Welcome to Diabetes in 21st Century

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www.DiabetesEd.net

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. Gain understanding of Type 2 Meds.
7. Discuss how the gut influences health
8. Demonstrate successful teaching strategies

Foundations of Care

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

Strategies for Improving Care

- Start with patient centered communication.
  - Incorporate pt preferences, literacy, life experiences
- Treatment decisions timely, based on evidence and tailored to individual pt.
- Align care with Chronic Care Model to ensure proactive practice and informed, activated patient.
- Support team-based care, community involvement, decision support tools.

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Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

1994

Diabetes Education SERVICES

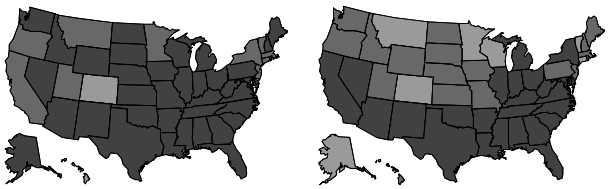
Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

2004

Diabetes Education SERVICES

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

2013



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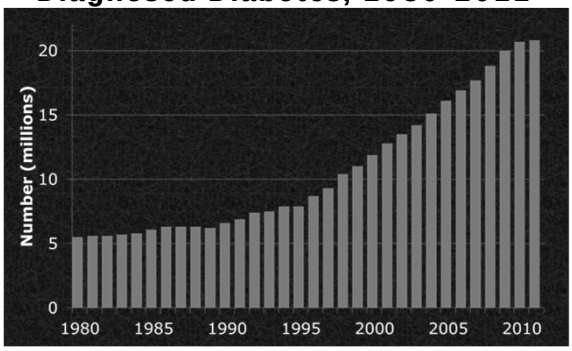
Number of Americans with Diagnosed Diabetes, 1980-2011



Centers for Disease Control and Prevention www.cdc.gov/diabetes/statistics

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Type 2 in Kids

- 7 fold increase since 1990
- 1 in 6 overwt 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 urgently needed

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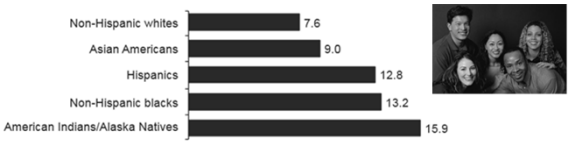
Age-adjusted Diabetes Prevalence

20 yrs or older, by race/ethnicity— U.S. 2014

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.

1 out of 2 black men, Hispanic men and Hispanic women will develop Type 2 Diabetes during their lifetime. NDEP 2016

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Diabetes in America 2017

- 29 million or > 9.3%
  - 27% don't know they have it
- 37% of US adults have pre diabetes (86 mil)
- Increasing rates 3 key factors
  - Aging of U.S. Population
  - Increasing size of higher-risk minority populations
  - Declining mortality among those with diabetes

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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

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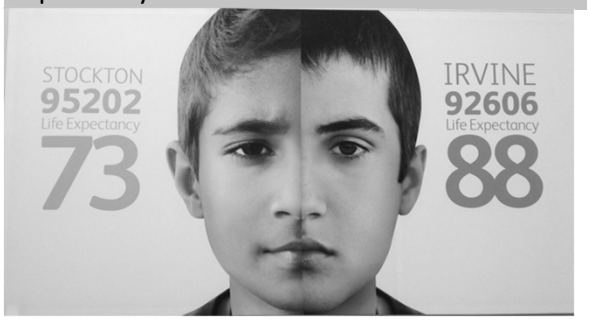
Why Should Zip Code Determine Life Expectancy?



Measureofamerica.org

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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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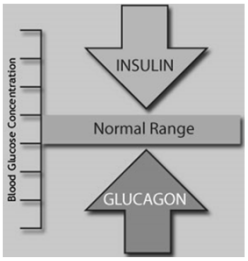
Role of the Pancreas Endocrine Functions



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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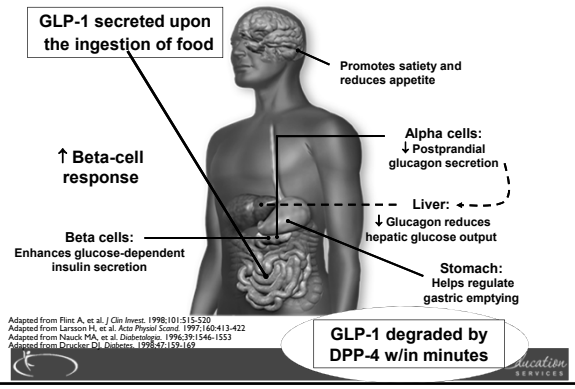
Hormones Effect on Glucose

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)	↓

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

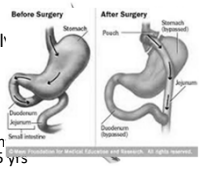
Incretin Mimetics
Byetta, Bydureon, Trulicity, Tanzeum

