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NAME	**: Mr. SUBHASH CHANDER**		
AGE/ GENDER	: 73 YRS/MALE	**PATIENT ID**	: 1779999
COLLECTED BY	:	**REG. NO./LAB NO.**	**: 012503050047**
REFERRED BY	: P.G.I. (CHANDIGARH)	**REGISTRATION DATE**	: 05/Mar/2025 06:04 PM
BARCODE NO.	: 01526521	**COLLECTION DATE**	: 05/Mar/2025 06:05PM
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CLIENT ADDRESS	: 6349/1, NICHOLSON ROAD, AMBALA CANTT		

HAEMATOLOGY

COMPLETE BLOOD COUNT (CBC)

Test Name	Value	Unit	Biological Reference interval
RED BLOOD CELLS (RBCS) COUNT AND INDICES			
HAEMOGLOBIN (HB) *by CALORIMETRIC*	**11.6^{L}**	gm/dL	12.0 - 17.0
RED BLOOD CELL (RBC) COUNT *by HYDRO DYNAMIC FOCUSING, ELECTRICAL IMPEDENCE*	4.68	Millions/cmm	3.50 - 5.00
PACKED CELL VOLUME (PCV) *by CALCULATED BY AUTOMATED HEMATOLOGY ANALYZER*	**36.8^{L}**	%	40.0 - 54.0
MEAN CORPUSCULAR VOLUME (MCV) *by CALCULATED BY AUTOMATED HEMATOLOGY ANALYZER*	**78.6^{L}**	fL	80.0 - 100.0
MEAN CORPUSCULAR HAEMOGLOBIN (MCH) *by CALCULATED BY AUTOMATED HEMATOLOGY ANALYZER*	**24.9^{L}**	pg	27.0 - 34.0
MEAN CORPUSCULAR HEMOGLOBIN CONC. (MCHC) *by CALCULATED BY AUTOMATED HEMATOLOGY ANALYZER*	**31.7^{L}**	g/dL	32.0 - 36.0
RED CELL DISTRIBUTION WIDTH (RDW-CV) *by CALCULATED BY AUTOMATED HEMATOLOGY ANALYZER*	**16.6^{H}**	%	11.00 - 16.00
RED CELL DISTRIBUTION WIDTH (RDW-SD) *by CALCULATED BY AUTOMATED HEMATOLOGY ANALYZER*	48.7	fL	35.0 - 56.0
MENTZERS INDEX *by CALCULATED*	16.79	RATIO	BETA THALASSEMIA TRAIT: < 13.0 IRON DEFICIENCY ANEMIA: >13.0
GREEN & KING INDEX *by CALCULATED*	28.01	RATIO	BETA THALASSEMIA TRAIT:<= 65.0 IRON DEFICIENCY ANEMIA: > 65.0
WHITE BLOOD CELLS (WBCS)			
TOTAL LEUCOCYTE COUNT (TLC) *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	6570	/cmm	4000 - 11000
NUCLEATED RED BLOOD CELLS (nRBCS) *by AUTOMATED 6 PART HEMATOLOGY ANALYZER*	NIL		0.00 - 20.00
NUCLEATED RED BLOOD CELLS (nRBCS) % *by CALCULATED BY AUTOMATED HEMATOLOGY ANALYZER*	NIL	%	< 10 %

