Diabetes Education SERVICES

15 years

Advancing Your Career in Diabetes Education

Welcome to Diabetes in the 21st Century

DiabetesEd.net

President, Diabetes Educational Services
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DIABETES IN THE 21ST CENTURY: A CLINICAL AND EDUCATIONAL UPDATE

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

CDC ANNOUNCES

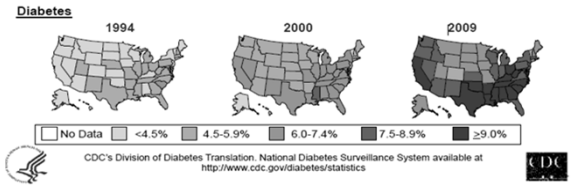
1 in 3 Americans may have Diabetes by 2050

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

DIABETES IN AMERICA 2013

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

CDC 2011



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"

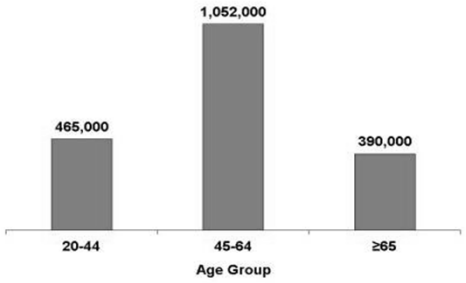
WORLD DIABETES DAY- NOVEMBER 14

AGE-ADJUSTED DIABETES PREVALENCE 20 YRS OR OLDER, BY RACE/ETHNICITY— U.S. 2008

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

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

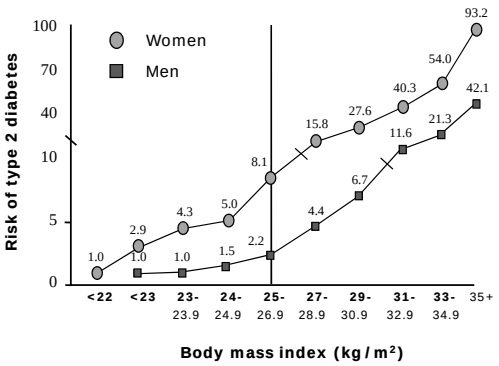
NEW CASES OF DIAGNOSED DIABETES 20 YEARS + IN UNITED STATES, 2010

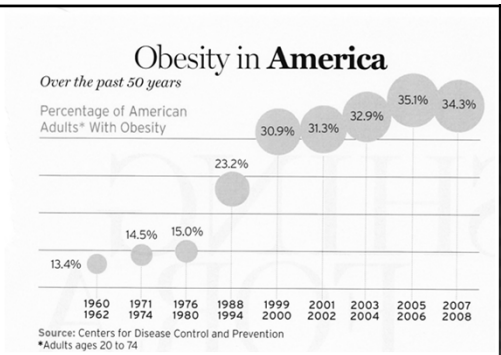


Source: 2007–2009 National Health Interview Survey estimates projected to year 2010.

WHY SHOULD ZIP CODE DETERMINE LIFE EXPECTANCY?

THE RELATIONSHIP BETWEEN BMI AND THE RISK OF DEVELOPING TYPE 2 DIABETES





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

THOUGHTS ON DIABETES, WEIGHT, SOCIAL CHANGE

- "The only way on a societal basis to reduce the prevalence of obesity is through community action" – Dr. Frieden, CDC
- In the past 20 yrs:
  - the price of soda has gone up 20%
  - Fruits and vegetables have gone up 100+%
- Obesity (BMI 30+) prevalence 22% to 40%
- Poverty, Obesity, Diabetes inter-related

EMERGING EPIDEMIC: YOUTH WITH TYPE 2 DM

- Up to 45% of children diagnosed w/ diabetes have type 2
- Prevalence only 4% in 1990
- Native Americans, Hispanic, African Americans highest incidence
- 85% are overweight at time of diagnosis
- Key risk factor is insulin resistance
- SEARCH for Diabetes in Youth 5 yrs Study (NIH)
  - www.searchfordiabetes.org

Source: AACE 2007

NEW AND EARLY RESEARCH ON GUT BACTERIA

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

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

ROLE OF THE PANCREAS ENDOCRINE FUNCTIONS

Beta Cells - Insulin

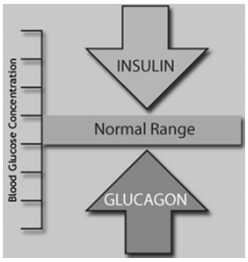
Anabolic hormone - helps store glucose as glycogen in muscle, liver

- secreted in response to elevated glucose
- halts breakdown of glycogen in liver
- increases protein synthesis, fat storage
- powerful hypoglycemic

Beta Cells - Amylin

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

ROLE OF THE PANCREAS ENDOCRINE FUNCTIONS



Alpha cells - Glucagon

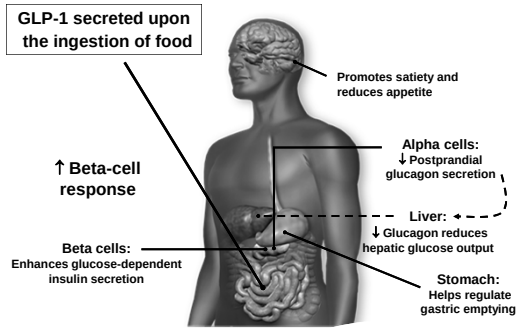
Opposes action of insulin at the liver

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

HORMONES EFFECT ON GLUCOSE

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

BARIATRIC SURGERY

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

SIGNS OF DIABETES

- Polyuria
- 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

CASE STUDY

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

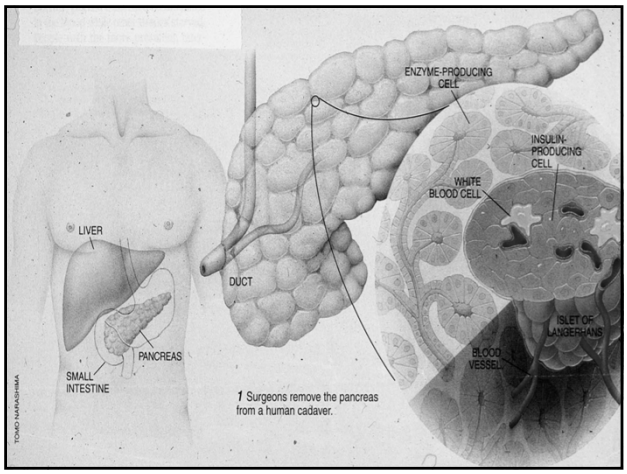
Diabetes 12 years, on insulin 3 yrs

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?



