

LRI Children's Hospital

Fasting Provocation test for Hypoglycaemia

Staff relevant to:	Medical and Nursing staff working within UHL Children's Hospital
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1. Introduction, Aim and Who Guideline applies to:

Hypoglycaemia can cause significant morbidity and mortality in children and young people, if they are not diagnosed and managed properly. There are many endocrine and metabolic conditions that can present with hypoglycaemia. Obtaining the appropriate samples during the episode of hypoglycaemia is crucial for making the right diagnosis. However sometimes it is not practically feasible to obtain them for various reasons. Hence these patients have to be subjected to controlled fasts to obtain these samples. Proper planning with strict adherence to protocol and liaison with the laboratory is important to complete the controlled fasts safely.

2. Preparation:

- Should be planned only after discussion with the Endocrine or Metabolic team
- Start of fast depends on the length of fast and history of length of fasting time. The aim is for hypoglycaemia to occur between 0900 and 1600 when staffing levels are high and for the fast to end by 1600
- The clinician who is booking the test should assess if it would be appropriate to start a fast at home.
- If the patient is not safe to start fasting at home, the patient should be admitted in the hospital and the start of the fasting time should be planned by the arranging Consultant
- **A NORMAL SERUM ACYLCARNITINE, URINE ORGANIC ACIDS PROFILE AND IGF-1 (only for children with short stature) SHOULD HAVE BEEN ESTABLISHED PRIOR TO ATTEMPTING THE FAST.**

Table 1: Recommended maximum length of fast based on age of the child:

Age	Hours of fast
<3 months	6 hours
3-6 months	8 hours
6-8 months	12 hours
8-12 months	16 hours
1-2 years	18 hours
2-7 years	20 hours
>7 years	24 hours

3. Procedure:

- 1) Admit to the ward and obtain baseline observations, including weight, height, and blood pressure. Nurse the child where they can be easily observed.
- 2) Insert cannula (at least 22g (blue) size) for sampling and make sure IV access is patent and secure.
- 3) Calculate and prescribe the amount of dextrose required in the event of hypoglycaemia – 500 mg/kg 10% Glucose (equivalent to 2ml/kg 10% glucose)
- 4) Ensure blood bottles, blood forms and ice packs are ready for hypoglycaemic screen
- 5) Monitor blood glucose (BG) levels hourly and increase frequency if trending down or symptomatic. Complete the monitoring chart (Appendix 1). Monitor every 15 min when $BG \leq 3\text{mmol/l}$.
- 6) Check blood ketones along with blood sugars once blood sugar is below 3 mmol/l
- 7) Hydration must be maintained with free access to plain water
- 8) Inform the General Paediatric or Endocrine Registrar on call about the patient

9) When hypoglycaemia occurs (blood sugar is 2.6 mmol/l or below on near patient testing) or if develops symptoms of hypoglycaemia obtain the blood samples below.

STOP THE TEST AND TAKE TIME CRITICAL SAMPLES FOR:

- Access the cannula. Take 0.5 mls of blood and discard. Then take at least 10 mls of blood from the cannula and fill it in the respective sample bottles.
- **Priority tests are lab Glucose, lactate, Insulin, C-peptide and Free Fatty Acids**
- Get ice packs/ ice cubes ready
- Please note that separate (hand-written) forms are required for specimens as marked 1-9 in the table below
- Please ensure that the samples are taken to the lab (Level 4, Sandringham building) on ice immediately

A total of 10 mls in 9 blood specimen bottles required (5 orange, 3 yellow, 1 white)

**** RED- Priority tests – must be collected at the time of hypoglycaemia**

Table 2: Fasting Provocation test for Hypoglycaemia - Time critical samples

Lab	Investigation	Specimen type	Volume	Blood taken	Time taken
Blood					
Bedside	Blood glucose stix		1 drop		
Bedside	Blood ketone stix		1 drop		
Bedside	Blood gas(capillary/venous)		0.5 ml		
Fast-track 1	Glucose	Fluoride oxalate (YELLOW top)	0.5 ml		
Fast-track 2	Lactate On ice	Fluoride oxalate (YELLOW top)	1.0 ml		
Fast-track 3	Ammonia On ice	Lithium Heparin (ORANGE top)	1.0 ml		
Fast-track 1	U&E's, Cortisol and Growth Hormone	White (WHITE top)	1.0 ml		
Specials 4	Insulin	Serum (WHITE or BROWN top)	0.5 ml		
Specials 5	C-peptide	Serum (WHITE or BROWN top)	0.5 ml		
Specials 6	*Free Fatty Acids and 3β-hydroxybutyrate	Fluoride oxalate	1.0 ml		

		(YELLOW top)			
Specials 7	Acylcarnitine profile, Gal-1-Put	Lithium Heparin (ORANGE top)	1.0 ml		
Specials 8	Serum amino acids	Lithium Heparin (ORANGE top)	1.0 ml		
Urine					
Specials 9	Urine organic acids	Urine sample (universal pot)	5 ml min		

10) Put urine bag on child or collect **next passed urine** to send for **urine organic acids**.

