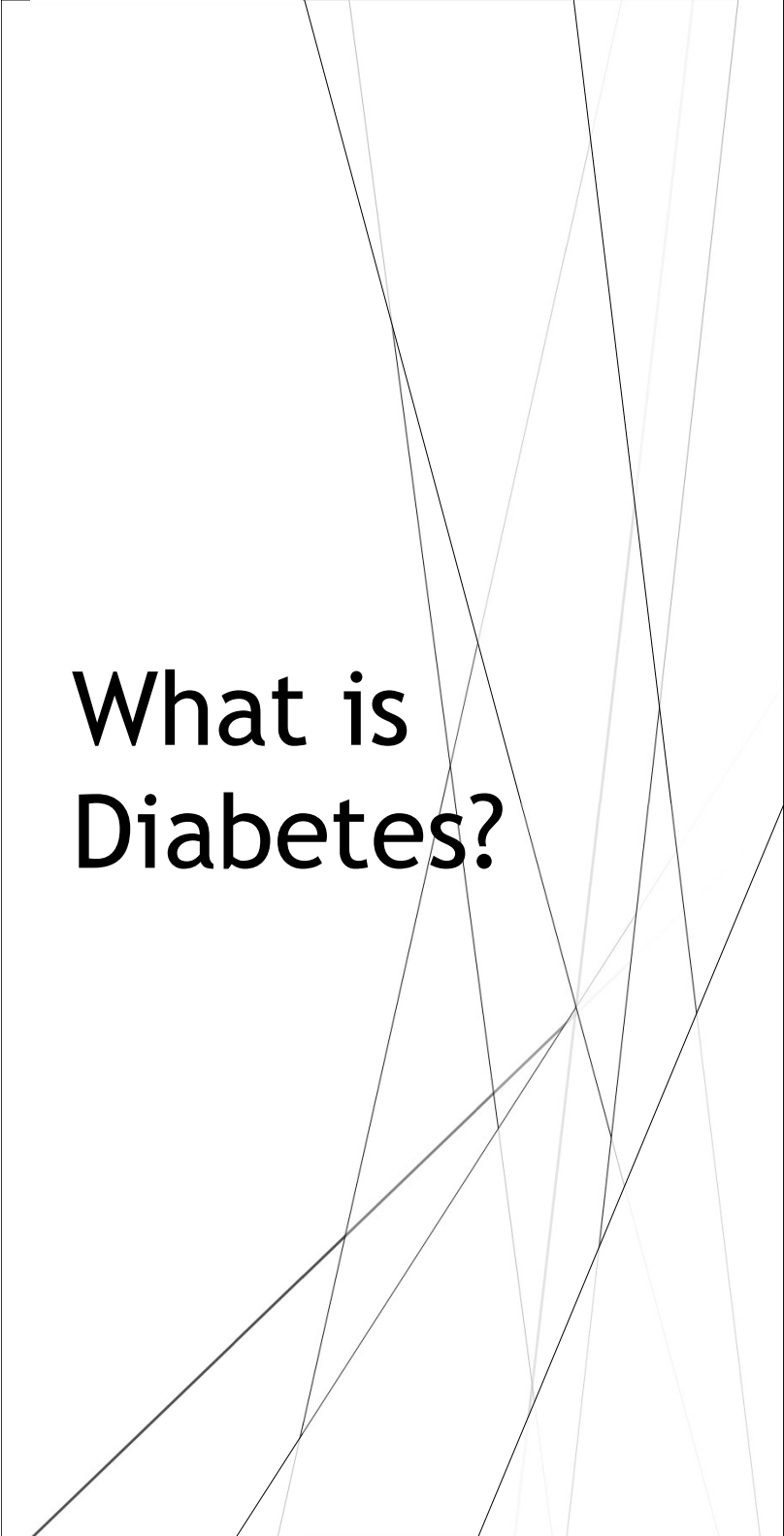


Diabetes Basics

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- ▶ Diabetes is a chronic health condition in which the body cannot use the glucose (sugar) found in food.
 - ▶ **Type 1:** The pancreas does NOT produce insulin.
 - ▶ Autoimmune destruction of the beta cells of the pancreas
 - ▶ The rate of beta cell destruction can happen slowly or rapidly, explaining the wide variability in the severity of onset of symptoms from one child to another
 - ▶ **Type 2:** The pancreas does not produce ENOUGH insulin and/or the body RESISTS the action of insulin.

