The ABCs of Caring for Children with Diabetes

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What is Type 1 Diabetes?

- Autoimmune attack on the pancreas
  - Beta cells, which produce insulin are destroyed
  - Cannot make insulin
  - need it from outside the body for life
- Chances of developing T1 are 1 in 100
- Most common type of diabetes in children
- Not related to weight
- Slight genetic basis

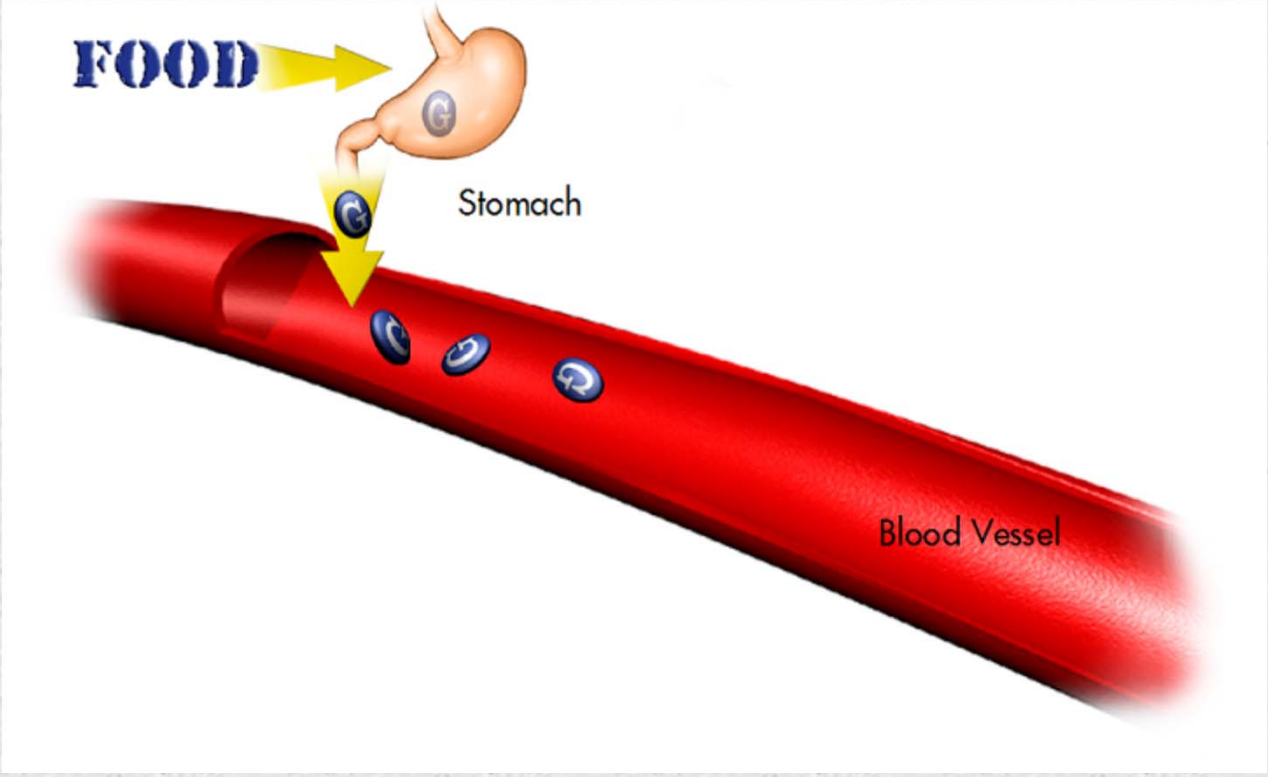
Food Metabolism, Insulin & Glucose

All the cells in the body are locked

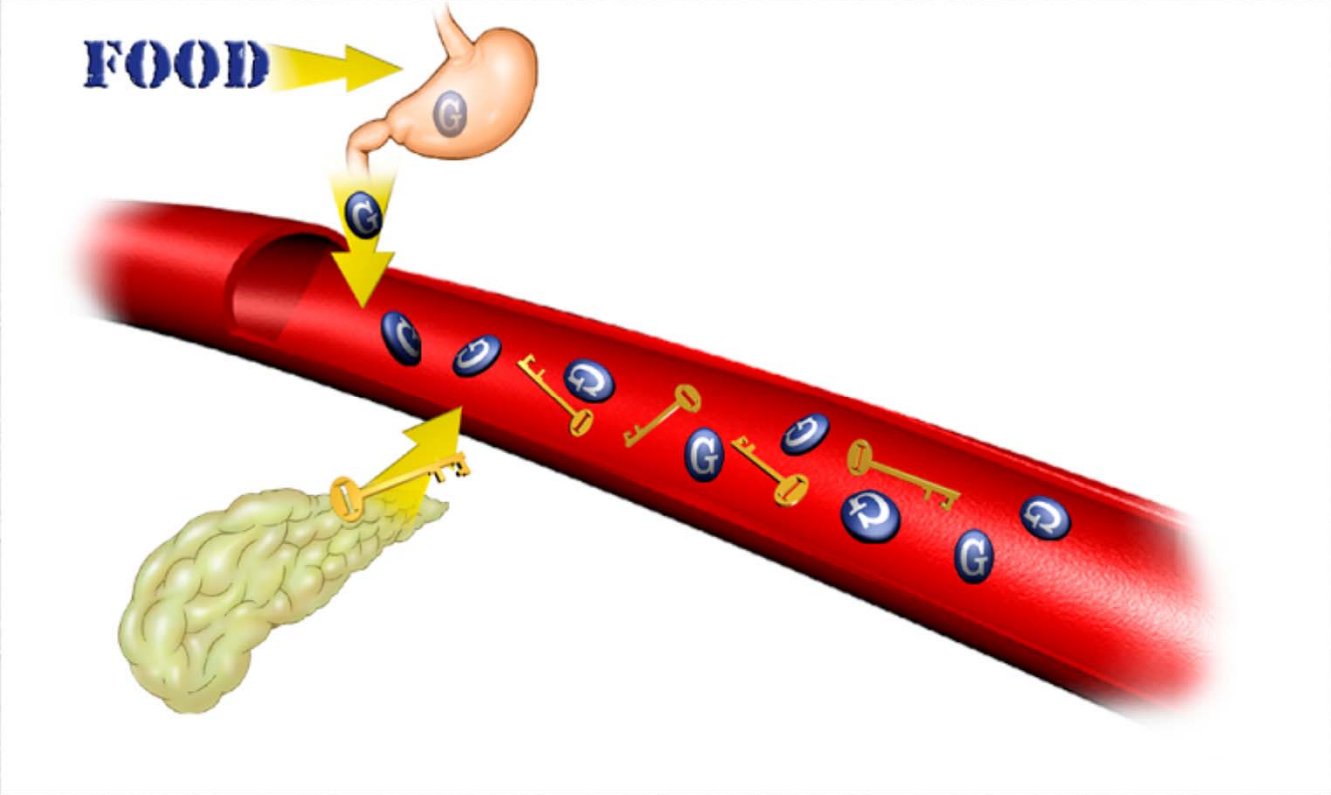
The cells need glucose to provide energy for the body

Insulin is the key!

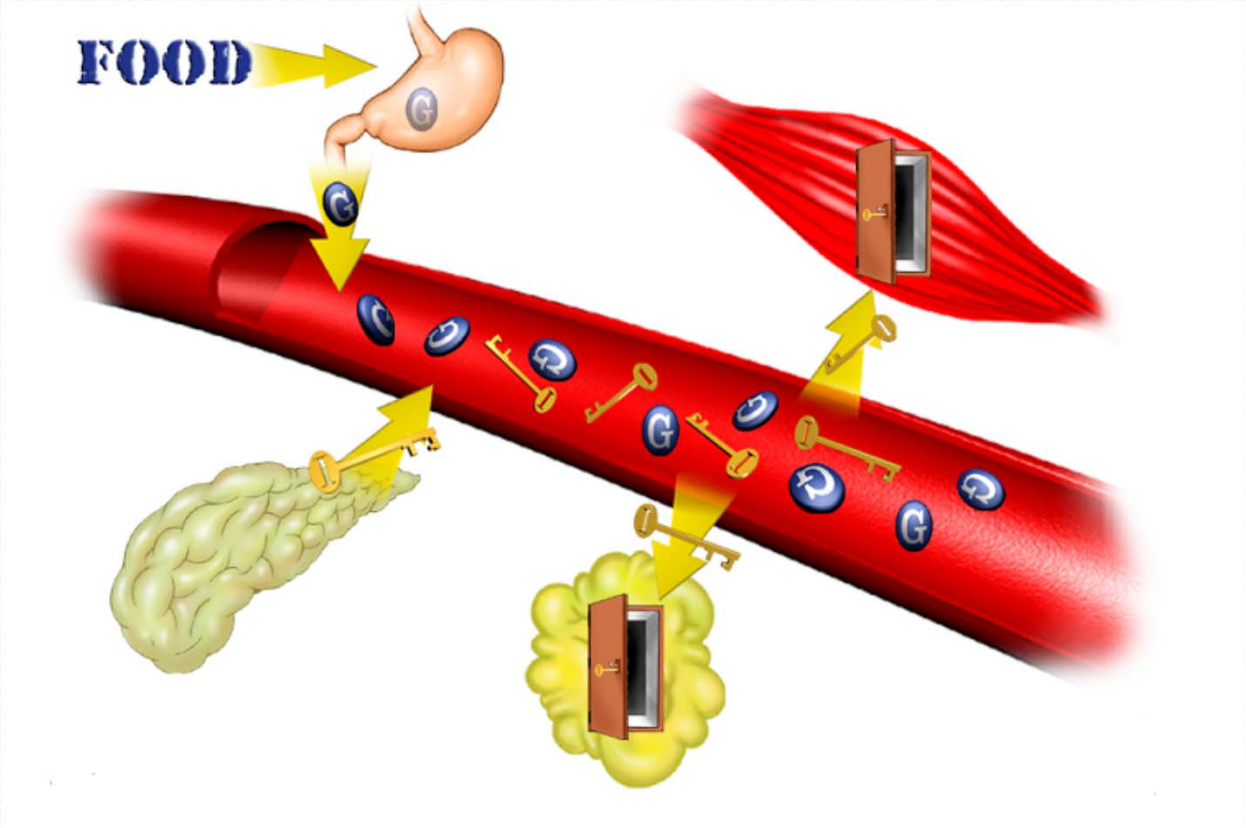
Normal metabolism: food (carbohydrates) are ingested and enter the blood stream as glucose



