



Above and Beyond: Refining Your Skills and Enhancing Your Value

Beverly Thomassian, RN, MPH, BC-ADM, CDE
President, Diabetes Education Services



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Thank You to Hawaii's AADE Coordinating Committee – Job Well Done!

- ▶ Viola Genadio, APRN, CDE, BC-ADM – None
- ▶ Camlyn Masuda, RPh, PharmD, CDE, BCAC
- ▶ Anna L. Silva, BSN, RN, CDE
- ▶ Naomi Fukuda, MSN, APRN-Rx, BC-ADM
- ▶ Kevin W.K. Kam, RPh, CDE
- ▶ Alana Busekrus, BSN, RN, CDE – None
- ▶ Kourtney Inoue, MS, RD, CDE, LD
- ▶ Patricia Liang-Tong, MSCP, RD, LD, CDE



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Schedule of Topics

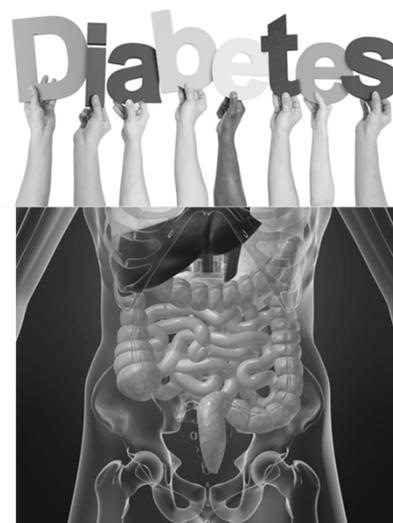
- ▶ Diabetes Overview
- ▶ Gut Microbiome and Health
- ▶ New and Emerging Insulins
- ▶ New Medications
- ▶ Patient Centered Approach to Insulin Therapy
- ▶ AACE and ADA Medication Algorithm
- ▶ Critical Assessment of the Diabetes Patient
- ▶ Optional – Preparing for CDE



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Diabetes and Getting to the Gut

- ▶ Explore the current state of diabetes.
- ▶ Discuss the role of gut bacteria in relation to health.
- ▶ State strategies to improve intestinal health.
- ▶ Enjoy the state of wonder



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CDC Announces



35% of
Americans will
have Diabetes
by 2050

Boyle, Thompson, Barker, Williamson

2010, Oct 22:8(1)29

www.pophealthmetrics.com

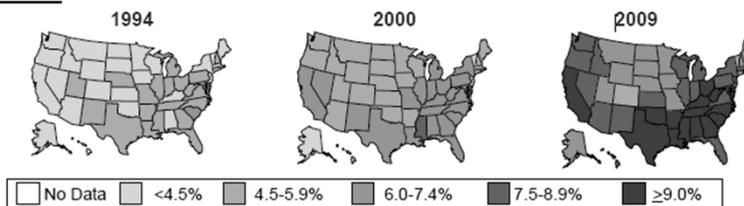


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Diabetes in America 2016

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

Diabetes



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



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Global Epidemic

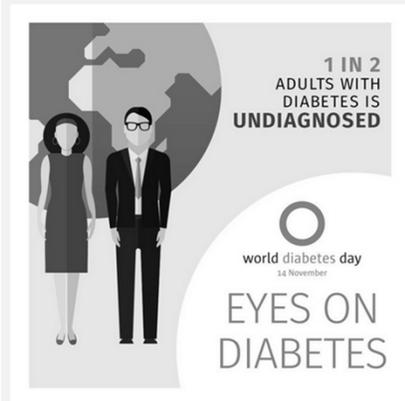
- ▶ Every 10 seconds
 - ▶ 1 person dies with diabetes
 - ▶ 2 people develop diabetes
- ▶ Every year
 - ▶ 3 million deaths
 - ▶ 6 million new cases
- ▶ World Diabetes Day is November 14
- ▶ March is ADA Sound the Alert Day “find people w/ undetected diabetes”



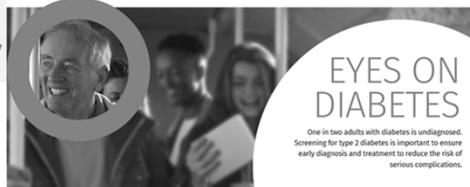
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Nov 14 – World Diabetes Day

ES



Español | Français



If you are organizing or participating in a screening activity, take pictures using the blue circle app and share them through social media using the hashtags:
#test2prevent #eyesondiabetes #WDD

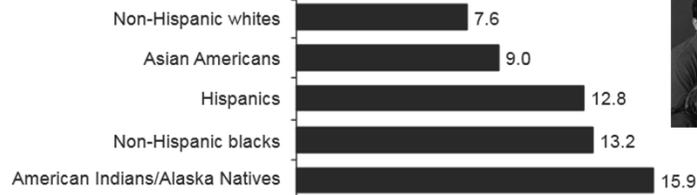


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Age-adjusted Diabetes Prevalence

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

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



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

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



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Asian Americans, Native Hawaiians and Pacific Islanders are at greater risk for type 2 diabetes at any weight.

YOU COULD BE AT RISK TOO.

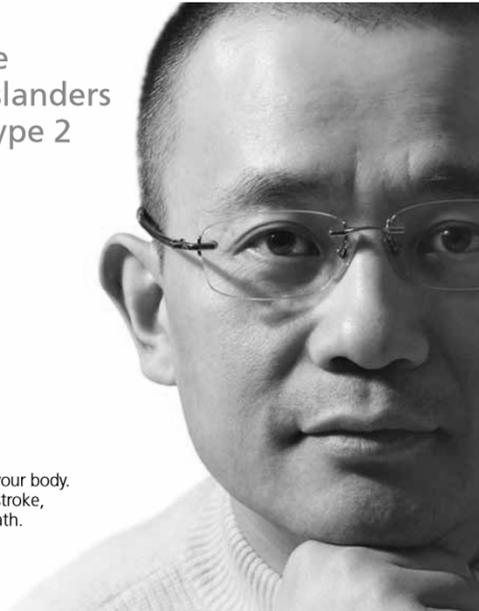
If you can check one of these boxes, you are at risk for type 2 diabetes.

- I am of Asian descent
- I am of Hawaiian descent
- I am of Pacific Islander descent
- I am overweight/obese
- I do not exercise regularly
- I am over 45 years old
- I have family members with diabetes

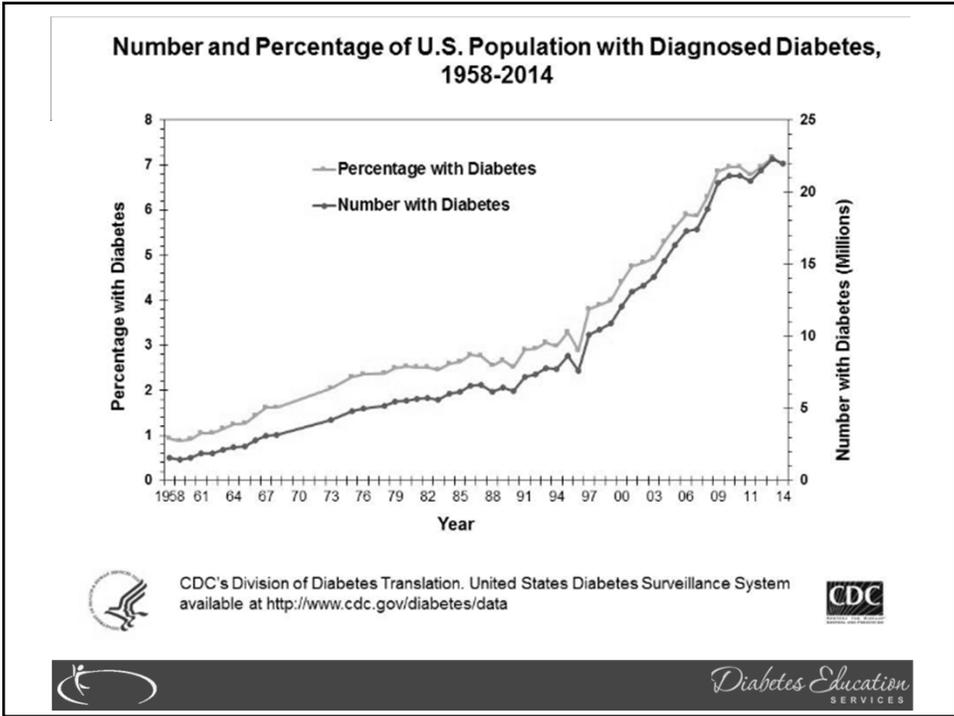
WHAT IS DIABETES?

Diabetes is a disease that affects every part of your body. If untreated, diabetes can lead to heart attack, stroke, kidney disease, blindness, amputations and death.

The good news is you can prevent or delay getting type 2 diabetes by eating healthy and getting regular physical activity.



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Type 2

look BEYOND the obvious



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In the Beginning

- ▶ Earth
- ▶ Man
- ▶ Spirit



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Obesity - other factors?

- ▶ Not only humans are gaining weight globally
- ▶ Animals are getting heavier too (and not just the domestic kind).
- ▶ Factors – sleep deprivation, AC, light exposure?
 - ▶ Marmosets to macaques



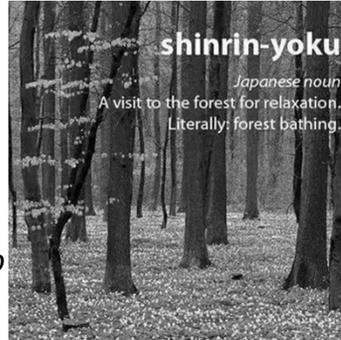
Newsweek, Fat Canaries in a Coal Mine, Dec 10, 2010.. Begley



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Humans and Nature

- ▶ Quiet: think tank of soul
- ▶ Trips to forest, enhance bodies immune system by increasing the number and activity of lymphocytes –
2008 Nippon Med School Tokyo
- ▶ Tranquility lowers BP, reduces muscle tension, decreases stress related illness and improves sleep.



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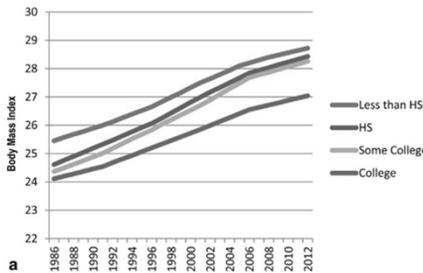
Quick Question

- ▶ What do you think is contributing to increasing prevalence of type 2 diabetes?
 - A. Junk food
 - B. Lack of exercise
 - C. Changes in gut bacteria
 - D. Environment
 - E. All of the above

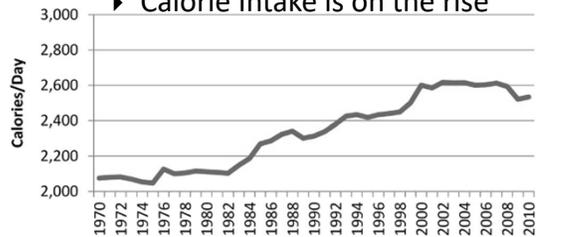
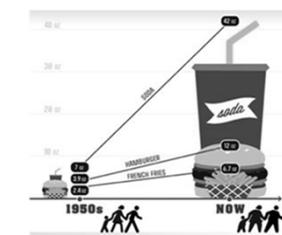


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U.S. Weight - 68% overweight or obese



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



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



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Public Health Issue?

- ▶ 66% of our people are obese/overweight
- ▶ Rates of gestational diabetes on rise
- ▶ 30% of kids are obese/overweight

1250 CALORIES

LARGE

Double Cheeseburger, Large Fries, 22 oz. Cola

CHOOSE LESS. WEIGH LESS.

PORTION SIZE MATTERS.
2000 calories a day is all most adults need.

For more information and tips on healthy eating visit:
CHOOSEHEALTHLA.COM

680 CALORIES

SMALL

Cheeseburger, Small Fries, 16 oz. Cola

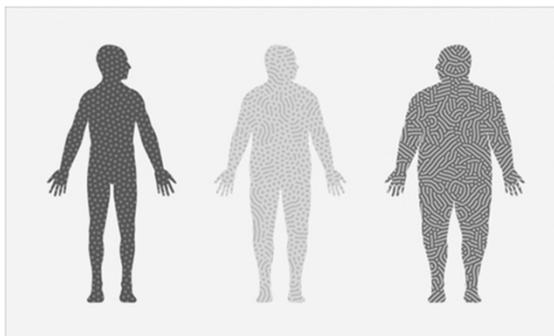


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SCIENCE

Can your biome make you fat?

Jun 8, 2016 / Sandra Aamodt



Emily Pidgeon/TED

Is there a correlation between your biome and your BMI? In her new book, *Why Diets Make Us Fat*, neuroscientist Sandra Aamodt sheds light on this tangled, cryptic relationship.



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Quick Question

- ▶ How many teaspoons of sugar does the avg American consume daily?
 - ▶ 6-8 teaspoons
 - ▶ About 10 teaspoons
 - ▶ 12-16 teaspoons
 - ▶ About 25 teaspoons



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Average American Consumes



Steph Curry Backs Brita -- Not Coke or Pepsi

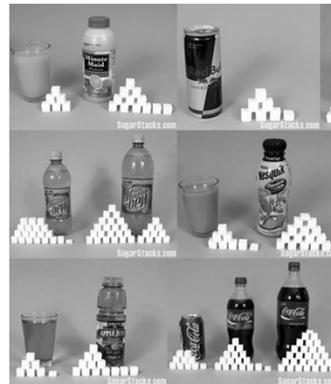
Steph Curry has a new endorsement deal with a water brand.



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Dietary Sugar Affects Gut Colonies?

- ▶ Daily sugary beverage increases type 2 risk by 18%.
- ▶ After accounting for weight, type 2 diabetes risk 13%
- ▶ Diet Soda alters gut bacteria?
- ▶ Dietary sugar affecting "healthy" gut microbial colonies



Dr. Steven Smith, Mayo Clinic in Rochester, MN.

Online issue of BMJ, July 2015



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Two diet drinks a day could double the risk of diabetes, study finds



Diet drinks were linked with a raised risk of diabetes CREDIT: JOHN TAYLOR

By Laura Donnelly, HEALTH EDITOR
21 OCTOBER 2016 • 6:01AM

Two fizzy drinks a day could double the risk of diabetes - even if they are diet versions - a Swedish study has found.

- Artificial sweeteners:
 - stimulate and distort appetite
 - alter gut bacteria
 - Increase glucose intolerance
- Sugar sodas:
 - Increase risk of LADA
 - Increase insulin resistance
- Associated w/ less healthy lifestyle

European Journal of Endo, 10-2016



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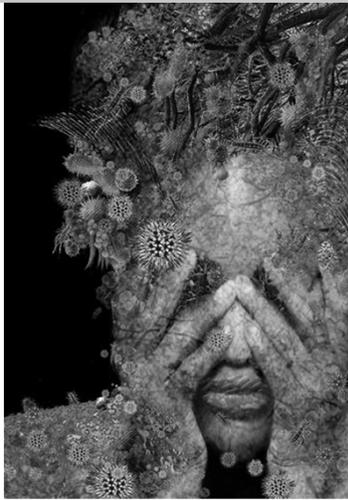
Soda Tax - Does it work?

- ▶ Mexico – down 12% (esp in lower SES groups)
- ▶ Berkeley had 21% drop in a year
 - ▶ Both resulted in increase in water and milk consumption
- ▶ Sugary drinks a primary driver of obesity
- ▶ Let your vote and voice be heard



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Bacterial Cells Outnumber Human Cells 10 to 1



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



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Bacterial Taxis?



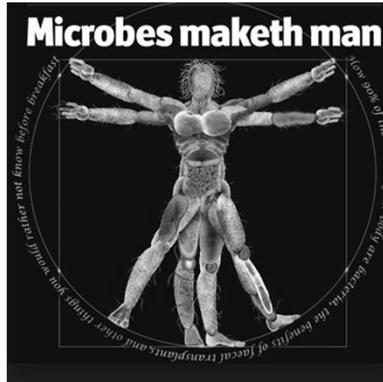
For better or worse, we're "host-microbe ecosystems." Microbes shape us from without and also from within.



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Gut Microbiome

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



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C-Section – Consider Gauze in Vagina

<p>Eat a healthy, balanced diet during pregnancy.</p> 	<p>If possible, avoid a C-section delivery.</p> 
<p>Avoid unnecessary antibiotics.</p> 	<p>If you need a C-section, try the "gauze-in-the-vagina technique."</p> 
<p>Breast-feed baby for the first 12 months.</p> 	

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



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Human Intestine Friends

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



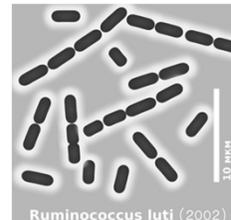
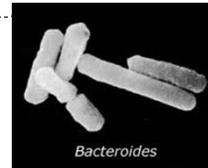
in proportions determined in part by birth, breastfeeding, diet



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Intestinal Health – A Balancing Act

- ▶ Within these, three distinct enterotypes of the human gut microbiome proposed by Arumugam:
 - ▶ (1) abundant *Bacteroides* (assoc with carbs and meat intake, Western Diet)
 - ▶ (2) few *Bacteroides* but abundant *Prevotella* (higher fiber, vegetarian diets)
 - ▶ (3) abundance of Firmicutes *Ruminococcus* – (fat and protein intake).
- ▶ Each of these genera may be linked to distinct nutrient-metabolism functions



The Health Advantage of a Vegan Diet: Exploring the Gut Microbiota Connection

Marian Glick-Bauer and Ming-Chin Yeh *

Nutrition Program, CUNY School of Public Health, Hunter College, City University of New York, 2180 Third Avenue, Room 614, New York, NY 10035, USA; E-Mail: mglickbauer@gmail.com

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Quick Question

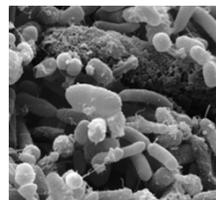
- ▶ How much does your gut bacteria weigh?
 - A. 24 ounces
 - B. 3 pounds
 - C. Less than 1 pound
 - D. 1.5 pounds
 - E . Not sure



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3 lbs of Microbes in our Gut

- ▶ Community of bacteria extra 'organ' "microbiome".
- ▶ Evolved together with our microbiome over millions of years.
- ▶ Ratios of these communities has changed over the past 30 years
- ▶ Mirrors global spikes in obesity, diabetes, allergic and inflammatory diseases
- ▶ What are we doing to change these bacteria?



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By Age 3, Gut Guests are Settled In

- ▶ NPR Story Oct 1, 15
- ▶ Kids who:
 - ▶ Born vaginally
 - ▶ Are breastfed
 - ▶ Limited antibiotic exposure
- ▶ Have less allergy and asthma
- ▶ And a different microbiome

Some of My Best Friends Are Germs

By MICHAEL POLLAN MAY 15, 2013



Hannah Whitaker for The New York Times. Prop stylist: Emily Mullin.