- **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

Metabolic Surgery Benefits

- Increases gut hormone availability
- More likely to cause remission* with recently diagnosed diabetes (more beta cell mass)
  - 30 - 63% remission over 1-5 years
  - 35 – 50% redeveloped diabetes
    - Avg remission time 8.3 years
  - Most pts who undergo surgery maintain substantial improvement of BG control from baseline for ~5 yrs
- Trials demonstrate metabolic surgery achieves superior BG control and reduction of CV risk factors in obese pts with type 2 compared to lifestyle/medical intervention
- Improvements in micro and macro disease and cancer have been observed.
- Procedure may reduce long term mortality

*remission = BG levels normal without meds



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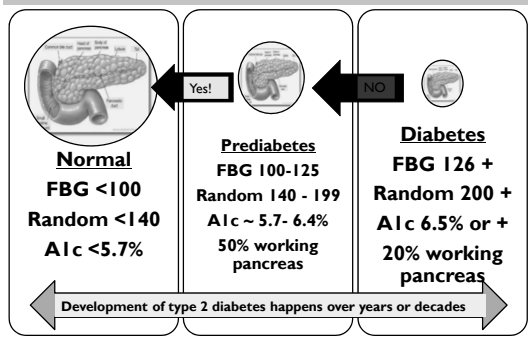
Natural History of Diabetes



Signs of Diabetes

- Polyuria
- Polydipsia
- Polyphasia
- Weight loss
- Fatigue
- Skin and other infections
- Blurry vision

- Glycosuria, H_2O losses
- Dehydration
- Fuel Depletion
- Loss of body tissue, H_2O
- Poor energy utilization
- Hyperglycemia increases incidence of infection
- Osmotic changes

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Diabetes Classifications

- Type 1
- Type 2
- Gestational
- Secondary

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. 5'6", 108 lb female

On insulin 3u Regular before meals, 10u NPH at bedtime

What type of DM and how do you know?

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)

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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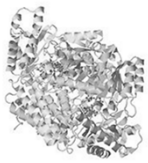
Autoantibodies Assoc w/ Type 1

Panel of autoantibodies –

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



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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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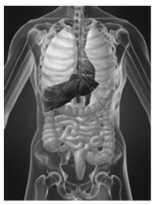
Type 1 Diabetes Associated with other immune conditions

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



Type 1 Summary

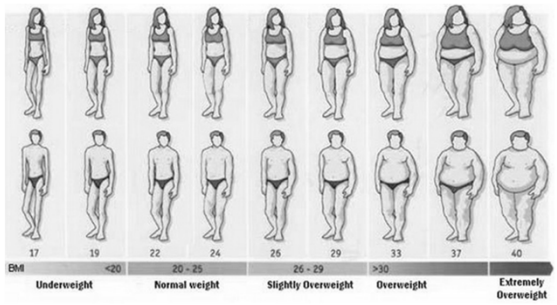
- Autoimmune pancreatic destruction
- Need insulin replacement therapy
- Often first present in DKA
- At risk for other autoimmune diseases
- Eval coping strategies

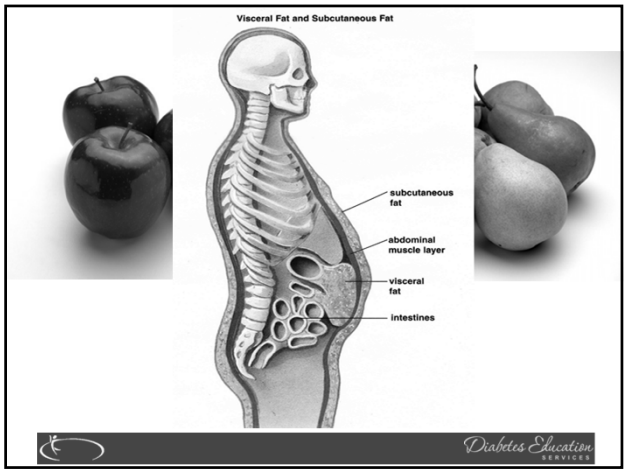
Type 1 in Hospital

- 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.

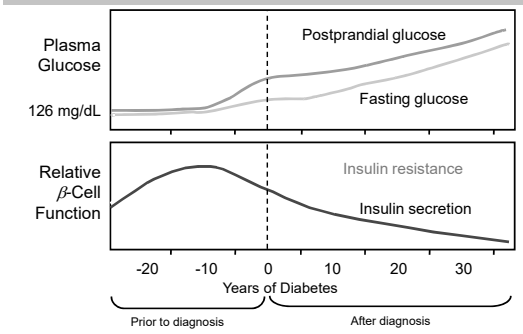
What do you say?

BMI Categories



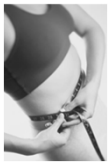


Natural Progression of Type 2 Diabetes



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

Pre Diabetes & Type 2- Screening Guidelines (ADA Clinical Practice Guidelines)

1. Start screening at age 45 or for anyone who is overweight (BMI ≥ 25, Asians BMI ≥ 23) with one or > additional **risk factor**:
   - 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
- history of Gestational Diabetes Mellitus
- Polycystic ovary syndrome (PCOS)
- Other conditions assoc w/ insulin resistance:
  - Severe obesity, acanthosis nigricans (AN)

