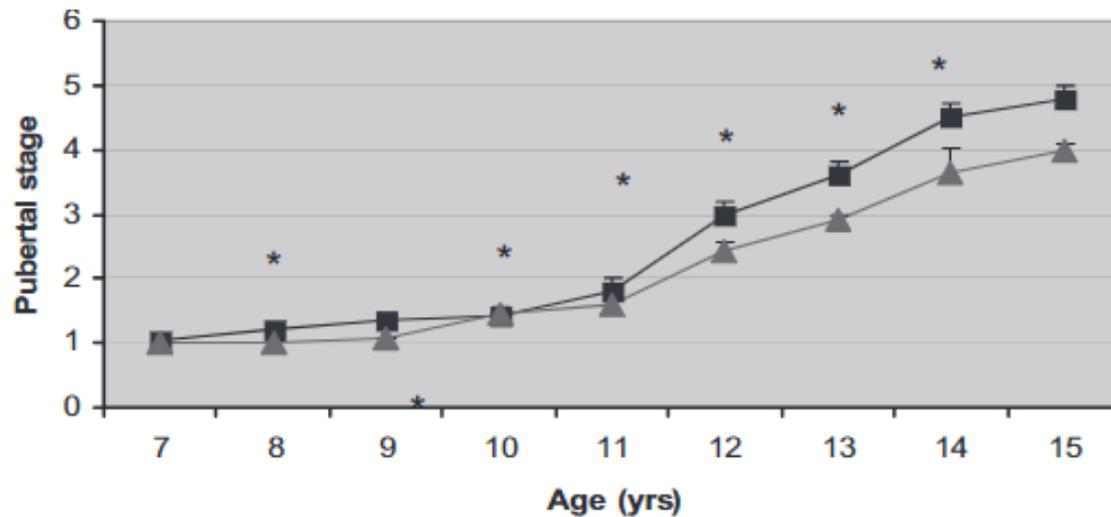

FIG. 3. Racial differences in progression though puberty in AA (■) and EA (▲) girls. *Error bars*, SEM. *, *P* < 0.05.
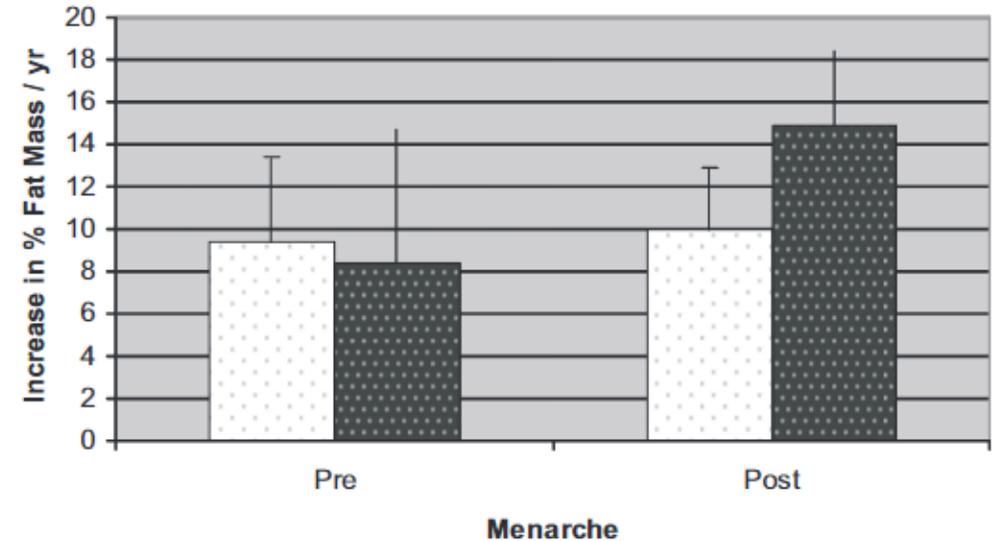
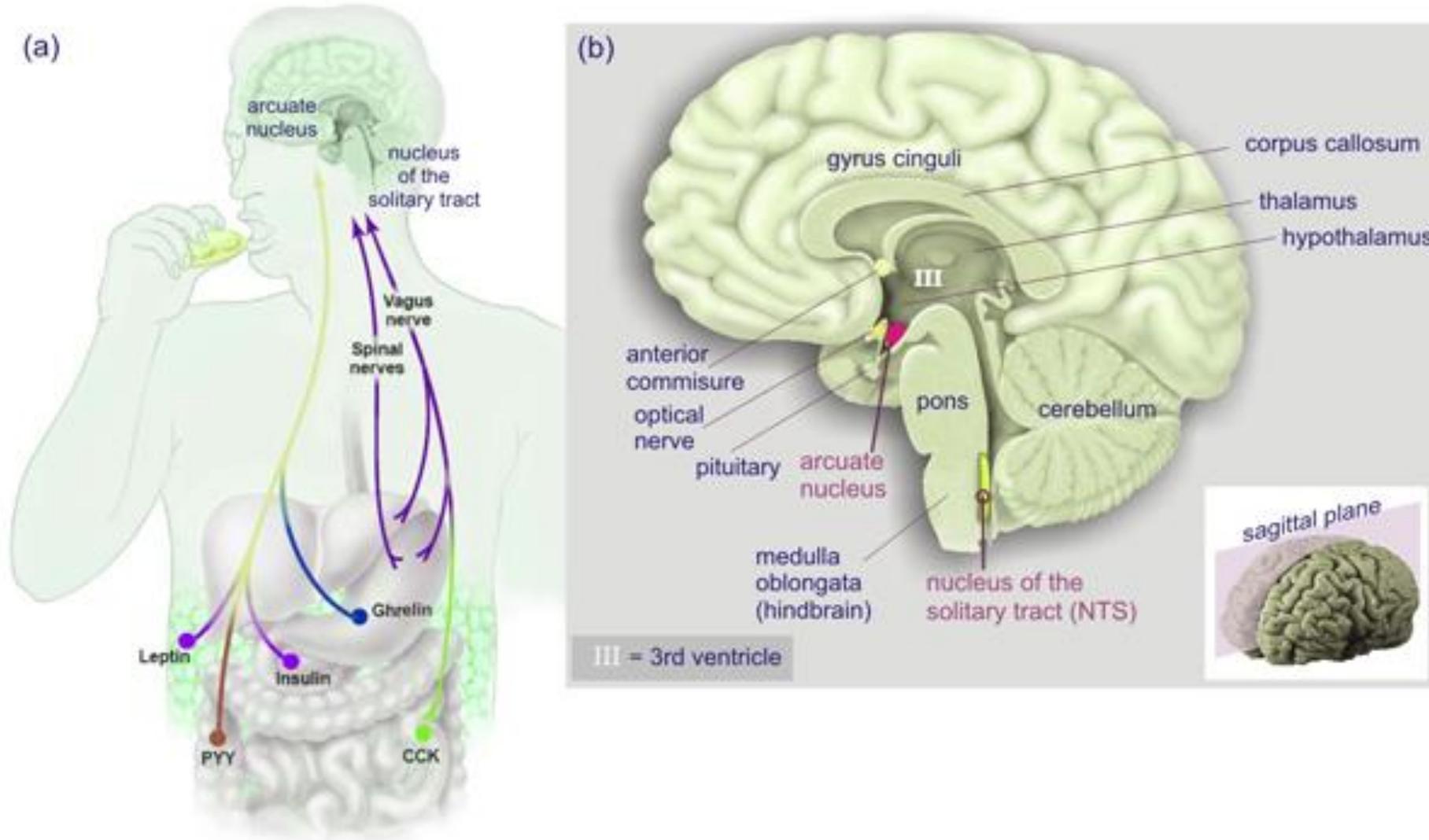FIG. 4. Comparison between increase in percent fat before and after menarche in AA (*shaded bars*) and EA (*unshaded bars*) girls.

