



Laboratory Training in Hospital

Blood glucose diagnostic tests

Clinical biochemistry

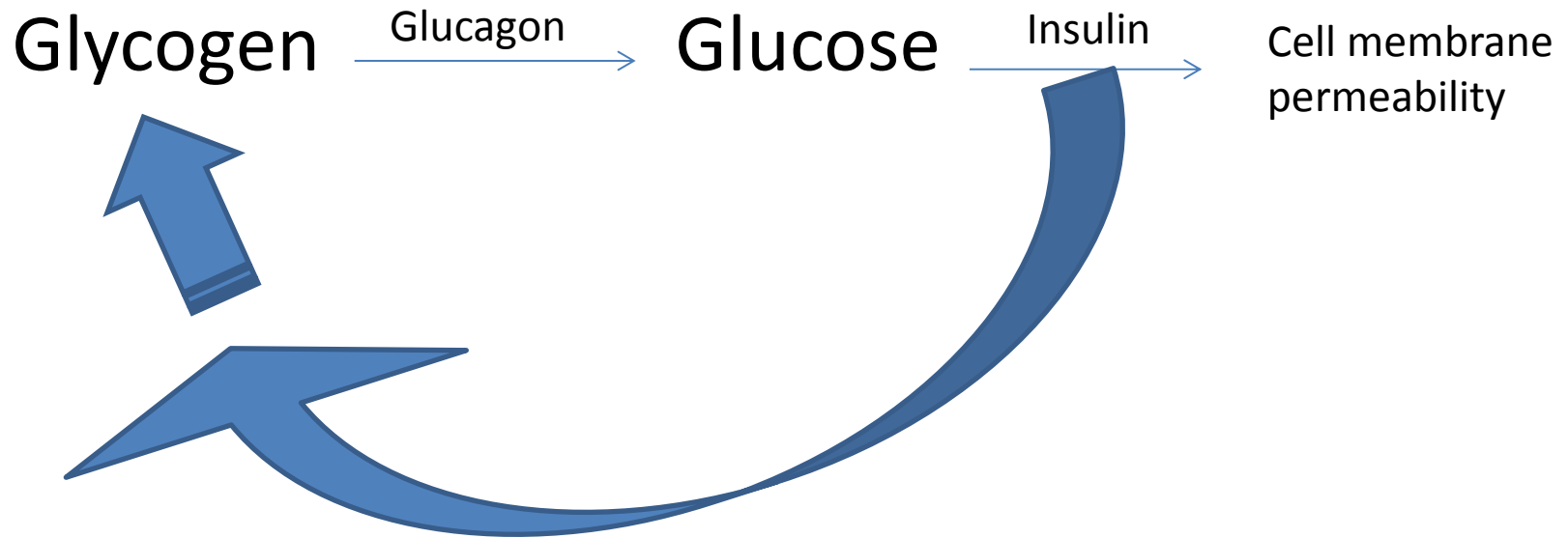
By

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Fasting Blood Glucose FBG

- Normal values:
- Adult: 80-120 mg/dL; 3.6-6.1 mmol/L.
- Child (6-18)yr: 3.9-6.0 mmol/L.
- Critical Values:
- Adult: <2.8, > 22 mmol/L; OR < 50; > 400 mg/dL.
- Newborn: <1.66, >16.7 mmol/L;
- (<30 >300 mg/dL).

CHO Metabolism



FBG

- FBG >140 mg/dl) hyperglycemia (diagnostic for diabetes mellitus (DM).
- Mild-sever
- Could be caused by impairment of pancreatic islet β -cells to produce insulin, reducing number of insulin receptors, problem in Glu. Absorption, inability of liver to metabolise glycogen or alteration level of hormones play role in Glu. Metabolism

Type 1 diabetes

10%

The body does not produce insulin

NO

Type 2 diabetes

90%

The body produces insulin but is not used efficiently

CAN BE PREVENTED



HEALTHY & BALANCED EATING

APPROPRIATE BODY WEIGHT



MODERATE PHYSICAL EXERCISE

(E.G. WALKING 30 MINUTES A DAY)

HOW TO PREVENT?

