

Third Edition

Pathology Practical and Quick Review

is a well revised and updated edition of the book which presents the information on the practical aspects of pathology in a student-friendly manner. The book has been written in a simple and lucid style and includes illustrations for the benefit of all the students, intelligent as well as ordinary, studying pathology at undergraduate level in various fields including medical (MBBS) and dental sciences (BDS), AYUSH courses, and other courses pertaining to medical laboratory technology and allied health sciences.

Salient Features of the Book

- ❖ The book is divided into five sections: •Haematology, •Clinical Pathology and Basics of Cytology, •General Pathology and Systemic Pathology, •Histopathology Techniques and •Cytology Techniques
- ❖ Each part covers different exercises.
- ❖ Book lays emphasis on acquiring practical skills.
- ❖ Most of the NMC competencies related to skills are addressed.
- ❖ The book is also useful for the students in their preparation of examination to answer long answers, short essays and short answers and to face viva voce examination as quick review in pathology.
- ❖ Additional important material is added as supplements after each section to address some of the topics.
- ❖ Case studies are included after Haematology, Clinical Pathology, General Pathology and Systemic Pathology and Cytology sections to take the students to a higher level of thinking. The answers to these cases are given at the end of all the chapters. After main five parts, at the end has "Similes in Pathology", "Know Your Scientists" and "Pearls to Remember" covering various topics which will help the students in preparation for competitive examination in medicine.
- ❖ The book has been designed with illustrations of gross and microscopic pictures with original as well as schematic diagrams.

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Third Edition

Pathology

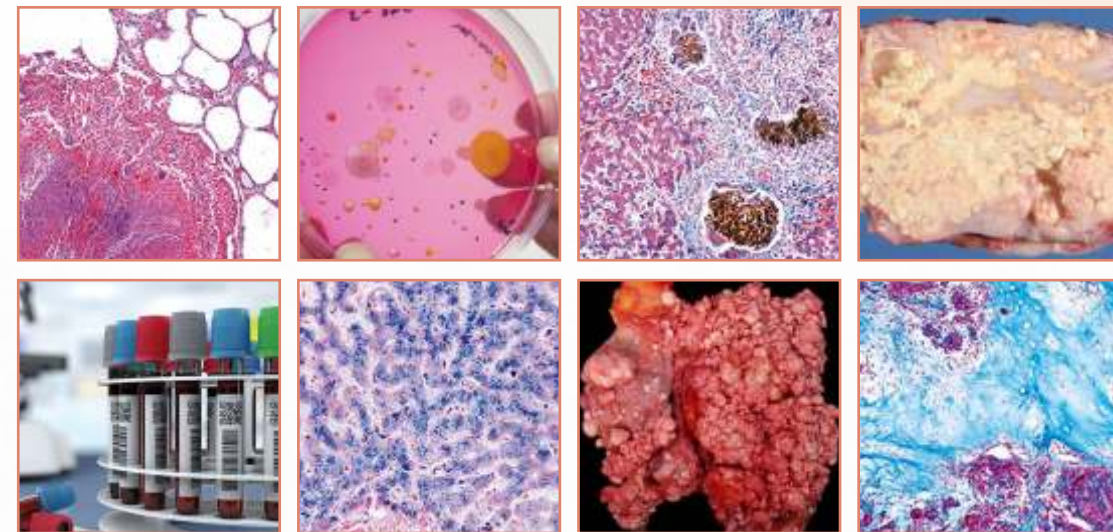
Practical and Quick Review

Pilli



Third Edition

Pathology Practical and Quick Review



Ganga S Pilli



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Dedicated to Education

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CBME Competencies and Case Study Topics

SECTION I: HAEMATOLOGY

Competencies

Practicals

1. PA 13.1: Describe haemopoiesis (pp.3–7).
2. PA 13.2: Describe the role of anticoagulants (pp.10–11).
3. PY 2.11: Estimate Hb (pp.14–16), RBC (p.18), TLC (pp.17-20), RBC indices (p.21), DLC (p.23), blood groups (p.31), BT/CT (pp.67–68).
4. PY 2.12: Describe ESR (p.28), osmotic fragility (p.52), PCV (p.26).
5. PA 13.5: Perform, identify and describe the peripheral blood picture in anaemia (pp.12,36,38–39).
6. PA 14.3: Identify and describe the peripheral smear picture in microcytic anaemia (pp.38–39).
7. PA 15.3: Identify and describe the peripheral smear picture in macrocytic anaemia (pp.39–43).
8. PA 16.5: Describe the peripheral blood picture in different haemolytic anaemias (pp.46–49,81).
9. PA 16.6: Prepare a peripheral smear and identify haemolytic anaemia from it (pp.12, 46–49,81).
10. PA 20.1: Describe the features of plasma cell myeloma (p.64)
11. FM 14.8: Demonstrate the correct technique to perform and identify ABO and Rh blood groups of a patient (p.31).
12. PA 22.2: Enumerate the indications, describe the principles, enumerate and demonstrate steps of compatibility testing (p.82).

