



**Welcome to  
Diabetes in the 21st Century**

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[www.DiabetesEd.net](http://www.DiabetesEd.net)

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

1. Describe impact of diabetes
2. Discuss prevention, management strategies
3. Discuss different types of diabetes
4. Describe insulin therapy
5. Review glucose patterns and determine how to adjust therapy to improve glucose.
6. Discuss medical nutrition therapy
7. Gain understanding of Type 2 Meds.
8. Demonstrate successful teaching strategies

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**Foundations of Care**

- ▶ Education
- ▶ Nutrition
- ▶ Monitoring
- ▶ Physical Activity
- ▶ Psychosocial Care
- ▶ Medications
- ▶ Reducing Risk
- ▶ Getting to Best Possible Health




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## Diabetes in America 2015

- ▶ 29 million or > 9.3%
- ▶ 27% don't know they have it
- ▶ 37% of US adults have pre diabetes (86 mil)

### Diabetes



Legend: No Data, <4.5%, 4.5-5.9%, 6.0-7.4%, 7.5-8.9%, ≥9.0%



CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at <http://www.cdc.gov/diabetes/statistics>



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## CDC Announces



35% of  
Americans will  
have Diabetes  
by 2050

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



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## Type 2 in Kids



- ▶ 7 fold increase 1990
- ▶ 1 in 6 overweight kids (age 12- 19) have prediabetes.
- ▶ ~2,500 to 3,700 new cases in U.S. annually.
- ▶ Highest risk: very obese, minority, female, low socioeconomic status, limited education
- ▶ In age range 12-19, less than 1% have Type 2 – NHANES
- ▶ Environmental changes to urgently needed



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## 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 14
- ▶ March is ADA Sound the Alert Day “find people w/ undetected diabetes”



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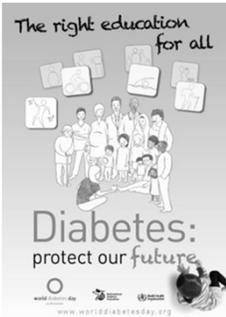
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## World Diabetes Day

November 14



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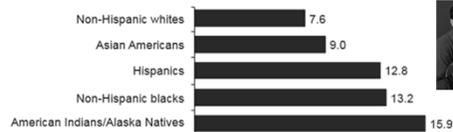
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## Age-adjusted Diabetes Prevalence

20 yrs or older, by race/ethnicity— U.S. 20014

Age-adjusted\* percentage of people aged 20 years or older with diagnosed diabetes, by race/ethnicity, United States, 2010–2012



\*Based on the 2000 U.S. standard population.  
Source: 2010–2012 National Health Interview Survey and 2012 Indian Health Service's National Patient Information Reporting System.

- Among Hispanic adults, the age-adjusted rate of diagnosed diabetes was 8.5% for Central and South Americans, 9.3% for Cubans, 13.9% for Mexican Americans, and 14.8% for Puerto Ricans.
- Among Asian American adults, the age-adjusted rate of diagnosed diabetes was 4.4% for Chinese, 11.3% for Filipinos, 13.0% for Asian Indians, and 8.8% for other Asians.
- Among American Indian and Alaska Native adults, the age-adjusted rate of diagnosed diabetes varied by region from 6.0% among Alaska Natives to 24.1% among American Indians in southern Arizona.



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## Why Should Zip Code Determine Life Expectancy?



California Endowment – look up your zip code at [www.measureofamerica.org](http://www.measureofamerica.org)



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## Free Live Webinars and Live Seminars at DiabetesEd.net

- ▶ Free Webinars
  - ▶ Preparing to take CDE
  - ▶ New Frontiers
  - ▶ New Medications
  - ▶ BC-ADM



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## 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



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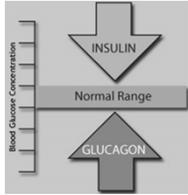
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## Role of the Pancreas Endocrine Functions



### 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



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## Hormones Effect on Glucose

| Hormone _____   | Effect |
|---|--------|
| ▶ 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) | ⬇      |



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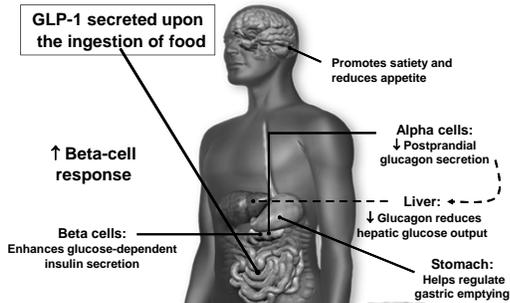
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## GLP-1 Effects in Humans Understanding the Natural Role of Incretins



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 Nauock MA, et al. Diabetologia. 1998;39:1546-1553  
Adapted from Deucker D. Diabetes. 1998;47:159-169



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## Incretin Mimetics

Byetta, Bydureon, Trulicity, Tanzeum

- ▶ **Action (synthetic gut hormone)**
  - ▶ Insulin release in response to meal
  - ▶ Slows gastric emptying
  - ▶ Causes Satiety – promotes wt loss
  - ▶ Preserves Beta Cells



### ▶ Details:

- ▶ Daily and long acting version - 1x week injection
- ▶ **Efficacy:** Decreases A1c by 0.5 – 1.6%, wt by 3lbs +

- ▶ **Benefits/Issues** – wt loss, no hyp. Expensive, N/V
  - Pancreatitis Warning – report signs immediately



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## 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



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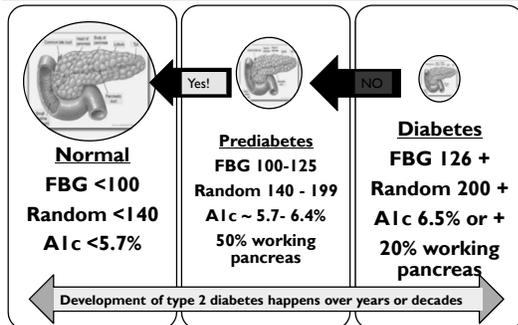
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## Natural History of Diabetes




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## Signs of Diabetes



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



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## Diabetes Classifications

- ▶ Type 1
- ▶ Type 2
- ▶ Gestational
- ▶ Secondary



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## 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?



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## Type 1 Rates Increasing Globally

- ▶ 23% rise in type 1 diabetes incidence from 2001-2009
- ▶ Why?
  - ▶ Autoimmune disease rates increasing over all
  - ▶ Changes in environmental exposure and gut bacteria?
  - ▶ Hygiene hypothesis
  - ▶ Obesity?