TYPE 1 DIABETES – GENETICS AND RISK FACTORS

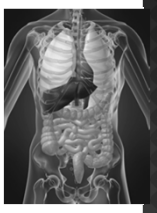
- 1- 400 to 1-1000 = Risk of type 1 in gen pop
- 1-20 to 1-50 in offspring of diabetes parents
- Combo of genes and disease susceptibility
- Risk Factors:
  - Autoimmunity tends to run in families
  - Higher rates in non breastfed infants
  - Viral triggers: congenital rubella, coxsackie virus B, cytomegalovirus,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

TYPE 1 DIABETES – 10% OF ALL DM

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

TYPE 1 DIABETES ASSOCIATED WITH OTHER IMMUNE CONDITIONS

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



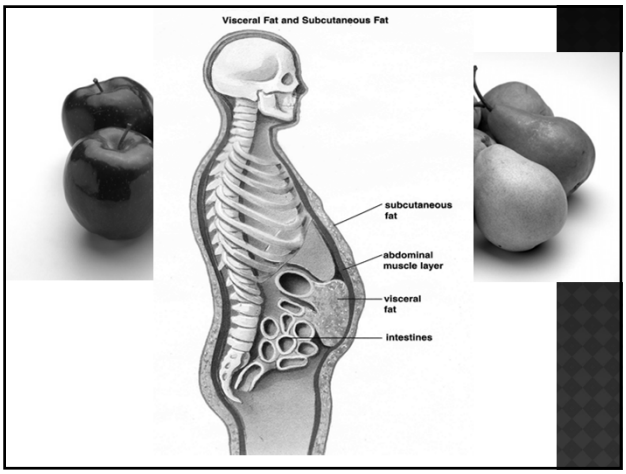
TYPE 1 SUMMARY

- Autoimmune and often associated w/
- Complete pancreatic destruction
- Need insulin shots
- Often first present in Diabetic KetoAcidosis (DKA)

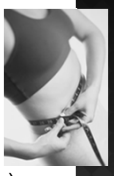
TYPE 1 IN HOSPITAL

- 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?



CARDIO METABOLIC RISK - 5 HYPERS -



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

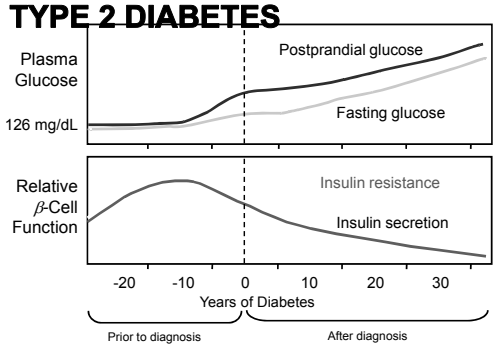
Manifestations of Insulin Resistance

FLASH MOB – WORLD DIABETES DAY TO BEAT IT

- March R/C/R
- Fred Astaire
- Point R/L
- Arms up, down
- Shoulder Walk
- Punch down/up
- Scoot Rt/Left
- Reach up R/L
- Shoulder Walk

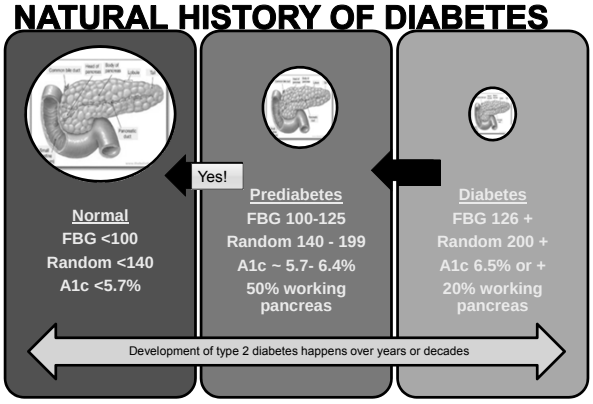
- Open door
- Ride Horse
- Scoot Rt/Left
- Turn R & Clap, then L
- Shoulder Walk
- Punch down/up

NATURAL PROGRESSION OF TYPE 2 DIABETES



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

NATURAL HISTORY OF DIABETES



DIAGNOSTIC CRITERIA

- All test should be repeated in the absence of unequivocal hyperglycemia
- If test abnormal, repeat same test to confirm diagnosis

Kaiser Diabetes Screening Guidelines:

- Fasting Plasma Glucose (FPG) preferred screening test – after 8 hr fast
- A1c acceptable alternative screening test

DIABETES 2 - WHO IS AT RISK?
(ADA CLINICAL PRACTICE GUIDELINES)

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

DIABETES 2 - WHO IS AT RISK?
(ADA CLINICAL PRACTICE GUIDELINES)

Risk factors cont'd

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

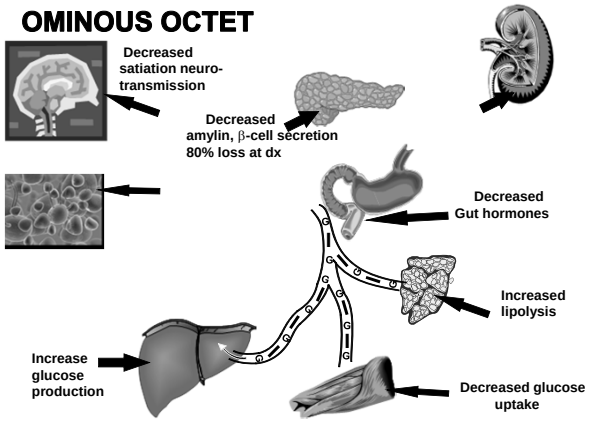
ACANTHOSIS NIGRICANS (AN)