Theory

Anaemia

1. PA 14.2: Describe the etiology, investigations and differential diagnosis of microcytic hypochromic anaemia (pp.38–39).
2. PA 14.3: Identify and describe the peripheral smear in microcytic anaemia (pp.38–39).
3. PA 15.1: Describe the metabolism of vitamin B12 and the etiology and pathogenesis of B12 deficiency (pp.39–43).
4. PA 15.2: Describe laboratory investigations of macrocytic anaemia (pp.39–43).
5. PA 15.3: Identify and describe the peripheral blood picture of macrocytic anaemia (pp.39–43).
6. PA 15.4: Enumerate the aetiology of megaloblastic and non-megaloblastic macrocytic anaemia (p.79).
7. PA 16.1: Define and classify haemolytic anaemia (pp.44–55).

8. PA 16.2: Describe the pathogenesis and clinical features and haematologic findings of haemolytic anaemia (pp.45–46,48–49).
9. PA 16.3: Describe the pathogenesis, features, haematologic indices and peripheral blood picture of sickle cell anaemia and thalassaemia (pp.46,80–81).
10. PA 16.4: Describe the aetiology, pathogenesis, haematologic indices and peripheral blood picture of acquired haemolytic anaemia (p.81).

Disorders of White Blood Cells

1. PA 18.1: Enumerate and describe the causes of leukocytosis, leucopenia, lymphocytosis and leukemoid reaction (pp.23–25, 61).
2. PA 18.2: Describe the aetiology, genetics, pathogenesis, classification, features, haematologic features of acute and chronic leukaemia (pp.56–63).

Plasma Cell Disorders

1. PA 20.1: Describe the features of plasma cell myeloma (p.64).

Disorders of Haemostasis

1. PA 21.3: Differentiate platelet or vascular disorders from clotting disorders based on the clinical and haematologic features (p.79).
2. PA 21.4: Disseminated intravascular coagulation (p.79).

Blood Groups and Transfusion Reactions

1. PA 22.1: Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion (p.31).
2. PA 22.1: Classify and describe blood group systems (ABO and Rh) (p.31).
3. PA 22.2: Describe a correct technique to perform cross match (p.82).
4. PA 22.4: Enumerate blood components and describe their clinical use (p.83).
5. PA 22.5: Enumerate and describe infections transmitted by blood transfusion (p.89).
6. PA 22.6 Enumerate transfusion reactions (p.84).

Case Study Topics

1. Microcytic hypochromic anaemia
2. Macrocytic anaemia
3. Aplastic anaemia
4. Haemolytic anaemia: Thalassaemia, spherocytosis, auto-immune haemolytic anaemia
5. Leukaemia
6. Multiple myeloma
7. Idiopathic thrombocytopenic purpura

SECTION II: CLINICAL PATHOLOGY AND BASICS OF CYTOLOGY...

Competencies

Practicals

1. PE 21.11: Perform and interpret abnormal components in urine examination: Nephritic syndrome, nephrotic syndrome, acute and chronic renal failure (pp. 97–113,143,437–438).
2. PA 23.3: Describe semen analysis (pp.115–116,144), thyroid function tests (pp. 123,144), renal function tests (119,143), and liver function tests (pp. 121,143).
3. PA 10.1 and MI 2.5: Malaria and filariasis (p.131).
4. PA 10.2: Cysticercosis (p.142).

Charts: Interpretation

1. PA 23.1: Urine analysis charts UTI, RCC (p.143).
2. PA 23.3: Interpret given sample of semen analysis (p. 144).
3. Charts: Interpret thyroid function tests, renal function tests, and liver function tests (pp.143,144).