An abstract graphic on the right side of the slide, featuring several thin, dark lines that intersect to form a series of overlapping triangles and quadrilaterals. The lines are set against a light gray background.

What is Diabetes?

Diabetes Education

Education begins in the hospital at the time of diagnosis and continues in the outpatient clinic (PENS)

Education should be started as soon as possible

Begin with mechanical skills (ie: drawing up insulin and giving injections, blood glucose monitoring)

Ensure basic understanding of healthy eating and carbohydrate counting, how to manage high and low blood sugars, and when/how to test for ketones.

Testing blood sugar



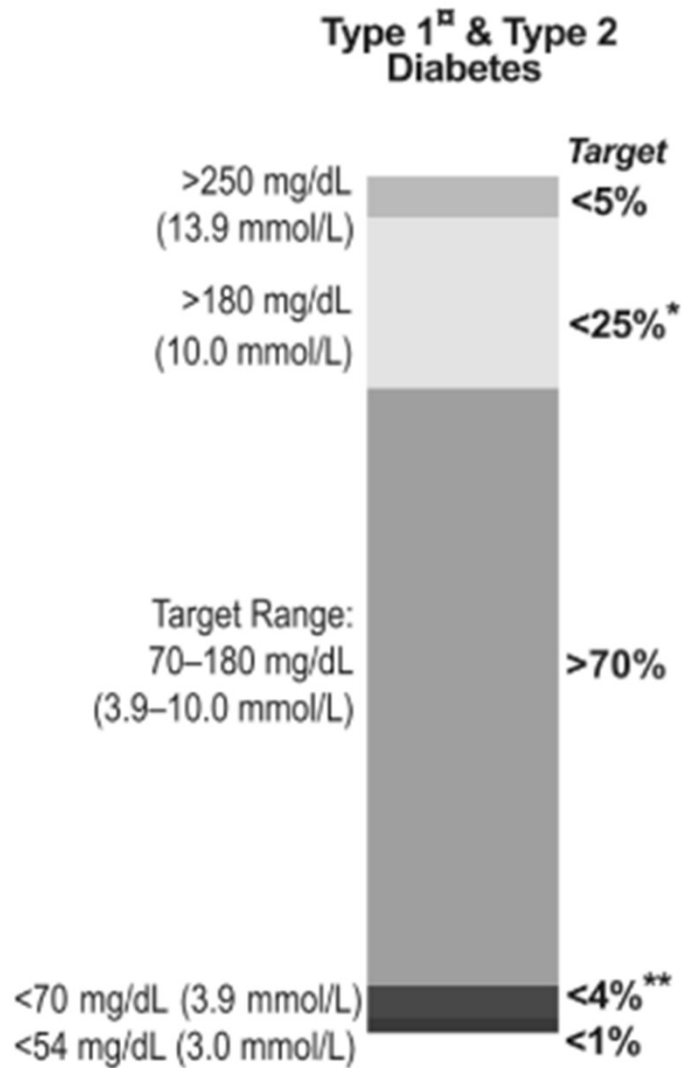
- ▶ Before all meals
- ▶ Before bed
- ▶ With signs of low blood sugars
- ▶ Before and during exercise
- ▶ Minimum 4 times per day or continuous glucose monitor

What about CGM (Continuous Glucose Monitoring)?

- ▶ A CGM works through a tiny sensor inserted under your skin, usually on the belly or arm.
- ▶ The sensor measures interstitial glucose level, which is the glucose found in the fluid between the cells.
- ▶ The sensor tests glucose every few minutes. A transmitter wirelessly sends the information to a monitor (receiver or phone) or an insulin pump.



