

Advice to Families on the Purpose and Practice of Blood Ketone Testing (Pen Injections)

Blood ketones can be tested in exactly the same way as blood glucose but you will need the Optium Neo meter and special purple blood ketone test strips (see below) to perform a blood ketone test.



What causes blood ketones?

Blood ketones are caused when the body does not receive enough insulin, especially *long-acting* insulin such as Levemir, Lantus, Abasaglar or Tresiba. The body starts to break down fat in the body and this process produces acids called ketones.

Are ketones dangerous?

At low levels ketones can be managed by giving extra *fast-acting* insulin such as NovoRapid or Humalog (see grid overleaf for dose advice). But if ketones are allowed to build up too high in the blood they may lead to a condition called ketoacidosis, which cannot be reversed without hospital admission. Your child will feel extremely unwell and **symptoms of nausea and/or vomiting should initially be treated as a likely sign of ketones and not necessarily a 'bug' or ordinary illness.** especially if your child felt well the day before.

What are the signs and symptoms of ketones?

Nausea and/or vomiting – early sign test for ketones immediately

High blood glucose levels – early sign of possible ketone build up

Fruity smelling breath – serious sign of advanced ketone build up

Stomach pain – very serious sign of advanced ketone

Difficulty breathing – almost certainly ketoacidotic – emergency help required immediately

Confusion and/or disorientation – almost certainly ketoacidotic – emergency help required immediately

How do I prevent ketones being produced?

NEVER stop giving Levemir, Lantus, Abasaglar or Tresiba (long-acting insulin). Of course, missing any insulin will not be good for your child but missing the long-acting insulin in particular will lead to ketones being produced.

If you realise your child has missed a dose of their long-acting insulin for whatever reason then give *half the normal dose immediately* and *test the blood ketones and blood glucose*. Then call the diabetes nurse or the Children's Ward for further help. Tell them what the blood ketone and blood glucose levels are.

When should I test for blood ketones?

Blood ketone test strips are very expensive so we only want you to test for blood ketones in particular circumstances. They are:

1. **If your child is unwell or your blood glucose level is above 14 mmol/l**, especially with a high temperature, such as with 'flu symptoms, chest infection etc.
2. **If you think you have forgotten or missed a dose of Levemir, Abasaglar or Tresiba.** This may be indicated by (but not always) obvious by rising blood glucose levels
3. **If your child wears an insulin pump and insulin doses for meals and correction don't appear to be having any effect.** A steady rise in blood glucose levels despite insulin being given suggests that the pump may not be working. A positive test for blood ketones will almost certainly confirm that it has malfunctioned and the pump set and insulin will require prompt changing. **Give correction dose using a Novorapid pen device and the dose is calculated based on the ketone levels and refer to the table below**

What should I do if I discover blood ketones?

A blood ketone level is measured in mmol/l just like blood glucose levels. The grid below explains what to look out for and what to do in the event of blood ketones and high blood glucose levels.

Blood Ketone level	Risk of developing ketoacidosis	Action
LO or 0.5 mmol/l or under	None	No action - this is a natural level of blood ketones
0.6 - 1.0 mmol/l	Slight	Give usual correction dose and test ketones and glucose again in 2 hours
1.1 - 1.9 mmol/l	Moderate	Give usual correction dose + 25% extra and test ketones and glucose again in 2 hours. If blood ketone level has dropped repeat correction dose using new blood ketone and blood glucose readings. Contact diabetes nurses or on-call registrar (see telephone number below) for further assistance if blood ketone level not dropping
2.0 - 2.9 mmol/l	Moderate - High	Give usual correction dose + 50% extra and test ketones and glucose again in 2 hours. If blood ketone level has dropped repeat correction dose using new blood ketone and blood glucose readings. Contact diabetes nurses or on-call registrar (see telephone number below) for further assistance if blood ketone level not dropping
3.0 mmol/l	High	Give double the usual correction dose. Seek medical advice from the diabetes nurses or on-call registrar (see telephone number below) immediately. Prepare for admission to hospital

NEVER GIVE A CORRECTION DOSE WITHIN 2 HOURS OF GIVING A PREVIOUS CORRECTION DOSE

Emergency Contact Number: Diabetes Nurses (8am - 5pm Monday- Friday) 0300 422 8473
Out of hours: Direct number for PAU 03004228306 and Mobile 07798695981