SECTION III: GENERAL PATHOLOGY AND SYSTEMIC PATHOLOGY

Competencies*Practicals**General Pathology*

1. PA 2.8: Identify and describe various forms of cell injuries, their manifestations and consequences in gross and microscopic specimens (SH, DOAP session, skill assessment) (pp.153–158).
2. PA 3.2: Identify and describe amyloidosis (pp.161–163).
3. PA 4.4: Identify and describe acute and chronic inflammation in gross and microscopic specimens (pp.164–180).
4. PA 6.7: Identify and describe the gross and microscopic features of infarction in pathology specimens (pp.186–189).

Systemic Pathology

1. PA 27.8: List cardiac function tests (p.329).
2. PA 24.3: Describe and identify gross and microscopic features of peptic ulcer (p.242).
3. PA 25.6: Interpret liver function test and hepatitis serology panel. Distinguish obstructive from non-obstructive jaundice based upon clinical features and liver function tests-Cases (pp.121,143,256–258).
4. 26.1,26.3: Chronic bronchitis, emphysema, COPD, pneumonia (pp.224–231).
5. PA 19.5: Identify and describe the features of Hodgkin's lymphoma (p.319).
6. PA 19.6: Enumerate the causes of splenomegaly (p.330).
7. 19.7: Identify and describe the specimen of enlarged spleen (p.182).
8. PA 30.7: Describe aetiology, hormonal dependence, features and morphology of adenomyosis (p.295).
9. PA 31.3: Describe and identify the morphological and microscopic features of carcinoma breast (p.267).
10. Lump breast: Describe identify morphological features of Benign and malignant breast diseases (pp.264,267).
11. PA 33.1: Osteomyelitis (pp.312–313).
12. PA 33.2,33.5: Bone tumours (pp.313–315).
13. PA 23.1: Small contracted kidney: Differential diagnosis (p.439).
14. PA 34.4: Identify, distinguish and describe common tumours of skin (pp.286–288,289–293).

*Theory**Cell Injury and Adaptation*

1. PA 2.1: Causes, mechanisms, types and effects of cell injury (pp.153–158).
2. PA 2.2: Describe the aetiology of cell injury (pp.153–158).
3. PA 2.2: Distinguish between reversible–irreversible cell injury (pp.153–158).

4. PA 2.6: Describe and discuss cellular adaptations: atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia (p.154).
5. PA 2.4: Apoptosis: Definition, physiological-pathological causes, mechanism, morphology of cells (pp.155–156).
6. PA 2.4: Define necrosis and types of necrosis (p.156).
7. PA 2.5: Gangrene, types, differences between dry and wet gangrene (pp.157–158).
8. PA 2.3,3.1,3.2: Fatty change and amyloidosis (pp.159–160,161–163).
9. PA 3.1: Describe the pathogenesis and pathology of amyloidosis (pp.161–163).
10. PA 3.2: Identify and describe amyloidosis in a pathology specimen (pp.161–163).

Inflammation

1. PA 4.1: Define and describe the general features of acute and chronic inflammation including stimuli, vascular and cellular events (pp.164–180).
2. PA 4.2: Chemical mediators of inflammation (p.167).
3. PA 4.3,4.4: Chronic inflammation including causes, types (pp.164–180).

Haemodynamic Disorders

1. PA 6.2: CVC: Liver, lung and spleen (pp.181–182).
2. PA 6.4: Define and describe normal haemostasis and the aetiopathogenesis and consequences of thrombosis (pp.183–186)
3. PA 6.7: Identify and describe the gross and microscopic features of infarction in a pathologic specimen (Heart and Lung) (pp.186–189).
4. PA 6.1: Edema: Mechanisms and pathophysiology (p.190).
5. PA 6.3: Shock: Types, stages, and organ changes (p.193).

Infectious Diseases

1. PA 10.1: Pathogenesis and pathology of malaria—clinical pathology (p.131).
2. PA 10.2: Pathogenesis and pathology of cysticercosis (p.142).
3. PA 26.4: Describe pathogenesis and pathology of tuberculosis (pp.174,222).
4. PA 10.3: Define and describe the pathogenesis and pathology of leprosy (pp.178–180).

Neoplastic Disorders

1. PA 7.1: Define and classify neoplasia. Describe the characteristics of neoplasia including gross, microscopy, biologic behaviour and spread. Differentiate between benign from malignant neoplasm (pp.196–202).
2. PA 7.4: Describe the effects of tumour on the host including paraneoplastic syndrome (pp.201–202).

