Weight Loss Strategies for Diabetes Prevention & Management

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Disclosures

- No relevant financial disclosures
Objectives

• To review the evidence behind weight-loss strategies for diabetes management and prevention

• To recognize weight-neutral or weight-loss promoting glucose-lowering medications

• To understand the indications and side effects of anti-obesity medications

• To be familiar with indications and efficacy of bariatric surgery
Case

- 58 year old woman with T2DM diagnosed at age 43
- Managed with lifestyle, then metformin
- Could not tolerate metformin due to GI side effects
- Started on sitagliptin, then pioglitazone—worked well x years
- Eventually needed sulfonylurea, then insulin
- Insulin dependent for 3 years prior to initial visit (on insulin pump)
- PMH notable for NAFLD, dyslipidemia
Case

- A1C 8.1%
- BMI 33.4 kg/m²
- Height 5’4”, Weight 195 lbs (88.5 kg)
- Admitted to following unhealthy diet, high in refined starches, fat, and cholesterol and low in fiber
- Very little formal exercise
- Employed as secretary
Questions

1. Is weight loss effective to treat T2DM? How much weight loss is needed?
2. What components of lifestyle interventions are effective at treating obesity?
3. Which diabetes medications are weight-neutral or weight-loss promoting?
4. When should anti-obesity medications be used?
5. How should anti-obesity medications be selected?
6. When should bariatric surgery be used to treat obesity?
Lifestyle Therapy

Meal Plan

• 500-750 kcal/day deficit
• Med, DASH, Low-carb, Low-fat, Volumetric, High protein, vegetarian
• Meal replacements
• VLCD requires med supervision

Lifestyle Therapy

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Physical Activity
- >150 min/week on 3-5 separate days/week
- Resistance (2-3 times per week)
- Reduce sedentary behavior
- Individualize

Lifestyle Therapy

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Behavior
- Self-monitoring
- Goal setting
- Education
- Problem-solving
- Stimulus control
- Behavioral contracting
- Stress reduction
- Psych eval
- Cognitive restructuring
- Motivational interviewing
- Mobilization of social support

Best Diets

U.S. News evaluated 38 of the most popular diets and identified the best. Find which top-rated diet is best for your health and fitness goals.

Best Diets Overall

1. DASH Diet
2. Mediterranean Diet
3. MIND Diet

See the full rankings list »

Satisfying weight-loss food to fill your entire day.
Meal Plan

• Prime determinant of weight loss is energy balance (total calories)
• Multiple eating patterns are associated with weight loss
• May be rationale for selection of specific meal plans for select patient groups
  • DASH: Hypertension
  • Mediterranean-style (MedS): Cardiovascular risk reduction
• Low fat diet associated with less weight loss than MedS or Low carb diet
• Higher plant protein and lower saturated fat intake associated with greater weight loss maintenance

Meal Plan

• Weight loss is accomplished by changing typical diet

• Efficacy of a particular commercial diet (Atkins, Ornish, Weight Watchers, Zone, etc) is determined by adherence rather than macronutrient composition

Garvey et al. AACE/ACE Guidelines. Endocrine Practice Vol 22 (suppl 3) July 2016
Weight Loss

Figure 2. Mean percentage of weight loss/maintenance in individuals with type 2 diabetes from 11 studies of weight-loss interventions (19 weight-loss intervention study groups with 10 categories of weight-loss intervention; n=6,754).

Franz et al. Lifestyle Weight-Loss Intervention Outcomes in Overweight and Obese Adults with Type 2 Diabetes: A Systematic Review and Meta-Analysis of Randomized Clinical Trials, J Acad Nutr Diet. 2015; 115:1447-1463.
### Weight loss

