



Advancing Your Career in Diabetes Education

Welcome to Diabetes in the 21st Century

DiabetesEd.net

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Founder, President and Concerned Community Member

**Diabetes in the 21st Century:
A Clinical and Educational Update**

1. Describe type 1 and type 2 diabetes.
2. List 4 manifestations of insulin resistance.
3. List ADA diabetes guidelines.
4. State unique qualities of diabetes agents.
5. Describe insulin therapy
6. Discuss medical nutrition therapy
7. Describe diabetes survival skills

CDC Announces



1 in 3 Americans
may have
Diabetes by
2050

Boyle, Thompson, Barker, Williamson
2010, Oct 22:8(1)29
www.pophealthmetrics.com

Diabetes in America 2013

- **26 million or 8.3%**
- **79 million have pre diabetes**
- New cases increased **90%** in past 10 years.
 - ↘ 4.8 per 1,000 people during 1995-1997 to
 - ↘ 9.1 per 1,000 in 2005-2007 in 33 states.

CDC 2011

Diabetes



Global Epidemic

- Every 10 seconds
 - ↘ 1 person dies with diabetes
 - ↘ 2 people develop diabetes
- Every year
 - ↘ 3 million deaths
 - ↘ 6 million new cases
- World Diabetes Day is November 14th
 - ↘ *Understand diabetes, take control*
 - ↘ *(2009-2013 theme)*



Diabetes Detectives Needed



- On average – takes 6.5 years to diagnose diabetes
- 1/3 of all people with diabetes don't know they have it



Age-adjusted Diabetes Prevalence
20 yrs or older, by race/ethnicity— U.S. 2008

- Native Americans 16.5%
- Alaska Natives 16.5%
- Blacks 11.8%
- Hispanics 10.4%
- Asian Americans 7.5%
- Whites 6.6%

In 2002, Native Hawaiians and Japanese and Filipino residents of Hawaii aged twenty years or older were approximately 2 times as likely to have diagnosed diabetes as white residents of Hawaii

Obesity in America

Over the past 50 years

Percentage of American Adults* With Obesity



Source: Centers for Disease Control and Prevention
*Adults ages 20 to 74

- 34% BMI 30 +, 34% BMI 25-29
- We burn 100 cals less a day at work
- 1/3 of all overwt people don't get diabetes



Thoughts on Diabetes, Weight, Social Change

■ "The only way on a societal basis to reduce the prevalence of obesity is through community action" – Dr. Frieden, CDC



- Obesity (BMI 30+) prevalence 22% to 40%
- Poverty, Obesity, Diabetes inter-related

New and Early Research on Gut Bacteria

- Leaner people appear to have higher proportion of bacteroidetes
 - ↳ Gut bacteria less efficient at converting food to calories
- Obese people appear to have higher levels of firmicutes
 - ↳ Gut bacteria very efficient at calorie extraction
- Bacteria tend to run in families

■ Newsweek. Don't Just Blame Calories – July 6, 2010 DM Forecast – Feb 2011

Free Live Webinars and Live Seminars at DiabetesEd.net

- Free Webinars
 - ↳ Preparing to take CDE
 - ↳ New Frontiers
 - ↳ New Medications
- Sign up to receive newsletter



Role of the Pancreas Endocrine Functions

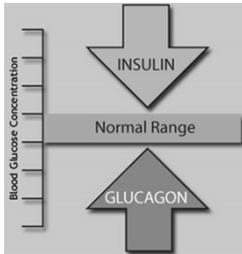
Beta Cells - Insulin

- Anabolic hormone - helps store glucose as glycogen in muscle, liver
- ↳ secreted in response to elevated glucose
- ↳ halts breakdown of glycogen in liver
- ↳ increases protein synthesis, fat storage
- ↳ powerful hypoglycemic

Beta Cells - Amylin

- ↳ secreted in 1:1 ratio with insulin
- ↳ Causes satiety
- ↳ Lowers post-prandial glucagon response
- ↳ Slows gastric emptying
- ↳ Type 1 make none
- ↳ Type 2 make less than normal amounts

Role of the Pancreas Endocrine Functions



Alpha cells - Glucagon

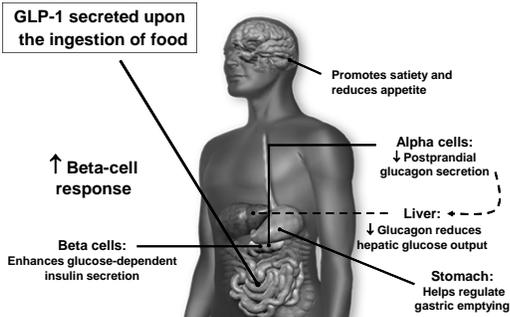
Opposes action of insulin at the liver

- stimulated in response to low glucose levels
- stimulates liver to convert glycogen to glucose
- inhibits liver from glucose uptake
- causes hyperglycemia

Hormones Effect on Glucose

<u>Hormone</u>	<u>Effect</u>
■ Glucagon (pancreas)	⬆
■ Stress hormones (kidney)	⬆
■ Epinephrine (kidney)	⬆
■ Insulin (pancreas)	⬇
■ Amylin (pancreas)	⬇
■ Gut hormones - incretins (GLP-1) released by L cells of intestinal mucosa, beta cell has receptors)	⬇

GLP-1 Effects in Humans Understanding the Natural Role of Incretins



Adapted from Flint A, et al. *J Clin Invest*. 1998;101:515-520
Adapted from Larsson H, et al. *Acta Physiol Scand*. 1997;160:413-422
Adapted from Nauck MA, et al. *Diabetologia*. 1996;39:1346-1353
Adapted from Trueter DJ. *Diabetes*. 1998;47:139-149

GLP-1 degraded by DPP-4 w/in minutes

Bariatric Surgery

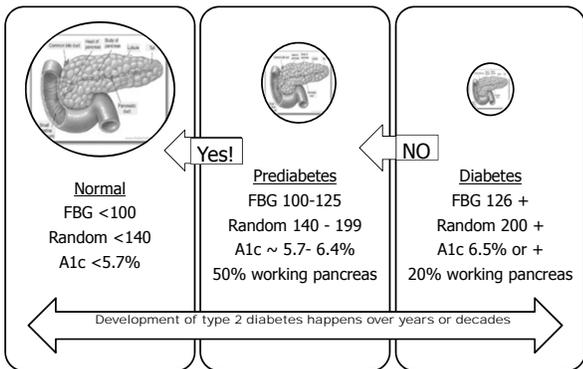
- Consider on diabetes pts w/ BMI >35, esp with comorbidities
- Remission (BG normalized)
 - ↳ rates range from 40 – 95%
 - ↳ Better results with newer diabetes (more beta cell mass)
 - ↳ Due to increase incretins (gut hormones)
- Still researching long term benefits, cost effectiveness and risk



Signs of Diabetes

- | | |
|-----------------------------|--------------------------------------------------|
| ■ Polyuria | ■ Glycosuria, H ₂ O losses |
| ■ Polydipsia | ■ Dehydration |
| ■ Polyphasia | ■ Fuel Depletion |
| ■ Weight loss | ■ Loss of body tissue, H ₂ O |
| ■ Fatigue | ■ Poor energy utilization |
| ■ Skin and other infections | ■ Hyperglycemia increases incidence of infection |
| ■ Blurry vision | ■ Osmotic changes |

Natural History of Diabetes



4 Types of Diabetes

- Type 1
- Type 2
- Gestational
- Other Causes



Case Study

1. Pt profile: 5'8", 192 lb male

Diabetes 12 years, on insulin 3 yrs
What type of DM and how do you know?



2. Pt profile: 5'6", 108 lb female

On insulin 3u Novolog before meals,
10u Lantus at bedtime
What type of DM and how do you know?



Type 1 Diabetes – Genetics and Risk Factors

- 1- 400 to 1-1000 = Risk of type 1 in gen pop
- 1-20 to 1-50 in offspring of diabetes parents
- Combo of genes and disease susceptibility
- Risk Factors:
 - Autoimmunity tends to run in families
 - Higher rates in non breastfed infants
 - Viral triggers: congenital rubella, coxsackie virus B, cytomegalovirus, adenovirus, mumps.
 - Hygiene Hypothesis: Could gut bacteria could influence immunity?