Lymph Nodes and Spleen (PA 19.1–19.7)

1. PA 19.2: Describe the pathogenesis and pathology of tuberculous lymphadenitis (p.174).
2. PA 19.3: Identify and describe the features of tuberculous lymphadenitis in a gross and microscopic specimen (p.174).
3. PA 19.5: Identify and describe the features of Hodgkin's lymphoma in a gross and microscopic specimen (p.319)
4. PA 19.4: Describe and discuss Hodgkin's lymphoma and non-Hodgkin's lymphoma
5. PA 19.6: Enumerate the causes of splenomegaly (p.330).
6. PA 19.7 Identify and describe the gross specimen of an enlarged spleen (p.182).

CVS: Heart

1. Congenital heart diseases (p.211).
2. PA 27.4: Rheumatic fever (p.216).
3. PA 27.5: Ischemic heart disease (p.187).
4. PA 27.6: Infective endocarditis (p.214).
5. PA 27.7: Describe the aetiology, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of pericarditis and pericardial effusion (p.221).
6. PA 27.9: Cardiomyopathies (p.219).
7. PA 27.8: Cardiac function tests (p.329).

Respiratory System

1. PA 26.4: Tuberculosis: Etiology, types, pathogenesis, stages, morphology, microscopic appearance and complications of tuberculosis (p.222).
2. PA 26.3: Obstructive pulmonary diseases: Chronic bronchitis, emphysema, asthma, bronchiectasis (pp.224–231).
3. PA 26.3: Aetiology, types, pathogenesis, morphology and complications and evaluation of obstructive airway disease (OAD) and bronchiectasis (pp.224,229).
4. Restrictive lung diseases (p.230)
5. PA 26.1: Aetiology, types, pathogenesis, stages, morphology and complications of pneumonia (p.171).
6. PA 26.6: Aetiology, types, exposure, genetics environmental influence, pathogenesis, stages, morphology, microscopic appearance, metastases and complications of tumours of the lung and pleura (p.231).
7. PA 26.5: Aetiology, types, exposure, environmental influence, pathogenesis, stages, morphology, microscopic appearance and complications of occupational lung diseases (p.233).

Salivary Gland (p.239)**Oral Cavity and Esophagus**

1. PA 24.1 Describe the etiology, pathogenesis, pathology and clinical features of oral cancer 242.

Stomach and Intestine

1. PA 24.2: Describe the aetiology, pathogenesis, pathology, microbiology, clinical and microscopic features of peptic ulcer disease (p.242).
2. PA 24.3: Describe and identify the microscopic features of peptic ulcer (p.242).
3. PA 24.4: Describe the aetiology, pathogenesis and pathologic features of carcinoma of the stomach (p.244)
4. PA 24.5: Describe the aetiology, pathogenesis and pathologic features of tuberculosis of the intestine (p.246)
5. PA 24.6: Describe the aetiology and pathogenesis and pathologic and distinguishing features of Inflammatory bowel disease (p.247).
6. PA 24.7: Describe the aetiology, pathogenesis, pathology and distinguishing features of carcinoma of the colon (p.251).

Liver and Hepatobiliary

1. PA 25.1: Bilirubin metabolism, enumerate the aetiology and pathogenesis of jaundice, distinguish between direct and indirect hyperbilirubinaemia (pp.87,255).

2. PA25.4: Describe the pathophysiology, pathology and progression of alcoholic liver disease including cirrhosis (pp.258–261).
3. PA 25.6: Interpret liver function and viral hepatitis serology panel. Distinguish obstructive from non-obstructive jaundice based on clinical features and liver function tests (pp.143,256–258).

Breast

1. PA 31.1: Classify and describe the types, aetiology, pathogenesis, pathology and hormonal dependency of benign breast disease (p.264).
2. PA 31.2: Classify and describe the epidemiology, pathogenesis, classification, morphology, prognostic factors, hormonal dependency, staging and spread of carcinoma of the breast (p.267).
3. PA 31.3: Describe and identify the morphologic and microscopic features of carcinoma of the breast (p.267).
4. PA 31.4: Enumerate and describe the aetiology, hormonal dependency and pathogenesis of gynecomastia (p.266).

Female Genital Tract

Cervix

1. PA 30.1: Describe the epidemiology, pathogenesis, aetiology, pathology, screening, diagnosis and progression of carcinoma of the cervix (p.301).

