Diabetes in the 21st Century:
A Clinical and Educational Update

1. Describe impact of diabetes
2. Discuss prevention, management strategies
3. Discuss different types of diabetes
4. Describe insulin therapy
5. Gain understanding of Type 2 Meds.
6. Review glucose patterns and determine how to adjust therapy to improve glucose.
7. Describe carb counting
8. Discuss gut bacteria and healthy eating
9. Demonstrate successful teaching strategies

CDC Announces

35% of Americans will have Diabetes by 2050

Boyle, Thompson, Barker, Williamson
2010, Oct 22-26 | www.pophealthmetrics.com
13% of adults have diabetes (34 mil)
21% of those don’t know they have diabetes
35% adults have pre diabetes (88 mil)
85% of those don’t know they have prediabetes

Prevalence varied significantly by education level, an indicator of SES status
7.5% - More than high school education
9.7% - High school education
13% - Less than high school education

Socioeconomics – Diabetes Diagnosis

Prevalence varied significantly by education level, an indicator of SES status
7.5% - More than high school education
9.7% - High school education
13% - Less than high school education

CDC 2020
Diagnosed Diabetes by Ethnic Group

- Highest prevalence among
  - Indigenous people
  - Mexican and Puerto Ricans
  - Asian Indians and Filipinos

Global Epidemic

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

World Diabetes Day
November 14

The right education for all
Diabetes: protect our future

The right environment for all
Diabetes: protect our future
**Hormones Effect on Glucose**

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

**GLP-1 Effects in Humans**

Understanding the Natural Role of Incretins

GLP-1 secreted upon the ingestion of food

- Promotes safety and reduces appetite
- Alpha cells: ↑ Postprandial glucagon secretion
- Beta cells: Enhances glucose-dependent insulin secretion
- Liver: ↓ Glucagon reduces insulin glucose output
- Stomach: Helps regulate gastric emptying

GLP-1 degraded by DPP-4 w/in minutes

**GLP-1 Receptor Agonists & Injectables**

- **Exenatide (Symlin)**
- **Lanreotide (Sandostatin)**
- **Octreotide (Sandostatin)**
- **Liraglutide (Victoza)**
- **Semaglutide (Ozempic)**
- **DPP-4 inhibitors**

<table>
<thead>
<tr>
<th>Class/Action</th>
<th>Name</th>
<th>Dose Range</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLP-1 Receptor Agonist (GLP-1 RA)</td>
<td>exenatide (Symlin)</td>
<td>3 and 10 mg QD</td>
<td>Side effects: MTX, proteinuria, weight loss, injection site reaction, joint pain, headache, allergic reactions</td>
</tr>
<tr>
<td></td>
<td>lanreotide (Sandostatin)</td>
<td>2 mg 1 x a week</td>
<td>Approval for pediatric use 10 yrs +</td>
</tr>
<tr>
<td></td>
<td>liraglutide (Victoza)</td>
<td>0.6, 1.2, and 1.8 mg daily</td>
<td>Approved for pediatric use 10 yrs +</td>
</tr>
<tr>
<td></td>
<td>semaglutide (Ozempic)</td>
<td>40 mg 1 x a week</td>
<td>Approval for pediatric use 10 yrs +</td>
</tr>
</tbody>
</table>

**Amylin Agonists**

- **Pramlintide (Symlin)**

<table>
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<tr>
<th>Class/Action</th>
<th>Name</th>
<th>Dose Range</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amylin Agonist</td>
<td>pramlintide (Symlin)</td>
<td>Type 1: 15 - 60 mg; Type 2: 60 - 120 mg</td>
<td>For Type 1 or 2 on insulin, severe hypoglycemic risk, decreases insulin dose when starting, side effects: nausea, weight loss, low Wt. A1C 0.5 - 1%</td>
</tr>
</tbody>
</table>

Adapted from Nauck MA, et al. Diabetologia. 1996;39:1546-1553
Adapted from Drucker DJ. Diabetes. 1998;47:159-169

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**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

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**Natural History of Diabetes**

- No Diabetes
  - 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.
Signs of Diabetes

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

- Glycosuria, H₂O losses
- Dehydration
- Fuel Depletion
- Loss of body tissue, H₂O
- Poor energy utilization
- Hyperglycemia increases incidence of infection
- Osmotic changes

Diabetes Classifications

- Type 1
- Type 2
- Gestational
- Secondary

Case Study

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

2. 5’6”, 108 lb female
On insulin 3u Regular before meals, 10u glargine at bedtime
What type of DM and how do you know?
Type 1 Rates Increasing Globally

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

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.
Autoantibodies Assoc w/ Type 1

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

What Does Type 1 Look Like?