Type 1 Diabetes – 10% of all DM

- Auto-immune pancreatic beta cells destruction
- Most commonly expressed at age 10-14
- More rapid destruction in youth (vs. adults)
- Insulin sensitive (require 0.5 - 1.0 units/kg/day)
- Auto-immune Markers
 - Positive Glutamic Acid Decarboxylase (GAD), Insulin & Islet Cell Autoantibodies (IAA & ICA's)
 - New marker – ZnT8 (zinc transporter) antibodies to this (ZnT8) found in 60-80% of type 1
- Other clues
 - Low C-Peptide level < 0.5
 - Usually lean and present in sick state

Type 1 Diabetes Associated with other immune conditions

- Celiac disease (gluten intolerance)
- Thyroid disease
- Addison's Disease
- Rheumatoid arthritis
- Other



What Does Type 1 Look Like?



Mary Tyler Moore

Adam Morrison



Nick Jonas

Bret Michaels



Sharon Stone
Halle Berry

From Debbie Nagata's slide collection



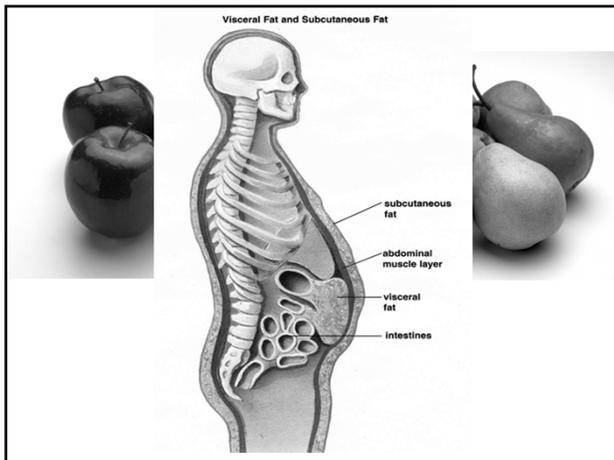
Justice Sonia Sotomayor

Type 1 in Hospital

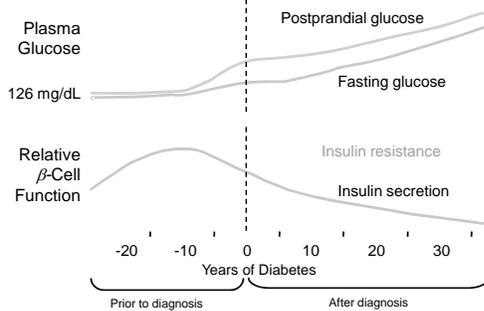
- 43 yr old admitted to evaluate angina.
- Morning blood sugar is 92.
- Based on Regular insulin sliding scale, no insulin required.
- Breakfast tray shows up and patient says, I need my insulin shot before I eat.



What do you say?



Natural Progression of Type 2 Diabetes



Adapted from Bergenstal et al. 2000; International Diabetes Center.

Cardio Metabolic Risk -
5 Hypers -

- Hyperinsulinemia (resistance)
- Hyperglycemia
- Hyperlipidemia
- Hypertension
- Hyper"waistline"emia (35" women, 40" men)



Manifestations of Insulin Resistance

Diabetes 2 - Who is at Risk?

(ADA Clinical Practice Guidelines)

1. Testing should be considered in all adults who are overweight (BMI \geq 25) and have additional **risk factors**:
 - First-degree relative w/ diabetes
 - Member of a high-risk ethnic population
 - Habitual physical inactivity
 - PreDiabetes
 - History of heart disease



Diabetes 2 - Who is at Risk?

(ADA Clinical Practice Guidelines)

Risk factors cont'd

- HTN - BP > 140/90
- HDL < 35 or triglycerides > 250
- baby >9 lb or history of Gestational Diabetes Mellitus (GDM)
- Polycystic ovary syndrome (PCOS)
- Other conditions assoc w/ insulin resistance:
 - Severe obesity, acanthosis nigricans (AN)



Acanthosis Nigricans (AN)

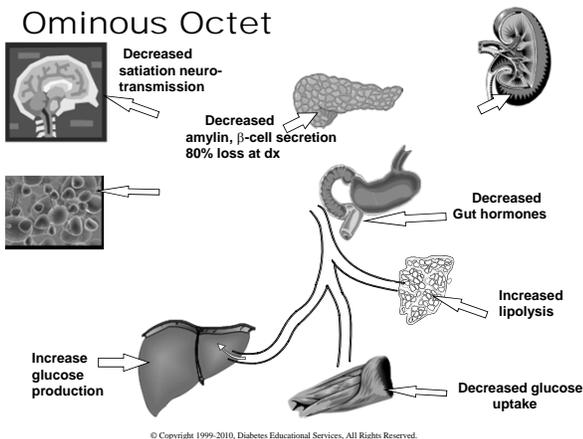
- Signals high insulin levels in bloodstream
- Patches of darkened skin over parts of body that bend or rub against each other
 - ↳ Neck, underarm, waistline, groin, knuckles, elbows, toes
 - ↳ Skin tags on neck and darkened areas around eyes, nose and cheeks.
- No cure, lesions regress with treatment of insulin resistance

Diabetes is also associated with

- Fatty liver disease
- Obstructive sleep apnea
- Cancer; pancreas, liver, breast
- Alzheimer's
- Depression



Ominous Octet



Comparison of Type 1 and Type 2

	<u>Type 1</u>	<u>Type 2</u>
Obesity	x	xxx
Family History	xxx	xxx
Respond to oral agents	0	xxx
Ketosis	xxx	x
Antibodies present	xxx	0
Age of onset	teens	30-40s

Gestational Diabetes



Increasing Prevalence of GDM A public health perspective

- GDM prevalence increased by
 - ↳ ~10–100% in several race/ethnicity groups during the past 20 years
- In the U.S., Native Americans, Asians, Hispanics, and African-American women are at higher risk for GDM than non-Hispanic white women

Ferrara, Diabetes Care July 2007 vol. 30 no. Supplement 2 S141-S146

Gestational Diabetes – GDM

7-18% of all pregnancies



- GDM – hyperglycemia first recognized during pregnancy (24-28 weeks)
 - ♦ may or may not persist after pregnancy
 - High risk of type 2 post partum are those that are diagnosed early, have higher glucoses, and obese.

Perinatal Health: Maternal Behavior



- Weight gain during pregnancy matters”
 - > 40 lbs increases risk of diabetes
 - If obese, no wt gain needed
- Women with GDM –
 - 5-10% have dm immediately after delivery
 - 50% risk of getting DM w/in 5-15 yrs of delivery
 - Her child at risk for Insulin Resistance / diabetes
- Small for gestational age/wt babies at risk of insulin resistance ,obesity (5.8 lbs or <)
- *GDM during child's gestation no listed as risk for childhood diabetes screen*

Screen for GDM

- Screen for undiagnosed Type 2 at the first prenatal visit in those with risk factors using standard diagnostic criteria.
- If normal, recheck at 24-28 weeks



Postnatal Health: Maternal Behavior

- Breastfeeding:
 - Reduces child's risk of type 1 and 2
 - Lowers mom's risk of DM 50%+
 - Decreases mom's HTN, lipids and helps regain girlish figure
- Encourage family to role model healthy eating and activity
- Resources



Postpartum after GDM

- Screening 6-12 weeks post partum using non-pregnant OGTT criteria
- Repeat at 3 yr intervals or signs of DM
- Encourage weight control
- Encourage exercise
- Make sure connected with health care
- Lipid profile/ follow BP
- Preconception counseling

Flash Mob – World Diabetes Day to Beat It

- | | |
|-----------------|-------------------------|
| ↘ March R/C/R | • Open door |
| ↘ Fred Astaire | • Ride Horse |
| ↘ Point R/L | • Scoot Rt/Left |
| ↘ Arms up, down | • Turn R & Clap, then L |
| ↘ Shoulder Walk | • Shoulder Walk |
| ↘ Punch down/up | • Punch down/up |
| ↘ Scoot Rt/Left | |
| ↘ Reach up R/L | |
| ↘ Shoulder Walk | |



Other Causes of Hyperglycemia

- ↳ Steroids
- ↳ Agent Orange
- ↳ Tube feedings / TPN
- ↳ Transplant medications
- ↳ Cystic Fibrosis

Regardless of cause, requires treatment

- Insulin always works
- Sign of pancreatic malfunction

Life Study – Mrs. Jones

Mrs. Jones is 62 years old, overweight and complaining of feeling tired and urinating several times a night. She is admitted with a urinary tract Infection. Her WBC is 12.3, glucose 237. She is hypertensive with a history of gestational diabetes. No ketones in urine.