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Test Name	Value	Unit	Biological Reference interval
DIFFERENTIAL LEUCOCYTE COUNT (DLC)			
NEUTROPHILS *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	65	%	50 - 70
LYMPHOCYTES *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	25	%	20 - 40
EOSINOPHILS *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	3	%	1 - 6
MONOCYTES *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	7	%	2 - 12
BASOPHILS *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	0	%	0 - 1
ABSOLUTE LEUKOCYTES (WBC) COUNT			
ABSOLUTE NEUTROPHIL COUNT *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	4271	/cmm	2000 - 7500
ABSOLUTE LYMPHOCYTE COUNT *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	1642	/cmm	800 - 4900
ABSOLUTE EOSINOPHIL COUNT *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	197	/cmm	40 - 440
ABSOLUTE MONOCYTE COUNT *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	460	/cmm	80 - 880
ABSOLUTE BASOPHIL COUNT *by FLOW CYTOMETRY BY SF CUBE & MICROSCOPY*	0	/cmm	0 - 110
PLATELETS AND OTHER PLATELET PREDICTIVE MARKERS.			
PLATELET COUNT (PLT) *by HYDRO DYNAMIC FOCUSING, ELECTRICAL IMPEDENCE*	242000	/cmm	150000 - 450000
PLATELETCRIT (PCT) *by HYDRO DYNAMIC FOCUSING, ELECTRICAL IMPEDENCE*	0.27	%	0.10 - 0.36
MEAN PLATELET VOLUME (MPV) *by HYDRO DYNAMIC FOCUSING, ELECTRICAL IMPEDENCE*	11	fL	6.50 - 12.0
PLATELET LARGE CELL COUNT (P-LCC) *by HYDRO DYNAMIC FOCUSING, ELECTRICAL IMPEDENCE*	86000	/cmm	30000 - 90000
PLATELET LARGE CELL RATIO (P-LCR) *by HYDRO DYNAMIC FOCUSING, ELECTRICAL IMPEDENCE*	35.4	%	11.0 - 45.0
PLATELET DISTRIBUTION WIDTH (PDW) *by HYDRO DYNAMIC FOCUSING, ELECTRICAL IMPEDENCE*	16.2	%	15.0 - 17.0

NOTE: TEST CONDUCTED ON EDTA WHOLE BLOOD

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Test Name	Value	Unit	Biological Reference interval

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Test Name	Value	Unit	Biological Reference interval

ERYTHROCYTE SEDIMENTATION RATE (ESR)

ERYTHROCYTE SEDIMENTATION RATE (ESR) *by RED CELL AGGREGATION BY CAPILLARY PHOTOMETRY*	**77^{H}**	mm/1st hr	0 - 20

INTERPRETATION:

1. ESR is a non-specific test because an elevated result often indicates the presence of inflammation associated with infection, cancer and auto-immune disease, but does not tell the health practitioner exactly where the inflammation is in the body or what is causing it.
2. An ESR can be affected by other conditions besides inflammation. For this reason, the ESR is typically used in conjunction with other test such as C-reactive protein
3. This test may also be used to monitor disease activity and response to therapy in both of the above diseases as well as some others, such as systemic lupus erythematosus

CONDITION WITH LOW ESR

A low ESR can be seen with conditions that inhibit the normal sedimentation of red blood cells, such as a high red blood cell count (polycythaemia), significantly high white blood cell count (leucocytosis) , and some protein abnormalities. Some changes in red cell shape (such as sickle cells in sickle cell anaemia) also lower the ESR.

NOTE:

1. ESR and C - reactive protein (C-RP) are both markers of inflammation.
2. Generally, ESR does not change as rapidly as does CRP, either at the start of inflammation or as it resolves.
3. **CRP is not affected by as many other factors as is ESR, making it a better marker of inflammation.**
4. If the ESR is elevated, it is typically a result of two types of proteins, globulins or fibrinogen.
5. Women tend to have a higher ESR, and menstruation and pregnancy can cause temporary elevations.
6. Drugs such as dextran, methyldopa, oral contraceptives, penicillamine procainamide, theophylline, and vitamin A can increase ESR, while aspirin, cortisone, and quinine may decrease it

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Test Name	Value	Unit	Biological Reference interval

CLINICAL CHEMISTRY/BIOCHEMISTRY

ALKALINE PHOSPHATASE (ALP)