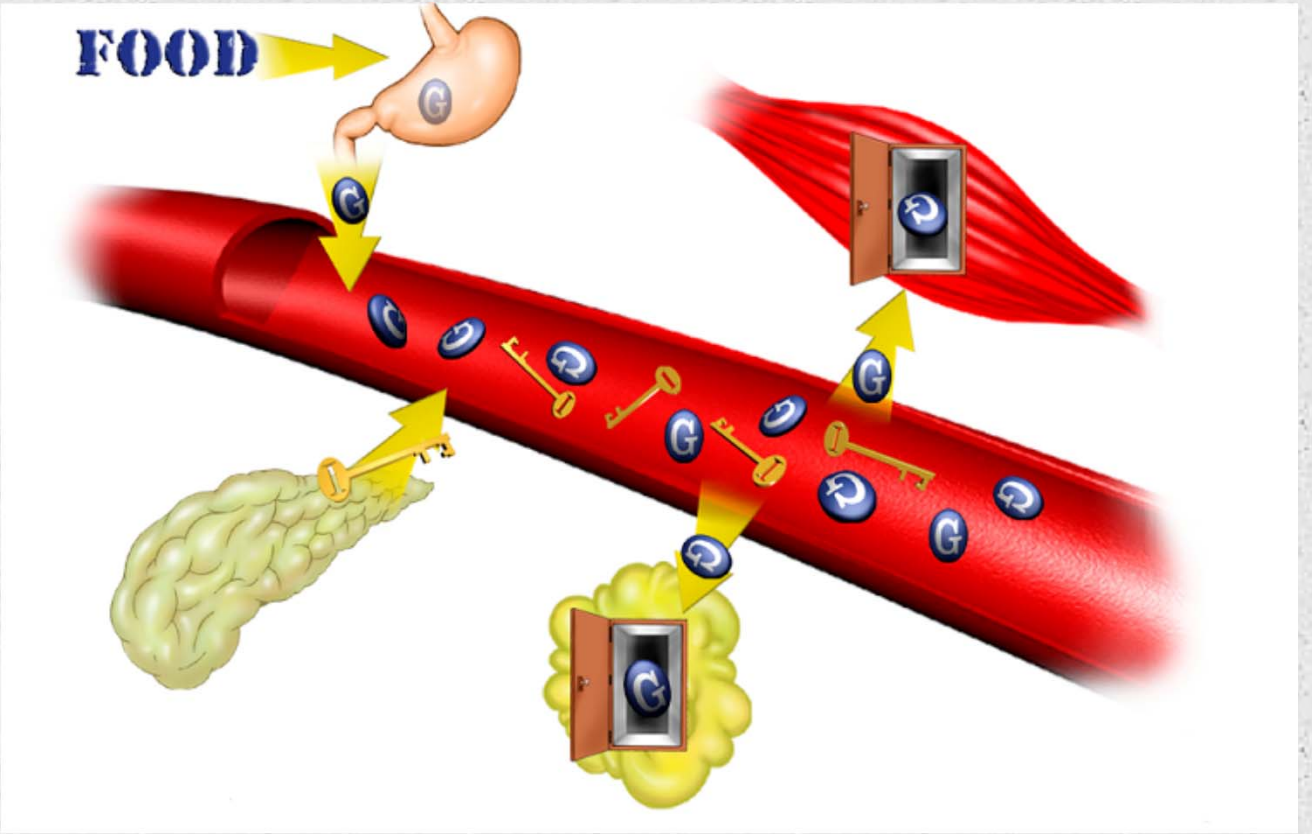
Normal metabolism: insulin is released from the beta cells in the pancreas