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## Incidence of Type 1 in Youth



- ▶ **General Pop 0.3%**
- ▶ **Sibling 4%**
- ▶ **Mother 2-3%**
- ▶ **Father 6-8%**
- ▶ Rate doubling every 20 yrs
- ▶ Many trials underway to detect and prevent (Trial Net)



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## Type 1 – 10% of all Diabetes Genetics and Risk Factors

- Auto-immune pancreatic beta cells destruction
- Most commonly expressed at age 10-14
- Insulin sensitive (require 0.5 - 1.0 units/kg/day)
  
- Combo of genes and environment:
  - Autoimmunity tends to run in families
  - Higher rates in non breastfed infants
  - Viral triggers: congenital rubella, coxsackie virus B, cytomegalovirus, adenovirus and mumps.



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## Autoantibodies Assoc w/ Type 1

Panel of autoantibodies –

- ▶ GAD65 - Glutamic acid decarboxylase –
- ▶ ICA - Islet Cell Cytoplasmic Autoantibodies
- ▶ IAA - Insulin Autoantibodies



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## Type 1 Diabetes Associated with other immune conditions

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



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## What Does Type 1 Look Like?



Mary Tyler Moore



Nick Jonas



Justice Sonia Sotomayor

Bret Michaels



Adam Morrison



From Debbie Nagata's slide collection



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## Medalist Study – Harvard Joslin Diabetes Center

- ▶ After 50 years with diabetes
  - ▶ Many still produced some insulin
  - ▶ Many had no eye disease



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## Type 1 Summary

- ▶ Autoimmune
- ▶ Complete pancreatic destruction
- ▶ Need insulin shots
- ▶ Often first present in DKA



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## 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?**



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## BMI Categories

BMI Categories: Underweight (BMI 17, 19), Normal weight (BMI 20-24), Slightly Overweight (BMI 25-29), Overweight (BMI 30-33), Extremely Overweight (BMI 34-40).

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## Diabetes 2 - Who is at Risk?

(ADA Clinical Practice Guidelines)

- 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

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## 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)

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## 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



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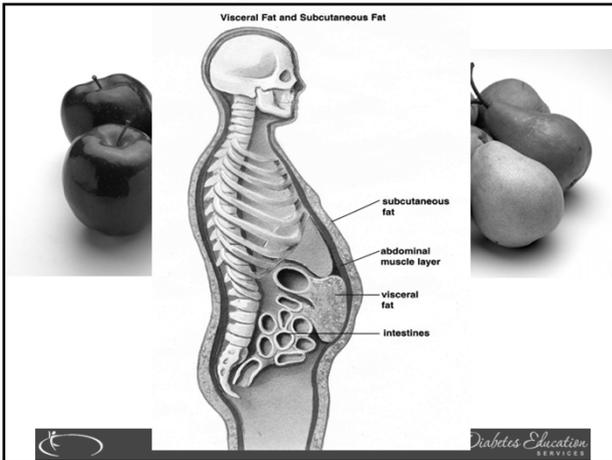
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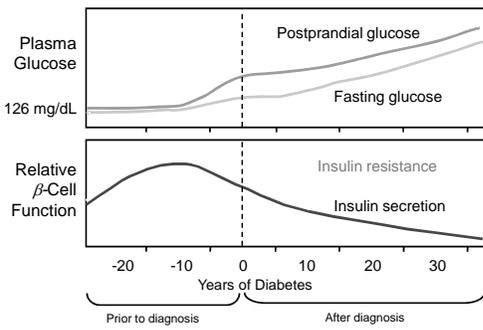
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## Natural Progression of Type 2 Diabetes



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



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Cardio Metabolic Risk -  
5 Hypers -

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



*Manifestations of Insulin Resistance*



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Diabetes Detectives Needed



- ▶ On average – takes 6.5 years to diagnose diabetes
- ▶ 1/4 of all people with diabetes don't know they have it



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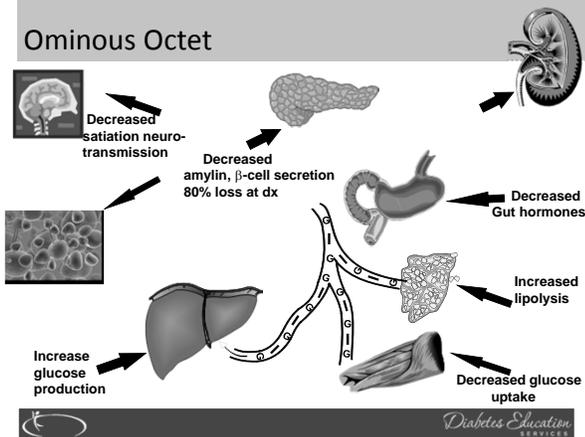
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Ominous Octet



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## SGLT2 Inhibitors- "Gluco-retics"



▶ **Action:** "Gluco-retic" decreases renal reabsorption in the proximal tubule of the kidneys (reset renal threshold and increase glycosuria)

Decreases Glucose Reabsorption

### SGLT2 Inhibitors

- Decrease glucose reabsorption in kidneys
- "gluco-retic."

Canagliflozin (Invokana)  
Dapagliflozin (Farxiga)  
Empagliflozin (Jardiance)

100-300 mg once daily  
5-10 mg once daily  
10-25 mg once daily

▶ **Benefits:** Lowers A1c 0.7 – 1.5%, lowers wt 1-3 lbs, no hypo

▶ **Issues:** Can initially lower GFR, monitor kidney function and lytes. Watch for hypotension/ GU infections. Expensive



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## Comparison of Type 1 and Type 2

|                        | <u>Type 1</u> | <u>Type 2</u> |
|------------------------|---------------|---------------|
| <b>Obesity</b>         | x             | xxx           |
| Insulin dependence     | xxx           | 30%           |
| Respond to oral agents | 0             | xxx           |
| Ketosis                | xxx           | x             |
| Antibodies present     | xxx           | 0             |
| Typical Age of onset   | teens         | adult         |
| Insulin Resistance     | 0             | xxx           |



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## Gestational DM ~ 7% of all Pregnancies

- ▶ GDM prevalence increased by
  - ▶ ~10-100% during the past 20 yrs
- ▶ Native Americans, Asians, Hispanics, African-American women at highest risk
- ▶ Immediately after pregnancy, 5% to 10% of GDM diagnosed with type 2 diabetes
- ▶ Within 5 years, 50% chance of developing DM in next 5 years.