ALKALINE PHOSPHATASE: SERUM *by PARA NITROPHENYL PHOSPHATASE BY AMINO METHYL PROPANOL*	94.4	U/L	40.0 - 130.0

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Test Name	Value	Unit	Biological Reference interval

CALCIUM

CALCIUM: SERUM *by ARSENAZO III, SPECTROPHOTOMETRY*	9.27	mg/dL	8.50 - 10.60

INTERPRETATION:-

1.Serum calcium (total) estimation is used for the diagnosis and monitoring of a wide range of disorders including diseases of bone, kidney, parathyroid gland, or gastrointestinal tract.
2. Calcium levels may also reflect abnormal vitamin D or protein levels.
3.The calcium content of an adult is somewhat over 1 kg (about 2% of the body weight).Of this, 99% is present as calcium hydroxyapatite in bones and <1% is present in the extra-osseous intracellular space or extracellular space (ECS).
4. In serum, calcium is bound to a considerable extent to proteins (approximately 40%), 10% is in the form of inorganic complexes, and 50% is present as free or ionized calcium.
NOTE:-Calcium ions affect the contractility of the heart and the skeletal musculature, and are essential for the function of the nervous system. In addition, calcium ions play an important role in blood clotting and bone mineralization.

HYPOCALCEMIA (LOW CALCIUM LEVELS) CAUSES :-

1.Due to the absence or impaired function of the parathyroid glands or impaired vitamin-D synthesis.
2. Chronic renal failure is also frequently associated with hypocalcemia due to decreased vitamin-D synthesis as well as hyperphosphatemia and skeletal resistance to the action of parathyroid hormone (PTH).
3.***NOTE:-*** A characteristic symptom of hypocalcemia is latent or manifest tetany and osteomalacia.

HYPERCALCEMIA (INCREASE CALCIUM LEVELS) CAUSES:-

1.Increased mobilization of calcium from the skeletal system or increased intestinal absorption.
2.Primary hyperparathyroidism (pHPT)
3.Bone metastasis of carcinoma of the breast, prostate, thyroid gland, or lung.
NOTE:-Severe hypercalcemia may result in cardiac arrhythmia.

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Test Name	Value	Unit	Biological Reference interval

PHOSPHOROUS

PHOSPHOROUS: SERUM *by PHOSPHOMOLYBDATE, SPECTROPHOTOMETRY*	3.44	mg/dL	2.5 - 4.5

INTERPREATION:-

1.Eighty-eight percent of the phosphorus contained in the body is localized in bone in the form of hydroxyapatite. The remainder is involved in intermediary carbohydrate metabolism and in physiologically important substances such as phospholipids, nucleic acids, and adenosine triphosphate (ATP).
2.Phosphorus occurs in blood in the form of inorganic phosphate and organically bound phosphoric acid. The small amount of extracellular organic phosphorus is found exclusively in the form of phospholipids.
3.Serum phosphate concentrations are dependent on meals and variation in the secretion of hormones such as parathyroid hormone (PTH) and may vary widely.

DECREASED (HYPOPHOSPHATEMIA):-

1.Shift of phosphate from extracellular to intracellular.
2.Renal phosphate wasting.
3.Loss from the gastrointestinal tract.
4.Loss from intracellular stores.

INCREASED (HYPERPHOPHATEMIA):-

1.Inability of the kidneys to excrete phosphate.
2.Increased intake or a shift of phosphate from the tissues into the extracellular fluid.

SIGNIFICANCE:-

1.Phosphate levels may be used in the diagnosis and management of a variety of disorders including bone, parathyroid and renal disease.
2.Hypophosphatemia is relatively common in hospitalized patients. Levels less than 1.5 mg/dL may result in muscle weakness, hemolysis of red cells, coma, and bone deformity and impaired bone growth.
3.The most acute problem associated with rapid elevations of serum phosphate levels is hypocalcemia with tetany, seizures, and hypotension. Soft tissue calcification is also an important long-term effect of high phosphorus levels.
4.Phosphorus levels less than 1.0 mg/dL are potentially life-threatening and are considered a critical value.