Regulation of Food Intake

Regulation of Food Intake
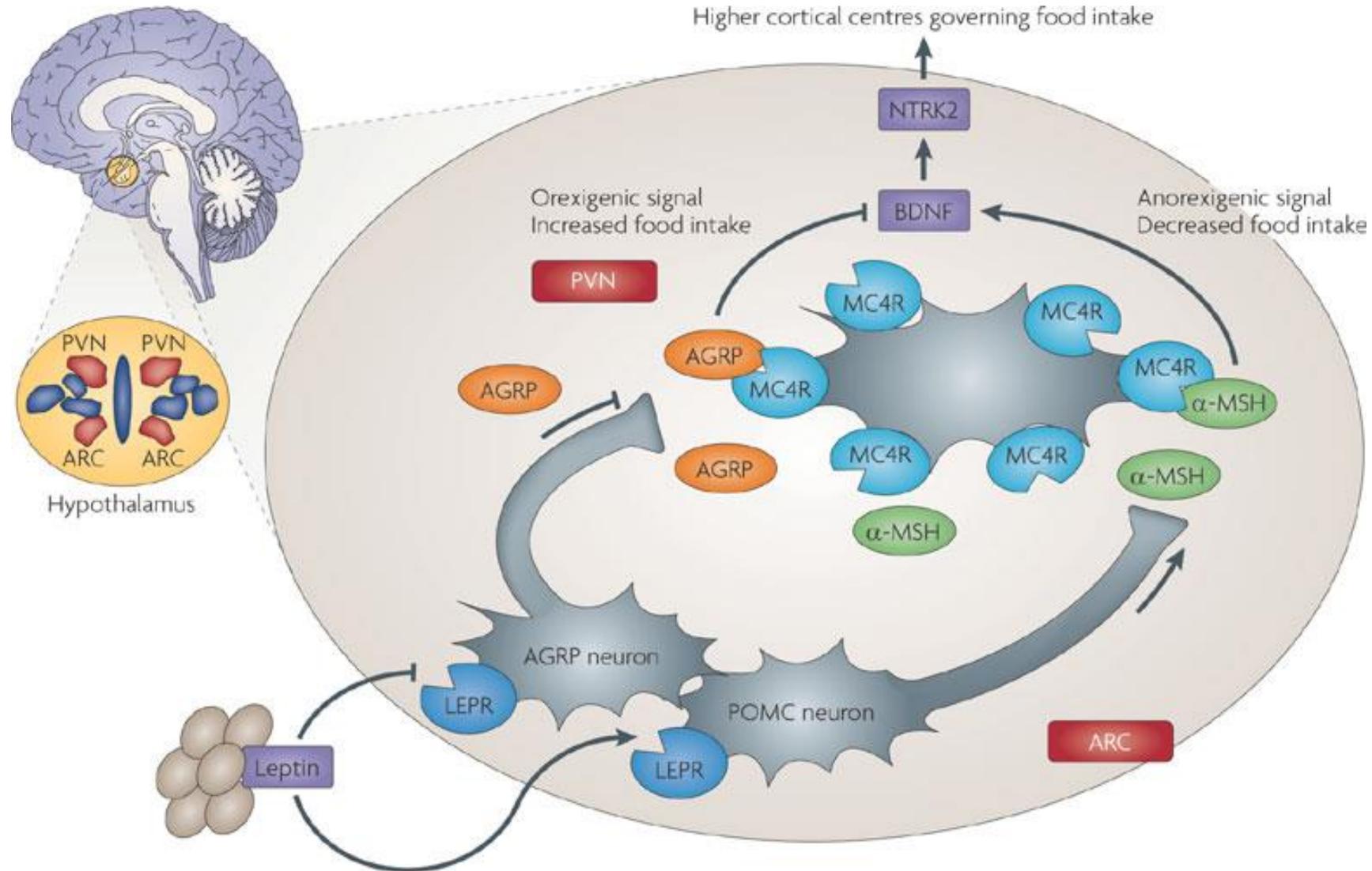
BDNF Regulation and Obesity
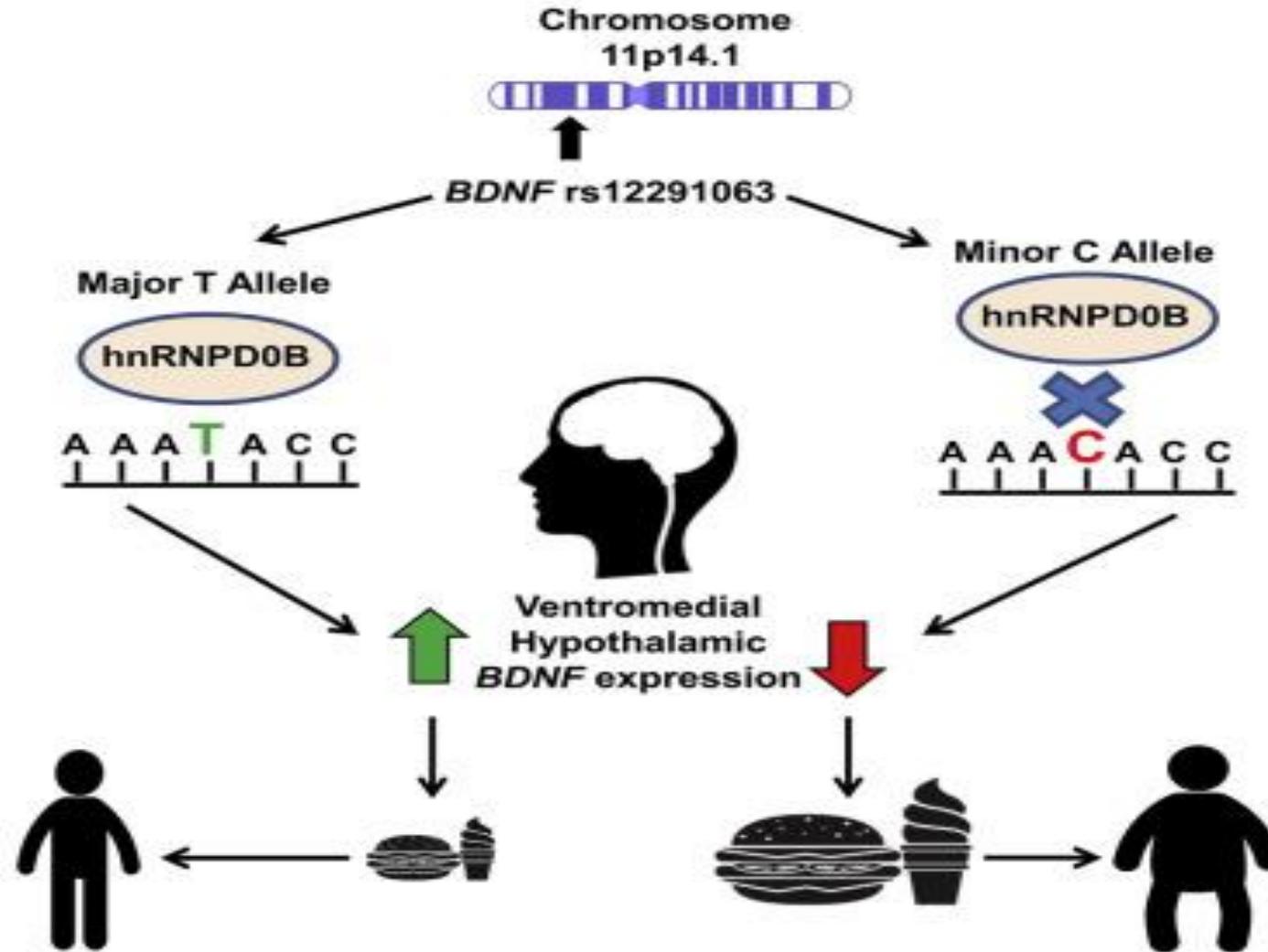
Genome-wide analysis-African-specific variant in *SEMA4D* associated with body mass index
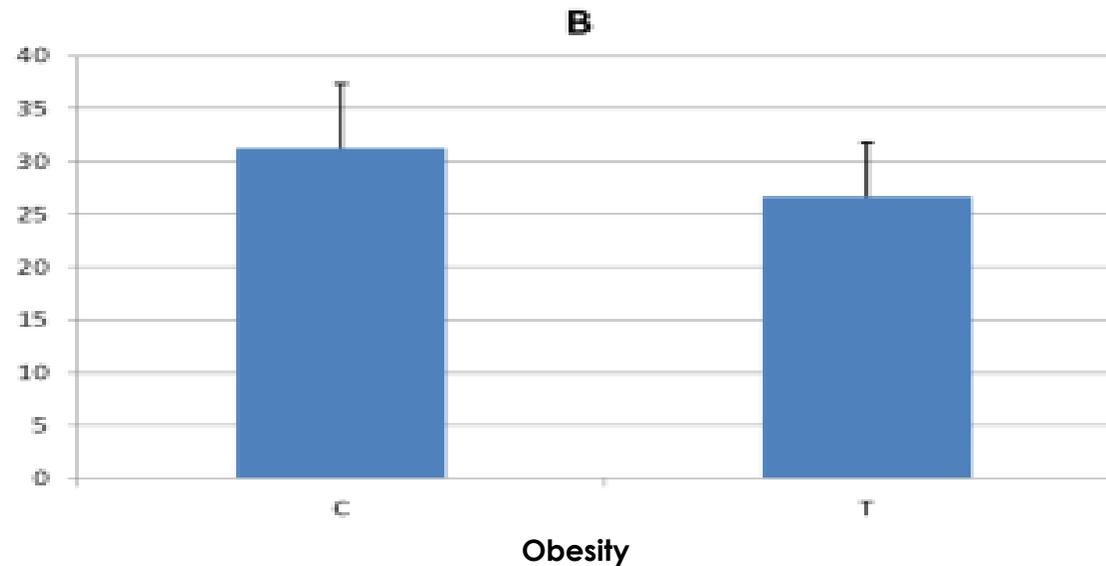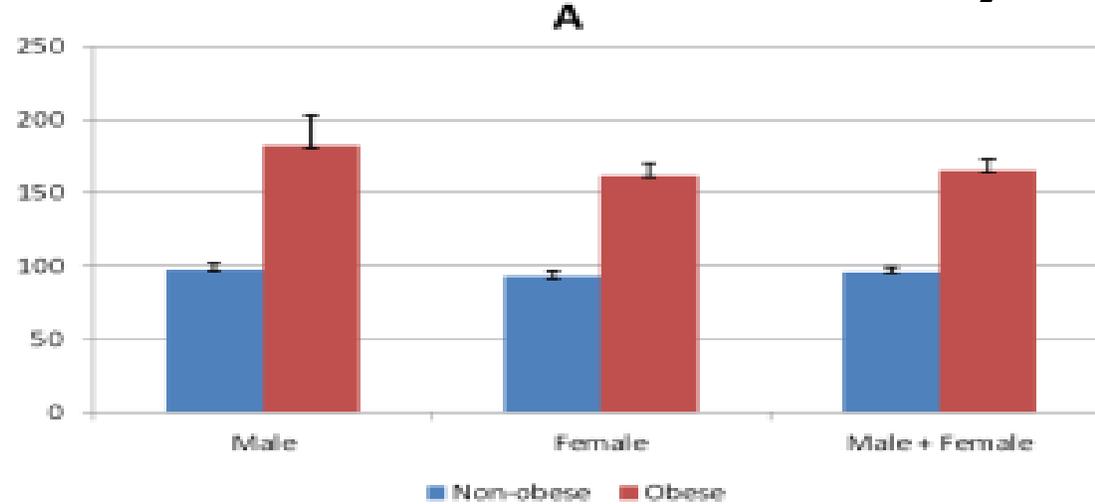
Women with Lower Income have Higher Obesity in the US
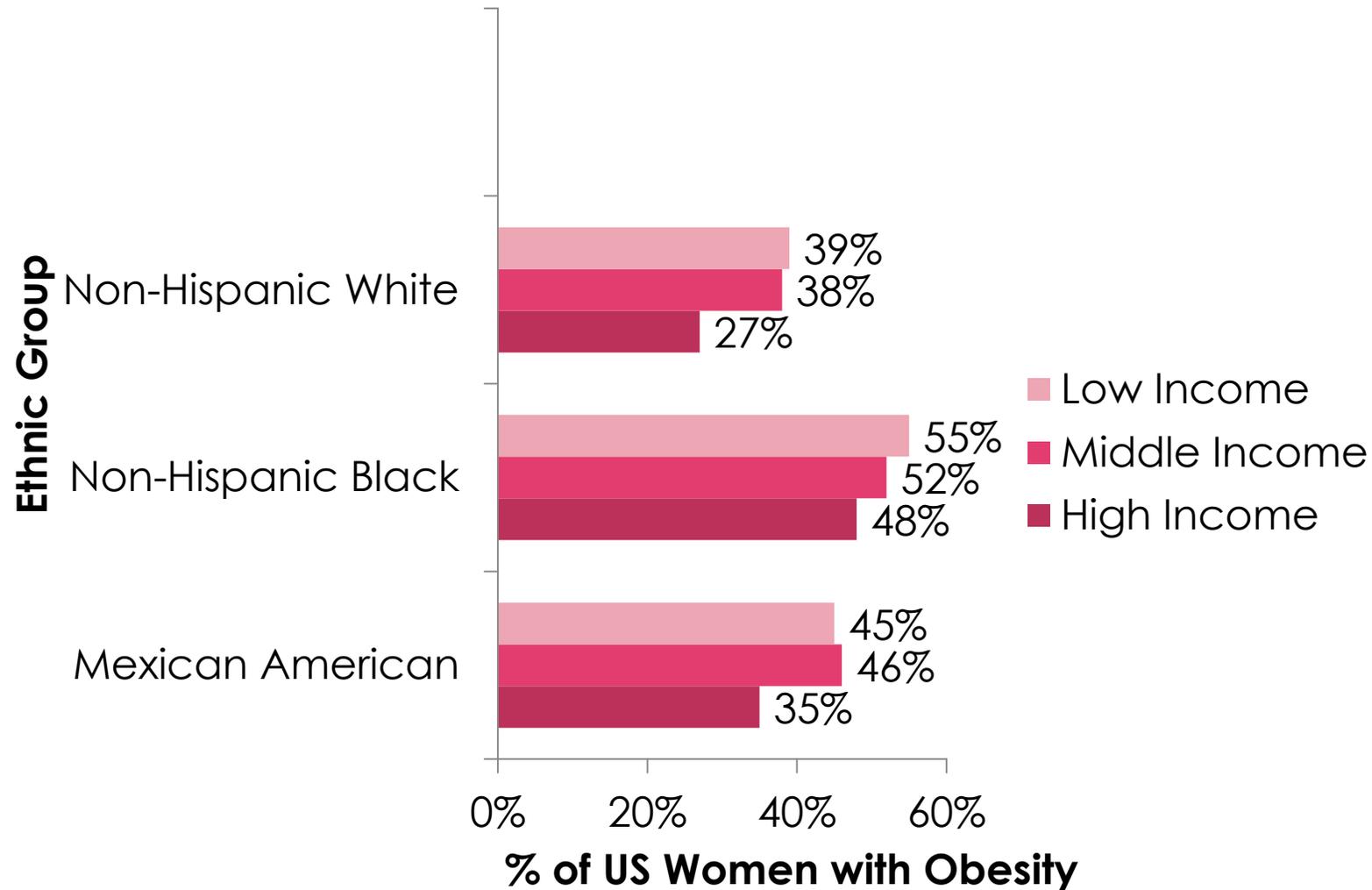
Ogden CL et al. NCHS Data Brief 2010