<table>
<thead>
<tr>
<th>Study group</th>
<th>12-month difference</th>
<th>SE$^3$</th>
<th>Weight (%)</th>
<th>Mean difference (95% CI)</th>
<th>Mean difference (95% CI)</th>
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<tbody>
<tr>
<td>Brehm$^{18}$ High MUFA$^b$</td>
<td>3</td>
<td>7.17</td>
<td>1.2%</td>
<td>3 (-11.04, 17.04)</td>
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<tr>
<td>Brehm$^{18}$ High CHO$^c$</td>
<td>2</td>
<td>4.90</td>
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<tr>
<td>Davis$^{19}$ Low CHO</td>
<td>3.9</td>
<td>4.38</td>
<td>3.1%</td>
<td>3 (-4.69, 12.49)</td>
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<tr>
<td>Davis$^{19}$ Low Fat</td>
<td>-5.9</td>
<td>4.28</td>
<td>3.7%</td>
<td>-5.9 (-14.29, 2.49)</td>
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<tr>
<td>Esposito$^{20}$ Low-fat</td>
<td>-5.8</td>
<td>0.67</td>
<td>62.1%</td>
<td>-5.8 (-7.11, -4.48)</td>
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<tr>
<td>Gulbrand$^{20}$ Low Fat</td>
<td>0</td>
<td>6.95</td>
<td>1.8%</td>
<td>0 (-13.62, 13.62)</td>
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<tr>
<td>Gulbrand$^{20}$ Low CHO</td>
<td>-7.8</td>
<td>7.07</td>
<td>1.8%</td>
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<tr>
<td>Krebs$^{22}$ High Protein</td>
<td>-3.9</td>
<td>2.32</td>
<td>3.3%</td>
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<td>-1.5</td>
<td>2.28</td>
<td>3.3%</td>
<td>-1.5 (-5.95, 2.95)</td>
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<tr>
<td>Larsen$^{23}$ High CHO</td>
<td>0.4</td>
<td>5.75</td>
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<td>0.4 (-10.87, 11.67)</td>
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<tr>
<td>Larsen$^{23}$ High Protein</td>
<td>-5.9</td>
<td>3.76</td>
<td>3.6%</td>
<td>-5.9 (-13.27, 1.47)</td>
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<tr>
<td>Li$^{16}$ Meal Replacements</td>
<td>-10.76</td>
<td>6.80</td>
<td>1.3%</td>
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<tr>
<td>Li$^{16}$ Reduced Energy Intake</td>
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<td>Metz$^{24}$ Meal Replacements</td>
<td>6.2</td>
<td>4.09</td>
<td>3.2%</td>
<td>6.2 (-1.81, 14.21)</td>
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<tr>
<td>Wolf$^{15}$ Reduced Energy Intake</td>
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<td>3.90</td>
<td>2.4%</td>
<td>-1.8 (-9.43, 5.83)</td>
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<tr>
<td><strong>12-month Wt loss &lt;5%</strong></td>
<td>-4.39</td>
<td>1.48</td>
<td>100.0%</td>
<td>-4.39 (-15.47, 6.69)</td>
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<tr>
<td><strong>12-month Wt loss &gt;5%</strong></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Esposito$^{20}$ Med-Style</strong></td>
<td>-15.1</td>
<td>1.48</td>
<td>100.0%</td>
<td>-15.1 (-18.01, -12.18)</td>
<td>-15.1 (-46.43, 16.23)</td>
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<tr>
<td><strong>Usual Care/Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

Test for heterogeneity: Q=0.970, df=17, $I^2=1652\%$

Franz et al.  Lifestyle Weight-Loss Intervention Outcomes in Overweight and Obese Adults with Type 2 Diabetes: A Systematic Review and Meta-Analysis of Randomized Clinical Trials, J Acad Nutr Diet. 2015; 115:1447-1463.
Effect on A1C