NOTE: Phosphorus has a very strong biphasic circadian rhythm. Values are lowest in the morning, peak first in the late afternoon and peak again in the late evening. The second peak is quite elevated and results may be outside the reference range

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Test Name	Value	Unit	Biological Reference interval

IMMUNOPATHOLOGY/SEROLOGY

C-REACTIVE PROTEIN (CRP)

C-REACTIVE PROTEIN (CRP) QUANTITATIVE: SERUM *by NEPHLOMETRY*	4.47	mg/L	0.0 - 6.0

INTERPRETATION:

1. C-reactive protein (CRP) is one of the most sensitive acute-phase reactants for inflammation.
2. CRP levels can increase dramatically (100-fold or more) after severe trauma, bacterial infection, inflammation, surgery, or neoplastic proliferation.
3. CRP levels (Quantitative) has been used to assess activity of inflammatory disease, to detect infections after surgery, to detect transplant rejection, and to monitor these inflammatory processes.
4. As compared to ESR, CRP shows an earlier rise in inflammatory disorders which begins in 4-6 hrs, the intensity of the rise being higher than ESR and the recovery being earlier than ESR. Unlike ESR, CRP levels are not influenced by hematologic conditions like Anemia, Polycythemia etc.,
5. Elevated values are consistent with an acute inflammatory process.

NOTE:

1. Elevated C-reactive protein (CRP) values are nonspecific and should not be interpreted without a complete clinical history.
2. Oral contraceptives may increase CRP levels.

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Test Name	Value	Unit	Biological Reference interval

IMMUNOGLOBIN IgA

IMMUNOGLOBIN-A (IgA): SERUM *by NEPHLOMETRY*	**466.87^{H}**	mg/dL	20.0 - 400.0

INTERPRETATION:

1.Approximately 10 to 15% of total plasma immunoglobulings account for IgA. It contains 10% of carbohdrate and has mol. wt. 160,000 with half life of 6 days.

2.It serves to protect the skin and mucosa against microorganisms. It is capable of binding toxins and in combination with lysozyme develop antibacterial and antiviral activity.

3. IgA is the predominant immunoglobulin in the body secretion such as colostrum, salivai, and sweet. Secretary IgA provides defense against local infection and is important in binding food antigens in the gut.

4.*Increased polyclonal IgA may occur in chronic liver diseases, autoimmune disorders (SLE, Rheumatoid arthritis) and sarcoidosis. Monoclonal IgA increases in IgA myeloma.*

5. *Decreased synthesis of IgA is observed in acquired and congenital immunodeficiency diseases. Reduced levels of IgA can be caused by protein losing gastroenteropathies and loss through skin from burns*.

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Test Name	Value	Unit	Biological Reference interval

IMMUNOGLOBIN IgG

IMMUNOGLOBIN-G (IgG): SERUM *by NEPHLOMETRY*	**17.05^{H}**	gm/L	7.0 - 16.0

INTERPRETATION:

1.Immunoglobulin is a humoral antibody consisting of two light and two heavy chains in the molecule.
2.Approximately 80% of serum immunoglobulins is IgG. Its major function is neutralization of toxin in tissues spaces.
3.Antibodies of the IgG class are produced in response to most bacteria and viruses.IgG is the only immunogloblin that can cross the placental barrier and provide passive immune protection for fetus and new born till about 6 month.
4.Increased levels may be seen in SLE, chronic liver diseases, infectious diseases and cystic fibrosis. Monoclonal IgG increases in IgG myeloma.
5.Decreased synthesis of IgG is found in congenital/ acquired immunodeficiencies and in selective subclass deficiency such as bruton type agammaglobinulinemia.
6.Decreased IgG concentrations are seen in protein-losing enteropathies, nephrotic syndrome and in skin burns.