I can tell you the exact date that I began to think of myself in the first-person plural — as a superorganism, that is, rather than a plain old individual human being. It happened on March 7. That's when I opened my e-mail to find a huge, processor-choking file of charts and raw data from a laboratory located at the BioFrontiers Institute at the University of Colorado, Boulder. As part of a new citizen-science initiative called the American Gut project, the lab sequenced my microbiome — that is, the genes not of "me," exactly, but of the several hundred microbial species with whom I share this body. These bacteria, which number around 100 trillion, are living (and dying) right now on the surface of my skin, on my tongue and deep in the coils of my



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SCIENCE

HUMANS SHARE MICROBIOMES WITH THEIR DOGS, STUDY FINDS

YOU HAVE A LOT MORE IN COMMON WITH FIDO THAN YOU THINK.

By Francie Diep April 18, 2013



- ▶ Bring bacteria into house from soil and who knows what else?
- ▶ Increases human microbiome diversity
- ▶ Less allergic and autoimmune diseases



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Weight and Gut Bacteria New and Early Research

- ▶ Fecal samples in humans have distinct microbial signatures:
 - ▶ Obese
 - ▶ Type 1
 - ▶ Type 2

Pathobionts – at low levels in healthy people but can bloom under certain dietary conditions (bacteria gone rogue)

Lipopolysaccharide Endotoxins – stimulated with high fat diets



Endocrine Today 10/2014



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Weight and Gut Bacteria New and Early Research

- ▶ Leaner people appear to have more bacterial diversity and a higher proportion of bacteroidetes
- ▶ Obese people appear to have higher levels of firmicutes
- ▶ Bacteria tend to run in families



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Fecal Transplants?

- ▶ Works well to treat C Diff?
- ▶ Still in state of wonder



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Get your gut bacteria analyzed for \$99

HOME THE HUMAN FOOD PROJECT » BOOKS THE PEOPLE » AMERICAN GUT



HUMAN FOOD PROJECT
Anthropology of Microbes

Home » American Gut - Human Food Project

American Gut



Americangut.org



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Obesity associated with



- ▶ Higher levels of:
 - ▶ Firmicutes
 - ▶ *Staphylococcus aureus*
- ▶ **Depletion of:**
 - ▶ *Bifidobacterium*
 - ▶ *Lactobacillus*
- ▶ Microbes might strategically generate cravings for food
- ▶ High fat diet, lower fiber diet decreases microbial diversity
- ▶ Decreases butyrate, gut more alkaline and inflamed

▶ *Endocrine Today*, Oct 2014
Meghan Jardine



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McDonalds Study

After eating for Fast Food for 10 Days



McDonald's and the Microbiome: What Effect Does Junk Food Have on Gut Bacteria?

Tim Spector, a genetics professor at King's College London – *Endo Today* 2015

Dramatic Changes

- ▶ Gut microbiome diversity devastated
- ▶ Firmicutes replaced by Bacteroidetes
- ▶ Bifidobacteria decreased by over 50%
- ▶ Pt felt bad- took over 2 weeks to get gut back to health



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Fatty Foods Trigger Leaky Gut?



With diabetes, a high fat meal appears to trigger:

- Passage of bacterial endotoxins through intestinal wall
- Increase levels of inflammatory cytokines and triglycerides
- Contributing to insulin resistance
- Seems to be worse if eat frequent fatty meals throughout the day – increases presence of lipopolysaccharide endotoxins

Research by Alison Harte, PhD - Clinical Endocrinology News- Nov 11, 2011



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H. Pylori a Gut Culprit?



- ▶ *Helicobacter pylori* infection doubled risk of DM among Latinos 60 yrs +
- ▶ Study details:
 - ▶ 1,789 Latino men, women in Sacramento Area Latino Study on Aging (SALSA)
 - ▶ During 10 yr study, 18% developed diabetes
 - ▶ 2.7 times more likely to develop diabetes if seropositive for *H. pylori* (also assoc w/ higher BMI)
 - ▶ Why? Inflammation?

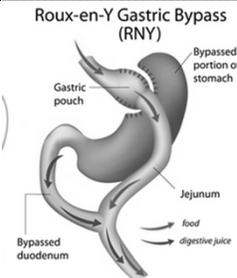
Reported at Annual Meeting of Infectious Disease Society of America – Research led by Dr. Christine Y. Jeon of Columbia University - Clinical Endocrinology News- Nov 11, 2011



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Gastric Bypass effects on Blood Glucose

- ▶ Increases gut hormones but...
- ▶ Physical manipulation of the gut alters bacterial communities
- ▶ Levels of the Firmicute *Roseburia Intestinalis* increase
 - ▶ *Roseburia Intestinalis* are lacking in people with type 2 (butyrate producing)
 - ▶ Maybe this increase lowers BG levels?



Endocrine Today – April 2015



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Gut Bacteria and Mood

Brain, Behavior, and Immunity



journal homepage: www.elsevier.com/locate/ybrt



A randomized controlled trial to test the effect of multispecies probiotics on cognitive reactivity to sad mood[☆]



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 Depression

ABSTRACT

Background: Recent insights into the role of the human microbiota in cognitive and affective functioning have led to the hypothesis that probiotic supplementation may act as an adjuvant strategy to ameliorate or prevent depression. **Objective:** Heightened cognitive reactivity to normal, transient changes in sad mood is an established marker of vulnerability to depression and is considered an important target for interventions. The present study aimed to test if a multispecies probiotic containing *Bifidobacterium bifidum* W23, *Bifidobacterium lactis* W52, *Lactobacillus acidophilus* W37, *Lactobacillus brevis* W63, *Lactobacillus casei* W56, *Lactobacillus salivarius* W24, and *Lactococcus lactis* (W19 and W58) may reduce cognitive reactivity in non-depressed individuals. **Design:** In a triple-blind, placebo-controlled, randomized, pre-

RCT – demonstrated that consuming specific probiotics elevated mood. Warrants further investigation.



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Reunite with “Old Friends”

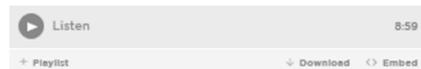
But while your inherited genes are more or less fixed, it may be possible to reshape, even cultivate, your “second genome”



shots - health news

Staying Healthy May Mean Learning To Love Our Microbiomes

July 22, 2013 • Scientists are investigating the microscopic world that lives in and on our bodies. It's becoming clear that these tiny companions play a much more complex and important role in human health than thought. But we don't yet know enough about the microbiome to use it to prevent and treat disease.



Centre For Infections/Science Photo Library/Corbis



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Quick Question

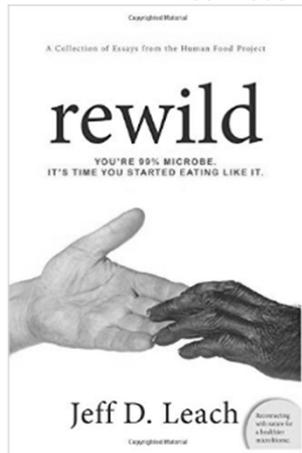
Which two best describe our relationship to gut bacteria.

- A. less the better
- B. the more diverse the better
- C. foods rich in fiber improve gut bacteria flora
- D. limit intake of bacteria to improve health
- E. all of the above



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Jeff Leach – Founder Human Food Project



Quest started when daughter diagnosed with type 1



ABOUT THE AUTHOR

We are not apart from nature, but a part of nature.

Jeff Leach is the Founder of the not-for-profit Human Food Project and Co-Founder of the American Gut Project - the largest open source, crowd funded microbiome project in the world. His research has been published in numerous journals including the *European Journal of Clinical Nutrition*, *Nature*, *Journal of Virology*, *Archives*, *Current Research in the Philippines*, *Journal of Archaeological Science*, *British Journal of Nutrition*, and numerous others. His research has been featured in numerous magazine and newspaper articles and he has written opinion pieces about health and nutrition for the *New York Times* and *San Francisco Chronicle*. His work, among the Hadza, was recently profiled in the prestigious journal *Science* and in several television programs and an upcoming PBS documentary.

MORE INFO:
humanfoodproject.com
facebook.com/humanfoodproject



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Research on Type 1

- ▶ Primary Prevention – what triggers type 1?
 - ▶ Viruses
 - ▶ Lack of breastfeeding
 - ▶ Early exposure to foods?
 - ▶ Hygiene (too much?)
- ▶ Intervention – Secondary and Tertiary
- ▶ Cure



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The Hygiene Hypothesis

- ▶ In studies, mouse raised in clean environment is higher risk for DM than one raised in dirty one
- ▶ “Clean living” may increase risk for autoimmune diseases
- ▶ DM risk is higher in urban than rural settings
- ▶ Daycare, other early exposures, lower risk for DM
- ▶ Children exposed to dirt, farm animals, and other kids have less reactive immune systems



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Type 1 Diabetes Prediction and Prevention Program (DIPP)

- ▶ Launched in 1994 to search for means to prevent or delay type 1 diabetes
- ▶ Follows a cohort of children at genetic risk for type 1
- ▶ Data consistently shows that those who develop type 1
 - ▶ Have less bacterial diversity
 - ▶ Increase in certain species of bacteroidetes associated with 20 fold increased risk of autoimmunity
 - ▶ Association is not causation



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Type 1 Diabetes and Gut Bacteria DiabImmune Study Group

- ▶ Exciting research Type 1
 - ▶ 8 children with same risk of getting type 1 diabetes based on family history and HLA Q phenotype
 - ▶ In the 4 children with ATB conversion, w/in 6 months before, the levels of firmicutes decreased and bacteroidetes increased.
 - ▶ The bio diversity also decreased
 - ▶ Hope that can id kids early on and halt progression to type 1.

Resource

The Dynamics of the Human Infant Gut Microbiome in Development and in Progression toward Type 1 Diabetes

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Gut Bacteria Shift Prior to Diagnosis

Type 1 Diabetes

- ▶ ↓ Firmicutes
- ▶ ↑ Bacteroidetes
- ▶ Less diverse
- ▶ Less stable

No Type 1

- ▶ ↑ Firmicutes
- ▶ ↓ Bacteroides
- ▶ Healthy Microbiome, diversity increased





The Environmental Determinants of Diabetes in the Young

Funded by NIDDK, the National Institute of Allergy and Infectious Diseases (NIAID), the National Institute of Child Health and Human Development (NICHD), the National Institute of Environmental Health Sciences, the CDC, the JDRF, and the ADA.



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TEDDY – to determine if...

- ▶ Can reduce the risk of type 1 diabetes w/
 - ▶ Avoid early cows milk exposure
 - ▶ Avoid introduction of gluten grains < 6mo
 - ▶ Adequate vitamin D
 - ▶ Reduce nitrate exposure
 - ▶ Others



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Early TEDDY Finding

- ▶ **Infants at Risk of Type 1 Diabetes Benefit from Early Probiotics**
- ▶ Exposure to probiotics during the first month of life is associated with a 60% decrease in the risk of pancreatic beta-cell islet autoimmunity among children with type 1 diabetes–associated *HLA* genotype DR3/4, but not among those with other genotypes.



JAMA Pediatrics

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Original Investigation | November 09, 2015

Association of Early Exposure of Probiotics and Islet Autoimmunity in the TEDDY Study FREE

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Primary Prevention of Type 1

- ▶ Strategy – Find those at highest risk of Type 1 diabetes and see if early intervention to protect beta cells prevents or delays onset.
- ▶ Identify through genetic testing
- ▶ 1 million currently at risk
- ▶ Fecal transplants?



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Get Involved – Get Screened
DiabetesTrialNet.org

www.DiabetesTrialNet.org

If Someone In Your Family Has
Type 1 Diabetes
 You May Be At Risk

1-800-HALT-DM1
 (1-800-425-8361)

North America
1-800-425-8361

United Kingdom
+44-117-959 5337

Australia and New Zealand
+61-3-93452555

Italy
39-02-2643 2818

Finland
358-2-313 0000

[contact label]

Can Type 1 Diabetes Be Prevented?
 You Can Help Answer This Question



NIDDK NATIONAL INSTITUTES OF HEALTH

NICHD NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

National Center for Research Resources

JDRF JUDDY R. FRIEDMAN RESEARCH FOUNDATION

American Diabetes Association

August 2011

Type 1 Diabetes TrialNet

Diabetes Education SERVICES

In Conclusion

- ▶ What can we pass on to our patients and communities to promote healthy microbiomes?



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More Breast Milk

PreBiotic

- ▶ Sets the stage for healthy bacterial microdiversity to take hold
- ▶ Oligosaccharides feed the Bifidobacterium

ProBiotic

- ▶ Contains healthy super hero bacteria



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Getting to Better Gut Bacterial Health

Eat more PREbiotics

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

PRObiotics

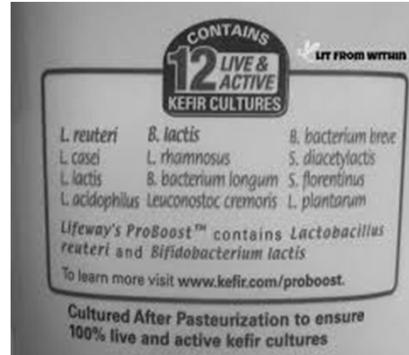
- ▶ These foods contain healthy bacteria like *Bifidobacterium* and *Lactobacillus*.
 - ▶ Yogurt, Kefir – look for “live or active cultures”
 - ▶ Fermented foods like: Sauerkraut, Kimchi, Miso soup, kombucha



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Kefir – Fermented Milk

From the Turkish word *keyif*, which means “feeling good” after eating



Diabetes Education SERVICES

GET Lots of Diverse Fiber Foods Goal is 25 – 30 gms day

American Food Project Full Plate Diet



► Helps increase fiber in usual meals

Fiber is suddenly hip. Grandma, it turns out, was just ahead of her time.

—Health & Nutrition Letter
Tufts University
February 2009



Diabetes Education SERVICES

12 Super Foods to Enjoy

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



Take Home Message

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



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Question for You!

▶ After hearing this information....



▶ Are you going to do anything different for your health?

▶ Are you going to share a new piece of info with your patients?



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15
years

Insulin, Diabetes Meds, Algorithms

Beverly Dyck Thomassian, RN, MPH, BC-ADM, CDE®
President, Diabetes Education Services



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Path to Type 2 Diabetes



Diabetes Education
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Patti LaBelle
"divabetic"
"I have diabetes, it
doesn't have me"



"I don't want diabetes
to steal one more life."
- Patti LaBelle

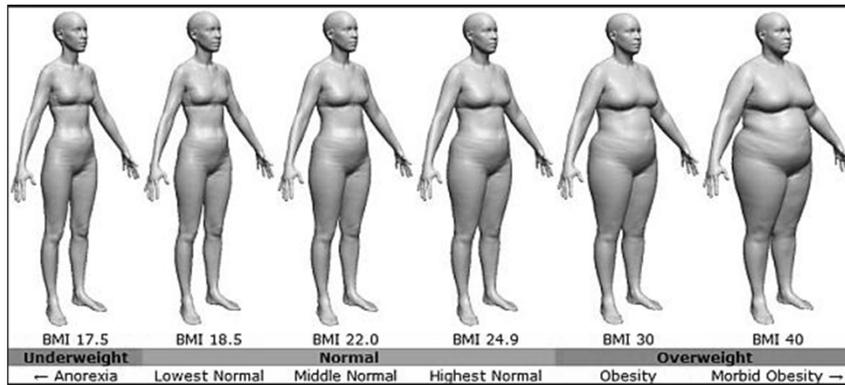
Join Patti LaBelle
to Stop
Diabetes®

Donate now and give hope

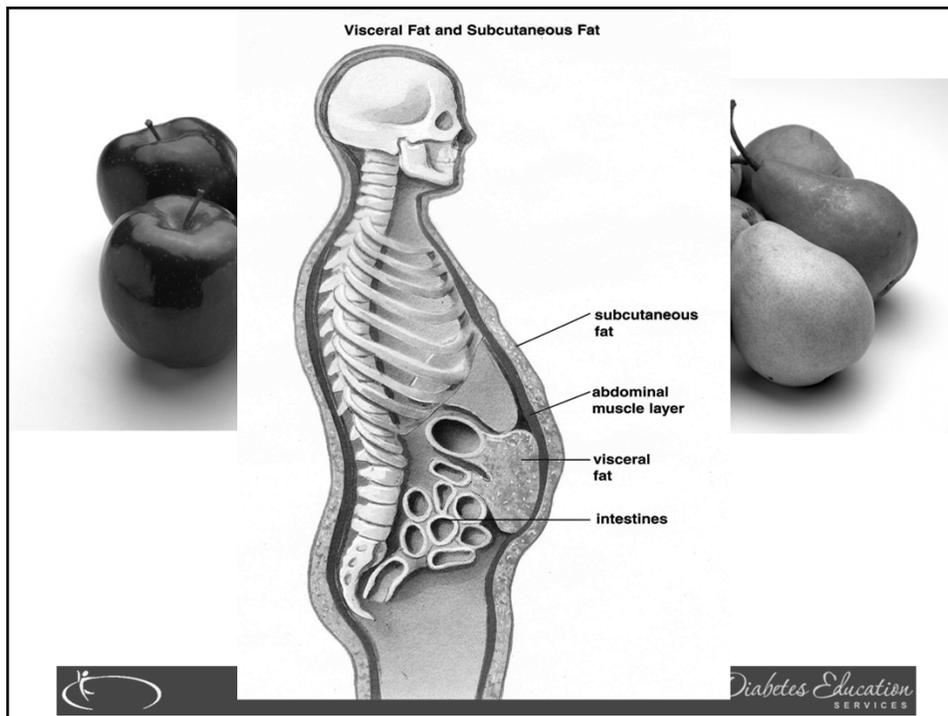


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BMI – Visual Image



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Diabetes 2 – Who is at Risk?