Blood Sugar Goals



Hypoglycemia (Low Blood Sugar)

- ▶ Blood or Sensor Glucose < 70 mg/dL
- ▶ Common Causes:
 - ▶ Too much insulin
 - ▶ Too little carbohydrate for the insulin given
 - ▶ Exercise

Signs of Hypoglycemia



- ▶ Hungry
- ▶ Tired
- ▶ Shaky
- ▶ Irritable, Confused
- ▶ Sweaty
- ▶ Pale
- ▶ Rapid Heart rate

Treatment of low blood sugars

Rule of 15: Give 15 gms of fast-acting carbohydrate, wait 15 minutes, and retest. If still hypoglycemic ($< 70\text{mg/dl}$ or $< 80\text{mg/dl}$ for some kids) retreat with another 15 gms.

EXAMPLES OF FAST-ACTING CARBOHYDRATES:

8 lifesavers

3-4 glucose tablets

1/2 cup of juice (4 OZ)

1 tube of glucose gel

*Do not treat low blood sugar with food containing protein or fat because it slows sugar absorption.

*Follow-up with a snack if snack or meal is $>$ one hour away.

Glucagon Administration

- ▶ Use Glucagon Emergency Kit if child is unresponsive
- ▶ Simultaneously call 911
- ▶ IM injection or Intranasal
- ▶ Gvoke pen
 - ▶ 2 pen kit
 - ▶ Stable at room temp
- ▶ Baqsimi (intranasal)
 - ▶ Stable at room temp for 2 years
 - ▶ Must keep in foil pouch



Symptoms of Hyperglycemia or High Blood Sugar

- ▶ Frequent urinating
- ▶ Thirst
- ▶ Headache
- ▶ Fatigue
- ▶ Hunger
- ▶ Dehydration