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Test Name	Value	Unit	Biological Reference interval

IMMUNOGLOBIN IgM

IMMUNOGLOBIN-M (IgM): SERUM *by NEPHLOMETRY*	172.44	mg/dL	35.0 - 220.0

INTERPRETATION:

1.The human immunoglobulins (IgG, IgA, IgM, IgE and IgD) are a group of functionally and structurally closely related glycoproteins.
2.IgM is produced by plasma cells (B -cells) and represents about 5% of all soluble immunoglobulins.
3.It is the first specific antibody to appear in serum after infection which is capable of activating complement and killing bacteria.
5.Post infection IgM returns rapidly to normal levels as compared to IgG. If IgM is prevalent, the infection is acute whereas if IgG predominates, the infection is chronic.
6.Polyclonal IgM increases in viral, bacterial and parasitic infections, liver diseases, rheumatoid arthritis, scleroderma, nephrotic syndrome, collagen vascular disease and other chronic disorders.
7.Monoclonal IgM increases in Waldenstroms macroglobulinemia.
8.Decreased IgM levels are seen in protein losing enteropathies, skin burns, congenital and acquired immunodeficiency diseases.

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SPECIAL INVESTIGATIONS

KAPPA/LAMBDA LIGHT CHAINS - FREE: SERUM

Test Name	Value	Unit	Biological Reference interval
KAPPA - FREE LIGHT CHAIN: SERUM *by NEPHLOMETRY*	**1510^{H}**	mg/dL	629.0 - 1350.0
LAMBDA - FREE LIGHT CHAIN: SERUM *by NEPHLOMETRY*	**766^{H}**	mg/dL	313.0 - 723.0
KAPPA/LAMBDA RATIO: SERUM *by NEPHLOMETRY*	1.97		0.26 - 1.65 IN CASE OF RENAL IMPAIREMENT: 0.37 - 3.1

INTERPRETATION:

KAPPA	LAMBDA	KAPPA/LAMBDA RATIO	REMARKS
Normal	Normal	Normal	Normal sample. If serum electrophoretic pattern is also normal, it is unlikely that patient has Monoclonal gammopathy.
Normal	Normal	Low/High	Suggestive of Monoclonal gammopathy with Bone Marrow suppression
Low	Low	Normal	Suggestive of Bone Marrow suppression
Low	Low	Low/High	Suggestive of Monoclonal gammopathy with Bone Marrow suppression
High	High	Normal	**Suggestive of :** 1.Renal Impairment. 2.Overproduction of Polyclonal free light chain from inflammatory conditions 3.Biclonal gammopathy of different free light chain types
High	High	Low/High	Suggestive of Monoclonal gammopathy with Renal Impairment

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BARCODE NO.	: 01526521	**COLLECTION DATE**	: 05/Mar/2025 06:05PM
CLIENT CODE.	: KOS DIAGNOSTIC LAB	**REPORTING DATE**	: 08/Mar/2025 11:29AM
CLIENT ADDRESS	: 6349/1, NICHOLSON ROAD, AMBALA CANTT		

Test Name	Value	Unit	Biological Reference interval

COMMENTS:

1.Increased production of monoclonal immunoglobulins or free monoclonal light chains leads to a change in the k/lambda light chain quotient. A k/lambda quotient outside the reference interval is thus an indication of the existence of a monoclonal gammopathy.
2.Serum light chains are also dependent upon several factors like the type of clonality, presence of associated renal failure or polyclonal hypergammaglobulinaemia and thedegree of bone marrow impairment from the growing tumour or from drug therapy. These factors should be considered during interpretation .
3.Following are the recommendations as per the International Myeloma Working Group (IMWG)-: guidelines for serum free light chain analysis & interpretation in multiple myeloma and related disorders

NOTE:

1.Use of free light chain ratio (rFLC) in combination of serum protein electrophoresis & immunofixation for diagnosis.
2.Use of involved free light chain (iFLC) quantitation or the difference between the involved & uninvolved serum light chains (dFLC) for serial measurements during monitoring & to define complete response. During monitoring the ratio (rFLC) can be unreliable due to associated fluctuations in the concentration of uninvolved light chains and renal failure.

