



## An Overview: The History of Urologic Pathology

Swami A. Shirapure<sup>1</sup>, Samadhan V. Pawar<sup>2</sup>, Dr. Swapnil D. Deo<sup>3</sup>, Ms. Rutuja R. Yeole<sup>4</sup>

<sup>1,2,3,4</sup>Dr. Uttamrao Mahajan College of B. Pharmacy Chalisgaon

### ABSTRACT-

The need for standards in the management of patients with endocrine tumors of the digestive system prompted the European Neuroendocrine Tumor Society (ENETS) to organize a first Consensus Conference, which was held in Frascati (Rome) and was based on the recently published ENETS guidelines on the diagnosis and treatment of digestive neuroendocrine tumors (NET). Here, we report the tumor–node–metastasis proposal for foregut NETs of the stomach, duodenum, and pancreas that was designed, discussed, and consensually approved at this conference. In addition, we report the proposal for a working formulation for the grading of digestive NETs based on mitotic count and Ki-67 index. This proposal, which needs to be validated, is meant to help clinicians in the stratification, treatment, and follow-up of patients.

### Key Words :-

1. Disease: An abnormal condition or disorder that disrupts the normal functioning of the body.
2. Pathogen: A microorganism or agent that can cause disease, such as bacteria, viruses, fungi, and parasites.
3. Pathogenesis: The process by which a disease develops and progresses within the body.
4. Etiology: The study of the causes and origins of diseases.
5. Diagnosis: The process of identifying a disease or medical condition through clinical evaluation, laboratory tests, and other diagnostic methods.
6. Histopathology: The examination of tissue samples to study the microscopic changes and abnormalities associated with diseases.
7. Clinical Pathology: The branch of pathology that involves the analysis of blood, urine, and other bodily fluids to diagnose and monitor diseases.

### Introduction To Pathology :-

1. The term pathology is derived from two Greek words Pathos means suffering of diseases or logos means-study.
2. Pathology Of the scientific diseases and also deals With causes, effects. mechanism and nature of diseases.
3. Its Very important branch of medicine.
4. Which involves all the abnormal state of body.

### Pathology is broadly divided into two categories :-

1. General pathology.
2. Systemic pathology.
  - **Pathogenesis** — is the mechanism by which the disease is produced.
  - **Physical signs** — are the functional implications of the disease felt by the patient.
  - **Earlier concept of disease** - it was the outcome of curse or evil eye of spirits.

### Terminology Pathway :-

1. **Patient** :- Is a person affected by the disease.

2. **Lesion** :- Is characteristic changes in tissue and cells.
3. **Etiology** :- Is the cause of the disease.

{Paul Ehrlich (14 March 1854 – 20 August 1915) was a Nobel Prize- winning German physician and scientist who worked in the fields of hematology, immunology, and antimicrobial chemotherapy.}



{His laboratory discovered arsphenamine (Salvarsan), the first effective medicinal treatment for syphilis, thereby initiating and also naming the concept of chemotherapy.}

{Ehrlich popularized the concept of a magic bullet. He also made a decisive contribution to the development of an antiserum to combat diphtheria and conceived a method for standardizing therapeutic serums.}



disciplinary contexts.}

{George Nicholas Papanicolaou (1883-1962) a American pathologist developed test for diagnosis of cancer of uterine.}

{The purpose of this review article is to summarise the scientific work of George Nicholas Papanicolaou, one of the most eminent figures in the 20th century history of clinical cytology and medicine.}

{Science teaching, especially in biology, addresses subjects that carry a very abstract context in themselves, which makes the learning process difficult, since most students do not have direct access to some

## **Clinical Chemistry Of Blood :-**

**Blood** :- Blood is body fluid I humans and other animals winch circulated In the body and delivers necessary substances such as Nutriens and Oxygen to the cells and transport metabolic waste products from those same cells.

### **Functions of blood :-**

1. Transports oxygen and nutrients.
2. Transport waste products.
3. Contains Ab and WBC- protects body from diseases.
4. Clotting blood protects against.

### **Erythrocytes (RBC) :-**

1. RBC's Red Blood Cells- life span 120 days), which is typically a circular, biconcave disc without a nucleus in humans.
2. Normal haemoglobin content of blood is about 13-17/100ml for males and 11-12g/100ml females.