Endometrium, Uterus and Trophoblastic Diseases

1. PA 30.3,30.5: Endometrium and uterus, trophoblastic diseases (pp.293–300).
2. PA 30.9: Describe the aetiology, hormonal dependence and morphology of endometrial hyperplasia (p.294).
3. PA 30.2: Describe the pathogenesis, aetiology, pathology, diagnosis and progression and spread of carcinoma of the endometrium (p.296).
4. PA 30.7: Describe endometriosis (p.295).
5. PA 30.8: Describe adenomyosis (p.295).
6. PA 30.5: Describe gestational trophoblastic neoplasms (p.298).

Ovaries

1. PA 30.4: Classify and describe the aetiology, pathogenesis, pathology, morphology, clinical course, spread and complications of ovarian tumors (pp.303–306).

Male Genital System

1. PA 29.1: Classify testicular tumors and describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of testicular tumours (pp.307–309).
2. PA 29.3: Pathogenesis, pathology, hormonal dependency presenting and distinguishing features, urologic findings and diagnostic tests of benign prostatic hyperplasia (p.310).
3. PA 29.4: Pathogenesis, pathology, hormonal dependency presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the prostate (p.311).

Endocrine Pathology

1. PA 32.1: Aetiology, pathogenesis, pathology and iodine dependency of thyroid swellings (p.316).

Renal System

1. PA 28.5: Glomerular diseases: Aetiology, pathogenesis, mechanisms of glomerular injury, pathology, distinguishing features and clinical manifestations of glomerulonephritis (pp.271–276).
2. PA 28.10: Aetiology, pathogenesis, pathology, laboratory findings, distinguishing features, progression and complications of acute and chronic pyelonephritis and reflux nephropathy (pp.276–278).
3. PA 28.11: Aetiology, pathogenesis pathology, laboratory, urinary findings, distinguishing features, progression and complications of vascular disease of the kidney (p.279).
4. PA 28.13: Complications of renal stone disease and obstructive uropathy (pp.276–281).
5. PA 28.14: Aetiology, genetics, pathogenesis, pathology, presenting features, progression and spread of renal tumors (p.281).

Bone

1. PA 33.1: Aetiology, pathogenesis, pathology, clinical manifestations, radiologic findings and complications of osteomyelitis (p.312).
2. PA 33.2: Aetiology, pathogenesis, manifestations, radiologic and morphologic features and complications of bone tumors (pp.313–315).

Central Nervous System

1. PA 35.1: Describe the aetiology, types and pathogenesis, differentiating factors, CSF findings in meningitis (pp.174,388,417,441).
2. PA 35.2: Classify and describe the aetiology, genetics, pathogenesis, pathology, presentation sequelae and complications of CNS tumours (pp.325–328).
3. PA 35.3: Identify the aetiology of meningitis based on given CSF parameters (pp.388,417,441).

Case Study Topics*General Pathology (6 Cases)*

1. DVT
2. Myocardial Infarction
3. Lung Infarct
4. Air Embolism
5. Amniotic Fluid Embolism
6. Fat Embolism

Systemic Pathology (40 Cases)

1. Lymphoma
2. Emphysema
3. Lung Abscess
4. Bronchiectasis
5. Carcinoma Lung
6. Mesothelioma
7. Hypertensive Heart Disease
8. Stable Angina
9. Unstable Angina

10. Rheumatic Fever
11. Bacterial Endocarditis
12. Cardiomyopathy
13. Peptic Ulcer
14. Carcinoma Stomach
15. Carcinoma Colon
16. Inflammatory Bowel Disease
17. Viral Hepatitis
18. Obstructive Jaundice
19. Cirrhosis with PHT
20. Alcoholic Liver Disease
21. Diabetes Mellitus
22. Carcinoma Breast
23. Carcinoma Cervix
24. Carcinoma Endometrium
25. Nephritic Syndrome
26. Nephrotic Syndrome
27. Chronic Kidney Disease
28. Acute Kidney Injury
29. Chronic Pyelonephritis
30. Hashimoto's Thyroiditis
31. Goitre
32. Meningitis

SECTION V: CYTOLOGY TECHNIQUES

Competencies

1. PA 8.2: Describe the basis of exfoliative cytology including (p.135)
 - a. Stains used (p.375)
 - b. Technique of FNAC (p.381)
 - c. Exfoliative cytology (pp.407-411)
2. PA 8.3: Diagnostic cytology in various organs (pp.394-411)
3. PA 23.2: Abnormal findings in body fluids in various diseases (pp.384-393).
4. Interpret CSF findings (pp.440-441).

