

OVERVIEW AND MANAGEMENT OF DIABETES - THE GLOBAL EPIDEMIC

(With the Focus on Type 2)

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LEARNING OBJECTIVES

- Recognize the prevalence and impact of diabetes
- Identify risk factors associated with type 2 diabetes
- Differentiate between pre-diabetes / type 1 / type 2 diabetes
- Identify the complications of diabetes
- Develop and implement non-pharmacologic and pharmacologic strategies to prevent and manage diabetes
- Assist patients in taking control of their diabetes

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EPIDEMIOLOGY OF DIABETES

- **23.6 million with diabetes**
- 57 million with pre-diabetes
- Prevalence = rising
- Affects men/women equally
- Proportion increases with age
- Affects some racial/ethnic groups more than others

SOURCE: American Association of Diabetes Educators Diabetes Fact Sheet

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IMPACT OF DIABETES

- 7th leading cause of death in the US
- Poorly controlled = more health problems
- Economic impact = \$174 billion (2007)
 - Social and personal
- Direct medical costs = \$116 billion
- Sociological / emotional affects

SOURCE: American Association of Diabetes Educators Diabetes Fact Sheet

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CLASSIFICATION AND DIAGNOSIS OF DIABETES

DEFINITION:

A group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both.

SOURCE: Diabetes Care, Volume 31, Supplement 1, January 2008

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CLASSIFICATION AND DIAGNOSIS OF DIABETES

● **TYPES:**

- Type 1
- Type 2
- Pre-diabetes

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OTHER TYPES OF DIABETES

- Gestational
- Genetic defects of beta cells
 - MODY
- Diseases of pancreas
 - Pancreatitis
 - cancer
- Endocrinopathies
 - Acromegaly
 - Cushing's syndrome
- Drug/chemical induced diabetes
 - Glucocorticoids
 - Thyroid hormone
- Genetic syndromes
 - Down's syndrome
 - Turner's syndrome

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PATHOGENIC PROCESSES Type 1

- Appears in 5 – 10% of diabetic population
 - Young patient – average age = 12 y/o
- Autoimmune destruction of pancreas beta-cells
 - Absolute insulin deficiency
- Abnormalities in metabolism
- Patient presentation - acute
 - Thin
 - Accelerated disease process
 - Ketoacidosis possible at initial presentation

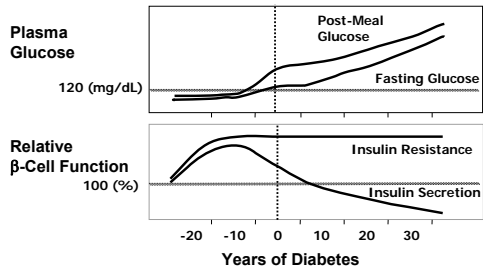
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PATHOGENIC PROCESSES Type 2

- 90 – 95% of the diabetic population
 - "Adult onset"
- Actual cause??
 - Specific etiologies unknown
 - NO autoimmune destruction
- Initial insulin resistance
- Later...relative insulin deficiency
- Abnormalities in metabolism
- Patient presentation - chronic
 - Obese
 - Disease developing over many years
 - Ketoacidosis not likely

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NATURAL HISTORY OF TYPE 2 DIABETES



Source: Adapted from International Diabetes Center (Minneapolis, MN).

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CLASSIC SYMPTOMS OF DIABETES (TYPE 1 OR 2)

- Polyuria
- Polydipsia
- Polyphagia
- Weight loss or gain
- Blurred vision
- Slow healing wounds
- Susceptibility to infections

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NORMAL PLASMA GLUCOSE LEVEL

- Depends on the reference lab.....
 - Fasting plasma glucose (FPG): **70 – 99 mg/dl**
 - 2 hr. after eating (OGTT): **70 – 145 mg/dl**
 - Random (casual): **70 – 125 mg/dl**

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CRITERIA FOR THE DIAGNOSIS OF DIABETES

- FPG \geq 126 mg/dl.
- OR**
- Symptoms and a casual PG of \geq 200 mg/dl
- OR**
- 2 hr. PG \geq 200 mg/dl during an OGTT.

