PEDIATRIC TRACK

DIABETES IN ADOLESCENCE

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CONFLICT OF INTEREST

Ohman-Hanson: I have nothing to disclose.
Fay-Itzkowitz: I have nothing to disclose.

ACKNOWLEDGEMENT

Slides adapted with permission from Brigitte Frohnert, MD
(Barbara Davis Center for Childhood Diabetes)
GOALS/OBJECTIVES

- Metabolic changes during puberty
- Pubertal hormones: impact on diabetes control
- Beyond hormones: what else is going on that can impact diabetes management?
- How can you navigate this time more successfully?

GROWING UP COMES WITH MANY CHANGES
TYPICAL PUBERTAL EVENTS

Girls

Boys
WHAT IS HAPPENING?

Insulin needs are increasing
  Body size
Puberty (Hormones)
  Insulin resistance
  Blood glucose variability
You have/are a teenager
  And everything that comes with it

→ Maintaining diabetes control becomes even more difficult!
INSULIN NEEDS INCREASE

With age, weight goes up AND amount of insulin per body weight goes up.

**Total Daily Insulin**

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Total Insulin (Units/kg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschool (&lt;6)</td>
<td>0.65</td>
</tr>
<tr>
<td>Preadolescent (6 to &lt;12)</td>
<td>0.74</td>
</tr>
<tr>
<td>Adolescent (12 to &lt;18)</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Adapted from: Lau et al., 2015

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OH, THE HORMONES!

**Puberty hormones:** glucose variability and insulin resistance
- Estrogen / Progesterone
- Testosterone (androgens)
- Growth hormone

**Stress hormones:** cause release of glucose from the liver
- Cortisol
- Epinephrine (adrenaline)

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Insulin resistance

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Slide from B. Frohnhert

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INSULIN RESISTANT

Cell

Insulin Receptor

Glucose Channel

Glucose

Insulin

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TESTOSTERONE PEAKS IN THE MORNING

Women also have early morning testosterone peak, but at much lower levels. (1/100th)

Adapted from Brenner et al. JCEM 1983

GROWTH HORMONE PEAKS AT NIGHT

Am J Physiol Endocrinol Metab 282: 943, 2002

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CORTISOL PEAKS IN THE MORNING

From UpToDate

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SHIFTS IN BASAL PROFILES

- With age, timing of peak basal rate moves from evening to morning.

Adapted from Sachran et al., 2012

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BEYOND HORMONAL CHANGES...

Typical teenagers!

- Want to be like peers
- Need for privacy
  - Keep diabetes secret
- Need for Autonomy
  - Move from wanting to please parents to wanting to be in control
  - May want to control what numbers you see, or tell you what you want to hear.
- Mood swings
- There’s a lot going on
  - May be distracted and forgetful
  - Diabetes is not always THEIR priority
- Body image becomes more important
  - Worry about weight
  - May be opposed to pumps/CGM etc
- Spending more time with peers
  - Making more of their own food choices
  - Less structure to their time

THE TEENAGE BRAIN

off the mark  by Mark Parisi  www.offthemark.com

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SO, WHAT CAN YOU DO?

Be prepared for change
Be flexible (every child is different, diabetes is different in every child)

GATHER DATA!

- Overall numbers/trends (outgrown doses?)
- Overnight trends (basal needs)
- Exercise → glucose pattern
STAY INVOLVED!

Be present:
- It's not just THEIR diabetes, it's the family's diabetes
- Everyone's lives are busy
  - Find a time each day to watch at least one BG check or one insulin dose
- Take on some of the "grunt work" of diabetes:
  - Be in charge of AM glucose check
  - Be in charge of long-acting insulin injection
  - Offer a "diabetes vacation day"
    - Caregiver does all BG checks, counts all carbs, gives all injections.

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BE A TEAM PLAYER

Allow teen to make choices:

"I am going to help make sure you are checking BG regularly. How would this work best for you?"
- Text message?
- Post-it note?
- Delegating reminders to sibling/friend?
- Alarm on smart phone?
- Leave meter out at night?

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AUTONOMY

Engage teen in decisions

• What is working well?
• What are the problem areas?
• What do you think might help?
• Medical visits:
  • Allow teen to answer questions first
  • Encourage teen to have time alone with provider to communicate needs

CHILD FIRST, DIABETES SECOND

• Talk to your child/teen about something OTHER than diabetes
• First question is NOT “what is your number?”
• Numbers aren’t “bad”: they are information for a decision (More insulin? Less insulin? Change in plan?)
### IT'S OK TO SET LIMITS AND EXPECTATIONS

<table>
<thead>
<tr>
<th>IF YOU ARE GOING OUT YOU NEED TO:</th>
<th>IF YOU ARE DRIVING YOU NEED TO:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tell me where you are going</td>
<td>• No texting while driving</td>
</tr>
<tr>
<td>• Tell me who you are with</td>
<td>• No driving while under the</td>
</tr>
<tr>
<td>• Be home by ___</td>
<td>influence</td>
</tr>
<tr>
<td>• Check your BG when needed</td>
<td>• Abide by traffic laws</td>
</tr>
<tr>
<td>• Give insulin when needed</td>
<td>• Check BG before driving</td>
</tr>
<tr>
<td>• Have your supplies with you</td>
<td>• Keep a snack in car</td>
</tr>
<tr>
<td></td>
<td>• Wear a medical alert ID</td>
</tr>
</tbody>
</table>

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### IT'S OK TO GIVE CONSEQUENCES

Stay calm
This is not a punishment for diabetes – this is life
Praise is motivational! So are rewards.
Everyone can be grumpy when:
- Hungry
- Tired
- Not being heard

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RESOURCES

http://www.jdrf.org/t1d-resources/

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QUESTIONS AND DISCUSSION

LET'S TALK

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