Healthy Life

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inside

Department of Laboratory Medicine

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MD (Pathology), DPB
Cons. Pathologist and Laboratory Co-ordinator

Dr L H Hiranandani Hospital has a round-the-clock laboratory testing facility catering to both outpatient as well as patients admitted in the hospital with an extremely comprehensive menu of investigations to choose from including routine and specialised investigations. The Department of Laboratory Medicine is equipped with the latest state-of-the-art analyzers, which are fully integrated with the laboratory information system providing for online patient results. The department boasts of consistent and quality results through stringent quality control measures and participation in external proficiency testing programmes. The laboratory gives holistic services in the form of Clinical Pathology, Microbiology, Histopathology, Biochemistry, Haematology and Serology. The department has been accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL), Department of Science and Technology, Government of India.

Laboratory Quality Policy

We are committed to provide accurate and reliable test results conforming to national and international standards (ISO 15189:2007 and NABL 112). All laboratory personnel are properly trained and continuously updated with the technical advances for achieving continual improvement. We will strive to improve at every given time, thus ensuring patient satisfaction.

Diabetes Mellitus

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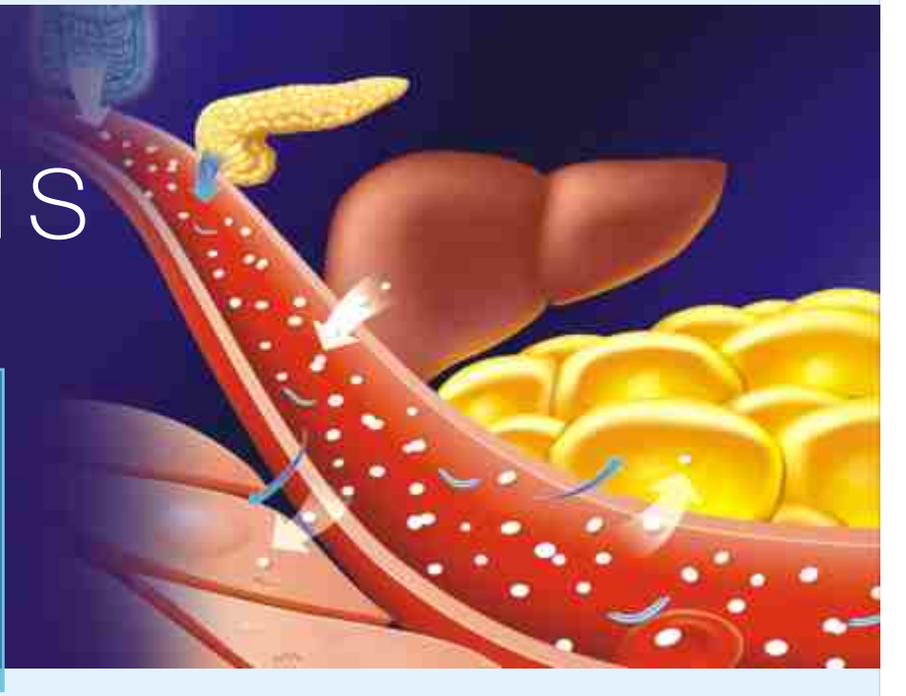


DEFINITION

Diabetes Mellitus is currently defined as a group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.

The chronic hyperglycemia of diabetes is associated with long term damage, dysfunction and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels. Defined literally, diabetes, or urine flow, is promoted by Mellitus, or sweetness, in the urine as a result of hyperglycemia. Normally, plasma glucose, the primary substrate for brain metabolism and function, is tightly regulated within a narrow fasting range of 60 to 100 mg/dL by insulin secreted from the beta cells of the pancreatic islets.

DIAGNOSTIC CRITERIA

The revised criteria for the diagnosis of diabetes mellitus is as follows:

Normoglycemia	Impaired Fasting Glucose (IFG) or Impaired Glucose Tolerance (IGT)	Diabetes Mellitus
FPG < 110 mg/dl	FPG > 110 and < 126 mg/dl (IFG)	• FPG > 126 mg/dl
2-hour post (75 gm) glucose < 140 mg/dl	2-hour post glucose > 140 and < 200 mg/dl (IGT)	• 2-hour post glucose > 200 mg/dl • Symptoms of diabetes and random plasma glucose > 200 mg/dl

- Each positive test must be confirmed, on a subsequent day, by any one of the three methods.
- Fasting is defined as no caloric intake for atleast 8 hours.
- The classic symptoms of diabetes include polyuria, polydipsia and unexplained weight loss.
- The Oral Glucose Tolerance Test (OGTT) uses a glucose load containing equivalent of 75 gm anhydrous glucose dissolved in water.