SOURCE: Diabetes Care, Volume 31, Supplement 1, January 2008

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PRE-DIABETES

- Impaired Fasting Glucose (IFG)
 - *Fasting plasma glucose (FPG) of 100 mg/dl to 125 mg/dl*
- Impaired Glucose Tolerance (IGT)
 - 2 hr. plasma glucose of 140 mg/dl to 199 mg/dl

SOURCE: Diabetes Care, Volume 31, Supplement 1, January 2008

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**SCREENING FOR TYPE 2 DIABETES
(i.e. RISK FACTORS)**

- | | |
|---------------------------------------------------|-----------------------------------------|
| ● Overweight (key factor – check BMI!) | ● Hypertension |
| ● Physically inactive | ● Low HDL or high TG |
| ● 1 st degree relative w/diabetes | ● Women w/PCOS |
| ● High risk population | ● IGT or IFT on <u>previous</u> testing |
| ● Gestational diabetes / delivered \geq 9# baby | ● Other clinical conditions |
| | ● History of CVD |

SOURCE: American Diabetes Association, Diabetes Care, Volume 31, Supplement 1, January 2008

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SCREENING FOR TYPE 2 DIABETES (i.e. RISK FACTORS)

- *In the absence of above risk factors, testing for pre-diabetes and diabetes should begin at age 45 years*
- *If results are normal, testing should be repeated at least at 3-yrs intervals*

SOURCE: American Diabetes Association, Diabetes Care, Volume 31, Supplement 1, January 2008

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Obesity Trends* Among U.S. Adults BRFSS, 1985

(*BMI ≥ 30 , or ~ 30 lbs. overweight for 5' 4" person)



No Data <10% 10%-14%

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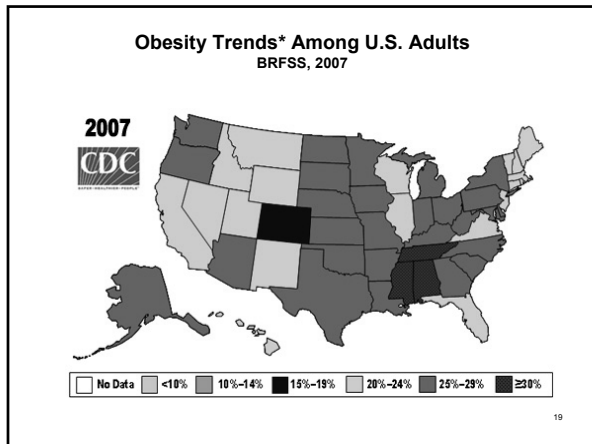
Obesity Trends* Among U.S. Adults BRFSS, 1990, 1998

(*BMI ≥ 30 , or about 30 lbs. overweight for 5' 4" person)



No Data <10% 10%-14% 15%-19% 20%-24%

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FUN (?) BUT STARTLING
MAP TO VIEW

<http://www.cdc.gov/nccdphp/dnpa/obesity/trend/maps/>

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THE
OBESITY – DIABETES LINK

- Visceral obesity
 - Increased capillary supply
 - Turnover of free fatty acids (FFA)
 - FFA's in liver → insulin resistance
- New study – University of CA, San Diego
 - Increased macrophages (ATMs) in adipose tissue
 - ATMs (subsets called CD11c+ cells) = inflammation
 - Inflammation leads to insulin resistance

SOURCE: Cell Metabolism, October 8, 2008 issue.

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OBESITY EFFECT ON DIABETES

- Increases:
 - Insulin resistance
 - Glucose intolerance
- Worsens:
 - Hyperglycemia
 - Hyperinsulinemia
 - Hyperlipidemia
- Obesity + diabetes:
 - Increased risk for hypertension
 - Increased risk for cardiovascular disease

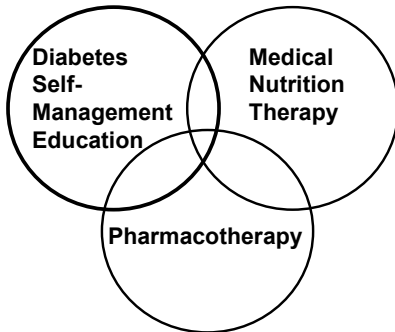
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DIABETES CARE AND MANAGEMENT

- Perform a comprehensive medical evaluation – see extra handout
- Establish a coordinated team effort
- Develop and implement individualized plan of care with patient
- Promote DSME
- Consideration of patient elements

