

**TREATING OBESITY**

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**Disclosures**

I have no relevant financial relationships or conflicts of interest to disclose.

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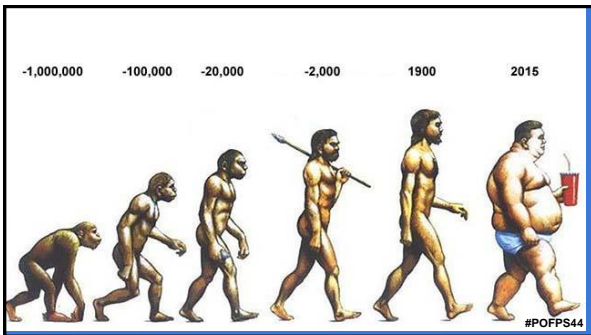
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**Stephen F. Gold, DO**

Medical School: PCOM 1990

Osteopathic Internship: Community Hospital of Lancaster

Residency: Family Medicine Forbes Regional Hospital, Monroeville, PA

Board Certifications: ABFM, ABOM

Managing Partner, Obesity Medicine Specialist, Family Physician

Dr. David J. Silverstein Associates

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**In This Lecture:**

- Define obesity
- Discussion of the impact of obesity
- The physiology behind obesity
- The evaluation of the obese patient
- Treatments for obesity
- Case Reviews

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**What is Obesity?**

Obesity is defined by the WHO as: The abnormal or excessive accumulation of fat which may impair health.

It is classified by BMI weight categories:

- <18.5 Underweight
- 18.5 to <25 Healthy Weight
- 25 to <30 Overweight
- 30 to <35 Obesity Class I
- 35 to <40 Obesity Class II
- =>40 Obesity Class III



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**Waist Circumference: Increased Body Fat (Adiposity)**

Obesity classification:  
 Waist circumference (WC)\*

Abdominal Obesity - Men  
 ≥ 40 inches  
 ≥ 102 centimeters

Abdominal Obesity - Women  
 ≥ 35 inches  
 ≥ 88 centimeters

\*Different WC abdominal obesity cut-off points are appropriate for different races (i.e., ≥ 90 centimeters for Asian men and ≥ 80 centimeters for Asian women)

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**Waist Circumference and Metabolic Syndrome**

Component	Clinical Cutoff Values
Waist Circumference	≥102 cm in men ≥88 cm in women
Triglycerides	≥150 mg/dL
HDL Cholesterol	<40 mg/dL in men <50 mg/dL in women
Blood Pressure (BP)	≥130 mmHg Systolic BP or ≥85 mmHg Diastolic BP
Fasting Glucose	≥100 mg/dL
Diagnosis	Any 3 of the 5 features above

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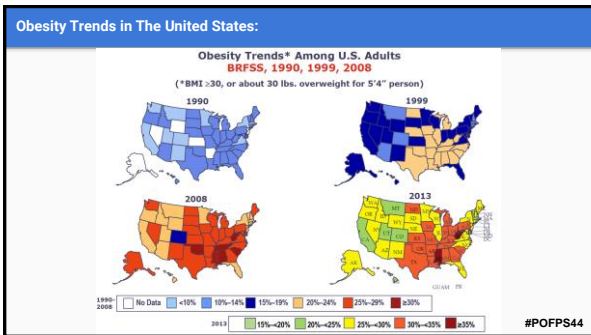
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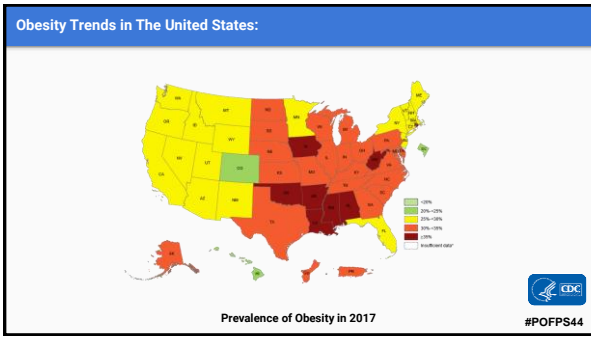
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### Is Obesity a Disease?

- Is it a lifestyle choice?
- Is it the patient's fault?
- Is it a mental issue or addiction?
- Is it a simply another risk factor for disease?

If we label it as a disease then over one third of Americans would be afflicted!

How does Obesity differ from other diseases such as Hypertension or Diabetes?

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### Why Obesity is a Disease

- It is associated with impaired body function
- Like other diseases, it results from physiological dysfunction (precipitated by numerous forces in modern society)
- It causes, exacerbates or accelerates more than 180 significant comorbid diseases
- It is associated with a substantial burden of morbidity and premature death
- Like other diseases, obesity is a chronic, progressive, relentless disease which will need to be treated until the end.

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### “The Creep”

**Obesity is a chronic and progressive disease, with most adults gaining ~1 lb/year over time<sup>1,2</sup>**

Change in weight over time<sup>2</sup>

Year	Males (N=5,037) Weight (lb)	Females (N=5,001) Weight (lb)
1990	180	150
1992	182	152
1994	184	154
1996	186	156
1998	188	158
2000	190	160
2002	192	162
2004	194	164
2006	196	166
2008	198	168

>90% of young adults move into a higher BMI category by middle age<sup>2</sup>

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### Where is the “Cure”?

