Diabetes: Treating and Preventing a Lifestyle Disease

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Senior Vice President for Medical Affairs
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What I will cover

• Classification, prevalence and pathophysiology of diabetes
• Prevention of Type 2 diabetes
• Approach to treatment of type 2 diabetes
  – Lifestyle modification
  – Medications
  – “Other”
Classification of Diabetes

- **Type 1 diabetes**
  - Beta cell destruction
  - Usually autoimmune
- **Type 2 diabetes**
  - Insulin resistance and insulin secretory defect
  - Other abnormalities
- **Secondary diabetes**
- **Gestational diabetes**
  - Diabetes discovered or developing during pregnancy
- **Impaired fasting glucose and impaired glucose tolerance**
  - “Pre diabetes”
# Diabetes – Diagnostic Criteria

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Impaired</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HbA1c (%)</strong></td>
<td>4 - 6</td>
<td>5.5 – 6.4</td>
<td>≥ 6.5</td>
</tr>
<tr>
<td><strong>Fasting glucose</strong></td>
<td>&lt; 100</td>
<td>110 – 125</td>
<td>≥ 126</td>
</tr>
<tr>
<td>(mg/dL)</td>
<td></td>
<td>(IFG)</td>
<td></td>
</tr>
<tr>
<td><strong>2 hour post 75 g</strong></td>
<td>&lt; 140</td>
<td>140 – 199</td>
<td>≥ 200</td>
</tr>
<tr>
<td><strong>glucose load</strong></td>
<td></td>
<td>(IGT)</td>
<td></td>
</tr>
<tr>
<td>(mg/dL)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* venous plasma

*Must be confirmed on more than 1 occasion*
Diabetes in the USA today: An epidemic

• 29 million (9.3% of population)*
• 8 million undiagnosed*
• The number is growing by > 1 million per year
• A major cause of mortality and morbidity
• Cost (direct and indirect) $ 245 billion per year
  – About 1 in 10 US health care dollars spent on diabetes
• And + 86 million people at risk for diabetes

* CDC 2014
The Diabetes Epidemic: Global Projections, 2010–2030

World
- 2011 = 366 million
- 2030 = 552 million
- Increase = 51%

- 37.7
- 51.2
- 36%

- 52.8
- 64.2
- 22%

- 71.4
- 120.9
- 69%

- 32.6
- 59.7
- 83%

- 14.7
- 28.0
- 90%

- 131.9
- 187.9
- 42%

IDF. Diabetes Atlas 5th Ed. 2011
Natural History of Type 1 Diabetes

- Putative trigger
- Circulating autoantibodies (ICA, GAD65)
- Loss of first-phase insulin response (IVGTT)
- Glucose intolerance (OGTT)

β-Cell mass

Genetic predisposition

Insulitis β-Cell injury

“Pre”-diabetes

Diabetes

Time (yrs)

Clinical onset

Natural History of Type 2 Diabetes and Risk for Complications

- Post-meal glucose
- Fasting glucose
- PG 200 mg/dL
- PG 126 mg/dL
- Meets ADA diagnostic criteria for T2DM
- Macrovascular disease risk
- Microvascular disease risk
- Insulin Resistance
- Beta-cell Function

Time (years)
Pathophysiology of Type 2 DM: From the Triumvirate...
To the Ominous Octet

From DeFronzo Diabetes 2009; 58:773-795
Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among U.S. Adults

1994

Obesity (BMI ≥ 30 kg/m²)

- <14.0%
- 14.0%–17.9%
- 18.0%–21.9%
- 22.0%–25.9%
- ≥26.0%

Diabetes

- <4.5%
- 4.5%–5.9%
- 6.0%–7.4%
- 7.5%–8.9%
- ≥9.0%

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among U.S. Adults

2000

Obesity (BMI ≥ 30 kg/m²)

- Missing Data
- <14.0%
- 14.0%–17.9%
- 18.0%–21.9%
- 22.0%–25.9%
- ≥26.0%

Diabetes

- Missing data
- <4.5%
- 4.5%–5.9%
- 6.0%–7.4%
- 7.5%–8.9%
- ≥9.0%

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among U.S. Adults 2010

Obesity (BMI ≥ 30 kg/m²)