- What risk factors and signs of diabetes does she have?
- What type of diabetes does she have?
- Does she have insulin resistance?
- How would we manage her BG in hospital

What Do You Say? Mrs. Jones asks you

- What is type 2 diabetes?
- Will this go away?
- Will I get complications?
- Will I need to take diabetes medication for the rest of my life?
- How come I got diabetes?
- Do I have to check my blood sugars?

How will it help me?

- See if your treatment plan is working
- Make decisions regarding food and/or med adjustment when exercising
- Find out how that pizza affected your BG
- Avoid unwanted weight gain
- Enhanced athletic performance
- Find patterns
- Manage illness



How Often Should I Check?

- Be realistic!!
- Type 1 – at least 3 times a day
- Type 2 – as often as needed to achieve goals (ADA)
- Consider:
 - ↳ Types and timing of meds
 - ↳ Goals
 - ↳ Ability (physical and emotional)
 - ↳ Finances





Alternate Site Testing

- OK before meal / 2 hrs after
- Not used during when hypoglycemic or prone to hypoglycemia
- Not used when glucose levels are rapidly rising or decreasing
- Avoid in persons with hypoglycemia unawareness



DiaBingo

- B** Frequent skin and yeast infections
- B** A BMI of ____ or greater is considered overweight
- B** To reduce complications, control **A**1c, **B**lood pressure, **C**holesterol
- B** PreDiabetes – fasting glucose level of ____ to ____
- B** Erectile dysfunction indicates greater risk for ____
- B** Diabetes – fasting glucose level ____ or greater
- B** Type 1 diabetes is best described as an ____ disease
- B** People with diabetes are ____ times more likely to die of heart dx
- B** Elevated triglycerides, < HDL, smaller dense LDL
- B** Each percentage point of A1c = ____ mg/dl glucose
- B** At dx of type 2, about ____% of the beta cell function is lost
- B** Diabetes – random glucose ____ or greater

Complications - Why?



- Degree of hyperglycemia "glucose toxicity"
- Duration of hyperglycemia
- Genes
- Multiple risk factors: smoking, vascular disease, dyslipidemia, hypertension, other

Diabetes Complications

- Heart disease leading cause of death.
- CAD death rates are about 2 -4x's as high as adults without diabetes (it's not getting better)
- Risk of stroke is 2 - 4 times higher
- 60% - 65% of people with DM have HTN.
- DM accounts for 40% of new cases of ESRD
- 60 - 70% have mild - severe forms of neuropathy
- Diabetes is the leading cause of blindness
- Accounts for 50% of lower limb amputations

Control Matters

- Prevention
- Trials
- Practice Recommendations



Financial Advisor

- Mid 30s, friendly, he smiles to greet you and you notice his gums are inflamed. You'd guess a BMI of 26 or so, with most of the extra weight in the waist area.
- If you could give him some health related suggestions, what would they be?





Can Type 2 be Prevented in Older Adults?

- Physical activity (30 mins a day)
- Dietary score (higher fiber intake, low saturated fat and *trans*-fat, lower mean glycemic index)
- Not Smoking
- Alcohol use (up to 2 drinks a day);
- BMI <25 and waist circumference

Overall, 9 of 10 new cases of diabetes attributable to these 5 lifestyle factors.

89% risk reduction when all at goal.

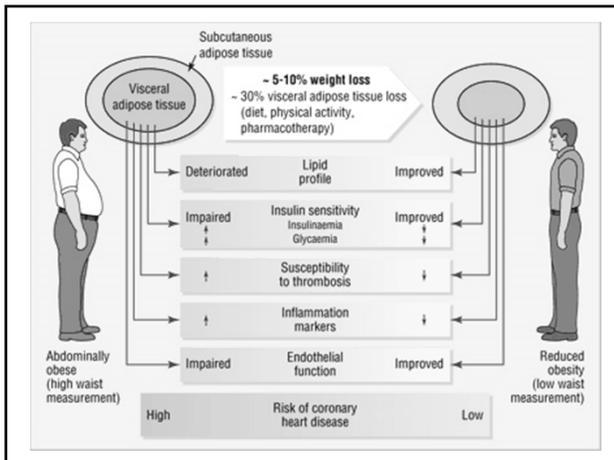
35% rel risk reduction for each additional

Dariush Mozaffarian, MD,
Arch Intern Med. 2009;169(8):798-807.

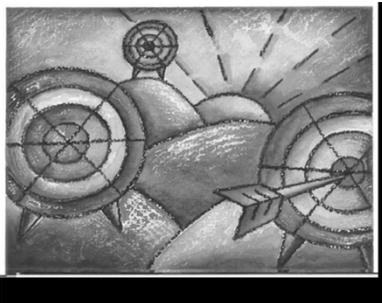
Diabetes Prevention Program (DPP) August 2001

3, 234 people w/ IGT randomized to Placebo, Diet/Exercise or Metformin for 3 years

- Standard Group - 29% developed DM
- Lifestyle Results - 14% developed DM
 - ↳ 30 mins daily mod activity/ low fat diet reduced DM risk by 58% (71% for 60yrs +)
 - ↳ On avg, participants lost 5-7% of body wt
- Metformin 850 BID - 22% developed DM
 - ↳ reduced risk by 31% (less effective with elderly and thinner pt's)



Goals of Care



ABC's of Diabetes

A1C

Blood Pressure

Cholesterol

www.diabetes.org/makethelink

Glucose and BP Control Matter

- 1% decrease in A_{1c} reduces microvascular complications by 35%
- 1% decrease in A_{1c} reduces diabetes related deaths by 25%

- B/P control (144/82) reduced risk of:
 - ↳ Heart failure (56%)
 - ↳ Stroke (44%)
 - ↳ Death from diabetes (32%)

Lancet 352: 837-865, 1998

A1c and Estimated Avg Glucose (eAG) 2008

<u>A1c (%)</u>	<u>eAG</u>
5	97
6	126
7	154
8	183
9	212
10	240
11	269
12	298

eAG = 28.7 x A1c - 46.7 ~ 29 pts per 1%
Translating the A1c Assay Into Estimated Average Glucose Values – ADAG Study
Diabetes Care: 31, #8, August 2008

ABCs of Diabetes –

- A1c less than 7% (avg 3 month BG)
 - ↳ Pre-meal BG 70-130
 - ↳ Post meal BG <180
- Blood Pressure < 140/80
- Cholesterol
 - ↳ HDL >40
 - ↳ LDL <100 (if CHD, <70)
 - ↳ Triglyceride < 150

“Legacy Effect”

- For participants of DCCT and UKPDS
 - ↳ long lasting benefit of early intensive BG control prevents
 - microvascular complications
 - Macrovascular complications (15-55% decrease)
 - ↳ Even though their BG levels increased over time
 - ↳ Message – Catch early and Treat aggressively



Vaccinations- Immunizations

- Flu vaccine
 - ↳ every year starting 6 months
- Pneumococcal starting at 2 years.
 - ↳ One time Revaccination for those over 64 and had first vaccine >5 years prior
- Hepatitis B Vaccine (ADA Stds 2013, pg s28)
 - ↳ For diabetes pts age 19 – 59 (not previously vaccinated)
 - ↳ Double risk of Hep B due to lancing devices/ glucose meter exposure



DiaBingo- G

- G ADA goal for A1c is less than ____%
- G People with DM need to see their provider at least every month
- G Blood pressure goal is less than _____
- G People with DM should see eye doctor (ophthalmologist) at least _____
- G The goal for triglyceride level is less than _____
- G Goal for my HDL cholesterol is more than _____
- G The goal for blood sugars 1-2 hours after a meal is less than: _____
- G People with DM should get this shot every year _____
- G People with DM need to get urine tested yearly for _____
- G Periodontal disease indicates increased risk for heart disease
- G The goal for blood sugar levels before meals is: _____
- G The activity goal is to do ____ minutes on most days

Mr. Jones - What are Your Recommendations?

