



## Diabetes Survival Skills Across the LifeSpan

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



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## Diabetes Survival Skills Across the LifeSpan

1. Unique features of type 1 and type 2 diabetes across the lifespan
2. Strategies to prepare for successful hospital discharge
3. Medication and insulin considerations and teaching points
4. Critical points to share about food and activity
5. Teaching approaches to prevent hypo and improve lower extremity care



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## CDC Announces



35% of  
Americans will  
have Diabetes  
by 2050

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



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## Diabetes in America 2019

- ▶ 30.3 million or > 9.4%
- ▶ 27% don't know they have it
- ▶ 37% of US adults have pre diabetes (846mil)

Figure 2. Age-adjusted, county-level prevalence of diagnosed diabetes among adults aged ≥20 years, United States, 2013.

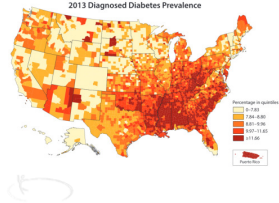
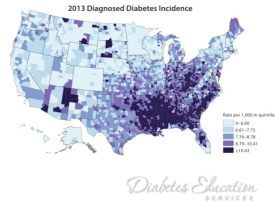


Figure 3. Age-adjusted, county-level incidence of diagnosed diabetes among adults aged ≥20 years, United States, 2013.



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## Global Epidemic

- ▶ Every 10 seconds
  - ▶ 1 person dies with diabetes
  - ▶ 2 people develop diabetes
- ▶ Every year
  - ▶ 3 million deaths
  - ▶ 6 million new cases
- ▶ World Diabetes Day is November 14 to celebrate the discovery of insulin



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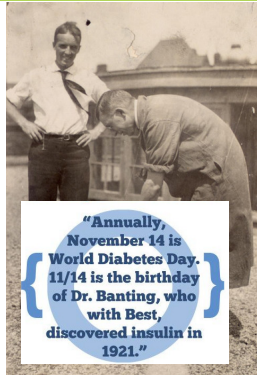
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## Best and Banting – U of Toronto 1921



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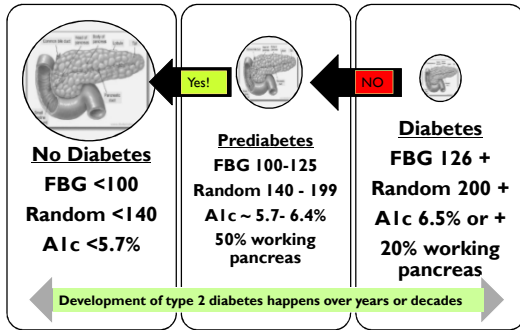
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## Natural History of Diabetes




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## Signs of Diabetes



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

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## ABCs of Diabetes –

- ▶ A1c less than 7% (avg 3 month BG)
  - ▶ Pre-meal BG 80-130
  - ▶ Post meal BG <180
- ▶ Blood Pressure < 140/90
  - ▶ Goal 130/90 (If 10 year CVD risk > 15%, or has history of CV event) google ASCVD Risk Estimator
- ▶ Cholesterol
  - ▶ DM and 40 yrs, start statin
  - ▶ HDL >40
  - ▶ Triglyceride < 150



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## A1c and Estimated Avg Glucose (eAG) 2008

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

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



$$eAG = 28.7 \times A1c - 46.7 \sim 29 \text{ pts per } 1\%$$

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

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## Factors that Affect Blood Glucose

**42**  
Factors That Affect BG

diaTribe Learn  
MAKING SENSE OF DIABETES

ABOUT | COLUMNS | RESOURCES | TYPE 1 | TYPE 2 | DONATE

**42 Factors That Affect Blood Glucose?!**  
A Surprising Update  
2/23/18 - ADAM'S CORNER

Share this Article [f](#) [t](#) [g+](#) [v](#)

<https://diatribe.org/42factors>

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## Good Exercise Info / Quotes

- ▶ **“Passaggiata” – take an after meal stroll**
- ▶ Exercise decreases A1c 0.7%
- ▶ No change in body wt, but 48% loss in visceral fat
  - ▶ ADA PostGrad 2010



**“Every minute of activity lowers blood sugar one point.”**

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

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## 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



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## A hard truth

- ▶ Exercise alone doesn't cause weight loss
- ▶ But...
  - ▶ It helps keep weight off
  - ▶ Decreases visceral adiposity
  - ▶ Decreases CV Risk

IT TAKES 524 BURPEES

TO BURN OFF 1 LARGE FRIES  
BURPEES SUCK, SO CHOOSE WISELY!  
@HEALTH



- ▶ To combat the rise in body weight, we need to change the food environment
- ▶ "You cannot outrun an unhealthy diet".

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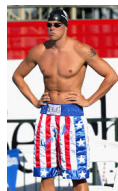
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## Where are we on this continuum?