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# The Cause(s) Of Obesity

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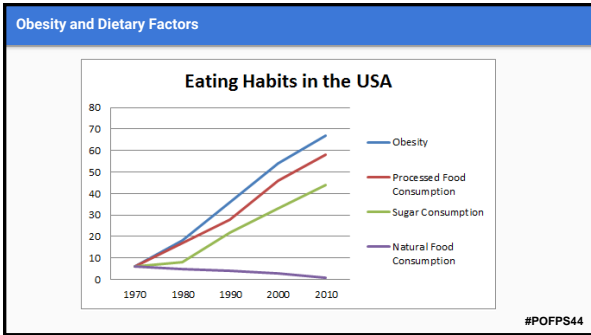
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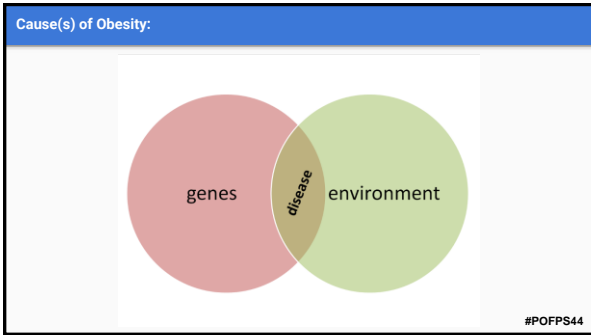
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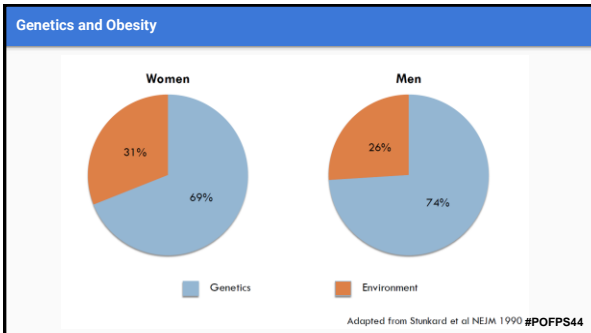
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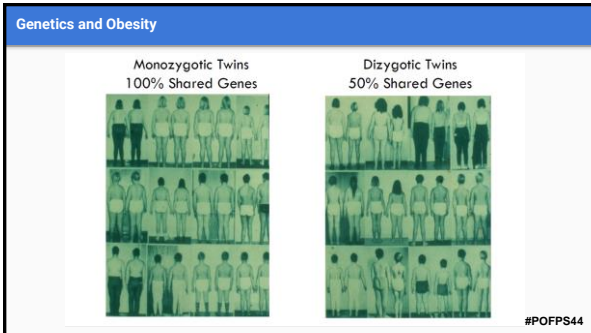
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### Comorbidities and Obesity:

#### Health Consequences of Obesity

- Depression
- Obstructive sleep apnea
- Coronary artery disease
- Fatty liver
- Gallbladder disease
- Incontinence
- Intertigo
- Osteoarthritis
- Gout
- Pseudotumor cerebri
- Heart failure
- GI Reflux disease
- Diabetes
- Hypertension
- Cancer
- Infertility
- Thrombosis

#### 13 cancers are associated with overweight and obesity

- Bladder
- Brain
- Colon
- Esophagus
- Endometrium
- Esophagus
- Galbladder
- Kidney
- Liver
- Pancreas
- Prostate
- Stomach
- Uterus
- Uterine Cervix

Vitalsigns  
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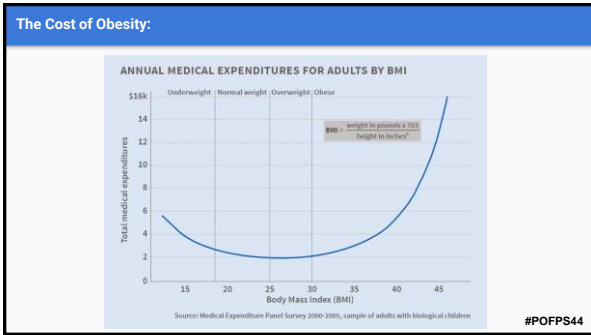
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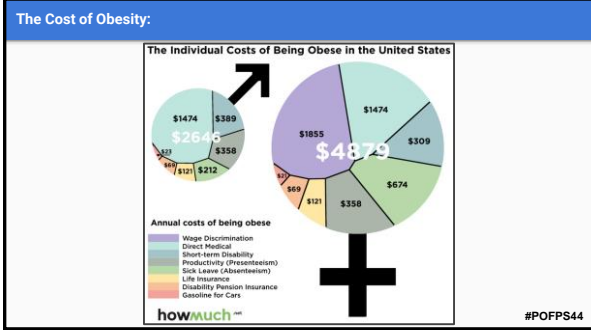
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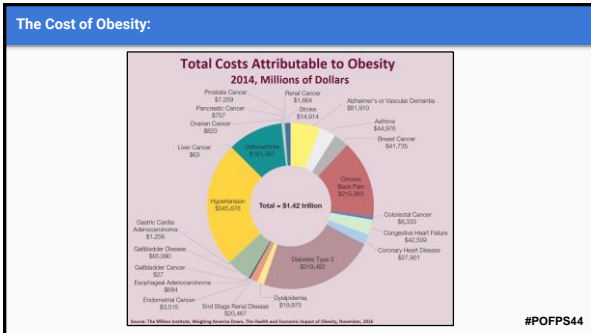
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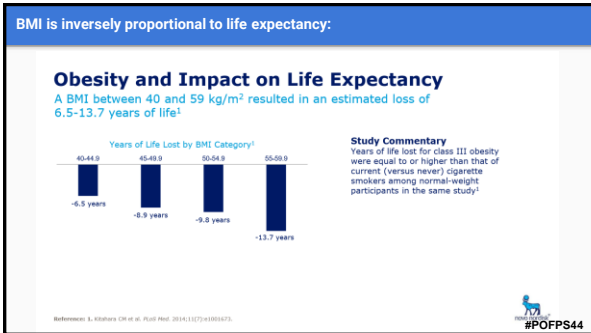
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**10% Weight Loss Will Improve the Following Conditions Effected by Obesity**