Non-Hispanic Black and Mexican American Men have Higher Obesity Rates at Higher Income Levels

Ogden CL et al. NCHS Data Brief 2010
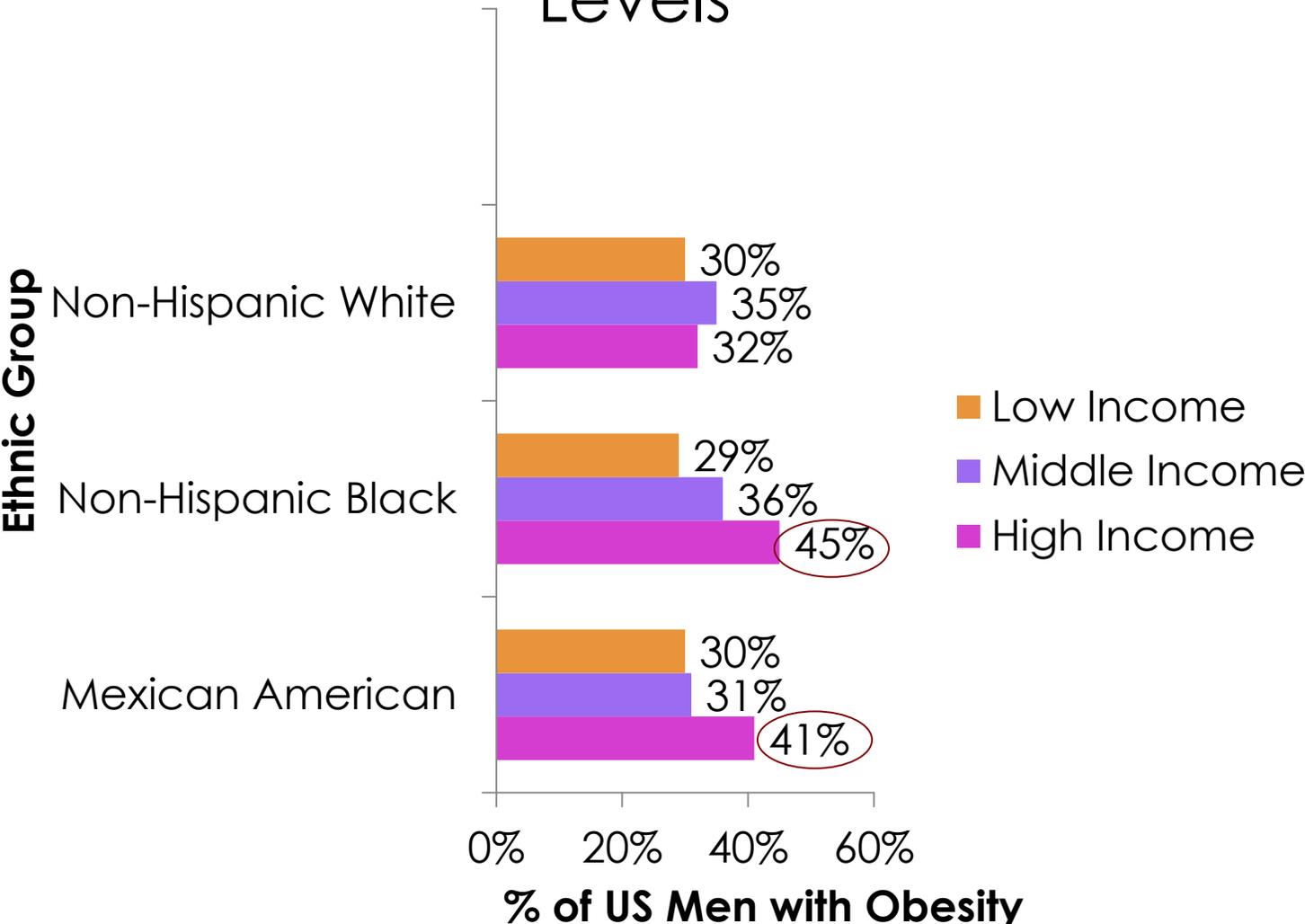
Ethnic Minorities are Less Commonly Diagnosed with Overweight and Obesity