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

DIABETES IS ALSO ASSOCIATED WITH

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

OMINOUS OCTET



COMPARISON OF TYPE 1,TYPE 2, LADA

	Type 1	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

GESTATIONAL DIABETES

- GDM – hyperglycemia first recognized during pregnancy

SCREEN FOR GDM

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

GDM DIABETES RATES – 2-10% OF ALL PREGNANCIES

- GDM prevalence increased by
  - ~10–100% during the past 20 years
- Native Americans, Asians, Hispanics, and African-American women at highest risk
- Immediately after pregnancy, 5% to 10% of GDM diagnosed with type 2 diabetes
- Women with gestational diabetes 35% to 60% chance of developing DM in next 10–20 years.

INCREASING PREVALENCE OF GDM A PUBLIC HEALTH PERSPECTIVE

- Body weight before and during pregnancy influences risk of GDM and future diabetes
- Children born to women with GDM at greater risk of diabetes
- Focus on prevention

POSTNATAL HEALTH: MATERNAL BEHAVIOR

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

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

DIABETES DETECTIVES NEEDED

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

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

LIFE STUDY - MR. CALHOUN

Mr. Calhoun is 72 years old, has recently lost 10 pounds and complains of feeling very tired lately. He is admitted with an infected foot ulcer. His WBC is 12.3, glucose 284. He smokes a pack of cigarettes a day. He takes glyburide 10mg daily and doesn't have a meter to test his BG.

- What risk factors and signs of diabetes?
- What type of diabetes does he have?

WHAT DO YOU SAY? MR. CALHOUN 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?

UNCONDITIONAL POSITIVE REGARD

- ***Unconditional Positive Regard –***

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

- *Term coined by humanist, Carl Rogers*

- Help with
- Unconditional
- Guidance and Support

Anne Peters, MD, CDE
ADA Post Grad

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

BLOOD GLUCOSE TESTING -HOW WILL IT HELP ME?

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

HOW OFTEN SHOULD I CHECK?

- Be realistic!!
- Type 1 – at least pre and post meal
- Type 2 – as often as needed to achieve goals (ADA)
- Consider:
  - Types and timing of meds
  - Goals
  - Ability (physical and emotional)
  - Finances

COMPLICATIONS - WHY?

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

DIABETES COMPLICATIONS

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

CONTROL MATTERS

- **Prevention**
- **Trials**
- **Practice Recommendations**

FINANCIAL ADVISOR

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

CAN TYPE 2 BE PREVENTED IN OLDER ADULTS?

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

- 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

89% risk reduction when all at goal.

35% rel risk reduction for each additional

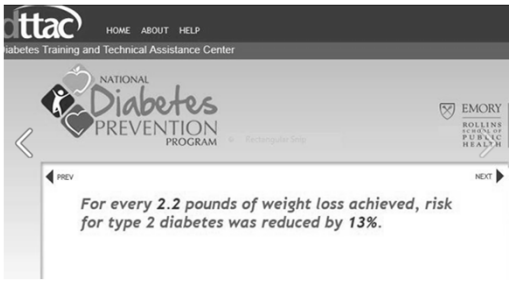
Dariush Mozaffarian, MD,
Arch Intern Med. 2009;169(8):798-807.

DIABETES PREVENTION PROGRAM (DPP) AUGUST 2001

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

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

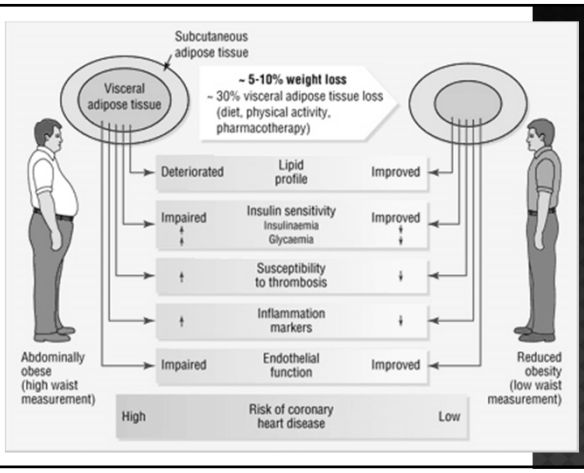
WEIGHT LOSS AND PREVENTION



DIABETES PREVENTION PROGRAMS

- Delay or Prevent Type 2 Diabetes
- Save $5.7 billion over 25 years
- Programs
  - Partnering with YMCA's
  - CDC now recognizes Diabetes Prevention Programs www.cdc.gov/diabetes/prevention

Health Affairs 31, No 1 2012 p50-60



ABC'S OF DIABETES

A1C
Blood Pressure
Cholesterol

professional.diabetes.org

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 reduces risk of:
  - Heart failure (56%)
  - Stroke (44%)
  - Death from diabetes (32%)

Lancet 352: 837-865, 1998

A1C GOALS FOR NON PREGNANT ADULTS INDIVIDUALIZE TARGETS – ADA

- < 7% for patients ***in general***
- For individual pts, as close to normal as possible (<6%) w/out significant hypo
- < 8% for frail elderly
- *Goals based on:*
  - *Duration of diabetes*
  - *Life expectancy and Age*
  - *Co morbid conditions*
  - *Know CVD or advanced micro complications*
  - *Ind pt considerations, shared decision making*

A1C AND ESTIMATED AVG GLUCOSE (EAG) 2008

http://professional.diabetes.org/GlucoseCalculator.aspx

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

eAG = 28.7 x A1c-46.7 ~ 29 pts per 1%

Translating the A1c Assay Into Estimated Average Glucose Values – ADAG Study
Diabetes Care: 31, #8, August 2008