Mary Tyler Moore
Nick Jonas
Justice Sonia Sotomayor
Bret Michaels
**Type 1 Diabetes Associated with other immune conditions**

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

**Type 1 in hospital**

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

**Patti Labelle**  
“divabetic”  
“I have diabetes, it doesn’t have me”
Cardio Metabolic Risk - 5 Hypers -

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

Manifestations of Insulin Resistance

2. Classification and DM Diagnosis

› Pre Diabetes & Type 2 - Screening Guidelines
› Start screening at age 45 or for anyone with excess weight (BMI ≥ 25, Asians BMI ≥ 23) with one or > additional risk factor:
  › First-degree relative w/ diabetes
  › Member of a high-risk ethnic population
  › Habitual physical inactivity
  › PreDiabetes
  › History of heart disease

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

Risk factors cont’d

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

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

Diabetes Detectives Needed

- On average – takes 6.5 years to diagnose diabetes
- 1/4 of all people with diabetes don’t know they have it
- 50% of Latino and Asians are undiagnosed

Ominous Octet

- Decreased satiation neuro-transmission
- Decreased amylin, β-cell secretion 80% loss at dx
- Increased glucagon secretion
- Increased glucose production
- Increased renal glucose reabsorption
- Decreased GIP hormones
- Increased lipolysis
- Decreased glucose uptake
SGLT2 Inhibitors - “Glucoretics”

- **Action:** “Glucoretic” decreases renal reabsorption in the proximal tubule of the kidneys (reset renal threshold and increase glucosuria). **Risk of ketoacidosis, Fournier’s gangrene**

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### Common Oral Diabetes Meds

<table>
<thead>
<tr>
<th>Class/Main Action</th>
<th>Name(s)</th>
<th>Daily Dose Range</th>
<th>Considerations</th>
</tr>
</thead>
</table>
| SGLT2 Inhibitors  | Canagliflozin* (Invokana) | 100 - 300 mg/daily | Side effects: Hypoglycemia, UTI, urinary tract infections, genital infections, hypotension. Monitor GFR and other considerations. See package insert for dosing based on GFR. *Invokana is a trademark of Janssen Pharmaceuticals, a Johnson & Johnson company.
|                   | Dapagliflozin* (Farxiga) | 10 - 25 mg/daily | Don't start if GFR < 60. |
|                   | Empagliflozin* (Jardiance) | 10 - 25 mg/daily | Don't start if GFR < 45. |
|                   | Ertugliflozin* (Svetra) | 10 - 25 mg/daily | Don't start if GFR < 30. |

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### Comparison of Type 1 and Type 2

<table>
<thead>
<tr>
<th>Feature</th>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess weight</td>
<td>x</td>
<td>xxx</td>
</tr>
<tr>
<td>Insulin dependence</td>
<td>xxx</td>
<td>30%</td>
</tr>
<tr>
<td>Respond to oral agents</td>
<td>x</td>
<td>xxx</td>
</tr>
<tr>
<td>Antibodies present</td>
<td>xxx</td>
<td>0</td>
</tr>
<tr>
<td>Typical age of onset</td>
<td>puberty</td>
<td>40-65</td>
</tr>
<tr>
<td>Insulin Resistance</td>
<td>x</td>
<td>xxx</td>
</tr>
</tbody>
</table>

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### Metformin & GFR Guidelines

<table>
<thead>
<tr>
<th>Class/Main Action</th>
<th>Name(s)</th>
<th>Daily Dose Range</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanide</td>
<td>Metformin (Glucophage)</td>
<td>500 - 2500 mg</td>
<td>Side effects: nausea, bloating, diarrhea, B12 deficiency. To minimize GI effects, see fill and take w/ meals. Observe GFR before starting.</td>
</tr>
<tr>
<td></td>
<td>Pioglitazone (Prandin)</td>
<td>300 - 2500 mg</td>
<td>Dose: 300 mg/500 mg/ each.</td>
</tr>
<tr>
<td></td>
<td>Rosiglitazone (Avandia)</td>
<td>4 mg to 16 mg</td>
<td>Dose: 4 mg/16 mg/ each.</td>
</tr>
</tbody>
</table>

#### Biguanide derived from:
- Goat’s Rue *Galega officinalis*,
- French Lilac
**ADA Step Wise Approach to Hyperglycemia 2020**

- **Step 1** – Metformin + Lifestyle
- **Step 2** - If A1c target not achieved after 3 months, Metformin + another med
  - If ASCVD, CHF, or CKD, consider adding a second agent to reduce risk based on drug effects and individual factors.
  - SGLT-2i: Empagliflozin (Jardiance), canagliflozin (Invokana) and dapagliflozin (Farxiga) – Eval GFR
  - GLP-1 RA: Semaglutide > liraglutide > dulaglutide > exenatide > lixisenatide
- **Step 3** - If A1c target still not achieved after 3 months, combine metformin plus one to two other (2-3 drugs)
- **Step 4** - If A1c target not achieved after 3 months, add injectable therapy (GLP-1 RA or Basal insulin) to drug combination.