YES

Gestational diabetes

High blood sugar levels in pregnancy

Usually, levels are stabilised after giving birth

~60% probability of suffering from type 2 diabetes



Abnormal finding

Hyperglycaemia	Hypoglycaemia
Diabetes mellitus	insulinoma
Acute stress response	Hypothyroidism
Cushing's syndrome	Hypopituitarism
Chronic renal failure	Addison's disease
Glucagonoma	Extensive liver disease
Acute pancreatitis	Insulin overdose
Corticosteroid therapy	Starvation

Estimation blood glucose

Finger stick on glucometer

<https://www.youtube.com/watch?v=rMMpeLLgdgY>

How to Use a Glucometer



1. Prepare your supplies and clean your hands.



2. Turn on glucometer and insert test strip.



3. Prick your finger and squeeze a drop of blood.



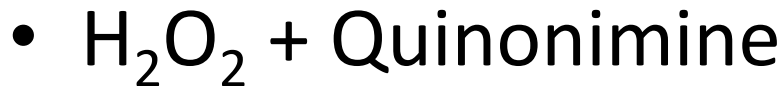
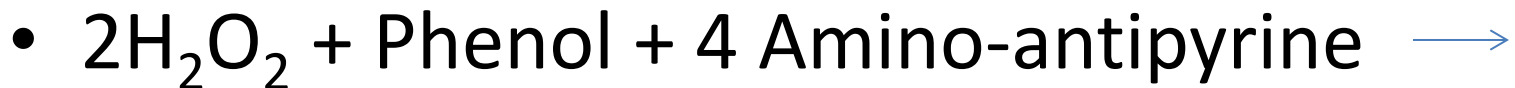
4. Place the drop to the edge of the test strip



5. Wipe away any remaining blood.

Estimation of Plasma Glucose levels

- Principle:



- 5 mL I.V. from overnight fasten person .

Reagents

Reagent 1:

Buffer solution :

Reagent 2 :

Reagent 3 :

Tris buffer pH 7

Phenol

Glucose oxidase

Peroxidase

Amino-antipyrine

Standard glucose

100 mmol/l

0.3 mmol/l

10 000 U/l

1000 U/l

2.6 mmol/l

1.00 mg/dl (1 g/L)

5.56 mmol/l

Method

	Blank	Standard	Sample
Standard	-----	10 μ L	-----
Sample	-----	-----	10 μ L
W.R	10 μ L	10 μ L	10 μ L

Mix, incubate 10 min. at 37°C or 30min. At RT (20°C-30°C). Read at 505 nm. Colour is stable for 30 min.

Calculation:

Glucose conc.= OD Sample/ OD Std * n

n=100 mg/dl

mmol/L= 5.56

2hr Post Prandial Glucose O'Sullivan Test

- A post prandial test performed 2 hrs after meal
- The patient should be taken high CHO diet (75gm) 2-3 days before testing and at beginning test time.
- Insulin secreted immediately after meal in response to elevated glu. then return to normal level after 2 hrs.
- Patient should take rest during 2 hrs interval, smoking is not permitted during test time.

PPG

- For DM patient glu. Levels usually still elevated at 2 hrs after meal.
- PPG using to screening DM .
- IF results >140 mg/dl and <200 , glu. Tolerance test would performed to confirm the diagnosis.
- If > 200 mg/dl or 11mmole , DM confirmed.

Gestational diabetes mellitus GDM

- About (3-8) % of pregnant women, up to half of these women would be developing diabetes later long-life.
- 1hrs glu. screen test is used for detection.

Treatment of GDM is imp. to reduce high risk of several adverse prenatal outcome(excessive fetal growth and birth trauma, neonatal mortality and morbidity.