- Missing Data
- <14.0%
- 14.0%–17.9%
- 18.0%–21.9%
- 22.0%–25.9%

Diabetes

- Missing data
- <4.5%
- 4.5%–5.9%
- 6.0%–7.4%
- 7.5%–8.9%
- ≥9.0%

Screening for Diabetes

• ADA
  - Screen for diabetes at age 45 and every 3 yrs after, or adults of any age with BMI > 25 kg.m² and one or more additional risk factors

• AACE
  - Screen all at risk individuals. Persons with prediabetes should have at least annual measure of FPG or OGTT

American Diabetes Association. Standards of Medical Care in Diabetes-2013. Diabetes Care 2013; 36 (Suppl. 1)
American Association of Clinical Endocrinologists. Medical Guidelines for Clinical Practice for Developing a Diabetes Mellitus Comprehensive Care Plan. Endocr Pract. 2011; 17(suppl. 2)
Risk Factors for Type 2 Diabetes

- Physically inactive
- First-degree relative with diabetes
- Members of a high risk ethnic population
- Delivered baby > 9 lbs or GDM
- Hypertensive (BP ≥ 140/90 mmHg)
- HDL cholesterol < 35 mg/dL and/or triglyceride levels > 250 mg/dL
- Women with polycystic ovary syndrome
- Obesity
- A1c > 5.7% or IGT or IFG on previous testing
- History of vascular disease

American Diabetes Association. Standards of Medical Care in Diabetes-2013. Diabetes Care 2013; 36 (Suppl. 1)
American Association of Clinical Endocrinologists. Medical Guidelines for Clinical Practice for Developing a Diabetes Mellitus Comprehensive Care Plan. Endocr Pract. 2011; 17(suppl. 2)
Type 2 Diabetes (T2 DM) Can Be Prevented

Diabetes Prevention Program Research Group NEJM 2002; 346:393-403
## Prevention of Type 2 Diabetes

### Completed Trials in Impaired Glucose Tolerance

<table>
<thead>
<tr>
<th>Trial</th>
<th>Journal/Year</th>
<th>Description</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Da Qing</td>
<td>Diabetes Care 1997</td>
<td>Diet and/or exercise</td>
<td>31%–46% risk reduction</td>
</tr>
<tr>
<td>Finnish Prevention Study (FPS)</td>
<td>NEJM 2001</td>
<td>Intensive lifestyle</td>
<td>58% risk reduction</td>
</tr>
<tr>
<td>Diabetes Prevention Program (DPP)</td>
<td>NEJM 2002</td>
<td>Metformin or lifestyle</td>
<td>Metformin: 31% risk reduction</td>
</tr>
<tr>
<td></td>
<td>Lancet 2002</td>
<td>Acarbose</td>
<td>Acarbose: 25% risk reduction</td>
</tr>
</tbody>
</table>

DREAM: Rosiglitazone Decreases Risk for Development of Diabetes by 60% in IGT

Da Qing Diabetes Prevention Study: 23 year follow up

- Patients enrolled in 1986 – 577 adults – diet or exercise or both vs control group
- 6 year intervention study
- Follow up in 2009 – all-cause mortality, cardiovascular mortality and incidence of diabetes
- Data available for more than 90% of participants

Guangwei Li et al. Lancet Diabetes and Endocrinology 2014; published online 4/3/14
Da Qing: Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Cardiovascular mortality (%)</th>
<th>All cause mortality (%)</th>
<th>Diabetes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention group</td>
<td>11.9</td>
<td>28.1</td>
<td>72.6</td>
</tr>
<tr>
<td>Control group</td>
<td>19.6</td>
<td>38.4</td>
<td>89.9</td>
</tr>
<tr>
<td>P value</td>
<td>0.033</td>
<td>0.049</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Guangwei Li et al. Lancet Diabetes and Endocrinology 2014; published online 4/3/14
Mediterranean Diet Reduces Risk for the Development of Diabetes

MedDiet + EVOO: unadjusted HR, 0.66 (95% CI, 0.49–0.89)
MedDiet + nuts: unadjusted HR, 0.78 (95% CI, 0.59–1.04)

Participants at risk, n
MedDiet + EVOO        1154  1109  996  830  679  487
MedDiet + nuts        1240  1170  998  773  625  424
Control               1147  1049  896  675  520  364

Once Diabetes is Diagnosed What’s the Best Way to Manage it?