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COMPONENTS OF DIABETES MANAGEMENT PROGRAM



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**DIABETES MANAGEMENT
1. GLYCEMIC ASSESSMENT**

- SMBG (self-monitoring of blood glucose)
 - Intense insulin therapy – test 3 or more times/day
 - Less intense therapy – testing is individualized
 - Monitor technique, proper interpretation and use of data
 - Continuous glucose monitoring?
 - Proper use and disposal of needles

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GLYCEMIC TARGETS

- Fasting: 70 - 130 mg/dl
- Post-prandial: \leq 180 mg/dl
- Bedtime: 110 - 150 mg/dl
- Otherwise, depends on patient variables
 - Age
 - Compromise

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**DIABETES MANAGEMENT
1. GLYCEMIC ASSESSMENT**

- A1C (glycated hemoglobin)
 - Perform q 3 – 6 mos.
 - No fasting required
 - Advantages
 - Indicates accuracy of pt.'s meter or reported results
 - Tells adequacy of SMBG testing schedule
 - Limitations
 - Inaccurate during erythrocyte turnover
 - Cannot measure glycemic variability

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A1C / PLASMA LEVEL CORRELATIONS

A1C (%) Mean plasma glucose (mg/dl)

6	135
7	170
8	205
9	240
10	275
11	310
12	345

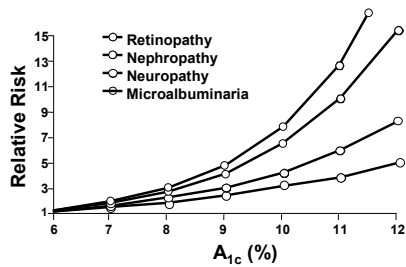
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A1C TARGET

- Normal: 4 – 6%
- ADA goal: ≤ 7%
- AACE goal: ≤ 6.5%

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A1C and RISK OF MICROVASCULAR COMPLICATIONS*



*Data from Diabetes Control and Complications Trial (DCCT; type 1 diabetes).

Source: Skyler JS. *Endocrinol Metab Clin N Am* 1996;25:243-254.

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**DIABETES MANAGEMENT
2. MEDICAL NUTRITION THERAPY**

- In depth MNT counseling
- Appropriate caloric intake with tracking
 - To achieve/maintain IBW (ideal body weight)
- CHO intake: approx. 50-60% of total calories
 - Including high grains and fiber (14 grams fiber/1000 calories)
- Saturated fat intake: $\leq 7\%$ of total calories
- Protein: Atkins diet not recommended!

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**DIABETES MANAGEMENT
2. MEDICAL NUTRITION THERAPY, cont'd.**

- Sugar alcohols / nonnutritive sweeteners

- Moderate alcohol intake

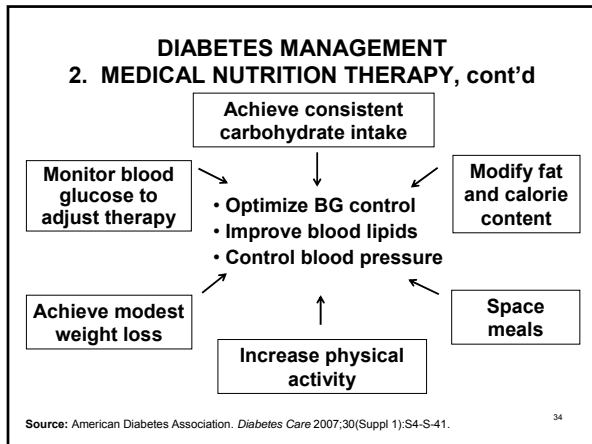
- Routine vitamin supplementation?

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**DIABETES MANAGEMENT
2. MEDICAL NUTRITION THERAPY, cont'd.**

- Do Not Use.....“ADA diet – i.e. 1500 calorie ADA diet”, “no concentrated sweets”
 - Replaced with more flexible and predictable CHO counting

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- DIABETES MANAGEMENT**
2. GENERAL DIETARY RECOMMENDATIONS*
- 5-7 servings/day of fruits and vegetables
 - ≥ 6 servings/day of whole grain products
 - 25-30 grams/day of fiber
 - < 300 milligrams/day of cholesterol
 - ≥ 64 ounces/day of water
 - Fat-free and low-fat milk products, fish, legumes, skinless poultry, and lean meats
 - Limited intake of high calorie/low nutrition foods and foods high in saturated fat or cholesterol
- *Supported by the NHLBI, AHA, ACS, and ADA. 35