Not taking enough
insulin



Eating carbohydrates
without taking insulin



Inactivity



Stress



Illness

Causes of Hyperglycemia

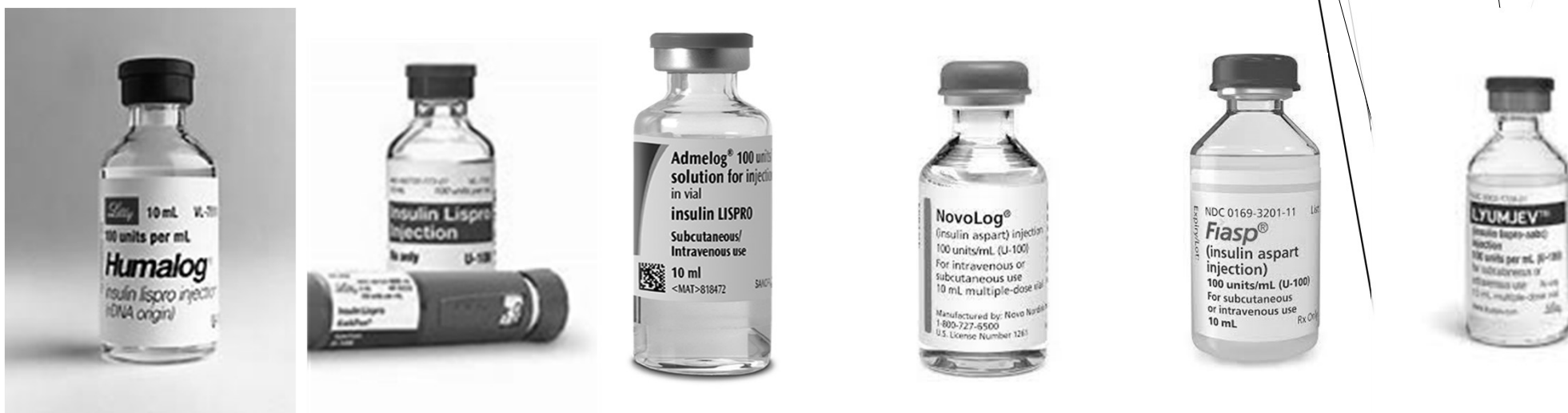
Treatment of high blood sugar

Rapid acting insulin

- ▶ Insulin sensitivity ratio
 - ▶ 1 for 50mg/dl over 150
- ▶ Correction scale or sliding scale insulin
 - ▶ Less than 150, no extra insulin
 - ▶ 151-200 = 1 unit
 - ▶ 201-250 = 2 units
 - ▶ 251-300 = 4 units
 - ▶ 301-350 = 5units
 - ▶ Greater than 351 = 6 units



Rapid-Acting Insulin



These insulins are used to cover carbohydrates and to bring down high blood sugar quickly

- Starts to work in 15 minutes
- Peaks in 30 -90 minutes
- Lasts 3-5 hours

Long-Acting

Also called basal insulin.

They work in the background to keep the blood sugars stable in between meals.

- ▶ Starts to work in 1-2 hours
- ▶ No real peaks
- ▶ Lasts 20-24 hours

DO NOT MIX WITH OTHER INSULINS!!!