**Other Causes of Hyperglycemia**

- Steroids
- Agent Orange
- Tube feedings / TPN
- Transplant medications
- Cystic Fibrosis

Regardless of cause, requires treatment:
- Insulin always works
- Sign of pancreatic malfunction

**Diabetes is also associated with**

- Fatty liver disease
- Obstructive sleep apnea
- Alzheimer’s
- Depression
- Cancer; pancreas, liver, breast
DiaBingo
- Frequent skin and yeast infections
- A BMI of ____ or greater is considered overweight
- To reduce complications, control A1c, Blood pressure, Cholesterol
- PreDiabetes – fasting glucose level of ____ to ____
- Erectile dysfunction indicates greater risk for ____
- Diabetes – fasting glucose level ____ or greater
- Type 1 diabetes is best described as an ______ disease
- People with diabetes are ______ times more likely to die of heart dx
- Elevated triglycerides, < HDL, smaller dense LDL
- Each percentage point of A1c = _____ mg/dl glucose
- At dx of type 2, about ___% of the beta cell function is lost
- Diabetes – random glucose ____ or greater

Self Reflective Question
- A individual is admitted and tells you they are only taking their daily insulin injection about 4 times a week.
- What feelings would that evoke?
  - Patient doesn’t care
  - Non-compliant
  - Lazy
  - Better scare them
  - Exasperation

Language of Diabetes Education
Old Way
- Control diabetes
- Test BG
- Patient
- Normal BG
- Non-adherent, compliant
- Refuse

New Way
- Manage
- Check
- Participant
- BG in target range
- Focus on what they are accomplishing
- Decided, chose

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

Old Way
- Can’t, shouldn’t, don’t, have to
- Regimen
- Refused
- Victim, suffer, stricken

New Way
- Have you tried..."
- Plan, choices
- Declined, Chose not to
- ...lives with diabetes
- ...has diabetes

Life Study – Mrs. Jones

Mrs. Jones is 62 years old, with a BMI of 36 and complains of feeling tired and urinating several times a night. She has an urinary tract infection. Her A1c is 8.3%, glucose 237. She is hypertensive with a history of gestational diabetes. No ketones in urine.

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

Mrs. Jones asks you
What Do You Say?

- What is diabetes?
- They say I am a diabetic because I am obese?
- How am I going to control this?
- What is a normal blood sugar?
- Do I have to test my blood sugars?
- My doctor told me to stay away from white foods. Is that true?
Mrs. Jones asks you

What Do You Say?

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

Let’s use language that (is)

- Imparts hope
- Neutral, nonjudgmental
- Based on fact, actions or biology
- Free from stigma
- Respectful, inclusive
- Fosters collaboration between person and provider
- Avoids shame and blame

Look Beyond Diabetes

- ACE – Adverse Childhood Experiences
- Feelings around their diabetes
- Cultural traditions, family system.
- Social, religious and employment influences
- Personal factors: attitudes, cognitive factors, literacy, learning styles, health beliefs
- Depression, anxiety
- Mental illness
- Addiction issues
**A1c and Estimated Avg Glucose (eAG) 2008**

<table>
<thead>
<tr>
<th>A1c (%)</th>
<th>eAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>97</td>
</tr>
<tr>
<td>6</td>
<td>126</td>
</tr>
<tr>
<td>7</td>
<td>154</td>
</tr>
<tr>
<td>8</td>
<td>183</td>
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<tr>
<td>9</td>
<td>212</td>
</tr>
<tr>
<td>10</td>
<td>240</td>
</tr>
<tr>
<td>11</td>
<td>269</td>
</tr>
<tr>
<td>12</td>
<td>298</td>
</tr>
</tbody>
</table>

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

Order teaching tool kit free at diabetes.org

**How Often Should I Check?**

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

**Diabetes Wise – Non-Profit Site**

Helping You Find The Right Diabetes Devices For Your Life.

**CHECKUP**

DO YOUR DEVICES STILL WORK FOR YOUR LIFE?

There is no info in the records who might be your next diabetes care team.