NHANES 1999-2004 for Persons with BMI>30

Race/ Ethnicity	Odd Ratio
Non-Hispanic White	1.0
Non-Hispanic Black	0.6
Hispanic	0.7

Davis NJ et al. Obesity 2009

In some studies, Ethnic Minorities have Smaller Response to Weight Loss Pharmacotherapy

	Sibutramine	Orlistat
Non-Hispanic Whites	-4.4kg	-2.8 kg
Ethnic Minorities	-2.7 kg	-2.3 kg

Osei-Assibey et al. Diabetes, Obesity, and Metabolism 2011

There is Minimal Ethnic/ Racial Difference in Pharmacotherapy Response to Liraglutide

A

Estimated treatment difference (%)

Change from baseline (%)

		Liraglutide 3.0 mg LS means (N)	Placebo LS means (N)	ETD (%) [95% CI]
White		-7.7 (2776)	-2.3 (1611)	-5.3 [-5.6 to -4.9]*
Black/African-American		-6.3 (339)	-1.4 (194)	-4.8 [-5.9 to -3.7]*
Asian		-6.3 (112)	-2.5 (51)	-4.0 [-6.1 to -2.0]*
Other		-7.3 (72)	-0.49 (33)	-6.8 [-9.3 to -4.3]*

-10 -8 -6 -4 -2 0 2

Favours liraglutide 3.0 mg Favours placebo

Test for interaction between treatment and race: p = 0.33
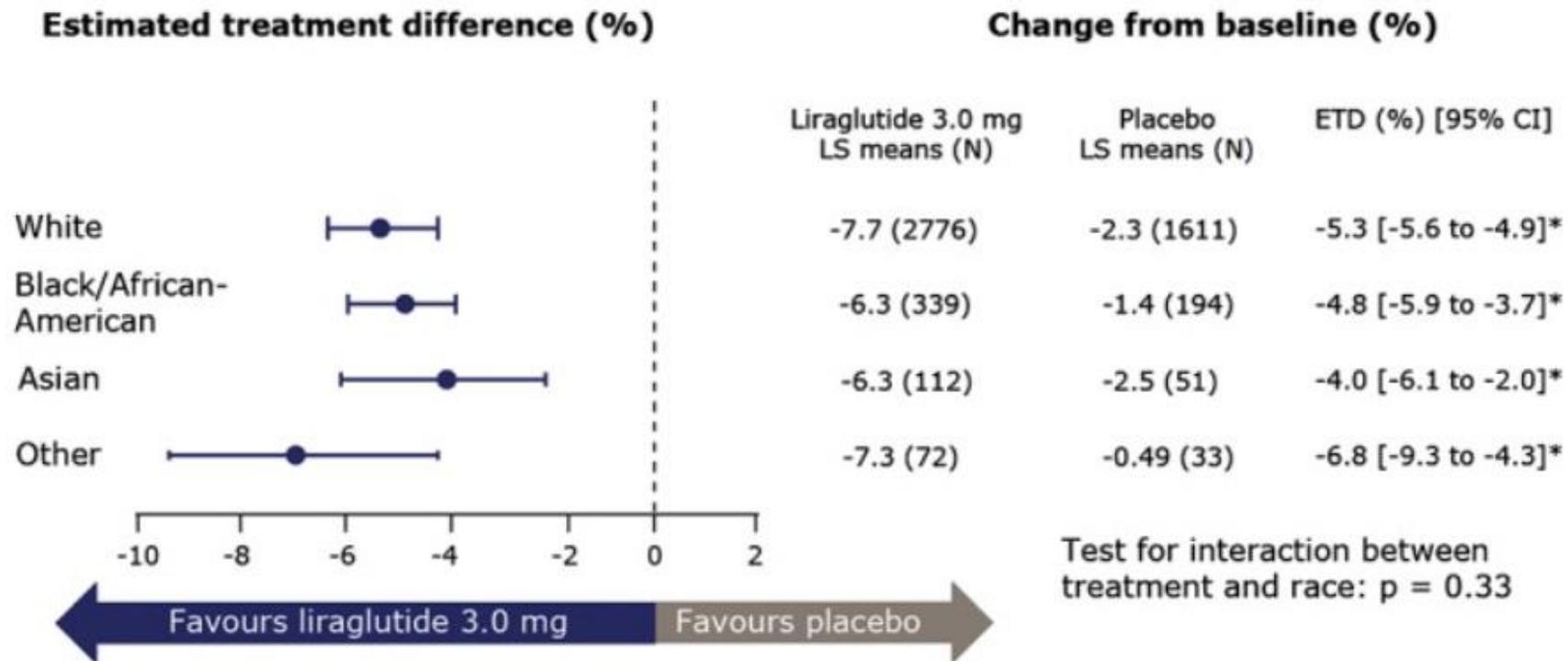
There is Minimal Ethnic/ Racial Difference in Pharmacotherapy Response to Liraglutide

B

	White	BAA	Asian	Other
≥5% weight loss OR (95% CI):	4.7 (4.1; 5.4)*	5.9 (3.8; 9.2)*	3.8 (1.8; 7.9)*	15.2 (4.2; 55.0)*
>10% weight loss OR (95% CI):	4.6 (3.8; 5.6)*	6.6 (3.2; 13.5)*	3.9 (1.3; 12.1)*	∞*†
>15% weight loss OR (95% CI):	4.4 (3.3; 5.9)*	5.7 (1.7; 19.0)*	∞*†	∞*†

Test for interaction between treatment and race:

■ Liraglutide 3.0 mg   ■ Placebo

p = 0.17   p = 0.07   p = 0.23
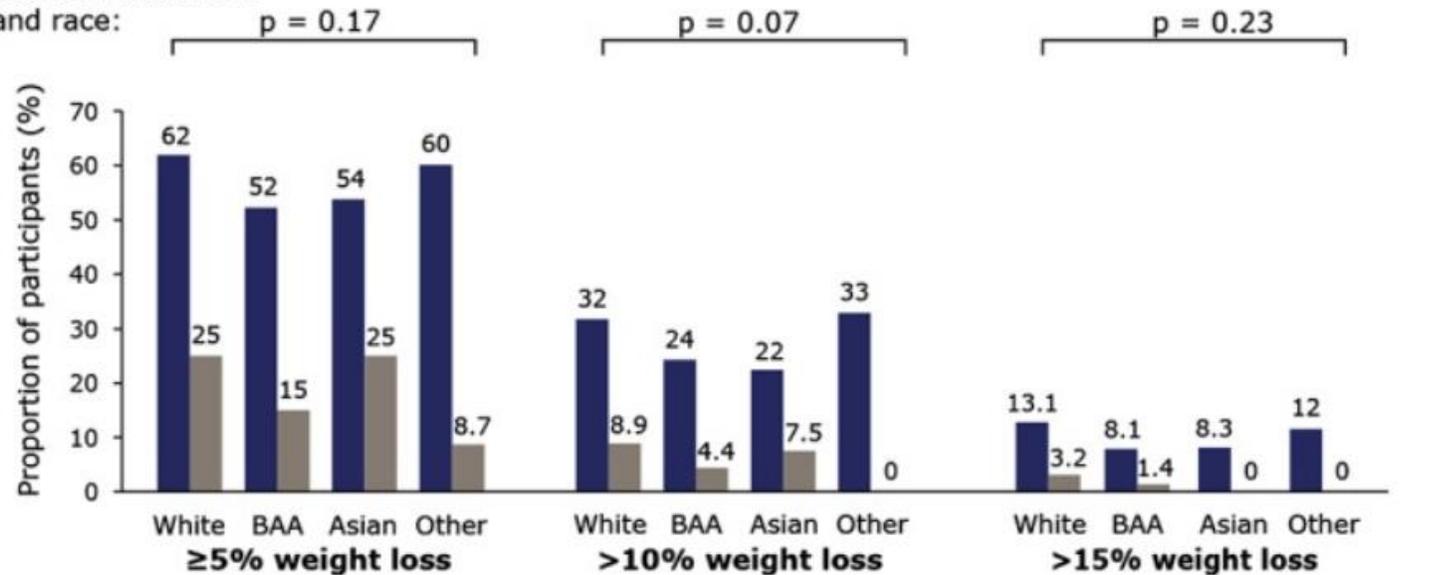
African-Americans Achieve Less Weight Loss After Bariatric Surgery