- DIABETES MANAGEMENT**
3. BENEFITS OF PHYSICAL ACTIVITY
- Decreases risk for CVD, type 2 diabetes, dyslipidemia, and other comorbidities of overweight and obesity
 - Graded response in lipoprotein variables (triglycerides, LDL, HDL)
 - Increases metabolic rate
 - Increases muscle mass
- Sources: Ratner R, et al. *Diabetes Care* 2005;28:888-894; Wei M, et al. *JAMA* 1999;282:1483-1492; Tuomilehto J, et al. *N Engl J Med* 2001;344:1343-1350; Kraus WE, et al. *N Engl J Med* 2002;347:1483-1492. 36

DIABETES MANAGEMENT
3. PHYSICAL ACTIVITY RECOMMENDATIONS

- Evaluate patient for cardiovascular fitness prior to commencement
- Stress that activity must be balanced with diet
- Target regimen to patient's baseline fitness and activity level
- Suggest 30 minutes of moderately vigorous physical activity, performed daily
- Stress that activity *accumulates* during day

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DIABETES MANAGEMENT
4. PHARMACOLOGIC APPROACHES

- Causes of hyperglycemic
 - Loss of 1st phase insulin release
 - Peripheral tissue insulin resistance
 - Hepatic glucose overproduction
 - Relative lack of insulin
 - Increased gastric emptying time
 - Increased glucagon production after meals

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DIABETES MANAGEMENT
4. PHARMACOTHERAPY: General Considerations

- β -cell decline is progressive in type 2 diabetes
- Most patients who receive an oral agent will ultimately require additional agents (oral or insulin)
- All patients should be treated aggressively
- Titrate doses upward and add agents rapidly over several months to attain glycemic control

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DIABETES MANAGEMENT
4. PHARMACOTHERAPY: Selecting an Oral Agent

Considerations:

- Efficacy for glycemic reduction
- Mechanism of action
- Side effects/contraindications
- Associated metabolic changes
- Patient adherence
- Cost

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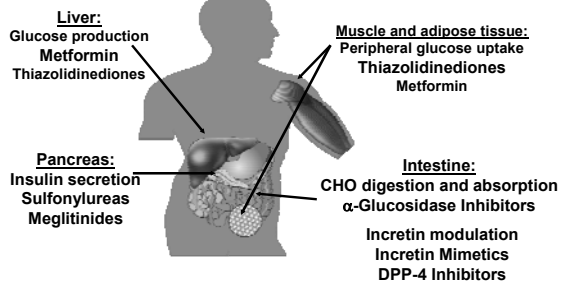
DIABETES MANAGEMENT
4. PHARMACOLOGIC APPROACHES, cont'd

So....we have medications that are therapeutic to the physiology....

- Need for more insulin / slowed CHO absorption
 - Prandin, Starlix, Precose, Glyset
- Increase insulin sensitivity
 - Actos, Avandia, sulfonylureas (Glucotrol, Amaryl)
- Reduce hepatic glucose production
 - Metformin – very popular
- Mimic insulin precursors, etc.
 - Byetta (injection)
 - Symlin

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DIABETES MANAGEMENT
4. ORAL ANTIHYPERGLYCEMICS:
Sites of Action



Adapted from: Sonnenberg GE, Kotchen TA. *Curr Opin Nephrol Hypertens.* 1998;7(5):551-55.

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DIABETES MANAGEMENT
4. INSULIN SECRETAGOGUES:
Sulfonylureas (SUs)

- Decrease A_{1c} levels 1-2%¹⁻³
- Agents vary slightly in duration of action or metabolism^{4,5}
- Associated with weight gain and hypoglycemia^{1,6}
- Glucose-lowering effects plateau after half of maximal dose is reached^{3,7}
- Approved as monotherapy and with all other oral agent classes and insulin
- Use cautiously if severe renal or hepatic impairment

References: ¹UKPDS Group. *Lancet* 1998;352:837-853; ²Schade D, et al. *J Clin Pharmacol* 1998;38:636-641; ³Simonson D, et al. *Diabetes Care* 1997;20:597-606; ⁴Dills D, Schneider J. *Horm Metab Res* 1996;28:426-429; ⁵Kitabchi A, et al. *Am J Med Sci* 2000;319:143-148; ⁶Zimmerman B. *Endocrinol Metab*, *North Am* 1997;26:511-521; ⁷Stenman S, et al. *Ann Intern Med* 1993;118:169-172.