"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

GLUCOSE GOALS
INDIVIDUALIZE TARGETS – ADA

- Pre-Prandial BG 70- 130
- 1-2 hr post prandial < than 180

*for nonpregnant adults

DIABETES SELF MANAGEMENT EDUCATION AND SUPPORT (DSMES)

- People w/ DM and prediabetes need education that:
  - Addresses psychosocial and emotional well-being
  - Meets National Standards
  - Focuses on promoting self-care and behavior change
- Evidence that DSMES programs work
  - Lower A1c, wt loss, improved quality of life, better coping and lower costs

BP GOAL – 140/80

ADA CLINICAL PRACTICE RECOMMENDATIONS

If >140 / 80 = lifestyle + meds

- Start lifestyle therapy when BP 120/80
- Lifestyle (wt loss, exercise, DASH diet, limit ETOH)
- First Line B/P Drugs
  - ACE – I orAngiotensin receptor blocker (ARBs)
  - Beta Blocker for post MI
  - Diuretics often needed
  - Monitor creat, GFR, potassium, sodium
- Many pts require 2 or > anti-HTN meds

BP GOAL FOR KP NCAL

BP < 139/ 89

*LIPID GOALS

ADA CLINICAL PRACTICE RECOMMENDATIONS

- LDL < 100 mg/dL
- LDL <70 an option for ind w/ overt CVD

- HDL > 40 mg/dL men
- HDL > 50 mg/dL women

- Trig < 150 mg/dl

****alternative goal is 40% lower than baseline levels if on max statin therapy & above goals not met***

Screen biannually or annually, more often if indicated

ABCS OF DIABETES –

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

"LEGACY EFFECT"

- For participants of DCCT and UKPDS
  - long lasting benefit of early intensive BG control prevents
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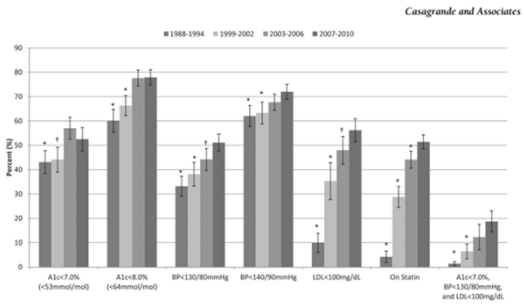
HOW ARE WE DOING? REACHING GOAL



Diabetes Care, 2/13

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

VACCINATIONS- IMMUNIZATIONS

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

MR. CALHOUN - WHAT ARE YOUR RECOMMENDATIONS FOR SELF-CARE

Patient Profile

62 yr old with newly dx type 2. History of previous MI.

Meds: Lasix, synthroid

Labs:

- A1c 9.3%
- HDL 37 mg/dl
- LDL 156 mg/dl
- Triglyceride 260mg/dl
- Proteinuria - neg
- B/P 142/92

Self-Care Skills

- Walks dog around block 3 x's a week
- Bowls every Friday
- Widowed, so usually eats out

DIABINGO- G

G ADA goal for A1c is less than ____%

G People with DM need to see their provider at least every month

G Blood pressure goal is less than

G People with DM should see eye doctor (ophthalmologist) at least

G The goal for triglyceride level is less than

G Goal for my HDL cholesterol is more than

G The goal for blood sugars 1-2 hours after a meal is less than:

G People with DM should get this shot every year

G People with DM need to get urine tested yearly for _____

G Periodontal disease indicates increased risk for heart disease

G The goal for blood sugar levels before meals is:

G The activity goal is to do ___ minutes on most days

MR. CALHOUN - WHAT ARE YOUR RECOMMENDATIONS?

Patient Profile

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

Labs:

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

Self-Care Skills

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

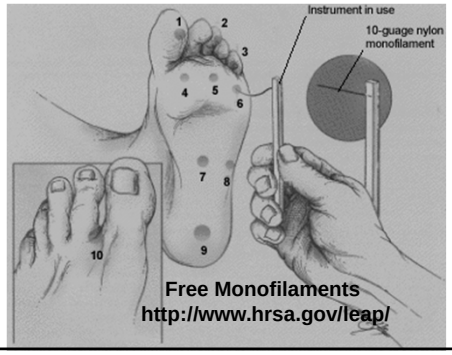
FOOT CARE

Lift the sheets and look at the Feets!

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

5.07 MONOFILAMENT = 10GMS LINEAR PRESSURE



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

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.

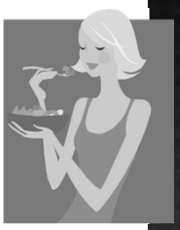
DIABETES SELF-MANAGEMENT

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

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.

MEDICAL NUTRITION THERAPY 2014 - 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

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.*
  - Wt loss goal ½ pound to 1 lb a week
    - Decrease intake 250-500 cals daily + exercise
- 2013 – Try and keep less than 2,300 mg a day
- Vitamin and mineral supplements not recommended - lack of evidence.
- Fiber 25 -38 gms a day

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

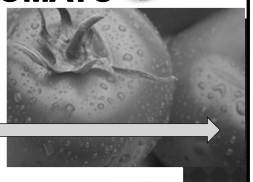
DIABETES PREVENTION PROGRAM FOCUS ON FAT = WT LOSS SUCCESS

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

MOVE TOWARD THE TOMATO



HEALTH CAMPAIGNS

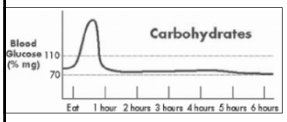
ADA RECOMMENDATION EAT LESS JUNK FOOD & SUGARY DRINKS –

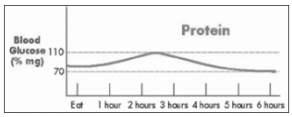
- Less Processed Foods
- Less Sugary Beverages
  - increase visceral adiposity
  - With sugar or
  - High fructose corn syrup
- Soda Tax?
- Junk Food Tax?