Mean Absolute Difference in Estimated Weight Loss in Caucasians versus African-Americans

-8.4%

% Estimated Weight Loss

Potential Reasons for Ethnic Disparities in Obesity

- ↑↑ Energy Intake
- ↓ Energy Expenditure
- ↑↑ Life Stressors
  - Racism
  - Lack of Career Options
  - Family Illness/ Death
- Cultural Influences
- Genetics

Johnston DW et al. Demography 2011
Johnson P et al. ABNF 2012

Factors which affect access to weight loss surgery

Race
Age
Sex
SES
Location
Referral

Jackson et al. Systematic Reviews 2014, 3:15
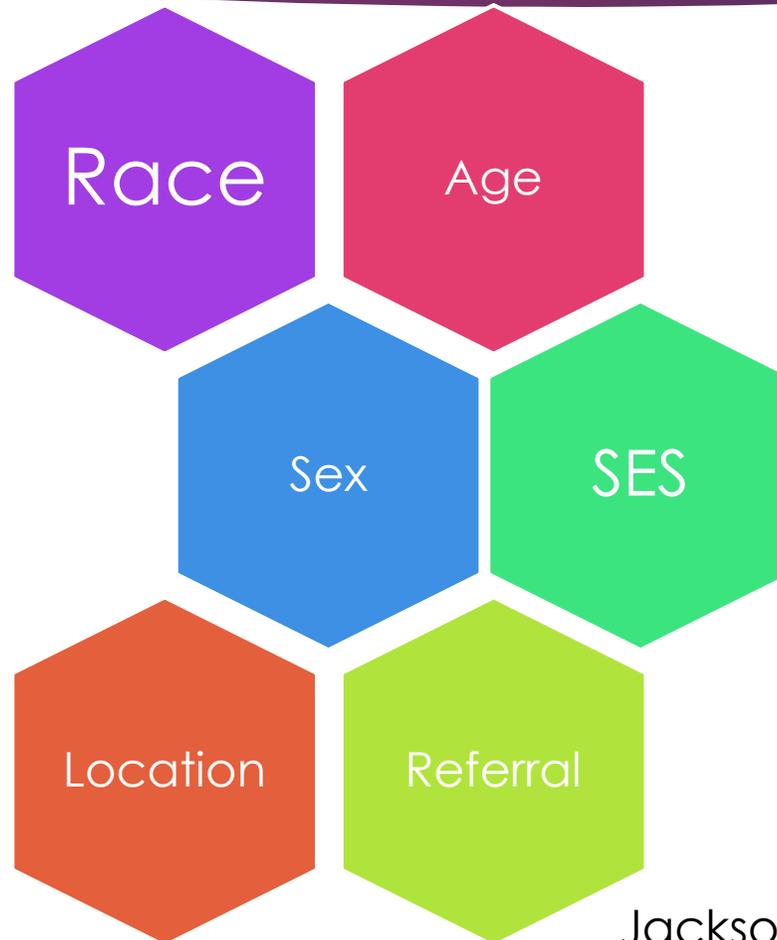
Access to RYGB in the United States

108,333 patients
- 79% white
- 12% black
- 9% Hispanic

Black patients
- Higher BMI
- More likely to have HTN

Serious Adverse Events
- Higher in Blacks (3.65%)
- Hispanics (3.19%)
- Whites (2.01%)

Sudan R et alJ Gastrointest Surg (2014) 18:130–136
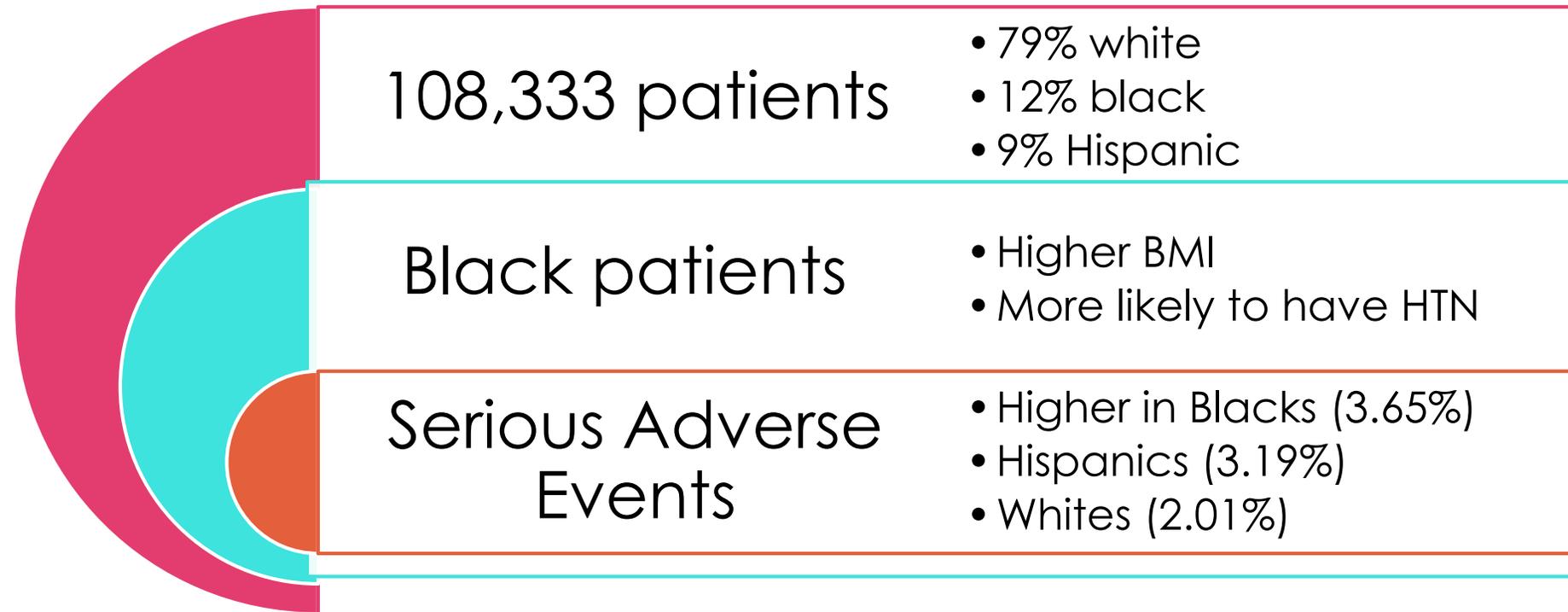
Are minorities less likely to proceed with weight loss surgery?

▶ 651 patients at 2 academic medical centers in Boston

▶ Evaluated whether racial and ethnic minorities were less likely to proceed with weight loss surgery

▶ Once referred, racial and ethnic minorities just as likely to proceed with surgery as their non-white counterparts

▶ Comorbid illness burden was similar, but there was difference in baseline BMI

What accounts for difference in response from weight loss surgery?

Demographics

Clinical (BMI, comorbidities, QOL)

Behavioral (Eating, PA, ETOH intake)

Wee CC et al. Obesity Surgery 2017

Adjustment of BMI Scale for Race, Gender, and Obesity Related Diseases

TABLE. Cutoffs for BMI Based on ROC Curve Analysis

| Obesity Co-morbidity	BMI (kg/m²)					
	Men			Women		
	Black	Hispanic	White	Black	Hispanic	White
Hypertension	28	29	28	31	28	27
Dyslipidemia	27	26	27	29	27	25
Diabetes	29	29	30	33	30	29
≥2 risk factors	28	29	29	31	30	28
Average	28	28	29	31	29	27

BMI = body mass index; ROC = receiver operating characteristic.