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## Hormones Effect on Glucose

Hormone	Effect
▶ Glucagon (pancreas)	↑
▶ Stress hormones (kidney)	↑
▶ Epinephrine (kidney)	↑
▶ Insulin (pancreas)	↓
▶ Amylin (pancreas)	↓
▶ Gut hormones - incretins (GLP-1) released by L cells of intestinal mucosa, beta cell has receptors	↓

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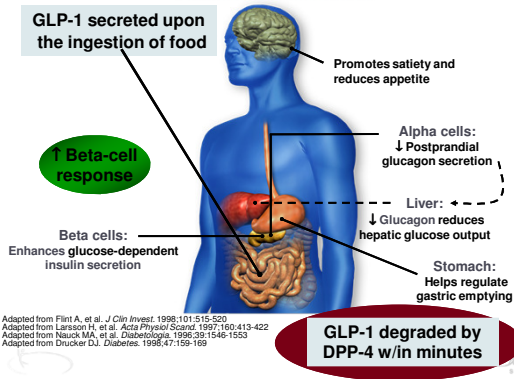
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## GLP-1 Effects in Humans Understanding the Natural Role of Incretins




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## Incretin Mimetics – GLP-1 RAs

### GLP-1 Receptor Agonists & Injectables



Download Success! Get Our Free CDE® Coach App

Class/Main Action	Name	Dose Range	Considerations
GLP-1 Receptor Agonist (GLP-1 RA) "Incretin Mimetic" • Increases insulin release with food • Slows gastric emptying • Promotes satiety • Suppresses glucagon	exenatide (Byetta)	5 and 10 mcg BID	Side effects for all: Nausea, vomiting, weight loss, injection site reaction. Report signs of acute pancreatitis (severe abdominal pain, vomiting), stop med. Renally excreted. Black box warning: Thyroid C-cell tumor warning for exenatide XR, liraglutide, dulaglutide, and semaglutide (avoid if family history of medullary thyroid tumor). *Significantly reduces risk of CV death, heart attack, and stroke. Lowers A1c 0.5 – 1.6% Weight loss of 1.6 to 6.0kg†
	exenatide XR (Bydureon)	2 mg 1x a week Pen injector - Bydureon BCise	
	liraglutide (Victoza)*	0.6, 1.2 and 1.8 mg daily Approved for pediatrics 10 yrs +	
	dulaglutide (Trulicity)	0.75 and 1.5 mg 1x a week pen injector	
	semaglutide (Ozempic)**†	0.5 and 1.0 mg 1x a week pen injector	
	Rybelsus Oral tablet	7 and 14 mg daily in a.m. Take on empty stomach w/H2O sip	

Liraglutide and semaglutide ADA recommended as helpful agents to slow progression of CKD (chronic kidney disease).



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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 **A1c**, **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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## Diabetes Classifications

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



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## Case Study

**1. Pt profile: 5'8", 192 lb male**  
Diabetes 12 years, on insulin 3 yrs  
*What type of DM and how do you know?*



**2. 5'6", 108 lb female**  
On insulin 3u Regular before meals,  
10u NPH at bedtime  
*What type of DM and how do you know?*



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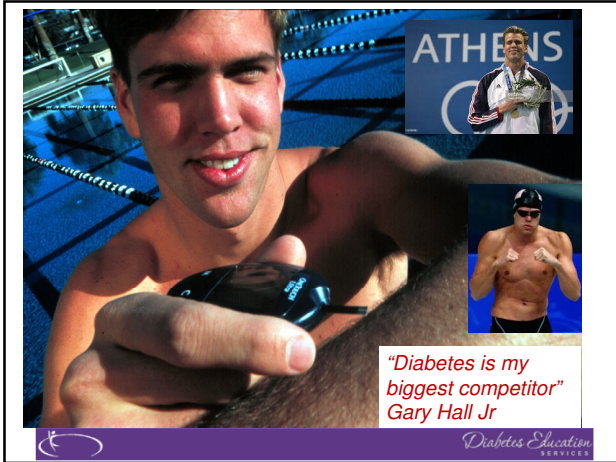
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### Incidence of Type 1 in Youth



- ▶ Rate of 13.8 to 16.9 per 100,000 for Caucasian- American
- ▶ Rate of 3.3 – 11.8 per 100,000 for African-American
- ▶ 208, 000 children under age 20 in U.S. have type 1 diabetes
- ▶ Rate doubling every 20 yrs
  - ▶ **Greatest increase in children <5**
- ▶ Many trials underway to detect and prevent (Trial Net)

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### Type 1 Rates Increasing Globally

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



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## Poll Question 1

- ▶ What percent beta cell function remains when someone is diagnosed with type 1 diabetes?
  - A. 20%
  - B. 20-30%
  - C. None
  - D. 15 – 40%