- ▶ Pre Diabetes & Type 2- Screening Guidelines
- ▶ Start screening at age 45 or for anyone who is overweight (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
- ▶ baby >9 lb or history of Gestational Diabetes Mellitus (GDM)
- ▶ Polycystic ovary syndrome (PCOS)
- ▶ Other conditions associated w/ insulin resistance:
 - ▶ Severe obesity, Acanthosis Nigricans (AN)



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Acanthosis Nigricans



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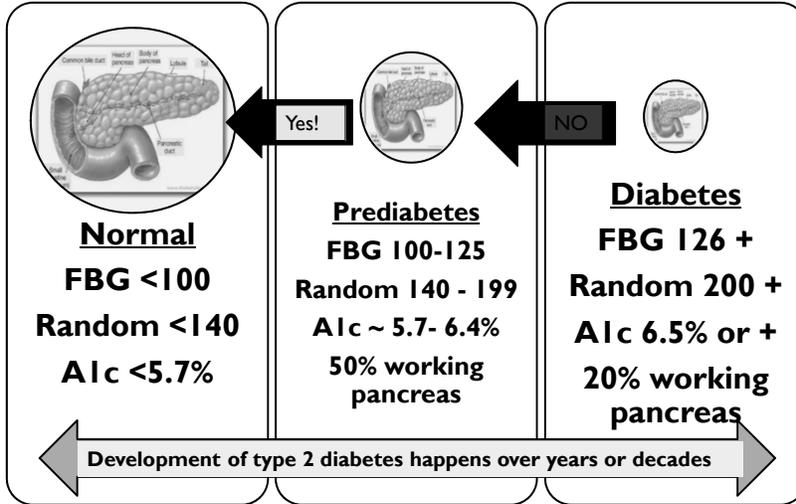
Acanthosis Nigricans (AN)

- ▶ 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

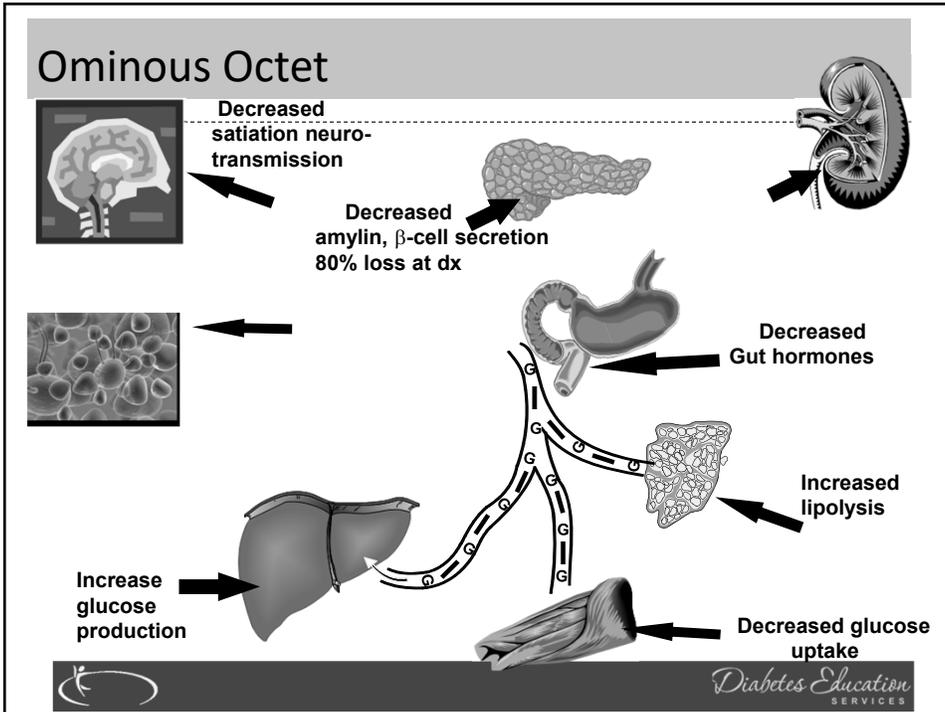


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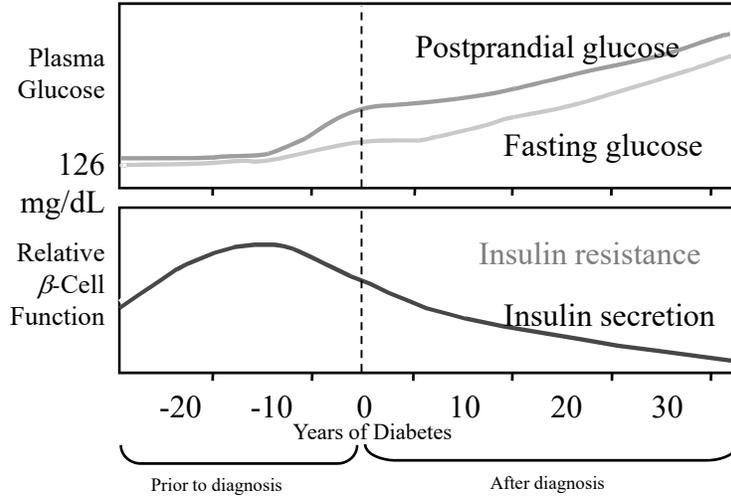
Natural History of Diabetes



Ominous Octet



Natural Progression of Type 2 Diabetes



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



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Comparison of Type 1 and Type 2

Feature	Type 1	Type 2
▶ Obesity	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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Diabetes is also associated with

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



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DiaBingo

- B** Frequent skin and yeast infections
- B** A BMI of ____ or greater is considered overweight
- B** To reduce complications, control **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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Patient Centered Antihyperglycemic Therapy – 1st Step

▶ Lifestyle Changes

- ▶ Weight control
- ▶ Healthy eating
- ▶ Activity



ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

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



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Patient Centered Approach

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

- Gauge patient’s preferred level of involvement.
- Explore, where possible, therapeutic choices.
- Utilize decision aids.
- **Shared** decision making – final decisions re: lifestyle choices ultimately lie with the patient.

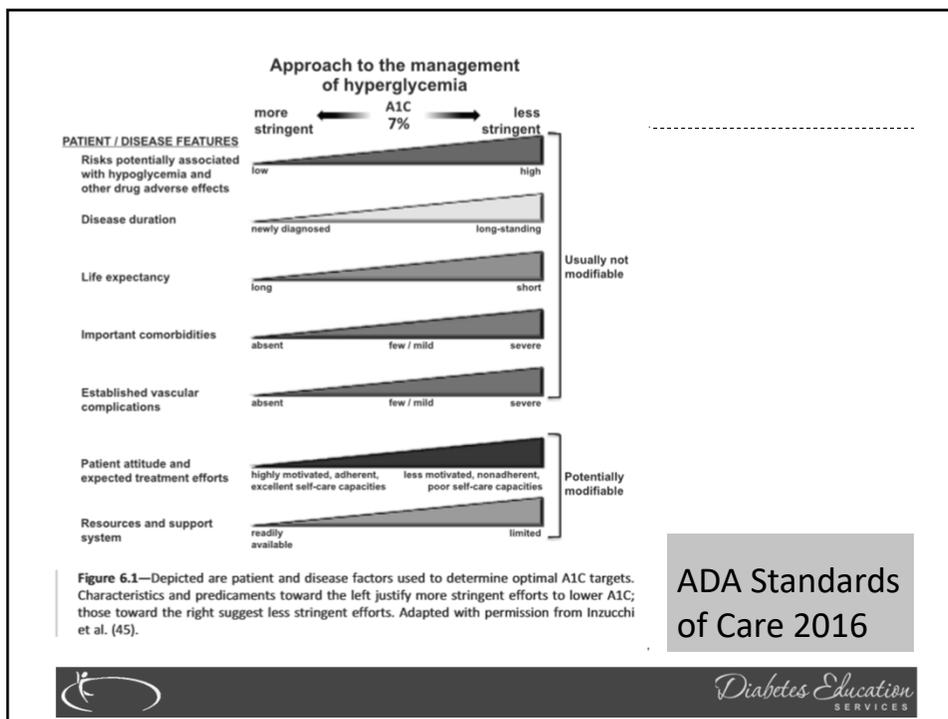


ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

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



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Other Considerations

- ▶ Cost
- ▶ Hypoglycemia
- ▶ Age
- ▶ Weight
- ▶ Comorbidities
 - ▶ Kidney disease
 - ▶ Heart disease – CHF, CAD
 - ▶ Liver dysfunction



ADA-EASD Position Statement: Management of Hyperglycemia in T2DM



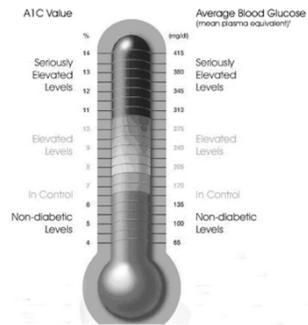
Diabetes Care 2012;35:1364–1379
Diabetologia 2012;55:1577–1596



Glycemic Targets - ADA

▶ Adult non pregnant A1c goals

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



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GOALS FOR GLYCEMIC CONTROL

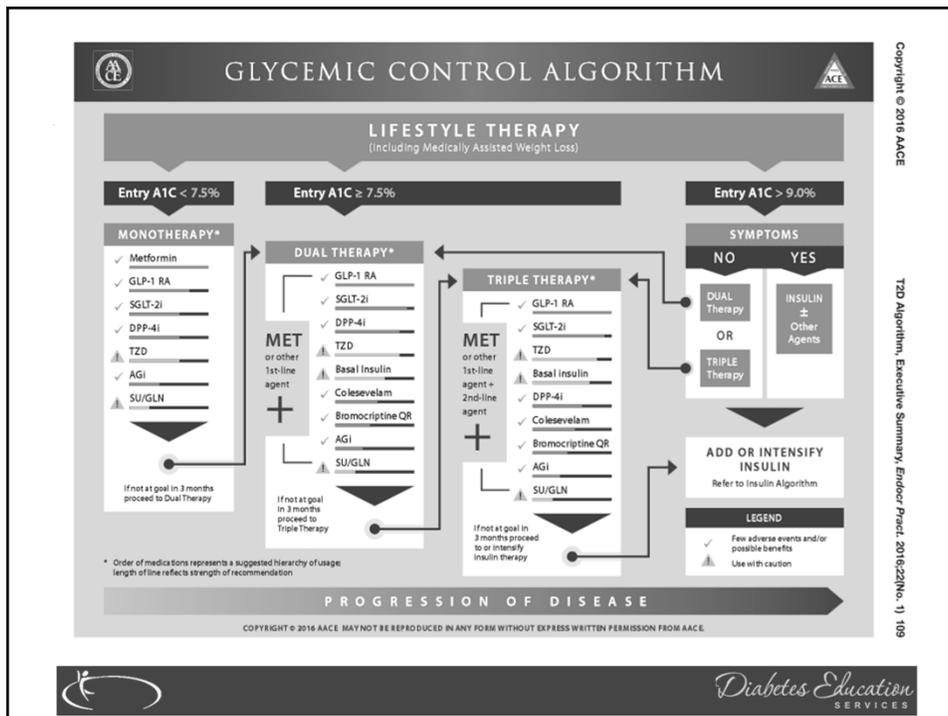
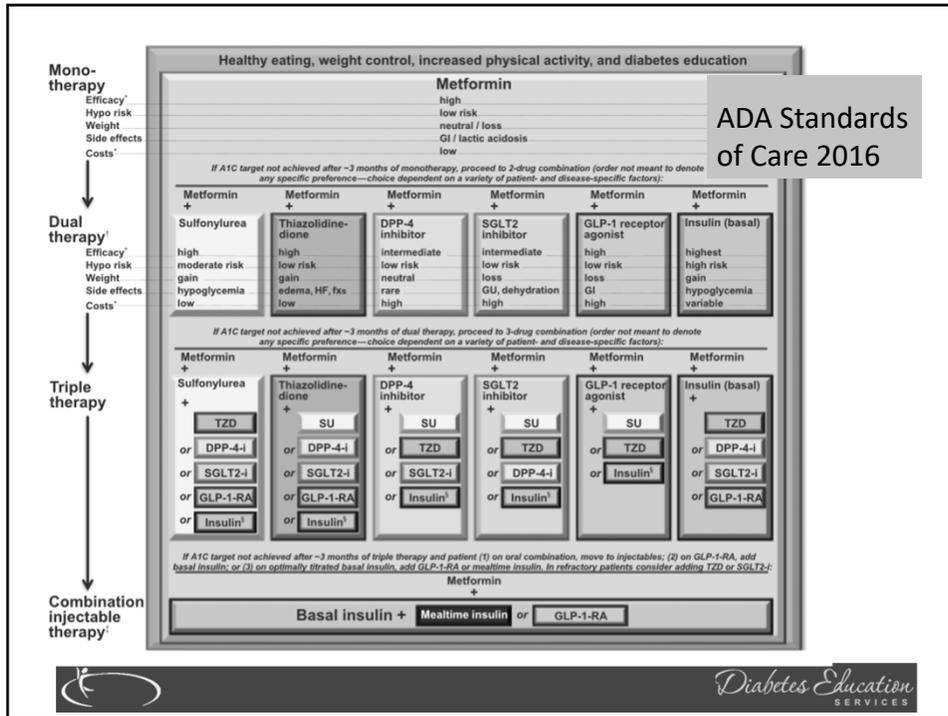
A1c ≤ 6.5%

For healthy patients
without concurrent
illness and at low
hypoglycemic risk

A1c > 6.5%

Individualize goals
for patients with
concurrent illness
and at risk for
hypoglycemia

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Common Oral Diabetes Meds



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Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides • Decreases hepatic glucose output • First line med at diagnosis of type 2	metformin (Glucophage)	500 - 2500 mg (usually BID w/ meal)	Side effects: nausea, bloating, diarrhea, B12 deficiency. To minimize GI Side effects, use XR and take w/ meals. Obtain GFR before starting. <ul style="list-style-type: none"> • 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 <60, liver disease, alcoholism or heart failure, restart metformin after 48 hours if renal function stable. Benefits: lowers cholesterol, no hypo or weight gain, cheap. Approved for pediatrics, 10 yrs + Lowers A1c 1.0%-2.0%.
	Riomet (liquid metformin)	500 - 2500mg 500mg/5mL	
	Extended Release-XR (Glucophage XR) (Glumetza) (Fortamet)	(1x daily w/dinner) 500 - 2000 mg 500 - 2000 mg 500 - 2500 mg	
Sulfonylureas • Stimulates sustained insulin release	glyburide: - Micronase, - Diabeta, - Glynase	1.25 - 20 mg 0.75 - 12 mg	Can take once or twice daily before meals. Low cost generic. Side effects: hypoglycemia and weight gain. Eliminated via kidney. Caution: Glyburide most likely to cause hypoglycemia. Lowers A1c 1.0% - 2.0%.
	glipizide: (Glucotrol) (Glucotrol XL)	2.5 - 40 mg 2.5 - 20 mg	
	glimepiride (Amaryl)	1.0 - 8 mg	

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Quick Question 1:

- Which of the following is the new GFR recommendation for Metformin?
- Stop med if GFR is less than 60
 - Only take once a day if GFR less than 60
 - If GFR less than 30, stop med
 - Hold for 3 days prior to IV dye study



Metformin – New GFR Guidelines

Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides • Decreases hepatic glucose output • First line med at diagnosis of type 2	metformin (Glucophage)	500 - 2500 mg (usually BID w/ meal)	Side effects: nausea, bloating, diarrhea, B12 deficiency. To minimize GI Side effects, use XR and take w/ meals. Obtain GFR before starting. <ul style="list-style-type: none"> • 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 <60, liver disease, alcoholism or heart failure, restart metformin after 48 hours if renal function stable. Benefits: lowers cholesterol, no hypo or weight gain, cheap. Approved for pediatrics, 10 yrs + Lowers A1c 1.0%-2.0%.
	Riomet (liquid metformin)	500 - 2500mg 500mg/5mL	
	Extended Release-XR (Glucophage XR) (Glumetza) (Fortamet)	(1x daily w/dinner) 500 – 2000 mg 500 – 2000 mg 500 – 2500 mg	



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



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Start Metformin therapy

- ▶ For women with PreDiabetes and History of GDM



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Common Oral Diabetes Meds

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Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors “Glucoretic” <ul style="list-style-type: none"> Decreases glucose reabsorption in kidneys 	Canagliflozin (Invokana)	100 - 300 mg 1x daily	Side effects: hypotension, UTIs, increased urination, genital infections, ketoacidosis. Obtain GFR when starting and yearly: Invokana – stop med if GFR <45 Jardiance – do not start if GFR <45 Farxiga – stop med if GFR <60. Do not use Farxiga in pts with bladder cancer. Benefits: no hypo or weight gain. Jardiance lowers all-cause mortality by 32%. Lowers A1c 1.0%-2.0%. Lowers wt 1-3 lbs.
	Dapagliflozin (Farxiga)	5 - 10 mg 1x daily	
	Empagliflozin (Jardiance)	10 - 25 mg 1x daily	
DPP – 4 Inhibitors “Incretin Enhancers” <ul style="list-style-type: none"> Prolongs action of gut hormones Increases insulin secretion Delays gastric emptying 	sitagliptin (Januvia)	25 - 100 mg daily – eliminated via kidney*	* If creat elevated, see med insert for dosing. Side effects: headache and flu-like symptoms. Can cause severe, disabling joint pain. Contact MD, stop med. Report signs of pancreatitis. † Saxagliptin and alogliptin can increase risk of heart failure. Notify MD for shortness of breath, edema, weakness, etc. No wt gain or hypoglycemia. Lowers A1c 0.6%-0.8%.
	saxagliptin (Onglyza)†	2.5 - 5 mg daily – eliminated via kidney*, feces	
	linagliptin (Tradjenta)	5 mg daily – eliminated via feces	
	alogliptin (Nesina)†	6.25 - 25 mg daily – eliminated via kidney*	

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Quick Question 2:

- Which of the following side effect of SGLT-2 Inhibitors should be immediately reported?
- GI upset
 - Signs of ketoacidosis
 - Excessive urination
 - Hypertension



Diabetes Education SERVICES

SGLT2 Inhibitors- “Glucoretics”

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

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

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



EMPA-REG OUTCOME[®]: Summary

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



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%

▶ **Indication:** For type 2s



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Quick Question 2:

- ▶ Which of the following is a new warning for the DPP-IV Inhibitors?
- Contact Provider with sudden hearing loss
 - Can increase risk of bladder cancer
 - Increased risk of genital infections
 - Report severe disabling joint pain immediately.