3. Normal RBC count of blood is 4.5-6.0 millions/ cu mm.

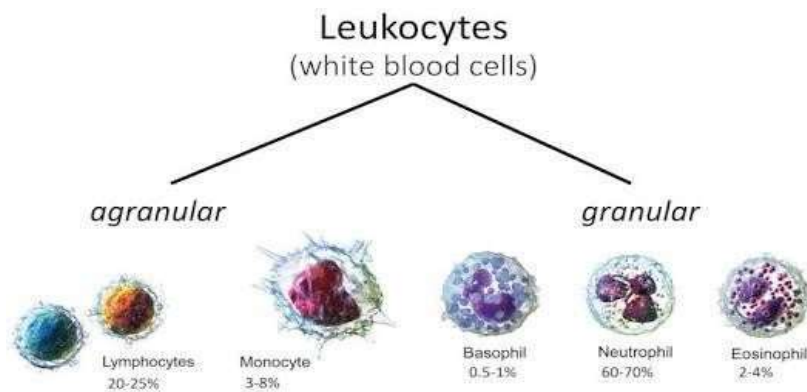
**Abnormal conditions due to RBC and significance :-**

- **ANAEMIA** :- It is a decrease in the total amount of RBC's or hemoglobin in the blood, or a lowered ability of the blood to carry oxygen.
- Symptoms of anaemia are fatigue, breathlessness, dyspepsia, anorexia, dizziness, vision problem, headache and insomnia.

**Types of Anaemia :-**

1. **Macrocytic** :- (Pernicious or Megaloblastic Anaemia) Occurs due to deficiency of vitamin B 12 or folic acid in the blood RBCs size becomes large with low hemoglobin content.
2. **Haemolytic anaemia** :- Occurs due to excessive destruction of RBCs and is caused by bacterial infection, malaria & snake bite.
3. **Aplastic anaemia** :- Reduction in all types of blood cells count. In this bone marrow is degraded due to exposure of body to irradiation like X-rays or chemicals.
4. **Sickle cell anaemia** :- Occurs due to faulty haemoglobin and RBC to take a sickle shape. This is a hereditary disorder.
5. **Polycythemia** :- It is an increase in number of RBCs.

**Types of WBC's :-**

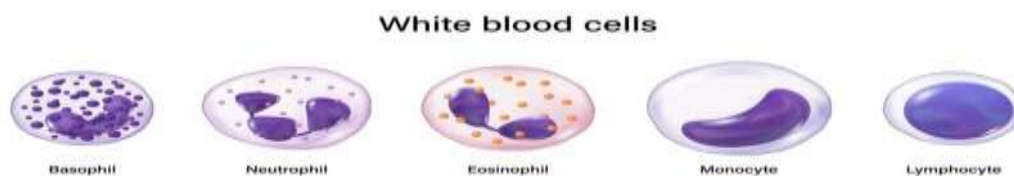


Produced in bone marrow and directly released into the lymphatic system.

● **They are two types :-**

1. T – lymphocytes.
2. B – lymphocytes.

Also called B-cells and responsible for the synthesis of antibodies (immunoglobulins) thus helps in immunity.



**WBC (White Blood Cells)**

● **Monocytes** :-

1. Normal count is 2-8% of blood and help as second line of defense. Neutrophils:
2. Normal count is 50-70% of blood and help as phagocytosis (ingesting the bacteria) Basophils:
3. Normal count is less than 1% and help as phagocytosis and in preventing blood coagulation.

● **Abnormal conditions due to WBC :-**

**AIDS (Acquired Immuno Deficiency Syndrome):** - Caused by a virus called HLTV III (Human Lymphocyte T-virus III). It reduces cellular immunity by destroying T-lymphocytes

**Leucopenia** :-

1. Decrease in TLC less than 4,000/ml of blood due to conditions like starvation, viral, bacterial infections or bone marrow depression, Leucocytosis.
  2. Increase in TLC above 11,000 ml blood due to conditions like pregnancy, menstruation, lactation and infections.
- **Eosinophilia** :- Increase in eosinophil count due to allergic conditions and in worm infestations.

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**PLATELETS (THROMBOCYTES) :-**

1. They are oval or spindle, non-nucleated, fragile and very small cells of about 2-4  $\mu$  size.
2. They play a vital role in formation of clot in blood to stop bleeding.
3. Normal range is about 3 lakh/ml of blood.



**Platelets Abnormal conditions due to Platelets :-**

- **Haemophilia** :- It is due to the absence of one or more clotting factors. Bleeding continues unstopped even with small injuries.
- **Thrombocytopenia** :- Platelet count is very low (less than 4,000/ml of blood due to anemia, acute infections, bone marrow diseases, mosquito bite (Dengue fever).