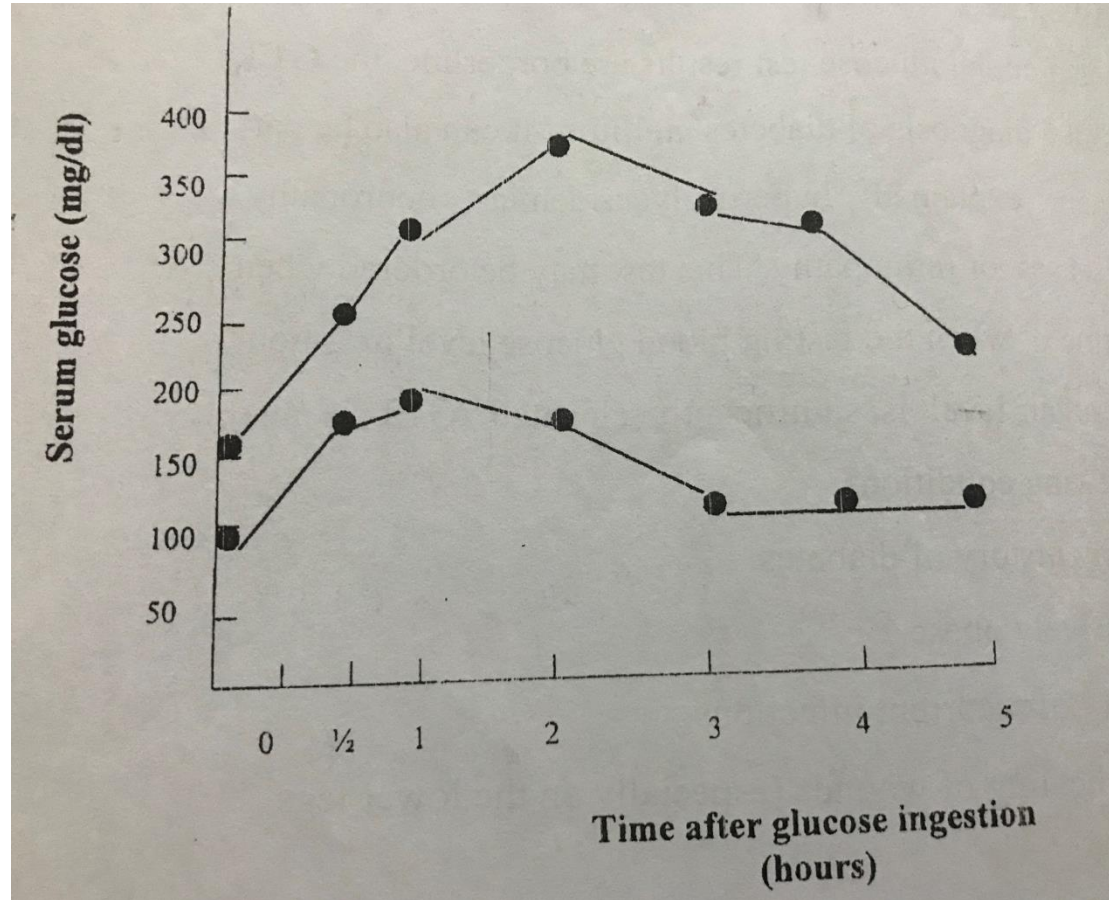
Screening for GDM

- 50-g oral glu. Following glu. determination at 1 hr later.
- Screening done between 24 and 28 weeks of gestation.
- If glu. > 140mg/dl should be elevated by GTT.

Oral Glucose Tolerance Test (GTT)

- AIM: When FBS & PPGT results are borderline, GTT can support and confirm DM diagnosis.
- In GTT, the patient ability to tolerate a standard oral glu. Loading, which is evaluated by obtaining serum and urine specimen to determine glu. Levels at time interval (30min, 1 hr, 2hr, 3 hr, and (4hr).

Glucose tolerance test curve for diabetic and prediabetes patient



- **Potential complications:** Dizziness, tremors, anxiety, sweating, fainting, ...
- **Interfering factors:**
 - Smoking
 - Stressing
 - Exercise
 - Drug ingestion (antihypertensive, anti-inflammatory drug, aspirin, B-blockers, furosemide, nicotine, oral contraceptive, psychiatric drugs, steroid, thiazide diuretics).
 - Vomiting glu.
 - Reduced caloric intake before GTT

Reference:

A manual of laboratory training in hospital. By: Dr. Shatha H. Ali