Objectives

1. Identify the key factors for long-term success of weight management
2. Review the structure and the long-term results of the Why WAIT program

Challenges in Dealing With Diabetes and Obesity

Why is it difficult for patients with diabetes to lose weight?

What are the barriers for weight loss in patients with diabetes?

- Sarcopenic obesity
- Hormonal imbalance
- Rebound weight gain
**Type of Lifestyle Intervention**

<table>
<thead>
<tr>
<th>Short-term weight loss (3-6 months)</th>
<th>Long-term weight loss (up to 4 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advice to change lifestyle</td>
<td>Intensive lifestyle intervention program</td>
</tr>
<tr>
<td>+/- 5 lbs (2%)</td>
<td>-4.7%</td>
</tr>
<tr>
<td>Lifestyle intervention program</td>
<td>Optimal intensive lifestyle intervention program</td>
</tr>
<tr>
<td>5 to 10 lbs (2-5%)</td>
<td>-6.3%</td>
</tr>
<tr>
<td>Intensive lifestyle intervention program</td>
<td>10 to 20 lbs (5-7%)</td>
</tr>
<tr>
<td>Optimal intensive lifestyle intervention program</td>
<td>20 to 30 lbs (10-15%)</td>
</tr>
</tbody>
</table>

**Why WAIT Program**


**Multidisciplinary Intervention**

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Innovations in the Why WAIT Program: Keys to Long-term Weight Reduction

- Duration and type of exercise
- Dietary composition
- Group intervention
- Medication adjustment


Benefits of Increased Physical Activity and Exercise

- Body weight and visceral fat
- Blood pressure and lipids
- Metabolic control
- Physical fitness and QOL
- Maintenance of weight loss
- Vascular resistance

The benefits of exercise and/or increased physical activity include:

Benefits of Increased Physical Activity and Exercise

- Body weight and visceral fat
- Blood pressure and lipids
- Metabolic control
- Physical fitness and QOL
- Maintenance of weight loss
- Vascular resistance

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Diabetes Significantly Accelerates Loss of Muscle Mass, Strength and Quality

Exercise Preserves Muscle Mass During Weight Reduction

Changes in % Body Fat, Fat Mass, and Lean/Fat Ratio After 12 Weeks of the Why WAIT? Program

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**Percent Weight Loss for Categories of 24-Month Physical Activity**

![Graph showing percent weight loss over 24 months for different categories of physical activity.](image)

(N = 170)


---

**Effect of Long vs Short Bouts of Exercise on Adherence and Weight Loss**

![Graph showing the effect of long vs short bouts of exercise on adherence and weight loss.](image)

Long bout = one 40-min session
Short bout = four 10-min sessions


---

**Balanced Exercise Model in the Why WAIT**

- Flexibility
  - Stretching
  - Yoga

- Aerobic
  - Walking
  - Swimming
  - Biking
  - Dancing

- Strength
  - Resistance tubing
  - Weight lifting
  - Yoga

---

All types of exercise should be considered for patients with diabetes unless contraindicated.

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**Gradual Progression of Exercise Intervention in the Why WAIT**

<table>
<thead>
<tr>
<th>Week</th>
<th>Frequency of Exercise*</th>
<th>Duration of Exercise</th>
<th>Type of Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–4</td>
<td>4 days/wk</td>
<td>20–40 min</td>
<td>AEX + STCH + CST + CT</td>
</tr>
<tr>
<td>5–8</td>
<td>5 days/wk</td>
<td>40–45 min</td>
<td>AEX + CT + IT STCH + Y + CCTV</td>
</tr>
<tr>
<td>9–12</td>
<td>6 days/wk</td>
<td>50–60 min</td>
<td>IT + CT + CIS + SS + Y + STCH</td>
</tr>
</tbody>
</table>

*AEX – Aerobic Exercise, CT – Circuit Training, STCH – Stretching Exercise, CST – Cross Training, CSE – Core Stability Exercise, IT – Interval Training, Y – Yoga (Vinyasa Flow)*

Weekly session at the Joslin gym

---

**The Role of Dietary Composition**

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**Diets With High or Low Protein Content and Glycemic Index for Weight-Loss Maintenance (26 weeks)**

- n = 773
- Initial weight loss ≥ 8%
- 15% protein (LGI/HGI) vs 25% protein (LGI/HGI)


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The Metabolic Effect of Different Protein/Carbohydrate Ratios in Type 2 DM

Total glycated hemoglobin response of subjects to the control (15% protein) and high-protein (30% protein) diets over the 5-week study period.