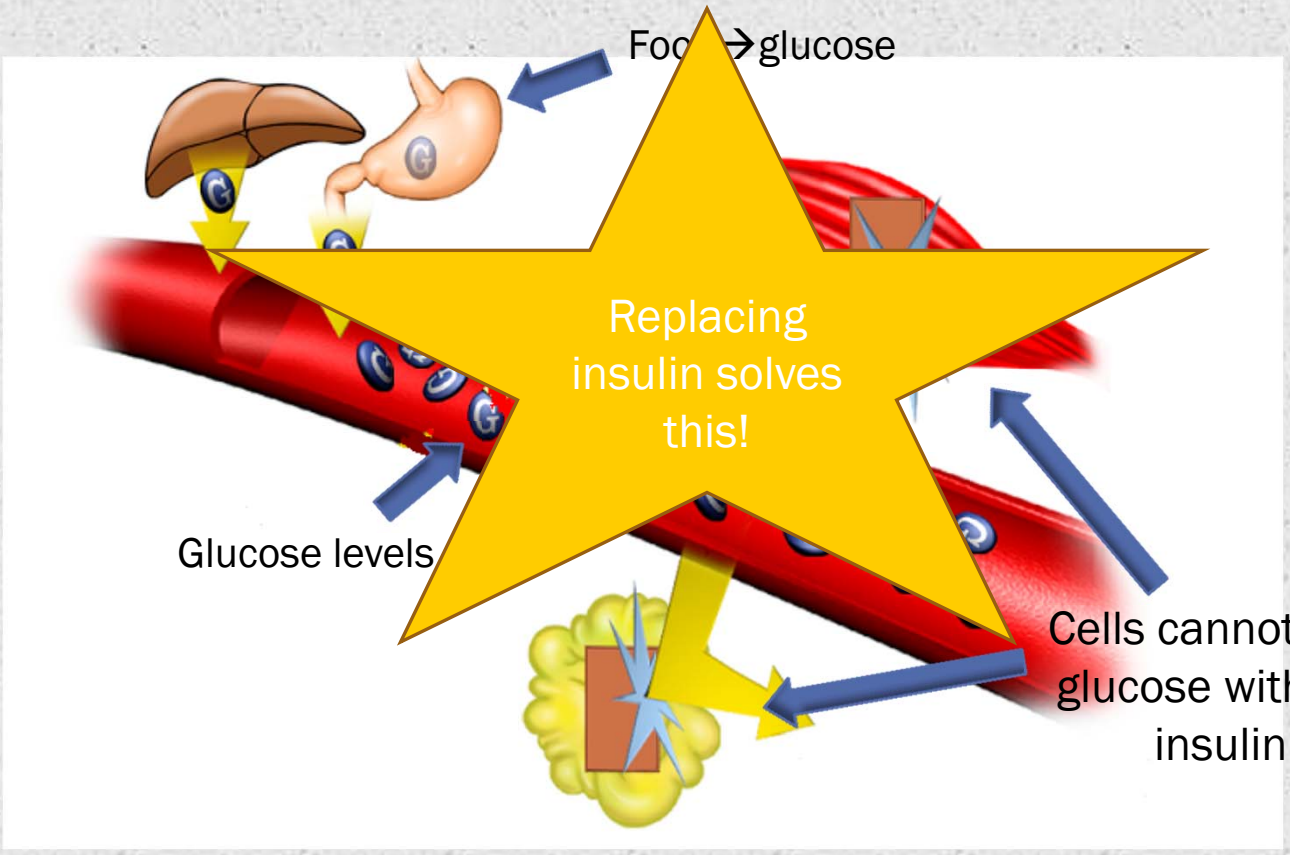
Normal Metabolism: insulin allows glucose to enter the cells



Normal metabolism: glucose is used by the cells for energy



In Type 1 Diabetes….



What is Type 1 Diabetes?

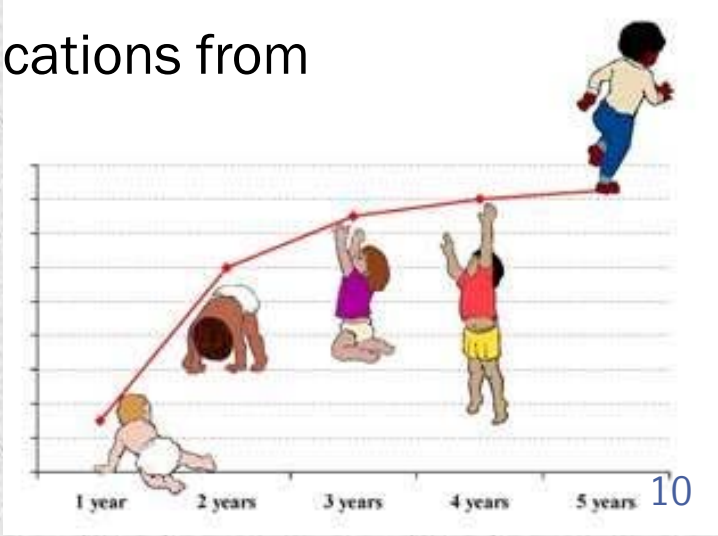
- Insulin replacement must be balanced to the food intake to normalize blood sugar

Other factors (exercise, stress, alcohol, illness, etc) will affect blood sugar

Blood Sugar

What is Type 1 Diabetes?