• Goals of treatment?
• Role of lifestyle modification?
• Which drugs?
• Role of surgery?
Approach to management of hyperglycemia:

- **Patient attitude and expected treatment efforts**
  - More stringent: Highly motivated, adherent, excellent self-care capacities
  - Less stringent: Less motivated, non-adherent, poor self-care capacities

- **Risks potentially associated with hypoglycemia, other adverse events**
  - Low
  - High

- **Disease duration**
  - Newly diagnosed
  - Long-standing

- **Life expectancy**
  - Long
  - Short

- **Important comorbidities**
  - Absent
  - Few / mild
  - Severe

- **Established vascular complications**
  - Absent
  - Few / mild
  - Severe

- **Resources, support system**
  - Readily available
  - Limited
### UKPDS Long Term Follow Up: Outcomes (Relative Risk Reduction)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>SU - Insulin</th>
<th>Metformin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any diabetes related end point</td>
<td>9% (p = 0.04)</td>
<td>21% (p = 0.01)</td>
</tr>
<tr>
<td>Death from any cause</td>
<td>13% (p = 0.007)</td>
<td>27% (p = 0.002)</td>
</tr>
<tr>
<td>Microvascular disease</td>
<td>24% (p = 0.001)</td>
<td></td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>15% (p = 0.01)</td>
<td>33% (p = 0.005)</td>
</tr>
</tbody>
</table>

**Improved outcomes despite no difference in A1c between treatment groups which occurred within a year of study end**

“Legacy effect”

### Impact of Intensive Therapy for Diabetes: Summary of Major Clinical Trials

<table>
<thead>
<tr>
<th>Study</th>
<th>Microvasc</th>
<th>CVD</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>UKPDS</td>
<td>![Down][1]</td>
<td>![Left to Right][2]</td>
<td>![Down][1]</td>
</tr>
<tr>
<td>DCCT / EDIC*</td>
<td>![Down][1]</td>
<td>![Left to Right][2]</td>
<td>![Down][1]</td>
</tr>
<tr>
<td>ACCORD</td>
<td>![Down][1]</td>
<td>![Left to Right][2]</td>
<td>![Up][3]</td>
</tr>
<tr>
<td>ADVANCE</td>
<td>![Down][1]</td>
<td>![Left to Right][2]</td>
<td>![Left to Right][2]</td>
</tr>
<tr>
<td>VADT</td>
<td>![Down][1]</td>
<td>![Left to Right][2]</td>
<td>![Left to Right][2]</td>
</tr>
</tbody>
</table>

* in T1DM

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Kendall DM, Bergenstal RM. © International Diabetes Center 2009

So what’s the take home message?

• Individualize treatment goals
• For most people getting A1c below 7% is appropriate provided one can do so safely
• In those individuals with established cv disease intensive glucose control may not reduce cv risk but will still reduce microvascular risk
• In all newly diagnosed patients with no cv complications intensive glucose control is beneficial, provided one can achieve this safely
Type 2 Diabetes Management 2014

• Lowering A1c to around 7% especially early after diagnosis can reduce the risk for the development or progression of the long term complications of diabetes

• There are many medications available today to treat type 2 diabetes – if used appropriately this could translate to improved control and less risk for complications

• The challenge for the practicing physician is to know which medications to use and when best to use them
There is **IS** consenus that metformin should be first line therapy

There is **NO** clear consensus what to add to metformin when A1c goals are not met

- Few head to head comparator trials
- Even fewer long term studies evaluating durability of medications on glycemic control, especially when added to metformin
Non Insulin Medications to Treat Type 2 DM

TZD
Metformin

α cells
Incretins
Pramlintide

β cells
Sulfonylureas
Meglitinides
Incretins

α glucosidase inhibitors
Incretins
Pramlintide
Colesevelam

Dopamine receptor agonists
Serotonin receptor agonists
Incretins

SGLT2 Inhibitors

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Which “Type” of Exercise is Better for Glycemic Control?