<ul style="list-style-type: none"><li>• Osteoarthritis</li><li>• Rheumatoid Arthritis</li><li>• Low Back Pain</li><li>• Cancer (Esophagus, Uterus, Colon, Kidney, Breast)</li><li>• Coronary Artery Disease</li><li>• Carpal Tunnel Syndrome</li><li>• CHF</li><li>• Kidney Disease</li><li>• Venous Insufficiency</li><li>• DVT</li><li>• Gallbladder Disease</li><li>• Gout</li></ul>	<ul style="list-style-type: none"><li>• Hypertension</li><li>• Diabetes</li><li>• Impaired respiratory Function</li><li>• Sleep Apnea</li><li>• Lipid Parameters</li><li>• NAFLD</li><li>• OB/Gyn Complications</li><li>• Pain</li><li>• Pancreatitis</li><li>• Stroke</li><li>• Surgical Complications</li><li>• Urinary Stress Incontinence</li><li>• And More...</li></ul>
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**What is the best way to lose weight?**



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**The winner is...Lifestyle Changes**



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Weight Loss is Simple...Right??

**Energy Intake**      **Energy Expenditure**

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Is a Diet Going to Guarantee Success?

What is the Best Diet?

- Lowfat?
- Dash?
- Low Carb: Atkins, South Beach?
- High Protein?
- “Juicing”?
- Paleo?
- Mediterranean?
- 1200 Calorie Diet? 1400 Calorie Diet?
- Vegan?
- Very Low Calorie Diet (VLCD)?

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**Weight Loss Plans**

Weight Loss Program:	Typical Cost per Month:	Avg Cost per lb Lost:	Avg lb Lost per Month:	Includes:
<b>Nutrisystem</b>	\$2380 to \$2590 per 6 months	\$130.00 to \$139.00 per lb		Does Not Say Some Food
<i>Jenny Craig</i>	\$2221 to \$3341 per 6 months	\$131.00 to \$237.56 per lb		Does Not Say Some Food
<b>WeightWatchers</b>	\$716.00 per month	\$98.00 per lb	\$716 divided by \$90 = 8 lbs	Foods, Meetings
<b>SOUTH BEACH DIET</b>	\$948.00 per month	\$45.00 to \$79.00 per lb	21 lbs 1st month - 12 lbs after	Does Not Say
<b>SOUTH BEACH DIET</b>	\$818.00 per month	\$48.00 to \$102.00 per lb	17 lbs 1st month - 8 lbs after	Does Not Say
<b>Body by Vi</b>	\$99.00 to \$249.00 per month Depending on Kit Chosen	\$9.30 to \$12.45 per lb <i>(Guaranteed Results!)</i>	10 lbs to 30 lbs per month Depending on Kit Chosen	All Inclusive

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What About Supplements?

1. Garcinia Cambogia Extract
2. Hydroxycut
3. Caffeine
4. Orlistat (Xenical)
5. Raspberry Ketone
6. Green Coffee Extract
7. Glucomannan
8. Meratrim
9. Green Tea Extract
10. Conjugated Linoleic Acid (CLA)
11. Forskolin
12. Bitter Orange Extract/Synephrine

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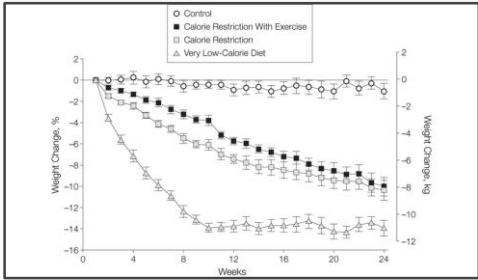
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What is the Best Diet?



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What is the Best Exercise?

The image contains three promotional graphics for exercise routines. The first graphic on the left shows a hand holding a piece of paper that says "30 MINUTES EXERCISES TO LOSE ARM FAT IN 1 WEEK AT HOME (NO EQUIPMENT REQUIRED)". The middle graphic shows a woman performing a squat with a red ball, titled "10 Exercises For The PEAR SHAPED BODYTYPE". The right graphic shows a woman performing a handstand with a stability ball, titled "6 STABILITY BALL EXERCISES to flatten your stomach!". The website "Tone-and-Tighten.com" and the hashtag "#POFPS44" are visible at the bottom.

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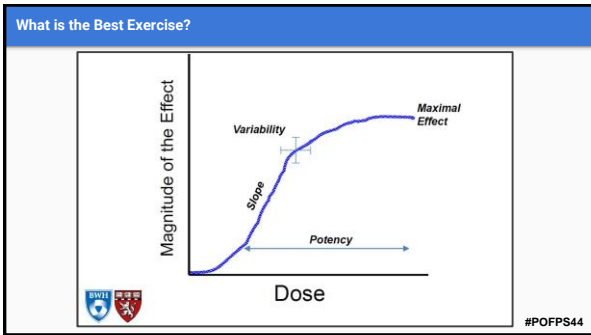
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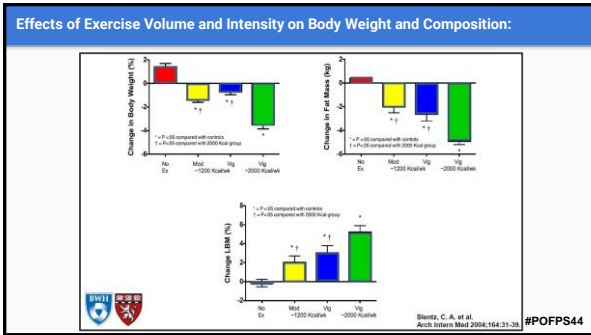
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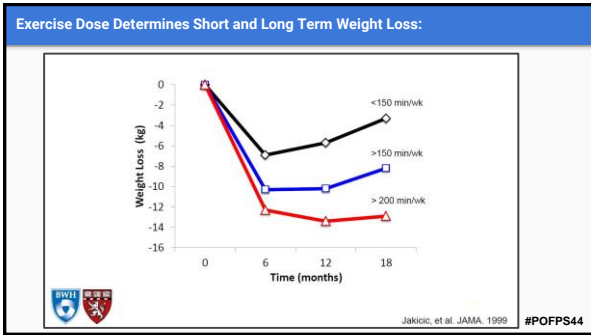
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**The Bottom Line:**

**Something is better than nothing...**

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Why is this so Difficult?