*Significantly different from the control diet, P < .05
The rate of decline was also significantly greater after the high-protein diet, P < 0.001


Strong Correlation Between Meal Replacement (MR) and Weight Loss


Mean number of MRs in each quartile

Reduction in initial weight in each quartile (%)

1st 2nd 3rd 4th

-5.9% -7.2% -9.4% -11.2%

Dietary Principles of the Why WAIT

Caloric intake
Carbohydrates 40-45%
Glycemic index
Protein 30%
Fiber
MUFA
Saturated fat
Sodium

Structured Modified Dietary Intervention

2 Meal Replacements
(BOOST® Diabetic or BOOST® Glucose Control™)

Two 200 cal snacks (e.g. Fruit, Nuts)
Choice from 14 pre-set dinner menus


Structured Modified Dietary Intervention

Meal Plan

<table>
<thead>
<tr>
<th></th>
<th>Carbs</th>
<th>Protein</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>130</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>1500</td>
<td>150</td>
<td>110</td>
<td>50</td>
</tr>
<tr>
<td>1800</td>
<td>180</td>
<td>120</td>
<td>65</td>
</tr>
</tbody>
</table>


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Weight Management in the Patient With Diabetes

**Diabetes Medications and Body Weight**

<table>
<thead>
<tr>
<th>List A: Stop, reduce, or switch</th>
<th>List B: Add</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight Gain</strong></td>
<td><strong>Weight Loss</strong></td>
</tr>
<tr>
<td>Significant</td>
<td>Metformin</td>
</tr>
<tr>
<td>Modest</td>
<td>SGLT-2 inhibitors</td>
</tr>
<tr>
<td>Pioglitazone</td>
<td></td>
</tr>
<tr>
<td>Sulfonylureas:</td>
<td></td>
</tr>
<tr>
<td>Gliclazide</td>
<td>Sitagliptin</td>
</tr>
<tr>
<td>Nateglinide</td>
<td>Saxagliptin</td>
</tr>
<tr>
<td></td>
<td>Linagliptin</td>
</tr>
<tr>
<td>Glipizide</td>
<td>Alogliptin</td>
</tr>
<tr>
<td></td>
<td>α-glucose inhibitors</td>
</tr>
<tr>
<td>Insulin</td>
<td></td>
</tr>
<tr>
<td>NPH</td>
<td>Acarbose</td>
</tr>
<tr>
<td>Glargine</td>
<td>Miglitol</td>
</tr>
<tr>
<td>Regular</td>
<td>Colesevelam</td>
</tr>
<tr>
<td>Aspart</td>
<td>Bromocriptine</td>
</tr>
<tr>
<td>Lispro</td>
<td>GLP-1 Analogs</td>
</tr>
<tr>
<td>Glulisine</td>
<td></td>
</tr>
</tbody>
</table>


**Cognitive Behavioral Support**

30-60 minute sessions facilitated by psychologist

- Realistic and attainable goals (Smart Goals) for long-term sustainability
- Relapse prevention using Logbook Learning and success stories
- Mastering unique challenges (Delay and distraction, Planning ahead, Problem solving)
- Managing automatic, negative thoughts (“detour thinking”)


**Group Adult-Educational Sessions**

- “Let Us Start” All Team
- “Balancing the Calorie Scale” RD
- “When Thoughts Get in Your Way” Psychologist
- “Take Action to Lose” EP, MD
- “Effect of Lifestyle on Diabetes & Vascular Health” RD
- “Making Sense of Portion Distortion” Psychologist
- “Burn the Fat” EP
- “Lose, Relate, Collapses” Psychologist
- “Stay Active: Keep it Off” EP
- “Lifestyle and Food: What Science Says” Psychologist
- “Keep out of the Fast Food Lane” RD
- “Eating for Life: How to Put it All Together” All Team


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Key Differences between Look AHEAD vs Why WAIT

**Look AHEAD Study**
- **Dietary intake:**
  - 1200–1500 kcal/day < 250 lbs
  - 1500–1800 kcal/day > 250 lbs
- **Calorie replacements:**
  - 2 liquid meal + one snack bar
  - Transition at week 20
- **Physical activity:**
  - 175 min/week
- **Group + Individual sessions**
- **Medication changes:** PCP

**Why WAIT Program**
- **Dietary intake:**
  - 1500 kcal/day for women
  - 1800 kcal/day for men
- **Calorie replacements:**
  - 2 liquid meals + 2 food snacks
  - Transition at week 6
- **Physical activity:**
  - 300 min/week
- **Group intervention only**
- **Medication changes:** Endocrinologists

---

**Results**

<table>
<thead>
<tr>
<th>Weight Loss in Lbs</th>
<th>n = 85</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5.3</td>
<td></td>
</tr>
<tr>
<td>-8.1</td>
<td></td>
</tr>
<tr>
<td>-9.7</td>
<td></td>
</tr>
<tr>
<td>-11.7</td>
<td></td>
</tr>
<tr>
<td>-13.5</td>
<td></td>
</tr>
<tr>
<td>-15.6</td>
<td></td>
</tr>
<tr>
<td>-17.4</td>
<td></td>
</tr>
<tr>
<td>-18.1</td>
<td></td>
</tr>
<tr>
<td>-20.8</td>
<td></td>
</tr>
<tr>
<td>-22.7</td>
<td></td>
</tr>
<tr>
<td>-24.6</td>
<td></td>
</tr>
</tbody>
</table>


