

PREDICTIVE VALUE → The predictive value of positive result is the percentage of positive result that are actual (true) positives.

Haematological tests →

Blood has 3 formed elements RBC's, WBC's and platelets. Some of the tests to determine the concn of these elements include Hemoglobin count, Hematocrit value (PCV) total WBC's or total leucocytes count (TLC), mean cell volume (MCV) erythrocyte sedimentation rate (ESR) ETC.

RBC (Erythrocytes)

Normal values: **MEN** 4.3 to 5.9 m/cmm

Women 3.5 to 5.0 m/cmm

The RBC count is most useful as raw data for calculation of erythrocyte indices MCV and MCH decreased RBC is usually seen in anemia of any cause.

Increased RBC is seen in erythrocytotic state polycythemia, dehydration etc.

The main function of erythrocytes or RBC's is to carry oxygen from lungs to the tissues and transport CO_2 back to lungs. Anemia occurs when the hemoglobin, hematocrit and RBC count are below normal range.

Normal sized RBCs are called as normocytes. Small ones are called as microcytes and large ones are macrocytes.

Date / /

Anisocytosis : Variability in the size of red blood cells.

poikilocytosis : any variation in the normal biconcave disc shape.

Such abnormalities are seen with iron deficiency on period of increased erythrocyte production and for red cell damage.

Q. Hematocrit value (Packed cell volume)

Normal values men 39% to 49%.

Women 33% to 43%.

It is the ratio of volume obtained by red cells to total blood volume. It is measured by centrifugation PCV is usually 3 times the Hb value and is given as percent.

Low PCV indicates anemia or dehydration. High PCV values indicates polycythemia or dehydration. This test is used to evaluate

$$\text{Blood Volume} = \text{plasma volume} \times \frac{100}{(100 - \text{Hct})}$$

- Anemia
- polycythemia
- Response to treatment for anemia.
- dehydration
- blood transfusion decision
- effectiveness of blood transfusion.

The Hemoglobin test → Hemoglobin the part of blood that contains iron.

Normal values men → 14-18 g/dL contains iron

Women → 12-16 g/dL.

It measures the grams of Hb contained in 1 dl of whole blood and also it estimates the oxygen carrying capacity of the RBC's.

Low value indicates anemia below normal Hb levels may lead to anemia that can result of -

- iron deficiencies or other deficiencies like folate
- hereditary: sickle cell anemia.
- Cirrhosis of liver.
- excessive bleeding.
- Kidney disease
- Bone marrow failure.
- excessive destruction of RBC's
- Cancer.

Erythrocyte Sedimentation Rate (ESR) →

it is the measurement of setting of RBC in the sample of anti coagulated blood over a period of time.

ESR increases in acute / chronic infection, inflammation, bowel disease, rheumatoid arthritis etc.

The Reticulocyte count → Measures the percentage of reticulocyte. Measure of immature RBC's normal RBC's circulate in the blood for about 1-2 days in this form. It is the index of bone marrow production of matured RBC's.

Decreased reticulocyte count is seen in drug induced aplastic anemia.

White Blood cells → (Leucocytes)

1. WBC Count

Increased WBC is known as leukocytosis usually signals infection (usually bacterial)

Decreased WBC is known as leucopenia it indicates bone marrow depression

WBC Differential count → It has two types of cells, granulocytes including neutrophils, basophils and eosinophils. Agranulocytes includes lymphocytes and monocytes.

~~Neutrophil~~ Neutrophils → These are body's first line of defence.

These increase in case of certain disease like virus infection (chicken pox), inflammatory disease (gout), metabolic disorder (diabetes) use of certain drugs like epinephrine etc.

Basophils → An increased no is seen lung cancer, viral infection and iron deficiency.

Eosinophils → An increased no is seen in acute allergic reactions like asthma, hay fever and amoebiasis.

Lymphocytes → it plays a major role in immunological activity.

They are classified as B-Lymphocyte and T-Lymphocytes.