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The Standard Approach:



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Weight Loss is Simple...Right??

**Energy Intake**      **Energy Expenditure**

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Weight Loss is Simple...Right??

**Energy Intake**      **Energy Expenditure**

**Appetite vs. Satiety**

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Weight Loss is Simple...Right??

**Energy Intake**      **Energy Expenditure**

**Appetite vs. Satiety**      **BMR + Activity + Thermogenesis**

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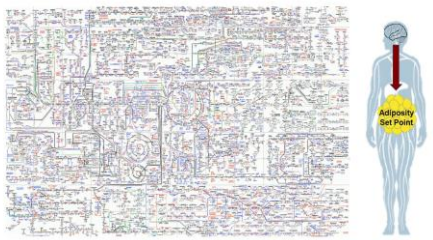
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The Physiology of Weight Management:



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The Physiology of Weight Management:



**The Set Point**

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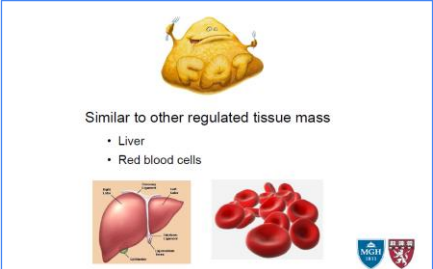
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The Human Body Seeks a Stable Fat Mass



Similar to other regulated tissue mass

- Liver
- Red blood cells

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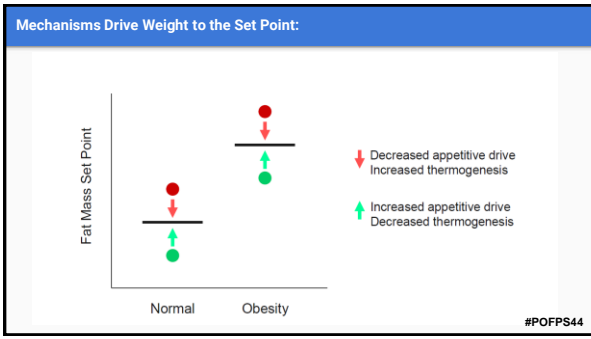
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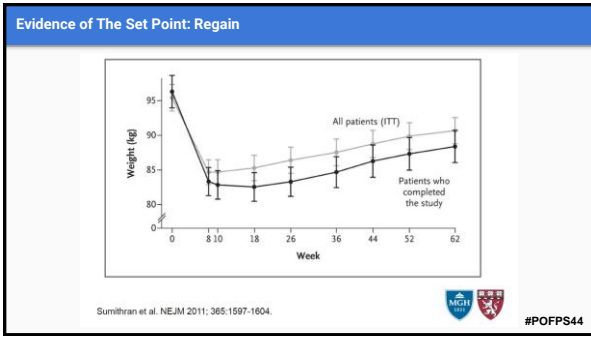
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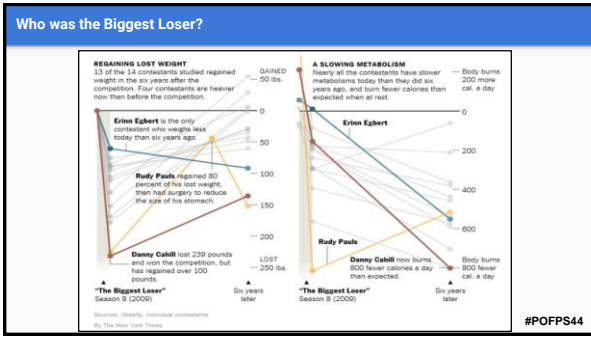
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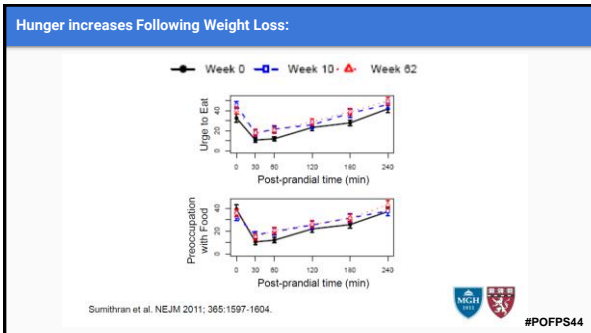
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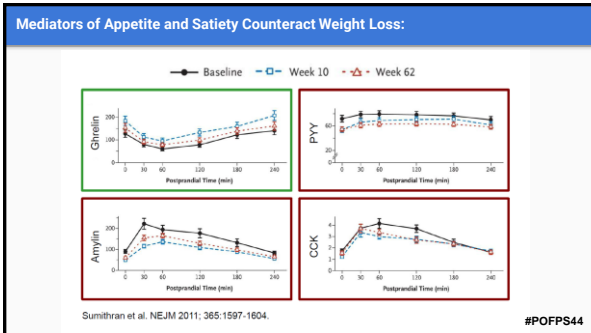
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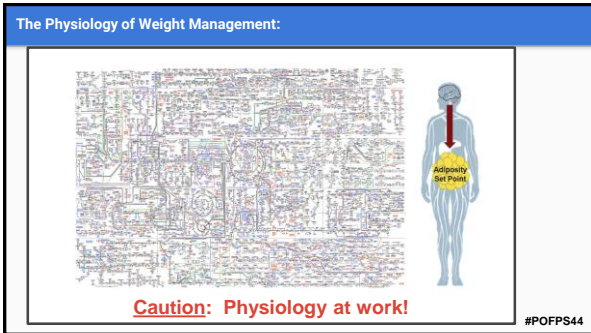
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The Physiology of Weight Management:

**Food for thought:**

*Does overeating cause obesity*

or

*Does obesity cause overeating??*

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The Control Center:

► Nuclei of the Hypothalamus

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**Appetite Regulation**  
 A New Frontier

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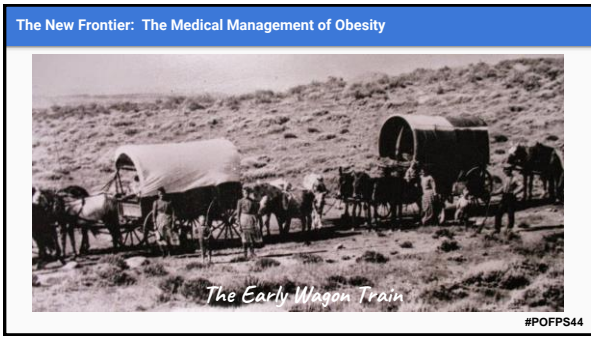
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Medical Evaluation of Obesity

**Modifiable**  
**Vs.**  
**Non-modifiable Causes**

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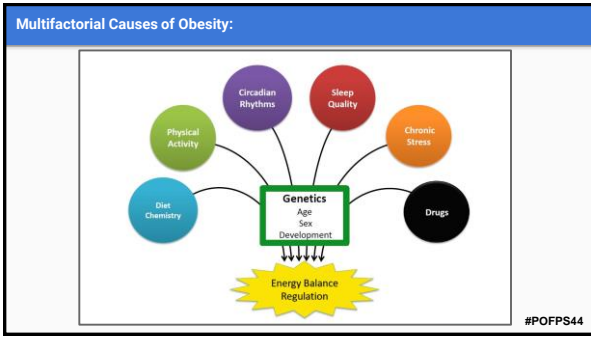
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### Medical Evaluation of Obesity

- 1) Medical Problems
- 2) Mental Problems
- 3) Medication Issues
- 4) Everything Else

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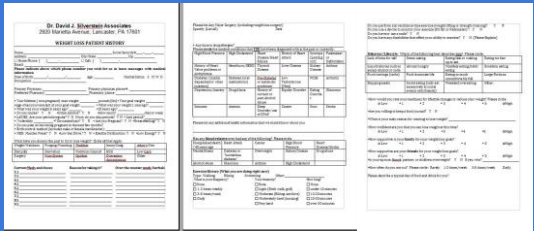
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### New Patient History:



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### Patient History is Key

- Diet and Exercise History (what has worked)
- Medical History
  - Sleep Apnea, Thyroid Disease, Low T, PCOS, Hyperglycemia
- Family History
- Medication Use
  - Steroids, Diabetes Meds, BP Meds, Psych Meds
- Previous weight loss surgery

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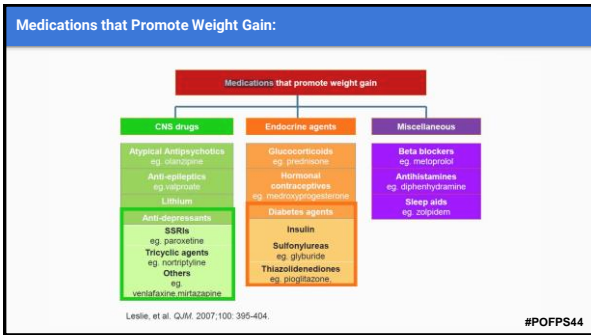
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# Physical Exam

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- Physical Exam**
- Vital Signs**
- Height with bare or stocking feet measured with a stadiometer
  - Weight using calibrated scale and method consistent from visit to visit (i.e., light indoor clothing or gown)
  - Body Mass Index
  - Waist circumference
    - Standing using superior iliac crest
    - May not provide additional diagnostic information among patients with BMI > 35 kg/m<sup>2</sup>
  - Blood pressure using appropriately sized cuff
  - Pulse
  - Neck circumference
- General Physical Exam**
- Comprehensive physical exam
  - Special emphasis on physical exam of the nose, throat, neck, lung, heart, abdomen, musculoskeletal system, and integument
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# Lab Tests

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### Laboratory: Routine

<b>Adiposity-relevant Blood Testing</b> <ul style="list-style-type: none"><li>• Fasting blood glucose</li><li>• Hemoglobin A1c</li><li>• Fasting lipid levels<ul style="list-style-type: none"><li>– Triglycerides</li><li>– Low-density lipoprotein (LDL) cholesterol</li><li>– High-density lipoprotein (HDL) cholesterol</li><li>– Non-HDL cholesterol</li></ul></li><li>• Liver enzymes and other liver blood tests</li><li>• Electrolytes (i.e., potassium, sodium, calcium, phosphorous, etc.)</li><li>• Renal blood testing (i.e., creatinine, blood urea nitrogen, etc.)</li><li>• Uric acid</li><li>• Thyroid stimulating hormone (TSH)</li><li>• Vitamin D levels</li></ul>	<b>General Laboratory Testing</b> <ul style="list-style-type: none"><li>• Complete blood count</li><li>• Urinalysis</li><li>• Urine for microalbumin</li></ul>
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### Laboratory: Individualized Testing