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## Type 1 – New Diagnosis

- ▶ Diagnosis in infancy rare
- ▶ 75% new cases diagnosed before age 18
- ▶ 30% of new diagnosis present in DKA
- ▶ Complaints include:
  - ▶ Nocturia, enuresis, weeks of polyuria, polydipsia, wt loss, tired, infections. Polyphagia is rare.
  - ▶ Labs indicate hyperglycemia, glycosuria, ketonemia and ketonuria



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

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



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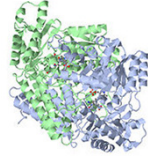
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## Autoantibodies Assoc w/ Type 1

Panel of autoantibodies –

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



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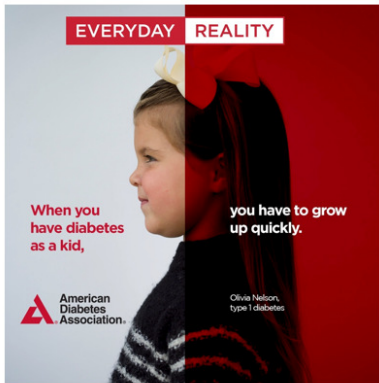
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## Pediatric Glycemic Control Goals

### Blood glucose goal range

Before meals	Bedtime/ overnight	A1C	Rationale
90–130 mg/dL (5.0–7.2 mmol/L)	90–150 mg/dL (5.0–8.3 mmol/L)	<7.5%	A lower goal (<7.0%) is reasonable if it can be achieved without excessive hypoglycemia

- Goals should be *individualized*, and lower goals may be reasonable based on benefit-risk assessment.
- Blood glucose goals should be modified in children with frequent hypoglycemia or hypoglycemia unawareness.
- Postprandial blood glucose values should be measured when there is a discrepancy between preprandial blood glucose values and A1C levels and to help assess glycemia in those on basal-bolus regimens.



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## What Does Type 1 Look Like?

A NEW YORK TIMES BESTSELLER

*Life, Loves, and Oh Yeah, Diabetes*



Mary Tyler Moore



Justice Sonia Sotomayor



Nick Jonas



Bret Michaels

From Debbie Nagata's slide collection

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## Ms. Idaho and Ms America – Pumpin' It



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## JR has Type 1, in hospital for procedure

- ▶ Before lunch blood glucose 98.
- ▶ Plans to eat 60 gms of carb for lunch.
- ▶ On insulin sliding scale that starts at 150.
- ▶ What is the best action?
- ▶ Survival skill education?



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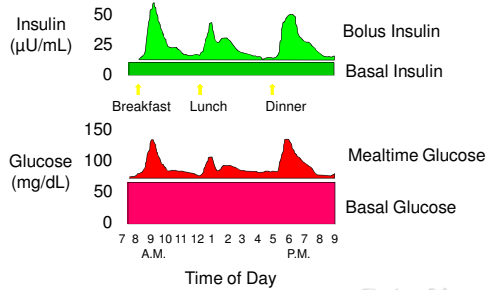
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## Physiologic Insulin Secretion: 24-Hour Profile




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## Insulin Action Teams

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



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## Bolus Insulins (½ of total daily dose ÷ meals)

Name	Onset	Peak Action
▶ Aspart (Fiasp)	2.5 min	1 hour
▶ Aspart (NovoLog)	15-30 min	1-1.5 hrs
▶ Lispro (Humalog, Admelog)		
▶ Glulisine (Apidra)		
▶ Afrezza (Inhaled)		
▶ Regular	30 mins	2-4 hrs

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## Bolus Insulin Timing

- ▶ How is the effectiveness of bolus insulin determined?
  - ▶ 2 hour post meal (if you can get it)
  - ▶ Before next meal blood glucose
- ▶ Glucose goals (ADA) – may be modified by provider/pt
  - ▶ 1-2 hours post meal <180
  - ▶ Before next meal – 80 - 130



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## Basal Insulins (½ of total daily dose)

<u>Intermediate Acting</u>	<u>Peak Action</u>	<u>Duration</u>
▶ NPH	4-12 hrs	12-24

<u>Long Acting</u>	<u>Peak Action</u>	<u>Duration</u>
▶ Detemir (Levemir)	No Peak	20 hrs
▶ Glargine (Lantus)		24 hrs
▶ Glargine (Basaglar)		24 hrs
▶ Degludec (Tresiba)		42 hrs

*Fasting BG reflects efficacy of basal*



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## 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



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### Bolus – Insulin Sliding Scale

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

	Break	Lunch	Dinner	HS
Day 1	94 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



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### Insulin Guidelines in hospital

