Important Stuff

- Welcome to our First Boot Camp ever
- We will meet for 5 consecutive Thursdays – from 11:30am to 1pm
- I will stay after the program to answer any questions “off – line”
- The course will be recorded and available for viewing within 4 hours of completion of the session
- Login to the Online University to hear the recorded version, take the quiz and get your CEs
- Please email us with any questions or concerns at Lainey@diabetesed.net

Getting Ready to take CDE Exam

- Recorded Webcast
- Online Courses
- Take as many practice tests as possible
- Study what you DON’T know
- Keep it Positive
- But MOST important
  - Remember the Journey
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.
- Spring test takers won’t get results for 8 wks.

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.

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.
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.

What to Study?

**Articles to Review**

- AADA Standards of Care PDF – This yearly publication by the American Association of Diabetes Educators outlines the goals of care for diabetes management. Since it is evidence-based, it is a summary of the task and research that the goals are based on. A enduring the examiner need of preparing to take the CDE® or NCQI exam.
- AACE/ACCG standa ed Diabetes Management Algorithm 2012. A consensus statement by an American Association of Clinical Endocrinologists and the American College of Endocrinology. This can help the exam board to review the information carefully.
- The Scope of Practice, Standards of Practice, and Standards of Proficiency for Diabetes Educators (2015). Change & Education for Educators – a need for anyone entering the field of diabetes or who is already in the field.
- Download CDE Examination Content Outlines from NCQI Handbook
- Screening and Diagnosis of Diabetes Mellitus 2016 – A fast-paced guide to the screening and diagnosis criteria for diabetes. A great tool for your point of care.

**AADE – The Art and Science of Diabetes Self Management Education – 3rd Ed**

New Art and Science
Our Price: $229.00
Both Books for $279
Includes 400 questions
- 200 in book,
- 200 computer based
Diabetes - More than Hyperglycemia

- Discuss the epidemiology of diabetes.
- Describe the pathophysiology of diabetes and insulin resistance.
- State the diagnosis and risk factors for type 2 diabetes.
- List the goals of care.
- Discuss treatment strategies.

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”

CDC Announces

35% of Americans will have Diabetes by 2050

Boyle, Thompson, Barker, Williamson
2010, Oct 22;8(1)29
www.pophealthmetrics.com
Diabetes in America 2014

- 29 million or > 9.3%
- 27% don’t know they have it
- 37% of US adults have pre diabetes

Age-adjusted Diabetes Prevalence
20 yrs or older, by race/ethnicity—U.S. 20014

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

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>BMI Cut-off</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Asians</td>
<td>24 kg/m²</td>
</tr>
<tr>
<td>Chinese</td>
<td>25 kg/m²</td>
</tr>
<tr>
<td>African American</td>
<td>26 kg/m²</td>
</tr>
<tr>
<td>Whites</td>
<td>30 kg/m²</td>
</tr>
</tbody>
</table>

BMI Cutoff for Diabetes Risk Differs based on Ethnicity

32% of Medicare dollars go to Treat diabetes.

- **2012 - Total cost of diabetes $245 billion**
  - Indirect costs: $69 billion (disability, work loss, premature mortality)
  - People with diabetes had 2-4 x's greater medical expenditures

- The largest components of medical expenditures are:
  - 43% - hospital inpatient care
  - 18% - prescription meds to treat complications
  - 12% - diabetes meds supplies
  - 9% - physician office visits
  - 8% - nursing/residential facility stays

Pancreas – Hormones that lower BG

**Beta Cells - Insulin**
- Anabolic hormone - helps store glucose as glycogen in muscle, liver
- secreted in response to elevated glucose
- halts breakdown of glycogen in liver
- increases protein synthesis, fat storage
- powerful hypoglycemic

**Beta Cells - Amylin**
- secreted in 1:1 ratio with insulin
- Causes satiety
- Lowers post-prandial glucagon response
- Slows gastric emptying
- Type 1 make none
- Type 2 make less than normal amounts
Pancreas – Hormone Raises BG