- Glucose tolerance testing
- Fasting insulin testing
- Fasting proinsulin, C-peptide, and insulin if hyperinsulinemia is suspected as a secondary cause of obesity (e.g. insulinoma, nesidioblastosis, etc.);
- One milligram (mg) overnight dexamethasone cortisol suppression test, 24-hour urine collection for (free) cortisol, or repeated measures salivary cortisol collection at 11:00 PM if endogenous hypercortisolism is suspected as a secondary cause of obesity
- Prolactin, estradiol, follicle-stimulating hormone, luteinizing hormone, and pregnancy test in women with unexplained oligomenorrhea or amenorrhea
- Testosterone and other androgen levels (i.e., dehydroepiandrosterone sulfate/DHEAS) for women with hirsutism or polycystic ovarian syndrome
- Testosterone (and if low to a clinically significant degree: possibly prolactin, follicle-stimulating hormone, and luteinizing hormone) for men with impotence or physical findings of hypogonadism
- Apolipoprotein B and/or lipoprotein particle number, especially if triglyceride levels are elevated
- Iron studies (iron, total iron binding capacity, ferritin)
- High-sensitive C-reactive protein (hs-CRP)

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# Diagnostic Tests

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- ### Diagnostic Testing: Individualized
- Magnetic-resonance imaging or computed tomography of the brain if a structural lesion of the pituitary/hypothalamus is suspected (i.e., craniopharyngioma, pituitary tumor)
  - Resting electrocardiogram
  - Cardiac stress testing
  - Echocardiogram
  - Coronary calcium scores
  - Ankle-brachial index
  - Sleep studies
  - Anaerobic threshold/ $\text{VO}_2$  testing
  - Imaging studies of the liver (i.e., ultrasound)
  - Resting metabolic rate (RMR)
- Obesity Algorithm © 2015-2016 Obesity Medicine Association      References: [1] [2] [3]      #POFPS44

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# Physical Exam

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# Treatment Of Obesity the Disease

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## Assess Patient Readiness

- 1) Is patient open to discussion?
- 2) Motivational Interviewing
- 3) Assessing barriers to lifestyle changes
- 4) Agreement to work together towards goal
- 5) This is a marathon not a sprint!

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When do we utilize different options?

### Multiple Treatment Options Are Needed to Help People With Obesity Lose Weight and Improve Their Health<sup>1</sup>

Clinical management of obesity: AHA/ACC/TOS guidelines<sup>2-4</sup>

Treatment	BMI category (kg/m <sup>2</sup> )				
	25-26.9	27-29.9	30-34.9	35-39.9	≥40
Diet, physical activity, and behavior therapy	Yes, with comorbidities	Yes	Yes	Yes	Yes
Pharmacotherapy	No, with comorbidities	Yes	Yes	Yes	Yes
Surgery				Yes, with comorbidities	Yes

Healthy eating and physical activity must be part of any weight-loss intervention, but are not always sufficient to maintain weight loss<sup>5</sup>

<sup>1</sup>“First” always indicates that this treatment is indicated regardless of the presence or absence of comorbidities. The solid arrow indicates the point at which treatment is indicated.  
<sup>2</sup>ACC/American Heart Association. ACC/American College of Cardiology. 10th The Obesity Society.  
 Balaramanian S, Flegal DM, et al. *Healthcare*. 2018;10(12):2018-2020. doi:10.1016/j.healthcare.2018.11.001. Accessed January 9, 2019. | 3. Jensen MD, et al. *J Am Coll Nutr*. 2013;22(2):101-109. doi:10.1016/j.jacn.2012.11.001.

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What Can Be Done?
Self-Directed Lifestyle Changes (Diet and Exercise)
Supervised Lifestyle Changes
Pharmacotherapy + Lifestyle Changes
Weight Loss Surgery + Lifestyle Changes
Weight Loss Surgery + Lifestyle Changes + Pharmacotherapy

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**Pharmacotherapy**

Medicate Weight via Appetite, Satiety and Metabolism

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# Pharmacotherapy

Efficacy + Tolerability + Affordability = SUCCESS

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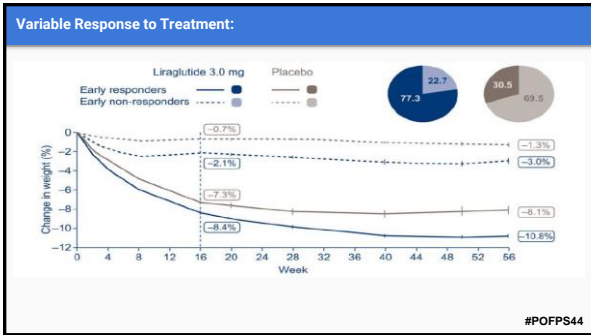
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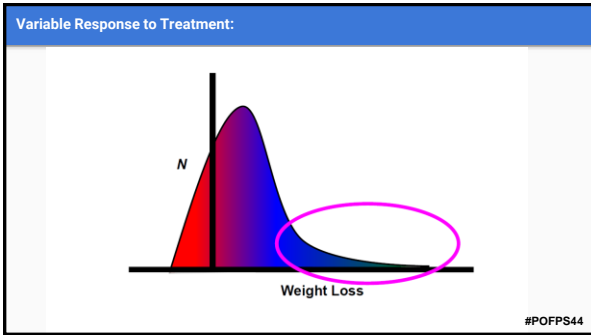
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Blood Pressure Medications:		
Common Drug Classes	Medications	Common side effects
Diuretics	Chlorthalidone, hydrochlorothiazide, Indapamide	Increase urination, low sodium, gout
Beta-blockers	Metoprolol, atenolol, nebivolol	Fatigue, depression
Alpha blockers	Prazosin, doxazosin	Low blood pressure, dizziness
Alpha agonists	Clonidine, methyl dopa	Rebound hypertension if you miss the dose of medication, dry mouth, drowsiness
Calcium channel blockers	Amlodipine, diltiazem	Swelling of feet
Angiotensin converting enzyme inhibitors (ACEI)	Lisinopril, ramipril	Dry cough, increase in blood levels of potassium, swelling of lips and tongue (very serious reaction!)
Angiotensin receptor blockers (ARB)	Telmisartan, olmesartan	increase in blood levels of potassium
Vasodilators	Minoxidil, hydralazine	Swelling of feet