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## Postnatal Health: Maternal Behavior

- ▶ Encourage breastfeeding for one year
  - ▶ (25% of women achieving this goal)
- ▶ Screening 6-12 weeks post partum using non-pregnant OGTT criteria (50%)
- ▶ Repeat at 3 yr intervals or signs of DM
- ▶ Encourage weight control and exercise
- ▶ Make sure connected with health care
- ▶ Preconception counseling



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## Start Metformin therapy

- ▶ For women with PreDiabetes and History of GDM



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## Metformin – 1<sup>st</sup> agent of choice

- ▶ **Action:** decrease hepatic glucose (glycogen)
- ▶ Metformin (Glucophage)
  - ▶ Starting dose: 500 BID, max 2500mg daily
  - ▶ Metformin XR - extended release – less GI upset
- ▶ **Efficacy:**
  - ▶ Decrease fasting plasma glucose 60-70 mg/dl
  - ▶ Reduce A1C 1.0-2.0%
- ▶ **Benefits / Issues**
  - ▶ Cheap, no weight gain; some lose weight, lowers LDL, no hypo
  - ▶ Not indicated if creat > 1.4-1.5 or GFR < 60 (cleared by kidney)



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## 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



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## Diabetes is also associated with:

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



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## DiaBingo

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



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## 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 are her risk factors, signs of diabetes
- ▶ What type of diabetes does she have?
- ▶ Does she have insulin resistance?



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## Strategies – One Step at a Time, Focus on Survival Skills



Look for  
“teaching moment”  
opportunities



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## 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?



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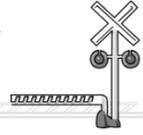
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## No one is Unmotivated

.... to lead and long and healthy life

### ▶ These are the 3 usual Critical Barriers

- ▶ Perceived worthlessness
- ▶ Too many personal obstacles
- ▶ Absence of support and resources



Bill Polonsky, PhD, CDE



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## Overcoming barriers

- ▶ Confront the key misbelief. Ask the question, does dm cause complications?
- ▶ Offer pts evidence based hope message –
- ▶ Frequent contact
- ▶ Paired glucose testing
- ▶ Ask pt, “Tell me 1 thing that is driving you crazy about your diabetes”
- ▶ Discuss medication beliefs
- ▶ To improve outcomes, see pts more often

Bill Polonsky, PhD, CDE



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## How Often Should I Check?

- ▶ Be realistic!!
- ▶ Type 2 on orals – Medicare covers 100 strips for 3 months
- ▶ Based on individual - Consider:
  - ▶ Types and timing of meds
  - ▶ Goals
  - ▶ Ability (physical and emotional)
  - ▶ Finances / Insurance



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## 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



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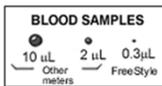
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## New Meters – a little goes a long way



- 0.3 microliters of blood
- minimal pain



Customer Service (toll-free): Look for 800 number



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## Spiritual Care



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***"The highest form of wisdom is kindness."***  
***The Talmud***

How many times has a person arrived disheartened?



This moment of discouragement and despair provides us an opportunity.

By modeling kindness and understanding, we can encourage them to be a kinder self-coach from this day forward.



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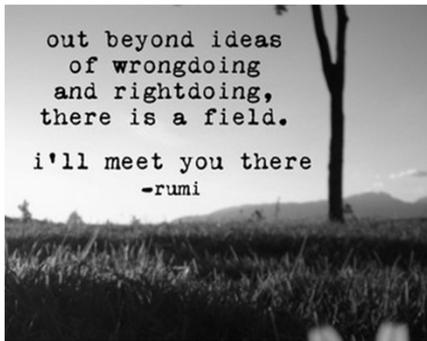
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***Give the gift of Non-Judgment***



out beyond ideas  
of wrongdoing  
and rightdoing,  
there is a field.

i'll meet you there  
-rumi



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***"Getting diabetes saved my life."***  
***~ Sherri Shepard***

**PLAN  
D**  
She's  
**LOSE WEIGHT  
AND BEAT  
DIABETES  
(EVEN IF YOU DON'T HAVE IT)**  
**SHERRI  
SHEPHERD**  
Using Nutrition Therapy Instead of Insulin  
WITH BILLIE FITZPATRICK  
MBA, RD, RDN, CDE



Sherri Shepard decided to embrace diabetes and use it as a motivator to improve her health.



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## Diabetes Vacations

“The greatest glory in living  
lies not in never falling, but in  
rising every time  
we fall.”  
—Nelson Mandela



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## 80 /20 Rule – Perfect Not Required



► Words of wisdom from my diabetes educator:

*“You don’t have to be perfect, Mom!”*

Certified diabetes  
educator (and  
daughter):  
Beverly Thomason,  
RN, MPH, CDE, BC-  
ADM, president of  
Diabetes Education  
Services, Chico, CA



Patient  
(and mom):  
Betty Dyck, 73  
Resident:  
Chico, CA



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## Complications - Why?



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



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## 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



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## Control Matters

- ▶ **Trials**
- ▶ **Practice Recommendations**



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## 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?



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### 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

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

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



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### Can we stop pre diabetes from progressing?

3, 234 people w/ Pre-Diabetes randomized:

- ▶ Placebo
- ▶ Diet/Exercise or
- ▶ Metformin

over a three year period

Diabetes Prevention Program (DPP) 2001



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### Diabetes Prevention Program

- ▶ Standard Group - 29% developed DM
- ▶ Lifestyle Results - 14% developed DM
  - ▶ 58% (71% for 60yrs +) Risk reduction
    - ▶ 30 mins daily activity
    - ▶ 5-7% of body wt loss
- ▶ Metformin 850 BID - 22% developed DM
  - ▶ 31% risk reduction (less effective with elderly and thinner pt's)



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## Weight loss and Prevention

- ▶ For every 2.2 pounds of weight loss, risk of type 2 diabetes was reduced by 13%.