Check Up
Ambulatory Glucose Report

- Standardized report with visual cues for those on CGM devices
- For most with type 1 or type 2 diabetes
  - > 70% of readings within BG range of 70-180 mg/dL
  - < 4% of readings < 70 mg/dL
  - < 1% of readings < 54 mg/dL
  - < 25% of readings > 180 mg/dL
  - < 5% of readings > 250 mg/dL
- For under 25 years, with A1c goal is < 7.5%, time-in-range target is set to about 60.

AGP Report

<table>
<thead>
<tr>
<th>Glucose Statistics and Targets</th>
<th>Time in Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 Feb 2018 to 1 Mar 2019</td>
<td>60.9%</td>
</tr>
</tbody>
</table>

- Glucose Range: Targets (Not Meets Time/day)|
- Target Range: 70-180 mg/dL. Sustained time: 70% (2/3 days)
- Below 70 mg/dL: Less than 4% (1 day)
- Below 54 mg/dL: Less than 1% (1/2 day)
- Above 180 mg/dL: Less than 25% (2/3 days)
- Above 250 mg/dL: Less than 5% (1 day)
- Each 1% increase in time in range (75-180 mg/dL) is clinically beneficial.

- Average Glucose: 173 mg/dL (7.3%)
- Glucose Management Indicator (GMI): 7.8%
- Glucose Variability: 40.9%

When Treatment Goals Aren’t Met

- Reassess treatment regimen and barriers
  - Competing demands including family responsibilities and dynamics
  - Literacy
  - Diabetes related distress or depression
  - Poverty
  - Culturally appropriate education?
  - Referral to social worker for assistance with insurance coverage
  - Medication taking behavior and regimen
  - Other?
Complications - Why?

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

Diabetes Complications

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

Control Matters

- Prevention
- Trials
- Practice Recommendations
Financial Advisor

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

Can we stop pre diabetes from progressing?

3, 234 people w/ Pre-Diabetes randomized:
- Placebo
- Diet/Exercise or
- Metformin
  over a three year period

Diabetes Prevention Program (DPP) 2001

Diabetes Prevention Program

- Standard Group - 29% developed DM
- Lifestyle Results - 14% developed DM
  - 58% (71% for 60yrs +) Risk reduction
    - 30 mins daily activity
    - 5-7% of body wt loss
- Metformin 850 BID - 22% developed DM
  - 31% risk reduction (less effective with elderly and thinner pt’s)
Weight loss and Prevention

- For every 2.2 pounds of weight loss, risk of type 2 diabetes was reduced by 13%.

ABCs of Diabetes

- A1c less than 7% (avg 3 month BG)
  - Pre-meal BG 80-130
  - Post meal BG <180
- Blood Pressure < 140/90
- BP target <130/80
  - If 10 year CVD Risk > 15%
- Cholesterol
  - Statin therapy indicated?
Glycemic Targets

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

What are next steps?


Concerns

Meds?

- **DPP-4 Inhibitors – “Incretin Enhancers”**
  - Januvia (sitagliptin) – Tradjenta (linagliptin)
  - Onglyza (saxagliptin) – Nesina (alogliptin)

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

- Can cause severe, disabling 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 weight gain or hypoglycemia
  - Lowers A1c 0.6% - 0.8%

Exercise Standards

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

A hard truth

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

- To combat the rise in body weight, we need to change the food environment
  - “You cannot outrun an unhealthy diet”.
Good Exercise Info / Quotes

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

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

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

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 should 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 Care Guidelines- ADA

<table>
<thead>
<tr>
<th>Test / Exam</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1c</td>
<td>At least twice a year</td>
</tr>
<tr>
<td>B/P</td>
<td>Each diabetes visit</td>
</tr>
<tr>
<td>Cholesterol (LDL, HDL, Tri)</td>
<td>Yearly (less if normal)</td>
</tr>
<tr>
<td>Vaccinations</td>
<td>Flu yearly, pneumonia</td>
</tr>
<tr>
<td>Weight</td>
<td>each diabetes visit</td>
</tr>
<tr>
<td>Microalbumin/GFR/Creat</td>
<td>Yearly</td>
</tr>
<tr>
<td>Eye exam</td>
<td>Yearly</td>
</tr>
<tr>
<td>Dental Care</td>
<td>At least twice a year</td>
</tr>
<tr>
<td>Comprehensive Foot Exam</td>
<td>Yearly (more if high risk)</td>
</tr>
<tr>
<td>Physical Activity Plan</td>
<td>As needed to meet goals</td>
</tr>
<tr>
<td>Preconception counseling</td>
<td>As needed</td>
</tr>
</tbody>
</table>
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

Foot Wounds

- Blisters
- Calluses
- Ulcers
- Bone infection

No Bathroom Surgery

2020 Diabetes Education Services® www.DiabetesEd.net
5.07 monofilament = 10gms linear pressure

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.