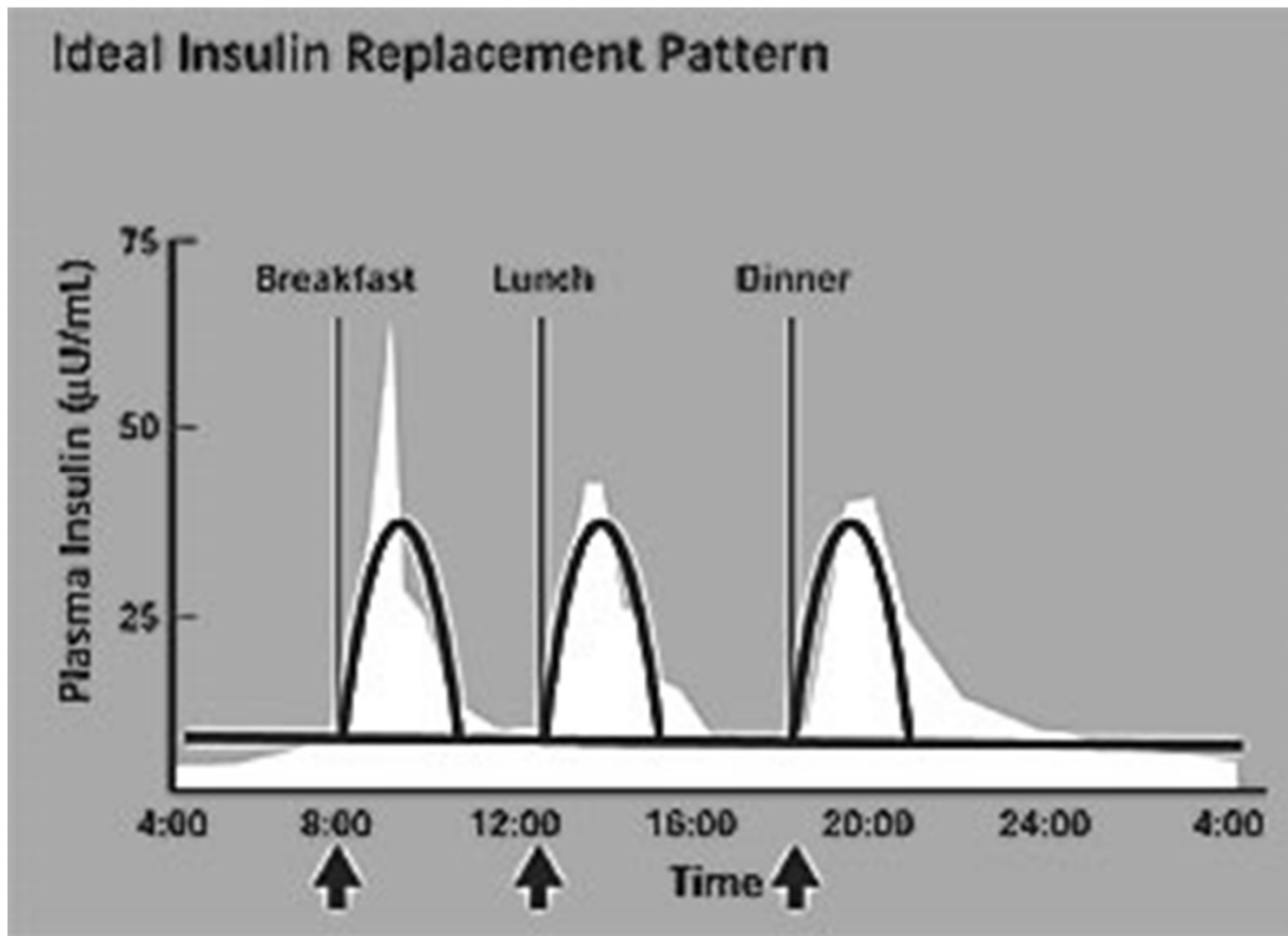


Ultra-long Acting

- ▶ Lasts 36-48 hours
- ▶ Once a day injection for better insulin coverage
- ▶ Timing is not as important
- ▶ Not a good insulin for backup for pumps as it takes a few days to get to proper serum concentration



IDEALLY.....



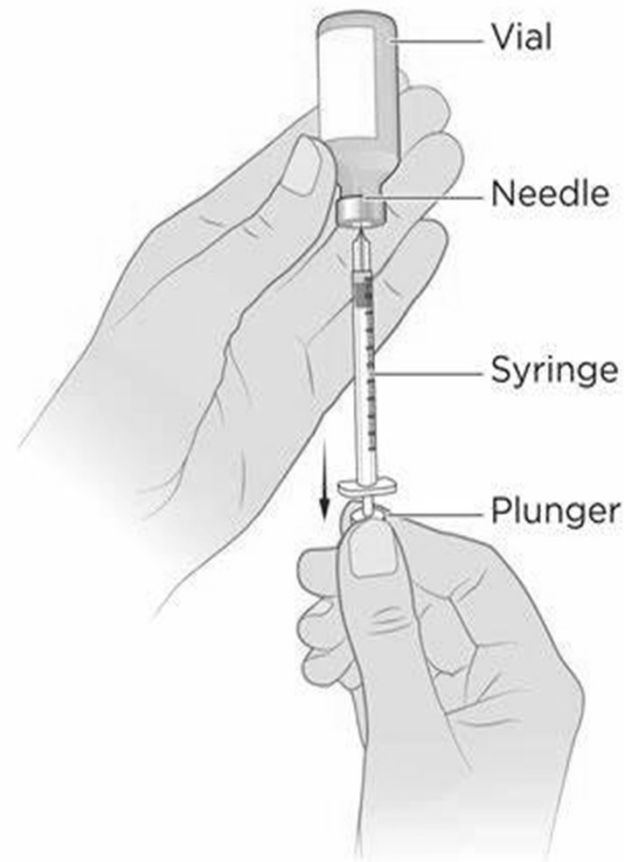
Insulin Facts

- ▶ Keep refrigerated until opening
- ▶ Once opened, can store at room temperature for 28-30 days- 1 month.
- ▶ Do not let insulin freeze or get too hot >86 F.
- ▶ Do not store in direct heat or light.
- ▶ Insulin should look clear, throw away if cloudy or clumpy.