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Table 1. Noninsulin Medications for Type 2 Diabetes			
Drug Class	Drug	Dose Range	Usual Dose
Sulfonylureas	Glipizide	5-20 mg once daily	5-10 mg once daily
	Glimepiride	1-4 mg once daily	1-2 mg once daily
	Gliclazide	80-320 mg once daily	80-160 mg once daily
Thiazolidinediones	Rosiglitazone	8-16 mg once daily	8-16 mg once daily
	Glaziprone	1-2 mg once daily	1-2 mg once daily
	Acetaminophen	25-100 mg 3-4 times daily	25-100 mg 3-4 times daily
Alpha-glucosidase inhibitors	Miglitol	25-100 mg 3-4 times daily	25-100 mg 3-4 times daily
	Acarbose	100-300 mg 3-4 times daily	100-300 mg 3-4 times daily
Neuroleptics/insulin sensitizers	Nateglinone	120-240 mg 3-4 times daily	120-240 mg 3-4 times daily
	Repaglinide	0.5-4 mg 3-4 times daily	0.5-4 mg 3-4 times daily
Dipeptidyl peptidase-4 inhibitors	Sitagliptin	100 mg once daily	100 mg once daily
	Vildagliptin	50-150 mg once daily	50-150 mg once daily
	Linagliptin	5 mg once daily	5 mg once daily
Sodium-glucocorticoid cotransporter 2 inhibitors	Ertugliflozin	5-15 mg once daily	5-15 mg once daily
	Canagliflozin	100-300 mg once daily	100-300 mg once daily
Glucagon-like peptide-1 receptor agonists	Liraglutide	3 mg once daily	3 mg once daily
	Semaglutin	0.5-2 mg once weekly	0.5-2 mg once weekly
Bile acid sequestrants	Orlistat	120 mg 3 times daily	120 mg 3 times daily
	Colestipol	15-30 mg 2-4 times daily	15-30 mg 2-4 times daily
	Wedgeol	1.5-3 mg 3 times daily	1.5-3 mg 3 times daily

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Weight Loss Medications (on label):			
Medication	Average Weight Loss*	Mechanism of Action	Potential Side Effects
Phentermine (Adipex™, Ionamin™)	~ 5%	Adrenergic	Tachycardia, hypertension
Phentermine / Topiramate (Qsymia™)	10%	Adrenergic, CNS	Tachycardia, hypertension, cognitive dysfunction, neuropathy, teratogenicity
Bupropion / Naltrexone (Contrave™)	4.5%	CNS; opioid antagonism	Seizures, confusion, anxiety, opiate withdrawal
Lorcaserin (Belviq™)	3.5%	Serotonergic (5HT <sub>2C</sub> )	Headache
Liraglutide (Saxenda™)	7%	GLP-1 agonist	Nausea
Orlistat (Xenical™)	3%	Lipase inhibitor	Steatorrhea, incontinence

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**Weight Loss Medications (off label):**

Medication	Other Uses	Mechanism	Potential Side Effects
Topiramate	Seizures Migraines	GABAergic	Cognitive Impairment, Paresthesias, Kidney Stones
Bupropion	Depression	Dopaminergic	Seizures
Naltrexone	Opioid Addiction	Opioid Receptor Antagonist	Acute Opioid Withdrawal
Zonisamide	Seizures	Unknown	Cognitive Impairment, Hyperhidrosis, Metabolic Acidosis
Metformin	TZDM	AMPK activation	Metabolic Acidosis
Liraglutide Exenatide Dulaglutide Semaglutide	TZDM	GLP-1 Receptor Agonist	Nausea
Canagliflozin Dapagliflozin Empagliflozin Ertugliflozin	TZDM	SGLT-2 Antagonist	Genital Mycotic Infections