“Getting diabetes saved my life.”
~ Sherri Shepard

Sherri Shepard decided to embrace diabetes and use it as a motivator to improve her health.
Insulin – the Ultimate Hormone Replacement Therapy

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

Psychological Insulin Resistance (PIR)

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

Psychological Insulin Resistance (PIR) (Rubin)

Needle Size often a Barrier
Size Does Matter

- Use more short needles – 4 mm
- Effective for pts with BMI of 24-49
- Keeps it subq
- If pt thin, inject at angle
- To avoid leakage, count to 10 before withdrawing needle
- ½ the patients who could benefit from insulin are not using it due to needle phobias
**Insulin Action Teams**

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

---

**Case Study**

- 70 yr old, weighs 100kg
- History of CABG, tobacco
- A1c – 11.3%, BG 400-500 for past weeks
- Insulin – 100+ units Lantus at hs (solostar)
- Oral Meds: Metformin, Invokana
- What is a better insulin dosing strategy?
- Can’t afford insulin pen – what other option
## Cost Per Vial in Northern CA

<table>
<thead>
<tr>
<th>Per vial cost</th>
<th>Walmart</th>
<th>Walgreens</th>
<th>Costco</th>
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<tbody>
<tr>
<td>regular insulin</td>
<td>$25*</td>
<td>$92</td>
<td>$99</td>
</tr>
<tr>
<td>NPH</td>
<td>$25*</td>
<td>$92</td>
<td>$99</td>
</tr>
<tr>
<td>70/30</td>
<td>$25*</td>
<td>$92</td>
<td>$101</td>
</tr>
<tr>
<td>Humalog</td>
<td>$137</td>
<td>$137</td>
<td>$137</td>
</tr>
<tr>
<td>Novolog</td>
<td>$197</td>
<td>$217</td>
<td>$178</td>
</tr>
<tr>
<td>Apidra</td>
<td>$180</td>
<td>$245</td>
<td>$178</td>
</tr>
<tr>
<td>Levemir</td>
<td>$200</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td>Lantus</td>
<td>$220</td>
<td>$221</td>
<td>$206</td>
</tr>
</tbody>
</table>

---

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Onset</th>
<th>Peak Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspart (Fiasp)</td>
<td>2.5 min</td>
<td>1 hour</td>
</tr>
<tr>
<td>Aspart (NovoLog)</td>
<td>15-30 min</td>
<td>1-1.5 hrs</td>
</tr>
<tr>
<td>Lispro (Humalog, Admelog)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glulisine (Apidra)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afrezza (Inhaled)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>30 mins</td>
<td>2-4 hrs</td>
</tr>
</tbody>
</table>

---

## Emergence of “Copy Cat” or “Biosimilar Insulins”

- Insulin considered a “biological drug product”
- Patent on “biologicals” last 12 yrs
  - Insulin patent sold in 1923 for $1
  - Patent can be extended by making small improvements
  - Insulin manufacturer’s have maintained exclusivity for 93 years. Until now
- Patents are expiring
Biosimilar Insulins: Lispro (Admelog) Glargine (Basaglar)

- Can’t use the term generics for large molecule biologicals because they are manufactured in living organisms (bacteria and yeast)
- Each batch may be slightly different
- Currently - Pharmacist to contact Provider before switching to biosimilar
- Future – may be same as generics

Bolus Insulin Summary

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

Bolus Insulin Timing

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

- Hyperglycemia is associated with increased morbidity and mortality in hospital settings.
- Acute Myocardial Infarction
- Stroke
- Cardiac Surgery
- Infection
- Longer lengths of stay

Pattern Management - AKA

How to think like a pancreas

Pattern Management

- Safety 1st!! - Evaluate 3 day patterns
- Hypo: eval 1st and fix:
  - If possible, decrease medication dose
  - Timing of meals, exercise, medications
- Hyperglycemia: evaluate 2nd
  - Identify patterns
  - Before increase insulin, make sure not missing something (carbs, exercise, omission)
ADA/AACE Goals and Treatments For 
Hospitalized Patients

ADA Goals: If BG 180 +
- Start subq insulin
- Blood glucose goals 140-180
  - Individualize based on pt status
- Basal/bolus Insulin or
- Insulin drip preferred (Critical Care)
- ADA Standards of Care