- Goals of treatment
  - Normal growth and development
  - Avoid being acutely ill from low or high blood sugar
  - Avoid long term complications from hyperglycemia
    - Kidney damage
    - Nerve damage
    - Eye damage



Treatment

- The Miracle of Insulin
  - Given via
    - Syringe
    - Pen
    - Pump
- Which regimen is best?
  - It depends!
    - patient choice, age, mealtimes, diet, exercise, parents' work hours, history of low blood sugars, previous control if already on insulin, availability of school RN or trained personnel

Treatment:

insulin via injection (syringe or pen)

- Types: rapid and long acting
  - clear and colorless
  - Store unopened vials/pens in refrigerator
    - Do not freeze
  - Once opened, keep at room temperature
  - Opened vials/pens are good for 1 month
  - Unopened vials are good until the expiration date
  - Can dose full or ½ units with both syringes and pens

Treatment:

insulin via injection (syringe or pen)

- Insulin pens compared with syringes
  - More discreet, portable, convenient
  - Dialing dose faster than drawing out of syringe
  - More accurate dosing, especially if person administering has vision problems
  - Disadvantages: need to hold needle in place for 10 seconds to ensure delivery, some insurances won't cover

Treatment:

insulin via injection (syringe or pen)

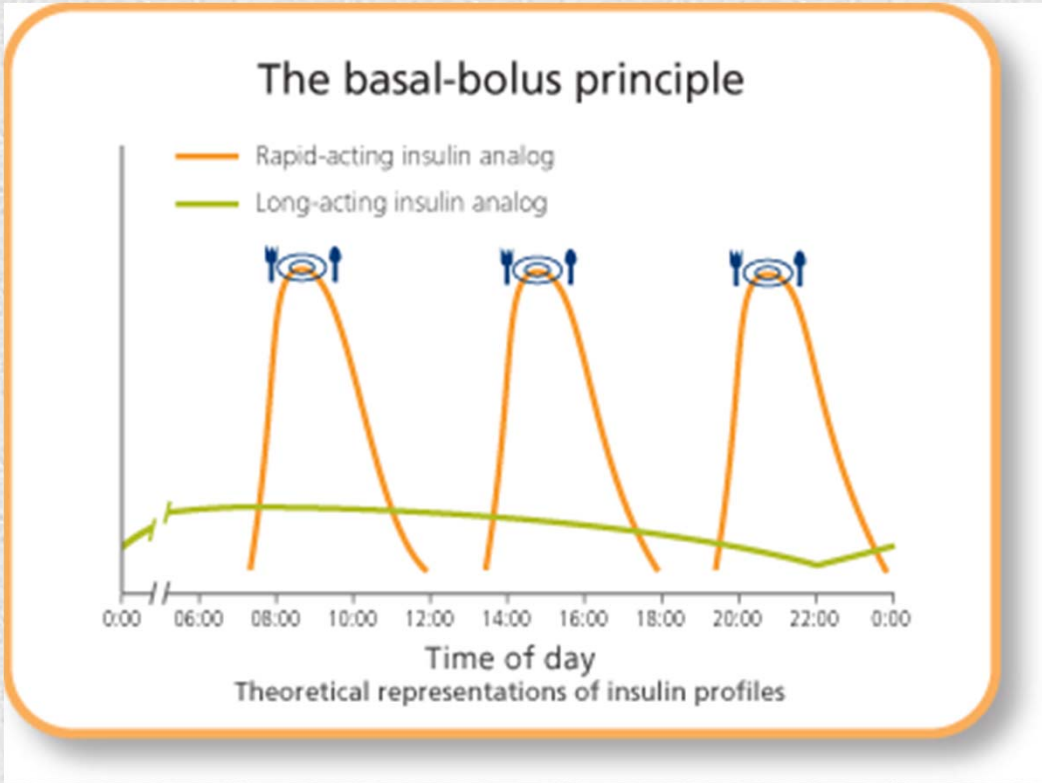
- Rapid acting insulin: Humalog, Novolog, Apidra
  - taken with meals and/or for high blood sugar
  - Action times after injection
    - Starts: 10-15 minutes
    - Works best: 30-90 minutes
    - Lasts: 4 hours
  - eat within 15 minutes of taking injection
    - low blood sugar occurs most often when insulin works best, 30 – 90 minutes after injecting

Treatment:

insulin via injection (syringe or pen)

- Long acting insulin: Lantus, Levemir, Basaglar
- Provides a steady-state level of insulin over a 24 hour period with no pronounced peak in activity.
- Given at the same time everyday
- Action times after injection
  - Starts: 2-4 hours
  - Works best: the same all day
  - Lasts: 20-24 hours
- Longer acting insulin: Tresiba
  - Given at the same time everyday but lasts for 42 hours