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DPP-IV Inhibitor Updates

- ▶ Can cause severe, disabling joint pain.
 - ▶ Contact Provider, Stop Medication
- ▶ Saxagliptin (Onglyza) and Alogliptin (Nesina) can increase risk of heart failure.
 - ▶ Notify provider for shortness of breath, edema, weakness, etc.
- ▶ Side effects: headache and flu-like symptoms
- ▶ Report signs of pancreatitis
- ▶ No wt gain or hypoglycemia
- ▶ Lowers A1c 0.6% - 0.8%



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Other Oral Diabetes Meds

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Class/Main Action	Name(s)	Daily Dose Range	Considerations
Thiazolidinediones "TZDs" <ul style="list-style-type: none"> • Increases insulin sensitivity 	pioglitazone (Actos)	15 – 45 mg daily	Black Box Warning: TZDs may cause or worsen CHF. Monitor for edema and weight gain. Increased peripheral fracture risk. Actos may increase risk of bladder cancer. Lowers A1c 0.5% – 1.0%
	rosiglitazone (Avandia)	4 – 8 mg daily	
Glucosidase Inhibitors <ul style="list-style-type: none"> • Delays carb absorption 	acarbose (Precose) miglitol (Glyset)	25 – 100 mg w/meals; 300 mg max daily dose	Start low dose, increase at 4-8 wk intervals to decrease GI effects. Caution with liver or kidney problems. In case of hypo, treat w/ glucose tabs. Lowers A1c 0.5– 1.0%.
Meglitinides <ul style="list-style-type: none"> • Stimulates rapid insulin burst 	repaglinide (Prandin)	0.5 – 4 mg w/meals (metabolized in liver)	Take before meals. Side effects may include hypoglycemia and weight gain. Lowers A1c 1.0% – 2.0%.
	nateglinide (Starlix)	60 – 120 mg w/meals (eliminated via kidney)	
Dopamine Receptor Agonists <ul style="list-style-type: none"> • Resets circadian rhythm 	bromocriptine mesylate— Quick Release "QR" (Cycloset)	1.6 to 4.8 mg a day (each tab 0.8 mg)	Take within 2 hrs of waking. Side effects: nausea, headache, fatigue, hypotension, syncope, somnolence. Lowers A1c 0.6% – 0.9%.
Bile Acid Sequestrants <ul style="list-style-type: none"> • Decreases cholesterol / BG levels. 	Colesevelam HCL (Welchol)	Up to six (6) 625 mg pills (3 tabs am, 3 tabs pm) 3.75gm packet in 4-8 ounces of fluid	Do not use if history of bowel obstruction, triglycerides >500, or pancreatitis. Can decrease absorption of certain meds, soluble vitamins. Lowers LDL by 15-30%. Side effects GI in nature. Lowers A1c 0.5%

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Combination Oral Medications PocketCard™



Medications	Avail Doses in mg	Medications	Avail Doses in mg
ACTOplus Met* (pioglitazone/metformin)	15 / 500 15 / 850	Jentadueto (linagliptin/metformin)	2.5 / 500 2.5 / 850 or 2.5 / 1000
ACTOplus Met XR (pioglitazone/metformin)	15 / 1000 30 / 100	Kazano (alogliptin/metformin)	12.5 / 500 12.5 / 1000
Avandamet (rosiglitazone/metformin)	2 / 100	Kombligize XR (onglyza/metformin XR)	2.5 / 1000 5 / 500 or 5 / 1000
Duetact* (pioglitazone/glimepiride)	30 / 2 30 / 4	Metaglip* (glipizide/metformin)	2.5 / 250 2.5 / 500 or 5 / 500
Glucovance* (glyburide/metformin)	1.25 / 250 2.5 / 500 5 / 500	Oseni (alogliptin/pioglitazone)	12.5/15 or 25 / 15 12.5 /30 or 25 / 30 12.5 / 45 or 25 / 45
Glyxambi (empagliflozin and linagliptin)	10/5 25/5	Prandimet (repaglinide/metformin)	1 / 500 2 / 500
Invokamet (canagliflozin/metformin)	50 / 500 or 50 / 1000 150 / 500 or 150 / 1000	Synjardy (empagliflozin/metformin)	5 / 500 or 12.5 / 500 5 / 1000 or 12.5 / 1000
Janumet (sitagliptin/metformin)	50 / 500 50 / 1000	Xigduo XR (dapagliflozin/metformin)	5 / 500 or 10 / 500 5 / 1000 or 10 / 1000
Janumet XR (sitagliptin/metformin)	50 / 500 50 / 1000 or 100 / 1000	*Available in generic. Observe precautions of each component drug. The information listed here are not guidelines. Please consult prescribing information for details.	

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Injectables that Lower Glucose



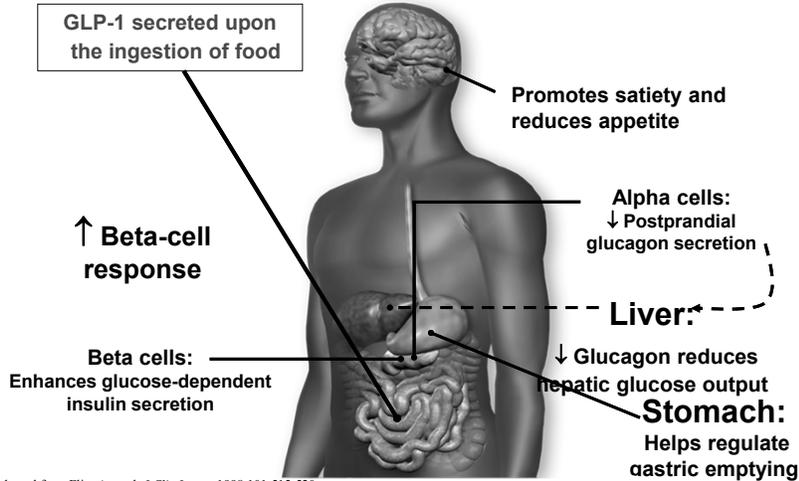
Class/Main Action	Name	Dose Range	Considerations
GLP-1 Receptor Agonist (GLP-1 RA) "Incretin Mimetic" <ul style="list-style-type: none"> Increases insulin release with food Slows gastric emptying Promotes satiety Suppresses glucagon 	exenatide (Byetta)	5 or 10 mcg BID	Side effects for all: Nausea, vomiting, weight loss, injection site reaction. Report signs of acute pancreatitis (severe abdominal pain, vomiting), stop med. Black box warning: Thyroid C-cell tumor warning for liraglutide, exenatide XR, albiglutide, and dulaglutide (avoid if family history of medullary thyroid cancer, notify MD of hoarseness, throat lump). Lowers A1c 0.5 – 1.6% Wt loss of ~ 3lbs
	exenatide XR (Bydureon)	2mg 1x a week (renally excreted)	
	liraglutide (Victoza)	0.6 - 1.8 mg daily	
	lixisenatide (Adlyxin)	10 mg daily for 2 weeks. Then increase to 20 mg daily.	
	albiglutide (Tanzeum)	30 and 50 mg 1x a week pen injector	
	dulaglutide (Trulicity)	0.75 and 1.5 mg 1x a week pen injector	
Amylin Mimetic <ul style="list-style-type: none"> Slows gastric emptying Suppresses glucagon Promotes satiety 	pramlintide (Symlin)	Type 1: 15 - 60 mcg; Type 2: 60 - 120 mcg immediately before major meals	For Type 1 or 2 on insulin. Black box warning: severe hypoglycemic risk 3 hrs post injection. Prevent hypoglycemia, decrease insulin dose when starting pramlintide. Side effects: nausea, weight loss. Lowers A1c 0.5 – 1%

The information listed here are general guidelines only; please consult prescribing information for details.

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



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



Diabetes Education SERVICES

Incretin Mimetics Exenatide (Byetta), Exenatide XR (Bydureon)

▶ Action:

- ▶ Insulin release in response to meal
- ▶ Slows gastric emptying
- ▶ Causes Satiety
- ▶ Protects Beta Cells

▶ Exenatide Dosing:

- ▶ 5-10 mcg before break, dinner
- ▶ Long acting version - 1x week (available in pens in 2015)

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

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



Diabetes Education SERVICES

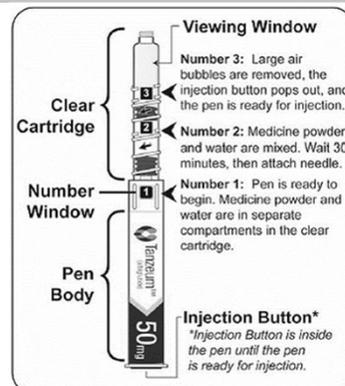
Incretin Mimetics – Exenatide XR - Bydureon

- ▶ **Once a Week Dosing:** 2mg
- ▶ **Efficacy:** Decreases A1c by 1.6%, wt by ~6lbs
- ▶ **Indication:** For type 2s only
- ▶ **Other:** – Available in pen
- ▶ **Caution:**
 - ▶ not indicated for pt's w/ history of medullary thyroid tumor
 - ▶ pancreatitis warning



Incretin Mimetics – Albiglutide - Tanzeum

- ▶ **Once a Week Dosing:** 30 – 50mg
- ▶ **Efficacy:**
Decreases A1c by ~ 1%, wt by ~2lbs
- ▶ **Indication:** For type 2s only
- ▶ **Other:** Pen injector
- ▶ **Caution:** not indicated for those with history of medullary thyroid tumor - pancreatitis warning



Diabetes Education
SERVICES

Incretin Mimetics – dulaglutide – Trulicity

- ▶ **Once a Week Dosing:** 0.75 – 1.5 mg
- ▶ **Efficacy:**
Decreases A1c by ~ 1%, wt by ~2lbs
- ▶ **Indication:** For type 2s only
- ▶ **Other:** Premixed Pen injector with retracting needle
- ▶ **Caution:** not indicated for those with history of medullary thyroid tumor - pancreatitis warning



Diabetes Education
SERVICES

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



Black box–thyroid tumor warning (avoid if family hx, notify MD of hoarseness, lump).



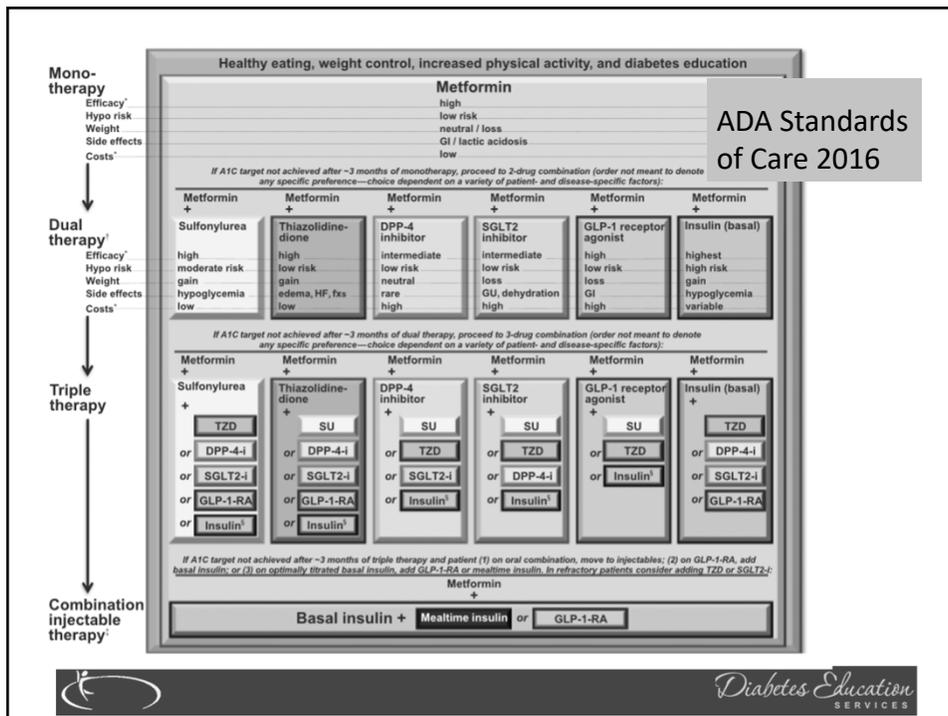
Diabetes Education
SERVICES

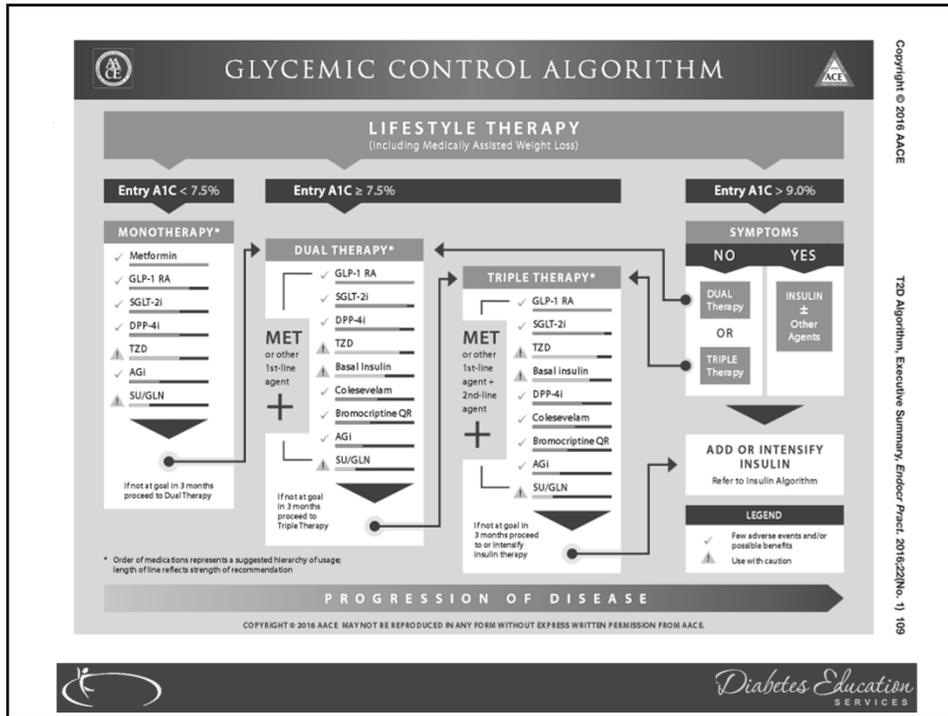
Liraglutide Approved for Weight Loss

- ▶ Saxenda and Victoza contain the same active ingredient (liraglutide) at different doses
 - ▶ Saxenda 3 mg and Victoza 1.8 mg
- ▶ Saxenda – as a treatment option for chronic weight management in addition to a reduced calorie diet and physical activity.
- ▶ Saxenda is approved for use in adults with a
 - ▶ BMI of ≥ 30 or
 - ▶ BMI of ≥ 27 or greater who have hypertension, type 2 diabetes, or dyslipidemia.



Diabetes Education SERVICES





Copyright © 2016 AACE
T2D Algorithm, Executive Summary, Endocr Pract, 2016;22(No. 1): 109



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When goal is to avoid weight gain

▶ These meds are weight neutral

- ▶ Metformin
- ▶ DPP-IV Inhibitors: Januvia, Onglyza, Tradjenta, Nesina
- ▶ Acarbose



▶ These meds associated with wt loss

- ▶ GLP-1 Receptor Agonists (Byetta, Bydureon, Victoza, Tanzeum, Trulicity)
- ▶ SGLT-2 Inhibitors (Canagliflozin, Dapagliflozin, Empagliflozin)
- ▶ Symlin (Pramlintide)



Diabetes Education
SERVICES

Life Study

- ▶ 61 year old overweight woman with type 2 diabetes 3 months. Has been trying to control diabetes with diet and exercise. GFR in 90s. Worried about weight gain.
- ▶ Most recent A1c 6.9%
 - ▶ Medication of choice?



Diabetes Education
SERVICES

Life Study

- ▶ 61 year old overweight woman with type 2 diabetes 3 months. Has been trying to control diabetes with diet and exercise. GFR in 90s. Worried about weight gain.
- ▶ Most recent A1c 6.9%
- ▶ Solutions?
 - ▶ Consider no meds and monitor
 - ▶ Or Start Metformin XR
 - ▶ DPP-IV Inhibitor?
 - ▶ Sulfonylurea?



Diabetes Education
SERVICES

Life Study – On Metformin

- ▶ 64 year old overweight woman with type 2 diabetes 3 years. Has been trying to control diabetes with diet and exercise. *On metformin.* GFR in 60s. Worried about weight gain.
- ▶ A1c increased to 7.7%
- ▶ What med would you add?
 - ▶ SGLT-2 Inhibitors
 - ▶ GLP-1 RA's
 - ▶ DPP-IV Inhibitor
 - ▶ Sulfonylurea?



Diabetes Education
SERVICES

Life Study

- ▶ 71 year old woman with type 2 diabetes for past year. BMI 24. Has been trying to control diabetes by limiting carbs and exercise. GFR 62. Good social support.
- ▶ Most recent A1c 8.6%
 - ▶ She hates needles



Diabetes Education
SERVICES

Older Adults - Considerations



- Reduced life expectancy
- Higher CVD burden
- Reduced GFR
- At risk for adverse events from polypharmacy
- More likely to be compromised from hypoglycemia

-
- ✓ **Less ambitious targets**
 - ✓ **A1c <7.5–8.0%**
 - ✓ **Focus on drug safety**

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



Diabetes Education
SERVICES

Life Study

- ▶ 71 year old woman type 2 diabetes.
BMI 24. Has been trying to control diabetes by limiting carbs and exercise.
GFR 62. Good social support.
- ▶ Most recent A1c 8.6%
- ▶ Solutions
 - ▶ Metformin XR +
 - ▶ Sulfonylurea?
 - ▶ GLP-1 RA?
 - ▶ SGLT-2 ?
 - ▶ DPP-IV Inhibitor ?
 - ▶ Eval eating disorder



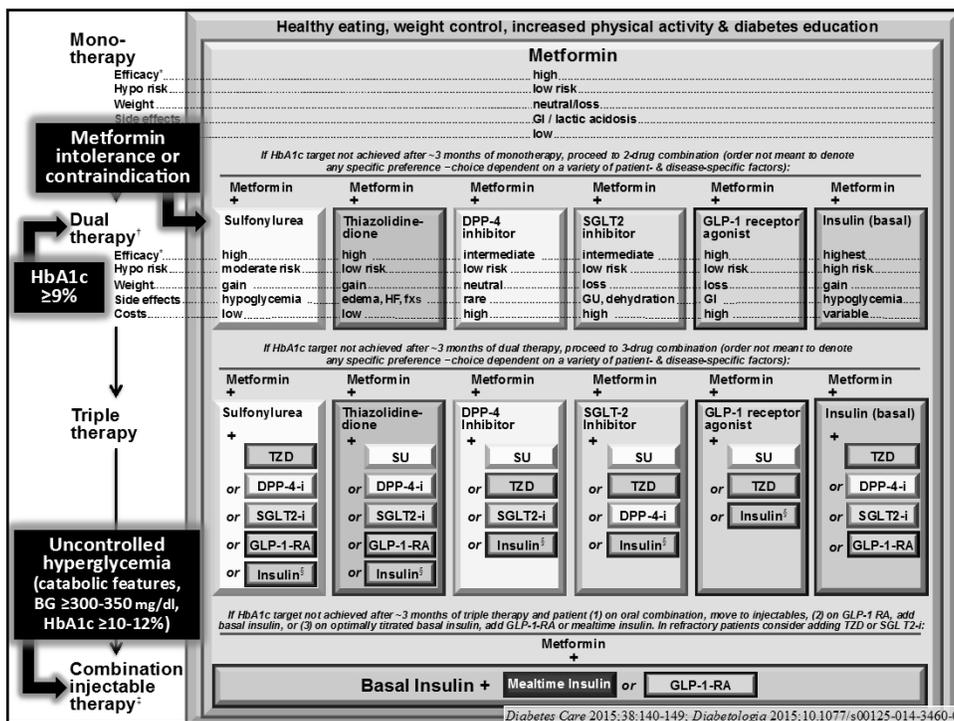
Diabetes Education
SERVICES

What next?