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NAME	**: Mr. SUBHASH CHANDER**		
AGE/ GENDER	: 73 YRS/MALE	**PATIENT ID**	: 1779999
COLLECTED BY	:	**REG. NO./LAB NO.**	**: 012503050047**
REFERRED BY	: P.G.I. (CHANDIGARH)	**REGISTRATION DATE**	: 05/Mar/2025 06:04 PM
BARCODE NO.	: 01526521	**COLLECTION DATE**	: 05/Mar/2025 06:05PM
CLIENT CODE.	: KOS DIAGNOSTIC LAB	**REPORTING DATE**	: 06/Mar/2025 04:49PM
CLIENT ADDRESS	: 6349/1, NICHOLSON ROAD, AMBALA CANTT		

PROTEIN ELECTROPHORESIS: SERUM

Test Name	Value	Unit	Biological Reference interval
TOTAL PROTEINS: SERUM *by MIGRATION GEL ELECTROPHORESIS*	6.91	gm/dL	6.20 - 8.00
ALBUMIN: SERUM *by MIGRATION GEL ELECTROPHORESIS*	**2.84^{L}**	gm/dL	3.50 - 5.50
A : G RATIO: SERUM *by MIGRATION GEL ELECTROPHORESIS*	**0.7^{L}**	RATIO	1.00 - 2.00
ALPHA 1 GLOBULIN *by MIGRATION GEL ELECTROPHORESIS*	0.31	gm/dL	0.11 - 0.40
ALPHA 2 GLOBULIN *by MIGRATION GEL ELECTROPHORESIS*	0.84	gm/dL	0.43 - 1.03
BETA GLOBULIN *by MIGRATION GEL ELECTROPHORESIS*	1.03	mg/dL	0.53 - 1.40
GAMMA GLOBULIN *by MIGRATION GEL ELECTROPHORESIS*	**1.89^{H}**	gm/dL	0.75 - 1.80

INTERPRETATION Serum protein electrophoresis shows Hypoalbuminemia and hyper gamma globulin region.

ADVICE **KINDLY CORRELATE CLINICALLY**

INTERPRETATION:

1.Serum protein electrophoresis is commonly used to identify patients with multiple myeloma and disorders of serum proteins.
2.Electrophoresis is a method of separating proteins based on their physical properties. the pattern of serum protein electrophoresis results depends on the frations of 2 types of protein : albumin and globulin (alpha 1 alpha2, beta and gamma.)
3.A homogeneous spike-like peak in a focal region of the gamma-globulin zone indicates a monoclonal gammopathy.
4.Monoclonal gammopathies are associated with a clonal process that is malignant or potentially malignant, including multiple myeloma, Waldenstrom macroglobulinemia, solitary plasmacytoma, smoldering multiple myeloma, monoclonal gammopathy of undetermined significance, plasma cell leukemia, heavy chain disease, and amyloidosis.
5.M-protein (in the gamma region) level greater than 3 g/dL should be interpreted along with other radiologic and haematological findings to arrive at a diagnosis of Multiple myeloma and must not be considered in isolation.
6.Occasionally M protein may appear as a narrow spike in the beta or alpha2 regions also.
7.Up to one fifth of patients with Myeloma may have an M-protein spike of less than 1 g /dL.
8.Hypogammaglobulinemia on serum protein electrophoresis occurs in about 10% of patients with multiple myeloma who do not have a serum M-protein spike.
9.Most of these patients have a large amount of Bence Jones protein (monoclonal free kappa or lambda chain) in their urine, wherein urine protein electrophoresis should be performed. Monoclonal gammopathy is present in up to 8 percent of healthy geriatric patients.