**Alpha cells - Glucagon**
- Opposes action of insulin at the liver
- Stimulated in response to low glucose levels
- Stimulates liver to convert glycogen to glucose
- Inhibits liver from glucose uptake
- Causes hyperglycemia

---

**Hormones Effect on Glucose**

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucagon (pancreas)</td>
<td></td>
</tr>
<tr>
<td>Stress hormones (kidney)</td>
<td></td>
</tr>
<tr>
<td>Epinephrine (kidney)</td>
<td></td>
</tr>
<tr>
<td>Insulin (pancreas)</td>
<td></td>
</tr>
<tr>
<td>Amylin (pancreas)</td>
<td></td>
</tr>
<tr>
<td>Gut hormones – incretins (GLP-1) released by L cells of intestinal mucosa, beta cell has receptors</td>
<td></td>
</tr>
</tbody>
</table>

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**Signs of Diabetes**

- Polyuria: Glycosuria, H₂O losses
- Polydipsia: Dehydration
- Polyphasia: Fuel Depletion
- Weight loss: Loss of body tissue, H₂O
- Fatigue: Poor energy utilization
- Skin and other infections: Hyperglycemia increases incidence of infection
- Blurry vision: Osmotic changes
Natural History of Diabetes

Normal
FBG <100
Random <140
A1c <5.7%

Prediabetes
FBG 100-125
Random 140-199
A1c ~ 5.7-6.4%
50% working pancreas

Diabetes
FBG 126 +
Random 200 +
A1c 6.5% or +
20% working pancreas

Development of type 2 diabetes happens over years or decades

Diagnostic Criteria

- All test should be repeated in the absence of unequivocal hyperglycemia
- If test abnormal, repeat same test to confirm diagnosis on a different day
- If one test normal, the other abnormal, repeat the abnormal test to determine status
- Medicare still using fasting as criteria for reimbursement for education

What Kind of Diabetes?

AJ, a 22 year old female admitted to the ICU with a blood glucose of 476 mg/dl and a pH of 7.1.

- What further questions and or testing is needed to determine if patient has type 1 or type 2 diabetes?
Type 1 Diabetes

Type 1 Diabetes Facts
- As many as 3 million Americans may have type 1 diabetes.
- Each year, approximately 60 people per day are diagnosed with type 1 diabetes in the U.S.
- Approximately 85 percent of people living with type 1 diabetes are adults, and 15 percent are children.
- The rate of type 1 diabetes incidence among children under age 14 is estimated to increase by 3 percent annually worldwide.
- Type 1 diabetes accounts for $14.9 billion in healthcare costs in the U.S. each year.

Type 1 Rates Increasing Globally
- 23% rise in type 1 diabetes incidence from 2001-2009
- Why?
  - Autoimmune disease rates increasing overall
  - Changes in environmental exposure and gut bacteria?
  - Hygiene hypothesis
  - Obesity?
Incidence of Type 1 in Youth

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

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

- Auto-immune pancreatic beta cells destruction
- Most commonly expressed at age 10-14
- Insulin sensitive (require 0.5 - 1.0 units/kg/day)

- Combo of genes and environment:
  - Autoimmunity tends to run in families
  - Higher rates in non breastfed infants
  - Viral triggers: congenital rubella, coxsackie virus B, cytomegalovirus, adenovirus and mumps.

Type 1 Diabetes – Genetics and Risk Factors

- Combo of genes and disease susceptibility
- Risk Factors:
  - Autoimmunity tends to run in families
  - Higher rates in non breastfed infant
  - Viral triggers: congenital rubella, coxsackie virus B, cytomegalovirus, adenovirus and mumps.
  - Living longer (avg age expectancy 68.5)
How do we know someone has Type 1 vs Type 2?