- ▶ Bolus insulin
  - ▶ 1 unit for 15 gms of carb
  - ▶ Most hospitals serve 45-60gms of carb per meal
  - ▶ 3-4 units of bolus insulin at meals
- ▶ Basal insulin
  - ▶ Type 2, restart what they use at home (reduce by 25%)
  - ▶ For Type 1, continue usual regimen or keep on pump
  - ▶ New start – 10 units or
  - ▶ Body weight Kg x 0.2.
    - ▶ 50 kg x 0.2 = 10 units
    - ▶ 75 kg x 0.2 = 15 units
  - ▶ If going home on insulin, let person self-inject



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### ADA/AACE Goals and Treatments For Hospitalized Patients

ADA Goals: If BG 180 +

- ▶ Start subq insulin
- ▶ Blood glucose goals 140-180
  - ▶ Individualize based on pt status
- ▶ Basal /bolus Insulin preferred
- ▶ Insulin drip preferred treatment



AACE Goals:

- ▶ Before meal < 140
- ▶ After meal <180

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



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## JR has Type 1, in hospital for procedure

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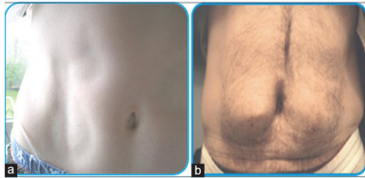
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## Insulin Teaching Keys

- ▶ Abdomen preferred injection site
- ▶ Stay 1" away from previous site
- ▶ Don't re-use syringes
- ▶ Keep unopened insulin in refrigerator
- ▶ Look for:
  - ▶ Lipodystrophy
  - ▶ Lipohypertrophy
- ▶ Make sure insulin isn't expired
- ▶ Proper disposal
- ▶ Review patients ability to withdraw and inject.



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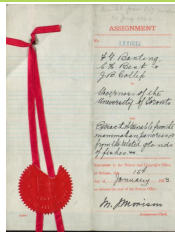
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## Emergence of "Copy Cat" or "Biosimilar Insulins"

- ▶ 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
- ▶ Patents are expiring



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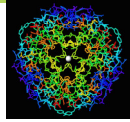
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## Biosimilar Insulins : Lispro (Admelog) Glargine (Basaglar)

- ▶ 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
- ▶ Currently - Pharmacist to contact Provider before switching to biosimilar
  - ▶ Future – may be same as generics



Insulin – Large Molecule



Aspirin – Small Molecule



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## Cost Per Vial in Northern CA

Per vial cost	Walmart	Walgreens	Costco
Regular Insulin	\$25*	\$92	\$99
NPH	\$25*	\$92	\$99
70/30	\$25*	\$92	\$101
Humalog	\$137	\$137	\$137
Novolog	\$197	\$217	\$178
Apidra	\$180	\$246	\$178
Levemir	\$300	\$300	\$300
Lantus	\$226	\$221	\$206

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## Poll Question 2

▶ JR has type 1. Nurse is ready to inject 10 units of regular insulin for breakfast. Pt weighs 70 kg and is almost 6 feet tall. Pre meal BG is 88. What is JR at risk of?



- infection due to chronic hyperglycemia
- hyperglycemia since there is no basal insulin
- severe stress response
- hypoglycemia due to over insulinization



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## Hypoglycemia – Focus on Prevention

- ▶ Defined as BG < 70
- ▶ Clinically Significant Hypo < 54
- ▶ If BG < 100, consider adjusting insulin / meds
- ▶ If BG < 70, insulin change required
- ▶ Need hypoglycemia treatment policies / action
- ▶ Need hypo *Prevention Policies*.



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## Hypoglycemic Symptoms

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



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## Treatment of Hypoglycemia

- ▶ If blood glucose **70mg/dl** or below:
  - 10-15 gms of carb to raise BG 30 - 45mg/dl
- Ⓞ Retest in 15 minutes, if still low, treat again, even without symptoms
- Ⓞ Follow with usual meal or snack
- Ⓞ If non responsive, give D50 IV or glucagon Emergency Kit
- Ⓞ Figure out how to prevent in future



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## 15 - 20 Gms Carb Sources

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



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## DiaBingo- G

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

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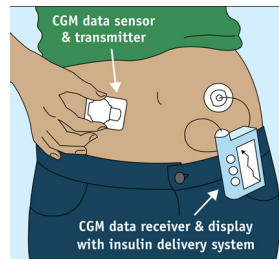
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## Continuous Glucose Monitors

- ▶ Tiny sensor under skin measures interstitial glucose every few minutes
- ▶ A transmitter wirelessly sends glucose data to a receiver: smart phone, reader, insulin pump



3 elements: sensor, transmitter, receiver

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## Poll Question 3

- ▶ Which of the following is a benefit of continuous glucose monitoring?
  - ▶ A. Eliminates need for self-monitoring of glucose via fingersticks.
  - ▶ B. Provides glucose readings as accurate as a lab value.
  - ▶ C. Interstitial glucose is more accurate than capillary glucose.
  - ▶ D. Contributes to decreased hypoglycemia



