Examination 17324 Glucose (Blood sugar, oral glucose tolerance test, OGTT)

**Purpose of test**

A glucose measurement may be used to help:

- diagnose diabetes when someone has symptoms of hyperglycaemia (increased thirst, increased urination, urinary tract infections, tiredness, blurred vision, slow-healing infections)
- investigate symptoms of hypoglycaemia,(sweating, hunger, trembling, anxiety, confusion, blurred vision)
  - because sample obtained during the symptomatic period are vital to further investigations the hypo pack protocol should be followed in full
- monitor diabetes
- confirm POCT glucose results

**Sample**

Blood

**Sample Tube/Container**

Na-fluoride/Na2EDTA

Please note that in clotted samples glucose is lost through glycolysis at a rate of 5-7% /hour at concentrations near the reference interval. Clotted samples should be separated within 30 minutes of collection, if delayed by >6 hours results will be reported with a disclaimer

**Sample Volume**

4ml

Minimum (see calculation of minimum volume)

**Special Precautions**

No specific requirements

**Request Form:**

Clinical Chemistry & Haematology Requests

**Laboratory**

Biochemistry

**Biological reference range**

Fasting: 4 - 6.0 mmol/L

Values for diagnosis of diabetes mellitus and other categories of hyperglycaemia according to the WHO 2006. Diabetes
Fasting plasma glucose ≥7.0mmol/L
or
2–h plasma glucose* ≥11.1mmol/L
Impaired Glucose Tolerance (IGT)
Fasting plasma glucose <7.0mmol/L
and
2–h plasma glucose* ≥7.8 and <11.1mmol/L

Impaired Fasting Glucose (IFG)
Fasting plasma glucose 6.1 to 6.9mmol/L
and (if measured)
2–h plasma glucose* <7.8mmol/L

* Venous plasma glucose 2-h after ingestion of 75g oral glucose load
* If 2-h plasma glucose is not measured, status is uncertain as diabetes or IGT cannot be excluded

Confirmation by repeat testing on a subsequent day is necessary to establish the diagnosis [note that repeat testing is not required for patients who have unequivocal hyperglycaemia, i.e.11.1 mmol/L with symptoms consistent with hyperglycaemia]

Please note that HbA1c is also recommended in diagnosis of Diabetes mellitus see HbA1c section for further details

Diagnostic Criteria and Classification of Hyperglycaemia
First Detected in Pregnancy WHO/NMH/MND/13.2  2013

Diabetes in pregnancy should be diagnosed by the 2006 WHO criteria for diabetes if one or more of the following criteria are met:
• fasting plasma glucose ≥ 7.0 mmol/L
• 2-hour plasma glucose ≥ 11.1 mmol/L following a 75g oral glucose load
• random plasma glucose ≥ 11.1 mmol/L in the presence of diabetes symptoms

Gestational diabetes mellitus should be diagnosed at any time in pregnancy if one or more of the following criteria are met:
- fasting plasma glucose 5.1 - 6.9 mmol/L
- 1-hour plasma glucose ≥ 10.0 mmol/L following a 75g oral glucose load*
- 2-hour plasma glucose 8.5 - 11.0 mmol/L following a 75g oral glucose load
*there are no established criteria for the diagnosis of diabetes based on the 1- hour post-load value

Clinical decision values
<2.5 mmol/L (non-diabetic only)
>20 mmol/L (non-diabetic only)

**Factors affecting performance**

In sample where icterus (bilirubin), haemolysis or lipemia is indicated by the manufacturer to cause inaccuracy of >10%, the result will be dashed out or reported with a disclaimer.

In fasting state capillary and venous sample will give the same result. In non-fasting state capillary will give a higher result than venous sample.

In very rare cases gammopathy, in particular type IgM (Waldenström’s macroglobulinemia), may cause unreliable results.

**Turnaround times:**
The Laboratory aims to report 90% of requests within the stated time from receipt.

- Urgent - 1 hour
- Ward - 4 hours
- GP and OPD – 1 working day

**Patient preparation**
No specific requirements

**Instructions for patient collected sample**
Fasting sample to be collected following 8 - 14 hour fast

**Sample transportation**
No specific requirements

**Special handling needs**
No specific requirements

**Patient consent required**
Implied consent

**Specific rejection criteria**
Generic rejection applies

**Additional information**
Stability
Glucose declines through glycolysis at a rate of 5 - 7%/h

Please note fluoride has little or no effect on this decline in the first 1 - 2 hours.

For accurate glucose determination WHO recommends transport in ice slurry with separation within 30 minutes or rapid citrate base inhibitor of glycolysis.

Minimum Retest Intervals-

Within 2 weeks of an abnormal glucose result in an asymptomatic patient

Inpatient monitoring of stable patients on IV fluids daily

Asymptomatic patients 3 years if result normal.
Oral Glucose Tolerance test (OGTT) protocol
(a) ADULT ORAL GLUCOSE TOLERANCE TEST
After at least 3 days of unrestricted diet (>150g of carbohydrate daily) and usual physical activity. Test should be preceded by an overnight fast of 8 - 14 hours, during which water may be drunk
Smoking not permitted during test
Collect fasting blood sample
Patient should drink 75g of anhydrous glucose or 82.5g of glucose monohydrate in 250 - 300 ml of water over 5 minutes
Collect 2 hour blood sample
(b) ORAL GLUCOSE TOLERANCE TEST IN PREGNANCY
Indication
Used for diagnosis when blood glucose levels are equivocal
Technique
After at least 3 days of unrestricted diet (>150g of carbohydrate daily) and usual physical activity. Test should be preceded by an overnight fast of 8 - 14 hours, during which water may be drunk
Smoking not permitted during test
Collect fasting blood sample
Patient should drink 75g of anhydrous glucose or 82.5g of glucose monohydrate in 250 - 300 ml of water over 5 minutes
Collect 1 & 2 hour blood sample

References
Lab Tests Online
Roche insert 2010-12, V 3 English
WHO use of anticoagulants in diagnostic laboratory investigations
National Minimum Re-testing Interval Project: A final report detailing consensus recommendations for minimum re-testing intervals for use in Clinical Biochemistry 2012
Stabilisation of glucose in blood samples: why it matters clin chem 2009 55 850-852
WHO definition and diagnosis of diabetes mellitus and intermediate hyperglycaemia 2009
WHO use of glycated haemoglobin (HbA1c) in diagnosis of diabetes mellitus. 2011
The National Academy of Clinical Biochemistry Guidelines and Recommendations for Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus 2011
Use of HbA1c in diagnosis of diabetes mellitus in UK, implementation of the WHO guidance 2011
Values for the diagnosis of gestational diabetes mellitus according to International Association of Diabetes and pregnancy Study Groups Consensus panel DIABETES CARE, VOLUME 33, NUMBER 3, MARCH 2010

Note: Printed documents are not controlled