- **Type 1**
  - Positive antibodies
    - GAD
    - ICA
    - IAA and others
  - Younger people develop quickly
  - Older people take longer to develop
  - Body wt and presentation

Autoantibodies Assoc w/ Type 1

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

Type 1 Diabetes Associated with other immune conditions

- Celiac disease (gluten intolerance)
- Thyroid disease
- Addison’s Disease
- Rheumatoid arthritis
- Other
How to Get Screened?
www.DiabetesTrialNet.org

› How to get families linked to screening?

AJ – Next Steps?
For AJ, a 22 year old newly diagnosed with T1DM
1. What baseline lab work, tests does she need?
2. What referrals?

Diabetes Lab Evaluation - ADA

<table>
<thead>
<tr>
<th>Test</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1c</td>
<td>Dx and 2-4 x’s a yr</td>
</tr>
<tr>
<td>Fasting lipid profile</td>
<td>Dx and Annually</td>
</tr>
<tr>
<td>Microalbuminuria</td>
<td>Dx and annually</td>
</tr>
<tr>
<td>Creatinine / GFR</td>
<td>Dx and Annually</td>
</tr>
<tr>
<td>Thyroid Stimulating Hormone</td>
<td>Dx and Annually</td>
</tr>
<tr>
<td>(type 1 over 50, hyperlipidemia, women &gt;50)</td>
<td></td>
</tr>
<tr>
<td>Screen for Celiac Disease</td>
<td>Type 1 Dx, repeat prn</td>
</tr>
<tr>
<td>Liver function test</td>
<td>Annually</td>
</tr>
</tbody>
</table>
Comprehensive Diabetes Evaluation – Referrals - ADA

- Annual dilated eye exam
- Family planning women of reproductive age
- Registered Dietitian for MNT
- Diabetes Self-Mgmt Program
- Dental exam
- Mental Health Professional, if needed

ADA Clinical Practice Recommendations

Type 1 Summary

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

Patti Labelle
"divabetic" -- that's a mix of diabetic and diva
BMI – Visual Image

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

Diabetes 2 - Who is at Risk?
(ADA Clinical Practice Guidelines)

1. Testing should be considered in all adults who are overweight (BMI ≥ 25) and have additional risk factors:
   - First-degree relative w/ diabetes
   - Member of a high-risk ethnic population
   - Habitual physical inactivity
   - PreDiabetes
   - History of heart disease
Diabetes 2 - Who is at Risk?

(ADA Clinical Practice Guidelines)

Risk factors cont’d

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

Acanthosis Nigricans (AN)

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

What is Type 2 Diabetes?

- Complex metabolic disorder ....
  (Insulin resistance and deficiency)
with social, behavioral and environmental risk factors unmasking the effects of genetic susceptibility.

New Diagnosis?
Call 800 – DIABETES to request “Getting Started Kit”
www.Diabetes.org
Natural Progression of Type 2 Diabetes

Ominous Octet

Comparison of Type 1, Type 2, LADA
Diabetes is also associated with

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

Other Types of Diabetes

- Gestational
- Other specific types of diabetes

Gestational DM ~ 7% of all Pregnancies

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

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

Diabetes in pregnant mothers associated with ...

- Offspring
  - Fetal Complications
  - Obesity and diabetes later in life
- Mother
  - More complicated pregnancy and delivery
  - Diabetes later in life
- Intrauterine environment is important

Screen Pregnant Women Before 13 weeks

- Screen for undiagnosed Type 2 at the first prenatal visit using standard risk factors.
- Women found to have diabetes at their initial prenatal visit treated as “Diabetes in Pregnancy”
- If normal, recheck at 24-28 weeks
GDM Criteria - 2 Options
“1 Step” – 75 gm OGTT

- 24-28 weeks
- OGTT in am after overnight fast of 8 or > hrs
- **GDM Diagnosis if ANY** of the following values met or exceeded:

  - **FBG**
  - **1 HR**
  - **2 HR**

<table>
<thead>
<tr>
<th>Value</th>
<th>Impaired Glucose Tolerance</th>
<th>NIDDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥92</td>
<td>≥180 or</td>
<td>≥153</td>
</tr>
</tbody>
</table>