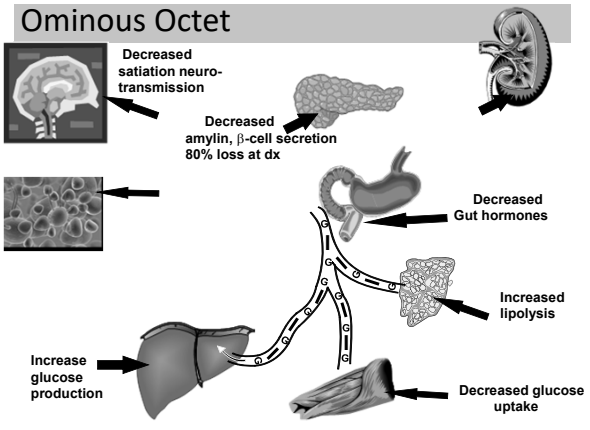
Acanthosis Nigricans (AN)

- 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 Detectives Needed

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

Ominous Octet



SGLT2 Inhibitors- "Glucoretics"

- **Action**: "Glucoretic" decreases renal glucose reabsporption (resets renal threshold and increases glucosuria)
- Side effects: hypotension, UTIs, increased urination, genital infections, ketoacidosis

Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors "Glucoretic" • Decreases glucose reabsorption in kidneys 	Canagliflozin (Invokana) Dapagliflozin (Farxiga) Empagliflozin (Jardiance)	100 - 300 mg 1x daily 5 - 10 mg 1x daily 10 - 25 mg 1x daily	**Side effects:** hypotension, UTIs, increased urination, genital infections, ketoacidosis. **Obtain GFR when starting and yearly:** Invokana – stop med if GFR <45 Jardiance – do not start if GFR <45 Farxiga – stop med if GFR <60. Do not use Farxiga in pts with bladder cancer. **Benefits:** no hypo or weight gain. Jardiance lowers all-cause mortality by 32%. Lowers A1c 1.0%-2.0%. Lowers wt 1-3 lbs.

- **Efficacy:**
  - Weight loss of 1-3 lbs Reduce A1C ~0.7-1.5% 'f

EMPA-REG OUTCOME®: Summary

- Empagliflozin used in trial for 3 years in 1,000 patients with type 2 diabetes at high CV risk:
- Empagliflozin reduced hospitalisation for CHF 35%
- Empagliflozin reduced CV death by 38%
- Empagliflozin improved survival by reducing all-cause mortality by 32%
- Need more research to determine this is a class effect

Jardiance gets special FDA CV approval

Comparison of Type 1 and Type 2

	Type I	Type 2
Obesity	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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Biguanides – Metformin (Glucophage)

- **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

- Benefits
  - Decrease LDL cholesterol and triglycerides
  - No weight gain, possible modest weight loss
  - Cancer protective?
- Concerns
  - Diarrhea and abdominal discomfort – Use XR (may see pill shell in stool – okay)
  - Lactic acidosis if improperly prescribed
  - Watch for B12 deficiency
  - Hold before and 48 hours after IV contrast dye studies. Resume when kidney function adequate.

Diabetes Education SERVICES

Metformin – New GFR Guidelines

Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides • Decreases hepatic glucose output • First line med at diagnosis of type 2	metformin (Glucophage)	500 - 2500 mg (usually BID w/ meal)	**Side effects:** nausea, bloating, diarrhea, B12 deficiency. To minimize GI Side effects, use XR and take w/ meals. **Obtain GFR before starting.** • If GFR <30, do not use. • If GFR <45, don't start Meformin • If pt on Metformin and GFR falls to 30-45, eval risk vs. benefit; consider decreasing dose. **For dye study,** if GFR <60, liver disease, alcoholism or heart failure, restart metformin after 48 hours if renal function stable. **Benefits:** lowers cholesterol, no hypo or weight gain, cheap. Approved for pediatrics, 10 yrs + Lowers A1c 1.0%-2.0%.
	Riomet (liquid metformin)	500 - 2500mg 500mg/5mL	
	Extended Release-XR (Glucophage XR) (Glumetza) (Fortamet)	(1x daily w/dinner) 500 – 2000 mg 500 – 2000 mg 500 – 2500 mg	

Biguanide derived from: Goat's Rue *Galega officinalis*, French Lilac

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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

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

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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?

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?

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

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

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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"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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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

- **Prevention**
- **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

Dariush 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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We need your help!

Lifespan Treadmill Desk - Amazon

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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

NATIONAL Diabetes PREVENTION PROGRAM

Diabetes Education SERVICES

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%.

NATIONAL Diabetes PREVENTION PROGRAM

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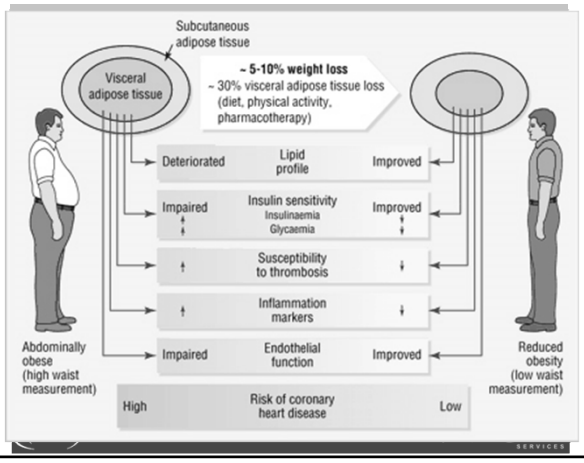
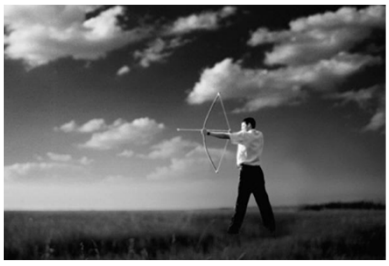