Patient Profile

64 yr old with type 2 for 11 yrs. Hx of CVD.

Labs:

- ↓ A1c 9.3%
- ↓ HDL 37 mg/dl
- ↓ LDL 114 mg/dl
- ↓ Triglyceride 260mg/dl
- ↓ Proteinuria - neg
- ↓ B/P 142/92

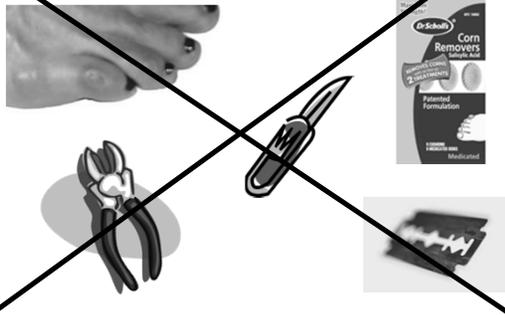
Self-Care Skills

- Walks dog around block 3 x's a week
- Bowls every Friday
- 3 beers daily
- Widowed, so usually eats out
- 15 lbs overweight
- *My foot hurts*

Foot Care

Lift the sheets
and look at
the Feet!

No Bathroom Surgery



5.07 monofilament =
10gms linear pressure



Three Most Important Foot Care Tips

- Inspect and apply lotion to your feet every night before you go to bed.
- Do NOT go barefoot, even in your house. Always wear shoes!
- Every time you see your doctor, take off your shoes and show your feet.

Tips for Succeeding with Diabetes Education

- Assess
 - ↳ where there are with their diabetes
 - ↳ "What is the most difficult thing right now for you in managing your diabetes?."
- Identify barriers
- Acknowledge – avoid judgement
- Provide emotional support, resources and info

KISS and Listen

- Keep
 - It
 - Short and
 - Simple
- Listen, understand, respect, converse
- We don't change behavior – our job is to inspire, inform, support and facilitate their efforts to ID and achieve goals



Diabetes Meds for Type 2: Objectives



1. Describe the main action of the 5 different categories of type 2 diabetes medications.
2. Discuss strategies to determine the right medication for the right patient.
3. List the side effects and clinical considerations of each category of medication.

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Resources for Medications

- Partnership for Prescription Assistance
→ www.pparx.org
- NeedyMeds.org
- www.rxassist.org



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Diabetes Agents Considerations

- Diabetes medications can be used as monotherapy, in combo or with insulin
- Combining agents from different classes has additive effect
- Most reduce A1c 0.5 – 2.0%
- Not to be used during preconception, pregnancy or when breastfeeding

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ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

Patient-Centered Approach

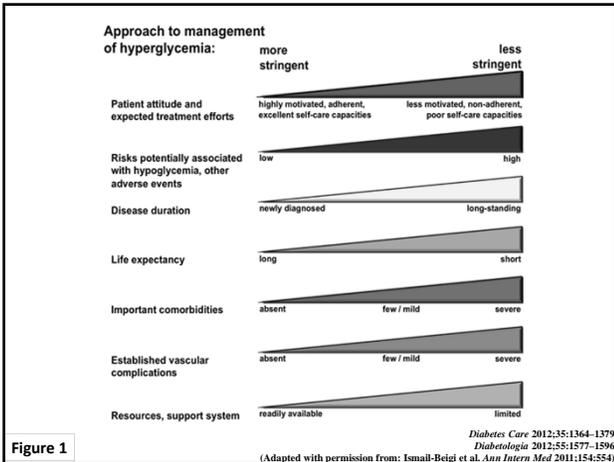
"...providing care that is respectful of and responsive to individual patient preferences, needs, and values - ensuring that patient values guide all clinical decisions."

- Gauge patient's preferred level of involvement.
- Explore, where possible, therapeutic choices.
- Utilize decision aids.



- **Shared** decision making – final decisions re: lifestyle choices ultimately lie with the patient.

Diabetes Care 2012;35:1364-1379
Diabetologia 2012;55:1577-1596



Ideal Diabetes Medication -



- No hypoglycemia
- No weight gain
- Affordable
- Lowers CV risk
- Most people can tolerate /use

Action/Classes of Type 2 Meds

1. Suppressor	Biguanide – Metformin
2. Squirter	Sulfonylureas Meglitinides
3. Satiators	AmylinoMimetics Incretin Mimetics DPP-4 Inhibitors
4. Sensitizer	Thiazolidinediones (TZD)
5. Glucretics	SGLT2 Inhibitors
6. Circadian Switchers	Dopamine Receptor Agonists
7. Slower	Alpha-glucosidase inhibitors

Biguanides – Suppressor Metformin (Glucophage®)

- Action: suppresses release of glycogen from the liver
- Who?
 - ↳ Fasting hyperglycemia
 - ↳ Dysmetabolic Syndrome
 - ↳ For pediatrics starting age 10
 - (XR age 17)



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Biguanides - Metformin

- **Action:** decrease hepatic glucose (glycogen)
- **Names:**
 - ↳ Metformin (Glucophage)
 - Starting dose: 500 BID, max 2500mg daily
 - ↳ Metformin extended release (3 different versions)
 - Starting dose 500mg at dinner, max dose 2000 to 2500 mg daily
- ↳ **Efficacy:**
 - Decrease fasting plasma glucose 60-70 mg/dl
 - Reduce A1C 1.0-2.0%

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Biguanides - Metformin

- Side effects
 - ↳ Diarrhea and abdominal discomfort
 - ↳ Lactic acidosis if improperly prescribed
 - ↳ Decrease LDL cholesterol and triglycerides
 - ↳ No weight gain, with possible modest weight loss
 - ↳ B12 deficiency can be assoc w/ nerve pain
- Hold prior to IV contrast dye studies and use caution during acute illness. Resume when kidney function adequate

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Considerations

Biguanide - Metformin (Glucophage®)

- Contraindications due to lactic acidosis:
 - ↳ creatinine >1.4 females, >1.5 males
 - ↳ liver disease
 - ↳ alcohol abuse
 - ↳ over 80 years old
 - ↳ risk of acidosis
 - ↳ during IV dye study
 - ↳ CHF requiring meds

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Metformin – How does it rate?

<u>Question</u>	<u>Answer</u>
■ Cause hypoglycemia?	No
■ Cause weight gain?	No
■ Affordable?	Yes
■ Lowers CV risk?	Yes
■ Can most tolerate /use?	Yes/No (GI, creat)

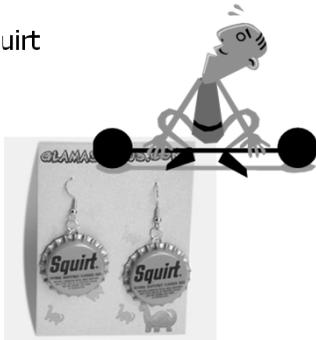
What questions would you ask?

35 yr old, BMI 28, A1c 6.7%. LDL 154, enjoys "occasional" beer.



Sulfonylureas -

- Action: tells pancreas to squirt insulin all day
- Who?
 - ↳ Lean type 2



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Sulfonylureas - Squirts

- Action: Increase endogenous insulin secretion
- Efficacy:
 - ↳ Decrease FPG 60-70 mg/dl
 - ↳ Reduce A1C by 1.0-2.0%
- Primary failures: about 20% no response
 - ↳ R/O glucose toxicity or low beta cell function
- Secondary failures: 5-10% shortly after initial response, many more later
 - ↳ Usually after 5 or more years of therapy due to natural history of DM 2

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Sulfonylureas: 2nd Generation

Generic	Trade	Duration
↳ Glyburide	Diabeta, Micronase, Glynase Prestabs	12-24 hrs
↳ Glipizide*	Glucotrol, Glucotrol XI	12-24 hrs
↳ Glimepiride	Amaryl	16-24 hrs

*take short acting product on empty stomach

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Sulfonylureas

- Other Effects
 - ↳ Hypoglycemia
 - ↳ Weight gain
 - ↳ Cleared by kidney, use caution for pts with kidney problems
 - ↳ Generally the least expensive class of medication



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Indication for "Fast Acting" Insulin Secretagogues- Meglitinides

- Action: tells pancreas to squirt insulin with meals
- Who?
 - ↳ Targets post-prandial hyperglycemia
- Med Names –
 - ↳ Prandin
 - ↳ Starlix



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Squirters – How does they rate?