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## Continuous Glucose Monitoring (CGM)

- ▶ CGM appropriate tool for children to adults
- ▶ Useful for those with frequent hypoglycemia or hypoglycemia unawareness (alarm features)
- ▶ Measures percent of time in, above and below range
- ▶ Assess individual's readiness



CGM uses interstitial glucose – correlates with plasma glucose  
 Reports glucose in  
 - Real time (rtCGM) or  
 - Or intermittent scanning "flash" (isCGM)

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## CGM Time in Range Recommendations

- ▶ For most with type 1 or type 2 diabetes
  - > 70% of readings within BG range of 70-180mg/dL
  - < 4% of readings < 70 mg/dL
  - < 1% of readings < 54 mg/dL
  - < 25% of readings > 180 mg/dL
  - < 5% of readings > 250 mg/dL



- ▶ For under 25 years, with A<sub>1c</sub> goal is < 7.5%, time-in-range target is set to about 60%.

Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range  
Tadej Battelino et al. Diabetes Care Aug 2019, 42 (8) 1593-1603; DOI: 10.2337/dci19-0028

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## Continuous Glucose Monitors




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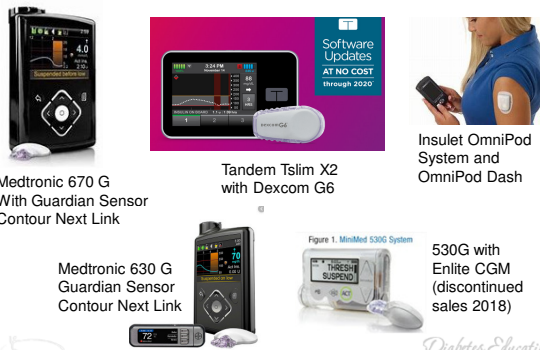
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## Insulin Pumps



Medtronic 670 G  
With Guardian Sensor  
Contour Next Link

Tandem Tslim X2  
with Dexcom G6

Insulet OmniPod  
System and  
OmniPod Dash

Medtronic 630 G  
Guardian Sensor  
Contour Next Link

Figure 1. MiniMed 530G System

530G with  
Enlite CGM  
(discontinued  
sales 2018)

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### Pediatric Diabetes Self-Management Education and Support – Type 1

- ▶ All should receive diabetes self-management education and support at diagnosis and routinely thereafter that is:
  - ▶ Culturally sensitive
  - ▶ Developmentally appropriate
  - ▶ Individualized
- ▶ Help prepare for transition to adult care



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### Poll Question 4

- ▶ Jason has type 1 diabetes for 7 years and is turning 18 this year. What will help him make a successful transition to diabetes self-care as an adult?
  - A. Encouraging complete autonomy
  - B. Moving to his own apartment
  - C. Requiring partial payment for his diabetes supplies
  - D. Introducing him to adult team a few months before transitioning.



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### Risk Taking Youth and Emerging Adults

- ▶ Monitor social adjustment, school performance
- ▶ Time alone w/ provider starting at age 12
- ▶ **Address risk taking –**
  - ▶ Alcohol – 15 gms of carb per drink, don't cover with extra insulin especially if going to sleep
  - ▶ Starting at puberty, preconception counseling
  - ▶ Drug use increases risk for hyperglycemic crisis
  - ▶ Make sure friends know what to do in case of Hypo or Hyperglycemia



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## Poll question 5

▶ JR is 15 and has had type 1 diabetes for the past 2 years. JR started insulin pump therapy a few months ago and noticed that their weight increased by over 5 pounds. JR is very worried about weight gain. JR's mom called the diabetes educator to share her concerns and added that JR's daily insulin usage significantly decreased over the past few weeks. What is the most likely reason for this insulin usage decrease?



- ▶ Insulin needs decrease with pump therapy
- ▶ The insulin pump is not delivering insulin effectively
- ▶ JR is under dosing insulin
- ▶ Insulin needs decrease during puberty



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## Disordered Eating

▶ Eval treatment regimen if individual presents with unexplained:

- ▶ Hyperglycemia
- ▶ Weight loss

▶ Review med regimen to eval treatment related

- ▶ Weight loss
- ▶ Weight gain

▶ Look for discordant eating behavior and disrupted patterns of eating



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## Disordered Eating

▶ "DiaBulimia"

▶ People with diabetes give themselves less insulin than needed to lose weight

▶ Tends to start in adolescence, more likely to occur in women than men.

▶ Signs: unexplainable spikes, A1c, weight loss, lack of marks from fingerpricks, lack of prescription refills for diabetes meds, records that don't match A1c.