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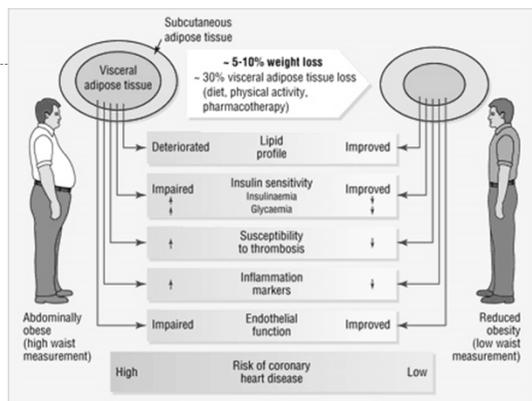
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## ABCs of Diabetes –

- ▶ **A**1c less than 7% (avg 3 month BG)
  - ▶ Pre-meal BG 80-130
  - ▶ Post meal BG <180
- ▶ **B**lood Pressure < 140/90
- ▶ **C**holesterol
  - ▶ DM and 40 yrs, start statin
  - ▶ HDL >40
  - ▶ Triglyceride < 150
- ▶ **E**xercise, Education
- ▶ **H**ealthy Eating



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## Glucose and BP Control Matter

- ▶ 1% decrease in A<sub>1c</sub> reduces microvascular complications by 35%
- ▶ 1% decrease in A<sub>1c</sub> 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



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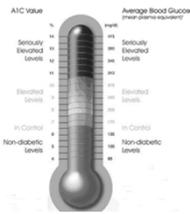
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## 6. Glycemic Targets

### ▶ Adult non pregnant A1c goals

- ▶ **A1c < 7%** - a reasonable goal for adults.
- ▶ **A1c < 6.5%** - may be appropriate for those without significant risk of hypoglycemia or other adverse effects of treatment.
- ▶ **A1c < 8%** - may be appropriate for patients with history of hypoglycemia, limited life expectancy, or those with longstanding diabetes and vascular complications.



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## A1c and Estimated Avg Glucose (eAG) 2008

| A1c (%) | eAG |
|---------|-----|
| 5       | 97  |
| 6       | 126 |
| 7       | 154 |
| 8       | 183 |
| 9       | 212 |
| 10      | 240 |
| 11      | 269 |
| 12      | 298 |

Order teaching tool kit free at [diabetes.org](http://diabetes.org)



**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



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## “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



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## Education

- ▶ People with diabetes and pre diabetes should receive DSME
  - ▶ Monitor for effective self-management and quality of life
  - ▶ Address psychosocial issues and emotional well being
  - ▶ Results in cost savings and improved outcomes, should be reimbursed by third party payers.



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## Exercise Recommendations

- ▶ **Activity update –Don’t sit more than 90 minutes**
- ▶ Evidence supports that everyone, including with diabetes should be encouraged to reduce sedentary time, by not sitting for more than 90 minutes at a time.
- ▶ It is recommended that people with pre diabetes and diabetes engage in 150 minutes of activity a week and at **least 2 weekly sessions of resistance exercise.**



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## Good Exercise Info / Quotes



- ▶ 20 % of people walk 30 mins a day
- ▶ Exercise decrease A1c 0.7%
- ▶ No change in body wt, but 48% loss in visceral fat
  - ▶ ADA PostGrad 2010

• “If you don’t have time for exercise, you better make time for disease.”

“I don’t have time to exercise, I MAKE time.”

Mike Huckabee

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## 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
  - ▶ For diabetes pts age 19 – 59 (not previously vaccinated)
  - ▶ Double risk of Hep B due to lancing devices/ glucose meter exposure



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## Pneumonia Vaccination Update

- ▶ Pneumonia polysaccharide PPSV23 vaccine to all patients starting at age 2
- ▶ **Adults ≥ 65 years of age**, if not previously vaccinated, should receive pneumococcal conjugate vaccine 13 (PCV13), followed by PPSV23 6-12 months after initial vaccination.
- ▶ **Adults ≥ 65 years of age**, if previously vaccinated with PPSV23 should receive a follow-up ≥ 12 months with PCV13.



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## 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



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## Diabetes Care Guidelines- ADA

| Test / Exam                   | Frequency                  |
|-------------------------------|----------------------------|
| ▶ A1c                         | At least twice a year      |
| ▶ B/P                         | Each diabetes visit        |
| ▶ Cholesterol (LDL, HDL, Tri) | Yearly (less if normal)    |
| ▶ Weight                      | each diabetes visit        |
| ▶ Microalbumin/GFR/Creat      | Yearly                     |
| ● Eye exam                    | Yearly                     |
| ● Dental Care                 | At least twice a year      |
| ● Comprehensive Foot Exam     | Yearly (more if high risk) |
| ● Physical Activity Plan      | As needed to meet goals    |
| ● Preconception counseling    | As needed                  |



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## 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
- ▶ Triglyceride 260mg/dl
- ▶ Proteinuria - neg
- ▶ B/P 152/94

### Self-Care Skills

- ▶ Walks dog around block 3 x's a week
- ▶ Bowls every Friday
- ▶ 3 beers daily
- ▶ *What meds?*
- ▶ *What referrals?*
- ▶ *My foot hurts*



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## Glucose Management and Hospitalized Patients



▶ In hospitalized patients with critical illness, hyperglycemia is a signal that warrants our attention.



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## Hospitals and Hyperglycemia – What’s the Big Deal?

- ▶ Hyperglycemia is associated with increased morbidity and mortality in hospital settings.
  - ▶ Acute Myocardial Infarction
  - ▶ Stroke
  - ▶ Cardiac Surgery
  - ▶ Infection
  - ▶ Longer lengths of stay



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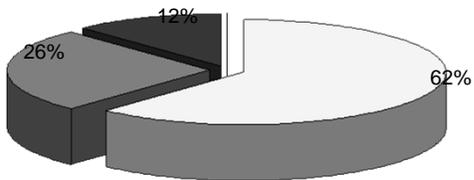
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## Hyperglycemia\*: A Common Comorbidity in Medical-Surgical Patients in a Community Hospital

Umptierrez G et al. J Clin Endocrinol Metabol 87:978, 2002



Normoglycemia  
 Known Diabetes  
 New Hyperglycemia

n = 2,020

Umptierrez et al

\* Hyperglycemia: Fasting BG  $\geq$  126 mg/dl or Random BG  $\geq$  200 mg/dl X 2