<table>
<thead>
<tr>
<th>Study group</th>
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<th>SE</th>
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<th>Mean difference</th>
<th>Mean difference (95% CI)</th>
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<td>0.1</td>
<td>9.4%</td>
<td>0.1 (-0.09, 0.29)</td>
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<tr>
<td>Brehm high CHO</td>
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<td>0.1</td>
<td>6.7%</td>
<td>0 (-0.21, 0.21)</td>
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<tr>
<td>Davis low CHO</td>
<td>-0.02</td>
<td>0.1</td>
<td>5.1%</td>
<td>-0.02 (-0.28, 0.24)</td>
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<tr>
<td>Davis low Fat</td>
<td>0.24</td>
<td>0.22</td>
<td>2.1%</td>
<td>0.24 (-0.19, 0.67)</td>
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<td>Espósito Low-fat</td>
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<td>0.06</td>
<td>11.2%</td>
<td>-0.6 (-0.71, -0.48)</td>
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<td>Gulbrands low fat</td>
<td>0.1</td>
<td>0.22</td>
<td>0.5%</td>
<td>0.1 (-0.32, 1.12)</td>
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<tr>
<td>Gulbrands low CHO</td>
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<td>0.57</td>
<td>0.4%</td>
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<tr>
<td>Kröbs high protein</td>
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<td>0.10</td>
<td>2.5%</td>
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<tr>
<td>Kröbs high CHO</td>
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<td>0.10</td>
<td>2.5%</td>
<td>-0.2 (0.39, 0)</td>
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<tr>
<td>Larsen high CHO</td>
<td>-0.28</td>
<td>0.15</td>
<td>4.0%</td>
<td>-0.28 (-0.56, 0)</td>
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<tr>
<td>Larsen high protein</td>
<td>-0.23</td>
<td>0.15</td>
<td>3.3%</td>
<td>-0.23 (-0.52, 0.06)</td>
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<tr>
<td>Lün Mealt Replacements</td>
<td>0.3</td>
<td>0.07</td>
<td>19.5%</td>
<td>0.3 (-0.43, -0.14)</td>
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<tr>
<td>Li reduced energy intake</td>
<td>-0.15</td>
<td>0.08</td>
<td>19.5%</td>
<td>-0.15 (-0.29, 0)</td>
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<tr>
<td>Metz Meal Replacements</td>
<td>-0.24</td>
<td>0.24</td>
<td>1.8%</td>
<td>-0.24 (-0.7, 0.22)</td>
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<tr>
<td>West Group + Motivational interviewing</td>
<td>-0.44</td>
<td>0.08</td>
<td>5.9%</td>
<td>-0.44 (-0.6, -0.27)</td>
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<tr>
<td>West Group Behavioral</td>
<td>-0.62</td>
<td>0.11</td>
<td>3.4%</td>
<td>-0.62 (-0.84, -0.39)</td>
<td></td>
</tr>
<tr>
<td>Wolf reduced energy intake</td>
<td>-0.2</td>
<td>0.19</td>
<td>2.1%</td>
<td>-0.2 (0.57, 0.17)</td>
<td></td>
</tr>
<tr>
<td>12-month Wt loss &gt;5%</td>
<td>-0.224</td>
<td></td>
<td></td>
<td>-0.224 (-0.64, 0.19)</td>
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<tr>
<td>Espósito Med-Style</td>
<td>-1.25</td>
<td>0.09</td>
<td>44.3%</td>
<td>-1.25 (-1.42, -1.07)</td>
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<tr>
<td>Look AHEAD intensive lifestyle</td>
<td>-0.64</td>
<td>0.02</td>
<td>55.7%</td>
<td>-0.64 (-0.67, -0.58)</td>
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<tr>
<td>12-month Wt loss &gt;5%</td>
<td>-0.01</td>
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<td></td>
<td>-0.01 (-2.3, 0.48)</td>
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<tr>
<td>Look AHEAD diabetes education</td>
<td>-0.12</td>
<td>0.02</td>
<td>60.2%</td>
<td>-0.12 (-0.15, -0.09)</td>
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<tr>
<td>Metz usual care</td>
<td>-0.2</td>
<td>0.18</td>
<td>28.0%</td>
<td>-0.2 (-0.55, 0.15)</td>
<td></td>
</tr>
<tr>
<td>Wolf usual care</td>
<td>-0.25</td>
<td>0.25</td>
<td>11.8%</td>
<td>0 (-0.48, 0.48)</td>
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<tr>
<td>Usual Care/Control</td>
<td>-0.128</td>
<td></td>
<td></td>
<td>-0.128 (-1.56, 1.31)</td>
<td></td>
</tr>
</tbody>
</table>

Test for heterogeneity: Q=2.39, df=21, I²=777%
Physical Activity

Aerobic

Resistance (strength)

Flexibility

Balance
Physical Activity

- RCTs and meta-analyses have shown that ≥ 150 min/week of exercise → modest weight loss (1-3 kg)