Monocytes → Monocytosis or increase in no is seen in case of TB, endocarditis, ulcers etc.

platelets or thrombocytes → It is the smallest formed element in the blood and involved in blood clotting.

~~ALP~~ Alkaline phosphate →

it is done for the liver or bone disorder. High ALP means bone or liver has been damaged. Increased serum alkaline phosphatase is

Seen in osteoblastic activity, liver dysfunction, in sepsis inflammatory bowel disease etc.

Lactate dehydrogenase (LD) $\rightarrow$ It has been used to diagnose and monitor heart attack. It is present in all tissues and they released when the cell are damaged or destroyed. Hence it can be used as a marker for cell injury.

Alanine aminotransferase (ALT/SGPT) $\rightarrow$

ALT is found mostly in liver and smaller amount in kidneys heart and muscles all are present in low concn in blood but in case of liver damage its concentration increases like hepatitis necrosis of liver jaundice.

Aspartate Aminotransferase (AST/SGOT) $\rightarrow$

AST is an enzyme present mostly in heart and liver to a lesser extent in other tissues.

It is also used to detect liver damage along with ALT, ALP.

Bone marrow is a highly structured and metabolically active organ of both the hematopoietic and reticuloendothelial systems.

It normally produces 2.5 billion RBCs, 1 billion granulocytes and 2.5 billion platelets/Kg of body weight daily.

Complete Blood count (CBC):

It supplies useful information regarding the concn of the different cellular and noncellular etc. ments of blood and applies to multiple disorders.

These results traditionally include,

1. Leukocyte (WBC) count.
2. RBC count.
3. Hemoglobin (Hgb)
4. Hematocrit (Hct)
5. RBC indices

- Mean corpuscular volume.
- Mean corpuscular Hgb.
- Mean corpuscular Hgb. concn (MCHC)
- RBC distribution with (RDW)

Red blood cell indices →

Because the following laboratory test specifically assess red blood cell characteristics they are called RBC indices.

These indices are useful in the evaluation of anemias polycythemia and nutritional disorders.

Mean Corpuscular volume: (Mcv) →

Normal range 80-90 fl cell.

→ Mcv is an estimate of the average volume of RBCs and is the most clinically useful of the RBC indices.

→ It can be calculated by dividing the hematocrit by the RBC count.

→ Abnormally large cell have an increased Mcv and are called ~~mac~~ macrocytic vit B₁₂ and folate deficiency cause the formation of macrocytic erythrocytes.

→ The Mcv may also be falsely increased in hyperglycemia.

→ Abnormally small cells (with a decreased Mcv) are called microcytic. The most common cause of microcytic erythrocytes (microcytosis) is iron deficiency.

Mean Corpuscular Hemoglobin (MCH) →

MCH is the amount of hemoglobin per RBC. It is calculated by dividing the Hgb by the RBC count.

MCH can be falsely increased in patients with hyperlipidemia due to turbidity. Falsely elevating the Hgb, but it can be truly increased in the presence of folate deficiency due to the presence of macrocytic erythrocytes.

A low MCH corresponds with hypochromic (pale) RBCs, as seen in iron deficiency anemia.

Mean corpuscular Hemoglobin concentration →

MCHC is the hemoglobin divided by the hematocrit. Iron deficiency is the only anemia in which the MCHC is routinely low, although it can also be decreased in other disorders of Hgb synthesis.

Like MCH, it can be falsely elevated in hyperlipidemia.

Red Blood cell Distribution width →

The red blood cell distribution width (RDW) is an indication of the variation in red cell size termed anisocytosis.

— This value is used primarily with other tests to differentiate iron deficiency anemia from thalassemias.