Based on Hyperglycemia and Adverse Pregnancy Outcomes Study - IADPSG

GDM Criteria - Option 2
“NIH 2 step”

**Step 1**
- 50 gm Oral Glucose Tolerance Test (non-fasting)
- If BG 140* at 1 hour proceed to Step 2
- Step 2 – 100 gm Oral Glucose Tolerance (fasting)

**GDM Diagnosis if 2 values are met or exceeded**

<table>
<thead>
<tr>
<th>Glucose Concentration</th>
<th>Impaired Glucose Tolerance</th>
<th>NIDDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 mg/dL (5.3 mmol/L)</td>
<td>105 mg/dL (5.8 mmol/L)</td>
<td></td>
</tr>
<tr>
<td>140 mg/dL (7.8 mmol/L)</td>
<td>190 mg/dL (10.6 mmol/L)</td>
<td></td>
</tr>
<tr>
<td>155 mg/dL (8.6 mmol/L)</td>
<td>165 mg/dL (9.1 mmol/L)</td>
<td></td>
</tr>
<tr>
<td>180 mg/dL (9.9 mmol/L)</td>
<td>185 mg/dL (10.3 mmol/L)</td>
<td></td>
</tr>
</tbody>
</table>

**Postpartum after GDM**

- 50% risk of getting diabetes in 5 years
- Screen at 6-12 wks post partum
- Repeat at 3 yr intervals or signs of DM
  - Encourage Breast Feeding
  - Encourage weight control
  - Encourage exercise
  - Make sure connected with health care
  - Lipid profile/ follow BP
  - Preconception counseling

**NIDDK**: National Diabetes Data Group.  *American College of Obstetricians and Gynecologists (ACOG) recommends a lower threshold of 135 mg/dL (7.5 mmol/L) in high-risk ethnic minorities with higher prevalence of GDM; some experts also recommend 130 mg/dL (7.2 mmol/L).
Start Metformin therapy

- For women with PreDiabetes and History of GDM

Online Courses

- Kids
- Older Adults
- Women

Other Specific Types of DM

- Medications such as: steroids, protease inhibitors and Prograf®
- Secondary to Agent Orange
- Liver failure
- TPN or tube feedings
- Pancreatic cancers or removal
- Cystic fibrosis, pancreatitis
- Other
Regardless of the cause, hyperglycemia needs to be treated.

Objectives for Insulin Resistance and Vascular Disease
- Describe the impact of insulin resistance
- State the factors associated with cardiometabolic risk.
- State strategies to maintain oral health and keep lower extremities healthy

Insulin Resistance is the Seed
Factors Associated with Insulin Resistance

- Abdominal obesity
- Sedentary lifestyle
- Genetics / Ethnicity
- Gestational Diabetes
- Polycystic ovary syndrome
- Acanthosis Nigricans
- Obstructive Sleep Apnea
- Cancer

Heart Disease & DM = 3-5xs Risk

- CHF
  - 7.9% w/ diabetes vs. 1.1% no diabetes
- Heart attack
  - 9.8% w/ diabetes vs. 1.8% no diabetes
- Coronary heart disease
  - 9.1% w/ diabetes vs. 2.1% no diabetes
- Stroke
  - 6.6% w/ diabetes vs. 1.8% no diabetes
**Vascular Disease & Diabetes** “atherosclerosis”

- Normal endothelial cells are protective
- Abnormal glucose = Endothelial cell dysfunction
- Lower Nitric Oxide levels = Poor vasodilation
- Release of inflammatory mediators
- Higher aldosterone levels
- Adipokines = > angiotensin = HTN
- = Increased risk of acute thrombotic event
- Increased arterial stiffness
  - Due to chronic hyperglycemia, endothelial inflammation

---

**Risk of CVD Is Elevated prior to Diagnosis of Type 2 Diabetes**

![Relative Risk of MI or Stroke Chart]