PATHOPHYSIOLOGY

The prevalence of diabetes is unknown. The most recent published information in the USA is from the Centers for Disease Control and Prevention (CDC) which estimated a prevalence of 7.9% in adults in 2001. The prediction is that by 2025 there will be 300 million adults with diabetes, more than 75% of whom will be living in developing countries. These statistics have led to diabetes being described as “one of the main threats to human health in the 21st century”. The prevalence of Diabetes Mellitus increases with age, and approximately half of all cases occur in people older than 55 years. Patients with diabetes are twice as likely as non-diabetic patients to develop cardiovascular disease. Education is inversely proportional, with the highest prevalence among those not finishing high school.

ETIOLOGY AND CLASSIFICATION

1. TYPE 1 DIABETES (β-cell destruction, usually leading to absolute insulin deficiency)

A. Immune mediated
B. Idiopathic

- Hereditary factors:
  1. Islet cell antibodies (found in 90% of patients within the first year of diagnosis)
  2. Higher incidence of HLA types DR3, DR4
  3. 50% concordance in identical twins
- Environmental factors: Viral infection (possibly Coxsackie virus, mumps virus)

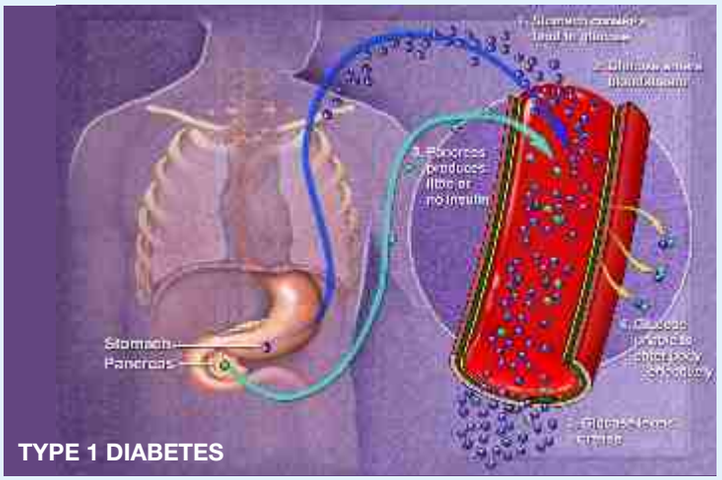
2. TYPE 2 DIABETES (Ranges from predominantly insulin resistance with relative insulin deficiency to a predominantly secretory defect with insulin resistance)

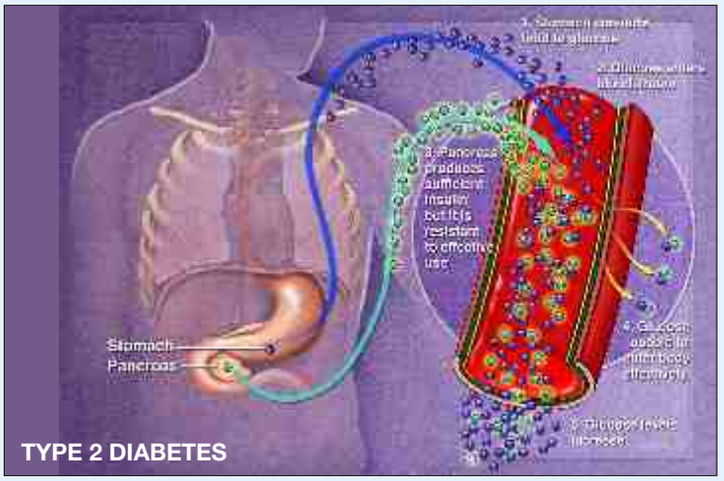
- Hereditary factors: 90% concordance in identical twins
- Environmental factor: Obesity