AACE Goals:
- Before meal < 140
- After meal <180

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

Bolus – Insulin Sliding Scale
Starts at 150, 2 units for every 50 mg/dl >150

<table>
<thead>
<tr>
<th>Break</th>
<th>Lunch</th>
<th>Dinner</th>
<th>HS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>94</td>
<td>212</td>
<td>148</td>
</tr>
<tr>
<td></td>
<td>no insulin</td>
<td>4 uR</td>
<td>no insulin</td>
</tr>
<tr>
<td>Day 2</td>
<td>243</td>
<td>254</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>4uR</td>
<td>6 uR</td>
<td>4uR</td>
</tr>
<tr>
<td>Day 3</td>
<td>189</td>
<td>243</td>
<td>162</td>
</tr>
<tr>
<td></td>
<td>2uR</td>
<td>4uR</td>
<td>2uR</td>
</tr>
<tr>
<td>Day 4</td>
<td>66</td>
<td>287</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>No insulin</td>
<td>6uR</td>
<td>none</td>
</tr>
</tbody>
</table>

Basal Insulins
(½ of total daily dose)

<table>
<thead>
<tr>
<th>Intermediate Acting</th>
<th>Peak Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPH</td>
<td>4-12 hrs</td>
<td>12-24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Long Acting</th>
<th>Peak Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detemir (Levemir)</td>
<td>No Peak</td>
<td>20 hrs</td>
</tr>
<tr>
<td>Glargine (Lantus)</td>
<td></td>
<td>24 hrs</td>
</tr>
<tr>
<td>Glargine (Basaglar)</td>
<td></td>
<td>24 hrs</td>
</tr>
<tr>
<td>Degludec (Tresiba)</td>
<td></td>
<td>42 hrs</td>
</tr>
</tbody>
</table>

Fasting BG reflects efficacy of basal
Basal Insulin Summary

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

Type 2 started on glargine 10 units hs. Newly discovered hyperglycemia.

Blood Sugars

<table>
<thead>
<tr>
<th></th>
<th>AM</th>
<th>Lunch</th>
<th>Dinner</th>
<th>HS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>137</td>
<td>178</td>
<td>203</td>
<td>193</td>
</tr>
<tr>
<td>Day 2</td>
<td>96</td>
<td>154</td>
<td>167</td>
<td>182</td>
</tr>
<tr>
<td>Day 3</td>
<td>73</td>
<td>127</td>
<td>153</td>
<td>169</td>
</tr>
<tr>
<td>Day 4</td>
<td>61</td>
<td>193</td>
<td>133</td>
<td>152</td>
</tr>
<tr>
<td>Day 5?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Combo Sub-Q Insulin

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

Considerations:
- Pre-mixed, difficult to fine tune therapy
70/30 Insulin

- Gently roll to mix insulin
- Prime pens – give 2 unit “air shot” to make sure pen and needle functional
- After injecting insulin, count to 5 before pulling needle out
- Use a new needle with each injection

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

<table>
<thead>
<tr>
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<th>Break</th>
<th>Lunch</th>
<th>Dinner</th>
<th>HS</th>
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</thead>
<tbody>
<tr>
<td>Mo 1</td>
<td>170s</td>
<td></td>
<td></td>
<td>298</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10u Det</td>
</tr>
<tr>
<td>Mo 2</td>
<td>160s</td>
<td></td>
<td></td>
<td>233</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20u Det</td>
</tr>
<tr>
<td>Mo 4</td>
<td>140s</td>
<td>283</td>
<td>265</td>
<td>206</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40u Det</td>
</tr>
</tbody>
</table>

Patterns? Changes needed?

<table>
<thead>
<tr>
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<th>Dinner</th>
<th>HS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>102</td>
<td>63</td>
<td>92</td>
<td>181</td>
</tr>
<tr>
<td>Day 2</td>
<td>112</td>
<td>67</td>
<td>106</td>
<td>195</td>
</tr>
<tr>
<td>Day 3</td>
<td>98</td>
<td>56</td>
<td>112</td>
<td>201</td>
</tr>
<tr>
<td>Day 4</td>
<td>99</td>
<td>71</td>
<td>132</td>
<td>211</td>
</tr>
</tbody>
</table>
What Medications Cause Hypoglycemia?