▶ Treatment – Mental health specialist and team



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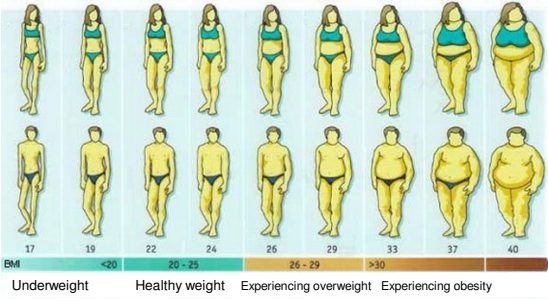
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## BMI Categories



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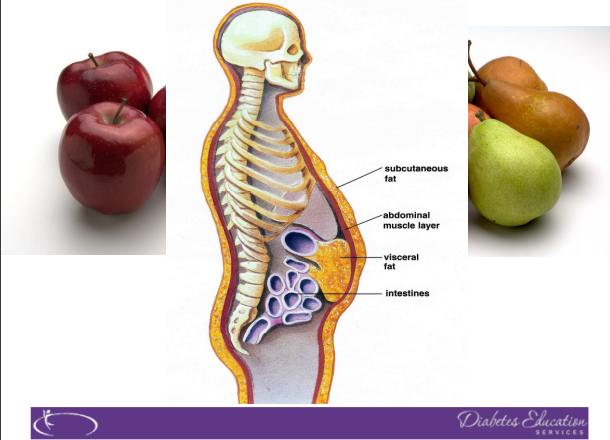
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Visceral Fat and Subcutaneous Fat



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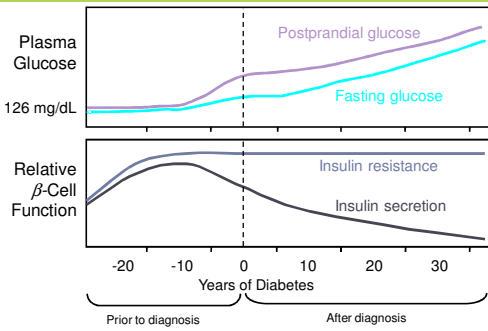
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## Natural Progression of Type 2 Diabetes



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

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## 2. Classification and DM Diagnosis

- ▶ Pre Diabetes & Type 2- Screening Guidelines
- ▶ Start screening at age 45 or for anyone with excess weight (BMI  $\geq$  25, Asians BMI  $\geq$  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



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## Diabetes 2 - Who is at Risk?

(ADA Clinical Practice Guidelines)



### Risk factors cont'd

- ▶ HTN - BP > 140/90
- ▶ HDL < 35 or triglycerides > 250
- ▶ history of Gestational Diabetes
- ▶ Polycystic ovary syndrome (PCOS)
- ▶ Other conditions assoc w/ insulin resistance:
  - ▶ Severe obesity, acanthosis nigricans (AN)
- ▶ Recheck every 3 years

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## Acanthosis Nigricans (AN)

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

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**Acanthosis Nigricans**



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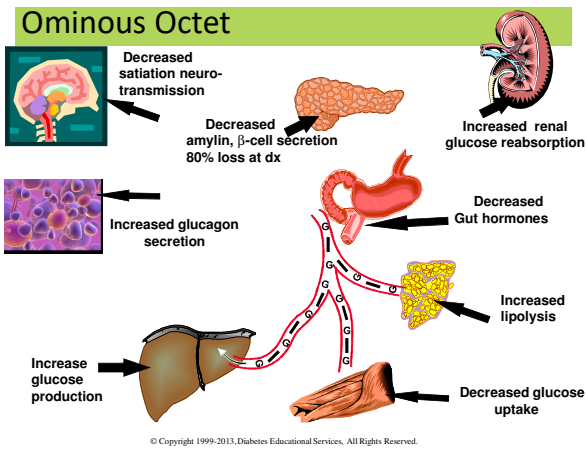
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**Ominous Octet**



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**SGLT2 Inhibitors- "Gluco-retics"**

- ▶ **Action:** "Gluco-retic" decreases renal reabsorption in the proximal tubule of the kidneys (reset renal threshold and increase glucosuria)
- ▶ Side effects: hypotension, UTIs, increased urination, genital infections, ketoacidosis, Fournier's gangrene
- ▶ Canagliflozin and Empagliflozin ADA indicated in CKD



**Common Oral Diabetes Meds**

Download FREE CDE® Coach App for latest PocketCard versions and priority notifications | DiabetesEd.net

Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors "Gluco-retic" • Decreases glucose reabsorption in kidneys	Canagliflozin* (Invokana)	100 - 300 mg 1x daily Don't start if GFR <45.	Side effects: hypotension, UTIs, increased urination, genital infections, ketoacidosis. Monitor GFR and other considerations: See package insert for dosing adjustment based on GFR. - Canagliflozin increases risk of amputation. - Dapagliflozin, don't use in pts w/ bladder cancer. *Empagliflozin & canagliflozin decrease risk of death from CV disease. Benefits: no hypo or weight gain. Lowers A1c 1.0%-2.0%. Lowers wt 1-3 lbs.
	Dapagliflozin (Farxiga)	5 - 10 mg 1x daily Don't start if GFR <45.	
	Empagliflozin* (Jardiance)	10 - 25 mg 1x daily Don't start if GFR <45.	
	Ertugliflozin (Steglatro)	5 - 15 mg 1x daily Don't start if GFR <60.	