Question	Answer
■ Cause hypoglycemia?	Yes
■ Cause weight gain?	Yes
■ Affordable?	Yes
■ Lowers CV risk?	No
■ Can most tolerate /use?	Yes/No

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What Medications Cause Hypoglycemia?

- Insulin
- Sulfonylureas
- Meglitinides
- Or any combo medication that includes these

Hypoglycemia - "Limiting Factor"

- Defined as glucose of 70mg/dl or below
- 50% of episodes occur during the night
- Higher mortality rate with severe hypoglycemia secondary to sulfonylureas
 - ↳ Especially (chlorpropamide) Diabinese® and (glyburide) Micronase®, Diabeta®
- Blood glucose levels don't describe severity, response is individual

Hypoglycemia Symptoms



- | | |
|----------------------------|--------------------------|
| ■ Autonomic | ■ Neuroglycopenia |
| ↳ Anxiety | ↳ Irritability |
| ↳ Palpitations | ↳ Drowsiness |
| ↳ Sweating | ↳ Dizziness |
| ↳ Tingling | ↳ Blurred Vision |
| ↳ Trembling | ↳ Difficulty with speech |
| ↳ Hypoglycemic Unawareness | ↳ Confusion |
| | ↳ Feeling faint |

Treatment of Hypoglycemia

- If blood glucose **70mg/dl** or below:
 - 10-15 gms of carb to raise BG 30 - 45mg/dl
- Retest in 15 minutes, if still low, treat again, even without symptoms
- Follow with usual meal or snack
- If BG less than 40, allow recovery time

15 - 20 Gms Carb Sources

- 3 - 4 Glucose Tablets
- 8 - 10 Lifesavers candy
- 8 - 10 Hard candies
- 2 Tablespoons Raisins
- 4 - 6 oz's Nondiet soda
- 4 - 6 oz's Fruit Juice
- 8 oz Milk (non fat)



What questions?

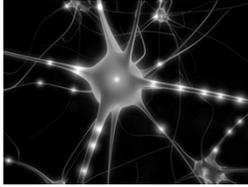
- 72 yr old, thin, lives alone, A1c 7.3%. History of MI, stroke. DM for 12 yrs, "diet controlled". Creat 1.4



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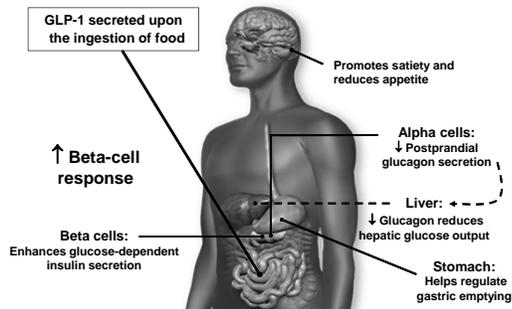
Incretin Mimetics - "Gut Hormone Imitators" GLP-1 Agonists

- How do they work?



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GLP-1 Effects in Humans Understanding the Natural Role of Incretins



Adapted from Flint A, et al. *J Clin Invest*. 1998;101:515-520
Adapted from Larsson H, et al. *Acta Physiol Scand*. 1997;160:413-422
Adapted from Nauck MA, et al. *Diabetologia*. 1996;39:1546-1553
Adapted from Drucker DJ. *Diabetes*. 1998;47:159-169

**GLP-1 degraded by
DPP-4 w/in minutes**

Incretin Mimetics Exenatide (Byetta)

■ Action:

- ↳ Insulin release in response to meal
- ↳ Slows gastric emptying
- ↳ Causes Satiety

■ Exenatide Dosing: - 5-10 mcg ac break, dinner

- Long acting version (Bydureon)

■ Efficacy: Decreases A1c by 0.7%, wt by 3lbs

■ Indication: For type 2s only - mono or in combo

■ Other: In prefilled pens in 5 or 10 mcg doses

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Incretin Mimetics – Exenatide XR - Bydureon

- **Once a Week Dosing:** 2mg
- **Efficacy:** Decreases A1c by 1.6%, wt by ~6lbs
- **Indication:** For type 2s only
- **Other:** Pt will need to mix powdered form and inject
- **Caution:** not indicated for those with history of medullary thyroid tumor - pancreatitis warning

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Incretin Mimetics – GLP-1 Analog Liraglutide (Victoza)

- Liraglutide Dosing:** 1x daily, time not critical
- 0.6 x 1 week – if tolerated (nausea), go to >
 - 1.2 x 1 week – if tolerated go to >
 - 1.8 mg daily
 - **Efficacy:** lowers; A1c by 1%, body wt by ~ 2.5kg
 - **Indication:** Monotherapy or in combo . Type 2 only
 - **Other:** Pancreatitis Warning
 - **Black box**–thyroid tumor warning (avoid if family hx, notify MD of hoarseness, lump).

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Incretin Mimetics – How do they rate?

<u>Question</u>	<u>Answer</u>
■ Cause hypoglycemia?	No
■ Cause weight gain?	No
■ Affordable?	No
■ Lowers CV risk?	No
■ Can most tolerate /use?	Yes/No
	(GI)

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DPP-4 Inhibitors – “Incretin Enhancers”
 Januvia (sitagliptin) – Tradjenta (linagliptin)
 Onglyza (saxagliptin)

- **Action:**
 - ↳ Increase insulin release w/ meals
 - ↳ Suppress glucagon
- **Dosing:** Januvia – 100mg a day
 Onglyza – up to 5mg a day
 Tradjenta – 5mg a day
- **Efficacy:** Decreases A1c by 0.6 -0.8%
- **Indication:** For type 2s

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DPP-4 Inhibitors – “Incretin Enhancers”
 Januvia (sitagliptin) – Tradjenta (linagliptin)
 Onglyza (saxagliptin)

- Januvia, Onglyza eliminated via kidney, lower dose needed
- Tradjenta reduced efficacy in combo w/ CYP 3A4 inducer (e.g., rifampin).
- Do not cause wt gain or hypoglycemia
- Side effects – headache, runny nose, sore throat - watch for pancreatitis
- Cost \$100 - \$150 mo

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DPP-IV Inhibitors – How do they rate?

Question	Answer
■ Cause hypoglycemia?	No
■ Cause weight gain?	No
■ Affordable?	No
■ Lowers CV risk?	No
■ Can most tolerate /use?	Yes

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For all the Previous GLP-1 Agonists

- **Pancreatitis Warning**
 - Please tell all patients to report signs right away and discontinue meds
 - Signs include:
 - Sudden abdominal pain, nausea and vomiting
 - May also be associated w/ increased risk of pancreatic cancer? Studies ongoing.

What questions?

- 69 year old male, BMI 25, on Metformin 1000mg BID and Exenatide 5mcg before breakfast and dinner. AM glucose 120s, A1c 8.1%. Creat 1.4



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Indications for Insulin Sensitizers

Rosiglitazone (Avandia®), Pioglitazone (Actos®)

- Action: **Sensitizers**
- Who?
 - ↳ Insulin resistant patient
 - ↳ Dysmetabolic syndrome



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Thiazolidinediones – TZD's

- **Action:** decrease insulin resistance by making muscle and adipose cells more sensitive to insulin. Decrease free fatty acids
- **Names:**
 - ↳ pioglitazone (Actos)
 - Dosing: 15-45 mg daily
 - ↳ rosiglitazone (Avandia) – restricted due to increased MI risk
- **Efficacy:**
 - ↳ Decrease fasting plasma glucose ~35-40 mg/dl
 - ↳ Reduce A1C ~0.5-1.0%
 - ↳ 6 weeks for maximum effect
 - ↳ \$30 a month

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Pioglitazone (Actos) Warning

Bladder Cancer Risk

- ↳ Risk increased with increasing dose and duration
- ↳ France has pulled Actos, Germany restricted access
- ↳ FDA Recommends
 - Do not use in pts with active bladder cancer.
 - Use with caution in pts w/ prior history of bladder CA
- ↳ Patient Instructions
 - Report symptoms of bladder cancer: blood or red color in urine; urgent need to urinate or pain while urinating; pain in back or lower abdomen.