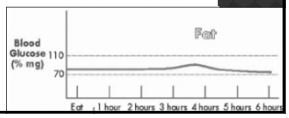
10 SUPERFOODS

- 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

HOW NUTRIENTS AFFECT BLOOD SUGAR





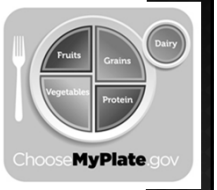


TEACHING ABOUT EATING HEALTHY

Major food groups
"Handy Diet"
Plate Method
Exchange Lists
Food Diaries / Glucose Records
Carbohydrate Counting

Assess what is best for the situation.

USDA FOOD PYRAMID WWW.MYPLATE.GOV



Balancing Calories

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

Foods to Increase

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

Foods to Reduce

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

LABEL LESSONS

Nutrition Facts

Serving Size 1/2 cup (114 g)
Servings Per Container 4

Amount Per Serving	
Calories 90	Calories from Fat 30
	% Daily Value*
Total Fat 3g	5%
Saturated Fat 0g	0%
Cholesterol 0g	0%
Sodium 300mg	13%
Total Carbohydrate 13g	4%
Dietary Fiber 3g	12%
Sugars 3g	
Protein 3g	
Vitamin A 80% • **Vitamin C** 60%	
Calcium 4% • **Iron** 4%	

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

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

Calories per gram: Fat 9 Carbohydrates 4 Protein 4

CARBS AFFECT POST MEAL BLOOD GLUCOSE

- Starch
- Fruit
- Milk
- Desserts

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

CHOOSE HEALTHY CARBS

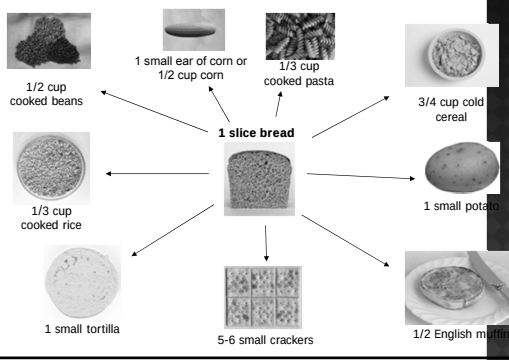
- Carbs have fiber, vitamins, minerals and phytonutrients
- 25 gms of fiber a day
- Power Carbs include:
  - Beans
  - Veggies
  - Fruits
  - Whole grain foods

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

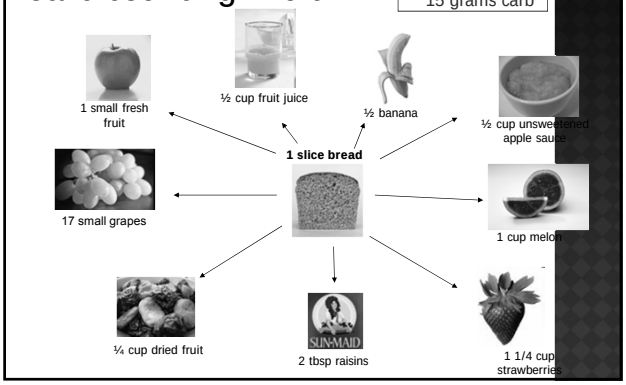
Carb counting- starch

Each Food has:
80 Calories
15 grams carb



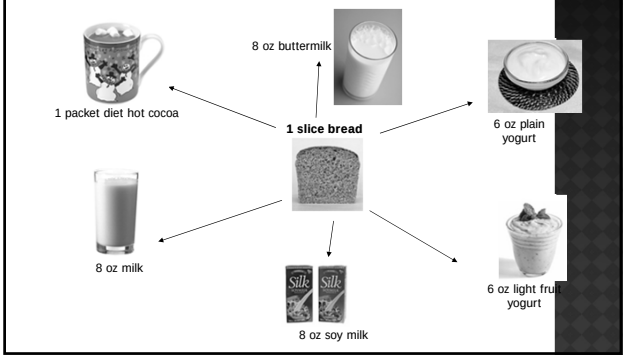
Carb counting- fruit

Each Food has:
60 Calories
15 grams carb



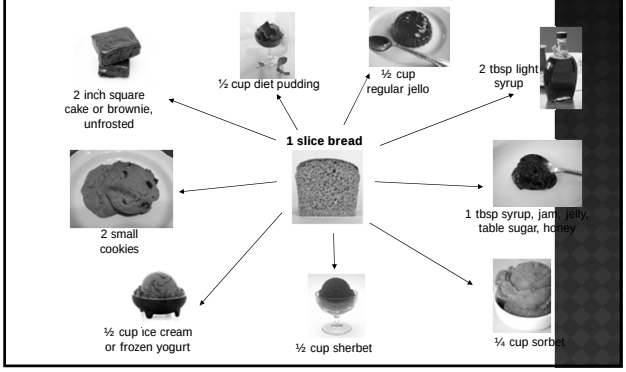
Carb counting- milk

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



Carb counting - sweets

Each Food has:
Calories vary
15 grams carb



GO LEAN WITH PROTEIN

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

FATS- AIM FOR HEART HEALTH

- **Saturated fats (LIMIT)**
  - **Solid**
  - **Animal**
  - **Tropical (palm, coconut)**
  - **Trans fats (deep fried)**
- Monounsaturated
  - Olive & canola oils
  - Nuts
  - Avocado

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

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

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

MS. GONZALES' GENERAL DIET PATTERN

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

RESOURCES

- www.eatright.org American Dietetic Association website for nutrition information resources, and access to Registered Dietitians
- www.diabetes.org American Diabetes Association website, advocates to prevent, cure and improve the lives of all people affected diabetes
- www.americanheart.org American Heart Association website; resources, recipes and tips; learn about efforts to reduce death caused by cardiovascular disease
- www.dce.org/publications/education-handouts/

RESOURCES

- www.nhlbi.nih.gov contains information for professionals and the general public about heart and vascular diseases, lung diseases, blood diseases.
- www.niddk.nih.gov National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) information and resources clearinghouse.