Use Technology to Prevent Diabetes

- Recent studies support content delivery through virtual small groups, internet social networks, cell phones and mobile devices.
  - Validated studies that these approaches can:
    - Support wt loss
    - Reduce A1c (prediabetes)
  - The CDC Diabetes Prevention Program is incorporating these tools into their program content

Goals of Care



ABCs of Diabetes –

- A1c less than 7% (avg 3 month BG)
  - Pre-meal BG 80-130
  - Post meal BG <180
- Blood Pressure < 140/90
- Cholesterol
  - DM and 40 yrs, start statin
  - HDL >40
  - Triglyceride < 150
- E xercise, Education
- H ealthy Eating

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

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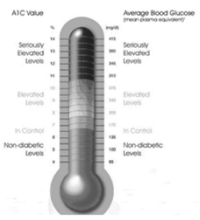
6. Glycemic Targets

- **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.



Diabetes Education SERVICES

Healthy & Good Functional Status

- Set more intensive goals if:
  - Good cognitive and physical function
  - Expected to live long enough to reap benefits of intensive management,
- Ongoing follow-up to eval safety
- **Goals:**
  - Reasonable A1c goal <7.5%,
  - Fasting BG 90 – 130
  - Blood Pressure < 140/90
  - Statin unless contraindicated or not tolerated

Diabetes Education SERVICES

Patients with Complications and Reduced Functionality - Less Intense Goals

- Adjusted based on shared - decision making and safety.
- Keep it realistic
- Consider DE-Intesification
- Goals:
  - Reasonable A1c goal <8.0%
  - Fasting BG 90 – 150
  - Blood Pressure < 140/90
  - Statin unless contraindicated or not tolerated

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.

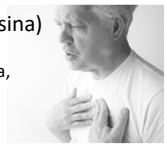
DPP-4 Inhibitors – "Incretin Enhancers"

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

DPP-IV Inhibitor Updates

- Can cause severe, disabling join pain.
  - Contact Provider, Stop Medication
- Saxagliptin (Onglyza) and Alogliptin (Nesina) can increase risk of heart failure.
  - Notify provider for shortness of breath, edema, weakness, etc.



- Side effects: headache and flu-like symptoms
- Report signs of pancreatitis
- No wt gain or hypoglycemia
- Lowers A1c 0.6% - 0.8%

Diabetes Education SERVICES

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

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

Diabetes Education SERVICES

"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

Diabetes Education SERVICES

Best Medicine

- **Exercise is the best medicine.** Structured exercise of 8 weeks duration, has been shown to lower A1c by an average of 0.66% in people with type 2, even without a significant change in BMI.

Activity Definitions

- Physical activity
  - Bodily movement produced by the contraction of skeletal muscle that requires more energy than when resting
- Exercise
  - Subset of physical activity that is planned, structured and includes repetitive body movements
  - Performed to improve or maintain physical fitness
- Sedentary behavior
  - Little on no movement or physical activity

Benefits of Exercise

- Increase muscle glucose uptake 5-fold
- Glucose uptake remains elevated for 24 - 48 hours (depending on exercise duration)
- Increases insulin sensitivity in muscle, fat, liver.
- Reduce CV Risk factors (BP, cholesterol, A1c)
- Maintain wt loss
- Contribute to well being
- Muscle strength
- Better physical mobility

Exercise decreases:

- Sleep apnea
- Diabetic kidney disease, retinopathy
- Depression
- Sexual dysfunction
- Urinary incontinence
- Knee pain
- Need for medications
- Health care costs

Diabetes Education SERVICES

Physical Activity - Kids

- Children should be encouraged to engage in at least 60 minutes of moderate/vigorous physical activity a day.
- Plus bone/muscle strengthening 3 times a week

Diabetes Education SERVICES

Exercise Standards

- Adults – 150 min/wk moderate intensity
  - over 3 days a week.
  - Don't miss > 2 consecutive days w/out exercise
  - Get up every 30 mins - Reduce sedentary time
  - Flexibility and balance training 2-3 xs a week (Yoga and Tai Chi)
  - T1 and T2 – resistance training 2 -3 xs a week

Diabetes Education SERVICES

Progressive Resistance exercise

- Improves insulin sensitivity
- Goal is 2 sessions a week
- Examples include:
  - Exercise with free weights, wt machines, resistance bands
- Each session consisting of least:
  - One set of five or more resistance exercises using large muscle groups

Resistance Exercise 5

Diabetes Education SERVICES

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

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

Diabetes Education SERVICES

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

Diabetes Education SERVICES

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*

Diabetes Education SERVICES

Glucose Management and Hospitalized Patients

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

Diabetes Education SERVICES

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

Diabetes Education SERVICES

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)

Diabetes Education SERVICES

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

Diabetes Education SERVICES

Now What?