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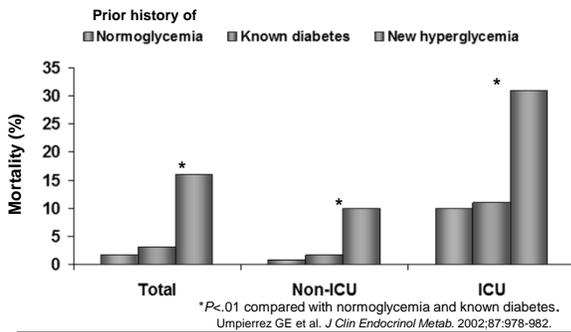
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## Effect of Hyperglycemia on Hospital Mortality



## WHAT SHOULD WE AIM FOR?

### Critically Ill pts

- BG > 180- Start insulin
- BG goal 140-180



### Non Critically Ill patients BG Goals

- Premeal <140
- Post meal <180
- Insulin therapy preferred treatment

Consensus: Inpt Hyperglycemia, Endocr Pract. 2009;15 (No.4)

## Management of Hyperglycemia and Diabetes

- ▶ Stop oral agents (ie) metformin & sulfonylurea on admission
- ▶ “The sole use of Sliding Scale insulin is discouraged” – ADA 2014
- ▶ For discharge, oral meds can be resumed

### Start Basal/bolus therapy

- ▶ NPH and Regular insulin
- ▶ Long-acting and rapid-acting insulin
- ▶ Premixed insulin



## Now What?

▶ Nurse had an emergency and pt already ate lunch?



▶ Nurse administered insulin and pt only ate a few bites of turkey and drank non sugar tea?

▶ You just gave 3 units of Aspart and patient needs to go to OR NOW!

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## Foot Care

# Lift the sheets and look at the Feets!



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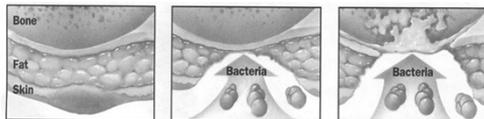
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## Foot Wounds



↑  
Blisters  
Calluses

↑  
Ulcers

↑  
Bone infection



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### No Bathroom Surgery

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### A Quick Foot Assessment

- ▶ Ask - What do you do to take care of your feet?
- ▶ Look - texture, toenails, structural deformities, lesions, corns
- ▶ Assess sensation
- ▶ Assess risk factors
- ▶ Teach, teach, teach

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5.07 monofilament = 10gms linear pressure  
 If pt can't feel pressure = neuropathy

Free Monofilaments  
<http://www.hrsa.gov/leap/>

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## Mr. Jones - What are Your Recommendations?

### Patient Profile

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



### Current Status:

- ▶ A1c 9.3%
- ▶ On Metformin 500mg BID
- ▶ Partial foot amputation
- ▶ Lives alone
- ▶ What resources, teaching?



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## 3 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.



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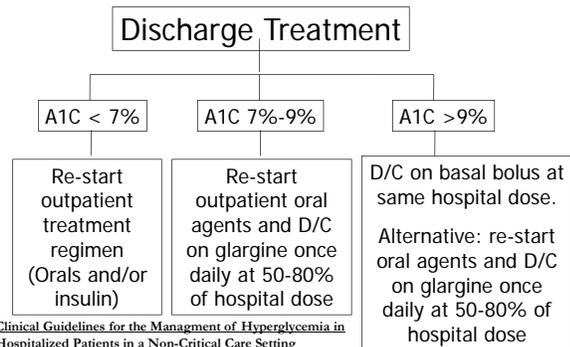
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## Discharge insulin Algorithm



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## Bottom Line

- ▶ 30-40% of hospitalized patients have diabetes
  - ▶ 10% aren't officially diagnosed
- ▶ Cardiovascular disease is the leading cause of hospitalization for people with diabetes
- ▶ Look for patients with hyperglycemia and cardiometabolic risk factors: smokers, HTN, central obesity, abnormal lipids, Acanthosis.
- ▶ Provide education and promote self-advocacy



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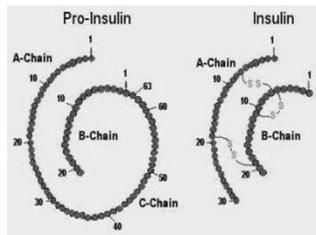
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## Insulin – the Ultimate Hormone Replacement Therapy

### Objectives:

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



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## 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*



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## 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
- ▶ ½ the patients who could benefit from insulin are not using it due to needle phobias
- ▶ Consider inhaled insulin



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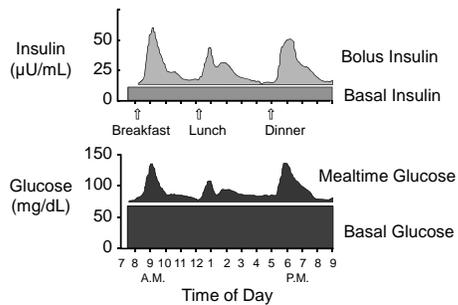
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## Physiologic Insulin Secretion: 24-Hour Profile



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## Insulin Action Teams

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



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## Case Study



- ▶ 70 yr old, weighs 100kg
- ▶ History of CABG, tobacco
- ▶ A1c – 11.3%, BG 400-500 for past weeks
- ▶ Insulin – 100+ units Lantus at hs (solostar)
- ▶ Oral Meds: Metformin, Invokana
- ▶ What is a better insulin dosing strategy?
- ▶ Pt can't afford insulin pen – what other option
- ▶ [Diabetes Meds on a Budget - 2014](#) - provides practical and affordable strategies to manage hyperglycemia



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## Cost Per Vial in Northern CA

| Per vial cost   | Walmart | Walgreens | Costco |
|-----------------|---------|-----------|--------|
| Regular Insulin | \$25*   | \$92      | \$99   |
| NPH             | \$25*   | \$92      | \$99   |
| 70/30           | \$25*   | \$92      | \$101  |
| Humalog         | \$200   | \$220     | \$178  |
| Novolog         | \$197   | \$217     | \$178  |
| Apidra          | \$180   | \$246     | \$178  |
| Levemir         | \$300   | \$300     | \$300  |
| Lantus          | \$226   | \$221     | \$206  |



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## Bolus Insulins

(½ of total daily dose ÷ meals)

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



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## Afrezza – Inhaled Insulin – Approved 2014

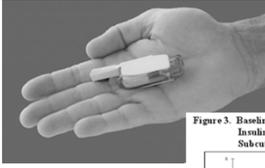
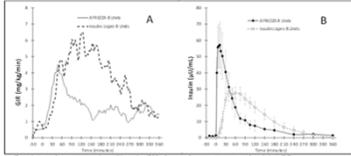


Figure 3. Baseline-Corrected Glucose Infusion Rate (A) and Baseline-Corrected Serum Insulin Concentrations (B) after Administration of AFREZZA or Subcutaneous Insulin Lispro in Type 1 Diabetes Patients\*



\* Despite the faster absorption of insulin (FI) from Afrezza, the onset of activity (OT) was comparable to insulin lispro.