11) After obtaining all the samples, treat hypoglycaemia as below:

4. Management of hypoglycaemia:

ORAL

- If oral treatment is appropriate give fast acting sugar (orange or apple juice, glucose polymer, i.e. SOS/polycal), followed by long acting carbohydrates, bread, cereal to reduce the risk of rebound hypoglycaemia.

Weight	0-10 kg	11-20 kg	21-30 kg	31-40 kg	41-50 kg	51-60 kg	>60 kg
Orange or Apple Juice	35 ml	70 ml	100 ml	140 ml	180 ml	215 ml	250 ml

INTRAVENOUS

- Give 2 mL/kg 10% glucose as intravenous bolus followed by infusion containing 10% glucose as maintenance for up to 2 hrs. If IV fluids are needed for >2 hrs, consider changing to 10% Glucose/0.9% Sodium chloride as maintenance fluids.
- If no IV access available, give stat glucagon IM: 0.5mg for patients < 8 yrs age or <25 kg, 1 mg for patients > 8 yrs age or >25 kg.
Please note, Glucagon might not be effective if the patient has metabolic condition.
Hence this MUST be immediately followed by IV or IO access with infusion of glucose to maintain normal glycaemic state (BG>3.5mmol/L). Monitor BG at least every 15-30 minutes until BG>4 mmol/l.
Ensure IV treatment is followed by long acting carbohydrates as in oral management above.

If hypoglycemia persistent, follow “Hypoglycaemia in Infants & Children” protocol.
[Hypoglycaemia - in Children NOT Diagnosed with Diabetes UHL Childrens Hospital Guideline](#)

12) Check blood sugar every 15-30 mins whilst low and hourly until normal feeding resumed and BG>4 mmol/l.

If no hypoglycaemia (blood sugar >2.6 mmol/l) by end of test;

- 1) Stop the fast as planned
 - 2) Collect urine and blood samples as above and document number of hours fasted at time of sampling.
- **Please ensure that the samples are taken to the lab (Level 4, Sandringham building) on ice immediately and inform the lab that these are samples for hypoglycaemia screen.**

If there was any difficulty in obtaining blood samples:

- Contact the Paediatric Registrar urgently for help
- Try to obtain the samples at least for priority tests if possible (Lab Glucose, Insulin, C-peptide and FFA)
- **If there was delay in getting the blood samples and if the patient is symptomatic with severe hypoglycaemia (blood sugar <2.6 mmol/l on near patient testing), treat the patient with IV glucose as stated above.**

Parents may need training for glucose monitoring and appropriate follow up organised with open access letter as needed prior to discharge.

5. Education and Training

Ward staff will need training and will be facilitated by Metabolic and Endocrine Nurse Specialist

6. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Completion of the test	Results discussion in the Paediatric-Biochemistry meeting	Clinical	Annual	Clinical Lead
	Result discussion in Metabolic MDT			
	Audit			

7. Supporting References

1) "How to use a controlled fast to investigate hypoglycaemia", Arch Dis Child Pract Ed 2017; 102:28-36.

8. Key Words

Controlled fast, Hypoglycaemia

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.

As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

Contact and review details	
Guideline Lead (Name and Title) Anbezhil Subbarayan – Consultant James Greening - Consultant	Executive Lead Chief Nurse
Details of Changes made during review; <ul style="list-style-type: none">• Age related maximum fasting table amended to age ranges 2-7 years and > 7 years• 3. Procedure - Added point 6 Check blood ketones along with blood sugars once blood sugar is below 3 mmol/l• Added inform Endocrine registrar as an alternative to paediatric registrar about the patient.• Hypoglycaemia blood sugar changed from 2.8 mmol/l to is 2.6 mmol/l or below• Acylcarnitine profile, Cortisol, & Beta hydroxybutyrate removed from priority tests• Blood ketones added to bedside investigations & urine dip ketones removed• Management of hypoglycaemia monitoring of BG at least hrly until stable changed to Monitor BG at least every 15-30 minutes until BG>4 mmol/l.	
October 2024 : Minor Change Blood bottle type updated for Insulin and C-Peptide investigations	

**Appendix 1:
Form for Fasting Provocation test for Hypoglycaemia**

Patient Label

Date

Supervised by:

Time of start of the fast:

Time since start of fast (hours)	Actual Time	Blood Glucose level (BG)	Blood ketones	Symptoms (lethargy, cold & clammy, sweating, palpitations, tiredness etc)	Blood samples sent
0					
1					
2					
3					
4					
5					
6					
7					
8					
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