Abbreviations

ACR	Urinary Albumin Creatinine Ratio
ADCC	Antibody-Dependent Cell-mediated Cytotoxicity
ADH	Anti-Diuretic Hormone
AD	Autosomal Dominant
ADP	Adenosine Diphosphate
AIHA	Auto-Immune Hemolytic Anaemia
AFP	Alpha Feto Proteins
ALIP	Abnormal Localisation of Immature Precursors
APLA/APS	Antiphospholipid Antibody
APTT	Activated Partial Thromboplastin Time
AR	Autosomal Recessive
BCC	Basal Cell Carcinoma
CCF	Congestive Cardiac Failure
CaCl ₂	Calcium Chloride
CIN	Carcinoma <i>In Situ</i>
CFTR	Cystic Fibrosis Transmembrane Conductance Regulator
CMV	Cytomegalo Virus
CNS	Central Nervous System
CRAB	Calcium (elevated), Renal failure, Anaemia, Bone Lesions
CT	Computerised Tomography
DCIS	Duct Carcinoma <i>In Situ</i>
DVT	Deep Vein Thrombosis
ECM	Extra Cellular Matrix
ER	Estrogen Receptors
FSGS	Focal Segmental Glomerulo Sclerosis
GCT	Giant Cell Tumour
GERD	Gastro Esophageal Reflux Disease
GGT	Gamma Glutamyl Transpeptidase
G6PD	Glucose 6 Phosphate Dehydrogenase
HA	Hemolytic Anaemia
HCC	Hepatocellular Carcinoma
HCG	Human Chorionic Gonadotropin
HCl	Hydrochloric Acid
HD	Hodgkin Disease
HDN	Hemolytic Disease of Newborn
HELLP	Hemolysis, Elevated Liver enzymes, Low Platelet count
HLA	Human Leukocyte Antigen
HNPCC	Hereditary Non-Polyposis Colorectal Cancer
HPV	Human Papillomavirus
HS	Hereditary Spherocytosis

HSIL	High Grade Squamous Intraepithelial Lesion
IC	Integrated Circuit
IL	Interleukin
INF	Interferon
IHC	Immunohistochemistry
ITP	Idiopathic Thrombocytopenic Purpura
JSB	J Singh and Bhattacharji
KOH	Potassium hydroxide
LDH	Lactate Dehydrogenase
LDHD	Lymphocyte Depleted Hodgkin Disease
L&H	Lymphocytic and Histiocytic
LN	Lymph Node
LSIL	Low Grade Squamous Intraepithelial Lesion
MCD	Minimal Change Disease
MCHC	Mean Corpuscular Haemoglobin Concentration
MCV	Mean Corpuscular Volume
MDS	Myelo Dysplastic Syndrome
MGN	Mesangial Glomerulonephritis
MEN	Multiple Endocrine Neoplasia
MGG Stain	May-Grünwald Giemsa Stain
MM	Multiple Myeloma
MPGN	Membrano-proliferative Glomerulonephritis
NaOH	Sodium hydroxide
NADPH	Nicotinamide Adenine Dinucleotide Phosphate
NO	Nitric Oxide
NP	Niemann-Pick Disease
OD	Optical Density
OS	Osteosarcoma
PCV	Packed Cell Volume
PAS Stain	Periodic acid-Schiff Stain
Pf HRP ₂	<i>P. falcifarum</i> -Histidine Rich Protein-2
PLAP	Placental Alkaline Phosphatase
POEMS	Polyneuropathy, Organomegaly, Endocrinopathy, Myeloma protein and Skin changes
PSGN	Post-Streptococcal Glomerulonephritis
PT	Prothrombin Time
QBC	Quantitative Buffy Coat
RBC	Red Blood cell
ROS	Reactive Oxygen Species
RPGN	Rapidly Progressive Glomerulonephritis
RS cells	Reed-Sternberg cells
SBC	Simple Bone Cyst
SIADH	Syndrome of Inappropriate secretion of ADH
TNF	Tumour Necrosis Factor
US	Ultrasound
V	Voltage
W	Watt
vWD disease	von Willebrand disease