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)

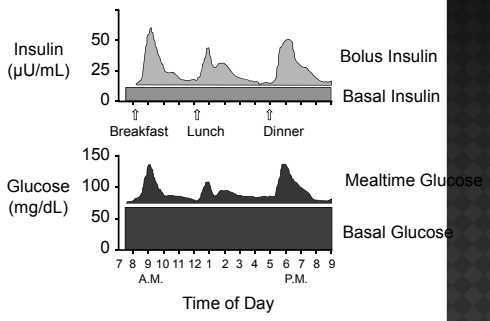
- 50% of providers in study threatened pts "with the needle".
- Less than 50% of providers realized insulins' positive effect on type 2 dm
- Most pts don't believe that insulin would "better help them manage their diabetes".
- Solutions: Find the root of PIR and address

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

PHYSIOLOGIC INSULIN SECRETION: 24-HOUR PROFILE



INSULIN ACTION TEAMS

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

BOLUS INSULINS (½ OF TOTAL DAILY DOSE ÷ MEALS)

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

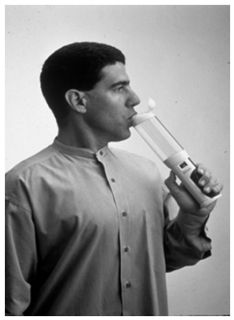
BOLUS INSULIN SUMMARY

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

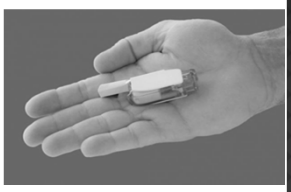
BOLUS INSULIN TIMING

- How is the effectiveness of bolus insulin determined?
  - 2 hour post meal (if you can get it)
  - Before next meal blood glucose
- Glucose goals (ADA) – may be modified by provider/pt
  - 1-2 hours post meal <180
  - Before next meal – 70 - 130

INHALED INSULIN – PAST TO FUTURE



afrezza



BOLUS – REG 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	354 10uR
Day 4	58 carbs	287 6uR	144 none	272 6uR

BASAL INSULINS
(½ OF TOTAL DAILY DOSE)

Intermediate Acting	Peak Action	Duration
⊙ NPH	4-12 hrs	12-24

Long Acting	Peak Action	Duration
⊙ Detemir (Levemir)	peakless	20 hrs
⊙ Glargine (Lantus)	No peak	24 hrs

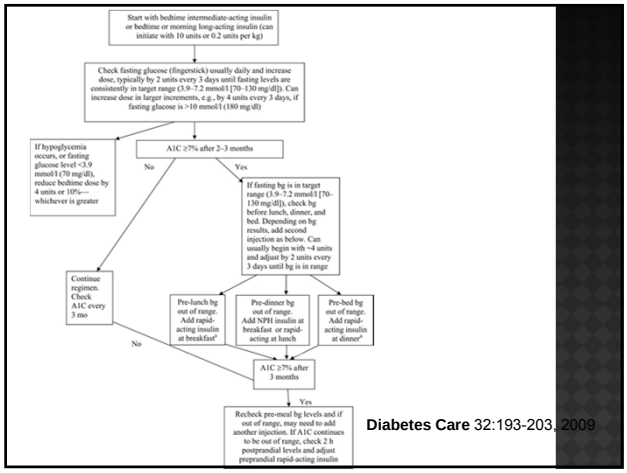
Fasting BG reflects efficacy of basal

BASAL INSULIN SUMMARY

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

BASAL ONLY
TYPE 2, 60KG

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



Diabetes Care 32:193-203, 2009

COMBINATION SQ INSULIN

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

Considerations:

- Pre-mixed, difficult to fine tune therapy

10U 70/30 BID PATTERNS? CHANGES NEEDED?

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

PATTERN MANAGEMENT

PATTERN MANAGEMENT

- Safety 1st!! - Evaluate 3 day patterns
- **Hypo** eval 1st and fix:
  - If possible, decrease medication dose
  - Timing of meals, exercise, medications
- **Hyperglycemia:** evaluate 2nd
  - Identify patterns:
  - fix fasting first, r/o Somogyi (check 3am BG)
- QA: check meter, insulin, meds

PATTERN MANAGEMENT

- Insulin adjustment general guidelines:
  - 1 unit increments if dose < 10 units
  - 2 unit increments if dose double digit
  - In general, adjust dose 10-20%
- Evaluate trends
- Provide frequent follow-up & feedback

TYPE 2 – NEW DIAGNOSIS – NO MEDS PATTERNS? QUESTIONS

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

TYPE 2 – GLUCOTROL 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

BASAL BOLUS – WHAT ADJUSTMENTS? PT WEIGHS 80KG

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

INTENSIVE DIABETES THERAPY INSULIN DOSING STRATEGY

50/50 Rule	Example
0.5-1.0 units/kg day	Wt 50kg x 0.5 = 25 units of insulin/day
Basal = 50% of total	Basal dose: 13 units
Bolus = 50% of total Divided into 3 meals	Bolus dose: 12 units 4 units at each meal

INTENSIVE DIABETES THERAPY INSULIN DOSING STRATEGY

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
- Bolus = 50% of total divided into 3 meals

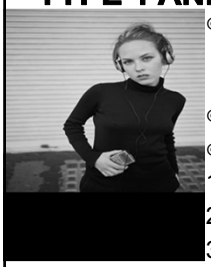
Example – You Try

- Wt 60 kg x 0.5 = ___ units of insulin/day
- Basal dose: ____ units
- Bolus dose: ____ units
  - at each meal

BASAL BOLUS – USING 50/50 RULE – PT WEIGHS 80KG A = ASPART

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

TYPE 1 AND A TEEN



- Cindy is trying to carb count and adjust her insulin, but is still having trouble. She weighs 60kg.
- What is her daily dose of insulin?
- What is her basal dose?