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SGLT2 Inhibitors



- Canagliflozin (Invokana)
- "Glucoretic" - Inhibit the reabsorption of glucose in the proximal kidney tubules
- Monitor B/P, K+ & renal function.
- If eGFR 45-60, do not exceed 100 mg day. Don't use if eGFR < 45.
- Side effects: hypotension, UTI, increased urination, genital yeast infections.
- Lowers A1c 0.7%–1.0%, wt loss 1-3 lbs.

Juvisync Januvia + Simvastatin

- Incretin Enhancer + Cholesterol Lowering
- 3 Doses:
 - ↳ 100 mg sitagliptin + 10 mg simvastatin
 - ↳ 100 mg sitagliptin + 20 mg simvastatin
 - ↳ 100 mg sitagliptin + 40 mg simvastatin
- Plan to develop 50 mg sitagliptin dose
- Observe precautions of each.
- Pancreatitis & muscle weakness/ soreness

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Juvisync- How does it rate?

<u>Question</u>	<u>Answer</u>
■ Cause hypoglycemia?	No
■ Cause weight gain?	No
■ Affordable?	No
■ Lowers CV risk?	Yes
■ Can most tolerate /use?	Yes

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Combo Pills for Type 2

Sulfonylurea + Biguanide

Glyburide + Metformin - **Glucovance**
 Glipizide + Metformin - **Metaglip**

Thiazolidinedione + Biguanide

Pioglitazone + Metformin - **Actoplus Met**

Thiazolidinedione + Sulfonylurea

Actos + Amaryl - **Duetact**

DPP-4 Inhibitor + Biguanide

Januvia + Metformin - **Janumet**
 Onglyza + Metformin XR **Kombiglyze**

DPP-4 Inhibitor + Statin

Januvia + Zocor - **Juvisync**

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List the Treatment Adjustments

1. 59 yr old, overweight on glyburide 10mg QD, average FBG 170's, pm glucose 210's. Creat 1.0, HDL 38, LDL 127.
2. Overweight 64 yr old on amaryl 4mg daily, 500mg metformin, 15 mg Actos®. FBG 150's, post prandial BG 190's. Creat 1.2, LDL 138.
3. 49 year old with type 2 diabetes for 9 years. Weighs 370 lbs, A1c 13.9%, Creat 2.0, Gave up checking BG

Meds for past year:

- Januvia
- Byetta
- Determir 20units at hs

Diabetes Self-Management

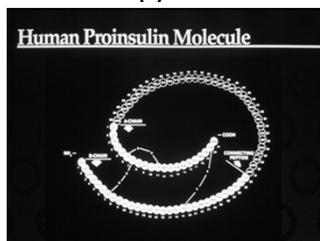
- Self Monitor Blood Glucose
- Meal Plan
- Exercise / Activity
- Medications



Insulin – the Ultimate Hormone Replacement Therapy

Objectives:

- Discuss the actions of different insulins
- Describe using pattern management as an insulin adjustment tool.



Psychological Insulin Resistance (PIR)

- 50% of providers in study threatened pts "with the needle".
- Less than 50% of providers realized insulins' positive effect on type 2 dm
- Most pts don't believe that insulin would "better help them manage their diabetes".
- Solutions: Find the root of PIR and address it, use more insulin pens

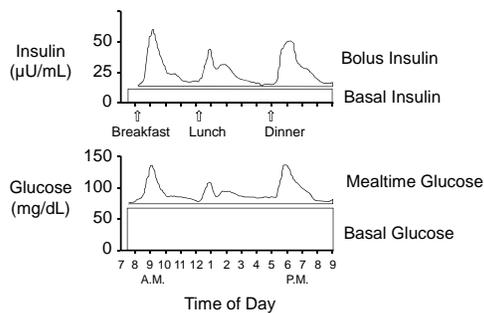


Diabetes Attitudes, Wishes, Needs Study - Rubin

Needle Size often a Barrier Size *Does* Matter

- Use more short needles – 4 mm
- Effective for pts with BMI of 24- 49
- Keeps it subq
- If pt thin, inject at angle
- To avoid leakage, count to 10 before withdrawing needle
- 1/2 the patients who could benefit from insulin are not using it due to needle phobias

Physiologic Insulin Secretion: 24-Hour Profile



Insulin Action Teams

- Bolus: lowers after meal glucose levels
 - ↓ Rapid Acting
 - Aspart, Lispro, Glulisine
 - ↓ Short Acting
 - Regular
- Basal: controls glucose between meals, hs
 - ↓ Intermediate
 - NPH
 - ↓ Long Acting
 - Detemir (Levemir)
 - Glargine (Lantus)



Bolus Insulins ($\frac{1}{2}$ of total daily dose \div meals)

Name	Onset	Peak Action
■ Lispro (Humalog)	15-30 min	1-1.5 hrs
■ Aspart (NovoLog)		
■ Glulisine (Apidra)		
■ Regular	30 mins	2-4 hrs

Bolus Insulin Summary

- Regular, Novolog, Humalog, Apidra,
- Starts working fast (15-30 mins)
- Gets out fast (3-6 hours)
- Post meal BG reflects effectiveness
- Should comprise about $\frac{1}{2}$ total daily
- Covers food or hyperglycemia.
- 1 unit
 - ↓ Covers \approx 10 -15 gms of carb
 - ↓ Lowers BG \approx 30 – 50 points



Bolus Insulin Timing

- How is the effectiveness of bolus insulin determined?
 - ↳ 2 hour post meal (if you can get it)
 - ↳ Before next meal blood glucose

- Glucose goals (ADA) – may be modified by provider/pt
 - ↳ 1-2 hours post meal <180
 - ↳ Before next meal – 70 - 130

Bolus – Insulin Sliding Scale

Starts at 150, 2 units for every 50 mg/dl >150

	Break	Lunch	Dinner	BS
Day 1	94 no insulin	212 4 uR	148 no insulin	254 6 uR
Day 2	243 4uR	254 6 uR	201 4uR	199 no insu
Day 3	189 2uR	243 4uR	162 2uR	244 4uR
Day 4	194	287	144	272

Basal Insulins

(½ of total daily dose)

Intermediate Acting Peak Action Duration

- NPH 4-12 hrs 12-24

Long Acting Peak Action Duration

- Detemir (Levemir) peakless 20 hrs
- Glargine (Lantus) No peak 24 hrs

Fasting BG reflects efficacy of basal

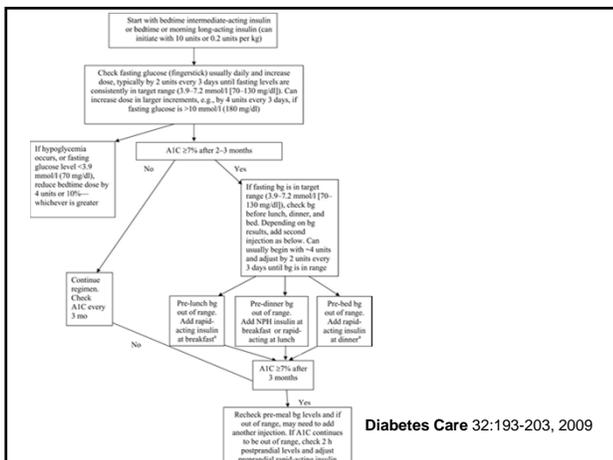
Basal Insulin Summary

- NPH, Levemir, Lantus
- Covers in between meals, through night
- Starts working slow (4 hours)
- Stays in long (12-24 hours)
 - ↳ NPH/ Lente 12 hrs
 - ↳ Levemir, Lantus 20-24 hrs
- Fasting blood glucose reflects effectiveness



Basal Only Type 2, 60kg

	Break	Lunch	Dinner	HS
Mo 1	170s	254	276	298 10uLan
Mo 2	160s	233	247	233 20uLan
Mo 3	140s	213	265	206 30uLan



Combination SQ Insulin

Insulin Type	Onset	Peak
Humalog Mix 75/25: 75% NPL, 25% lispro 50/50: 50% NPL, 50% lispro	0.25 - 0.5 hr	0.5-6.5 hrs
NovoLog Mix 70/30: 70% NPA, 30% aspart	0.25 - 0.5 hr	1 - 4 hrs
NPH + Reg Combo 70/30: 70%N /30%R 50/50: 50%N /50%R	0.5 - 1.0 hr	2 - 16 hrs

Considerations:

- Pre-mixed, difficult to fine tune therapy

10u 70/30 BID
Patterns? Changes needed?