For adults over 18  
Not indicated for pregnancy, while breastfeeding



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## Afrezza Dosing and Considerations

- ▶ Bolus regular insulin – inhaled before meals
- ▶ Dosing: 4 and 8 unit cartridges
  - ▶ Convert with 1:1 ratio to existing insulin dose
- ▶ Lung function test before start (incentive spiro)
  - ▶ Not for pts w/ chronic lung issues
    - ▶ Asthma, COPD, history of lung cancer, smokers
    - ▶ Can cause acute bronchospasm
- ▶ Side effects:
  - ▶ Hypoglycemia, sore throat, cough



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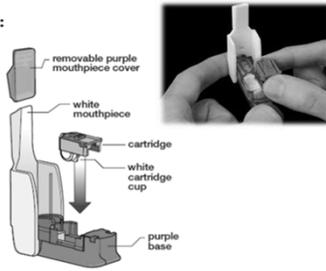
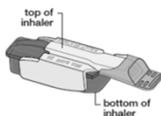
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## Afrezza Inhaler

Know your AFREZZA® inhaler:



Replace inhaler every 15 days



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## Afrezza – Foil Packages Contain 30 cartridges – Use w/in 10 days

There are two strengths of AFREZZA® cartridges:



Let cartridges and inhaler sit at room temp for 10 minutes before using



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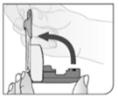
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## Afrezza – Loading Cartridge into device



▶ Hold inhaler level



▶ Open inhaler by lifting white mouthpiece



▶ Hold insulin cartridge with cup facing down.

▶ Place cartridge inside and close lid. Keep level.



▶ Make sure cartridge has been at room temp for 10 minutes



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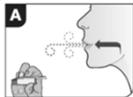
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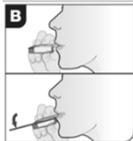
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## Afrezza – Proper Inhale Technique



▶ Exhale

▶ Position inhaler in mouth (take off cover)



▶ Tilt inhaler down toward chin, keep head level

▶ Inhale deeply and hold breath for as long as comfortable



▶ Remove cartridge

▶ Replace cover



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## Bolus Insulin Summary

- ▶ Regular, Novolog, Humalog, Apidra, Afrezza
- ▶ Starts working fast (15-30 mins)
- ▶ Gets out fast (3-6 hours)
- ▶ Post meal BG reflects effectiveness
- ▶ Should comprise about ½ total daily dose
- ▶ Covers food or hyperglycemia.
- ▶ 1 unit
  - ▶ Covers ≈ 10 -15 gms of carb
  - ▶ Lowers BG ≈ 30 – 50 points



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## 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 – 80 - 130



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## Pattern Management –AKA

How to think like a pancreas



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## 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)




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Type 2 – BMI 32. New diagnosis, No meds.  
What Patterns? Recommendations? Meds?

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




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## Bolus – Insulin Sliding Scale

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

|       | Break            | Lunch       | Dinner            | HS                |
|-------|------------------|-------------|-------------------|-------------------|
| Day 1 | 94<br>no insulin | 212<br>4 uR | 148<br>no insulin | 254<br>6 uR       |
| Day 2 | 243<br>4uR       | 254<br>6 uR | 201<br>4uR        | 199<br>no insulin |
| Day 3 | 189<br>2uR       | 243<br>4uR  | 162<br>2uR        | 244<br>4uR        |
| Day 4 | 66<br>No insulin | 287<br>6uR  | 144<br>none       | 272<br>6uR        |




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**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*



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**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



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**Basal + Metformin**  
Type 2, 80kg – A1c 8.7%

|      | Break | Lunch | Dinner | HS            |
|------|-------|-------|--------|---------------|
| Mo 1 | 170s  |       |        | 298<br>10uLan |
| Mo 2 | 160s  |       |        | 233<br>20uLan |
| Mo 4 | 140s  | 283   | 265    | 206<br>40uLan |



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### Next Steps – Switch from 40 units basal to 70/30 Insulin

- ▶ Switch to 70/30 Insulin
- ▶ Take current dose and give 2/3 in am and 1/3 in pm.
  - ▶ 2/3 of basal in am
    - ▶ 40 units x 0.6 = 24 units 70/30
  - ▶ 1/3 of basal in \*pm
    - ▶ 40 units x 0.4 = 16 units 70/30
  - ▶ \*pm = before dinner




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### 24u 70/30 am, 16 u 70/30 pm 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 |




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### 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 |




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## What Medications Cause Hypoglycemia?

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



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## Sulfonylureas - Squirts

- ▶ Action: Increase endogenous insulin secretion throughout day
- ▶ Efficacy:
  - ▶ Decrease FPG 60-70 mg/dl
  - ▶ Reduce A1C by 1.0-2.0%
- ▶ Side Effects:
  - ▶ Weight gain, hypoglycemia
- ▶ Benefits:
  - ▶ Cheap, effective



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## 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 (glyburide) Micronase<sup>®</sup>, Diabeta<sup>®</sup>
- ▶ Blood glucose levels don't describe severity, response is individual



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## Hypoglycemic Symptoms

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



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## 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



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## 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)



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### Basal Bolus – What Adjustments?