- ▶ 69 year old male, BMI 31,
on Metformin 2000mg a
day and Glipizide 40mg a
day.
- ▶ A1c 9.1%. Creat 1.2
- ▶ 11 yr history of diabetes
 - ▶ What next?



Diabetes Education
SERVICES



What next?

- ▶ 69 year old male, BMI 31, Metformin 2000mg a day and Glipizide 40mg a day. Wt 100kg
- ▶ A1c 9.1%. GFR 58
- ▶ Pt is obese, 11 yr diabetes
- ▶ Solutions
 - ▶ Continue metformin
 - ▶ Stop Glipizide?
 - ▶ GLP-1 RA?
 - ▶ SGLT-2 Inhibitor?
 - ▶ Add basal insulin?



Diabetes Education SERVICES

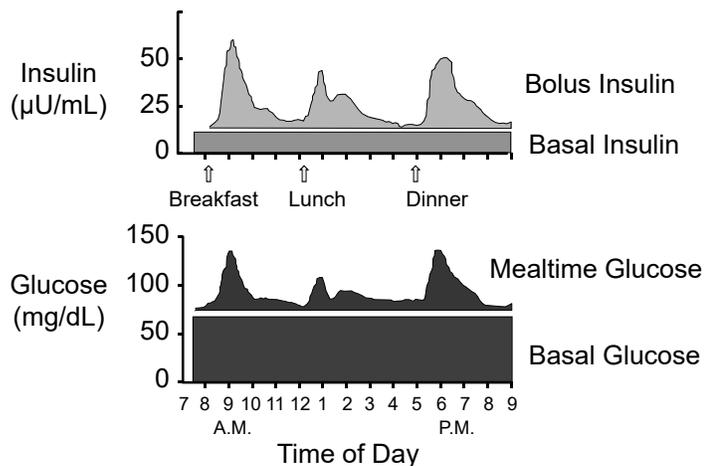
Starting Insulin?

- ▶ Basal
 - ▶ Start with 10 units
 - ▶ Or 0.1 – 0.2 units/kg of body weight
- ▶ 100 kg
 - ▶ 10 to 20 units basal (Lantus, NPH, Detemir, Tresiba)
- ▶ If meal time BG still elevated, add bolus at largest meal –
 - ▶ 10% of basal or 4 units
- ▶ Other Solutions
 - ▶ Continue metformin
 - ▶ Consider 70/30
 - ▶ Stop Glipizide? Consider stopping when bolus insulin started



Diabetes Education
SERVICES

Physiologic Insulin Secretion: 24-Hour Profile



Diabetes Education
SERVICES

Insulin PocketCard™



DOWNLOAD SUCCESS!
Get Our Free CDE® Coach App



Action	Insulin Name	Onset	Peak	Effective Duration	Considerations	
Bolus	Rapid Acting Analogs	Aspart (Novolog)	5 - 15 min	30 - 90 min	< 5 hrs	Bolus insulin lowers after-meal glucose. Post meal BG reflects efficacy.
		Lispro (Humalog)*				
		Glulisine (Apidra)				
	Short Acting	Regular*	30 - 60 min	2 - 3 hrs	5 - 8 hrs	Basal insulin controls BG between meals and nighttime. Fasting BG reflects efficacy.
Basal	Intermediate	NPH	2 - 4 hrs	4 - 10 hrs	10 - 16 hrs	Side effects: hypoglycemia, weight gain.
	Long Acting	Detemir (Levemir)	3 - 8 hrs	No peak	6 - 24 hrs	
		Glargine (Lantus)*	2 - 4 hrs		20 - 24 hrs	
		Glargine (Basaglar)			< 42 hrs	
	Degludec (Tresiba)*	~ 1 hr				
Basal + Bolus	Intermediate + short	Combo of NPH + Reg 70/30 = 70% NPH + 30% Reg 50/50 = 50% NPH + 50% Reg	30 - 60 min	Dual peaks	10 - 16 hrs	Typical dosing range: 0.5-1.0 units/kg body wt/day. Discard open vials after 28 days. For pen storage guidelines, see package insert.
	Intermediate + rapid	Novolog® Mix - 70/30	5 - 15 min			
		Humalog® Mix - 75/25 or 50/50				
	Ryzodeg Mix 70/30 (degludec/aspart)		24 hrs			

* Concentrated insulins available - see next page for details.

Insulin action times vary. Time periods listed here are general guidelines only; please consult prescribing information for details. REV 10/2016 © 2016



Quick Question:

5. How often should the dose of Degludec (Tresiba) be adjusted based on fasting blood glucose?

- Daily, until target is met
- No more than once a week
- Every other day
- Every 3-4 days



Degludec and Ryzodeg

▶ Degludec (Tresiba)

- ▶ An ultra long acting insulin - lasts up to 42 hours
- ▶ Takes 3-4 days to reach steady state
- ▶ Available in u-100 and u200 pens*
 - ▶ *200 units per mL vs 100 units per mL)
- ▶ Seems to cause less hypo
- ▶ Adjust dose every 3-4 days
- ▶ Wait at least 8 hours between doses
- ▶ Good at room temp for 8 wks

Insulin Degludec | A new-Generation-ultra-long acting basal insulin



▶ Ryzodeg 70/30

- ▶ mixture of insulin degludec and aspart



Diabetes Education
SERVICES

Case Scenarios

- ▶ Pt forgets morning 10 units degludec. Can take in the evening at 8pm. Next morning can get back on schedule and take morning degludec dose*
- ▶ *As long as there is an 8 hour gap in-between doses*
- ▶ Pt forgets to take 20 units degludec at hs. Can take the next morning. Can then get back on schedule and take again at hs*



Diabetes Education
SERVICES

Why Degludec (Tresiba)?

Once-daily Tresiba®: When schedules change, dose timing can too
Continued efficacy for your patients even if a dose is delayed or schedules change¹



Juggles a busy family life

Unpredictable work hours

Relies on caregiver for injection

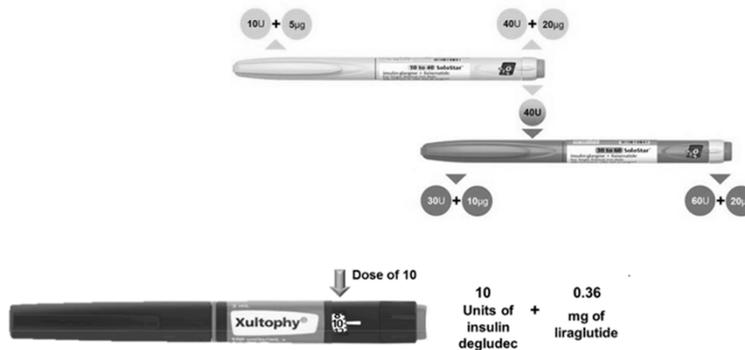
Travels



Diabetes Education SERVICES

What about

► Basal insulin plus GLP-RA Combo?



Diabetes Education SERVICES

Basal Insulin + GLP-1 RA

▶ Benefits

- ▶ Improved glycemic control
- ▶ Low risk of hypoglycemia
- ▶ Less weight gain
- ▶ Less treatment burden (one shot a day)
- ▶ Safe and effective alternative to basal/bolus



▶ Side Effects

- ▶ Hypoglycemia, weight gain (insulin)
- ▶ Nausea, vomiting, pancreatitis (GLP-1 RA)



Diabetes Education
SERVICES

Quick Question:

- ▶ What best describes IDegLira?
 - a. Basal bolus insulin
 - b. Basal insulin plus GLP-1 RA
 - c. Degludec plus Liramelonia
 - d. Basal insulin plus SGLT-2 Inhibitor



Diabetes Education
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Insulin/Injectable Combos

Download FREE CDE® Coach App for latest Pocketcard versions and priority notifications | DiabetesEd.Net



Name	Combines	Considerations
IDegLira	Insulin degludec (IDeg or Tresiba) Ultra long insulin + Liraglutide (Victoza) GLP-1 Receptor Agonist (GLP-1 RA)	Once daily fixed ratio pen injection – Dose range 1 to 50. Pre-filled pen contains fixed IDeg/liraglutide ratio of 100 units/ 3.6 mg per mL. Max dose is 50 = 50 units IDeg + 1.8 mg liraglutide. <ul style="list-style-type: none"> IDegLira dose titrated based on fasting BG (see package insert) Dose prescribed matches the number show on the pen. Common starting dose: <ul style="list-style-type: none"> 10 IDegLira for insulin naïve pts and 16 IDegLira for pts already on basal insulin or GLP-1 RA. When dialed to 10, IDegLira pen delivers 10 units IDeg + 0.36 mg liraglutide. When dialed to 16, IDegLira pen delivers 16 units IDeg + 0.6 mg liraglutide.
iGlarLixi Solostar Pen (Soliqua)	Insulin glargine (Lantus) 10 – 60 units day + Lixisenatide (Adlyxin) 5 – 20 µg GLP-1 Receptor Agonist	Once daily fixed ratio pen injection before breakfast based on Fasting BG levels. 2 different iGlarLixi Solostar pen dose ratios available: <ul style="list-style-type: none"> Yellow pen = 10 – 40 units glargine + 5 – 20 µg lixisenatide Delivers glargine/lixisenatide at 2/1 ratio (for insulin naïve pts) Green pen - 30 – 60 units glargine + 10 – 20µg lixisenatide Delivers glargine/lixisenatide at 3/1 ratio (for pts already on basal insulin)

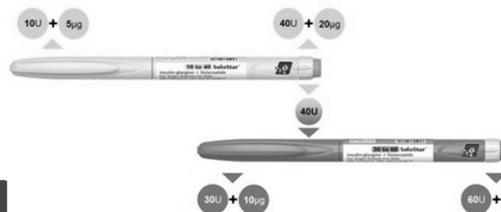
These are general guidelines only; please consult prescribing info. Observe precautions of each component drug. REV 10/2016 © 2016



Diabetes Education SERVICES

iGlarLixi – Glargine + Lixisenatide

- ▶ Once daily fixed ratio pen injection at breakfast
- ▶ Dose adjusted based on fasting BG
- ▶ 2 different iGlarLixi Solostar pen dose ratios
 - ▶ Yellow pen = 10-40 units glargine + 5-20 µg lixisenatide
 - ▶ Glargine/lixisenatide at 2/1 ratio (insulin naïve pts)
 - ▶ Green pen 30 – 60 units glargine + 10-20 µg lixisenatide
 - ▶ Glargine/lixisenatide at 3/1 ratio (pts on basal insulin)



Diabetes Education SERVICES

IDegLira – degludec + liraglutide

- ▶ Once daily fixed ratio pen injection – Dose 1 – 50.
- ▶ Pre-filled pen contains fixed IDeg/liraglutide ratio of 100 units/3.6mg per mL
- ▶ Max dose 50 = 50 units IDeg + 1.8mg liraglutide
- ▶ IDegLira dose titrated based on fasting BG
- ▶ Common starting dose:
 - ▶ 10 IDegLira for insulin naïve patients
 - ▶ 10 units degludec + 0.36mg liraglutide
 - ▶ 16 IDegLira for pts on basal insulin
 - ▶ 16units IDegLira + 0.6mg liraglutide

has 1 unit of insulin degludec and 0.036mg of Victoza



Dose of 10

10 Units of insulin degludec + 0.36 mg of liraglutide



Diabetes Education SERVICES

Case Study

- ▶ 70 yr old, weighs 100kg
- ▶ History of CABG
- ▶ A1c – 11.3%, BG 400-500 for past weeks
- ▶ Insulin – 100+ units Lantus at hs (solostar).
- ▶ Metformin 1000mg BID, glyburide 20mg daily
- ▶ What is max basal insulin should he be on?
- ▶ Should he be on glyburide?



Diabetes Education SERVICES

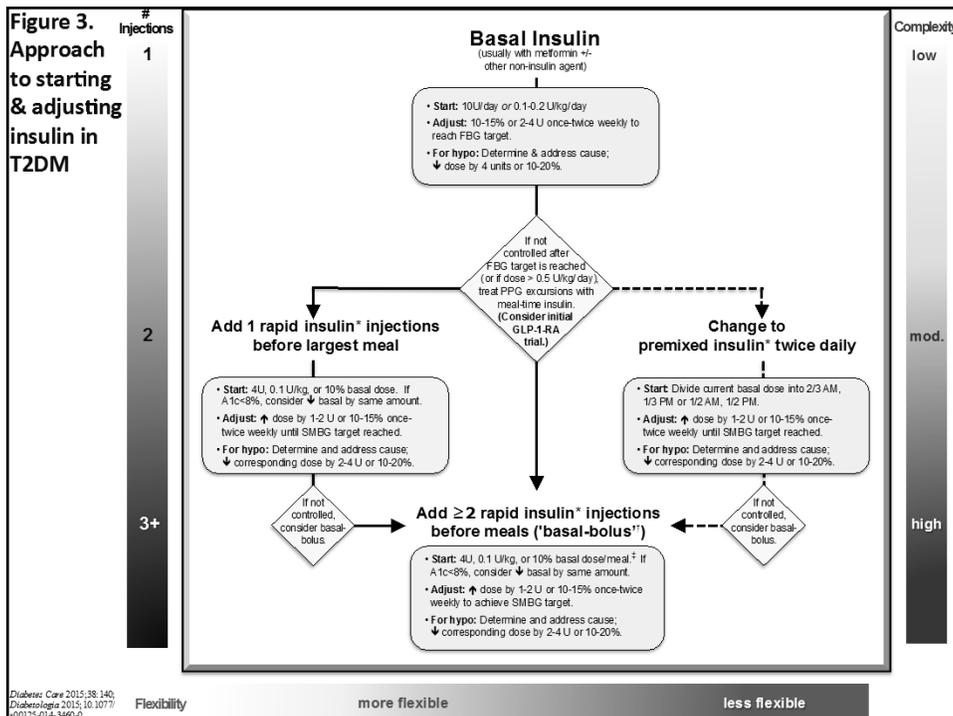
Cost Per Vial in Northern CA

Per vial cost	Walmart		
Regular Insulin	\$25*		
NPH	\$25*		
70/30	\$25*		
Humalog	\$200		
Novolog	\$197		
Apidra	\$180	\$246	\$178
Levemir	\$300	\$300	\$300
Lantus	\$226	\$221	\$206

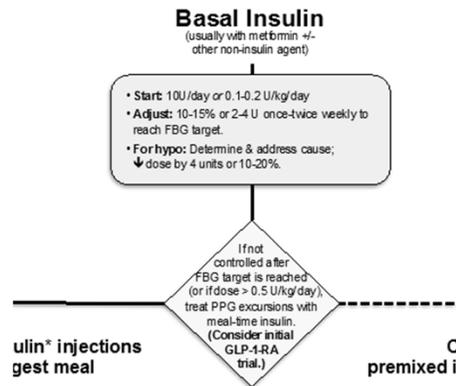


Diabetes Education
SERVICES

Figure 3.
Approach
to starting
& adjusting
insulin in
T2DM



When is it Too much basal insulin?



Diabetes Education
SERVICES

Case Study



What is max basal insulin should he be on?

- ▶ $100\text{kg} \times 0.5 = 50$ units a day
- ▶ What can we do next to improve BG?
 - ▶ Add bolus insulin to largest meal
 - ▶ Switch him to 70/30 insulin ac breakfast and dinner
 - ▶ Total previous basal dose – 100 units
 - ▶ 2/3 in am – 65 units am (43 NPH and 22 regular)
 - ▶ 1/3 pre dinner – 35 units pm (23 NPH and 12 regular)



Diabetes Education
SERVICES

Case Study



- ▶ 70 yr old, weighs 100kg
- ▶ History of CABG, tobacco
- ▶ A1c – 11.3%, BG 400-500 for past weeks
- ▶ What will inform you of how to proceed?
 - ▶ His willingness to stick to a complex regimen
 - ▶ His ability to self-monitor
 - ▶ His social support and connection to his medical team



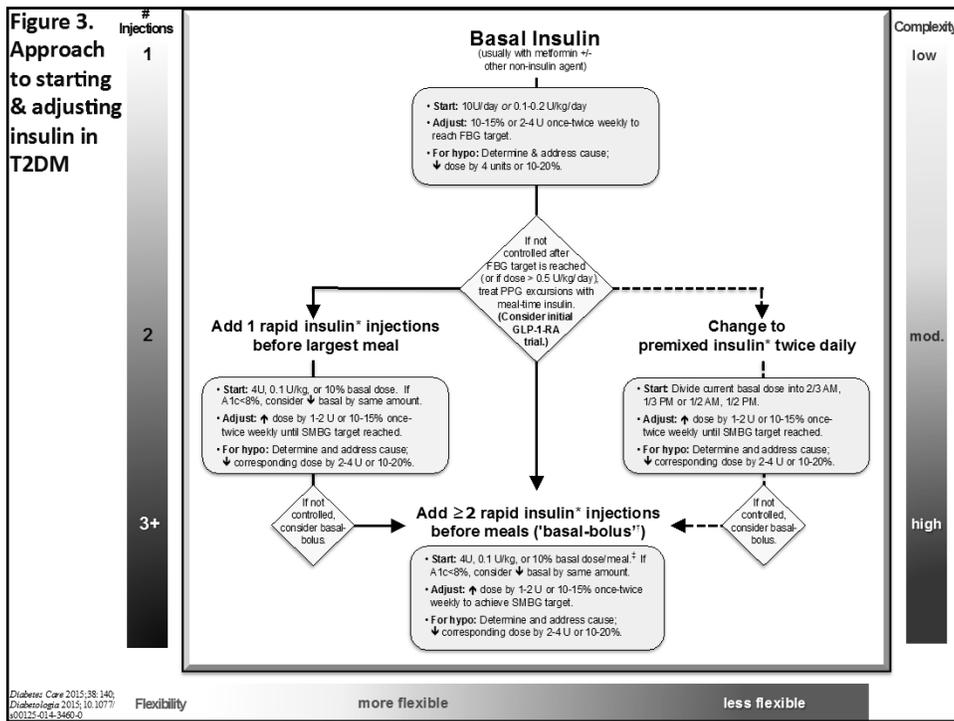
Diabetes Education
SERVICES

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

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



Diabetes Education
SERVICES



Next Steps

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



Diabetes Education
SERVICES

Combo Sub-Q Insulin

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

Considerations:

- Pre-mixed, difficult to fine tune therapy



Diabetes Education
SERVICES

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

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



Diabetes Education
SERVICES

Next Steps – Switch from 60 units basal to 70/30 Insulin

- ▶ Switch to 70/30 Insulin
- ▶ Take current dose and give 2/3 in am and 1/3 in pm.
 - ▶ 2/3 of basal in am
 - ▶ $60 \text{ units} \times 0.6 = \underline{\quad}$ units 70/30
 - ▶ 1/3 of basal in *pm
 - ▶ $60 \text{ units} \times 0.4 = \underline{\quad}$ units 70/30
 - ▶ *pm = before dinner



Diabetes Education
SERVICES

24u 70/30 am, 16 u 70/30 pm Patterns? Changes needed?