3. GESTATIONAL DIABETES MELLITUS

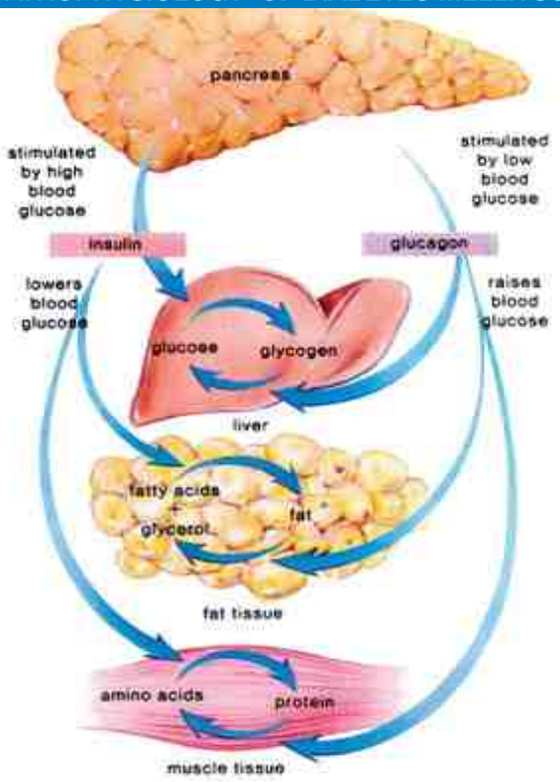
4. OTHER SPECIFIC TYPES

- Hormonal excess: Cushing's syndrome,Acromegaly, Glucagonoma, Pheochromocytoma
- Drugs: Glucocorticoids, Diuretics, oral contraceptives
- Insulin receptor unavailability (with or without circulating antibodies)
- Pancreatic disease: Pancreatitis, Pancreatectomy, Hemochromatosis
- Genetic syndromes: Hyperlipidemias, Myotonic Dystrophy, Lipoatrophy





PATHOPHYSIOLOGY OF DIABETES MELLITUS



Home Care - Laboratory

The Home-Care facility of the laboratory would extend the phlebotomy services to the patient's doorstep. To avail of the facility it is required to take a telephonic appointment by dialing 2576 3366 / 3234, and requisitioning the tests. Necessary instructions for the blood collection will be given by the hospital staff.

Contact us:
Home Care Nurse : 2576 3323 / 98198 73621
Ambulance : 2576 3328
Laboratory : 2576 3234 / 3366

ABX Pentra XL 80

Haematology analyzer, ABX Pentra XL 80, performs complete blood count giving 26 parameters for every sample within a minute. The analyzer boosts of high-speed auto-sampling with a capacity of 80 samples per hour along with STAT sampling facility.

Mini Vidas

The automated immunoanalyzer Mini Vidas is a compact system for hormones and tumour marker study allowing random analysis with a throughput of 30 tests per hour.

LABORATORY INVESTIGATIONS

- Diagnosis is made on the basis of the **Plasma Glucose** and should be confirmed by repeated testing on a different day.
- **Glycosylated hemoglobin (Hb A1c):** The A1c value reflects the average serum glucose level during the prior 3-month period that hemoglobin is circulated in red cells. The A1c value has become useful in gauging the level of glycemic control.
- Screening for diabetic nephropathy by measuring microalbuminuria is recommended in all patients with diabetes. It can be accomplished by any of the following three methods:
  1. Albumin-to-creatinine ratio
  2. Creatinine clearance test
  3. Urine for microalbumin

The diagnosis of microalbuminuria should be based on 2 to 3 elevated levels within a 3 to 6 month period because there is a marked variability in day-to-day albumin excretion and possible transient elevations in urine albumin from short-term hyperglycemia, exercise, severe hypertension, and other illnesses such as sepsis and CHF.

- A fasting serum **lipid panel, serum creatinine, and electrolytes** should be obtained yearly on all adult diabetic patients.

