

# KETONES AND SICK DAY MANAGEMENT

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# Hyperglycemia is NOT good.

- ▶ Hypoglycemia is NOT the only concern.
- ▶ Persistent Hyperglycemia may be a sign of a problem.
  - ▶ A pattern of 3 or more BG readings  $> 180$  mg/dL at the same time of day may need a dose adjustment.
  - ▶ Talk with your diabetes educators
  - ▶ (Unexplained) BG values  $> 250$  mg/dL times x 2
  - ▶ Think about ketones!

# What are ketones?

- ▶ **Insulin is needed by the body to lower BG values**
  - ▶ **It allows glucose to enter the cells**
  - ▶ **It also signals the body to use glucose as a fuel source**

# How do ketones make you feel?

- ▶ Without insulin the body needs to use other sources of energy
- ▶ Fat is a source of energy
- ▶ The breakdown of fat leads to formation of ketones
- ▶ Ketones are “acidotic” and can cause
  - ▶ Nausea
  - ▶ Abdominal Pain
  - ▶ ...Not feel good.

# When should you check for ketones?

- ▶ Two unexplained highs over  $> 250$  mg/dL
- ▶ **BUT ALSO WHENEVER....**
- ▶ You feel sick and/or vomiting
- ▶ You missed your injection of Lantus or Levemir
- ▶ Your pump site or pump stopped working
- ▶ Whenever you do not have enough insulin (ie coming out of the honeymoon period and your insulin dose has not been adjusted)
- ▶ Whenever there is extra stress to the body

# How you may be able to tell there are ketones present....

- ▶ Upset stomach or stomach pain
- ▶ Fruity odor
- ▶ Vomiting
- ▶ Dry mouth
- ▶ Drowsiness
- ▶ Deep breathing

# How do you check for ketones?

- ▶ Choice of urine or blood
- ▶ Urine is quick and easy
- ▶ Blood is recommended for
  - ▶ Young children
  - ▶ Those on pump therapy
  - ▶ If you are dehydrated
  - ▶ But may not be covered by insurance and it may be very expensive.

# How to Interpret Ketone Testing

Urine Ketones	Blood Ketones
Negative	<0.6 mmol/L

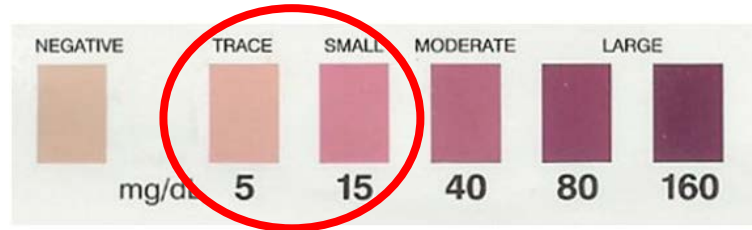


**Normal schedule and activities**



# How to Interpret Ketone Testing

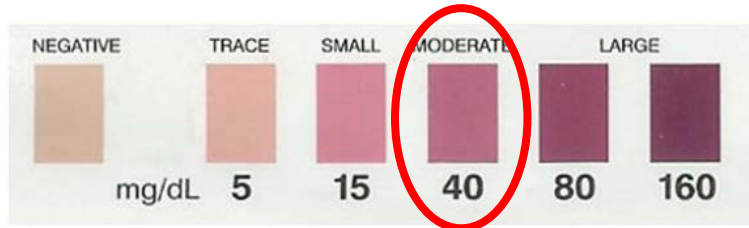
Urine Ketones	Blood Ketones
Trace or Small (15 mg/dL)	<0.6 mmol/L



**Drink extra water and recheck in 2 hours**  
**No Exercise**

# How to Interpret Ketone Testing

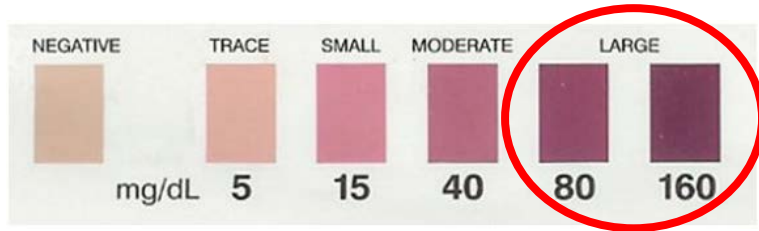
Urine Ketones	Blood Ketones
Moderate (40 mg/dL)	0.6 -1.5 mmol/L



**Extra insulin (5-10% of your total daily dose or TDD)**  
**Fluids (May need sugar containing drink to keep BG up while insulin is needed to get rid of the ketones)**  
**No Exercise and Call your diabetes team**

# How to Interpret Ketone Testing

Urine Ketones	Blood Ketones
Large (>80 mg/dL)	>1.6 mmol/L



**Extra insulin and fluids may be needed by IV**  
**No Exercise**  
**Immediately go to the nearest Emergency Room and on your way Call your diabetes team !**

# Why are ketones dangerous?

- ▶ The amount of ketones increases over time and you will become more “acidotic”
- ▶ What you want to avoid is **Diabetic Ketoacidosis or DKA**
  - ▶ Lethargy
  - ▶ Coma
  - ▶ 1% chance of stroke, brain swelling and death with each episode

# Common mistakes regarding ketones

- ▶ “My child with diabetes is sick and not able to eat so I don’t need to give him/her insulin.”
- ▶ Always give the background or basal insulin
  - ▶ May need an adjustment to dose
  - ▶ In as little as 3-4 hours ketones can start forming in the body

# Common mistakes regarding ketones

- ▶ **“My child is sick and has low blood sugars so he/she will NOT have ketones. I also gave him/her some the Lantus (Or he/she is still on the pump).”**
  - ▶ **May need sugar containing fluids if BG is less than 180 mg/dL**
  - ▶ **May still need to give extra insulin to drive out the ketones**

# Common mistakes regarding ketones

- ▶ **“Although I am on insulin, I have type 2 diabetes so I don’t need to check for ketones.”**
  - ▶ **Particularly during stress to the body, there is increased needs. If you are relatively deficient in insulin you can still have ketones**
  - ▶ **Up to 25% of those with type 2 diabetes still can have DKA**

# Being proactive about sick days and procedures

- ▶ Get the flu shot
- ▶ Talk to your diabetes team and doctor/dentist before the procedure
- ▶ Be prepared to
  - ▶ Check your BG more often
  - ▶ Give background/long acting/basal insulin
  - ▶ Check for ketones
  - ▶ Have sugar containing liquids at home
  - ▶ Know your diabetes team's phone number



# Congratulations!

- ▶ **Now you know**
  - ▶ **What ketones are**
  - ▶ **How to check for ketones**
  - ▶ **How to avoid ketones**
  - ▶ **How to handle ketones**