

6. Ketones

DIABETIC KETOACIDOSIS SYMPTOMS



ABDOMINAL PAIN



HIGH KETONE LEVELS



FAST BREATHING



VOMITING

Ketones: what are they?

When there is not enough insulin in the body, glucose cannot get into the cells to be used for energy. The body compensates by breaking down body fat for energy. The breakdown of fat produces a by-product called ketones. Ketones can be detected in the urine and the blood. A build-up of ketones can cause the blood to become acidic. A low level of ketones may not have much of an effect, but as the levels rise your child may feel unwell with abdominal pain and vomiting.

When ketone levels get very high (*greater than 2.5 mmol/L*) your child may become very unwell with *vomiting* and fast breathing. The term for this is diabetic ketoacidosis and this requires emergency medical treatment. If left untreated, it can be fatal. Early detection and management of rising ketones is important to prevent Diabetic Ketoacidosis (*DKA*).

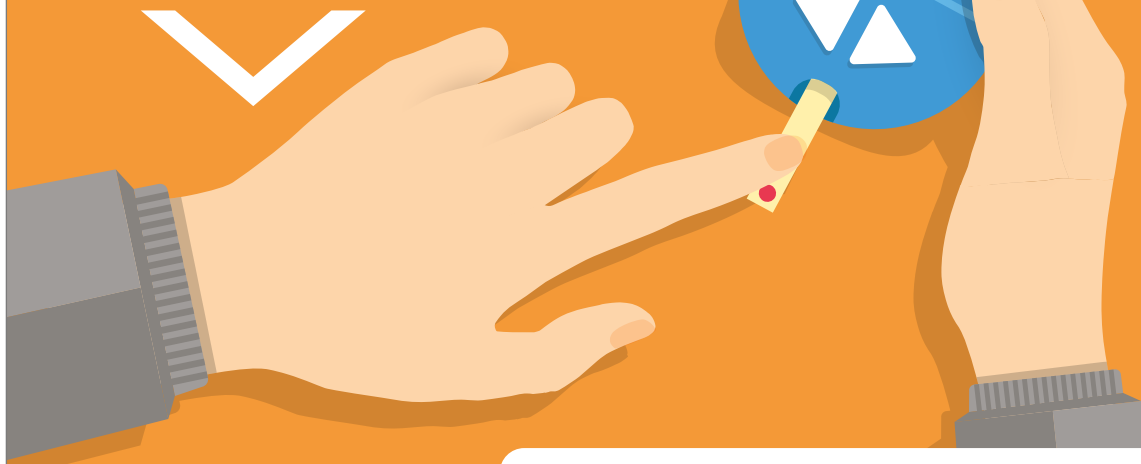
When to test for ketones:

- If your child is feeling sick, has tummy pain or is vomiting.
- If your child has a blood glucose level more than 14 mmol/L.
- If your child is breathing quickly.

What to do if ketones are present:

- Drink plenty of fluids to prevent dehydration.
- Give extra insulin as agreed with diabetes team - see sick day advice.
- Rest - do not exercise with high ketones.
- If ketone levels are very high or rising (*greater than 1.5 mmol/L*) you must call for medical advice immediately. Your child may need to come into the Emergency Department for assessment.

How to interpret blood ketone results



<0.6 **(under 0.6 mmol/L):**

May be normal; consider re-checking blood ketone levels in 1-2 hours if blood glucose remains elevated; above 13.9 mmol/L.

0.6-1.5 **(between 0.6 - 1.5 mmol/L):**

Indicates a need for extra insulin. It is important to telephone or follow the rules provided by your diabetes healthcare team and continue to check the blood glucose and blood ketone levels in 1-2 hours.

>1.5 **(over 1.5 mmol/L):**

Indicates risk of diabetic ketoacidosis. Call your child's health care team **WITHOUT DELAY** - it is likely that your child will need to be assessed in the emergency department.

Diabetic Ketoacidosis

DKA is a life-threatening condition which occurs when there is a build-up of ketones in the blood. DKA requires **urgent medical attention**.

Causes of DKA

- Sometimes present at time of new diagnosis of type 1 diabetes.
- Insufficient insulin or missed insulin dose.
- Illness.
- Equipment problems (e.g. pen not delivering insulin, pump cannula blockage).

Signs and symptoms of DKA include:

- High blood glucose.
- High blood ketones (*more than 2.5 mmol/L*).
- Dehydration.
- Abdominal Pain/Vomiting.
- Laboured or fast breathing.
- Sweet smelling breath.
- Drowsiness leading to coma (*late sign*).