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



Diabetes Education
SERVICES

Quick Question

- ▶ Which is his largest meal from a carb perspective?
 - ▶ A. Breakfast
 - ▶ B. Lunch
 - ▶ C. Dinner
 - ▶ D. Breakfast or Lunch



Diabetes Education
SERVICES

Food diary – Finding Largest Meal

- ▶ Breakfast
 - ▶ Big bowl of oatmeal with walnuts, banana, coffee
- ▶ Lunch
 - ▶ Sandwich and piece of fruit
 - ▶ A few cookies around 3pm
- ▶ Dinner
 - ▶ Big salad, BBQ meat, dinner roll, glass of wine
- ▶ Late night snacking
 - ▶ Peanut butter on celery, nuts, cheese



Diabetes Education
SERVICES

Now What?

▶ Patient ate lunch and forgot to take 3 units regular insulin

▶ Patient took 4 units regular insulin and is too nauseated to eat.



▶ Nighttime BG is 250, pt increases bedtime NPH by 4 units

Diabetes Vacations

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

~Nelson Mandela



Diabetes Education
SERVICES

Diabetes Bingo

“DiaBingo” Shout out Right Answer



Diabetes Education
SERVICES

DiaBingo - N

- N DPP demonstrated that exercise and diet reduced risk of DM by ___%
- N An _____ a day can help prevent heart attack and stroke
- N Rebound hyperglycemia
- N Scare tactics are effective at motivating patients to change behavior
- N Losing ___ % of body weight, can improve blood glucose, BP, lipids
- N Drugs that can cause hyperglycemia
- N 2/3 cups of rice equals _____ serving carbohydrate
- N A1c of 7% equals glucose of
- N One % drop in A1c reduces risk of complications by ___ %
- N 1 gm of fat equal _____ kilo/calories

- N Metabolic syndrome = hyperglycemia, hyperlipidemia, hypertension
- N Average American consumes 25 teaspoons of sugar a day.



Diabetes Education
SERVICES

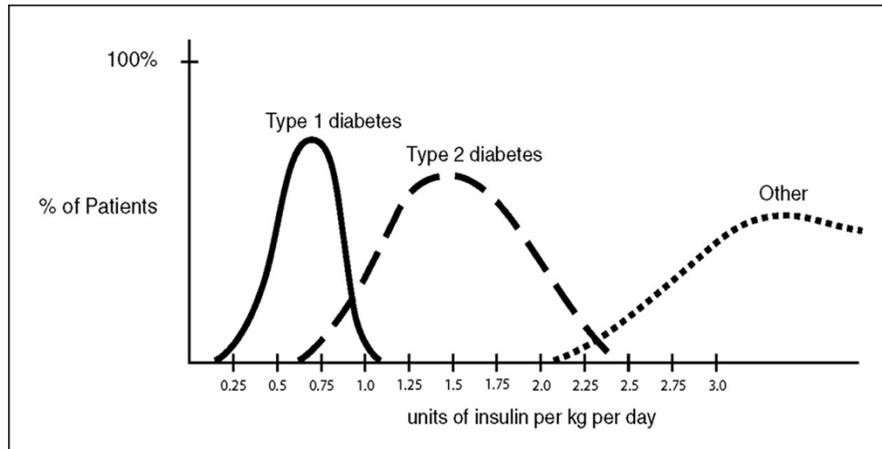
Approach Depends on Patient

- Insulin dosing is relative to body weight
- Kidney function
- Other meds
- Activity level
- Social support
- Goals of care
- Patients ability



Diabetes Education
SERVICES

Insulin Dosing Type 1 & 2



Diabetes Education
SERVICES

Concentrated & Inhaled Insulins

DiabetesEd.net

Name/Concentration	Insulin/Action	Considerations
Humulin Regular U-500 <ul style="list-style-type: none"> • 500 units insulin/mL • KwikPen or Vial 	Regular Bolus / Basal	5 xs concentration of u-100 insulin. Indicated for pts taking 200+ units insulin daily. 3 mL Pen – Once opened, good for 28 days. 20 mL Vial – Once opened, good for 40 days. Use designated U-500 insulin syringe.
Humalog KwikPen U-200 200 units insulin/mL	Lispro (Humalog) Bolus	2 xs concentration of u-100 insulin. 3 mL Pen. Once opened, good for 28 days
Toujeo Solostar U-300 Pen 300 units insulin/mL	Glargine (Lantus) Basal	3 xs concentration of u-100 insulin 1.5 mL Pen. Once opened, good for 42 days
Tresiba FlexTouch U-200 Pen 200 units insulin/mL	Degludec (Tresiba) Ultra basal	2 xs concentration of u-100 insulin 3 mL Pen. Once opened, good for 8 weeks

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

Inhaled Insulin

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

The information listed here are not guidelines. Please consult prescribing information for details.

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Diabetes Education
SERVICES

More than 200 units a day?



Your patients injecting more than 200 units of insulin per day may be ready for a change

LEARN MORE >

UNITS OF INSULIN **210** 260 335

- Maria* has type 2 diabetes with severe insulin resistance
- Her A1C is not at goal
- She is taking multiple insulin injections per day
- Approximately half of her current TDD of insulin is mealtime insulin and half is long-acting insulin



Indication for Humulin® R U-500

Humulin R U-500 (Concentrated) is indicated as an adjunct to diet and exercise to improve glycemic control in adults and children with type 1 and type 2 diabetes mellitus.



Diabetes Education
SERVICES

Humulin Regular U-500

Concentrated & Inhaled Insulins

DiabetesEd.net

Name/Concentration	Insulin/Action	Considerations
Humulin Regular U-500 <ul style="list-style-type: none"> • 500 units insulin/mL • KwikPen or Vial 	Regular Bolus / Basal	5 xs concentration of u-100 insulin. Indicated for pts taking 200+ units insulin daily. 3 mL Pen – Once opened, good for 28 days. 20 mL Vial – Once opened, good for 40 days. Use designated U-500 insulin syringe.

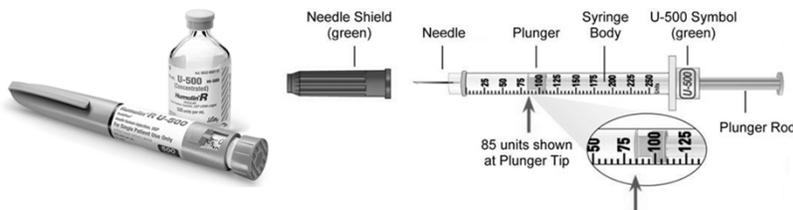


Diabetes Education SERVICES

Consider U-500 High Potency Insulin

5 x's the concentration of u100

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



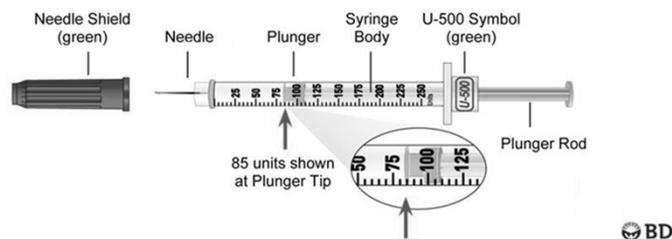
BD



Diabetes Education SERVICES

Dedicated U-500 Insulin Syringe

- ▶ Manufactured by BD – Nov 2016
- ▶ 5 unit increments
- ▶ No conversion or calculation required
- ▶ If 85 units of U-500 R Insulin is ordered...



Diabetes Education
SERVICES

Humulin R U-500 Updated Package Insert

- ▶ Patients using the U-500 vial must be prescribed the U-500 insulin syringe
- ▶ Administer U-500 two to three times daily 30 minutes before a meal
- ▶ Don't mix U-500 with other insulins
- ▶ Do not perform dose conversion when using U-500 KwikPen or U-500 Insulin syringe.
- ▶ Do not transfer U-500 from the KwikPen into any syringe.



Diabetes Education
SERVICES

Dosing Strategies u-500

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

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



Diabetes Education
SERVICES

Quick Calculation - U500

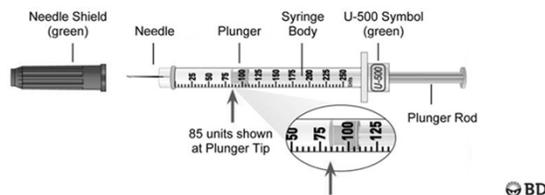
- ▶ Pt takes:
- ▶ 300 units of insulin a day.
- ▶ A1c 10.3%
- ▶ Convert patient to u-500
- ▶ 60% am / 40% pm
 - ▶ Morning dose
 - ▶ Before dinner dose



Diabetes Education
SERVICES

Quick Calculation u-500

- ▶ Pt takes: 300 units insulin
- ▶ Convert patient to u-500
- ▶ 60% am / 40% pm
 - ▶ $300 \times 60\% = 180$ units of u500
 - ▶ $300 \times 40\% = 120$ units of u500



Diabetes Education SERVICES

Concentrated & Inhaled Insulins

DiabetesEd.net

Name/Concentration	Insulin/Action	Considerations
Humalog KwikPen U-200 200 units insulin/mL	Lispro (Humalog) Bolus	2 xs concentration of u-100 insulin. 3 mL Pen. Once opened, good for 28 days
Toujeo SoloStar U-300 Pen 300 units insulin/mL	Glargine (Lantus) Basal	3 xs concentration of u-100 insulin 1.5 mL Pen. Once opened, good for 42 days
Tresiba FlexTouch U-200 Pen 200 units insulin/mL	Degludec (Tresiba) Ultra basal	2 xs concentration of u-100 insulin 3 mL Pen. Once opened, good for 8 weeks

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



Toujeo SoloStar
insulin glargine injection 300 Units/mL

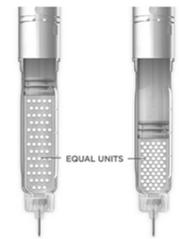


Diabetes Education SERVICES

Lispro (Humalog) U-200 Kwik Pen

- ▶ 2 xs the concentration of U-100
- ▶ 200 units per mL
 - ▶ Humalog U-200 Kwik Pen
 - ▶ Comes in 3mL pen/ 600 units (2 pack)
 - ▶ Once opened, keep at room temp. Toss after 28 days.

How often a patient changes pens if they need 15 units, 3 times a day



Diabetes Education SERVICES

Humalog 200 units/mL KwikPen

Writing the prescription

- When prescribing for your patients, be sure to specify the full product name: Humalog 200 units/mL KwikPen
- When using EMR to prescribe Humalog U-200 KwikPen, use the chart below as a guide, based on the requirements of your EMR*

Total Daily Mealtime Dose (Units)	Boxes (Per Month)	Total mL (Per Month)
20-39	1 box/2 pens (1200 units)	6
40-79	2 boxes/4 pens (2400 units)	12
80-119	3 boxes/6 pens (3600 units)	18



- Same size¹ and familiar design
- No dose calculations or conversions are required
- Dialing 1 unit delivers 1 unit of mealtime insulin
- Both pens contain 3 mL of liquid



Glargine (Toujeo) Solostar Pen U-300

- ▶ Glargine 300 units / mL
 - ▶ Need 10-14% higher dose than previous U-100 dose
 - ▶ Start with 1:1 conversion and adjust based on FBG
 - ▶ Less nocturnal and hypoglycemia.
 - ▶ Similar weight gain to U-100
 - ▶ Extend release of U-300 results in smoother, stable more prolonged profile
 - ▶ More injection site reactions with U-300
 - ▶ Max 80 units injection
 - ▶ Comes in 1.5mL pen/450 units (3 or 5 pack)
 - ▶ Once opened, keep at room temp. Toss after 42 days.



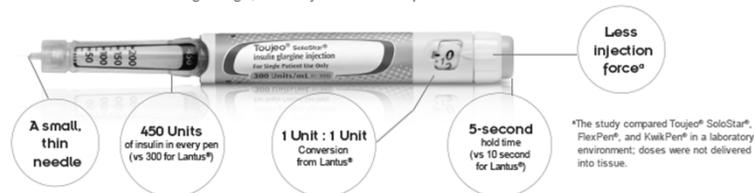
Diabetes Education
SERVICES

Toujeo U-300 Solostar Pen

Getting to know the Toujeo® SoloStar® pen

Toujeo® is available in the redesigned SoloStar® pen

Based on an award-winning design, the Toujeo® SoloStar® pen features:



Plus, the Toujeo® SoloStar® pen can be used for up to 42 days once opened.

For example, if order reads:
“30 units Toujeo U-300 Solostar Pen”
Dial the pen to 30 units.



Diabetes Education
SERVICES

Degludec (Tresiba) FlexTouch U-200 Pen

- ▶ Concentration – 200 Units/mL
- ▶ Max 160 units injection
- ▶ Comes in 3mL pen/600 units (3 pack)
- ▶ Dose increments – 2 units
- ▶ Once opened, keep at room temp. Good for 8 weeks



For example, if order reads:
"160 units Tresiba U-200
FlexTouch Pen" Dial the pen to
160 units.



Diabetes Education
SERVICES

Concentrated Insulin

Pros

- ▶ As pts are getting heavier, more insulin is needed
- ▶ More insulin in less volume
- ▶ Patients need less insulin -

Cons

- ▶ Risk of incorrect administration
- ▶ Cost
- ▶ Making sure orders are written correctly



Diabetes Education
SERVICES

Quick Question:

- ▶ Which of the following is true about all concentrated insulins?
 - a. Need to convert to get correct dose
 - b. Delivers the same amount of insulin in more volume.
 - c. Delivers the correct dose in less volume
 - d. No calculation or conversion required
 - e. C & D



Diabetes Education
SERVICES

Key Teaching Points

- ▶ Never withdraw concentrated insulin from a pen into a syringe
- ▶ All concentrated insulin pens and the U-500 insulin syringe automatically deliver the correct dose in less volume.
- ▶ No conversion, calculation or adjustment required.
- ▶ When writing Rx include type of insulin, concentration, delivery device and dose.



2:30



Diabetes Education
SERVICES

Quick Question:

- ▶ Which of the following insulin is considered a “biosimilar”?
 - a. Aspart (Novolog)
 - b. Detemir (Levemir)
 - c. Degludec (Tresiba)
 - d. Glargine (Basaglar)



Diabetes Education
SERVICES

Glargine (Basaglar) “Copy Cat” or “Biosimilar Insulin”

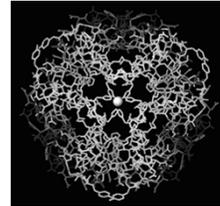
- ▶ Insulin considered a “biological drug product”
- ▶ Patent on “biologicals” last 12 yrs
 - ▶ Insulin patent sold in 1923 for \$1
 - ▶ Patent can be extended by making small improvements
 - ▶ Insulin manufacturer’s have maintained exclusivity for 93 years.. Until now
- ▶ Patent on glargine expired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



Diabetes Education
SERVICES

Glargine (Basaglar) – Eli Lilly

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



Insulin – Large Molecule



Aspirin – Small Molecule



Diabetes Education SERVICES

Are Insulin Biosimilars Identical?

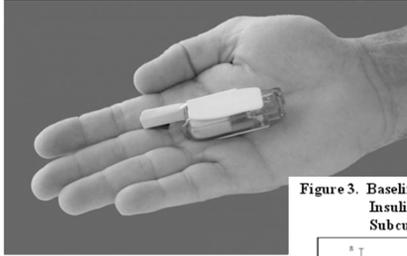
Are they exactly the same? "With any insulin, I always want patients to understand that these drugs are grown in batches – not manufactured by combining chemicals," says Alissa R. Segal, Pharm.D., RPh, CDE, CDTC, a Clinical Pharmacist at the Joslin Diabetes Center and associate professor of pharmacy practice at MCPHS University, both in Boston. "Insulin is grown using yeast or bacteria cells. There are very rigorous quality assurance protocols in place, but there can be changes in the cells over time. And that can translate into very small changes from batch to batch. With follow-on biologics like insulin, the manufacturing process is similar to the original – but not an exact copy. So there may be slight differences in the way it affects you."

<http://www.diabeticlifestyle.com/type-1-diabetes/cheaper-insulin-way>



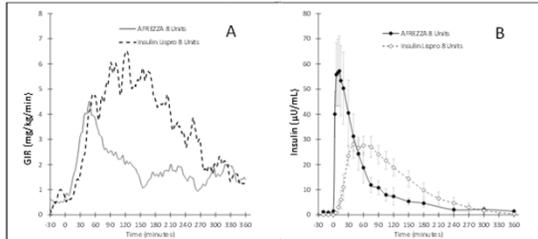
Diabetes Education SERVICES

Afrezza – Regular Inhaled Insulin Still need basal insulin & Lung function study



**Only studied in adults
over 18
Not indicated for
pregnancy, while
breastfeeding
4, 8, 12 units**

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



* Despite the faster absorption of insulin (PK) from Afrezza, the onset of activity (PD) was comparable to insulin lispro.



Diabetes Education
SERVICES

Diabetes Bingo “DiaBingo” Shout out Right Answer



Diabetes Education
SERVICES

DiaBingo- G

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



Diabetes Education
SERVICES

Critical Assessment

We are unique!



“ Be yourself, everybody else is already taken.
Oscar Wilde (1854-1900) ”



Diabetes Education
SERVICES

Objectives

1. Identify common yet often under diagnosed complications associated w/ type 1 and type 2 diabetes.
2. State strategies to identify previously undiscovered diabetes complications during patient assessments.
3. Demonstrate steps involved in lower extremity assessment.



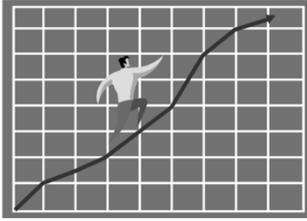
Diabetes Education
SERVICES

Patient is Gaining Weight

- ▶ 68 yr old female complains of 4 lb wt gain a week for past month. Wt 140lbs, BMI 27. BG levels 200-300s. B/P 142/96
- ▶ **Reported** daily meds include:
 - ▶ glyburide 10mg ac breakfast
 - ▶ Actos 30mg ac breakfast
 - ▶ Glargine 30units at night
 - ▶ Lispro sliding scale with meals
 - ▶ Synthroid (not sure of dose)
 - ▶ Lasix 20mg a day



Diabetes Education
SERVICES



Fluid Weight Gain

- ▶ People with diabetes at greater risk for Congestive Heart Failure (CHF) due to increased CVD risk factors.
- ▶ Actos and Avandia, (TZD's), can cause fluid wt gain and worsen CHF.

Thyroid Disease and Diabetes

- ▶ 27 mil Americans have over or under active thyroid glands, but more than half remain undiagnosed.
- ▶ More than 8 out of 10 pts w/ thyroid disease women.
- ▶ 15 to 30% of people w/ diabetes & their siblings or parents are likely to develop thyroid disease (compared to 4.5 percent of the general population).
- ▶ Check TSH on Type 1 & 2 annually or if indicated.