TYPES OF MEDICATION ERRORS

- **Prescribing errors**
- **Omission errors**
- **Improper dose errors**
- **Unauthorized drug errors**
- **Deteriorated drug errors**
- **Wrong time errors**
- **Wrong dosage form errors**
- **Wrong drug preparation errors**
- **Wrong administration technique errors**
- **Monitoring errors**
- **Compliance errors**

3

FACTORS THAT MAY INFLUENCE MEDICATION ERRORS

Factors associated with health care professionals

- Lack of therapeutic training
- Inadequate drug knowledge and experience
- Inadequate knowledge of the patient
- Inadequate perception of risk
- Overworked or fatigued health care professionals
- Physical and emotional health issues
- Poor communication between health care professional and with patients

Type of error →

1) Prescription errors → These errors involved prescribing missing or inaccurate allergy information, improper or omitted dose, route of administration, improper or omitted frequency medication, omission medication incorrect or unspecified medication, unauthorized drugs, duplication missing or inaccurate patient weight.

2) Dispensing errors → Dispensing is an integral part of the quality use of the medicines and together with the patient counseling form the core professional activities of a pharmacist. These activities allow the safe and efficient provision to the general public of what would normally be dangerous or restricted drugs.

Main risk factors associated with the dispensing errors were found to be prescription overload, lighting levels, noise, interruptions and distractions. Also the major parts of the dispensing errors were related to wrong drug or wrong strength.

3) Administration Errors → An error originating during the process directly associated with medication administration at the nursing unit.

- 4) Monitoring Errors → Failure to review a prescribed regimen for appropriateness or failure to use appropriate clinical or laboratory data for adequate assessment of resident response to prescribed therapy.
- 5) Potential errors → A mistake in prescribing, dispensing or planned medication administration that is detected and corrected through intervention before actual medication administration.
- 6) Compliance errors → Inappropriate resident behavior regarding adherence to a prescribed medication administration.
- 7) Clerical errors → These errors, often arise on one hand due to the errors in copying out doctor's instruction and on the other hand due to the mistaken identity of patient leading to the administration of ~~another~~ authorized drug.

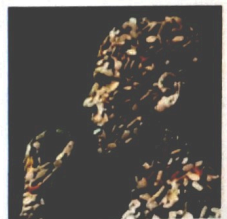
Causes of medication errors →

- i) Insufficient or inadequate information about the patient.
- ii) Lack of knowledge about drug therapy.
- iii) Poor communication of drug information.
- iv) Poor hand writing.



Roles of pharmacist in medication safety

- ☐ Individual pharmacist play individual role in medication safety for improvement of patient health.
- ☐ The role of pharmacists in medication safety can be categorized in three major areas which are given below-
 1. Hospital
 2. Clinical and
 3. Community.



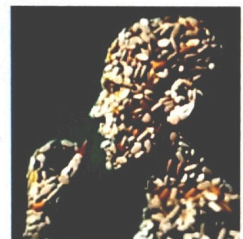
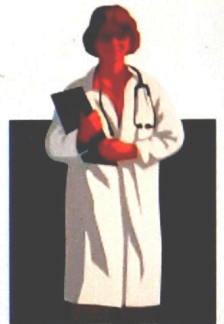


Roles of the hospital pharmacist in medication safety

- ❑ There are three responsibilities of hospital pharmacist for both In and Out patient, those are given below-

❖ Dispensing Area's Responsibilities:

- Ensure that established policies and procedures are follows
- Check for accuracy in the work of supportive personnel
- Maintains professional competence
- Insures the proper techniques are used in extemporaneous compounding.





Roles of the hospital pharmacist in medication safety

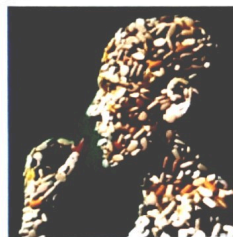
❖ Patient Care Area's Responsibilities:

- Inspect periodically the medication areas on the nursing unit to ensure an adequate supply of stock drugs and their proper storage.
- Identifies drug brought into clinic.
- Assist in drug product and entity section.



❖ General Responsibilities:

- Provide drug information as necessary to pharmacy, medical and nursing staffs.
- Coordinates overall pharmaceutical needs of the ambulatory services.
- Provide adequate control.