1. Pre meal target BG is 120
2. Post meal goal < 180.
3. Carb ratio: 1 unit for every 15 gms
4. Hyperglycemic correction factor is one unit for every 50 above goal

CORRECTION BOLUS – ADD TO MEALTIME INSULIN

RAPID/FAST ACTING INSULIN (1 UNIT:50 MG/DL>120)

70-120 mg/dl	0 units
121-170 mg/dl	1 unit
171-220 mg/dl	2 units
221-270 mg/dl	3 units
271-320 mg/dl	4 units
321-400 mg/dl	5 units

GRAMS OF CARB PER MEAL?

- Morning - BG 173
  - Breakfast – slice cold pizza, ½ c. juice
- Lunch BG 69
  - Menu- ham sandwich, pear, diet 7-up, mini snickers bar.
- 2 hrs after lunch, BG 148 - ran track
- Before dinner - BG 98
  - Cheeseburger, small fries, chocolate chip cookie
- At bedtime, BG 173

CARBS? HOW MUCH INSULIN?

- Morning - BG 173
  - Breakfast – slice cold pizza, ½ c. applesauce
  - 45 gms
- Lunch BG 69
  - Menu- ham sandwich, pear, diet 7-up, mini snickers
  - 60 gms
- 2 hours after lunch, BG 148 – ran track
- Before dinner - BG 98
  - Cheeseburger, small fries, chocolate chip cookie
  - 75 gms
- At bedtime, BG 173 – 15 unit Lantus

INSULIN TEACHING KEYS

- Bolus insulin with meals
- Basal 1-2xs daily
- Can't mix Glargine or Detemir w/ other insulins
- 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

MEDICAL WASTE MANAGEMENT ACT EFFECTIVE SEPT 1, 2008

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

SHARPS DISPOSAL: PRODUCT AND INFO

- Look in the Government section white pages for a household hazardous waste listing for your city or county.
- Call 1-800-CLEANUP (1-800-253-2687)
- Search for collection centers on the California Integrated Waste Management Board (CIWMB) Web site: http://www.ciwmb.ca.gov/HHW/HealthCare/Collection/
-

DIABINGO - I

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

DIABETES MEDS FOR TYPE 2: OBJECTIVES

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

ACTION/CLASSES OF TYPE 2 MEDS

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

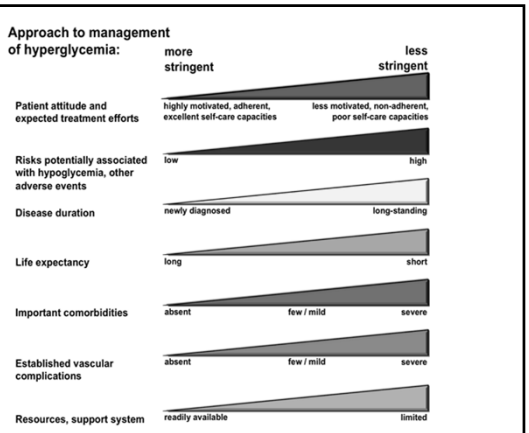


Figure 1

Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596
(Adapted with permission from: Ismail-Beigi et al. *Ann Intern Med* 2011;154:554)

DIABETES AGENTS CONSIDERATIONS

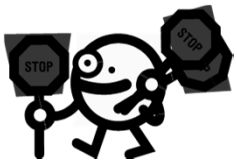
- Diabetes medications can be used as monotherapy, in combo or with insulin
- Combining agents from different classes has additive effect
- Most reduce A1c 0.5 – 2.0%
- Not to be used during preconception, pregnancy or when breastfeeding

IDEAL DIABETES MEDICATION -

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

BIGUANIDES – SUPPRESSOR METFORMIN (GLUCOPHAGE®)

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



Glycogen Stopper

BIGUANIDES - METFORMIN

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

BIGUANIDES - METFORMIN

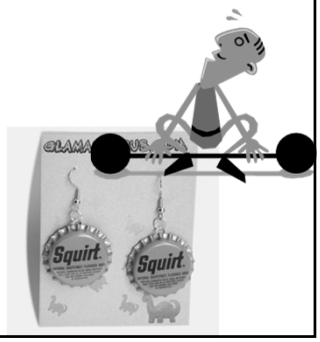
- Side effects
  - Diarrhea and abdominal discomfort
  - Lactic acidosis if improperly prescribed
  - Consider B12 deficiency for long term users
  - Decrease LDL cholesterol and triglycerides
  - No weight gain, with possible modest weight loss
- Hold prior to IV contrast dye studies and use caution during acute illness. Resume when kidney function adequate

CONSIDERATIONS
BIGUANIDE - METFORMIN (GLUCOPHAGE®)

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

SULFONYLUREAS –

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



SULFONYLUREAS - SQUIRTS

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

SULFONYLUREAS: 2ND GENERATION

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

*take short acting product on empty stomach

SULFONYLUREAS

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

HYPOGLYCEMIA – "LIMITING FACTOR"

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

HYPOGLYCEMIA 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

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)

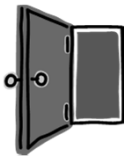
INDICATIONS FOR INSULIN SENSITIZERS
ROSIGLITAZONE (AVANDIA®), PIOGLITAZONE (ACTOS®)

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

THIAZOLIDINEDIONES – TZD'S

- **Action**: decrease insulin resistance by making muscle and adipose cells more sensitive to insulin. Decrease free fatty acids
- **Names**:
  - pioglitazone (Actos)
    - Dosing: 15-45 mg daily
  - rosiglitazone (Avandia) – restriction removed
    - Dosing: 4-8 mg daily
- **Efficacy:**
  - Decrease fasting plasma glucose ~35-40 mg/dl
  - Reduce A1C ~0.5-1.0%
  - 6 weeks for maximum effect
  - $30 a month

ROSIGLITAZONE (AVANDIA)