	Break	Lunch	Dinner	HS
Day 1	102	63	92	181
Day 2	112	67	106	195
Day 3	98	56	112	201
Day 4	99	71	132	211

Pattern Management



Pattern Management

- Safety 1st!! - Evaluate 3 day patterns
- **Hypo:** eval 1st and fix:
 - ↳ If possible, decrease medication dose
 - ↳ Timing of meals, exercise, medications
- **Hyperglycemia:** evaluate 2nd
 - ↳ Identify patterns
 - ↳ Before increase insulin, make sure not missing something (carbs, exercise, omission)



Type 2 - New diagnosis - No meds Patterns? Questions

	Break	Lunch	Dinner	HS
Day 1	164			181
Day 2		124	106	195
Day 3	149		102	242
Day 4	151	81		211

Type 2 - Amaryl 4mg AM, 10u Lantus pm

	Break	Lunch	Dinner	HS
Day 1	164	94	66	162
Day 2	169		59	195
Day 3		84	81	242
Day 4	159		43	211

Basal Bolus - What Adjustments? Pt weighs 80kg

	Break	Lunch	Dinner	HS
Day 1	69 7H	79 5H	245 8H	190 22u Det
Day 2	81 7H	87 5H	170 8H	133 22u Det
Day 3	73 7H	94 5H	194 8H	110 22u Det
Day 4	62 7H	83 5H	211 8H	127 22u Det

Intensive Diabetes Therapy Insulin Dosing Strategy

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
 - Glargine at HS
 - NPH or Detemir BID
- Bolus = 50% of total
 - usually divided into 3 meals

Example

- Wt 50kg x 0.5 = 25 units of insulin/day
- Basal dose: 13 units
 - Glargine 13 units at HS
 - NPH/Detemir 6u BID
- Bolus dose: 12 units
 - 4 units NovoLog, Apidra Humalog, Regular each meal

Intensive Diabetes Therapy Insulin Dosing Strategy

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
 - Glargine at HS
 - NPH or Detemir BID
- Bolus = 50% of total
 - usually divided into 3 meals

Example - You Try

- Wt 60 kg x 0.5 = ___ units of insulin/day
- Basal dose: ___ units
 - Glargine ___units HS
 - NPH/Detemir ___ BID
- Bolus dose: ___ units
 - ___units NovoLog, Apidra Humalog each meal

Intensive Diabetes Therapy Insulin Dosing Strategy

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
 - Glargine at HS
 - NPH or Detemir BID
- Bolus = 50% of total
 - usually divided into 3 meals

Example – You Try

- Wt 60kg x 0.5 = 30 units of insulin/day
- Basal dose: 15 units
 - Glargine 15 units HS or
 - NPH/Detemir 7u BID
- Bolus dose: 15 units
 - 5 NovoLog, Apidra Humalog each meal

Intensive Diabetes Therapy Insulin Dosing Strategy

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
 - Glargine at HS
 - NPH or Detemir BID
- Bolus = 50% of total
 - usually divided into 3 meals

Example – You Try

- Wt 100 kg x 0.5 = ____ units of insulin/day
- Basal dose: ____ units
 - Glargine ____units HS
 - NPH/Detemir ____ BID
- Bolus dose: ____ units
 - ____units NovoLog, Apidra Humalog each meal

Basal Bolus - Using 50/50 Rule - Pt weighs 80kg

	Break	Lunch	Dinner	HS
Day 1	84 6H	89 7H	145 7H	190 20 u Det
Day 2	81 6H	97 7H	107 7H	133 20u Det
Day 3	79 6H	104 7H	124 7H	110 20u Det
Day 4	69 6H	103 7H	208 7H	193 20u Det

Insulin Teaching Keys

- Bolus insulin with meals
- Basal 1-2xs daily
- Abdomen preferred injection site
- Stay 1" away from previous site
- Don't re-use ultra fine syringes
- Keep unopened insulin in refrigerator
- Toss opened insulin vial after 28 days
- Proper disposal
- Review patients ability to withdraw and inject.
- Side effects include hypoglycemia/wt gain
- Insulin pens –
 - Prime needle to assure accurate insulin dose given
 - Hold needle in for 5 seconds after injection
 - Roll 70/30 pens

Medical Waste Management Act Effective Sept 1, 2008

- CA Senate Bill 1305
- New law requires proper disposal of home generated syringes, needles, lancets
- Disposal in solid waste containers no longer permitted
- EPA in 2004 also discourages sharps disposal in trash.

Sharps Disposal: Product and Info



- Look in the Government section white pages for a household hazardous waste listing for your city or county.
- Call 1-800-CLEANUP (1-800-253-2687)

DiaBingo - I

- I Injected hormone that is an analog of amylin
- I Glargine, Detemir, NPH are types of
- I Breakdown of glycogen into glucose
- I Anabolic hormone
- I Insulin is released when glucose levels are low
- I Once opened, insulin vials are good for one _____
- I Elevated post-prandial glucose indicate need for pre-meal
- I Epinephrine increases insulin resistance
- I Creation of glucose from amino acids and lactate
- I Decreasing renal function for people on insulin can cause
- I Bolus insulins
- I A hormone that increases blood glucose levels

Medical Nutrition Therapy (MNT)

- Team led by Registered Dietitian
- Restore or maintain **near-normal** glucose
- Optimal lipid and blood pressure levels
- Calories sufficient to attain or maintain "reasonable body weight"



Nutrition Recommendations for Healthy Eating

ADA

Foods:

- ↓ Carbs 45-65% of intake
- ↓ Protein 10 - 20%
- ↓ Fat < 30% of calories (Saturated fat 7-10%)
- Weight Loss
 - ↓ If Goal ½ pound to 1 lb a week
 - ↓ Decrease intake 250-500 cals daily + exercise

➢ 2011 - New Sodium Restriction – limit to ½ tsp a day if + DM, 51+, African American, Kidney Dx

USDA 2011

USDA Food Pyramid www.myplate.gov



Balancing Calories

- Enjoy your food, but eat less.
- Avoid oversized portions.

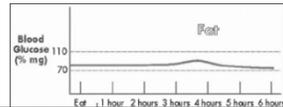
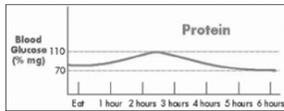
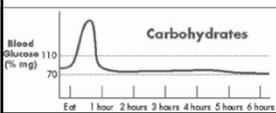
Foods to Increase

- Make half your plate fruits and vegetables.
- Make at least half your grains whole grains.
- Switch to fat-free or low-fat (1%) milk.

Foods to Reduce

- Compare sodium in foods like soup, bread, and frozen meals — and choose the foods with lower numbers.
- Drink water instead of sugary drinks.

How nutrients affect blood sugar



Carbohydrate foods

- Starch
- Fruit
- Milk
- Desserts

Starchy foods



©ADAM

**Remember:
Carbohydrates are Essential**

- Carbs have fiber, vitamins, minerals and phytonutrients
- Fiber helps to stabilize blood glucose and lower cholesterol
 - Helps control weight by providing sense of fullness
- Focus on eating consistent amounts of carbohydrate for blood glucose control



**Carbohydrate Needs for
Most Adults**

	<u>Grams</u>	<u>Servings</u>
Each Meal	45-60 gm	3 - 4
Snacks	15-30 gm	1- 2



RDA 130 gm carbohydrate per day

*The magic
number is*

15



Handy Meal Plan

- Per Meal Serving
 - ↳ Each finger = 15 gms carb (can have 3-4 servings/meal)
 - ↳ Palm of hand = 3 oz's protein
 - ↳ Thumbnail = 1 tsp fat serving



Label Lessons

Nutrition Facts	
Serving Size 1/2 cup (114 g)	
Servings Per Container 4	
Amount Per Serving	
Calories 90	Calories from Fat 30
% Daily Value*	
Total Fat 3g	6%
Saturated Fat 0g	0%
Cholesterol 0g	0%
Sodium 260mg	13%
Total Carbohydrate 13g	4%
Dietary Fiber 3g	12%
Sugars 3g	
Protein 3g	
Vitamin A 80%	Vitamin C 60%
Calcium 4%	Iron 4%

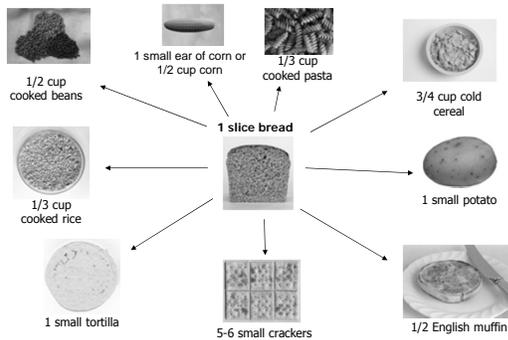
*Percent Daily Values are based on a diet of 2,000 calories. Your daily values may be higher or lower depending on your caloric needs.