DIABETES MANAGEMENT
4. INSULIN SECRETAGOGUES:
Meglitinides

- Short half-lives relative to SUs¹
- Dosing must be coordinated with meals
- Less pronounced adverse effects than SUs
- Repaglinide lowers A_{1c} 1-2%;² nateglinide 0.5-1%³
- Approved as monotherapy or with metformin
- Use caution with impaired liver or kidney function

References: ¹Perfetti R, Ahmad A. *Trends Endocrinol Metab*. 2000;11:218-223; ²Jovanovic L, et al. *J Clin Pharmacol*. 2000;40:49-57; ³Hanefeld M, et al. *Diabetes Care*. 2000;23:202-207.

DIABETES MANAGEMENT
4. METFORMIN

- Decreases hepatic glucose production
- Lowers A_{1c} by 1-2%^{1,2}
- Associated with decreased lipid levels and less hypoglycemia than SUs³⁻⁶
- Not associated with weight gain
- Discouraged for patients at increased risk for lactic acidosis⁷

References: ¹Campbell I, et al. *Diabetes Metab* 1994;20:394-400; ²Hermann L. *Diabetes Care* 1994;17:1100-1109; ³Bailey C, Turner R. *N Engl J Med* 1996;334:574-579; ⁴Johansen K. *Diabetes Care* 1999;22:33-37; ⁵Inzucchi S, et al. *N Engl J Med* 1998;338:867-872; ⁶Fontbonne A, et al. *Diabetes Care* 1996;19:920-926; ⁷Misbin R, et al. *N Engl J Med* 1998;338:265-266.

DIABETES MANAGEMENT
4. THIAZOLIDINEDIONES: Pioglitazone, Rosiglitazone)

- PPAR-γ agonists characterized as “insulin sensitizers”
- Increase insulin-stimulated glucose uptake by skeletal muscle cells¹
- Lower A_{1c} concentrations by 1-2%^{2,3}
- Elevate HDL-C while lowering triglycerides⁴
- Side-effects include weight gain and edema

Sources: ¹Petersen K, et al. *Diabetes* 2000;49:827-831; ²Lebowitz H, et al. *J Clin Endocrinol Metab* 2001;86:280-288; ³Aronoff S, et al. *Diabetes Care* 2000;23:1605-1611; ⁴Parulkar A, et al. *Ann Intern Med* 2001;134:61-71.

DIABETES MANAGEMENT
4. CONTRAINDICATIONS OF TZDs

- Rosiglitazone has been associated with:
 - Increased risk of MI and death from cardiovascular causes¹
 - Increased fracture risk in women with type 2 diabetes compared to glyburide and metformin²
- Unclear if fracture risk is TZD class effect

TZDs contraindicated in patients with advanced heart failure or hepatic impairments.

Sources: ¹Nissen SE, Wolski K. *N Engl J Med* 2007;356:2457-2471; ²Kahn SE, et al. *N Engl J Med* 2006;355:2427-2443.

DIABETES MANAGEMENT
4. α-Glucosidase Inhibitors (Acarbose, Miglitol)

- Reduce CHO absorption in intestine¹
- Lower A_{1c} concentrations by 0.5-1%^{2,3}
- Do not promote weight gain or hypoglycemia
- Side-effects include flatulence, abdominal discomfort, and diarrhea
- Approved as monotherapy and with SUs

References: ¹Lebowitz H. *Diabetes Rev* 1998;6:132-145; ²Braun D, et al. *Endocrinol Metab* 1996;3:275-280; ³Hasche H, et al. *Diabetes Nutr Metab* 1999;12:277-285.

DIABETES MANAGEMENT

**4. Incretin Mimetics
(Exenatide)**

- Incretins secreted upon digestion and modulate numerous metabolic functions:¹⁻⁴
 - Enhance insulin secretion
 - Decrease postprandial glucagon secretion
- Exenatide is synthetic incretin mimetic
- Indicated as adjunctive therapy with metformin, SU, TZD, and combinations thereof
- Lowers A_{1c} concentrations additional 0.8-1%⁵⁻⁷
- Associated with substantial weight loss⁵⁻⁷

References: ¹Flint A, et al. *J Clin Invest* 1998;101:515-520; ²Larsson H, et al. *Acta Physiol Scand* 1997;160:413-422; ³Nauck MA, et al. *Diabetologia* 1996;39:1546-1553; ⁴Drucker DJ. *Diabetes* 1998;47:159-169; ⁵Buse JB, et al. *Diabetes Care* 2004;27:2628-2635; ⁶Kendall DM, et al. *Diabetes Care* 2005;28:1083-1091; ⁷DeFronzo RA, et al. *Diabetes Care* 2005;28:1092-1100.