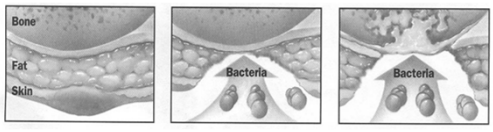
- Nurse had an emergency and pt already ate lunch?

- Nurse administered insulin and pt only ate a few bites of turkey and drank non sugar tea?
- You just gave 3 units of Regular and patient needs to go to OR NOW!

Foot Care

Lift the sheets and look at the Feets!

Foot Wounds

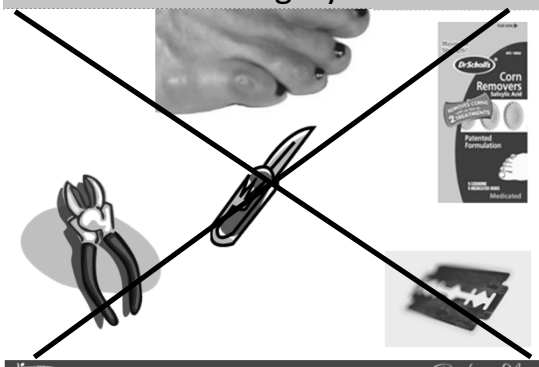


Blisters
Calluses

Ulcers

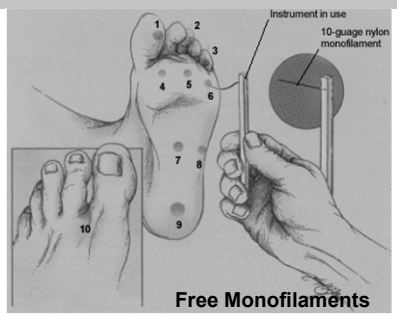
Bone infection

No Bathroom Surgery



Diabetes Education SERVICES

5.07 monofilament = 10gms linear pressure



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

Diabetes Education SERVICES

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.

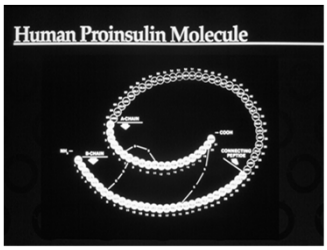
Diabetes Education SERVICES

"Getting diabetes saved my life."
~ Sherri Sheperd

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

Insulin – the Ultimate Hormone Replacement Therapy

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

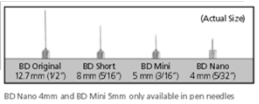


Psychological Insulin Resistance (PIR)

- 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

Diabetes Attitudes, Wishes, Needs Study - Rubin

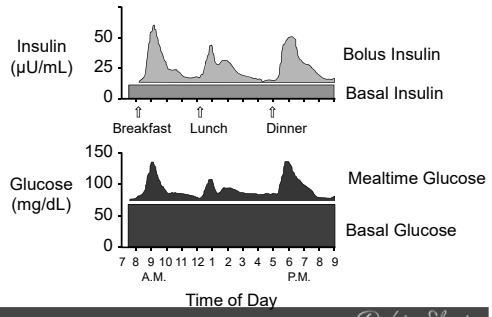
Needle Size often a Barrier Size *Does* Matter



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

Diabetes Education SERVICES

Physiologic Insulin Secretion: 24-Hour Profile



Diabetes Education SERVICES

Insulin Action Teams

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

Diabetes Education SERVICES

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

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

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

More than 200 units a day?

Diabetes Education SERVICES

Concentrated & Inhaled Insulins

DiabetesEd.net

Name/Concentration	Insulin/Action	Considerations
Humulin Regular U-500 • 500 units insulin/mL • KwikPen or Vial	Regular Bolus / Basal	5 xs concentration of u-100 insulin. Indicated for pts taking 200+ units insulin daily. 3 mL Pen – Once opened, good for 28 days. 20 mL Vial – Once opened, good for 40 days. Use designated U-500 insulin syringe.
Humalog KwikPen U-200 200 units insulin/mL	Lispro (Humalog) Bolus	2 xs concentration of u-100 insulin. 3 mL Pen. Once opened, good for 28 days
Toujeo Solostar U-300 Pen 300 units insulin/mL	Glargine (Lantus) Basal	3 xs concentration of u-100 insulin 1.5 mL Pen. Once opened, good for 42 days
Tresiba FlexTouch U-200 Pen 200 units insulin/mL	Degludec (Tresiba) Ultra basal	2 xs concentration of u-100 insulin 3 mL Pen. Once opened, good for 8 weeks

All concentrated insulin pens and the U-500 syringe automatically deliver correct dose (in less volume). No, conversion, calculation or adjustments required. For example, if order reads 30 units, dial the concentrated pen to 30 units or draw up 30 units on the U-500 syringe. **Important – never withdraw concentrated insulin from the pen using a syringe.**

Inhaled Insulin

Action	Insulin Name	Dose Range	Onset	Peak	Duration	Considerations
Bolus – Rapid-acting	Afrezza Inhaled regular human insulin	4, 8, and 12 unit cartridges before meals	15 min	1 hr	3 hrs	Assess lung function. Avoid in lung disease — bronchospasm risk. Side effects: hypo, cough, throat irritation.