Syringe and Vial

- ▶ Most newly dx families go home with syringe and vial and then switch to pens at 1st MD appt
- ▶ Sutter Medical Center Sacramento uses syringe and vial inpatient so its what families practice with
- ▶ Young kids may need $\frac{1}{2}$ units and if insurance doesn't cover $\frac{1}{2}$ unit pen would stay on syringes
- ▶ Need to inject air into vials to prevent vacuum
- ▶ Most vials are 10ml which have 1000 units



Insulin Pens

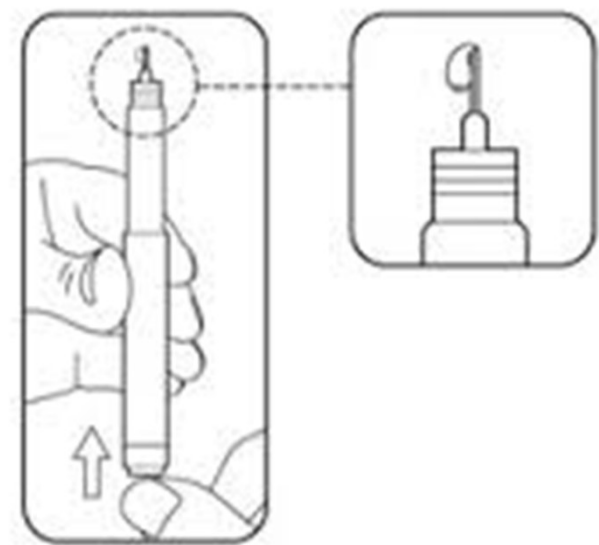


- Prefilled vs. cartridges
- Holds 300 units vs. 1000 in vial.
- Good for 28 days once opened
- Do not store with needle on



Using the Pen

- Step One: Insert new needle
- Step Two: Prime pen
- Step Three: Inject into skin pushing down plunger
- Step Four: Count to 10



Where to Inject?

- ▶ Abdomen
- ▶ Outer Arm
- ▶ Thigh
- ▶ Hip Area or upper Buttock

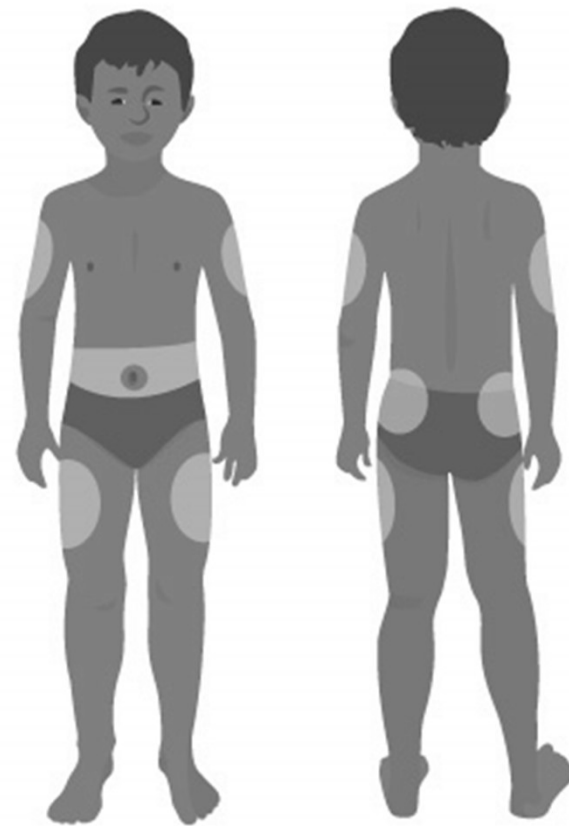
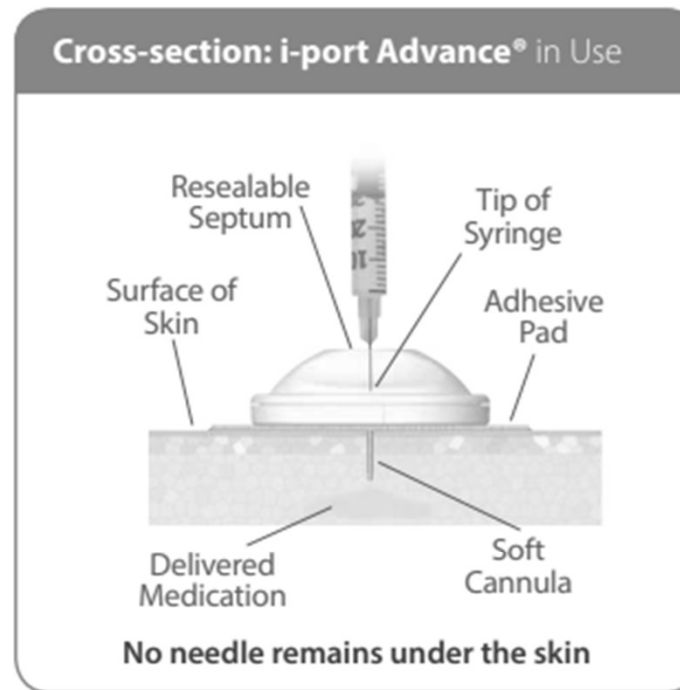