- Non-diabetic throughout study
- 18 yrs or more before diagnosis
- 10-14 yrs before diagnosis
- <10 years before diagnosis

*Mi = myocardial infarction. Nurses Health Study

**CardioVascular Risk Factors**

*The more risk factors = greater risk of heart disease and diabetes
ADA 2007*
Cardio Metabolic Risk - 5 Hypers -

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

Manifestations of Insulin Resistance

Bottom Line

- Cardiovascular disease is the leading cause of death for people with diabetes
- 65% of people with diabetes die from heart disease (36% in general population)
- Prevention and aggressive treatment of diabetes is critical

Vascular Risk Factors

- Nonmodifiable
  - Duration of diabetes – longer = more risk
  - Age – older increased risk
  - Gender – women have more CV protection pre-menopause
  - Race – risk varies
  - Genetics – family history
Vascular Risk Factors

- Modifiable
  - Blood Pressure
  - Lipids
  - Smoking
  - Obesity
  - Other factors – lack of exercise, Type A personality, dietary habits

Peripheral Vascular Disease – Venous Disease

- On exam
  - Skin brownish, reddish, mottled
  - Skin warm to touch, may be edematous
  - May have stasis ulcers on lower leg
  - Pulses difficult to locate due to edema

- Treatment
  - Support hose
  - Elevate feet
  - Avoid constriction
  - Shoes that can accommodate feet

Peripheral Arterial Disease (PAD)

- Affects 30% of people w/ dm over age 50
- Inadequate blood & oxygen to lower extremities
- Signifies ↑ risk of stroke, HTN, sudden death
- Pain w/ walking, relieved by rest “intermittent claudication”
- Pt c/o pain, cramping in calves, thighs, buttocks
- PAD + Neuropathy = increased amputation risk
Peripheral Arterial Disease
Intermittent Claudication

- Physical Exam – Skin
  - Pale or blue, purple
  - Dependent rubor, blanching when elevated
  - Cool to touch, loss of hair, nonhealing wounds, gangrenous
  - Diminished pulses
- Treatment = Protect feet
  - Avoid constriction, increase walking, stop smoking, medications and/or surgery

Profile of a High Risk Foot ADA

- Previous amputation
- Previous foot ulcer history
- Peripheral neuropathy
- Foot deformity
- Peripheral vascular disease
- Vision impairment
- Diabetic neuropathy (esp if on dialysis)
- Poor glycemic control
- Cigarette smoking

Diabetes and Amputations

- Rate declined by 65% from 1996-2008
  - From 11.2 per 1000 to 3.9 per 1000
- Diabetes = 8 fold risk of amputations
- Highest rate in those over 75
- 50% of amputations can be avoided through self-care skill education and early intervention
  - Stats from CDC 2012
No Bathroom Surgery

You Can Make A Difference

- Assess
  - Nail condition, nail care, inbetween 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

5.07 monofilament delivers 10gms linear pressure

10 Free Monofilaments
www.hrsa.gov/hansendisease/leap
5.07 monofilament delivers 10gms linear pressure

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

Three Most Important Foot Care Tips

- Inspect and apply lotion to your feet every night before you go to bed.
- Do NOT go barefoot, even in your house. Always wear shoes!
- Every time you see your doctor, take off your shoes and show your feet. Report any foot problems right away!
Periodontal disease and Heart Disease

- Heart disease link:
  - oral bacteria enter the blood stream, attach to fatty plaques in coronary arteries increasing clot formation
  - inflammation increases plaque build up, which may contribute to arterial inflammation
  - Hyperglycemia = Gingivitis = Heart Disease

Keeping Oral Healthy

- Oral disease linked with heart disease
- Dental exams (every 6 mo's)
- Metabolic control critical
- Quit smoking
- Pts may not understand importance of dental hygiene.
- Treat infections with ATB’x, can lower A1c by 1-2%. Lowering BG shortens infection.

Thank You