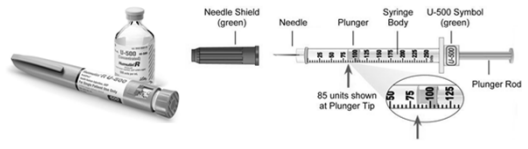
The information listed here are not guidelines. Please consult prescribing information for details. REV 10/2016 ©2016

Diabetes Education SERVICES

Consider U-500 High Potency Insulin

5 x's the concentration of u100

- 500 units per mL vs 100 units per mL
  - 20 mL a vial. 500 units per mL= 10,000 unit
  - Costs ~ ~~$400~~ $1,200 per vial
  - Less volume



Diabetes Education SERVICES

Dosing Strategies u-500

- Dosing – take total daily needs and split into 2-3 doses
  - 2 doses: 60% am / 40% pm or
  - 3 doses: 40/30/30 or 40/40/20
- No basal insulin needed, because U-500 has bolus and basal action
- Needs careful monitoring/ education

- Example - Pt on 240 units of insulin a day
  - 140 units am / 100 units pm (2 doses)
  - 100 / 70 / 70 or 100 / 100/ 40

Diabetes Education SERVICES

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 ½ total daily dose
- Covers food or hyperglycemia.
- 1 unit
  - Covers ≈ 10 -15 gms of carb
  - Lowers BG ≈ 30 – 50 points

Diabetes Education SERVICES

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

Diabetes Education SERVICES

Pattern Management –AKA

How to think like a pancreas

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 – 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

Bolus – Insulin Sliding Scale

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

	Break	Lunch	Dinner	HS
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 insulin
Day 3	189 2uR	243 4uR	162 2uR	244 4uR
Day 4	66 No insulin	287 6uR	144 none	272 6uR

Diabetes Education SERVICES

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)	No Peak	20 hrs
Glargine (Lantus)		24 hrs
Glargine (Basaglar)		24 hrs
Degludec (Tresiba)		42 hrs

Fasting BG reflects efficacy of basal

Diabetes Education SERVICES

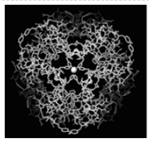
Glargine (Basaglar)
"Copy Cat" or "Biosimilar Insulin"

- Insulin considered a "biological drug product"
- Patent on "biologicals" last 12 yrs
  - Insulin patent sold in 1923 for $1
  - Patent can be extended by making small improvements
  - Insulin manufacturer's have maintained exclusivity for 93 years.. Until now
- Patent on glargine expired in 2015

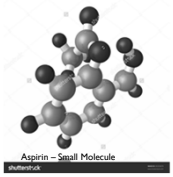
Diabetes Education SERVICES

Glargine (Basaglar) – Eli Lilly

- Can't use the term generics for *large* molecule biologicals because they are manufactured in living organisms (bacteria and yeast)
- Each batch may be slightly different
- Correct term is "biosimilar"
- Currently - Pharmacist to contact Provider before switching to biosimilar
  - Future – may be same as generics
- FDA working on standardized insulin naming system



Insulin – Large Molecule



Aspirin – Small Molecule

Diabetes Education SERVICES

Basal Insulin Summary

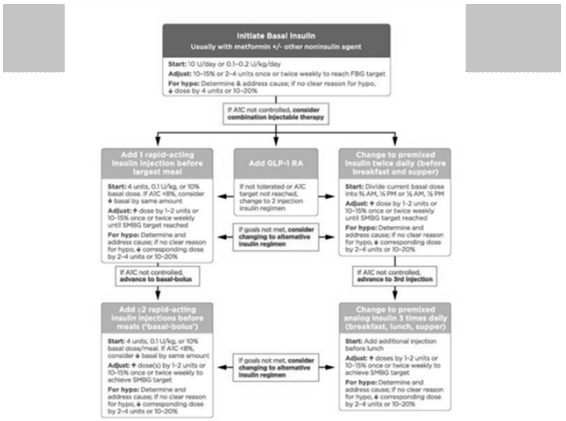
- NPH, Levemir, Lantus, Degludec
- Covers in between meals, through night
- Starts working slow (4 hours)
- Stays in long (12-24 hours)
  - NPH 12 hrs
  - Levemir, Lantus 20-24 hrs
  - Degludec – 42 hours
- Fasting blood glucose reflects effectiveness

Diabetes Education SERVICES

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

	Break	Lunch	Dinner	HS
Mo 1	170s			298 10uNPH
Mo 2	160s			233 20uNPH
Mo 4	140s	283	265	206 40uNPH

Diabetes Education SERVICES



Basal insulin key points – Type 2

- ADA Standards of Care 2017
  - Start basal insulin at 10 units or 0.1 to 0.2 units/kg day
  - Keep metformin and sometimes one other oral agent
  - Consider NPH insulin at HS if cost is a factor
- When is it too much basal insulin?
  - If basal insulin is >0.5 units/kg day, advance to combination injectable therapy
    - Add bolus, switch premixed 70/30 or to Basal + GLP-RA
  - Maintain metformin therapy and stop other oral meds to decrease complexity.