DIABETES MANAGEMENT

**4. Dipeptidyl Peptidase (DPP)-4 Inhibitors
(Sitagliptin)**

- DPP-4 rapidly degrades incretins such as glucagon-like peptide-1 (GLP-1)¹
- Sitagliptin increases postprandial GLP-1 without hypoglycemia or weight gain²⁻³
- Indicated as monotherapy or with metformin or TZD
- Lowers A_{1c} concentrations additional 1%⁴⁻⁶
- Recent FDA approval of a metformin/sitagliptin oral agent

References: ¹Meier JJ, et al. *Diabetes* 2004;53:654-662; ²Herman GA, et al. *Clin Pharmacol Ther* 2005;78:675-688; ³Herman GA, et al. *J Clin Pharmacol* 2006;46:876-886; ⁴Aschner P, et al. *Diabetes Care* 2006;29:2632-2637; ⁵Goldstein BJ, et al. *Diabetes Care* 2007;May 7:Epub ahead of print; ⁶Rosenstock J, et al. *Clin Ther* 2006;28:1556-1568.

DIABETES MANAGEMENT

4. Combination Oral Therapy

- Each consecutive oral agent may reduce A_{1c} by additional 1-2%
- For cost-effectiveness, use metformin + SU
- Patients with marked insulin resistance may benefit from metformin + TZD
- If combination therapy fails to lower A_{1c} < 7.0%, choice of third agent (oral vs insulin) must be made individually

**DIABETES MANAGEMENT
4. INSULIN**

- May be prescribed at any point in therapy
- Can be used alone or in combination with oral agents
- Varieties differ in onset, peak time, and duration of action
- Rapid-acting insulins should be injected immediately before meal
- Basal insulins provide steady action that mimics natural secretion

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**DIABETES MANAGEMENT
4. INSULIN**

Classification	Onset	Peak Time	Duration
Rapid-acting	5-10 min	1 hr	2-4 hr
Short-Acting	30 min	2-3 hr	3-6 hr
Intermediate-Acting	2-4 hr	4-12 hr	12-18 hr
Basal	1 hr	-----	18-28 hr

Adapted from: American Diabetes Association. "The Basics of Insulin." www.diabetes.org/type-1-diabetes/basics.jsp. 53

**DIABETES MANAGEMENT
4. INSULIN**

- Rapid-acting: Novolog, Humalog, Apidra
- Short-acting: Regular
- Intermediate-acting: NPH
- Basal: Lantus, Levemir
- Combinations: 70/30, 50/50
- Sliding scale?? NO!!!!
 - (only in certain situations)

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**DIABETES MANAGEMENT
4. INSULIN**

- Goal of exogenous insulin therapy
 - To cover the body's insulin needs
 - To mimic the physiologic processes of insulin secretion and glucose control
- Basal insulin secretion
- Prandial insulin secretion

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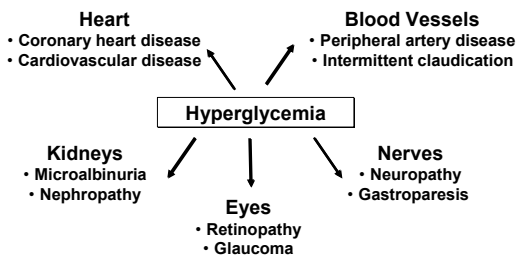
DIABETES COMPLICATIONS

"Man may be the captain of his fate, but he is also the victim of his blood sugar"

*Dr Wilfred Oakley
(Transactions of the Medical Society of London 1962; 78: 16)*

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DIABETES COMPLICATIONS



Source: American Diabetes Association. *Diabetes Care* 2006;29(Suppl 1):S4-S42.