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**The Why WAIT Program**

- Before: 7.5
- After: 6.6

N = 115
*P=0.001


---

**Percentage Changes in Lipid Profile after 12-Week of Why WAIT? Program**

<table>
<thead>
<tr>
<th>Lipid</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td></td>
<td>-10.8</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>-18.2</td>
<td></td>
</tr>
<tr>
<td>LDL</td>
<td></td>
<td>-9.6</td>
</tr>
<tr>
<td>HDL</td>
<td></td>
<td>-1.8</td>
</tr>
</tbody>
</table>

* p <0.05  ** p <0.01  *** p <0.001


---

**Changes in Liver Enzymes after Why WAIT? Program**

<table>
<thead>
<tr>
<th>Enzyme</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST</td>
<td>26.1</td>
<td>17.0</td>
</tr>
<tr>
<td>ALT</td>
<td>72.9</td>
<td>21.7</td>
</tr>
</tbody>
</table>

* p <0.05  ** p <0.01  *** p <0.001

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Changes in Urinary Albumin/Creatinine Ratio after 12-Week and One Year of the Why WAIT? Program

![Graph showing changes in urinary albumin/creatinine ratio](Image)

Changes in Blood Pressure after 12-Week and One Year of the Why WAIT? Program

![Graph showing changes in blood pressure](Image)

Changes in Diabetes Medications After 12 Weeks

<table>
<thead>
<tr>
<th>Diabetes medication</th>
<th>Before # patients (dose/day)</th>
<th>After # patients (dose/day)</th>
<th>% Change (dose change)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfonylureas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glyburide</td>
<td>6 (9.5 mg/day)</td>
<td>2 (6.2 mg/day)</td>
<td>-67% (-35%)</td>
</tr>
<tr>
<td>Glipizide</td>
<td>8 (11.25 mg/day)</td>
<td>3 (6.6 mg/day)</td>
<td>-63% (-41%)</td>
</tr>
<tr>
<td>Thiazolidinediones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Troglitazone</td>
<td>8 (28.1 mg/day)</td>
<td>1 (15 mg/day)</td>
<td>-88% (-47%)</td>
</tr>
<tr>
<td>Rosiglitazone</td>
<td>7 (8 mg/day)</td>
<td>2 (3 mg/day)</td>
<td>-77% (-33%)</td>
</tr>
<tr>
<td>Meglitinone</td>
<td>48 (1501.1 mg/day)</td>
<td>47 (10.6 mg/day)</td>
<td>2% (12%)</td>
</tr>
<tr>
<td>Bentaglinone</td>
<td>8 (15 mg/day)</td>
<td>29 (21.6 mg/day)</td>
<td>-67% (17%)</td>
</tr>
<tr>
<td>Insulin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPH</td>
<td>6 (47.5 unit/day)</td>
<td>3 (47.1 unit/day)</td>
<td>-50% (-12%)</td>
</tr>
<tr>
<td>Long-acting analogue</td>
<td>13 (10 unit/day)</td>
<td>19 (7.7 unit/day)</td>
<td>39% (+25%)</td>
</tr>
<tr>
<td>Short-acting analogue</td>
<td>11 (20.1 unit/day)</td>
<td>11 (24.1 unit/day)</td>
<td>-27% (-54%)</td>
</tr>
<tr>
<td>Glimepiride</td>
<td>2 (45 unit/day)</td>
<td>11 (27.2 unit/day)</td>
<td>-49% (-51%)</td>
</tr>
</tbody>
</table>

![Graph showing changes in diabetes medications](Image)

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Weight Management in the Patient With Diabetes

**Why WAIT?:** Changes in hs-CRP After 6 Months

Hamdy O et al. ADA. 2009.

---

**Economic Impact of Weight Loss in One Year in Patients With Diabetes**


1) P<0.05  2) P<0.001

---

**Keys to Optimal Lifestyle Intervention for Long-term Weight Reduction**

1. Aim for meaningful weight loss goal (5-10%)
2. Gradual and balanced and individualized physical activity
   - Duration of exercise
   - Type of exercise
   - Exercise records
3. Structured dietary intervention & modified macronutrient composition
   - Relatively higher protein, LGI & higher fibers
   - Food records
   - Diabetes specific meal replacement (GTSN)
4. Medication adjustment and frequent BG monitoring
5. Counseling and cognitive behavioral change
6. Group intervention and frequent participant contact
7. Daily weighing

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In Conclusion

1. Long-term weight reduction can be achieved through the non-surgical weight management model of Why WAIT.

2. Exercise type and duration significantly impact long-term weight maintenance.

3. Changing macronutrient compositions, providing structured meal plans, plus adding calorie replacements with additional dietary intervention.

4. Adjusting diabetes medications is important for effective long-term weight reduction in patients with diabetes.

5. Long-term weight reduction in the Why WAIT is cost-effective for prevention and treatment of diabetes.

Thank You