Case #1

- 27 year old African-American woman
- **Past medical history**:
  - Mixed Anxiety and Depression
  - Hyperinsulinsim
  - Depression
  - Hypertension
  - Asthma
- **Diet**:
  - Breakfast: Oatmeal (weight controlled)
  - Snack: Denies
  - Lunch: Chicken, Sausage
  - Snack: Fruit Cup
  - Dinner: Chicken, Sausage with vegetabls
  - Snack: Rare (Fruit Cup)
- **Exercise**: 4 T/TH- gym (elliptical (50 min)); treadmill (60 min)); Fri (treadmill- 60 min)
- **Sleep**: 6-7 hours (feels well rested)
- **Stress**: Moderate
- Strong Family History of Severe Obesity (Mother, 2 Aunts, and 1st Cousin- underwent RYGB with variable response

27 year old woman

BMI: 54

80% EBWL/
42.7% TBWL

154 lbs (BMI of 25)

BMI: 30
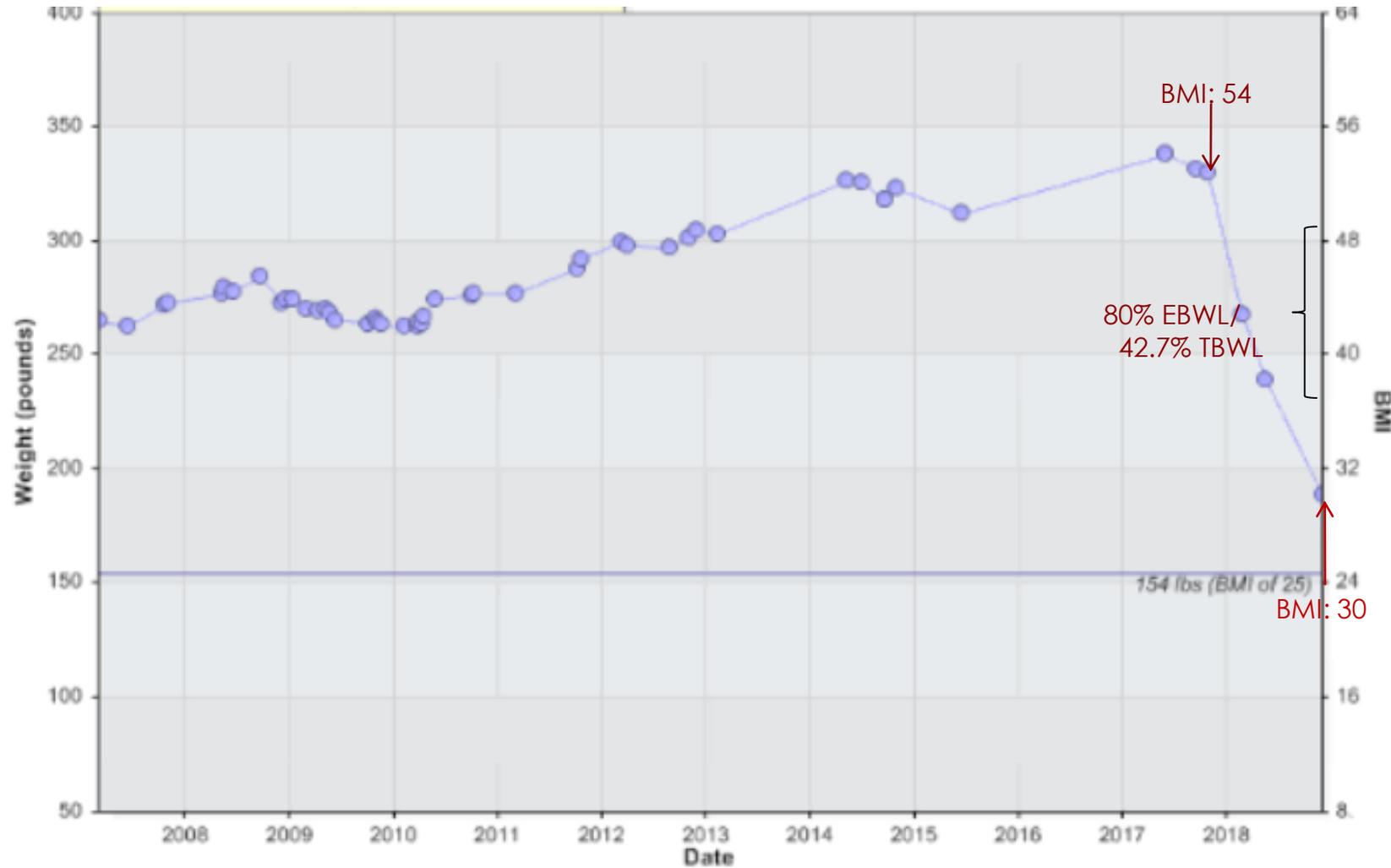
Vertical Sleeve Gastrectomy

Case #2

▶ 58 year old African-American woman

▶ **Past medical history**:

   ▶ Hypertension

   ▶ GERD

   ▶ Depression

▶ **Diet**:

   ▶ Breakfast: Scrambled eggs with spinach, onions, peppers, or sausage; OR Oatmeal with nuts/ blueberries/ blackberries

   ▶ Snack: Fruit; Protein Bar (KIND bars of Jif creamy peanut butter)

   ▶ Lunch: Leftovers (Baked chicken, vegetables, brown rice)

   ▶ Snack: Almonds, Protein Bar

   ▶ Dinner: Baked chicken, vegetables, brown rice

▶ **Exercise**: 4 days a week (1 hour); 2 days of cardio; 2 days of strength (meets with trainer twice a week)

▶ **Sleep**: 6-7 hours (feels well rested)

▶ **Stress**: Normal

▶ Post partum weight retention; Night Shift Nurse for 4 years

58 year old woman

BMI: 34

82% EBWL/
22% TBWL

164 lbs (BMI of 25)

BMI: 27.5

Phentermine
+Topiramate
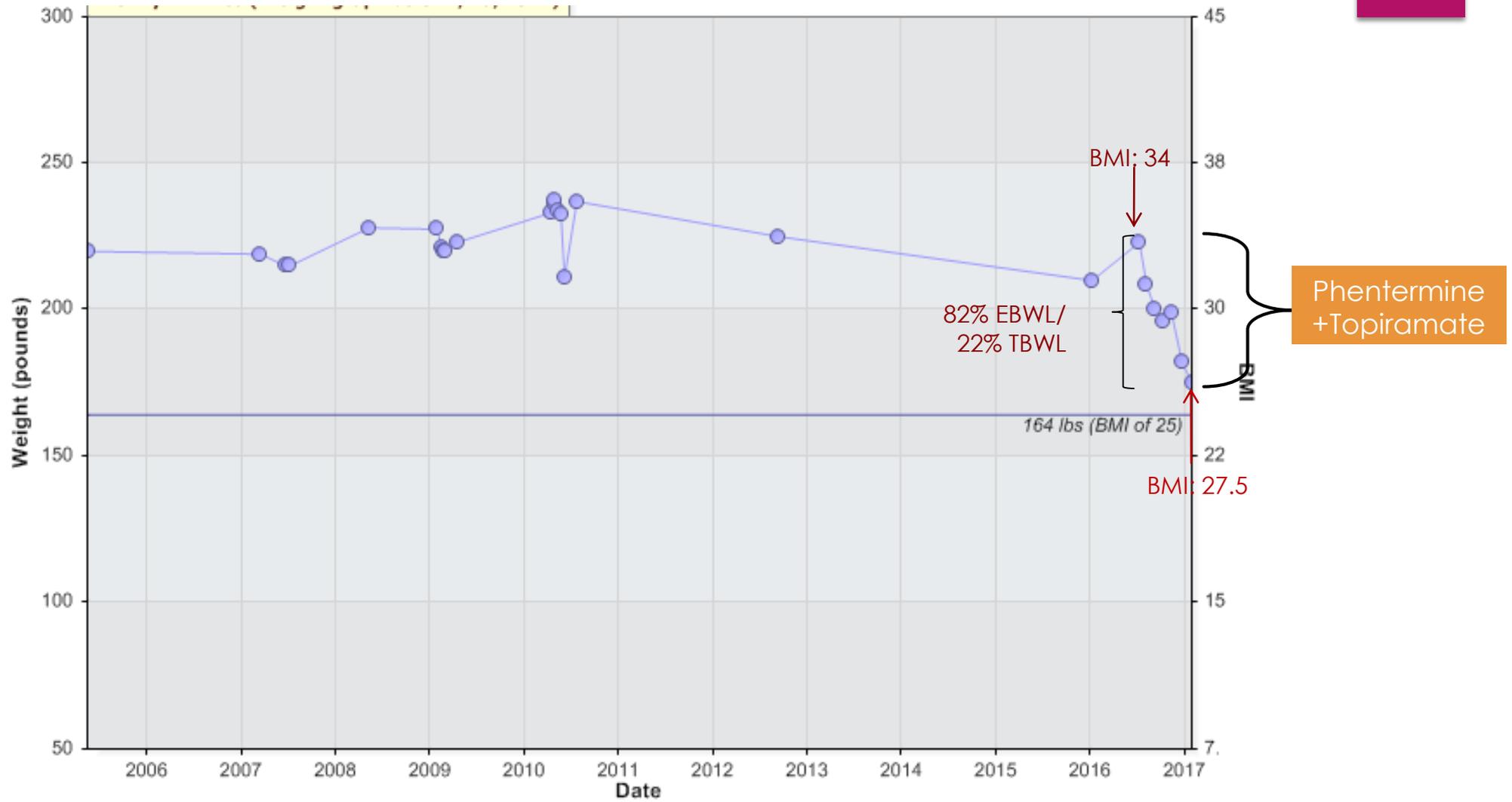
Case #3

- 49 year old Hispanic woman
- **Past medical history**:
  - Anxiety/Depression
  - Ventricular tachycardia s/p ablation
  - Mixed connective tissue disease
  - Hypertension
  - GERD
- **Diet** :
  - Breakfast: Fruit, Vitamins
  - Snack: Vitamin Water, Sobe Life Water, Fruit
  - Lunch: Lettuce (romaine and iceberg); cheese; ham, tomato, peppers, lite Italian dressing, OR vinegar/oil
  - Snack: Fruit (sometimes)
  - Dinner: Spinach, Smart Ones
  - Snack: Denies
- **Exercise**: Walking, some form of cardio, Walks 5 miles a day, Goes to Planet Fitness (Elliptical); Zumba (1 times per day; 7 days a week)
- Weight gain became prominent after childbirth (10 lbs. with each pregnancy X6); tobacco cessation, with metoprolol