TESTING IN ASYMPTOMATIC, UNDIAGNOSED INDIVIDUALS

1. Testing for diabetes should be considered in individuals at age 45 years and above particularly in those with a BMI ≥ 25 kg/m^2; if normal, it should be repeated at 3-year intervals.
2. Testing should be considered at a younger age or be carried out more frequently in individuals who are overweight (BMI ≥ 25 kg/m^2) and have additional risk factors:
   - A first-degree relative with diabetes
   - Habitually physically inactive
   - Members of high-risk ethnic population
   - Delivered a baby weighing > 4 kg or have been diagnosed with GDM
   - Hypertensive (≥ 140/90 mm Hg)
   - HDL cholesterol level ≤ 35 mg /dl and / or a triglyceride level ≥ 250 mg/dl
   - Polycystic ovary syndrome
   - Diagnosed with IGT or IFG in previous testing
   - History of vascular disease

TESTING FOR TYPE 2 IN CHILDREN AND ADOLESCENTS

Overweight (weight > 120% of ideal body weight) plus any of the following risk factors:

- Family history of type 2 diabetes in first or second degree relative
- Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia or polycystic ovarian syndrome)

REFERRAL

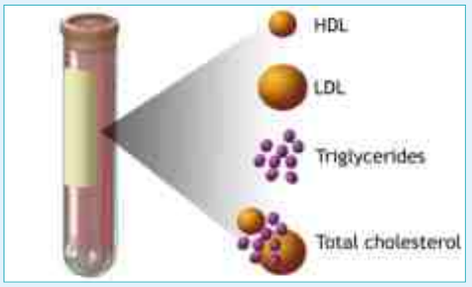
- **Ophthalmologic examination:** In Type 1 DM, ophthalmologic visits should begin within 3 to 5 yr, whereasTtype 2 DM patients should be seen from disease onset.
- **Podiatric care** can significantly reduce the rate of foot infections and amputations in patients with DM. Non-infected neuropathic foot ulcers require debridement and reduction of pressure.
- **Nephrology** consultation in all cases of proteinuria, hyperkalemia, uncontrolled BP, and when GFR has decreased to <30 mL/min/1.73 m2.

TARGETS FOR CONTROL OF DIABETES

Targets are only general guidelines and individualized targets are to be established. The tight control especially in pregnancy, post-renal transplant and retinopathy is desired. The relaxed control in elderly is recommended.

Targets for control of Diabetes	Ideal	Satisfactory	Unsatisfactory
Fasting Plasma Glucose (mg/dl)	80 - 110	111 - 125	> 125
2 hour Post Prandial Glucose (mg/dl)	120 - 140	140 - 180	> 180
Blood Pressure (mm Hg)	< 130/80	< 140/90	> 140/90
Body Mass Index (Kg/m2)	20 - 23		
Waist-Hip ratio	Men < 0.90 Women < 0.85		
HbA1c (%)	< 7	7 - 8	> 8

TARGETS FOR CONTROL OF LIPIDS	
Total Cholesterol (mg/dl)	< 180
HDL Cholesterol (mg/dl)	> 45
LDL Cholesterol (mg/dl)	< 100
Serum Triglycerides (mg/dl)	< 150



A lipoprotein profile measures the level of cholesterol in the blood

MONITORING AND FOLLOW-UP OF PEOPLE WITH DIABETES

- Urine glucose has limitations, do not use alone
- Plasma glucose – fasting and 2-hour postprandial
- Individualized regimes of self-monitoring of blood glucose – frequency and timing should be planned
- HbA1c every 3 – 6 months
- Clinical examination during every visit – minimum 3 months
- Optimizing weight, blood pressure, lipids
- Screening for long term complications – Retinopathy, Nephropathy, Peripheral Vascular Disease
- Encourage foot care
- Discourage tobacco use

SELF-MONITORING OF BLOOD GLUCOSE WITH GLUCOSE MONITOR

For blood glucose monitoring, glucose oxidase strips are used in conjunction with a meter to give a digital reading. The testing can be done once a day, but the time should be varied each day so that over time the serum glucose level before meals and at bedtime can be assessed frequently without pricking the patient's fingers four times daily. It is indicated in the following conditions:

- Ideal for every diabetic to achieve better control of diabetes
- All people with diabetes on Insulin
- Brittle Diabetes Mellitus
- Prone to ketosis / recurrent hypoglycemia
- Hypoglycemic unawareness
- Whenever tight control is indicated – pregnancy, acute illness and advanced complications
- If renal threshold low / high