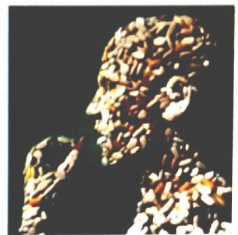




Role of the clinical pharmacist in medication safety

□ Clinical pharmacists play a vital role in the hospital. Their roles are as follows-

- Prescription monitoring.
- Medication history-taking and medicines reconciliation.
- Communicates patient information to the physician.
- Assist physician to select drug product, dosage form and schedules.
- Patient education and counseling.
- Monitoring the patient's total therapeutic drug level, effectiveness, side effects, toxicities, allergic drug reactions, drug interactions and appropriate patient outcome.
- Provide drug information to the patient, medical & nursing staffs.





Roles of the Community pharmacist in medication safety

❑ Role of the community pharmacists in medication safety are given below-

- Dispensing prescriptions medicines to the public, Check dosage, ensure the medicine are correct and safe and level it.
- Liaising with doctors about prescriptions.
- Supervising the preparation of any medicines.
- Counseling and advising the public on the treatment of minor ailments and any adverse side-effects of medicines or potential interactions with other medicines/treatments.





Roles of the Community pharmacist in medication safety

- Overseeing the ordering and safe storage of medical products and in some cases, arranging the delivery of prescription medicines to patients.
- Keeping up-to-date with current pharmacy practice, new drugs and their uses.
- Managing, supervising and training pharmacy support staff.





Aim of critical appraisal:

Should this paper In conjunction with other relevant literature and clinical experience change clinical practice?

By critical appraisal we have to ensure whether results can be applied in clinical practice.



Choosing a paper for critical appraisal:

Every year hundreds of biomedical journals publish thousands research papers on drug therapy.

In that few will change prescribing practice.

So during selection of a paper, clinical pharmacist should consider the following factors.



1. Is this paper addressing an important or controversial therapeutic issue which is of relevance to my patient?
2. Is this study the first evidence for the efficacy of a new drug class or treatment?
3. Does this study involves more patients or is it continued for longer than previous studies?
4. Is the study population different any way from previous studies?
5. Does the methodology address methodological problems identified in previous studies of the drug?

If the answer to any of these questions is yes then the paper may be worthy of critical appraisal.



Consideration should also be given to the type of study (strength of study design)

The relative strength carried by different types of studies in descending order of quality.

1. Systemic reviews and meta analysis
2. Randomised control trials
3. Non randomised trials
4. Cohort studies
5. Case control studies
6. Cross sectional surveys
7. Case reports



Terms used to describe the designs of drug trials

Double blind:

Neither subjects nor investigators know treatment allocation.

Single blind:

Subjects do not know which treatment they are receiving but investigators are aware about treatment allocation.

Placebo- controlled:

Controlled subjects receive inactive treatment which should be identical in appearance and method of administration to active medication.

Open label:

Subjects and investigators are aware of treatment allocation.

**Multi centre:**

Used to describe trials which are conducted in more than one institution.

Prospective study:

A study using data to be gathered in future.

Retrospective study:

A study using data available from the past.

Case control study:

A study which identifies a group of patient having the outcome of interest, and compares them to a matched group of patients who do not have the outcome of interest.

Cross over study:

Each subject receives both intervention and control treatment, usually separated by a wash out period during which subjects receive no treatment.

**Cross – sectional survey:**

A study which surveys a population about a condition or exposure, or both , at one point in time.

Cohort study:

A non experimental study design which follows a group of people Prospectively and then examines how events differ among people With in the group.

Factorial design:

Allows investigation of the separate and combined effects of more than One independent variable on given outcome.

Parallel group comparison:

Each group receive a different treatment , with both groups being entered into the study at the same time. Results are analysed by comparing groups.

**Paired comparison:**

Subjects receiving different treatments are matched to balance potential confounding factors. Results are analysed in terms of differences between subject pairs.