**Other problems relating to blood :-**

- **Blood Sugar** :-
  1. Normal glucose value in blood is 20-110 mg/dl (fasting) & 120-140 mg/dl (after meal). Higher values described as hyperglycemia. (Blood urea).
  2. Normal range of cholesterol in plasma is 120-200 mg/100ml. Increase level can cause hardening of blood vessels (Atherosclerosis).
- **Transaminase** :- Enzymes required for amino acid biosynthesis and normal range is between 5-30 IU/liter

**Two types :-**

1. SGPT (Serum Glutamate Pyruvic Transaminase).
2. SGOT (Serum Glutamate Oxaloacetate Transaminase).

Higher level of SGPT/SGOT means liver cirrhosis, hypoxia & cardiac infarction.

- **Blood calcium** :- Normal range is 8.5-10.5 mg/100ml of blood. The disease is associated with bone mineralization, blood coagulation and muscle sensitivity.
- **Bilirubin** :- RBC has a life span of 120 days. Afterwards they break and haemoglobin is released into them & protein part.

**Abnormal Constituents of Urine and their significance in diseases :- Introduction :-**

1. Urine is an excretory product of the body.
2. It is formed in the kidney.
3. Urine examination helps in the diagnosis of various renal as well as systemic diseases.

**Urine :-**

- Urine is a clear liquid by-product of metabolism in humans and in many other animals.

- Urine flows from the kidneys through the ureters to the urinary bladder and excreted (1 liter/day) from the body through the urethra.
- Specific gravity of urine is 1.015-1.020. Its pH is about 5.5.
- **Urine Analysis :-**
  1. Physical examination.
  2. Chemical examination.
  3. Microbiological examination.

**Chemical examination :-**

Normal constituents	Abnormal constituents
Inorganic constituents ✓ Chloride ✓ Calcium ✓ Ammonia  Organic constituents ✓ Urea ✓ Creatinine ✓ Uric acid	Urine pH Protein Reducing sugars Ketones Bihrubn Urobilinogen Nitrates Occult blood Beta heG Certain drugs

**Normal Constituents Of Urine :-**

Types of Constituents	Constituents	Amount Excreted in 24hrs
	Chloride	10-15 g
	Sodium	3-5 g
	Phosphorous	1-1.2 g
Inorganic	Potassium	1-3 g
	Sulphate	0.6-2 g
	Calcium	100-300 g
	Magnesium	100-200 g
	Iodine	100-200 mg
	Lead	0.03-0.08 mg
	Urea	20-35 g
Organic	Creatinine	1-1.8 g
	Ammonia	0.5-1.2 g
	Uric acid	0.6-1 g
	Amino acids	0.15-2 g

**Abnormal Constituents Of Urine :-**

Abnormal Constituents	Pathological Conditions	Causes
Proteins	Protinuria	Severe exercise, kidney disease and high protein pregnancy
Glucose	Glucosuria	Diabetes malatious & endocrine disorder
Blood	Haematuria	Kidney damage & renal stones
Pigments (Bihrubin)		Jaundice



### Urine colour

**Reference** :- <https://www.medicinenet.com/script/main/art.asp 5260>.

### **Experimental :-**

#### **1. Intramuscular Route :-**



### **Intramuscular Route**

The IM route or drug administration has definite advantages compared with oral administration, however, compared with the inhalation and IV routes IM fares poorly. In adults the only rationale more controllable routes. In pediatrics or with patients With disabilities however the IM (or SM) route may prove to be the only effective patient management technique available as'de from general anesthesia.

Circulation dentists using the IM route must be adept at patient monitoring and be trained in management of the unconscious airway.

### **Advantage :-**

1. Rapid and uniform absorption of the drug especially the aqueous solutions
2. IM injection bypasses the first-pass metabolism of the drug.
3. It also avoids the factors governing drug absorption.

### **Disadvantages :-**

The major advantage of the intramuscular route of drug administration is that intramuscular injection is futile if the precise site where it is administered isn't conducive to the ready absorption of the drug.

- It also aseptic conditions are needed as same as other parenteral routes.
- It may cause irregular absorption of the drug.

## 2. Intravenous route :-



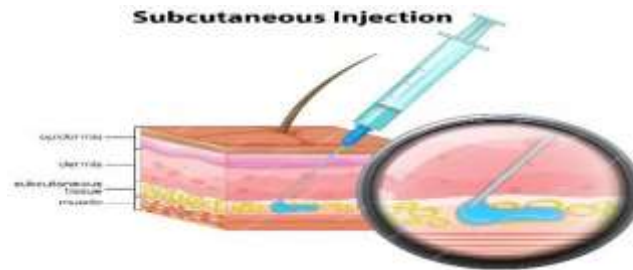
### Intravenous route Advantages of intravenous route of drug administration :-

1. The major advantage of the intravenous route of drug administration is that it is a one action.
2. Using the intravenous route of drug administration the medications can be delivered at a uniform rate with reproducible effects.
3. It is suitable for all kinds of patients such as the unconscious elderly, child.
4. It does not harm the digestive system since it bypasses them.