49 year old woman
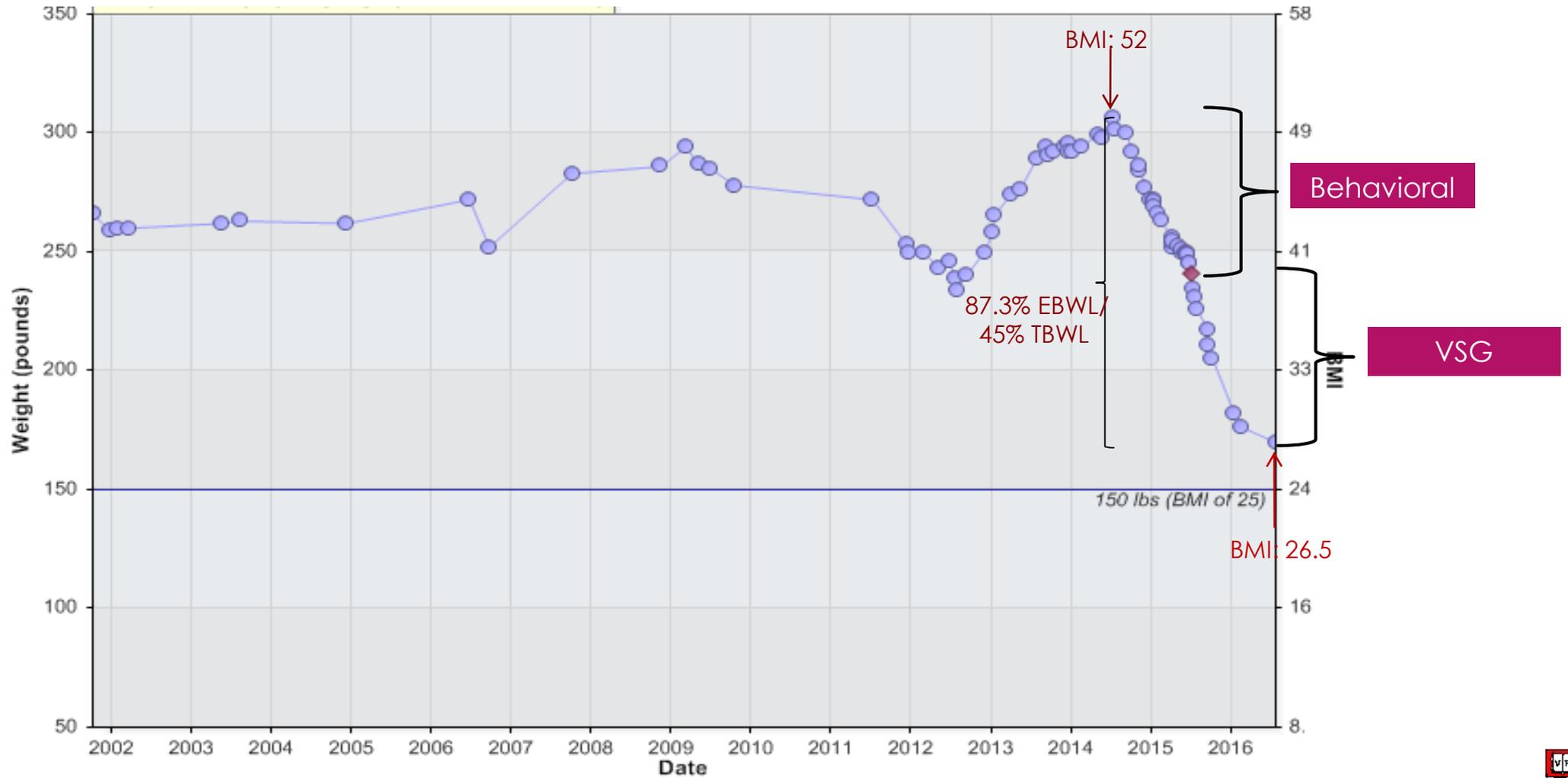
Case #4

- 67 year old African-American woman
- **Past medical history**:
  - Type 2 Diabetes Mellitus
  - Hypertension
  - CAD
  - CHF
  - NASH
  - Breast Cancer
  - GERD
- **Diet :**
  - Breakfast: Regular Yogurt with Fruit (may snack)
  - Snack: Occasionally popcorn
  - Lunch: Chicken or Fish with vegetables and/or fruit
  - Snack: Fruit (apple, oranges, and watermelon)
  - Dinner: Fish (Haddock, Tilapia) or Chicken with occasional vegetables
  - Snack: Nuts
- **Exercise**: Walking, some form of cardio; 1/2 hour per day; joined a gym (started on the treadmill)
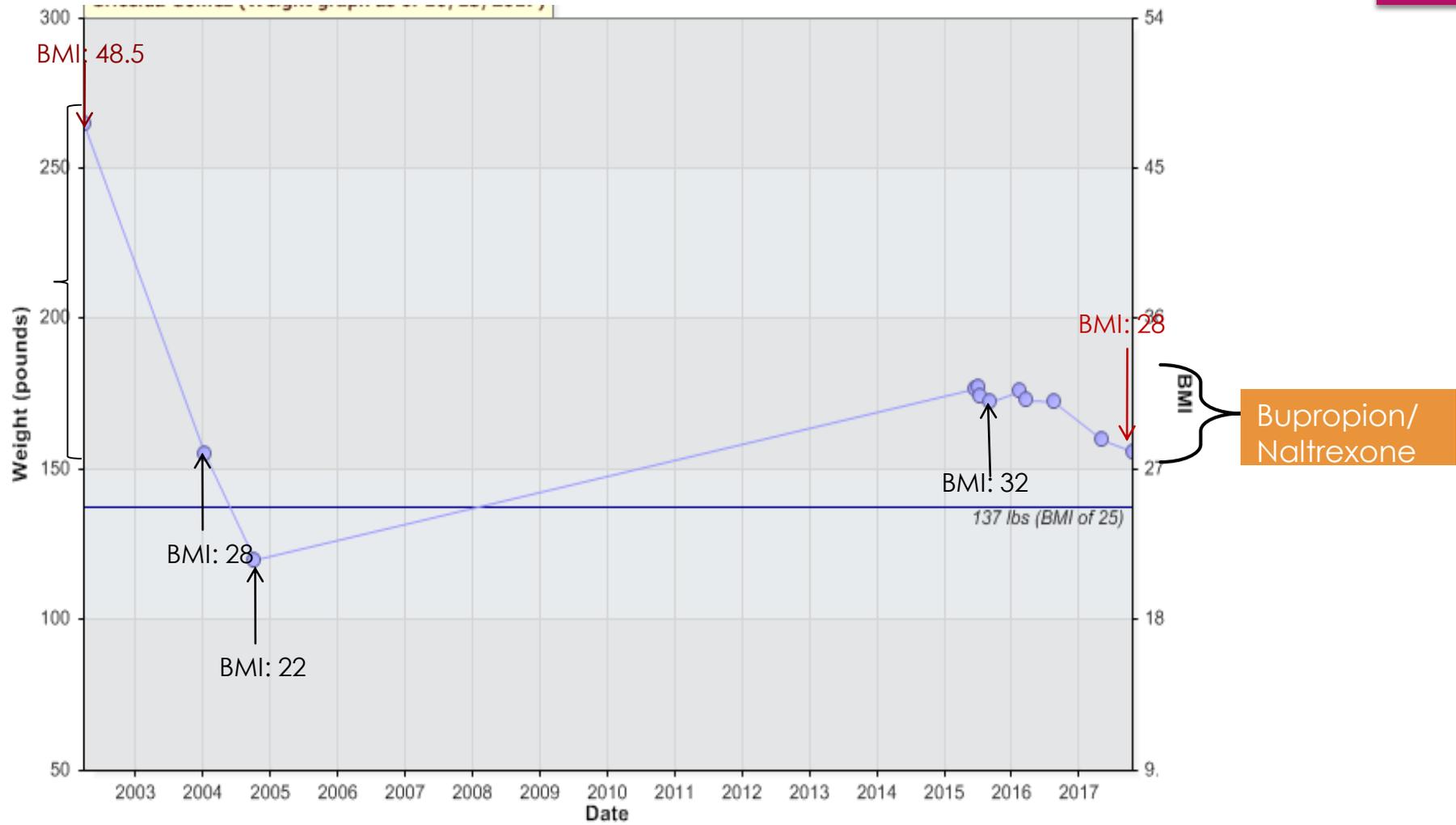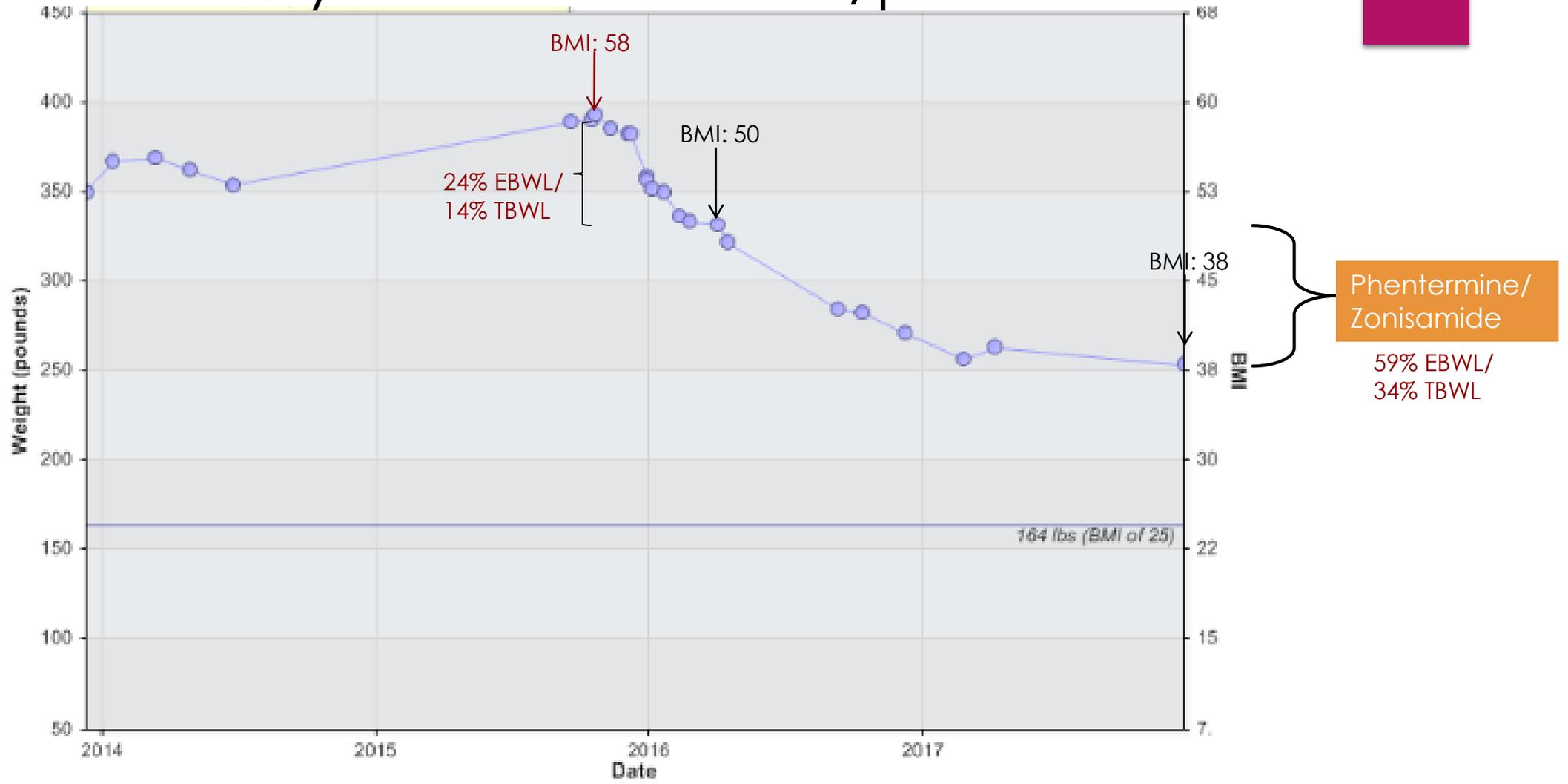- Weight gain became prominent in peri-menopause