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**Case Studies:**

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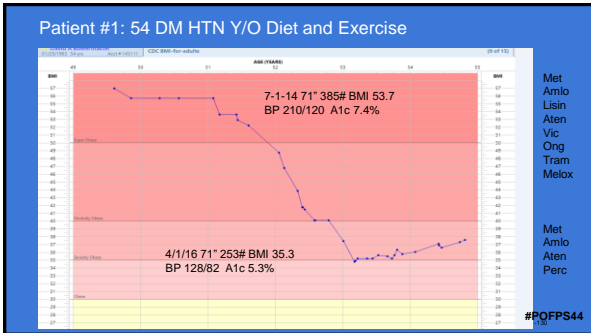
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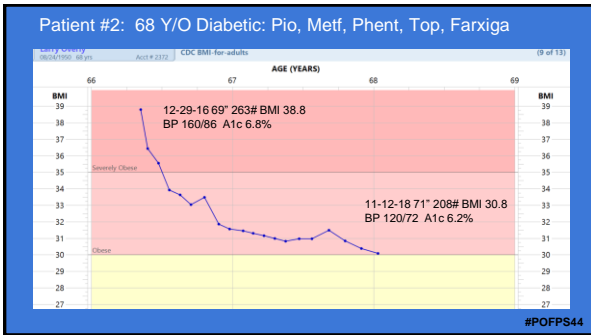
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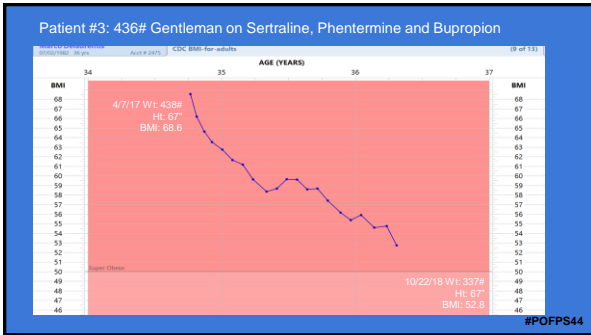
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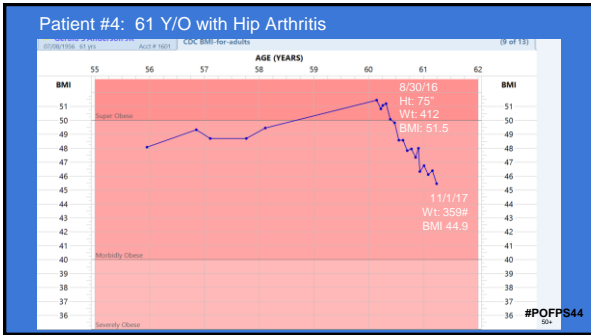
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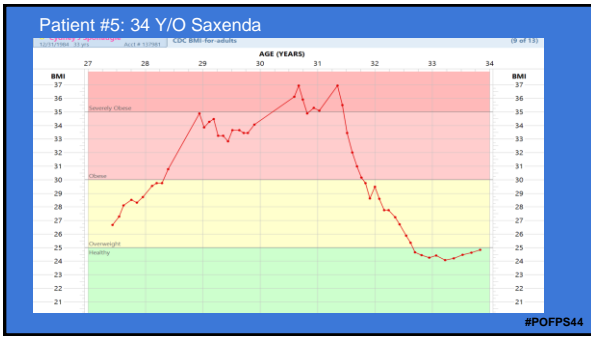
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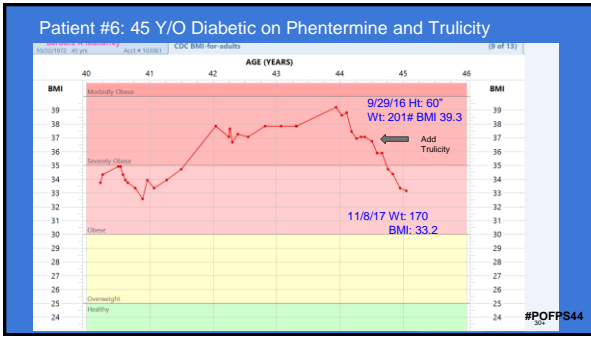
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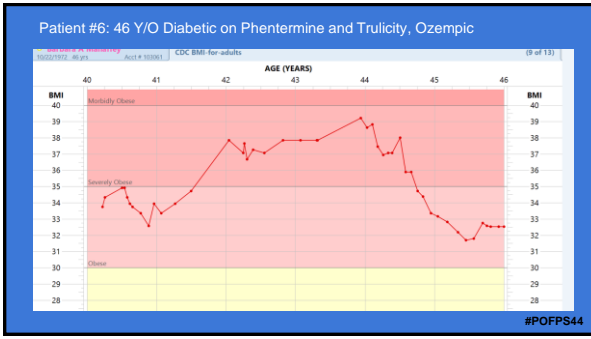
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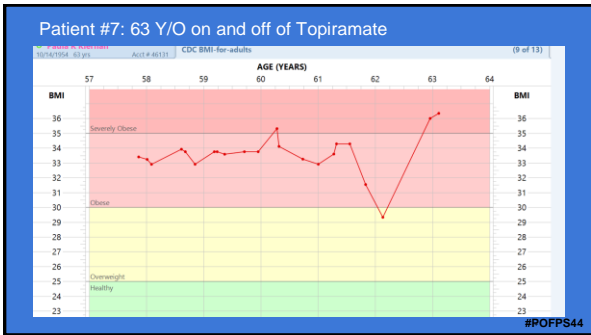
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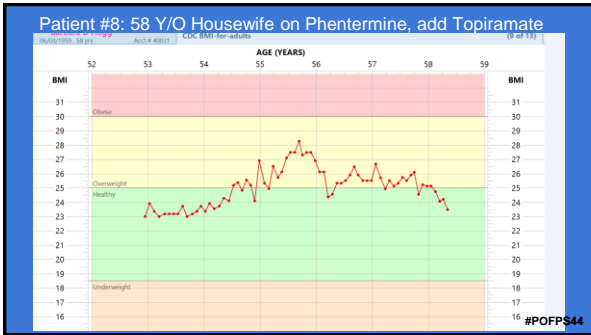
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**Summary:**

- Obesity is a disease with serious consequences
- There is much more to weight gain than overeating
- Weight loss is difficult and complex because of human physiology and our environment (lifestyles)
- Obesity can be successfully treated with:
  - Diet
  - Diet and Exercise
  - Diet, Exercise and Medication
  - Diet, Exercise and Bariatric Surgery
  - Diet, Exercise, Bariatric Surgery and Medication

Patients, friends and colleagues need encouragement and understanding because weight loss is a journey that will last a lifetime.

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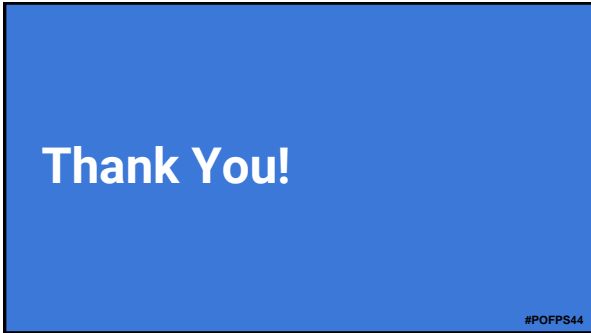
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