Pt weighs 80kg

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



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### Intensive Diabetes Therapy

#### Insulin Dosing Strategy

##### 50/50 Rule

▶ 0.5-1.0 units/kg day

▶ Basal = 50% of total

- Glargine QD
- 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 QD
- NPH/Detemir 6u BID

▶ Bolus dose: 12 units

- ▶ 4 units NovoLog, Apidra Humalog, Regular each meal



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### Intensive Diabetes Therapy

#### Insulin Dosing Strategy

##### 50/50 Rule

▶ 0.5-1.0 units/kg day

▶ Basal = 50% of total

- Glargine QD
- 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 \_\_\_\_ QD
- NPH/Detemir \_\_\_\_ BID

▶ Bolus dose: \_\_\_\_ units

- \_\_\_\_ units NovoLog, Apidra Humalog, Reg each meal



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## Intensive Diabetes Therapy Insulin Dosing Strategy

### 50/50 Rule

- ▶ 0.5-1.0 units/kg day
- ▶ Basal = 50% of total
  - Glargine QD
  - 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 QD or
  - NPH/Detemir 7u BID
- ▶ Bolus dose: 15 units
  - ▶ 5 NovoLog, Apidra, Humalog, Reg each meal



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## Basal Bolus – Using 50/50 Rule – Pt weighs 80kg

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



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## 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



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## 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)
- ▶ Search for collection centers on the California Integrated Waste Management Board (CIWMB) Web site:  
<http://www.ciwmb.ca.gov/HHW/HealthCare/Collection/>



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## DiaBingo - I

- I Inhaled insulin
- 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



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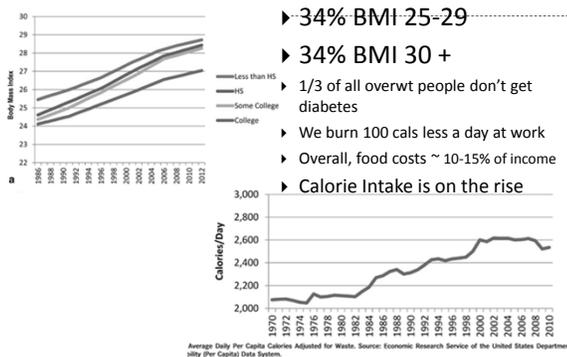
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## U.S. Weight - 68% overweight or obese



- ▶ 34% BMI 25-29 .....
- ▶ 34% BMI 30 +
- ▶ 1/3 of all overwt people don't get diabetes
- ▶ We burn 100 cals less a day at work
- ▶ Overall, food costs ~ 10-15% of income
- ▶ Calorie Intake is on the rise



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## Average American Consumes 25 teaspoons of sugar a day (400 cal)

- ▶ Warning label on sodas proposed
- ▶ One soda has 12 teaspoons of sugar
- ▶ On avg, 1 person consumes 40 gallons of soda each year
- ▶ ADA guidelines "limit sodas and beverages with sugar, High Fructose Corn Syrup, (HFCS)



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## Medical Nutrition Therapy – ADA 2014 Updates

- No ideal percentage of calories from protein, carbohydrate and fat for people with diabetes.
- Macronutrient distribution should be based on an *individualized assessment* of eating patterns, preferences and metabolic goals.



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## Medical Nutrition Therapy – ADA

- ▶ Focus on the Individual
- ▶ Maintain pleasure of eating
- ▶ Provide positive messages about food
- ▶ Limit food choices only when backed by science
- ▶ Provide practical tools
- ▶ Refer to a RD and Diabetes Education – Lowers A1c by 1-2%



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## Sodium, Fat and Fiber

- ▶ Sodium – Try and keep less than 2,300 mg a day
- ▶ Vitamin and mineral supplements not recommended -lack of evidence.
- ▶ Fat - same as recommended for general population
  - ▶ Less than 10% saturated fat,
  - ▶ Limit trans fats
  - ▶ Less than 300 mg cholesterol daily
  - ▶ Mediterranean Diet looks like good option
- ▶ Fiber 25 -38 gms a day



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## Approach Depends on Patient

- New Type 2
  - Portion Control
  - Plate Method
  - Record Keeping
  - Education
- On Insulin?
  - Carb counting
  - Post prandial checks



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## What are next steps?

- ▶ 72 yr old, thin, lives alone, A1c 7.3%. History of MI, stroke. DM for 12 yrs, “diet controlled”. Creat 1.4.
- ▶ Limited income.
- ▶ Good insurance



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## DPP-4 Inhibitors – “Incretin Enhancers”

Januvia (sitagliptin) – Tradjenta (linagliptin)  
Onglyza (saxagliptin) Nesina (alogliptin)

### ▶ Action:

- ▶ Increase insulin release w/ meals
- ▶ Suppress glucagon

### ▶ Dosing:

Januvia – 100mg a day  
Onglyza – up to 5mg a day  
Tradjenta – 5mg a day  
Nesina – up to 25 mg a day

### ▶ Efficacy:

- Decreases A1c by 0.6 -0.8%
- ▶ **Benefits/ Issues:** weight neutral, no hypo, few side effects. Expensive



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## Losing 2-8kg Early in diagnosis Type 2 Helpful

ADA 2014

### ▶ Weight Loss –

- ▶ *The optimal macronutrient intake to lose weight not known*
- ▶ *The literature does not support one particular nutrition therapy to reduce weight, but rather a spectrum of eating patterns that result in reduced energy intake.*



- ▶ To lose one pound – avoid 3,500 cal
  - ▶ Decrease intake 250-500 cal daily + exercise



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## Successful weight loss strategies include

- ▶ Weekly self-weighing
- ▶ Eat breakfast
- ▶ Reduce fast food intake.
- ▶ Decrease portion size
- ▶ Increase physical activity
- ▶ Use meal replacements
- ▶ Eat healthy foods



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## Diabetes Prevention Program Focus on fat = wt loss success

To help you lose weight and improve your health, stay as close as possible to your fat and calorie goals.  
Find your starting weight below. Your fat and calorie goals are in the same row. Circle your fat and calorie goals.

| Weight (lb) | Fat Goal (grams) | Calorie Goal |
|-------------|------------------|--------------|
| 120-174     | 33               | 1,200        |
| 175-219     | 42               | 1,500        |
| 220-249     | 50               | 1,800        |
| >250        | 55               | 2,000        |

<http://www.cdc.gov/diabetes/prevention/recognition/curriculum.htm>



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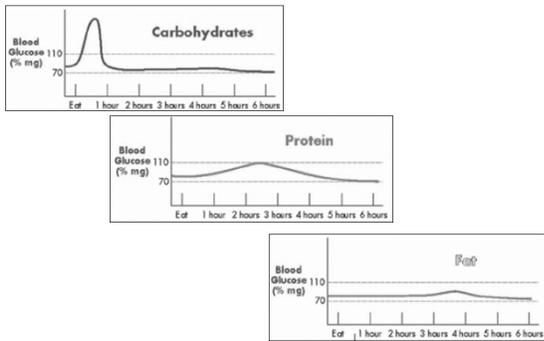
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## How nutrients affect blood sugar



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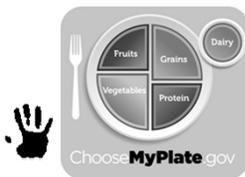
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## Teaching About Eating Healthy

- Major food groups
  - "Handy Diet"
  - Plate Method
  - Exchange Lists
  - Food Diaries / Glucose Records
  - Carbohydrate Counting
- Assess what is best for the situation.