### Disadvantages of intravenous route of drug administration :-

1. The major disadvantage of intravenous route of drug administration is that self-medication is not possible which requires a trained person.
2. Only highly soluble drugs are used in the formulation of IV.
3. It only works for rapid release of the drug not for sustained prolonged or controlled release.
4. There is a risk of infection, overdose, and arterial damage compared to other administration.

## 3. Subcutaneous route :-



### Subcutaneous route

**Definition** :- Subcutaneous injection is administered into the fatty layer of skin directly below the dermis and epidermis. Subcutaneous injections are highly effective in administering vaccines such as measles, mumps, rubella, and medications such as insulin, morphine, diacetylmorphine, and goserelin.

#### ➤ Advantages of subcutaneous injection :-

1. Safe and easy route.
2. Slow and sustained absorption.
3. Self-medication absorption.
4. Prolonged duration of action.

#### ➤ Disadvantages of subcutaneous injection :-

1. Painful.
2. Hypersensitivity reaction may occur.
3. Large volume of drug cannot be given.
4. Irritation, infection, tissue necrosis to the site of injection may occur.

**Reference** :- Dr.Md. Mokbul Hossain MBBS:M phill (pharmacology), A handbook of easy pharmacology.

**Alzheimer disease** :- Alzheimer's disease is a progressive and degenerative brain disorder that primarily affects memory, thinking, and behavior. It is the most common cause of dementia, a term used to describe a group of symptoms associated with a decline in cognitive function severe enough to interfere with daily life. Alzheimer's disease is named after Dr. Alois Alzheimer, who first described it in 1906.

### Key characteristics and features of Alzheimer's disease include :-

**Memory Loss** :- One of the earliest and most noticeable symptoms is difficulty in remembering recent events and conversations. Individuals may repeatedly ask the same questions or forget important dates and appointments.

**Cognitive Decline** :- Alzheimer's disease leads to a decline in cognitive functions, affecting reasoning, problem-solving, and judgment. People may struggle with tasks that were once routine.

**Language Problems** :- Individuals with Alzheimer's may have trouble finding the right words, following or joining in a conversation, and may become easily frustrated in communication.

**Disorientation** :- Patients often become disoriented and may lose their way even in familiar environments.

**Changes in Behavior** :- Alzheimer's can lead to changes in personality and behavior. Individuals may become irritable, anxious, or agitated. They may also experience mood swings and withdraw from social activities.

**Reference** :- Rathmann K.L., Conner C.S. Alzheimer's disease: Clinical features, pathogenesis, and treatment. Drug Intell. Clin. Pharm.

### What is Microscope :-

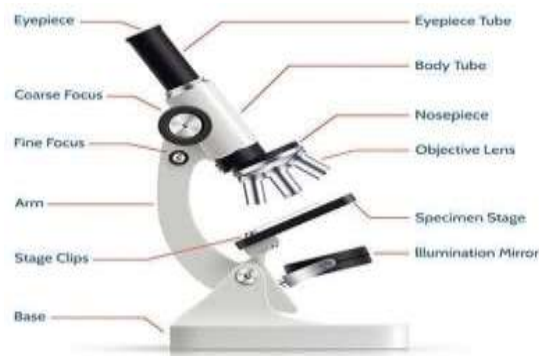
- A microscope is an instrument used to see object that are too small and investigating small object and structures using such an instrument.
- There are two microscope :-
  1. Light Microscope.
  2. Electron Microscope.

### Principle :-

1. The light microscope operates on the principle that light energy will pass through and around a thin object, such a microorganism and with the aid of lenses from a magnified Impression on the visual sensory layer of the eye.
2. The source of light is usually the sun or ambient indoor light.

### Application of light microscope :-

1. The light microscope can be used to provide information about the activity of cell and to look at very small structures such as nanostructures.
2. Light microscopy can be used to explore the time and space related dynamics Of molecules.



## Light Microscopy

### Uses of light microscopy :-

1. Microscope are essential tools for scientist. They are used in microbiology material science mineralogy and medicine.



2. Mineralogists also use light microscopy typically with a special preparation of a sample called thin sections as the name implies thin enough to let light travel through from the light source to the user's eye—the thin shape can tell the user what kinds of minerals are found in the sample.