- Aerobic training and resistance training each improve diabetes control
- The combination of aerobic and resistance training is superior to either type of exercise alone

Percent Weight Loss for Categories of 24-Month Physical Activity


N = 170
Change in Dietary Composition in Relation to Obesity Prevalence (1971-2010)

Historically Food Myths, Fad Diets and Dietary Trends Have Always Been Popular

- Oat Diet
- Grapefruit Diet
- Milk Diet
- Potato Therapy

- The Allen Diet (a starvation diet)
- Diabetes Diet (40% fat, 40% carbs, 20% protein)
- High Carb Diet (30% Fat, 50-55% Carbs, 15-20% protein)
- The Atkins Diet
- Joslin Diet (Carbs 40-45% low GI, Fat 30-35%, Protein 1.5-2 gm/Kg)
Lifestyle Intervention Programs in People with Type 2 DM Do Not Reduce All Cause Mortality or Cardiovascular Mortality

Look AHEAD Study: Changes in Weight, Physical Fitness, Waist Circumference, and HbA1c

Look AHEAD:
No Change in CV Mortality, Non fatal MI, Nonfatale Stroke or Hospitalization for Angina

But..

- Improved QOL
- Less depression
- Reduction in progression of renal disease, severe retinopathy
- Improved sleep apnea
- Fewer medications to control lipids, BP etc
Medical vs Surgical Treatment for DM and Obesity: Change in A1c

![Graph showing change in A1c over months for medical therapy, sleeve gastrectomy, and gastric bypass.]

<table>
<thead>
<tr>
<th>Value at Visit</th>
<th>Medical therapy</th>
<th>Sleeve gastrectomy</th>
<th>Gastric bypass</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>9.0 (8.5)</td>
<td>9.5 (8.9)</td>
<td>9.3 (9.2)</td>
</tr>
<tr>
<td>3.00</td>
<td>7.1 (6.8)</td>
<td>6.7 (6.4)</td>
<td>6.3 (6.2)</td>
</tr>
<tr>
<td>6.00</td>
<td>7.5 (6.9)</td>
<td>6.6 (6.4)</td>
<td>6.3 (6.1)</td>
</tr>
<tr>
<td>12.00</td>
<td>7.7 (7.3)</td>
<td>6.8 (6.8)</td>
<td>6.5 (6.4)</td>
</tr>
<tr>
<td>24.00</td>
<td>8.4 (7.6)</td>
<td>7.0 (6.6)</td>
<td>6.7 (6.6)</td>
</tr>
</tbody>
</table>

Change in Diabetes Medications: Medical vs Surgical Treatment

Change in BMI: Medical vs Surgical Treatment

Bariatric Surgery is Associated with Long Term Remission of Diabetes

Sjostrom L et al. JAMA 2014;311:2297-2304
Diabetes Duration and Likelihood of Remission: Shorter Duration – Greater Likelihood of Remission

Sjostrom L et al. JAMA 2014;311:2297-2304
And Decrease in Micro and Macrovascular Complications

Sjostrom L et al. JAMA 2014;311:2297-2304
Designing an Optimal Intensive Weight Management Program

Multidisciplinary Group Management Program

- **Dietary Intervention**
  - Dietary Composition
  - Caloric levels
  - Meal Replacement

- **Exercise Intervention**
  - Type
  - Duration
  - Frequency

- **Behavioral Intervention**
  - Cognitive
  - Others

- **Medications**
  - Weight gain medications

Patient adherence and compliance for long-term
Structured dietary intervention & modified macronutrient composition

- Relatively higher protein, LGI & higher fibers
  - Provide structure menus
  - Calorie replacements
    - Food records

Natural food (dinner menus and snacks) and Calorie Replacement

- Calorie intake
  - Carbs to 40-45%

- Glycemic index

- Protein intake to 30%
  - Fiber
  - MUFA

- Saturated fat and sodium
# Exercise:
## How Often and for How Long?