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## Comparison of Type 1 and Type 2

Feature	Type 1	Type 2
▶ Excess weight	x	xxx
▶ Insulin dependence	xxx	30%
▶ Respond to oral agents	x	xxx
▶ Antibodies present	xxx	0
▶ Typical age of onset	puberty	40-65
▶ Insulin Resistance	x	xxx



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## Older Adults

- ▶ Screen annually for early detection of cognitive impairment starting at age 65
- ▶ Assess for neuropsychological function and dementia using standardized assess tools
- ▶ Use collaborative care models that involve care managers to treat comorbidities and depression



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## Older Adults – Individualized Assessment

- ▶ Social support
  - ▶ Who do they live with?
  - ▶ Anyone helping with self-care?
- ▶ Finances
  - ▶ Housing, food, transportation
- ▶ Activity, Nutrition
- ▶ Medications
  - ▶ Types
  - ▶ Can they afford?



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## What are next steps?

- ▶ 72 yr old, thin, lives alone, A1c 7.3%. History of MI, stroke. DM for 12 yrs, “diet controlled”. Creat 1.4.
- ▶ Concerns
- ▶ Meds?



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## DPP-4 Inhibitors – “Incretin Enhancers”

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

- ▶ **Action:**
  - ▶ Increase insulin release w/ meals
  - ▶ Suppress glucagon
- ▶ **Dosing:** Januvia – 100mg a day  
Onglyza\* – up to 5mg a day  
Tradjenta – 5mg a day  
Nesina\* – up to 25 mg a day
- ▶ **Efficacy:** Decreases A1c by 0.6 -0.8%
- ▶ **Benefits/ Issues:** weight neutral, no hypo, few side effects. Expensive

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## Question 6

- ▶ MR is 79 year old with type 2 diabetes who prided themselves on always keeping their A1c less than 7%. Lately, MR is having trouble reaching target, so they are cutting carbs and have lost over 10lbs and have a BMI of 23. What would be an appropriate intervention?

- ▶ A. Start basal insulin
- ▶ B. Discuss option of starting an oral medication
- ▶ C. Remind MR that carbs are healthy
- ▶ D. Encourage exercise to increase muscle mass



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## Older Adults at Risk for Malnutrition

▶ Due to:

- ▶ Altered taste and smell
- ▶ Swallowing difficulties
- ▶ Oral/dental issues
- ▶ Functional difficulties shopping for/preparing food
- ▶ Anorexia
- ▶ Overly restrictive eating patterns - carb deprivation
  - ▶ Self-imposed or provider/partner directed



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## DiaBingo - N

- N DPP demonstrated that exercise and diet reduced risk of DM by \_\_\_%
- N Average A1c of 7% = Avg BG of \_\_\_\_\_
- 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 One % drop in A1c reduces risk of complications by \_\_\_%
- N 1 gm of fat equal \_\_\_\_\_ kilo/calories
- N Metabolic syndrome = hyperinsulinemia, hyperlipidemia, hypertension
- N Average American consumes 15 teaspoons of sugar a day.
- N Medication that was derived from the saliva of the Gila Monster



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## Mr. Jones admitted to hospital

Mr. Jones is 72 years old, with a BMI of 26 and complains of feeling tired and 10 lb wt loss. He was unusually confused and was found to have a lower extremity infection. His A1c is 9.3%, random glucose 297.



He is hypertensive with a history of diabetes on glyburide, but no meter. No ketones in urine.

- ▶ What are his risk factors and signs of diabetes?
- ▶ You find a few moments to teach and he asks you some questions.



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**Mrs. Jones asks you  
What Do You Say?**

- ▶ What is diabetes?
- ▶ Will I be on insulin for life?
- ▶ They say I am a diabetic because I am overweight?
- ▶ How am I going to control this?
- ▶ What is a normal blood sugar?
- ▶ Do I have to test my blood sugars?
- ▶ I heard people with diabetes can't eat fruit, is that true?