AACE Website



Diabetes Education
SERVICES

Thyroid & TSH* Levels



AACE 2012
Guidelines

- ▶ *Thyroid Stimulating Hormone - secreted by pituitary gland
- ▶ controls thyroid hormone thyroxine production
- ▶ first and best test
- ▶ TSH Norm = up to 4.5 mIU/mL
- ▶ Treatment based on TSH plus symptoms.
 - ▶ 4.5 – 10 based on risk, s/s
 - ▶ 10 or more = treat
- ▶ Lower = hyperthyroidism
- ▶ Higher = hypothyroidism-



Diabetes Education
SERVICES

Thyroid Dysfunction

HYPO THYROIDISM	HYPER THYROIDISM
<ul style="list-style-type: none"> DRY, COARSE HAIR LOSS OF EYEBROW HAIR PUFFY FACE ENLARGED THYROID (GOITER) SLOW HEARTBEAT ARTHRITIS COLD INTOLERANCE DEPRESSION DRY SKIN FATIGUE FORGETFULNESS HEAVY MENSTRUAL PERIODS INFERTILITY MUSCLE ACHEs WEIGHT GAIN CONSTIPATION BRITTLE NAILS 	<ul style="list-style-type: none"> HAIR LOSS BULGING EYES SWEATING ENLARGED THYROID (GOITER) RAPID HEARTBEAT DIFFICULTY SLEEPING HEAT INTOLERANCE INFERTILITY IRRITABILITY MUSCLE WEAKNESS NERVOUSNESS SCANT MENSTRUAL PERIODS WEIGHT LOSS FREQUENT BOWEL MOVEMENTS WARM, MOIST PALMS TREMOR OF FINGERS SOFT NAILS



Diabetes Education
SERVICES

Hypothyroidism

- ▶ Hashimoto's thyroiditis – autoimmune thyroid
 - ▶ most common cause of hypothyroidism w/ dm
- ▶ Type 1 and type 2 at greater risk
- ▶ Screen annually for thyroid disease in diabetes
- ▶ Clinical features: fatigue, wt gain, dry skin, cold intolerance, depression, constipation, dyslipidemia
 - ▶ Higher risk of CVD – monitor risk
- ▶ Dx: high TSH, then test for free T4, autoantibodies, and thyroid scans as needed
- ▶ Tx: replacement with levothyroxine (75-125 ug)

AACE Thyroid Guidelines



Diabetes Education
SERVICES

Diabetes – Distress and Depression Ask and Address



- Treatment includes:
- ▶ referral to mental health professional
 - ▶ Medications



Diabetes Education
SERVICES

Novel / Atypical Antipsychotics Linked to Hyperglycemia

- ▶ Severe cases of hyperglycemia – even death reported
- ▶ Monitor BG regularly for DM patients started on this class of med
- ▶ If pt at risk for DM, determine fasting glucose before initiating therapy and monitor closely during treatment
- ▶ Weight gain may require increased dosing of diabetes therapies.

Summary of FDA warning statement for atypical antipsychotics, 2004



Diabetes Education
SERVICES

Novel/ Atypical Antipsychotics Linked to Hyperglycemia

- ▶ Zyprexa – olanzapine
- ▶ Geodon - ziprasidone
- ▶ Seroquel – quetiapine
- ▶ Risperdal - risperadone
- ▶ Clozaril - clozapine
- ▶ Abilify – aripiprazole
- ▶ Latuda - lurasidone



*Consensus Development Conference on Antipsychotic Drugs and
Diabetes 2004*



Diabetes Education
SERVICES

Patient is Losing Weight

SR, 49 yr old woman w/ lean "type 2" 7 yrs.

- Monitors BG 1 x daily
- A1c 13.9%
- Insulin: 14 u Lantus at hs (uses pens)
- Humalog if BG > 200 (says too expensive)
- Also on Metformin 500mg BID
- At 5'7, her usual wt is 120, but now 106 lbs
- C/O of nausea, fullness, fatigue
- No health insurance



Diabetes Detective



- ▶ What other comorbidities are you suspecting?
- ▶ Any labs you would like to check?
- ▶ What type of diabetes?
- ▶ Social situation?
- ▶ Consider her lack of insurance and low income level during your discussion.
- ▶ Medication changes?



Diabetes Education
SERVICES

Suggested Med changes

- ▶ Regular insulin 2- 3 times a day – 3 units if don't check BG (eat 45 gms of carb)
- ▶ If check BG, add 1 unit for each 50 pts above 150
- ▶ Try and eat 3 times a day – use liquid calories as needed, low fiber
- ▶ Check BG at least once a day
- ▶ Weekly phone call check in



Diabetes Education
SERVICES

Hyperthyroidism

- ▶ Graves Disease (most common)
- ▶ 0.5 – 2.0% risk in type 1
- ▶ Autoimmune disorder:
 - ▶ Symptoms: wt loss, hypermetabolism, tremor, exophthalmos, palpitations, tachycardia, heat intolerance, nervousness, hyperglycemia
 - ▶ Diagnosis: Dx: low TSH, then check T3 & T4, autoantibodies, and thyroid scans
 - ▶ Treatment: antithyroid drugs, surgery, radioactive iodine. After treatment, may need thyroid replacement therapy.



Exophthalmos (bulging eyes)



Diffuse goiter

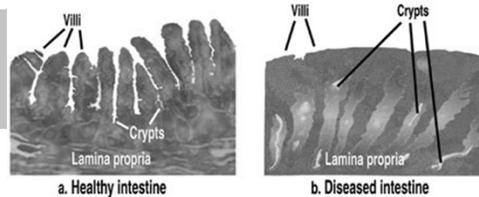
Graves' disease is a common cause of hyperthyroidism, an over-production of thyroid hormone, which causes enlargement of the thyroid and other symptoms such as exophthalmos, heat intolerance and anxiety

Normal thyroid
Enlarged thyroid

©ADAM

AACE Thyroid Guidelines 2002

Celiac Disease



- ▶ Type 1 – Affects 1-16%
- ▶ Immune reaction to gluten - affects function of villi in intestine, decreasing nutrient absorption
- ▶ S/S: bloating, malabsorption, wt loss, fatty stools, diarrhea, muscle tenderness, failure to thrive
- ▶ Diagnosis: measure either anti-endomysial antibodies (EMA) titers or tissue transglutaminase.
- ▶ If positive, refer to GI specialist for endoscopy and biopsy of small intestine to confirm diagnosis.

Disordered Eating

- ▶ “DiaBulimia”
- ▶ People with type 1 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



Diabetes Education
SERVICES

Gastroparesis



- ▶ Gastroparesis: affects 20 – 30% of pt's w/ longstanding dm
- ▶ Delayed emptying of stomach contents due to nerve damage
- ▶ S/S include early satiety, fullness, postprandial hypo, vomiting
- ▶ Diagnosis: gastric emptying studies, post-prandial hypoglycemia
- ▶ Tx: improve BG, small, low fat & fiber meals meds: reglan, erythromycin

Diabetes and Cancer

People with diabetes have a

- ▶ 2 fold higher risk for cancers of
 - ▶ the liver, pancreas and endometrium
- ▶ 1.2 to 1.5 fold risk of cancers of the
 - ▶ colon, breast and bladder.
- ▶ Lower risk of prostate cancer only.



Links



- ▶ Cancer is the 2nd leading cause of death in U.S.
- ▶ Diabetes is the 7th leading cause of death
- ▶ *Cancer and diabetes diagnosed within the same individual more frequently than would be expected, even after adjusting for age.*



Diabetes Education
SERVICES

7

Facts about Steroids and Cancer

- ▶ Glucose levels tend to normalize overnight
- ▶ Primarily effects post meal BG
- ▶ Insulin always works
 - ▶ Bolus insulin ac breakfast, lunch. Dinner as needed.
 - ▶ Basal or 70/30 insulin given in am
- ▶ Oral agents may work
- ▶ Consult w/ RD, CDE's and other specialists as needed.



Diabetes Education
SERVICES



Cystic Fibrosis Related Diabetes (CFRD)

- ▶ Cystic fibrosis
 - ▶ Affects >30,000 in U.S.
 - ▶ 1000 children dx each year
 - ▶ Abnormally thick mucus clogs lungs
 - ▶ Partial fibrotic destruction of islet cell mass leads to hyperglycemia
 - ▶ Due to improved treatment, survival rates improving



Diabetes Education
SERVICES

Cystic Fibrosis Related Diabetes (CFRD)



- ▶ CFRD distinct clinical entity
 - ▶ Insulin deficient but not prone to ketosis
 - ▶ Slow moving – 2-4 yrs before diagnosis
 - ▶ Abnormal glucose tolerance associated with progressive clinical deterioration
 - ▶ Associated w/ poor nutritional status, lung disease, resp failure
 - ▶ Lowers survival rate at 30 yrs
 - ▶ Only 25% live to 30 w/ CFRD
 - ▶ 60% live to 30 years when no CFRD



Diabetes Education
SERVICES



Cystic Fibrosis Related Diabetes (CFRD)

- ▶ CFRD Magnitude with CF
 - ▶ 20% of adolescents
 - ▶ 40% of adult pts, develop CFRD
 - ▶ CFRD Consensus Panel recommends:
 - ▶ FPG yearly after 14 yrs age or symptoms
 - ▶ Monitor BG closely during steroid therapy
 - ▶ A1c may not be accurate (false low)
- Clinical Practice Recommendations for CFRD 2010



Diabetes Education
SERVICES

Cystic Fibrosis Related Diabetes (CFRD)



- ▶ Treatment Philosophy
 - ▶ “Eat, we will cover”
- ▶ Goal of therapy: maintain glucose/ weight
 - ▶ Daily cals – 120 to 150% RDA (2,400 – 3000)
 - ▶ 40% fat, 15-20% protein,
 - ▶ May be on steroid pulses
- ▶ Med regimen needs flexibility
 - ▶ Bolus insulin w/meals, carb counting + basal
- ▶ Monitor BG levels annually or if s/s of DM



Diabetes Education
SERVICES

NonAlcoholic Fatty Liver Disease (NAFLD)

- ▶ Increasing worldwide prevalence
 - ▶ 25% of adults
 - ▶ 75% of people w/ DM or obese
 - ▶ Up to 50% of obese children



NAFLD = greater than 5.5% fat in liver that can't be attributed to other cause .

Due to Insulin Resistance and Obesity

The Metabolically Benign & Malignant Fatty Liver - 2011



Diabetes Education
SERVICES

DM & Fatty Liver

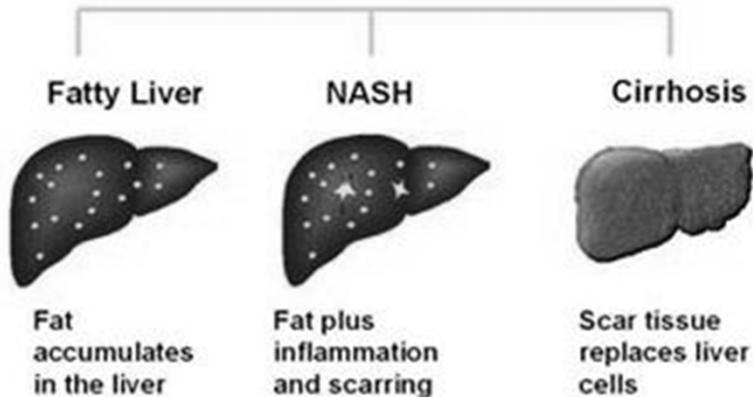
- ▶ Fatty Liver and hepatic inflammation is associated with insulin resistance and measures of visceral adiposity
- ▶ It also predicts:
 - ▶ Incidence of type 2 diabetes
 - ▶ Heart disease
- ▶ Fatty liver disease is directly involved in the pathogenesis of these diseases. Maybe a cause?



Diabetes Education
SERVICES

Natural History of NAFLD to NASH

The Spectrum of NAFLD



Diabetes Education
SERVICES

Non-Alcoholic Steatohepatitis

► Represents the hepatic manifestation of metabolic syndrome:

- Abdominal obesity
- Hypertension
- Diabetes
- Dyslipidemia



25 million Americans will develop NASH by 2025 with 20% progressing to cirrhosis, cancer or both



Diabetes Education
SERVICES



Finding Liver Disease

- ▶ No makers are accurate for diagnosing NASH – only biopsy (2015 – consider MRIs)
- ▶ Obese pts or those with metabolic syndrome should be evaluated
- ▶ Signs of advanced disease include:
 - ▶ Portal hypertension, spider angiomas, reddening of palms, declining platelet counts an family hx



Diabetes Education
SERVICES

Treating NAFLD

- ▶ Since there is no approved treatment for NAFLD and almost every patient with NAFLD will have to change their lifestyle – lose weight, exercise, and eat a healthy diet – it is not necessary to biopsy routinely." *NIH Clinical Center, Dr. Yaron Rotman*

Wt loss of 7-10% linked w/ 50% drop in liver fat
2015* Actos may be considered



Diabetes Education
SERVICES

NASH or SteatoHepatitis can lead to..

- ▶ Fibrosis and Cirrhosis
- ▶ Liver Cancer
- ▶ Liver Failure



Future epidemic of liver transplants??

Our role –

Emphasize healthy eating, weight loss and exercise!



Diabetes Education
SERVICES

Mr. Jones - What are Your Recommendations?

Patient Profile

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

Labs:

- ▶ A1c 9.3%
- ▶ HDL 37 mg/dl
- ▶ Triglyceride 260mg/dl
- ▶ Proteinuria - neg
- ▶ B/P 152/94

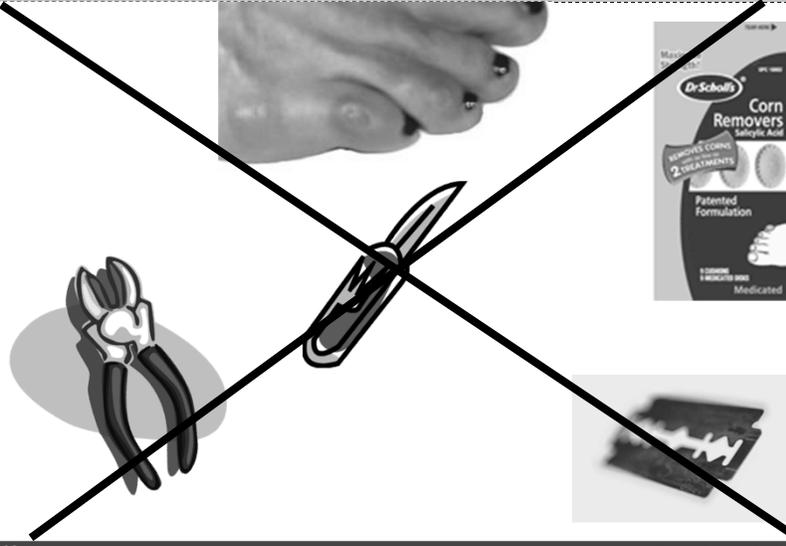
Self-Care Skills

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

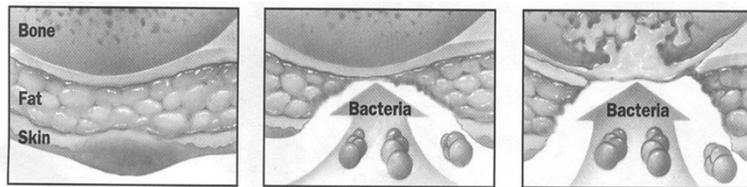


Diabetes Education
SERVICES

No Bathroom Surgery



Foot Wounds



↑
Blisters
Calluses

↑
Ulcers

↑
Bone infection

Lower Extremities

▶ Lift the Sheets and Look at the Feet



Diabetes Education
SERVICES

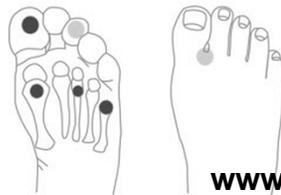
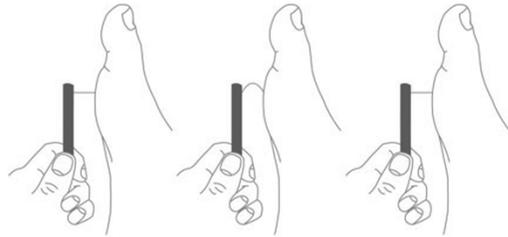
You Can Make A Difference

- ▶ Assess
 - ▶ Nail condition, nail care, in between the toes
 - ▶ Who trims your nails
 - ▶ Have you ever cut your self?
 - ▶ Shoes – type and how often
 - ▶ Socks
 - ▶ Skin/skin care and vascular health
 - ▶ Ability to inspect
 - ▶ Loss of protective sensation



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5.07 monofilament delivers 10gms linear pressure



10 Free Monofilaments
www.hrsa.gov/hansensdisease/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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“Getting diabetes saved my life.”
~ Sherri Sheperd



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



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In Conclusion

“Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.”



—Margaret Mead



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Mahalo



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LEVEL 3
CDE
BOOT CAMP

Preparing for
CDE Exam

**WEBCAST
SERIES**

8 Courses Series
Earn 10.5 CEs

Register NOW
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- ▶ Our Level 3 Boot Camp CDE® is the next step on **your path** to becoming a Certified Diabetes Educator.
- ▶ Designed to help you pass the CDE® Exam.
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Preparing for CDE[®] Exam

Handout 2016

Beverly Dyck Thomassian, RN, MPH, BC-ADM, CDE[®]
President, Diabetes Education Services



Preparing For the CDE[®] Exam

- Eligibility requirements
- Test Updates
- Get ready for success



*Certified Diabetes Educator[®] and CDE[®] are registered marks owned by NCBDE. The use of DES products do not guarantee successful passage of the CDE[®] exam. NCBDE does not endorse any preparatory or review materials for the CDE[®] exam, except for those published by NCBDE.”



Topics

- ▶ Eligibility requirements
- ▶ Definition of a Diabetes Educator
- ▶ Exam content
- ▶ Study strategies
- ▶ Test taking tips
- ▶ Resources



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Some Notes of Clarification

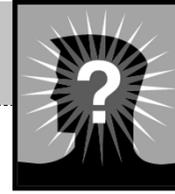
- ▶ Diabetes Ed Services has no relationship with National Certification Board of Diabetes Educators (NCBDE).
- ▶ For more info visit www.ncbde.org



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Why Take the CDE® Exam®



- ▶ Demonstrates to people with diabetes, employers, and third party payers that the CDE® possesses distinct and specialized knowledge, thereby promoting quality of care for patients with diabetes.
- ▶ CDE® is the recognized standard for competence in diabetes self-management education.
- ▶ Given the diabetes epidemic, access to CDE®s is critical



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What is a CDE®?

- ▶ A health care professional with comprehensive knowledge and experience in diabetes management, pre-diabetes, and diabetes prevention.
- ▶ Educates and supports people w/ diabetes to understand and manage the condition.
- ▶ Promotes self-management to achieve individualized behavioral and treatment goals that optimize health outcomes.