- Better outcomes with increasing amount and intensity of exercise
  - HUNT study over 33 years showed that physical activity above current recommendations are needed to attenuate weight gain

- Aerobic exercise has highest potential to reduce visceral fat even in absence of hypocaloric diet

- Additional weight loss of 1-3% when added to dietary intervention
  - More fat loss and less fat-free mass loss

- Exercise training lowers A1C even without BMI changes

Evidence

Look AHEAD Trial

- Largest RCT evaluating lifestyle intervention in older adults with T2DM
- Targeted weight loss of 7%
- 175 min/week of unsupervised exercise

Benefits

- Weight loss (7-9%)
- Cardiorespiratory fitness
- Blood glucose, BP, and lipid control
- Less OSA
- Less kidney disease and retinopathy
- Less depression
- Less sexual dysfunction, urinary incontinence
- Less knee pain, better physical mobility
- Improved QOL
- Lower overall healthcare costs

Aerobic vs. Resistance Exercise

- Aerobic (150 min/wk) clearly improves glycemic control (A1C lowering ~0.7%)\(^1\)
- Resistance increases strength and improves A1C by about 0.57%
- Aerobic better than resistance in A1C lowering (-0.18% difference)
- Combined training superior to either type alone for A1C

1. Umpierre D. Physical Activity Advice Only or Structured Exercise Training and Association with HbA1C levels in T2D. JAMA May 2011; Vol 305 No 17.
Step tracking

• Modest but meaningful reduction in weight and BMI as a result of incorporating more nonexercise movement into daily life

• Cochrane review of pedometer studies in workplace: improvements in BMI, but low-quality data and insufficient evidence

Sitting

• Sitting time independently associated with mortality

• Sedentary periods should last ≤ 90 min.

• Cochrane review of sit-stand desks: low-quality evidence

• ”Persons with T2DM are encouraged to increase their total daily unstructured physical activity.”

Exercise barriers

• Many patients with obesity cannot adhere to exercise due to physical limitations

• Individualize activities/exercise within capabilities and preferences of patient

• Exercise trainers can be beneficial to patients with obesity and arthritis in improving symptoms and functionality

Behavior Interventions

• Best executed by a multidisciplinary team

• Delivery can be accomplished by:
  • One-on-one meetings
  • Group sessions
  • Internet
  • Telephone
  • Other remote technologies

• Behavioral lifestyle interventions should be intensified if patients do not achieve a 2.5% weight loss in the first month

• Higher ”dose” interventions more successful

Behavior Interventions

- In 2011, CMS approved intensive behavioral weight loss counseling by PCPs for approximately 14 brief (10-15 min) face-to-face sessions over 6 months.
  - In 12 trials (3,893 participants), none of the counseling delivered by PCPs followed the CMS guidelines
  - Mean weight loss at 6 months: 0.3 to 6.6 kg vs. 0.9 to 2.0 kg in controls
  - Interventions that prescribed calorie reductions of ≥ 500 kcal/day, increased walking of >150 min/week, and behavioral therapy support were more effective

- Behavioral interventions by PCPs: -1.4 kg at 12 months and -1.23 kg and 24 months.

- Pooled results from 5 studies of commercial weight management programs detected significant weight loss at 1 year

Diabetes Prevention

• DPP: 3,234 patients with prediabetes randomized to:
  • Metformin
  • Placebo
  • Intensive lifestyle intervention (7% weight loss goal)

• Lifestyle intervention achieved greatest amount of weight loss and 58% reduction in risk of diabetes

• For every 1 kg of weight loss, there was a 16% reduction in T2DM risk.

• Patients who met initial 6-month study goals were 1.5 to 3.0 times more likely to meet goals in the long-term

• Results suggest that a stepped-care approach in treatment of obesity could be beneficial

Find a Program Near You

With hundreds of lifestyle change programs offered across the United States, odds are there’s one in your community. Find a program near you, or join an online program!

Click on your state or the online or combination in-person/online program link. Contact programs directly for details about dates, times, and costs.