67 year old woman s/p VSG
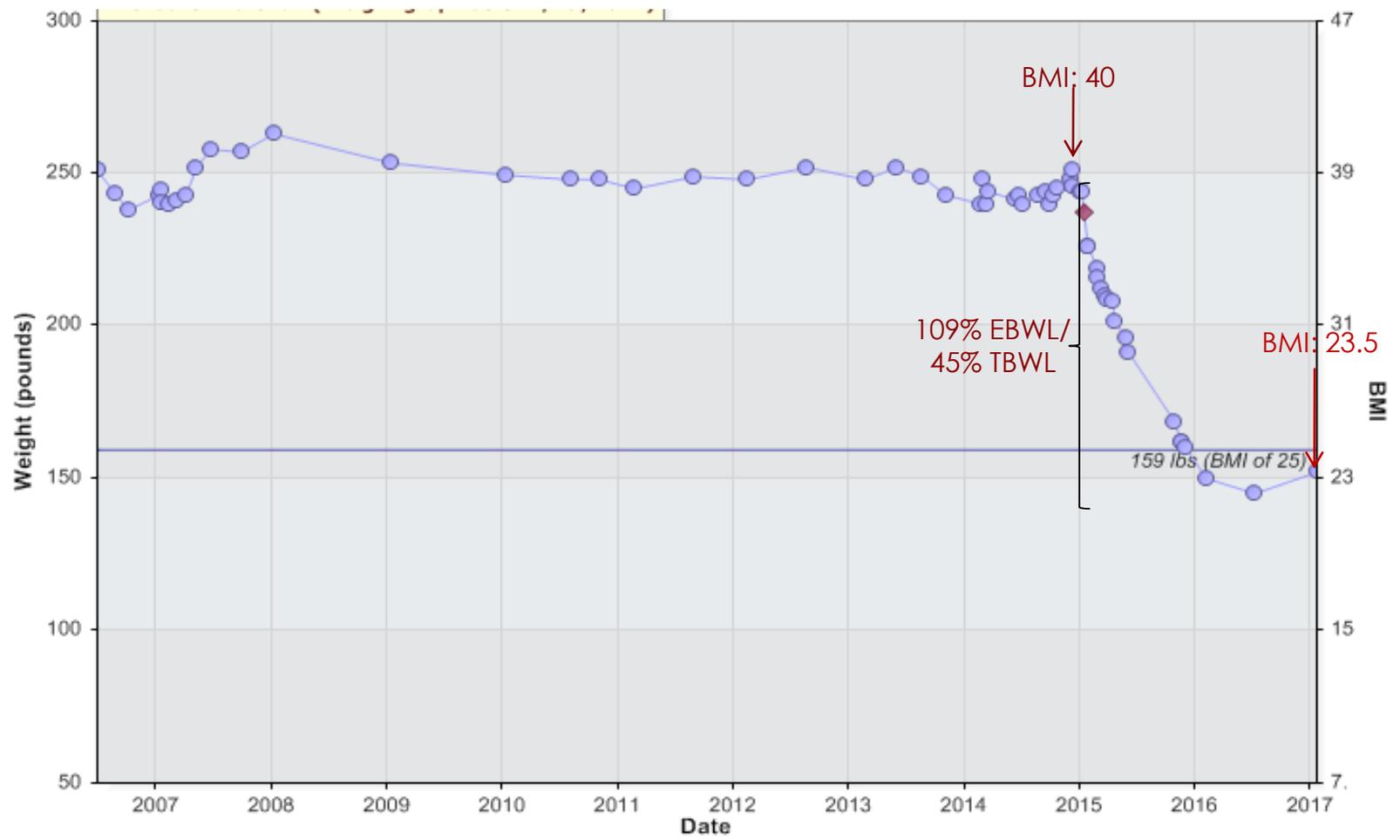
30 year old woman s/p RYGB

45 year old woman s/p VSG

59 year old woman s/p RYGB

Summary

- Obesity is a Multi-factorial disease process

- Regulation of food intake is complex

- ↑ Prevalence of Obesity in Ethnic Minorities

- Persons vary with response to education level and obesity

- Health Care Providers are less likely to diagnose ethnic minorities with overweight/obesity

- Ethnic minorities have less pronounced response to weight loss surgery and pharmacotherapy

Action Items

▶ Steps should be taken to ascertain etiology of higher prevalence of obesity in ethnic minorities

▶ Health care providers should be more vigilant about giving appropriate diagnosis of overweight/obesity in ethnic minorities

▶ Strategies should be employed to address disparities in prevention and treatment of obesity in ethnic minorities

Thank You For Your Time

Fatima Cody Stanford, MD, MPH, MPA, FAAP, FACP, FTOS

fstanford@mgh.harvard.edu

@fstanfordmd

@fatimacodystanford