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DIABETES COMPLICATIONS

- Risk factors for micro/macrovascular
 - Hyperglycemia
 - Hypertension
 - Dyslipidemia
 - Obesity
 - Smoking
 - Physical inactivity

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DIABETES COMPLICATIONS

- Coronary artery disease (CAD)
 - Accounts for 65% of deaths
 - Death rate 2 – 4 x higher than non-diabetics
 - More likely to experience “silent” MI
- Prevention of coronary artery disease
 - Lifestyle changes – smoking, lo-fat diet, exercise
 - Maintenance of optimal A1C
 - Treat HTN & hyperlipidemia aggressively

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DIABETES COMPLICATIONS

- Cerebrovascular disease (stroke, TIA)
 - Occurs 3 – 4 times more than in non-diabetics
- ADA recommends aspirin therapy

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DIABETES COMPLICATIONS

- Peripheral vascular disease
 - Affects especially the arteries
 - Amputation is end result
 - Risk is 15 – 40 x greater than non-diabetic
 - 50% die within 3 years after amputation
- Prevention
 - Smoking cessation
 - Importance of regular foot care and checks
 - Glycemic control

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DIABETES COMPLICATIONS

- Retinopathy
 - #1 cause of blindness
 - Nutrition-providing cells die
 - New collateral circulation weak, leaky
 - Usually seen within 5 years of diagnosis
- Prevention
 - Annual dilated eye exam by an ophthalmologist
 - Glycemic control

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DIABETES COMPLICATIONS

- Nephropathy
 - 20 – 40% will develop
 - ½ of all dialysis patients have diabetes
 - Thickening of glomeruli – unable to filter the blood – kidneys fail
- Prevention / screening
 - Annual microalbumin level
 - Annual creatinine level
 - Annual GFR estimation – www.kidney.org
 - HTN & Glycemic control
 - ACE / ARB inhibitors
 - Contrast media precautions
 - Smoking cessation

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DIABETES COMPLICATIONS

- Peripheral neuropathy
 - Affects lower extremities
 - First sensation is "sock" effect
 - Subsequent symptoms
 - Neuropathic pain – good sign
 - Foot ulcers
- Treatment
 - Antidepressants
 - Anticonvulsants
 - Topicals
- Prevention
 - Daily inspection
 - NO barefeet!
 - See podiatrist for probs.
 - Proper grooming of nails
 - Monofilament test
 - Glycemic control

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DIABETES COMPLICATIONS

- Other complications:
 - Autonomic neuropathy
 - Dry mouth
 - Abnormal sweating
 - Postural HTN
 - Urinary incontinence
 - Delayed gastric emptying
 - Impotence

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DIABETES COMPLICATIONS

- Hypoglycemia
 - Too little food or delayed intake
 - Too much diabetic medicine
 - Too much exercise without compensation
 - Alcohol intake without food
- Treatment
 - 1 carbohydrate choice (15 grams)
 - Repeated in 10 -15 minutes if not feeling better
 - Glucose tabs or jel
 - Glucagon injection

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THE GOOD NEWS.....

- Glycemic control (for each 1% drop in A1C)
 - 35-40% reduction of microvascular complic.
 - 21% reduction of CVD
- BP control
 - 33-50% reduction of CAD, CVD
 - 33% reduction of microvascular complic.
- Lipid control
 - 20-50% reduction of CAD, CVD
- Nephropathy detection/treatment
 - 30-70% reduction in kidney malfunction
- Retinopathy detection/treatment
 - 50-60% reduction in vision loss
- Foot care
 - 45-85% reduction in amputations

SOURCE: CDC 2005 Fact Sheet

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SUMMARY

- Lifestyle changes to prevent onset and progression of diabetes and CVD are the first step.
- Diabetes management is individualized and involves the patient and a provider-directed team.
- Establishing tight glycemic control is the key to management.
- Providers must take an active role in the design - should employ an aggressive, treat-to-target strategy and empower the patient to self-management as much as possible.
- Modest weight loss (5-10% of body weight) lowers risk for CVD and type 2 diabetes¹⁻²

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SUMMARY, cont'd.

- Loss may be achieved and maintained safely by combining dietary adjustments and regular physical activity
- Must be tailored to the patient's needs

- Often require adjustments for optimization

- Type 2 diabetes is progressive; management will likely ultimately require insulin

Sources: ¹Ratner R, et. al. Diabetes Care 2005;28:888-894; ²Diabetes Prevention Program Research Group. N Engl J Med 2002;346:393-403.