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Professional Qualifications to take CDE® - excerpted from NCBDE

- ▶ RN, clinical psychologist, OT, optometrist, pharmacist, PT, (M.D. or D.O.), or podiatrist w/ current license from U.S. or its territories.
- ▶ RD w/ CDR registration, PA w/ active registration with NCCPA, or exercise physiologist w/ active certification and Registered CEP® (master's degree).
- ▶ HCP w/ at least a master's degree in social work from accredited U.S. College



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2016 - Professional Practice Experience – Must meet all

- ▶ A minimum of two years (to the day) of professional practice experience in the discipline under which one is applying for certification

AND

- ▶ Minimum of 1,000 hours of professional practice experience within the past 4 years in diabetes self-management education with a minimum of 40% (400 hours = about 8 hrs a week) accrued in the most recent year preceding application.

AND

- ▶ Minimum of 15 clock hours of continuing diabetes education within 2 years prior to applying for certification.



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From NCBDE Handbook

Yes No

1. As a clinical psychologist, registered nurse, occupational therapist, optometrist, pharmacist, physical therapist, physician, podiatrist, master certified health education specialist, certified clinical exercise specialist, registered clinical exercise physiologist, registered dietitian, dietitian nutritionist, or registered physician assistant, is your license, certification or registration current, active and unrestricted?*

OR

Do you hold a minimum of a master's degree in social work from a United States college or university accredited by a nationally recognized regional accrediting body?

OR

If you do not meet either of these, you are encouraged to investigate NCBDE's Unique Qualifications Pathway. Please visit our website for more information on that pathway.

2. Has your practice experience occurred within the United States or its territories?
3. Has all your practice experience occurred since you met requirement #1 above?
4. Do you have a minimum of 2 calendar years (to the day) of practice experience since you received the license, registration or advanced degree as outlined above (within the last 4 years)?
5. Have you accrued 1,000 hours of practice experience in diabetes self-management education (DSME) within the last 4 years?
6. Has a minimum of 40% (or 400 hours) of the 1,000 hours of DSME practice experience been accrued within the past year?
7. Have you completed a minimum of 15 hours of continuing education activities** applicable to diabetes within the past 2 years?

If the answer to any of the above questions is "no", you are not ready to apply for the Certification Examination for Diabetes Educators.

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New- Health Educators



- ▶ Individuals holding the Master Certified Health Education Specialist (MCHES) credential,
- ▶ Plus meet all of the NCBDE eligibility requirements
- ▶ See www.ncbde.org for info.



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New- Unique Qualifications Pathway –

- ▶ Designed for health professionals holding an advanced degree in a health related area/concentration
- ▶ This pathway has different eligibility requirements and involves a “pre-application” process plus 2000 hrs DSME.
- ▶ For more: info@ncbde.org or call 877 -239- 3233



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Professional Degree, DSME Practice Hours, plus CE

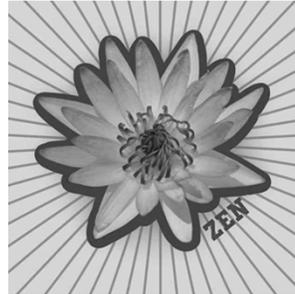
- ▶ Only experience occurring AFTER completing your professional degree can be counted toward the Professional Practice Experience requirement.
- ▶ Need 1000 hours of DSME Practice Hours
- ▶ If on Unique Qualifications Pathway, need 2000 hours of DSME



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Practice hours through Volunteering

- ▶ 1000 of the needed professional practice hours can be gained through providing DSME as a volunteer
- ▶ Supervisor must attest that DSME provided meets criteria



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On the Other Hand



- ▶ These are some activities that don't count toward practice hours.



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Professional practice experiences NOT considered diabetes education



- ▶ Demonstration of a skill that does not include some or all of the components of the DSME Process
- ▶ supervising and managing other professionals
- ▶ Providing medical assessment, diagnosis or treatment
- ▶ Conducting/ participating in research activities in which the individual is not involved in DSME
- ▶ Dispensing/ prescribing meds, unless part of DSME process



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Not Considered diabetes education experience cont'd



- ▶ Promoting or selling medications, diabetes supplies or products
- ▶ Providing continuing education to professionals
- ▶ Membership and committee work in professional organizations
- ▶ Having diabetes or caring for family member w/diabetes
- ▶ Diabetes-related volunteer activities that do not include some or all of the components of the DSME Process



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Quick Question – Multiple answers

What are some of the underlying themes of the CDE exam?

- a. CDEs motivate people to change behavior
- b. CDEs empower patients to improve diabetes self-management
- c. CDE's consider the individuals needs, goals and life experiences
- d. CDE's help all people with diabetes achieve an A1c less than 7%
- e. CDEs collaborate and provide ongoing care



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DiabetesEd.net > Resources



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Definition of Diabetes Self-Management Education (DSME)

- Health professionals who have appropriate credentials and experience
- It involves person with prediabetes or diabetes, caregivers and educator
- Defined as ongoing process of facilitating the knowledge, skill, and ability necessary for self-care.



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Definition of DSME (cont'd)

- ▶ Is a component of a comprehensive plan of diabetes care.
- ▶ Incorporates needs, goals and life experiences and is guided by evidence-based standards.
- ▶ Goal is to support
 - ▶ informed decision-making,
 - ▶ self-care behaviors,
 - ▶ problem-solving and
 - ▶ active collaboration with health care team to improve clinical outcomes, health status, and quality of life.



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DSME Defined for Practice Experience

- ▶ For purposes of certification eligibility, some or all of the following components of the DSME process may be performed and counted towards meeting the DSME practice experience requirement:



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What's included in DSME?

1. Assessment and education plan developed by individual and educator(s) to direct
 - ▶ appropriate educational interventions and
 - ▶ self-management support strategies.
2. Educational interventions to help individual
 - ▶ achieve self-management goals.
3. Periodic evaluations to determine if goals met
4. Personalized follow-up plan
5. Documentation
6. Program development and admin provided in support of the diabetes patient education.



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Applying to take the CDE® Exam

At the time of your online application you will receive:

- ▶ On-line notification of either approval
- ▶ Or that you have been selected for audit
- ▶ If you are submitting a paper application, call AMP if it has been more than 4 weeks since application was mailed and you have not received notice of receipt or audit. Call the AMP at (913) 895-4600



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What is included in audit if requested?

- ▶ Licensure
- ▶ Documentation of Professional Practice Experience –
 - ▶ A journal of weekly hours of providing DSME
 - ▶ Supervisor to verify
- ▶ CE course verification
- ▶ Employment verification signed by supervisor



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Test Taking Window – 2016 Change

- ▶ Starting on January 15, 2016
- ▶ The exam is administered on an ongoing basis
- ▶ Once application approved, candidates must schedule their testing appointment within a 90 day window on a date of their choosing
 - ▶ schedule an appointment to take the examination on a first-come, first-served basis through AMP's online scheduling system
 - ▶ See application booklet for more details



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When will I get my results?

- ▶ You will receive your test results the same day
- ▶ You can retake the test as many times as needed
- ▶ Cost –
 - ▶ 1st time \$350
 - ▶ Renewal - \$250



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Scoring the Exam

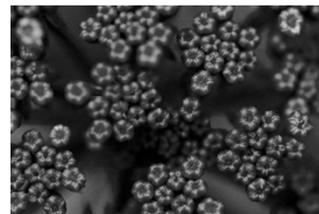
- ▶ Reported as raw and scaled scores
 - ▶ Raw score: number of right answers
 - ▶ Scaled score: statistically derived from the raw score
- ▶ Total score determines pass/fail and is reported as a scaled score ranging between 0 and 99
- ▶ To pass: 70 scaled score units



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CDE[®] Exam Pass rates over time

- ▶ 2007 – 81%
- ▶ 2008 – 80%
- ▶ 2009 – 69 % (test changed based on work study analysis and computerized)
- ▶ 2010 – 69%
- ▶ 2011 -65%
- ▶ 2012 – 63.5%
- ▶ 2013 – 67 and 69%
- ▶ 2014 - 66 and 67%
- ▶ 2015 - 62 and 64% (test updated)



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Overview of CDE® Exam



- ▶ Composed of 200 multiple-choice, objective questions with a total testing time of four (4) hours.
- ▶ Based on job analysis completed in 2013, which surveyed diabetes educators about the tasks they performed.



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Exam Details

- ▶ Questions are linked directly to a task or tasks.
- ▶ Each question is designed to test if the candidate possesses the knowledge necessary to perform the task or has the ability to apply it to a job situation.
- ▶ 25 of the 200 questions are new - but are **not** counted in the determination of individual examination scores.



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Quick Question – Multiple answers

What are some study strategies that will help you succeed?

- a. Focus your study time on topics you are confident in.
- b. Take as many practice tests as possible
- c. Read as many books on diabetes as possible
- d. Develop a study plan and block off study time.
- e. Teach the content to someone else



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Exam Content

- ▶ Assessment (60)
 - ▶ Learning/Self-Care Behaviors (20)
 - ▶ Medical, Psycho-Socioeconomic and Health Status (20)
 - ▶ Current Knowledge and Self-Management Skills (20)



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Exam Content

▶ Intervention (89)

- ▶ Collaboration with Patient, Family, Caregiver, and Healthcare Team (16)
- ▶ Teach/Counsel Regarding Principles of Diabetes Care (50)
- ▶ Evaluate, Revise and Document (17)
- ▶ Follow-up and Referral Recommendations (6)



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Exam Content

▶ Education and Program Standards (26)

- ▶ National Standards for Diabetes Self Management Education (8)
- ▶ Clinical Practice (16)
 - ▶ Inpt and Outpt Standards for ADA, AACE
- ▶ Promote Diabetes Advocacy (2)



- ▶ For detailed outline look in Testing Handbook



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Hope you don't mind a post directly from NCBDE posted on Linked In 2015

- ▶ Exam questions are created using any number of resources/references and each question has to be tied directly to a task on the exam content outline.
- ▶ A helpful idea- think outside your area of practice or population when reviewing the exam content outline
 - ▶ work with an adult population - think about pediatrics or gestational –
 - ▶ or mainly Type 1 population - think about Type 2 population.
- ▶ Then look for resources (whether say c.e. activities or hard copy/online resources) that will help you address those areas of weakness.
- ▶ The Exam handbook has information about preparing for the exam, including the exam content outline.
- ▶ Info on preparing for the exam can be found on pg 14; Appendices III-V include the exam content outline, sample questions, and list of potential references (starting on pg 22). Hope that helps and best of luck!



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What to Study?

Articles to Review

§ Indicates very important info to review in preparation to become a CDE®

§ ADA-Standards of Care PDF 2016- This yearly publication by the American Diabetes Association outlines the goals of care for diabetes management. Since it is evidenced based, it includes a useful summary of the trials and research that the goals are based on. A must read if you are entering the diabetes field or preparing to take the CDE® or BC-ADM Exam.

2016 ADA Primary Care Abridged Standards Of Care 2016- A summary of key points and updates in the yearly publication by the American Diabetes Association.

§ Screening and Diagnosis of Diabetes Mellitus 2016 – One page cheat sheet that summarizes screening, risk status and diagnostic criteria for diabetes.

§ AACE Comprehensive Diabetes Management Algorithm 2015. A slide set summary of the ACE/AACE Statement by an American Association of Clinical Endocrinologists/American College of Endocrinology Consensus Panel on Type 2 Diabetes Mellitus. Encourage all those planning to take CDE® exam to review this info carefully.

§ ADA 2013 Nutrition Therapy Recommendations for Adults with Diabetes – Guidelines

§ The Scope of Practice, Standards of Practice, and Standards of Professional Performance for Diabetes Educators (2011). Chicago, IL: American Association of Diabetes Educators – a must read for anyone entering the field of diabetes or as a reference for those already in the field.

§ Diabetes Self-Management Education and Support 2015 – A joint position statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. An important document to review for those providing Diabetes Self-Management Education or those considering take the certification exam.

§ Management of Hyperglycemia in Type 2 Diabetes – 2015 Update – A Patient Centered Approach » This hyperglycemia roadmap was developed in collaboration by the American Diabetes Association and the



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AADE – The Art and Science and Review Guide

New Art and Science

Our Price: \$229.00

Both Books for \$279

2015 Review Guide:

Includes 400 questions

- ▶ 2 practice exams, New questions
- ▶ Test taking tips
- ▶ Self-Assessment



DiabetesEd.net>Books and Study

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- ▶ Our Level 3 Boot Camp CDE® is the next step on **your path** to becoming a Certified Diabetes Educator.
- ▶ Designed to help you pass the CDE® Exam.
- ▶ Recorded and Ready for Viewing – Special \$199 for Hawaii attendees!
- ▶ Use coupon code Aloha



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Taking the Test

- ▶ Questions
- ▶ Answers
- ▶ Pitfalls



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Reading too Fast Pitfalls

- ▶ Choosing a “good” answer, but not the right one for the stem
 - ▶ key intent of question
- ▶ Failing to read an important words (always, never, most, probably, usually)
- ▶ Choosing an answer you did not understand because the others seem too easy



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Empowerment Errors

- ▶ Focusing on the medical need rather than the psychosocial needs
- ▶ Failing to keep in mind the patient's characteristics (age, type of diabetes, etc.)
- ▶ We are supporting patients efforts toward behavior change.



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Thinking Pitfalls

- ▶ Imagining a right answer and getting thrown when it is not among the choices
- ▶ Over thinking question/answers
- ▶ Choosing an answer that did not fit the situation
- ▶ Using the goals in your clinical setting. Focus on national goals.



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Take a Practice Test – Learn how to “work” test questions

- ▶ Weed through the details
- ▶ Make sure you REALLY understand key intent of question
- ▶ Find the stem
 - ▶ Identifies key intent of the question
- ▶ Read all the options or answers
- ▶ Eliminate obvious wrong answers
- ▶ Select BEST option



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Look for Clues in The Answers

- ▶ Answers with the following words are usually incorrect: always, never, all, none, only, must, and completely
- ▶ Answers with the following words are usually correct: seldom, most, generally, tend to, probably, usually



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Getting to the Right Answers



- ▶ Do not leave any answers blank
- ▶ Look for clues in the question
- ▶ Don't get lured in by juicy answers
- ▶ Avoid imposing your life experience into the question/answer
- ▶ Keep breathing – Get up and move
- ▶ Even simple math problem should be worked out on scratch paper



Three Types of Questions

- Recall – facts, principles, procedures
- Application – ie – application of knowledge that varies based on pt characteristics
- Analysis – integration or synthesis of a variety of concepts or elements (ie evaluating complex problems with many variables).



Sample Question -1

- ▶ A patient is admitted to the hospital with elevated glucose levels with a strong family history of diabetes. She is started on fluid replacement and is placed on a clear liquid diet. Her father is in the room and is very concerned. Which of the following would suggest a diagnosis of new onset type 1 diabetes vs type 2 diabetes?
- A. Hyperglycemia
 - B. Polyuria
 - C. Ketosis
 - D. Polydipsia



application

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Sample Question 2

- ▶ MJ has type 1 diabetes and wants to know the possible complications that can result from hyperglycemia during the first trimester of pregnancy. Which of the following complications can result from 1st trimester hyperglycemia?
- A. macrosomia
 - B. vascular defects
 - C. shoulder dystocia
 - D. spina bifida



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Vignette Style Question

- ▶ Read the following vignette to answer the next 3 questions.
- ▶ A 47 yr old man with newly diagnosed type 2 diabetes.
Additional known information.
 - ▶ Married, with 2 teenagers
 - ▶ Professor, obese
 - ▶ Started on Metformin 500mg BID
 - ▶ Father died of kidney failure secondary to diabetes



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Vignette Style Question 1

- ▶ Given what you know about this patient, what emotions would you expect him to express?
 - A. Fear of hypoglycemia
 - B. Reluctance to start on insulin
 - C. Panic disorder
 - D. Fear of complications

▶ analysis



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Vignette Style Question 2

- ▶ What is most likely to be a potential barrier to lifestyle change?
 - A. Difficulty exercising due to obesity
 - B. Excessive alcohol intake
 - C. Teenage children
 - D. Long work hours



▶ analysis



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Vignette Style Question 3

- ▶ The patient requests information about healthy eating. Which meal planning approach best suits this individual until he can see a registered dietitian?
 - A. 1,200 calorie exchange plan
 - B. Avoid all concentrated sweets
 - C. Eat 3 meals a day with snacks in between
 - D. Healthy eating based on the “My Plate” method

▶ application



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Sample Question 3

Metformin is an antidiabetic agent different than that of sulfonylurea drugs. Some features of the drug are that it:

- A. Stimulates insulin secretion and increases hepatic glucose production.
- B. Causes hypoglycemia
- C. Lowers hyperglycemia in persons with diabetes, but does not lower blood glucose levels in people without diabetes.
- D. Results in weight gain and increase in plasma glucose levels.

recall



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Sample question 4

A person with type 2 is on a twice daily dose basal/bolus insulin and complains of waking up with morning headaches. If the fasting capillary BG is 291, this person should be advised to:

- A. Increase evening dose of basal insulin
- B. Increase morning dose of bolus insulin
- C. Check 3am blood glucose
- D. Eliminate bedtime snack

analysis



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Study Habits

- ▶ Find your best time of day to study
- ▶ Determine your learning style
 - ▶ Auditory – discussion, study groups, tapes
 - ▶ Visual – books, handouts, notes, videos
 - ▶ Kinesthetic – workshops, demonstration
- ▶ Set up a study space
- ▶ Set up a study plan
 - ▶ Schedule your time
 - ▶ Make an appointment with yourself



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Study Group

- ▶ Set a location, time and schedule
- ▶ Have an agenda
- ▶ Set the rules
 - ▶ Everyone does their share
 - ▶ Everyone commits to attend
- ▶ Can be a great source of moral support and can help decrease test anxiety



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Study Time

- ▶ Review of what you know: 30 to 40%
- ▶ Learning new materials: 60 to 70 %
- ▶ CDE® prep courses, flash cards & sample tests
- ▶ Teach the content to someone else
- ▶ Use down time/waiting time productively



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Knowledge = Confidence

- ▶ Most important aspect of test taking
- ▶ Knowing the content will improve your confidence
- ▶ As you study your knowledge base expands



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Combating Test Anxiety

- ▶ Positive thinking and affirmations
- ▶ Use relaxation techniques we teach pts
- ▶ Take practice exam
- ▶ Rest well night before
- ▶ Know how to get to test site
- ▶ Arrive at exam room early
- ▶ Know your stuff – self-study or courses



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CDE® Success Page



I passed the CDE exam! Yippee!

I'm SO glad I took the CDE Boot Camp class online as the exam was even harder than I expected. Thanks for your tips for passing! I will happily recommend your course to anyone planning to take the CDE. — Alana Busekrus, BSN, RN, CDE

[Read More Reviews](#)

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