Next Steps

- At max basal dose
  - 80 x 0.5 = 40 units
- Start bolus insulin at largest meal
- Or switch to 70/30 Insulin

Combo Sub-Q 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

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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 0.7 = 28 units 70/30
  - 1/3 of basal in *pm
    - 40 units x 0.3 = 12 units 70/30
  - *pm = before dinner

Diabetes Education SERVICES

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

Diabetes Education SERVICES

Type 2 – Glyburide 20mg AM, 10u NPH 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

ADA Step Wise Approach to Hyperglycemia 2017

- Start lifestyle coaching and metformin therapy
- Metformin is effective, safe, affordable, lowers CV Risk
- If A1c target not achieved after 3 mos, start 2nd med/ins
- If A1c target not achieved after 3 mos, add 3rd agent
- If A1c target not achieved after 3 mos, add basal insulin
- If A1c target not achieved after 3 mos, keep metformin, consider adding bolus insulin, or switching to GLP-1 RA + Basal, or premixed insulin

- A1c ≥ 9% consider initiating dual therapy or insulin if
- A1c ≥ 10% consider initiating combo insulin therapy

What Medications Cause Hypoglycemia?

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

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

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®, Diabeta®
- Blood glucose levels don't describe severity, response is individual

Hypoglycemic Symptoms

- Autonomic
  - Anxiety
  - Palpitations
  - Sweating
  - Tingling
  - Trembling
  - Hypoglycemic Unawareness

- Neuroglycopenia
  - Irritability
  - Drowsiness
  - Dizziness
  - Blurred Vision
  - Difficulty with speech
  - Confusion
  - Feeling faint

Treatment of Hypoglycemia

- If blood glucose **70**mg/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

Diabetes Education SERVICES

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)

Diabetes Education SERVICES

Treating Hypo

Diabetes Education SERVICES

Basal Bolus – What Adjustments?
Pt weighs 80kg

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

Diabetes Education SERVICES

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

Diabetes Education SERVICES

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

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

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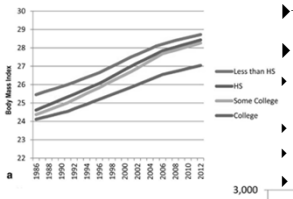
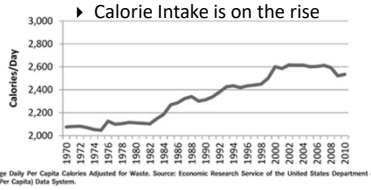
U.S. Weight - 68% overweight or obese



- ~~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



Average Daily Per Capita Calories Adjusted for Waste. Source: Economic Research Service of the United States Department ... ility (Per Capita) Data System.

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Bigger Meals, Bigger Kids

Education SERVICES

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

- Warning label on sodas proposed
- One soda has 12 teaspoons 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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In the Beginning

- Earth
- Man
- Spirit

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Bacterial Cells Outnumber Human Cells 10 to 1

- 10 trillion human cells
- Host 100 trillion bacterial and fungal cells

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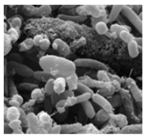
Poll Question 1

- How much does your gut bacteria weigh?
  - A. 24 ounces
  - B. 3 pounds
  - C. Less than 1 pound
  - D. 1.5 pounds
  - E . Not sure

3 lbs of Microbes in our Gut



- This community of bacteria can be thought of as an extra 'organ' "microbiome".
- We have evolved together with our microbiome over millions of years.
- Ratios of these communities has changed over the past 30 years
- Mirrors global spikes in obesity, diabetes, allergic and inflammatory diseases
- What are we doing to change these bacteria?

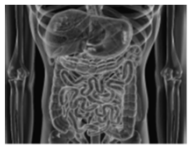
Gut Microbiome

- Part of endocrine axis
- Stabilized by 3 years of age
- Influenced by:
  - Birth method
  - Breast fed
  - Early Antibiotic use
  - Environment
  - Travel
- Help us
  - utilize energy
  - fight off invaders

C-Section – Consider Gauze in Vagina

- early research by Dr. Maria Gloria Dominguez-Bello, an associate professor in the Human Microbiome Program at the NYU School of Medicine. She is testing a fast and easy work-around called the "**gauze-in-the-vagina technique**."

Human Intestine Friends



- The majority belong 2 major phyla:
- Firmicutes
  - includes *Clostridium*, *Enterococcus*, *Lactobacillus* and *Ruminococcus*
- Bacteroidetes
  - includes *Bacteroides* and *Prevotella*

in proportions determined in part by birth, breastfeeding, diet

Weight and Gut Bacteria New and Early Research

- Leaner people appear to have more bacterial diversity and a 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

Getting to Better Gut Bacterial Health

Eat more PREbiotics

- Foods with indigestible fibers that nourish the good bacteria:
  - High fiber foods like, whole grains, fruits, veggies, nuts
  - High in prebiotic fibers include: Jerusalem artichokes, onions, kale, Brussels sprouts, bananas, dandelion greens & more

PRObiotics

- These foods contain healthy bacteria like *Bifidobacterium* and *lactobacillus.*
  - Yogurt, Kefir – look for "live or active cultures"
  - Fermented foods like: Sauerkraut, Kimchi, Miso soup, kombucha