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**Move toward the Tomato**

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**ADA recommendation**  
**Eat Less Junk Food & Sugary Drinks –**

- ▶ Less Processed Foods
- ▶ Less Sugary Beverages
  - ▶ increase visceral adiposity
  - ▶ With sugar or
  - ▶ High fructose corn syrup
- ▶ Soda Tax?
- ▶ Junk Food Tax?
- ▶ 12 teaspoons sugar in one soda

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**10 Superfoods**

- ▶ Beans
- ▶ Dark Green Leafy Veggies
- ▶ Citrus Fruit
- ▶ Sweet Potatoes
- ▶ Berries
- ▶ Tomatoes
- ▶ Fish High in Omega-3 Fatty Acids
- ▶ Whole Grains
- ▶ Nuts
- ▶ Fat-Free Milk and Yogurt

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## USDA Plate Method 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.



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## Another plate example

### Mi planificador de plato Una comida saludable sabe buenísima



El Método del Plato es una manera simple de planificar las comidas para usted y su familia. No necesita contar nada ni hacer largas listas de alimentos. Todo lo que necesita es un plato de 9 pulgadas.

1/4 de proteína, 1/4 de almidón, 1/2 de vegetales. Plato de 9 pulgadas



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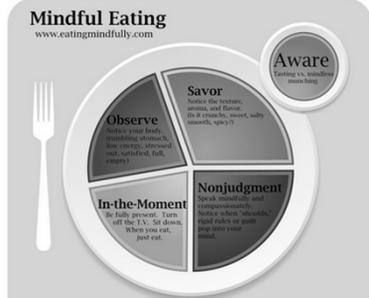
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## Mindful Eating

### Mindful Eating www.eatingmindfully.com



Source: Albers PayD 2012/9 Eat, Drink & Be Mindful



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## Choose Healthy Carbs

- o Carbs have fiber, vitamins, minerals and phytonutrients
- o 25 gms of fiber a day
- o Power Carbs include:
  - o Beans
  - o Veggies
  - o Fruits
  - o Whole grain foods



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## 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



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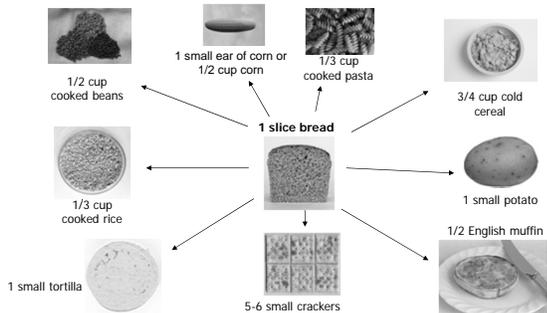
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## Carb Counting - Starch

Each Food has:  
80 Calories  
15 grams carb



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### Carb counting- fruit

Each Food has:  
60 Calories  
15 grams carb

1 slice bread

- 1 small fresh fruit
- 1/2 cup fruit juice
- 1/2 banana
- 1/2 cup unsweetened apple sauce
- 17 small grapes
- 1 cup melon
- 1/4 cup dried fruit
- 2 tsp raisins
- 1 1/4 cup strawberries

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### Carb Counting - Milk

Each Food has:  
90-150 calories  
12-15 grams carb

1 slice bread

- 8 oz buttermilk
- 1 packet diet hot cocoa
- 6 oz plain yogurt
- 8 oz milk
- 8 oz soy milk
- 6 oz light fruit yogurt

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### Carb Counting - Sweets

Each Food has:  
Calories vary  
15 grams carb

1 slice bread

- 2 inch square cake or brownie, unfrosted
- 1/2 cup diet pudding
- 1/2 cup regular jello
- 2 tsp light syrup
- 2 small cookies
- 1/2 cup ice cream or frozen yogurt
- 1/2 cup sherbet
- 1/4 cup sorbet
- 1 tbsp syrup, jam, jelly, table sugar, honey

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## Go Lean with Protein



- o Choose lean protein
  - o Poultry, fish, egg, lean beef
  - o Plant sources- beans, lentils, nuts
  - o Low fat cheese- cottage cheese, mozzarella cheese
- o Limit high fat protein
  - o Bacon & sausage
  - o High fat cuts of beef
  - o Whole milk cheese
- o Serving size
  - o 1 oz = ¼ cup
  - o 3 oz = deck of cards



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## Fats- Aim for heart health

### • Saturated fats (LIMIT)

- o Solid
- o Animal
- o Tropical (palm, coconut)
- o Trans fats (deep fried)

### Serving sizes

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

### o Monounsaturated

- o Olive & canola oils
- o Nuts
- o Avocado



### o Polyunsaturated

- o veg oils: canola, corn, walnut, safflower, soybean



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## Using Alcohol Safely

- ▶ Women- 1 or fewer alcoholic drinks a day
- ▶ Men 2 or fewer alcoholic drinks a day
  - ▶ 1 alcoholic drink equals
    - ▶ 12 oz beer, 5 oz glass of wine, or 1.5 oz distilled spirits (gin etc)
- ▶ If drink, limit amount and drink w/ food.
- ▶ Ask HCP if safe for you to drink. Tell them your usual quantity and frequency.
- ▶ Can cause hypo and worsen neuropathy



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## Ms. Gonzales' Daily Meal plan

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



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## DiaBingo - N

- 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 Average American consumes 25 teaspoons of sugar a day.



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## Keeping Healthy in Long Run

### ► HUG Patients

- Help with
- Unconditional
- Guidance and Support

Anne Peters, MD, CDE  
ADA Post Grad

### ► Unconditional Positive Regard –

*involves showing complete support and acceptance of a person no matter what that person says or does.*

Carl Rogers



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## Thank You



- ▶ Questions?
- ▶ Email  
[bev@diabetesed.net](mailto:bev@diabetesed.net)
- ▶ Web  
[www.DiabetesEd.net](http://www.DiabetesEd.net)



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