With in subject comparison:

Subjects are assessed before and after an intervention. Results are analysed in terms of subject changes.



Critical appraisal of Randomised Control Trials:

To evaluate the efficacy of drug treatment RCT is the preferred study Design.

Randomisation is to ensure that the two groups are very similar, so that any known or unknown variables (confounding factors) which may affect outcomes are evenly distributed between the groups.

Confounding is the possibility of alternative explanations of the study results.

Bias relates to the problems relates to the study design. Good study designs aims to minimise bias with in.

Randomisation process aims to minimise the bias between intervention and control group.



Statistical tests are of two types

1. Parametric test
2. Non parametric

Parametric tests are more powerful than non parametric test and so Should be used if possible.



Type of data	TWO COMPARISON GROUPS		MORE THAN TWO COMPARISON GROUPS	
	Unpaired data	Paired data	Unpaired data	Paired data
Nominal	Chi square	Mc nemar	Chi square	Cochran Q test
Ordinal	Mann witney U test	Wilcoxon	kruskal- wallis	Fried man
Parametric	Student t test	Paired student t test	Analysis of variance (ANOVA)	ANOVA

APPROPRIATE STATISTICAL TESTS OF SIGNIFICANCE ACCORDING TO DATA TYPE AND STUDY DESIGN



Evaluating results section

When examining the results section first check whether the groups are similar in perspective of all characteristics and confounding Factors.

Check the presence of confounding factors in study population which will have effect on treatment outcome. If there, whether they are evenly distributed between the groups.

Drop outs of the study should be considered while evaluating results section. Some times this may include those who do not adequately respond to treatment or who experience ADR.



The authors should present results for all the outcomes listed in the methods section and provide reasons for missing results.

For each outcome, results should be reported as a summary of the outcome for each group together with contrast between the groups, known as the effect size.

Ensure whether the investigators summarised both risk and benefits associated with intervention.



Evaluating 'P' value and

The P value, or calculated probability, is the probability of finding the observed, or more extreme, results when the null hypothesis (H_0) of a study question is true.

A smaller p-value means that there is stronger evidence in favour of the alternative hypothesis.

p-value	Interpretation
Over 0.1	- No evidence that the null hypothesis does not hold
Between 0.05 and 0.1	- Very weak evidence that the null hypothesis does not hold
Between 0.01 and 0.05	- Moderately strong evidence that the null hypothesis does not hold
Under 0.01	- Strong evidence that the null hypothesis does not hold



Evaluating the relation between two variables

Relation between two variables can be determined through two Statistical methods.

1. Correlation analysis
2. Regression analysis

- Correlation analysis provides a measure of strength of relationship.
- Regression analysis is a way of mathematically describing the relation between variables.

If there is more than one variable then the technique is known as multiple regression.



Evaluating the discussion

In discussion authors will compare their results with other studies, discuss the significance of their findings and summarise the Limitations of their study.

Reaching to a conclusion:

At the end of critical appraisal you should ask your self
"Should this paper In conjunction with other relevant literature and clinical experience change clinical practice?"

Whether the results of the study can be applied to patients in the real world is a matter of judgment.

Pulmonary Function Test

Purpose of pulmonary Function test - pulmonary function testing has been a major step forward in assessing the functional status of the lungs.

pulmonary function test are used for the following →

1. Screening for the presence of obstructive and restrictive disease.

2. Evaluating the patient prior to surgery especially those who:

are older than 60-65 years of age.

Have history of smoking, cough on exertion, wheezing.

3. Documenting the effectiveness of therapeutic intervention.

Normal values change with →

1) Age → As a person ages, the natural elasticity of the lungs decrease. This result in smaller lungs volume and capacities as we age.

2) Gender → Male have large lung volume and capacities than females.

3) Body height and size → A small man will have smaller PFT result than a man of same age who is much larger.

4) Race → Affects PFT values.