Maryland - Baltimore

Collaborate Care
100 International Drive
Baltimore, MD 21202
(410) 670-2377

Johns Hopkins Centro SOL Embajadores de Salud
5200 Eastern Ave, Mason F. Lord Center Tower Ste 4200
Baltimore, MD 21224
(410) 550-1129

Johns Hopkins Centro SOL Embajadores de Salud
701 Rappolis St.
Baltimore, MD 21224
(410) 670-1234

Keswick Community Health
700 W 40th St.
Baltimore, MD 21211
(410) 662-4363

MedStar Franklin Square Medical Center
9000 Franklin Sq, Dr.

Online or Combination In-Person/Online Programs
Mobile DPP

Block at al. Diabetes Prevention and Weight Loss with a Fully Automated Behavioral Intervention by Email, Web, and Mobile Phone: A Randomized Controlled Trial Among Persons with Diabetes. Journal of Medical Internet Research. 2015, Vol 17, iss 10
Effect of diabetes meds on weight

**Weight neutral or weight loss**
- \(\alpha\)-glucosidase inhibitors
- DPP-4 inhibitors
- Amylin
- Metformin
- GLP-1R agonists
- SGLT-2 inhibitors

**Weight promoting**
- Insulin
- Sulfonylureas
- TZDs

Anti-obesity medications

- FDA approved for use in:
  - BMI 27-29.9 kg/m² + one or more weight-related complications
  - BMI ≥ 30 kg/m²
- Should only be used as an adjunct to lifestyle and not alone
- Drugs alone result in only modest weight loss with inferior outcomes compared to use of weight-loss medications as an adjunct to lifestyle
- Weight regain may be greater after stopping meds when behavior modification is not included
- Not intended for short-term use

Anti-obesity Medications

1. Phentermine-topiramate
2. Lorcaserin
3. Naltrexone ER/bupropion ER
4. Liraglutide
5. Orlistat

Phentermine-Topiramate

• Qsymia®
  • Noradrenergic + GABA receptor → appetite suppression

• Weight loss at 1 year:
  • 7.5 mg/46 mg: -6.7 kg (~7% - 9%)
  • 15 mg/92 mg: -8.9 kg (~11% - 12%)

• Side effects:
  • Paresthesias
  • Dizziness
  • Taste alterations
  • Insomnia
  • Constipation
  • Dry Mouth
  • Elevated HR
  • Memory or cognitive changes

Lorcaserin

- Belviq®, BelviqXR®
- Selective 5-HT2C receptor agonist → appetite suppression
- Weight change ~4-6% at 1-2 yrs

- Side effects:
  - Headache
  - Dizziness
  - Fatigue
  - Nausea
  - Dry mouth
  - Cough
  - Constipation
  - Back pain
  - Cough
  - Hypoglycemia

Naltrexone ER/ Bupropion ER

- **Contrave®**
  - Acts on central pathways in hypothalamus → appetite suppression
  - Weight change ~5-6% at 1 yr

- **Side effects:**
  - Nausea
  - Headache
  - Vomiting
  - Suicidal behavior/ideation
  - Neuropsychiatric symptoms
  - Seizures
  - Increase in BP and HR
  - Allergic Reactions
  - Acute angle-closure glaucoma

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Liraglutide

- Victoza®; Saxenda®
  - GLP-1 delays gastric emptying, increases satiety
- Weight loss:
  - 3 mg dose (Saxenda®)
    • 6% to 8% at 1 year
  - 1.8 mg dose (Victoza®)
    • ~5% at 1 year
- Side effects:
  - Nausea
  - Diarrhea
  - Constipation
  - Vomiting
  - Increased HR
  - Headache
  - Pancreatitis (controversial)
  - C-cell hyperplasia (rodents)


Orlistat

- Alli® [OTC]; Xenical®
- Pancreatic lipase inhibitor
- ~9% weight loss at 1 year
- Placebo-subtracted difference ~4.5%

Side effects:
- Oily spotting
- Flatus with discharge
- Fecal urgency
- Fatty oily stool
- Increased defecation
- Fecal incontinence

Which drug to pick?