ANNUAL CHECK-UP

- Lipid profile
- Ophthalmology check-up / Fundus examination
- Blood Urea Nitrogen (BUN), Serum Creatinine
- Urine – protein / albumin, microalbumin
- ECG in those above 40 years of age

BacT Alert

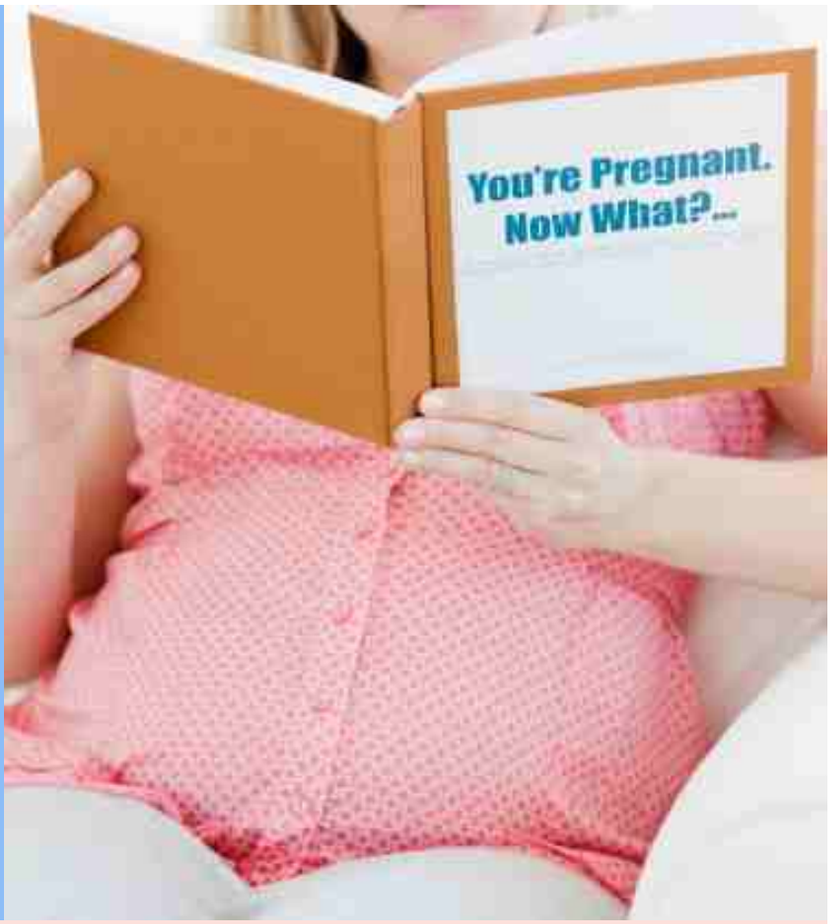
BacT Alert 3D Microbial Detection System is an automated test system capable of incubating, agitating and continuously monitoring aerobic and anaerobic media inoculated with patient specimens suspected of having bacteremia, fungemia and / or mycobacteremia.

Mini API

The Mini API is an automated instrument for the identification and susceptibility testing of the microorganisms.

Diabetes and Pregnancy

1. Mother's blood brings extra glucose to the fetus
2. Fetus makes more insulin to handle extra glucose
3. Extra glucose gets stored as fat and fetus become larger than normal



Pre-gestational Diabetes Mellitus

Women with type 2 diabetes who become pregnant are said to have pre-gestational diabetes. The maternal and fetal outcomes are excellent if the pregnancy is planned and tight glycemic control is achieved. The steps to achieve these are:

- Normalization of HbA1c and tight glycemic control with insulin (i.e. fasting glucose < 90 mg/dl and post-prandial < 120 mg/dl) before a planned pregnancy
- Treatment includes human insulin, folic acid supplementation and anti-hypertensive drugs (calcium channel blockers or α-methyldopa)
- Pre-pregnancy baseline evaluation of eyes and kidney function must be done
- Improvement of nutritional status should be made
- Maternal and fetal surveillance during pregnancy

Gestational Diabetes Mellitus

GDM is defined as any degree of glucose intolerance with onset or first recognition during pregnancy.