<table>
<thead>
<tr>
<th>Fitness &amp; Diabetes</th>
<th>Weight Loss &amp; Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 days/Wk</td>
<td>6-7 days/Wk</td>
</tr>
<tr>
<td>30 Minutes</td>
<td>60-90 Minutes</td>
</tr>
</tbody>
</table>

- Perform multiple bouts of minimum 10mins
- Start slowly and build up
# Exercise Intervention in the Why WAIT Program

<table>
<thead>
<tr>
<th>Session Number</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 + CSE</td>
</tr>
<tr>
<td>9-12</td>
<td>6 days /wk</td>
<td>50-60 min</td>
<td>IT + CT + CSE + SS + Y + STCH</td>
</tr>
</tbody>
</table>

AEX – Aerobic Exercise  
SS - Superset Training  
IT – Interval Training  
CSE - Core Stability Exercise

CT – Circuit Training  
STCH – Stretching Exercise  
CST - Cross Training  
Y- Yoga (Vinyasa flow)

Shahar J et al, ADA 2009  

* Weekly session at the Joslin gym
Avoid weight promoting medications

Adjusting medications that affect body weight

- Diabetes medications
- Antidepressants
- Weight loss medications
# Diabetes Medications and Body Weight

## List A

### Stop, reduce, or switch

<table>
<thead>
<tr>
<th>Weight Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Significant</strong></td>
</tr>
<tr>
<td>Pioglitazone</td>
</tr>
<tr>
<td>Sulfonylureas</td>
</tr>
<tr>
<td>Glyburide</td>
</tr>
<tr>
<td>Glipizide</td>
</tr>
<tr>
<td><strong>Modest</strong></td>
</tr>
<tr>
<td>Sulfonylureas</td>
</tr>
<tr>
<td>Glimepiride</td>
</tr>
<tr>
<td>Glipizide XL</td>
</tr>
<tr>
<td>Glinides</td>
</tr>
<tr>
<td>Repaglinide</td>
</tr>
<tr>
<td>Nateglinide</td>
</tr>
<tr>
<td><strong>Insulin</strong></td>
</tr>
<tr>
<td>NPH</td>
</tr>
<tr>
<td>Glargine</td>
</tr>
<tr>
<td>Regular</td>
</tr>
<tr>
<td>Aspart</td>
</tr>
<tr>
<td>Lispro</td>
</tr>
<tr>
<td>Glulisine</td>
</tr>
<tr>
<td><strong>Weight Loss</strong></td>
</tr>
<tr>
<td>Metformin</td>
</tr>
<tr>
<td>GLP-1 Analogs</td>
</tr>
<tr>
<td>Exenatide</td>
</tr>
<tr>
<td>Exenatide ER</td>
</tr>
<tr>
<td>Liraglutide</td>
</tr>
<tr>
<td>Pramlintide</td>
</tr>
</tbody>
</table>

## List B

### Continue

<table>
<thead>
<tr>
<th>Weight Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
</tr>
<tr>
<td>DPP-4 Inhibitors</td>
</tr>
<tr>
<td>Sitagliptin</td>
</tr>
<tr>
<td>Saxagliptin</td>
</tr>
<tr>
<td>Linagliptin</td>
</tr>
<tr>
<td>Alogliptin</td>
</tr>
</tbody>
</table>

### Add

<table>
<thead>
<tr>
<th>Weight Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>α-glucosidase Inhibitors</td>
</tr>
<tr>
<td>Acarbose</td>
</tr>
<tr>
<td>Miglitol</td>
</tr>
<tr>
<td>Colesevelam</td>
</tr>
<tr>
<td>Bromocriptine</td>
</tr>
</tbody>
</table>
Change in Body Weight During Why WAIT? Program (group 1)