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**Language of Diabetes Education**

- | <b>Old Way</b>            | <b>New Way</b>                         |
|---------------------------|--|
| ▶ Control diabetes        | ▶ Manage                               |
| ▶ Test BG                 | ▶ Check                                |
| ▶ Patient                 | ▶ Participant                          |
| ▶ Normal BG               | ▶ BG in target range                   |
| ▶ Non-adherent, compliant | ▶ Focus on what they are accomplishing |
| ▶ Refuse                  | ▶ Decided, chose                       |

American Diabetes Association, Diabetes Care  
The Use of Language in Diabetes Care and Education, 2017

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**Language of Diabetes Education**

- | <b>Old Way</b>                     | <b>New Way</b>  |
|------------------------------------|---|
| ▶ Can't, shouldn't, don't, have to | ▶ Have you tried..."<br>▶ What about..."<br>▶ May I make a suggestion..." |
| ▶ Regimen                          | ▶ Plan, choices   |
| ▶ Refused                          | ▶ Declined, Chose not to  |
| ▶ Victim, suffer, stricken         | ▶ ...lives with diabetes<br>▶ ...has diabetes                             |

American Diabetes Association, Diabetes Care  
The Use of Language in Diabetes Care and Education, 2017

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## Mr. Jones asks you What Do You Say?

- ▶ You are wondering if your weight caused your diabetes?
- ▶ You can manage your diabetes and improve your health at the same time.
- ▶ For people without diabetes, fasting blood sugar is less than 100 and A1c is less than 5.7%
- ▶ Checking blood sugars can help you figure out if the plan is working.



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## Mr. Jones asks about his foot ulcer



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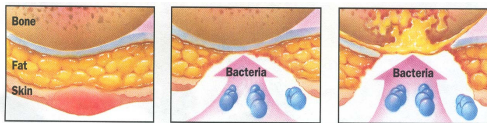
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## Foot Wounds



Blisters  
Calluses

Ulcers

Bone infection

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**No Bathroom Surgery**

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**5.07 monofilament = 10gms linear pressure**

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

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**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.

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## Mr. Jones is ready to leave hospital

- ▶ Discharge meds:
  - ▶ Metformin 500mg BID
  - ▶ Antibiotics
  - ▶ Simvastatin
  - ▶ Baby aspirin
  - ▶ Lisinopril
- ▶ What survival skill education does he need?



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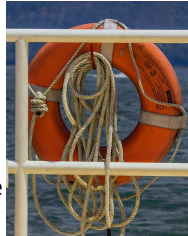
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## Ms. Jones Survival Skills

- ▶ Check BG once daily
  - ▶ Before breakfast or two hours after dinner
  - ▶ keep a log book
- ▶ Take metformin with meal to reduce upset stomach
- ▶ Contact provider if blood glucose above 200.
- ▶ Daily feet care
- ▶ Healthy eating, activity
- ▶ When to get help



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## How Often Should I Check?

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



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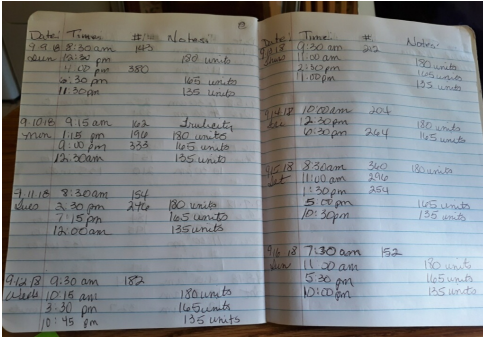
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## What feedback for this log book?



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## Metformin & 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. <b>Obtain GFR before starting.</b> • If GFR <30, do not use. • If GFR <45, don't start Metformin • If pt on Metformin and GFR falls to 30-45, eval risk vs. benefit; consider decreasing dose. For dye study, if GFR <50, 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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## Medical Nutrition Therapy – ADA

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



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United States: The Revis family of North Carolina. Food expenditure for one week: \$341.98. Favorite foods: spaghetti, potatoes, sesame chicken. Peter Menzel, from the book, "Hungry Planet: What the World Eats."



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Guatemala: The Mendozas of Todos Santos - Food expenditure for one week: 573 Quetzales or \$75.70. Family Recipe: Turkey... [VIEW MORE](#) Peter Menzel, from the book, "Hungry Planet: What the World Eats."

19 of 27



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## Successful weight loss strategies include

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



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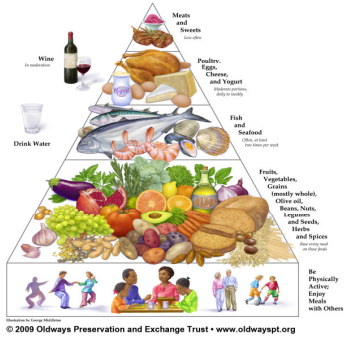
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## Mediterranean Diet Pyramid



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## Move toward the Tomato

Hostess Twinkies

100% TWINKIES

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## Another plate example

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

1/4 de proteína  
1/4 de almidón  
1/2 de vegetales

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

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

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## Diabetes Vacations



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## Thank You



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



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