Image Credit: Nemours KidsHealth/Google Images

Other Injection Options

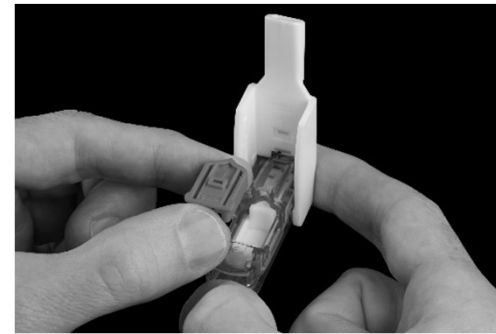
- ▶ i-Port Advance injection port lets you take your medication without having to puncture your skin for each shot.
- ▶ The port can be worn for up to three days and during all normal activities, including exercising, sleeping, and bathing.
- ▶ Must be used with 6-8mm pen needles or syringes





Afrezza (Inhaled Insulin)

- ▶ Replaces fast-acting insulin injections
- ▶ Still take long-lasting insulin as injection
- ▶ Comes in 4-8-12 unit cartridges
- ▶ Is not a 1:1 dosing with injected insulin, less concentrated
- ▶ Do not use insulin:carbohydrate ratio
- ▶ Approved 18 and older although some patients enrolled in study



Injected Mealtime Insulin (units)	Starting Afrezza Dose (units)	Anticipated Afrezza Dose (units) After Titration*
Up to 4	4	4-8
5-8	8	8-12
9-12	12	12-20
13-16	16	16-24
17-20	20	20-32
21-24	24	24-36

Ketones

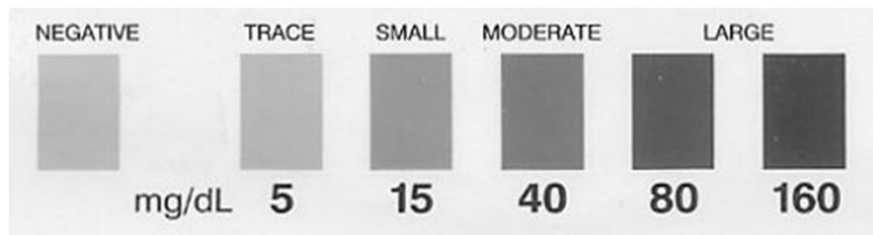
- ▶ Produced when insulin levels are low or during times of illness or stress
- ▶ Usually related to missed insulin doses, especially missing long acting insulin
- ▶ Can also occur with a pump malfunction or site failure

Symptoms

- Frequent urination
- Frequent thirst
- Blurry Vision
- Dry Mouth
- Fatigue
- Nausea
- Vomiting

Testing Ketones

- Test with high blood sugars generally above 300
- Test with illness
- Test with symptoms



Exercise

- ▶ Test before, during and after
- ▶ If less than 200 = eat a 15-30 gram carb snack
- ▶ If greater than 300 = test for ketones
- ▶ If ketones present, do not exercise
- ▶ If high after exercise wait to correct



The background of the slide features several thin, dark gray lines that intersect to form various geometric shapes, including triangles and polygons. These lines are primarily located on the right side of the slide, with some extending towards the center.

Questions?

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