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

Sulfonylureas - Squirts

- Action: Increase endogenous insulin secretion throughout day
- Efficacy:
  - Decrease FPG 60-70 mg/dl
  - Reduce A1C by 1.0-2.0%
- Side Effects:
  - Weight gain, hypoglycemia
- Benefits:
  - Cheap, effective

Hypoglycemic Symptoms

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

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

15 - 20 Gms Carb Sources

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

Nasal Glucagon - Baqsimi

- Approved for ages 4+
- Absorbed nasally
- No reconstitution or refrigeration needed
- Kept in temps up to 86
- Raises BG 67-73 mg/dl
- Don’t use in those with
  - Pheochromocytoma
  - insulinoma
Gvoke HypoPen – Single dose injector

Basal Bolus – What Adjustments?
Pt weighs 80kg

<table>
<thead>
<tr>
<th></th>
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<th>Lunch</th>
<th>Dinner</th>
<th>HS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>69</td>
<td>79</td>
<td>245</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>7R</td>
<td>5R</td>
<td>8R</td>
<td>22u Gl</td>
</tr>
<tr>
<td>Day 2</td>
<td>81</td>
<td>87</td>
<td>170</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>7R</td>
<td>5R</td>
<td>8R</td>
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</tr>
<tr>
<td>Day 3</td>
<td>73</td>
<td>94</td>
<td>194</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>7R</td>
<td>5R</td>
<td>8R</td>
<td>22u Gl</td>
</tr>
<tr>
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<td>127</td>
</tr>
<tr>
<td></td>
<td>7R</td>
<td>5R</td>
<td>8R</td>
<td>22u Gl</td>
</tr>
</tbody>
</table>

Intensive Diabetes Therapy
Insulin Dosing Strategy

50/50 Rule
- 0.5-1.0 units/kg day

- Basal = 50% of total
  - Glargine QD
  - NPH or Detemir BID

- Bolus = 50% of total
  - usually divided into 3 meals

Example
- Wt 50kg x 0.5 = 25 units of insulin/day
- Basal dose: 13 units
  - Glargine 13 units QD
  - NPH/Detemir 6u BID
- Bolus dose: 12 units
  - 4 units NovoLog, Apidra Humalog, Regular each meal
**Intensive Diabetes Therapy**

**Insulin Dosing Strategy**

**50/50 Rule**
- 0.5-1.0 units/kg day
- Basal = 50% of total
  - Glargine QD
  - NPH or Detemir BID
- Bolus = 50% of total
  - usually divided into 3 meals

**Example – You Try**
- Wt 60 kg x 0.5 = ___ units of insulin/day
- Basal dose: ___ units
  - Glargine ___ QD
  - NPH/Detemir ___ BID
- Bolus dose: ___ units
  - ___ units NovoLog, Apidra Humalog, Reg each meal

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

<table>
<thead>
<tr>
<th></th>
<th>Break</th>
<th>Lunch</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>6R</td>
<td>7R</td>
<td>7R</td>
<td>190</td>
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<tr>
<td></td>
<td>84</td>
<td>89</td>
<td>145</td>
<td>20 u Gl</td>
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<tr>
<td>Day 2</td>
<td>6R</td>
<td>7R</td>
<td>7R</td>
<td>133</td>
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<td></td>
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<td>104</td>
<td>124</td>
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<td>Day 4</td>
<td>6R</td>
<td>7R</td>
<td>7R</td>
<td>193</td>
</tr>
<tr>
<td></td>
<td>69</td>
<td>103</td>
<td>208</td>
<td>20u Gl</td>
</tr>
</tbody>
</table>

**More than 200 units a day?**

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

**Indication for Humulin R Lirin**

Humulin R Lirin is indicated as an adjunct to diet and exercise to improve glycemic control in adult and adolescents with type 1 diabetes mellitus.
Insulin Teaching Keys

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

Diabetes Vacations

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

- Nelson Mandela
DiaBingo - N

N DPP demonstrated that exercise and diet reduced risk of DM by __%  
N Average A1c of 7% = Avg BG of ____  
N An _____ a day can help prevent heart attack and stroke  
N Rebound hyperglycemia  
N Scare tactics are effective at motivating patients to change behavio  
N Losing ___% of body weight, can improve blood glucose, BP, lipids  
N Drugs that can cause hyperglycemia  
N 2/3 cups of rice equals ______ serving carbohydrate  
N One % drop in A1c reduces risk of complications by ___ %  
N 1 gm of fat equal ___ kilo/calories  
N Metabolic syndrome = hyperinsulinemia, hyperlipidemia, hypertension  
N Average American consumes 15 teaspoons of sugar a day;  
N Medication that was derived from the saliva of the Gila Monster

Standard American Diet is SAD

N 70% of food consumed is processed  
N Low fiber, high sugar  
N Intake of fruit and veggies decreasing  
N We are starving our good bacteria

U.S. Weight - 68% experiencing overweight or BMI >30

N 34% BMI 25-29  
N 34% BMI 30 +  
N 1/3 of all people with extra weight don’t get diabetes  
N We burn 100 cals less a day at work  
N Overall, food costs ~ 10-15% of income  
N Calorie intake is on the rise
Average American Consumes 22 teaspoons of added sugar a day