Treatment:
insulin via injection (syringe or pen)



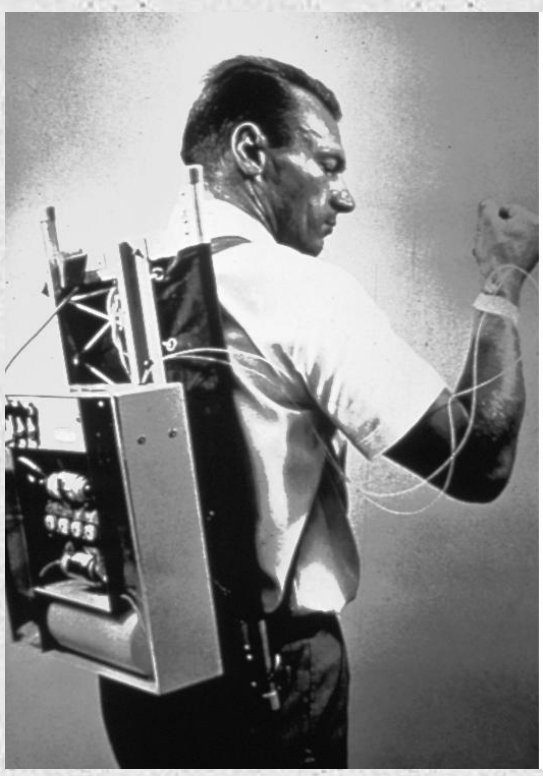
Treatment:

insulin via pump (continuous infusion)

- Gives small amounts of insulin all day long
  - Acts like a pancreas!
- Insulin infused in 2 ways
  - Small amount continuously = BASAL
  - Larger amount for meals and high blood sugar = BOLUS
- Most pumps have 3 parts
  - Pump: a tiny computer
  - Infusion set: delivers insulin under the skin: change every 2-3 days
  - Reservoir/cartridge: holds 2-3 days worth of insulin
- Check blood sugar, count carbs, enter into pump

Treatment:

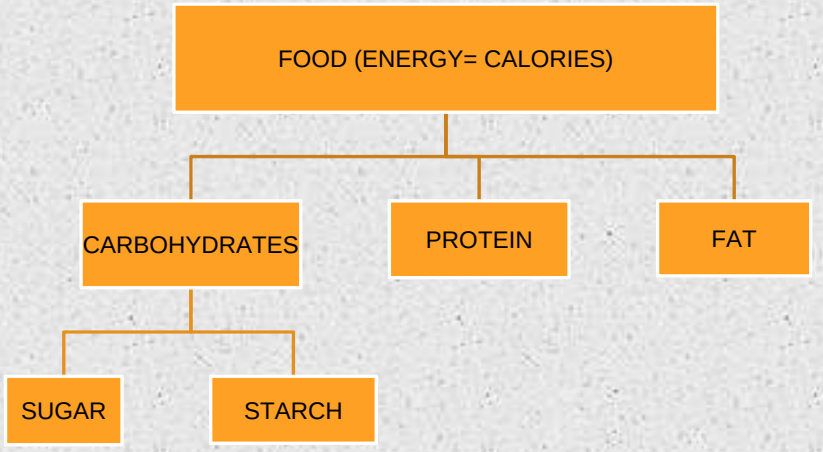
insulin via pump (continuous infusion)



Treatment:
insulin via pump (continuous infusion)

Treatment: meal planning

- Food is made up of 3 major nutrients:
  - Fat, protein, carbohydrates
- Only carbohydrate (carb) turns to glucose when digested
- Blood sugar rises when carbohydrate-containing foods are eaten, that is why we count carbohydrates



Treatment: meal planning

- Carb counting: when we count the grams (g) of carbohydrate in a food
- Add up the total number of carbs in each meal and snack
  - Your doctor will tell you how much insulin to give for those carbs (the “insulin to carb ratio”)
  - Match the insulin to the carbs
- what foods contain carbohydrate??
  - Breads, grains, cereals, fruits and fruit juices, starchy vegetables (potatoes, corn, peas, beans, squash), milk and yogurt, sweets and sugary foods





Treatment: meal planning

- Reading a food label
  - Serving Size
    - Don't get confused with the grams next to the serving size
  - Total carbohydrate
    - Sugars are included in this number
    - Sugar free ≠carb free

Nutrition Facts

Serving Size 1/2 cup (57g)
Servings Per Container 15

Amount Per Serving

Calories 230 Calories from Fat 100

	% Daily Value*
Total Fat 11g	**17%**
Saturated Fat 2g	**10%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 95mg	**4%**
Total Carbohydrate 32g	**11%**
Dietary Fiber	**12%**
Sugars 18g	
Protein 5g	

Vitamin A 0% • Vitamin C 0%
Calcium 4% • Iron 10%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Saturated Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300 mg
Sodium	Less Than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Treatment:

Blood glucose monitoring

- Normal range (without diabetes):
  - Fasting: less than 126
  - Non-fasting: less than 200
- Goal range for diabetes:
  - Depends on other factors, especially age
  - In babies and toddlers, main focus is to avoid low blood sugars; as the child grows, the target gets tighter
    - low blood sugars can affect brain development at a young age.