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Test Name	Value	Unit	Biological Reference interval

NOTE:
The following conditions require serum immunofixation to confirm monoclonality or to differentiate monoclonal and polyclonal disoders.
1.A well defined "M" band.
2.Faint band .
3.Chronic inflammatory pattern (decreased albumin, increased alpha, increased gamma fractions)
4.Isolated increase in any region with an otherwise normal pattern.
5.Shouldering of albumin peak along anodal or cathodal side may be seen with lipoproteins, drugs, bilirubin or radiological contrast.

*** End Of Report ***

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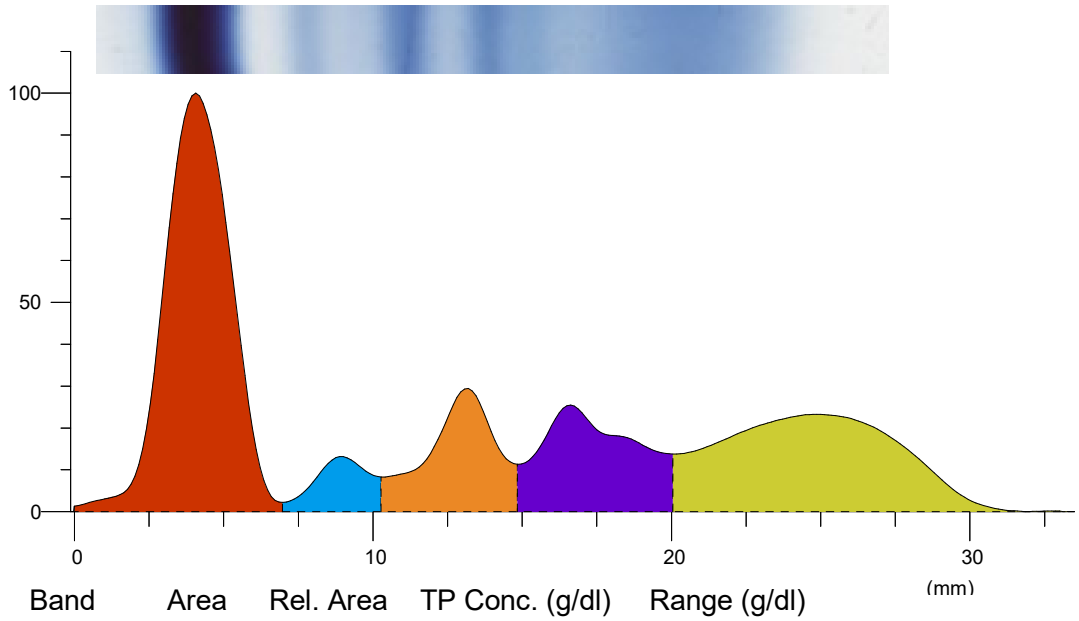
KOS Diagnostic Lab

(A Unit of KOS Healthcare)

PROTEIN ELECTROPHORESIS

NAME	**SUBHASH CHANDER**	**BARCODE ID**	**01526521**
AGE/SEX	**73 YRS/M**	**DATE**	**06-03-2025**

Chemistry Results **TP 6.91(g/dl)**



Index	Band	Area	Rel. Area	TP Conc. (g/dl)	Range (g/dl)
1	Albumin	2.157	41.10%	2.84 L	3.50 ... 5.00
2	Alpha 1	0.237	4.51%	0.31	0.11 ... 0.40
3	Alpha 2	0.638	12.16%	0.84	0.43 ... 1.03
4	Beta	0.780	14.86%	1.03	0.53 ... 1.40
5	Gamma	1.437	27.37%	1.89 H	0.75 ... 1.80
Total		5.249		6.91	

Ratio A/G 0.70

Comment:-

Serum protein electrophoresis shows Hypoalbuminemia and hyper gamma globulin region. Kindly correlate clinically.

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