- WHO and AHA – Goal 6 teaspoons a Day
- 1 tsp = 4 gms sugar (15 cals)
- 15cals x 22 teaspoons a day = 330 cals a day just from added sugars
- One soda has 12 tsps sugar
- New labels will list added sugar

Reduce refined Carbs, Added Sugars - ADA

- To control wt, reduce risk of CVD and fatty liver disease
- ADA strongly discourages consumption of:
  - Sugar sweetened beverages
  - Processed “low-fat” or “non-fat” foods with high amounts of refined grains & added sugar

Your health can only get better
Bacterial Cells Outnumber Human Cells 10 to 1

How do our bacteria help us?

- Maintain physiological homeostasis and metabolism.
- Other benefits:
  - pathogen displacement
  - immune system development
  - barrier fortification
  - vitamin production
  - nutrient absorption

Forgotten organ

Poll 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
3 lbs of Microbes in our Gut

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

Quick Question

- In general, how does immigrating to the U.S. impact individual’s gut microbiota?
  A. Increased diversity due to new food exposure.
  B. A generational decline in bacterial diversity
  C. They experience a sudden increase in Akkermansia muciniphila
  D. Decrease in helicobacter pylori.

Just Months of American Life Change the Microbiome

Immigrants gut bacteria "work overtime" soon after they move to the U.S., which might influence obesity in immigrants and Americans alike.

Atlantic.com Nov 2018
From Vietnam to America – Hmong immigrants microbiome shifts associated with worse health

- In Minneapolis—scientists followed a group of Hmong immigrants for 9 months.
- Increased intake of protein, sugar, and fat and processed food.
- Researchers found that the immigrants’ gut microbiomes “westernized” and became less diverse.
- Within a generation, Hmong women experiencing a BMI of >30 increased from 5% to 30%.

Moving to America isn’t good for your health

Researchers don’t know if eating a less healthy diet increases the rate of obesity and changes the microbiome, or if a less healthy diet changes the microbiome so it makes people experience higher BMI.

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
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

Follow Your Gut – Dr. Rob Knight

Check out Dr. Knight’s:
- TED Talk
- Website – AmericanFoodProject.org
- Articles in Nature and all over

Take Home Message

- Get Dirty
- Limit Unnecessary C-Sections
- Breastfeed if possible
- Limit early antibiotics
- Eat a wide variety of fiber foods
Medical Nutrition Therapy – ADA

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

- There is no single ideal dietary distribution of calories among carbohydrates, fats and proteins for those with diabetes.
- Individualize meal plans while keeping total calorie and metabolic goals in mind
- A variety of eating patterns are acceptable for type 2 and prediabetes.

ADA MNT Standards 2020

Until there is more evidence:
- Emphasize non starchy vegetables
- Minimize added sugars and refined grains
- Choose whole foods over highly processed foods to the extent possible
- Healthful approaches include:
  - Mediterranean-style, low-carb and plant based or vegetarian
  - Plate method good getting started approach
- Refer to RD/RDN

Approach Depends on Individual

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

10 SuperFoods

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

As posted on diabetes.org website

Choose Healthy Carbs

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

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

- Encourages engagement in health promoting behaviors
- Directs clients to the practices to maintain their life, rather than the pursuit of wt loss
- Encourages body trust and acceptance
- Advocates for using wt neutral meds

Setting goals using weight neutral approach

- I will continue to care for my body by doing [x].
- I will focus on small changes—such as testing my BG—instead of daily wts
- I will increase my self-worth by telling myself “I am worth self-care”

How nutrients affect blood sugar

Graphs showing the effect of carbohydrates, protein, and fat on blood glucose levels.
**Carb Counting - Sweets**

Each Food has: Calories vary
15 grams carb

- 2 inch square cake or brownie, unfrosted
- 2 small cookies
- 1 slice bread
- 1 tbsp light syrup
- ½ cup plain ice cream or frozen yogurt
- ½ cup sorbet
- ½ cup pudding
- 1 tbsp jam, jelly, table sugar, honey
- 1 tsp peppermints

**Using Alcohol Safely**

- Women- 1 or fewer alcoholic drinks a day
- Men 2 or fewer alcoholic drinks a day
  - 1 alcoholic drink equals
    - 12 oz beer, 5 oz glass of wine, or .5 oz distilled spirits (vodka, gin etc)
- If drink, limit amount and drink w/ food.
- Ask HCP if safe to drink. Tell them your usual quantity and frequency.
- Can cause hypo and worsen neuropathy

**Our belief in people makes a difference**
Thank You

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