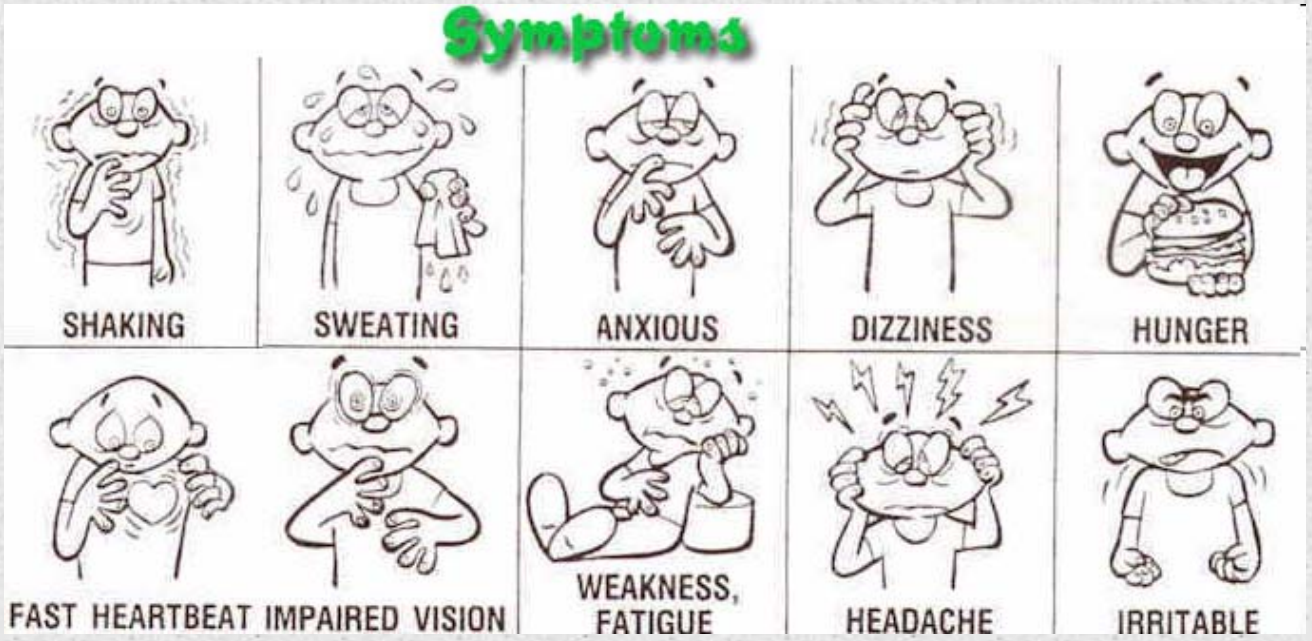
Treatment:
Blood glucose monitoring

- When to check
  - Before meals, at bedtime, and from time to time overnight, 2 hrs after meals to see how the insulin for that meal worked.
  - Before exercise
  - More frequently when ill (as directed by your doctor)
  - Whenever the child is acting “differently” in any way (more tired, irritable, anxious, shaking, sweating unusually, etc.)
- Sites: Fingertips are preferred

Hypoglycemia
Low Blood Glucose

- Generally when < 80 (or if older child, < 70)
- Causes
  - Too much insulin (give it and then child does not eat enough)
  - Exercise
  - Vomiting, illness which causes child to "lose" the carbs/sugar eaten

Hypoglycemia
Low Blood Glucose



Hypoglycemia
Low Blood Glucose

- Treatment
  - Rule of 15s
    - 15 grams of a fast-acting carbohydrate
      - Examples: ½ cup juice, 3-4 glucose tablets, ½ cup reg pop
    - Wait 15 min. and test blood sugar again.
    - If still low, retreat with 15 more grams.
- Don't over treat low blood sugar
- Icing, cake gel, honey and need for protein if persistent
- Glucagon if severe, child is not able to be aroused