Terminology and definitions →

Lungs volume tests : routinely measure the:

1- Tidal volume → The tidal volume is the volume of air breathed in and out during normal quiet breathing (about 500 ml).

only about 350 ml of the tidal volume actually reaches the alveoli, the remaining 150 ml remains in the air spaces of nose, pharynx, trachea and bronchi and is called Dead air volume.

2) Minute volume of respiration $\rightarrow$ The total air taken in during 1 min.

It is approximately 6000 ml/min.

Tidal volume $\times$ respiratory rate per minute (12)

3) Inspiratory Reserve Volume: The air that can be breathed in by maximum inspiratory effort after an ordinary inspiration.

This is approximately 3100 ml above 500 ml of tidal volume, thus inspiratory system can fill in 3600 ml of air.

4) Expiratory Reserve volume: The air that can be breathed out by maximum expiratory effort after an ordinary expiration.

This is about 1200 ml.

5) Residual volume (RV) $\rightarrow$ The volume of air which remains in the lungs after maximal expiration.

This is about 1200 ml of air.

Lungs capacities →

1. Inspiratory capacity → It is the maximum volume of air that can be inspired the sum of the tidal volume + inspiratory reserve volume.

2. Vital capacity → It is the maximal volume of air that can be ~~ex~~ exhaled after a maximum inspiration.

It is the sum of inspiratory reserve volume + tidal volume + expiratory reserve volume.

It is approx equal to 4800 ml.

3. Total Lung Capacity (TLC) → It is the sum of all the lung volumes (6000 ml).

4. Forced Vital Capacity (FVC) → The maximum volume of air exhaled with maximally forced effort from a position of maximal inspiration.

Peak expiratory Flow Rate (PEFR)

This is the maximum flow rate achieved by the patient during the FVC measured from the beginning after full inspiration and ending with maximum expiration.

Forced expiratory Flow Rate (FEF) →

It is mea forced expiratory flow during the middle half of the FVC and is measured as the slope of the line b/w 25 and 75 % of the FVC on the flow.

Date ____ / ____ / ____

Saathi

Slow vital capacity (SVC): The amount of air you can slowly exhale after you inhale as deeply as possible.

$$TV \rightarrow 500 \text{ ml}$$

$$IRV \rightarrow 3000 \text{ ml}$$

$$ERV \rightarrow 1000 \text{ ml}$$

$$RV \rightarrow 1500 \text{ ml}$$

$$IC = IV + IRV$$

$$= 500 + 3000 = 3500 \text{ ml}$$

$$FRC = ERV + RV$$

$$= 1000 + 1500 = 2500 \text{ ml}$$

$$VC = \text{vital capacity}$$

$$= IRV + TV + ERV$$

$$= 3000 + 500 + 1000$$

$$= 4500 \text{ ml}$$

$$TLC = TV + IRV + ERV + RV$$

$$= 500 + 3000 + 1000 + 1500$$

$$= 6000 \text{ ml}$$

Spirometry →

Spirometer is the primary instrument used in pulmonary function testing.

It is designed to measure changes in volume and can measure lungs volume compartments that change gas within the atmosphere.

As the patient breath in and out from the air enclosed on the surface of the water below the bell jar. As the patient breaths, the ball of the Spirometer is displaced and the pen deflection reflects the volume of air entering or exiting the lungs.

The device usually attached to the spirometer which measures the movement of gas in and out of the chest, is referred as spirograph. Some times, the spirograph is replaced by a printer like unit used in laboratory. The resulting tracing is called spirogram.

A visual record of respiratory movements made by a spirometer.

pulmonary function can be grouped into main categories →

1) obstructive Airway Disease.

2) Restrictive Airway Disease.

i) obstructive Airway →

obstructive disease limit airflow during expiration. The portency (dilation on openness) is estimated by measuring the flow of air as the patient exhales as hard and as fast as possible. Flow through the tubular passage ways can be decreased because -

← Thyroid Function test →

Definition →

Thyroid function tests are blood tests used to evaluate how effectively the thyroid gland is working.