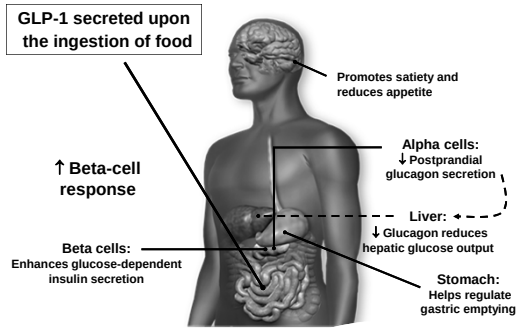
- Avandia FDA Restriction lifted.
  - New studies show not associated w/ increased risk of Myocardial Infarction

PIOGLITAZONE (ACTOS) WARNING

Bladder Cancer Risk

- Risk increased with increasing dose and duration
- France has pulled Actos, Germany restricted access
- Patient Instructions
  - Report symptoms of bladder cancer: blood or red color in urine; urgent need to urinate or pain while urinating; pain in back or lower abdomen.

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

FOR ALL THE FOLLOWING GLP-1 INHIBITORS

- Pancreatitis Warning
  - Please tell all patients to report signs right away and discontinue meds
  - Signs include:
  - Sudden abdominal pain, nausea and vomiting

  Also investigating if use associated w/ increased risk of pancreatic cancer

INCRETIN MIMETICS
EXENATIDE (BYETTA) XR (BYDUREON)

- **Action:**
  - Insulin release in response to meal
  - Slows gastric emptying
  - Causes Satiety
- **Exenatide Dosing**: - 5-10 mcg ac break, dinner
  - Extended Release 2013 – Bydureon – 1x week
- **Efficacy:** Decreases A1c by 0.7%, wt by 3lbs
- **Indication**: For type 2s only - mono or in combo
- **Other**: In prefilled pens in 5 or 10 mcg doses

INCRETIN MIMETICS – GLP-1 ANALOG
LIRAGLUTIDE (VICTOZA)

Liraglutide Dosing: 1x daily, time not critical

- 0.6 x 1 week – if tolerated (nausea), go to >
- 1.2 x 1 week – if tolerated go to >
- 1.8 mg daily

- **Efficacy:** lowers; A1c by 1%, body wt by ~ 2.5kg
- **Indication**: Monotherapy or in combo . Type 2 only
- **Other**: In pen, with preset dosing
- **Black box**–thyroid tumor warning (avoid if family hx, notify MD of hoarseness, lump).

INCRETIN MIMETICS CONSIDERATIONS EXENATIDE, LIRAGLUTIDE, DPP - IVS

- Store pens in refrig, toss after 30 days
- Sub-Q Injection in abd, thigh, upper arm
- To prevent hypoglycemia , reduce sulfonylurea/insulin dose when starting
- Side effects include nausea, diarrhea
- Pancreatitis warning (instruct pt to report abd pain, vomiting)
- Don't use w/ gastroparesis, severe renal disease
- Exenatide Cost : $150-175 for month supply of pen devices

DPP-4 INHIBITORS – "INCRETIN ENHANCERS"

JANUVIA (SITAGLIPTIN)
TRADJENTA (LINAGLIPTIN)
ONGLYZA (SAXAGLIPTIN)
NESINA (ALOGLIPTIN)

- **Action:**
  - Increase insulin release w/ meals
  - Suppress glucagon
  - Promote satiety (slows gastric emptying)
- **Dosing**: See pocketcard
- **Efficacy:** Decreases A1c by 0.6 -0.8%
- **Indication**: For type 2s

DPP-4 INHIBITORS- "INCRETIN ENHANCERS"

- Januvia, Onglyza eliminated via kidney, lower dose needed
- Do not cause wt gain or hypoglycemia
- Side effects –headache, runny nose, sore throat- watch for pancreatitis
- Cost $100 - $150 mo

SGLT2 Inhibitors

- Cangliflozin (Invokana)
- Dapagliflozin (Farxiga)
- "Glucoretic" - Inhibit the reabsorption of glucose in the proximal kidney tubules
- Monitor B/P, K+ & renal function.
- If GFR < 60, see instructions
- Side effects: hypotension, UTI, increased urination, genital yeast infections.
- Lowers A1c 0.7%–1.0%, wt loss of 1-3 lbs.

MR. JONES - WHICH DIABETES MEDICATION WOULD YOU START?

Mr. Jones is 62 with newly diagnosed type 2 diabetes. He is overweight with a slow healing foot sore. His blood glucose levels are ranging from 160 – 250. His creatinine is 1.1. Lipid results are pending. He has medical insurance and lives alone. He walks his dog 3 times a week.

LIST THE TREATMENT OPTIONS

1. 42 yr old, obese, Type 2, newly diagnosed. FBG 178, LDL 154, normal creatinine.
2. 72 yr old, thin, lives alone, newly diagnosed. FBG 141, Creat 1.3, Triglycerides 132, LDL 97.
3. 59 yr old, overweight on glyburide 10mg QD, average FBG 170's, pm glucose 210's. Creat 1.0, HDL 38, LDL 127.
4. 58 year old overweight on Metformin 1000mg BID before breakfast and dinner. AM glucose 120s, A1c 8.1%. Creat 1.4, LDL 106
5. Overweight 64 yr old on glucotrol 10mg daily, 500mg metformin, 15 mg Actos®. FBG 150's, post prandial BG 190's. Creat 1.2, LDL 138.

DIABINGO - N

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

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

N 1 gm of fat equal _____kilo/calories

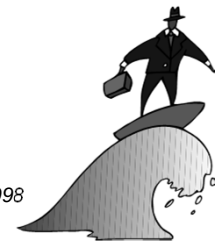
N Metabolic syndrome = hyperglycemia, hyperlipidemia, hypertension

N 1% A1c = _____ of Blood Glucose

HIGH NUMBERS GOT YOU DOWN?

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

Testa, Simonson JAMA 280: 1998



THANK YOU

Questions?
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We are happy to help

Diabetes Education SERVICES