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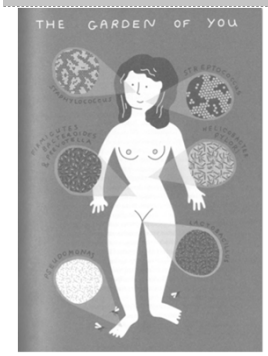
Follow Your Gut – Dr. Rob Knight



Check out Dr. Knight's:

- TED Talk
- Website – AmericanFoodProject .org
- Articles in Nature and all over

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Take Home Message

- Get Dirty
- Limit Unnecessary C-Sections
- Breastfeed if possible
- Limit early antibiotics
- Eat a wide variety of fiber foods

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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%

Approach Depends on Patient

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

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 cals
    - Decrease intake 250-500 cals daily + exercise

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
- Drink Water

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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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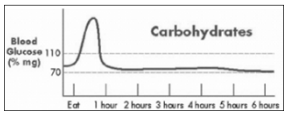
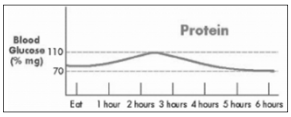
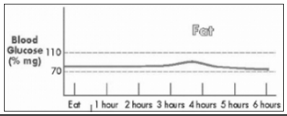
How nutrients affect blood sugar







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Carbohydrate Needs for Most Adults

	Grams	Servings
Each Meal	45-60 gm	3 - 4
Snacks	15-30 gm	1- 2

Carbs affect Post Meal Blood Glucose

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Choose Healthy Carbs

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

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10 Superfoods

- Beans
- Dark Green Leafy Vegs
- 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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Another plate example

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Ms. Gonzales' Daily Meal plan

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**

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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 (vodka, 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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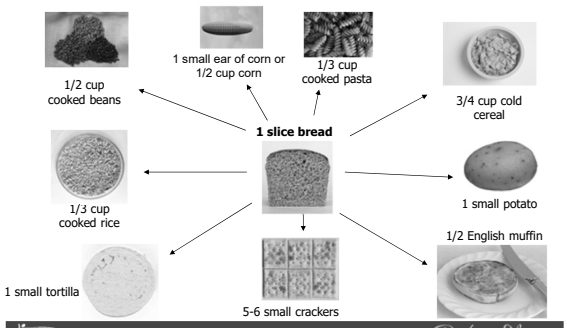
Carb Counting - Starch

Each Food has:
80 Calories
15 grams carb



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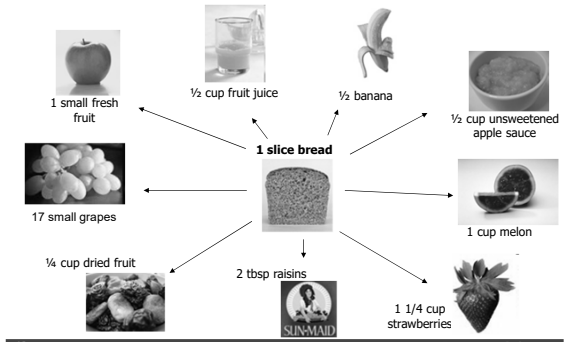
Carb counting- fruit

Each Food has:
60 Calories
15 grams carb



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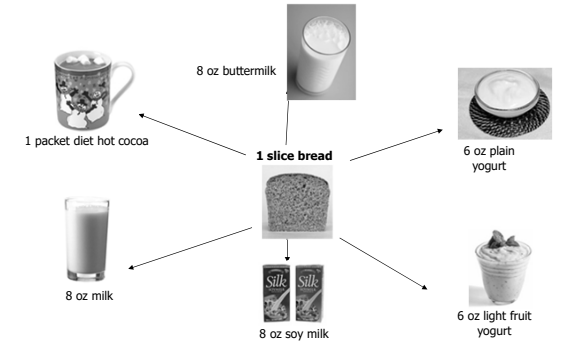
Carb Counting - Milk

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



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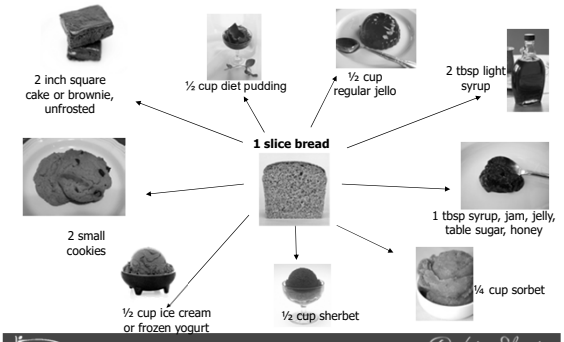
Carb Counting - Sweets

Each Food has:
Calories vary
15 grams carb



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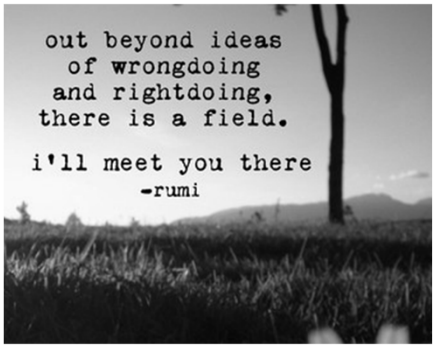
Give the gift of Non-Judgment



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Thank You

- Questions?
- Email
  bev@diabetesed.net
- Web
  www.diabetesed.net

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DiaBingo - I

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

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