Indications:

- History of GDM
- First degree relative with diabetes
- Pre-pregnancy obesity
- History of large weight babies
- History of still-born babies or infants with congenital abnormalities
- Bad obstetric history including recurrent fetal wastage, hypertension, eclampsia. hydramnios
- Repeated or persistent urinary tract infection
- Glycosuria during pregnancy
- Age above 25 years

Screening methods:

Oral glucose tolerance test (OGTT) using 100 gm of oral glucose done in the morning after an overnight fast of between 8 and 14 hours and after at least 3 days of unrestricted diet (>150 gm carbohydrate per day) and unlimited physical activity. The subject should remain seated and should not smoke throughout the test.

Diagnosis	
Glucose load (100 gm)	**Plasma Glucose (mg/dl)**
Fasting	95
1-hour	180
2-hour	155
3-hour	140

Goals for therapy	
Fasting	90 mg/dl
1-hour post-prandial	< 140 mg/dl
2-hour post-prandial	< 120 mg/dl

2-hour OGTT using 75 gm glucose should be done 6 -8 weeks after delivery for reclassification.

Salient features - Laboratory

1. 24-hour operation provides for any test, any time approach to the patient management.
2. **Automated state-of-art equipments:** The department is well equipped with fully automated systems and is in keeping with the progressive outlook of the hospital. This machinery has helped to maintain minimal downtime error.
3. **Integrated Laboratory Information System:** The laboratory system is integrated with the Integrated Informatic System providing for minimal human handling and improving the operational efficiency and productivity. In addition, the system provides for the inbuilt delta-checks in the system. The system integration also provides for the capability of online reporting.
4. **Bar-code (positive) identification system:** The system improves the efficiency of the process flow and minimises any random errors.
5. **Bi-directional interface of analyzers:** This ensures error-free reporting and improves the turnaround time by obviating manual entry.
6. **Web-report viewing:** The system facilitates the patients to view their result using the internet at their base. This result viewing is password protected.
7. **Quality Assurance programmes:** The laboratory conducts stringent quality assurance programmes using internal quality controls and has robust quality measures in place. The department is participating in various proficiency testing programmes, thus helping in validating its quality processes.
8. **Accreditation programme:** The Laboratory is accredited for the medical testing facility by the NABL.
9. **Home-Care facilities:** For patient convenience, we also provide personalized services in the form of home collection of blood samples.
10. **Stat sample facilities:** As part of our endeavour to improve the patient management, the laboratory has STAT facilities where the urgent samples are processed and reported on priority.
11. Qualified and well-trained team of pathologists and technologists is the cornerstone of the laboratory services.

Vitros 350

Vitros 350 analyzer for biochemistry is capable of handling 350 results per hour with the capacity for processing urgent (STAT) samples along with the batch analysis, thus making critical information available quickly for emergency samples.

Vitros ECiQ

Immunodiagnostic Vitros ECiQ system for hormones, vitamins and infective markers provides marked improvement in quality of results, optimizing assay performance and productivity. The continuous, random access to the sample loading along with STAT operation helps in providing results any time.

Endorphins

Signs!

Sign over a Gynecologist's Office:
"Dr. Jones, at your cervix."

On a Septic Tank Truck in Oregon:
Yesterday's Meals on Wheels

At a Proctologist's door:
"To expedite your visit please back in."

On a Maternity Room door: "Push. Push. Push."

At an Optometrist's Office
"If you don't see what you're looking for,
you've come to the right place."

In the front yard of a Funeral Home:
"Drive carefully. We'll wait."

A man speaks frantically into the phone,
"My wife is pregnant, and her contractions are only two minutes apart!"
"Is this her first child?" the doctor queries.
"No, you idiot!" the man shouts.
"This is her husband!"

The difference between
a neurotic and a psychotic is that,
while a psychotic thinks that 2 + 2 = 5,
a neurotic knows the answer is 4,
but it worries him.

Contact Us

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Your family hospital™

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Casualty	: 2576 3322, 2576 3323, 2576 3328, 2576 3271
Laboratory	: 2576 3366, 2576 3365, 2576 3234
Home Health Care	: 2576 3322, 98198 73621
Ambulance	: 25763328, 2576 3323
Health-check	: 2576 3318, 2576 3398
Blood bank	: 2576 3355, 2576 3356
OPD Counter	: 2576 3337, 2576 3338, 2576 3339, 2576 3340
Centralised OPD Appointment	: 2576 3500
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