Weight Loss in Lbs


Week 1-12

Thanksgiving

n = 14

Hamdy O et al, ADA 2007
Percentage Weight Reduction in Patients with Diabetes in the Real-World Clinical Practice over 5 years (Joslin Why WAIT Program)

Total Group n=129
Group 1 n=61 (Participants maintained <7% weight loss at 1 year)
Group 2 n=68 (Participants maintained ≥ 7% weight loss at 1 year)

*** p<0.001 (group 1 vs. group 2)
Effect of Long-term Weight Reduction on A1C in Patients with Diabetes in the Real-World Clinical Practice: 5-Year Follow-up of the Joslin Why WAIT Program

Total Group n=129
Group 1 n=61 (Participants maintained <7% weight loss at 1 year)
Group 2 n=86 (Participants maintained ≥ 7% weight loss at 1 year)

* p<0.05  ** p<0.01  *** p<0.001 (group 1 vs. group 2)
### Change of Diabetes Medications

<table>
<thead>
<tr>
<th>Diabetes Medication</th>
<th>Before # Patients (dose/day)</th>
<th>After # Patients (dose/day)</th>
<th>% Change # Patients (dose)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sulfonylureas</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glyburide</td>
<td>6 (9.5 mg/d)</td>
<td>2 (6.2 mg/d)</td>
<td>-67% (-35%)</td>
</tr>
<tr>
<td>Glipizide</td>
<td>8 (11.25 mg/d)</td>
<td>3 (6.6 mg/d)</td>
<td>-63% (-41%)</td>
</tr>
<tr>
<td><strong>Thiazolidinediones</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pioglitazone</td>
<td>8 (28.1 mg/d)</td>
<td>1 (15 mg/d)</td>
<td>-88% (-47%)</td>
</tr>
<tr>
<td>Rosiglitazone</td>
<td>7 (7.4 mg/d)</td>
<td>2 (5 mg/d)</td>
<td>-71% (-33%)</td>
</tr>
<tr>
<td><strong>Metformin</strong></td>
<td>46 (1664.1 mg/d)</td>
<td>47 (1862 mg/d)</td>
<td>2% (12%)</td>
</tr>
<tr>
<td><strong>Exenatide</strong></td>
<td>8 (15 mcg/d)</td>
<td>25 (17.6 mcg/d)</td>
<td>213% (17)</td>
</tr>
<tr>
<td><strong>Insulin</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPH</td>
<td>6 (47.5 unit/d)</td>
<td>3 (41.7 unit/d)</td>
<td>-50% (-12%)</td>
</tr>
<tr>
<td>Long-acting Analog</td>
<td>10 (60.9 unit/d)</td>
<td>13 (27.2 unit/d)</td>
<td>30% (-55%)</td>
</tr>
<tr>
<td>Short-acting Analog</td>
<td>14 (52.1 unit/d)</td>
<td>11 (24.1 unit/d)</td>
<td>-21% (-54%)</td>
</tr>
<tr>
<td>Pramlintide</td>
<td>2 (45 unit/d)</td>
<td>11 (47.3 unit/d)</td>
<td>450% (5%)</td>
</tr>
</tbody>
</table>

**N = 85**
Earlier and More Aggressive Intervention May Improve Patients’ Chances of Reaching Goal

Why WAIT Conceptual Approach

Diet and exercise
OAD monotherapy
OAD up-titration
OAD combination
OAD + basal insulin
OAD + multiple daily insulin injections

Conventional stepwise treatment approach
Earlier and more aggressive intervention approach

Mean A1C of patients
OAD=oral antidiabetic agent
Summary

• There is a world wide “burgeoning” epidemic of diabetes
• There is clear correlation between type 2 DM and obesity
• Type 2 diabetes can be prevented
• Once diagnosed, intensive lifestyle modification and pharmacologic treatment is required for maintenance of good glycemic control
• Lifestyle modification does not impact cardiovascular mortality but has other health benefits
• Weight loss programs are beneficial
• Bariatric surgery remains a therapeutic option for some obese people with type 2 DM and multiple co-morbidities