These tests are used to,

1. diagnose an underactive thyroid and an overactive thyroid (hyperthyroidism)
2. evaluate thyroid gland activity.
3. Monitor response to thyroid therapy.

These hormones are thyroxine T_4 and tri iodo thyronine (T_3) .

Thyroid gland also secretes calcitonin, which reduces blood calcium ion concn. Secretion and transport of thyroid hormone are controlled by TSH (thyrotropin).

This TRH is secreted from hypothalamus.

■ Thyroid hormones affect the following →

1. Growth and development.
2. Calorigenics by increasing the rate of basal metabolism.
3. The CNS by increasing or diminishing cerebation.
4. Musculature - a fine tremor characterizes hyperthyroidism.
- 5) Lipid metabolism - lipid mobilization and degradation are stimulated.

Precautions → Thyroid treatment must be

Stopped one month before blood is drawn for a thyroxine.

Steroids, Propranolol, cholestyramine, and other medications that may influence thyroid activity are usually stopped before a

Prion to taking a long-acting thyroid stimulant test, the patient will probably be told to stop taking all drugs that could affect test results.

Description →

TSH thyroid gland to secrete the hormones thyroxine (T_4) and triiodothyronine T_3 . measures the amount of this hormone in the blood. T_3 is normally present in very small amounts, but has a significant impact on metabolism. It is the active component of thyroid hormone.

Thyroid Function Studies →

1. Serum total thyroxine (TT4) →

This test provides the most direct reflection of thyroid function through indicating hormone availability to tissues. T_4 is determined by radio immuno assay, which is sensitive and rapid.

2. Serum total tri iodo thyronine (TT3) →

① This test measures total T_3 .

② Serum T_3 and T_4 usually rise and fall together. Hyperthyroidism commonly causes a disproportionate rise in T_3 and TT3 can rise before the TT4 level does.

③ The TT3 may be low in only 50% of patients with hypothyroidism.

④ The TT3 may be low in only 50% of patients with hypothyroidism.

3. Resin tri-iodo thyronine up take (RT3U)

- This test clarifies whether abnormal T_4 levels are due a thyroid disorder or to abnormalities in the binding proteins cause it evaluates the binding capacity of TBG.
- If an abnormal amount of thyroid hormone is present in the blood the RT3U results change in the same direction as the altered level elevated in hyperthyroidism and decreased in hypothyroidism.

4. Serum thyrotropin (TSH) and Sensitive TSH assays.

a) Serum TSH assay →

The most sensitive test for detecting the hypothyroid state because the hypothalamic pituitary axis compensates very quickly for even slight decreases in circulating free hormone by releasing more TSH.

Thyroid Function Tests →

1. Tests that directly or indirectly measure the concentration of T_3 and T_4 .
2. Free T_4 .
3. Total Serum T_4 .
4. Serum T_3 resin uptake.
5. Free T_4 index.
6. Total Serum T_3 .

2. Tests that evaluate integrity of the hypothalamic pituitary thyroid axis.

- TSH.
- TRH.

Free thyroxine (T_4) →

Normal range 0.8 - 1.5 mg/dl

→ The test measures the unbound T_4 in the serum.

→ It is the most accurate reflection of thyroid metabolic status.

→ A decreased direct equilibrium dialysis free T_4 with an elevated TSH is diagnostic of primary hypothyroidism.

TRH (thyroid releasing hormone) →

→ TRH is a hormone secreted by the hypothalamus.

→ It regulate TSH secretion from the pituitary.

→ TRH Test measures the ability of injected TRH to stimulate the pituitary to release TSH.

→ Radioactive iodine uptake test →

This test is used to detect the ability of thyroid gland to trap and concn iodine and produce thyroid hormone.

Anti thyroid antibodies →

Normal range: Varies with antibodies.

Antibodies that attack various thyroid tissue components can be detected in serum of patients with autoimmune disorders. Such as graves disease.