**Reference** :- Jones K W. Evaluation of cell morphology and introduction to platelet and white blood cell morphology. In, Harmening and fundamentals of Hemostasis, Philadelphia, 2009 pp 93- 116.

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### **Semi auto analyzer :-**

#### **Introduction to semi – auto analyzer :-**

This machinery is Semi-Automatic, bench-type that can be used for Laboratory use, research, In- vitro diagnosis, clinical tests, and hospital use. This analyzer consists of an embedded high speed processor with a built-in thermal printer and connection to an external printer for comprehensive quality reports.



#### ➤ **Advantages :-**

1. Displaying the test results.
2. Printing and memorizing these results.
3. Graphs of all linear and nonlinear reactions.

#### ➤ **Disadvantages :-**

- Initial stage of analysis are performed manually, like
  1. Pipetting of reagent.
  2. Pipetting of specimen.
  3. Mixing and incubation.
- This instrument requires minimum 500 microliters of reagent for test. More consumption of reagent and sample.
- More manpower required.
- Manual L-J chart to draw.

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### **Analysis of constituents of blood and urines analysis of normal and abnormal constituents of blood and urine:-**

#### **A. Hematologic values :-**

1. Thyroid function test.
2. Glucose.
3. Urea.
4. Creatinine.
5. Cholesterol.
6. Alkaline phosphate.
7. Bilirubin.
8. SGPT.

9. Disease and lipase.
10. SGOT.
11. Acid phosphate.

**Liver detect** :-1. **SGOT** :-

- SGOT (Serum Glutamic Oxylate Transaminase).
- It is an enzyme that present in liver and heart cells.
- It is released in to blood when liver and heart is damaged.

**Interpritation** :- Increase level of the SGOT **Symptoms** :-

1. Fatty liver
2. Liver damage
3. Alcoholic disease
4. Hepostatic patient **Normal range** :- **SGOT** : upto 40 Iv/L

**Test procedure** :-

- Reagent – R1 500
- Serum – 50
- It – kinetic Intestine

**Alkaline phosphate** :- It is enzyment it is present in many of the body fluid it is founf in liver, intestine, kidney etc.

**Symptoms** :-

1. Itching
2. Vomiting
3. Weight loss
4. Weakness
5. Swelling and pain over stomach
6. Dark colour in urine

**Normal range** :-

Alkaline phosphate 98 to 138 IV/I

**Test procedure** :-

**Reagent** :- R1 900+ R2 100

**Serum** :- 100

**LT** :- Kinetic

- **Hematologic value** :-

Hematologic value parameters such as (RBC) and while blood cell aunt And hemaphoglobin (Hb) Concentrating are tightly regulated.

- **Acid phosphate** :-

Acid phosphate is a biquitous lysosomal enzyme that organic acid PH.

- **Thyroid Function Test** :-

A thyroid function test (TET) commonly refer to the auatitation.

- **Creatine** :-

Creatine is a chemical waste produce in the blood that process through the kidneys to be detered and eliminated in urine.

➤ **Glucose** :-

Glucose is the main type of sugar in the blood and is the major source of energy for the body cells.

➤ **Urea** :-

Urea nitrogen is a waste product that your kidneys removes from your blood higher than normal BUN levels may be a sign that your kidneys.

➤ **Cholesterol** :-

A cholesterol test is a blood test usually done in the morning if you fast overnight blood is drawn from a vein.

➤ **21 Bilirubin** :-

Bilirubin testing is usually one of group of tests to check the health of your liver.

➤ **SGOT** :-

An test pressures the levels of amino transferase also called AST SGOT.

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**Conclusion :-**

1. **Diagnosis and Understanding:** Pathologists play a vital role in diagnosing diseases by examining tissues, cells, and bodily fluids. Their findings are essential for physicians to make accurate treatment decisions and understand the nature of the disease.
2. **Disease Research:** Pathology is not limited to diagnosis but also contributes to the research and understanding of diseases. It involves investigating the underlying mechanisms, causes, and risk factors associated with different medical conditions.
3. **Personalized Medicine:** Advances in pathology, including molecular and genetic testing, have paved the way for personalized medicine, where treatment plans are tailored to an individual's unique genetic makeup and disease characteristics.
4. **Quality Healthcare:** Pathology is integral to the practice of modern healthcare, helping ensure the delivery of high-quality medical services and patient care.
5. **Public Health:** Pathologists also play a role in monitoring and controlling public health issues, such as infectious disease outbreaks and cancer screening programs.
6. **Pathology Specializations:** Pathology encompasses various subfields, including anatomical pathology, clinical pathology, forensic pathology, and more, each with its unique focus and expertise.

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