• No head-to-head trials

• Differences in efficacy compared by examining placebo-subtracted weight loss across various trials

- Orlistat / lorcaserin (4.5%)
- Naltrexone/ER and liraglutide (~6%)
- Phentermine-Topiramate (8%)

• Consider side effect profile

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Naltrexone ER/ Bupropion ER</th>
<th>Liraglutide 3 mg</th>
<th>Locaserin</th>
<th>Orlistat</th>
<th>Phentermine/ Topiramte ER</th>
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<tbody>
<tr>
<td>Brand Name</td>
<td>Contrave</td>
<td>Saxenda</td>
<td>Belviq</td>
<td>Xenical</td>
<td>Qsymia</td>
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<tr>
<td>Frequency</td>
<td>Oral, BID</td>
<td>subQ, QD</td>
<td>Oral, BID</td>
<td>Oral, TID</td>
<td>Oral, QD</td>
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<td>Total Daily Dose</td>
<td>32 mg/360 mg</td>
<td>3 mg</td>
<td>20 mg</td>
<td>360 mg</td>
<td>7.5 mg/46 mg/15 mg/92 mg</td>
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</table>

<table>
<thead>
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<th>Age (years)</th>
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<th>Drug</th>
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<tbody>
<tr>
<td>Gender (% female)</td>
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<td>45.2</td>
<td>45.0</td>
<td>43.8</td>
<td>43.7</td>
<td>43.2</td>
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*There is a lack of clinical trials with head-to-head direct comparisons among the drugs approved for chronic weight management. For this table, data are delineated from a representative major randomized clinical trial for each drug. Each study was conducted over at least 1 year in duration, enrolled subjects with baseline weights of approximately 100 kg and average BMIs in the range of Class II obesity (BMI 35-39.9 kg/m²), and included data from subjects on the recommended doses for the medication. Each study also had to have data for weight loss % (completers), weight loss % (LOCF), 5% weight loss LOCF and 10% weight loss LOCF to be included in the chart.

**Abbreviations:** ITT = Intent-to-treat; LOCF = last observation carried forward.
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<th>ORLISTAT</th>
<th>Lorcaserin</th>
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<th>Naltrexone ER/bupropion ER</th>
<th>Liraglutide 3 mg</th>
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<td>Hepatic metabolism of drug</td>
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Bariatric surgery

- Patients with BMI ≥ 40 kg/m² without coexisting medical problems and for whom bariatric surgery would not be associated with excessive risk
- Patients with BMI ≥ 35 kg/m² and 1 or more severe obesity-related comorbidities:
  - T2DM
  - HTN
  - HLD
  - OSA
  - Obesity-hypoventilation syndrome
  - NAFLD
  - Pseudotumor cerebri
  - GERD
  - Asthma
  - Venous stasis
  - Severe urinary incontinence
  - Debilitating arthritis
  - Considerably impaired QOL
- Patients with BMI 30-34.9 kg/m² with diabetes or metabolic syndrome

4 Most Common Weight Loss Surgery Procedures in the United States

- **Adjustable Gastric Band (Lap Band)**
  - Stomach pouch
  - Adjustable band
  - Port placed under skin

- **Roux-en-Y Gastric Bypass (RYN)**
  - Bypassed portion of stomach
  - Jejunum
  - Food
  - Digestive juice

- **Duodenal Switch (DS)**
  - Gallbladder removed
  - Partially resected stomach
  - Food
  - Digestive juice

- **Vertical Sleeve Gastrectomy (Gastric Sleeve)**
  - Gastric sleeve (new stomach)
  - Removed portion of stomach

---

Which type of bariatric surgery to recommend?

- Depends on:
  - Individualized goals of therapy (weight loss and/or metabolic control)
  - Available local-regional expertise (surgeon and institution)
  - Patient preferences
  - Personalized risk stratification

- Laparoscopic generally preferred over open due to lower postop morbidity and mortality

- Greater nutritional deficiencies with BPD

Telem D. Metabolic outcomes following bariatric surgery. In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed on February 14, 2017.)
Metabolic control after bariatric surgery

• Immediate improvements likely reflect alterations in metabolism independent of weight loss (? GLP-1)

• Surgery more effective than intensive medical therapy:
  • Obese patients with uncontrolled T2DM who achieved A1C <6% at 12 months\textsuperscript{1}:
    • RYBG + intensive medical therapy: 42%
    • Sleeve gastrectomy + intensive medical therapy: 37%
    • Intensive medical therapy: 12%
  • Diabetes remission rates at 2 years\textsuperscript{2}:
    • RYGB: 75%
    • BPD: 95%
    • Medical therapy alone: 0%

Back to the case

• Patient had heard about the Furhman Diet and wanted my opinion

• Vegan-style diet
  • High fiber, low glycemic load foods
  • Beans, greens, nonstarchy vegetables, nuts, seeds, berries
  • No: BBQ or processed meats, commercial red meats, full fat dairy, fried foods, baked goods, soft drinks, sugars, etc.