Severe Hypoglycemia

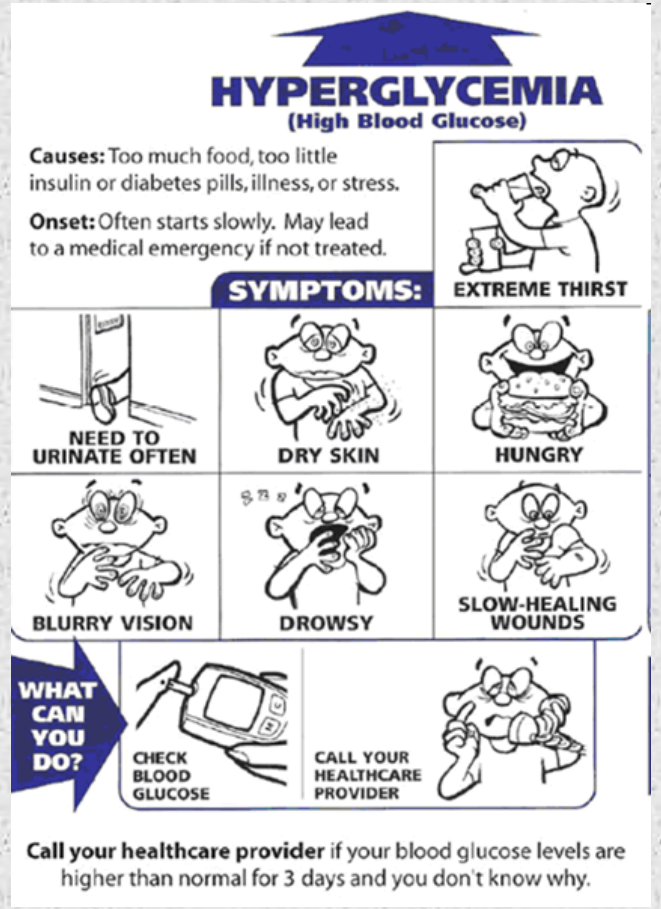
Severe low blood glucose

- Glucagon: naturally occurring hormone made in the pancreas
- Treatment for severe hypoglycemia
- A life-saving, injectable hormone that raises blood glucose level
- Cannot harm a child

Hyperglycemia
High Blood Glucose

- Definition varies by child, but generally any value > 180
- Causes
  - Illness, infection
  - Not giving enough insulin (skipped dose or miscalculation)
  - Giving injections in the same place over and over again
    - must rotate sites so the body can absorb insulin properly
  - Liver making sugar (insulin prevents this)
  - Eating between meals and/ or eating sweets
  - Not enough exercise
  - Emotional stress
  - Puberty
- Treatment
  - sugar-free fluids every hour
  - Insulin: give a correction dose based on your scale for high sugars

Hyperglycemia
High Blood Glucose



Hyperglycemia
High Blood Glucose

- Ketones
  - The “bad guys” or toxic acids that build up when our body is missing insulin
  - If ketones continue to build, this leads to diabetic ketoacidosis (DKA)
  - Check for these in the urine with ketone testing strips
  - There is also a blood ketone meter
    - When blood sugars are 300 or greater
    - With ANY vomiting or belly pain
    - If you give insulin but the blood sugar is not coming down
    - If you are sick with a cough, cold, etc.

Treatment

Glucose monitoring with CGM

- CGM – continuous glucose monitor
  - Checks tissue glucose (interstitial), not blood glucose: not perfect!
    - Change every 6-7 days
    - Calibration required (by finger stick) at least 2x/day
    - Wear on upper buttocks, abdomen
  - Checks glucose every 5 minutes : shows trends
    - Alarms when glucose is high/low
    - Some are FDA approved to dose insulin off of reading
  - Can send information to a receiver, insulin pump or phone

Treatment

Exercise

- It is recommended that all kids exercise at least 30 minutes/day
- Exercise acts like insulin!
  - May require less insulin with exercise, for up to 12 hours afterward
  - Watch for hypoglycemia
- Only way to know how to adjust the insulin or food prior to exercise is to check blood sugars before, during, and after the exercise

Treatment

Motivation, Support

- It is NOT easy!
- Help and supportive supervision!
  - At home and school
  - They may become more independent with age but they should never manage diabetes alone
  - They may need a "break" from caring for diabetes, parents should then take over
  - It may be beneficial for the whole family to make healthy changes
  - Discussing future complications usually does not motivate kids to improve self care, they live in the moment!
  - It's o.k. to seek counseling to help you cope with this challenging chronic illness
- You have the right to
  - Cry, be angry, feel overwhelmed, confused
- But…please try not to BLAME
  - "let's fix that high blood sugar" instead of, "why is your blood sugar so high?!"

Resources

- Local
  - La Rabida: Pediatric diabetes experts, social workers and psychologists (800) 770-2232, CCDC@larabida.org
  - Chicago-based: Jimmyinsulin.org
- National
  - The American Diabetes Association: www.diabetes.org
  - Juvenile Diabetes Research Foundation: www.jdrf.org
  - www.Childrenwithdiabetes.com
  - www.Insulinforlife.org to donate extra supplies
  - www.diatribe.org for support and information
- Research
  - www.diabetestrialnet.org
  - www.JDRF.org
- Camps!
- Smart Phone Apps, Glooko, Tidepool, Myfitnesspal, Calorieking calorie counter.
- Give lots of praise, love and hugs ☺

Questions