

Ketones

Ketones are produced when the body breaks down fat for energy when there is insufficient insulin for cells to access glucose. Ketones occur most commonly when there is not enough insulin in the body. They are acidic and are dangerous if they build up in the blood as they cause a life threatening condition called Diabetic Ketoacidosis DKA.

Small amounts of ketones are normal (0.0 – 0.6mmol).

What is Diabetic Ketoacidosis (DKA)?

Diabetic Ketoacidosis (DKA) is a life threatening condition that occurs when there is insufficient insulin and blood ketones are abnormally high. High ketones are often associated with very high BGLs as well. The high ketones cause imbalances in body fluid and salt levels, leading to dehydration and build-up of acids in the blood. Vomiting and increasing drowsiness result. DKA requires urgent medical assistance.

What causes DKA?

- Missing insulin injections
- Illness
- Previously undiagnosed type 1 diabetes

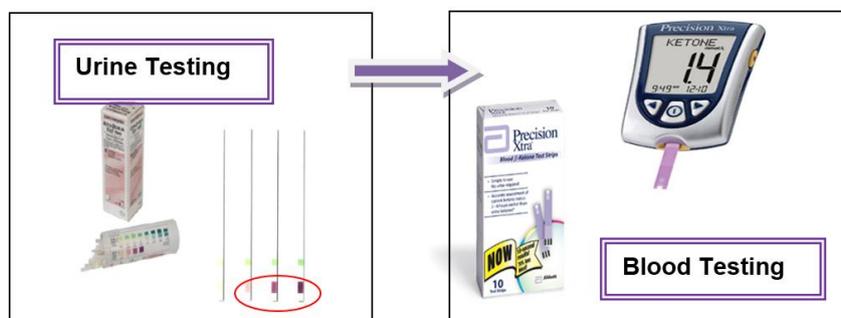
What are the signs and symptoms of DKA?

DKA can develop rapidly and requires urgent medical assistance. Signs and symptoms may include

- High blood glucose levels with ketones present
- Tummy pain
- Vomiting
- Dehydration
- Rapid, shallow breathing
- Acetone smell on the breath
- Confusion
- Drowsiness which may lead to coma

How do I check for ketones?

- Ketones can be detected in the blood and in the urine.



Urine ketones are positive if a colour change occurs (+, ++ or +++). If positive urine ketones check blood ketones.

When do I need to check for ketones?

- When the blood glucose level is greater than or equal to (\geq) 15 mmol/L
- Whenever your child is unwell, no matter what the blood glucose is.

Ketones do not need to be checked more frequently than every four hours if they are less than 1.0mmol/L

Action is required if ketones are greater than 1.0mmol/L

What should I do if my child's ketones are greater than 1.0mmol/L and they are on injected insulin?

1. If BGL greater than ($>$) 15mmol/L:

- Give 10% of total daily insulin dose using rapid acting insulin (Novorapid or Humalog) immediately
 - Total daily dose is calculated by adding all insulin doses for a usual day and dividing by 10. This equals 10% of total daily insulin dose.
 - If insulin is due, add 10% of total daily insulin dose to normal insulin dose
 - If insulin is not due, give 10% of total daily insulin dose as an extra injection immediately
- Check ketones in 2 hours and seek medical advice if ketones remain > 1.0 mmol/L
- Extra insulin may be required if BGL remains >15 mmol/L & ketones remain > 1.0 mmol/L after 2 hours

2. If BGL 8.0mmol/L - 15mmol/L:

- Consider giving 5 -10% of total daily insulin dose using rapid acting insulin.
- Encourage extra carbohydrate to maintain BGL
- Check ketones in 2 hours and seek medical advice if ketones remain > 1.0 mmol/L

3. If BGL 4.0mmol/L – 7.9mmol/L:

- Encourage extra carbohydrate to maintain BGL
- Give normal insulin dose
- Check ketones in 2 hours and seek medical advice if ketones remain > 1.0 mmol/L

4. If BGL < 4.0 mmol/L:

- Treat hypo and encourage sweetened fluids
- Seek medical advice if insulin is due – reduction in insulin dose may be required
- Check ketones in 2 hours and seek medical advice if ketones remain > 1.0 mmol/L

Remember

- If vomiting and ketones present, call RCH early for support with insulin doses
- If unsure of appropriate treatment, call the RCH and ask for the sick day diabetes service:
 - RCH switchboard 9345 5522

What do I do if my child is on a pump?

Positive ketones = 0.6 mmol/L or higher.

If you have ketones you have not been receiving adequate insulin.

Insulin pump therapy carries a much higher risk for developing ketones than injected insulin because if there is interruption to insulin delivery, there is no background or long acting insulin

Insulin pump users need to have access to injected insulin at all times.

A ketone reading of 0.6mmol/L and higher is positive and needs immediate treatment:

- Inject emergency dose of short acting insulin via pen or syringe
- Calculate emergency dose dividing your pump total daily dose of insulin by six (PTDD÷6)
- Do a full line and cannula change
- Check BGL's and ketones 2 hourly (Do not enter a BG into the pump for at least 2 hours). Bolus for any carbs consumed.

Please update and record your PTTD regularly and keep it with your emergency pack.

How do I know what my child's PTTD is?

PTDD can be found in the pump or on the download.

Medtronic Veo

In utilities menu, daily totals, daily average, 7 days to average, total insulin
Page 2 of download, right hand side – statistics box

Medtronic 640G

History menu, summary, 7 days, TDD
Page 2 of download, right hand side – statistics box

Animas Vibe

History, total daily dose. TDD done individually so need to average 5-7 days
Compilation page, average daily dose