• Patient seemed motivated

• Referred to CDE/RD

• Recommended 6 lb weight loss in 1 month with goal 19 lbs in 3 months (~10%)

• Brisk walking 30 minutes x 5 days

• Trial of metformin ER 500 mg daily, titrating slowly

Not actual patient
Back to the case

• Patient called me in 2 weeks with recurrent fasting and daytime hypoglycemia

• Strictly following new diet plan and found that bolus requirements were significantly lower

• Dropped basal rates by 20% and reduced her insulin:carb ratio

• Returned in 3 months with 16 lb weight loss (BMI now 30.7 kg/m²)

• A1C 6.7% on metformin ER 1000 mg daily and 30% lower insulin TDD on pump

• Liver enzymes improving, but still mildly elevated
Back to the case

• Weight loss plateau: 3 months later – 172 lbs (BMI 29.5 kg/m²)
• Added liraglutide 0.6 mg $\rightarrow$ 1.2 mg
• Tolerated 1.2 mg dose, but not higher dose
• Lost 11 more lbs on liraglutide (BMI 27.6 kg/m²)
• Insulin doses reduced further, predominantly bolus doses
• Encouraging intensification of physical activity—joined gym and got a personal trainer
Question

• In the management of type 2 diabetes, which of the following medications would be preferred for a patient whose main priority is weight loss?
  A. Glipizide
  B. Pioglitazone
  C. Liraglutide
  D. Sitagliptin
Answer

C. In selecting medications for type 2 diabetes treatment, the effect of a drug on weight is often an important consideration. Metformin, which is first-line therapy, may be associated with slight weight loss, while glucagon-like receptor (GLP-1) agonists, sodium glucose transport (SGLT-2) inhibitors, and the amylin analogue, pramlintide, are all associated with weight loss. Among the answer choices, liraglutide (C) is the only drug class associated with weight loss. Sulfonylureas (e.g. glipizide) and thiazolidinediones (TZDs) (e.g. pioglitazone) are associated with weight gain. Therefore, answer choices A and B are incorrect. While DPP-4 inhibitors (e.g. sitagliptin) are weight neutral and might be considered in an overweight patient with type 2 diabetes, GLP-1 agonists are expected to result in more weight loss. Therefore, answer Choice D is incorrect. The effect of liraglutide on weight is dose dependent: at the 1.2 mg dose, weight loss of -1.01 (95% CI -2.4, 0.38) kg is typically observed, while the highest dose of 1.8 mg leads to weight loss of -1.51 kg (95% CI: -2.67, -0.37) compared to placebo. In fact, liraglutide at a higher dose of 3.0 mg is FDA approved (trade name Saxenda) for the management of obesity.

References:


DO YOU HAVE PREDIABETES?

You may qualify for a research study to see how well a mobile phone application in combination with a digital body weight scale helps people with prediabetes monitor and manage their physical activity and weight to improve blood sugar levels and overall health.

WHO MAY BE ELIGIBLE?

- Diagnosis of Prediabetes
- Male and female adults ages ≥18 through ≤75 years
- Must be a smartphone user (Android or Apple iPhone 5s and above)
- Must be an English speaker
- We will ask you to complete 2 study visits over the course of 3 months
- We will install an application on your smartphone that will send you personal messages to encourage healthy habits
- Participants who complete the study will receive a $100 gift card and parking costs will be covered by the study

To learn more, call

Principal Investigator: Nestoras Mathioudakis, MD MHS
Phone: (410) 502-0993
OR
Contact the Study Team at (443) 287-8394
JHMH-IRB Application No.: IRB000099812

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