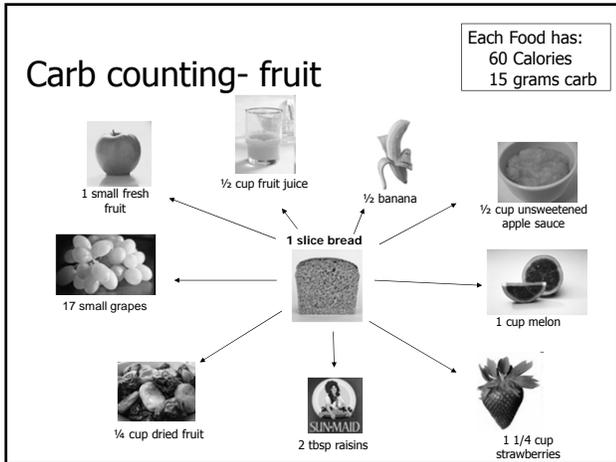
Calories		2000	2500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate	Less than	300g	375g
Fiber		25g	30g

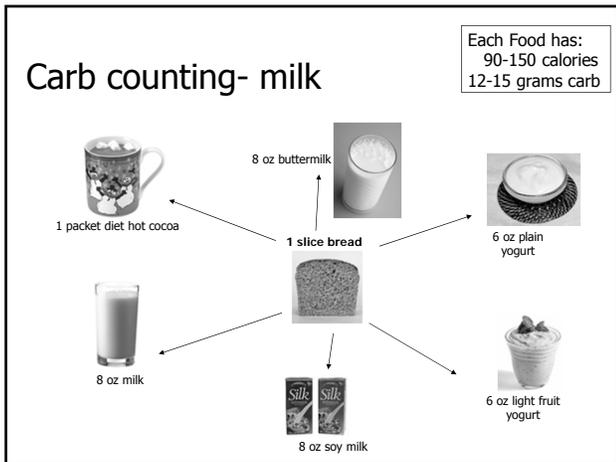
Calories per gram: Fat 9 Carbohydrates 4 Protein 4

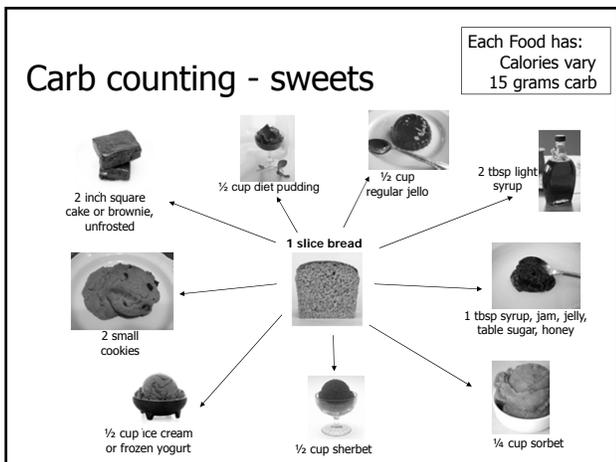
Carb counting- starch

Each Food has:
80 Calories
15 grams carb









Foods that do not raise blood sugar

- Vegetables
- Meat
- Fat
- "Free" foods

Proteins

Orange 3 fatty acids are found in only fish like salmon and flaxseed and canola oils



#ADAM

#ADAM

Go Lean with Protein

- Choose lean protein
 - Poultry, fish, egg, lean beef
 - Plant sources- beans, lentils, nuts
 - Low fat cheese- cottage cheese, mozzarella cheese
- Limit high fat protein
 - Bacon & sausage
 - High fat cuts of beef
 - Whole milk cheese
- Serving size
 - 1 oz = 1/4 cup
 - 3 oz = deck of cards



Fats- Aim for heart health



- Monounsaturated
 - Olive & canola oils
 - Nuts
 - Avocado
- Polyunsaturated
 - veg oils: canola, corn, walnut, safflower, soybean
- Saturated fats (LIMIT)
 - Solid
 - Animal
 - Tropical (palm, coconut)
 - Trans fats (deep fried)

Serving sizes

- 1 tsp butter, margarine, oil, mayonnaise
- 1 Tbsp salad dressing, cream cheese, seeds
- 2 Tbsp avocado, cream, sour cream
- 1 slice bacon



Don't limit Non-Starchy Vegetables

- Non-starchy vegetable category
- Contains about 5 gm carb per serving
- But much of the carb comes from fiber
 - Not digested
 - Has minimal affect blood sugar*
 - Helps to keep us full
 - Aim for 25-35 gm fiber daily



Using Alcohol Safely

- Recommended Intake
 - ↳ None to 1 drink a day (women)
 - ↳ None to 2 drinks a day (men)
 - ↳ (12oz beer, 6oz wine, 1 oz spirits)
- Alcohol can worsen:
 - ↳ Triglyceride levels
 - ↳ Nerve disease, pancreatitis
- Always eat when drinking to prevent hypo



Ms. Gonzales' General Diet Pattern

Break	Lunch	Dinner	Night
5 corn tortillas, 1/2 c. beans, salsa, peppers, egg beaters	Sandwich, low fat potato chips, 1c. juice, 2-4 lowfat cookies	Lg bowl low salt soup, 1c. rice, BBQ meat, salad & cooked vegs 1 glass wine	1 bowl of cereal
Avg BG 120's	Avg BG 200's	Avg BG 200's	Avg BG 180's

DiaBingo - N

- N Injected hormone called an incretin mimetic
- N DPP demonstrated that exercise and diet reduced risk of DM by ___%
- N An _____ a day can help prevent heart attack and stroke
- N Rebound hyperglycemia
- N Scare tactics are effective at motivating patients to change behavior

- N Losing ___ % of body weight, can improve blood glucose, BP, lipids
- N Drugs that can cause hyperglycemia
- N 2/3 cups of rice equals _____ serving carbohydrate
- N A1c of 7% equals glucose of _____
- N One % drop in A1c reduces risk of complications by ___ %

- N 1 gm of fat equal _____kilo/calories
- N Metabolic syndrome = hyperglycemia, hyperlipidemia, hypertension
- N 1% A1c = _____ of Blood Glucose

In Patient Strategies - Start Early, Focus on Survival Skills



InPatient Glucose Goals 2009 - AACE

1. Non-critically ill
 - ◆ Pre meal - Less than 140
 - ◆ Post meal - Less than 180
2. Critically ill Pts
 - ◆ 140mg/dl – 180mg/dl
3. Any BG over 140 mg/dl deserves treatment

Before Discharge

- Be sure patient has adequate self-care skills and prescription for supplies
 - Glucose meter and supplies
 - Medications
 - Healthy Eating – RD consult
 - Knows glucose goal range and when to call for help
- Follow-up MD / education appointment
- Consider home health/ outpt referral

When to Call Provider?*

- *Blood glucose >300 twice in a row
- *Blood glucose <70
- When sick



**Individualize based on pt/provider*

High Numbers Got You Down?

- **By getting glucose less than 150 you will:**
 - * have more energy
 - * spend fewer days in bed
 - * feel less depressed
 - * urinate less often
 - * improve your vision
 - * think more clearly
 - * miss work less often



Testa, Simonson JAMA 280: 1998



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