Clinical Biochemistry for Pharmacy

Introduction

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طبعا كلنا عارفين إنه المادة بتشرحها دكتورة إيمان وكلنا مجربين امتحاناتها وموادها من قبل نصيحة لا تراكموا خصوصا انه الفصل كثير زخم وحاولوا تربطوا المعلومات لأنه الدكتورة كثير بتحب الربط وبالاخيرالمادة بتحكي عن شغلات مهمة كثير إلك كصيدلاني فلا تضيعوها من ايدكم وحاولوا تستفيدوا قدر المستطاع

Ref. An illustrated colour text in clinical biochemistry, Gaw, 4th ed, 2008

يعطيكم العافية ان شاء الله يكون فصل خير علينا جميعا ❤

CLINICAL BIOCHEMISTRY

- Clinical biochemistry, chemical pathology and clinical chemistry → its important for you as a pharmacist for:
  1. help patient with diagnosis and prognosis the disease.
  2. to limit the patient from self treatment.
- The test must be performed as accurately as possible. دقة عالية جدًا
- Biochemical tests are used extensively in medicine for both diagnosis (1) and prognosis (2) of diseases
  - The test should be very accuratly → to prevent the wrong diagnosis and treatment for disease.
- Your role as a **pharmacist** (*Terminology knowledge, understand basis of lab test, effect of disease and drugs on the diagnostic test*) مصطلحات طبية

لـ يمكن من خلال الفحص أفهم إذا هو تم بطريقة صحيحة أولا.

EX for understanded basic of lab test and effect of disease and drugs on the diagnostic test.

→ The measuring of glucose level in the blood:

1. From vain or capillary → حسب مكان سحب عينة الدم، راح يكون في فرق في قراءة ال glucose level بنسبة 20%.

2. Analysis of Sample in the lab by using kit or by using glucometer → حسب عليقة قايس العينة، وراح يكون في فرق في قراءة ال glucose level

* in the kit → low interferences.
* in the glucometer → there are interferances.

There are many drugs will increase the level of glucose in the blood such as Corticosteroids.

لـ فإذا أجاك مريض عنده hyperglycemia لازم تسأله إذا هو عم ياخذ أدوية أول لأنه ممكن تكون ال hypoglycemia يلي عنده بسبب الدواء شي خلل في ال insulin داخل جسمه.

في عندي فحوصين بيتم عملهم لجميع الأطفال حديثي الولادة:

1. Congenta hypothyrodism → قصور الغدة الدرقية

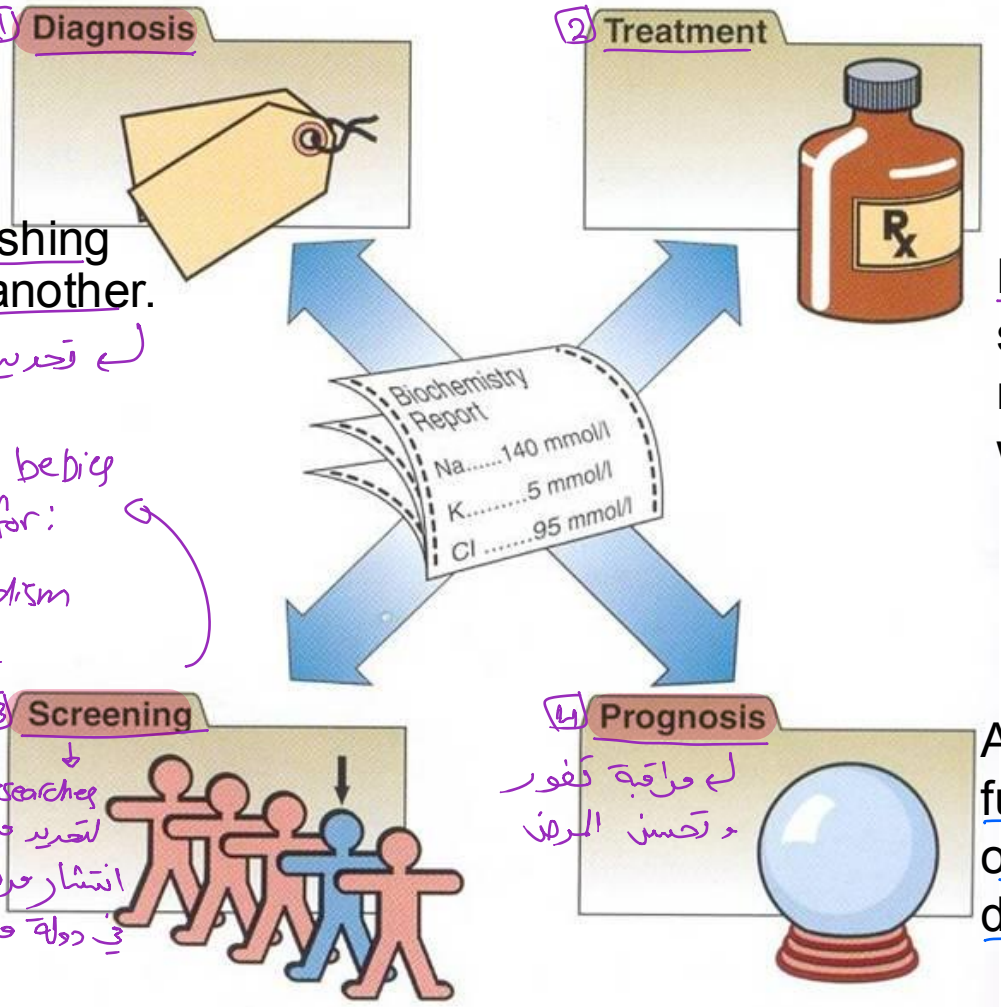
2. glucose 6 phosphate dehydrogenase enzyme. →

إذا كان في عندي defect في الأنزيم هذا → الطفل راح يكون مصاب بمرض التفول.

Biochemical tests

Qualitative and quantitative analysis

Importance of Biochemical test :



The art of distinguishing one disease from another.

لـ تحديد المرض

such as newborn being we do a test for:
1. Conjenital hypothyroidism
2. glucose-6 Phosphate dehydrogenaze enzyme.

Examine for the presence or absence of a disease.

researches لتحديد مدى انتشار مرض معين في دولة معينة.

if the drug effective or not.

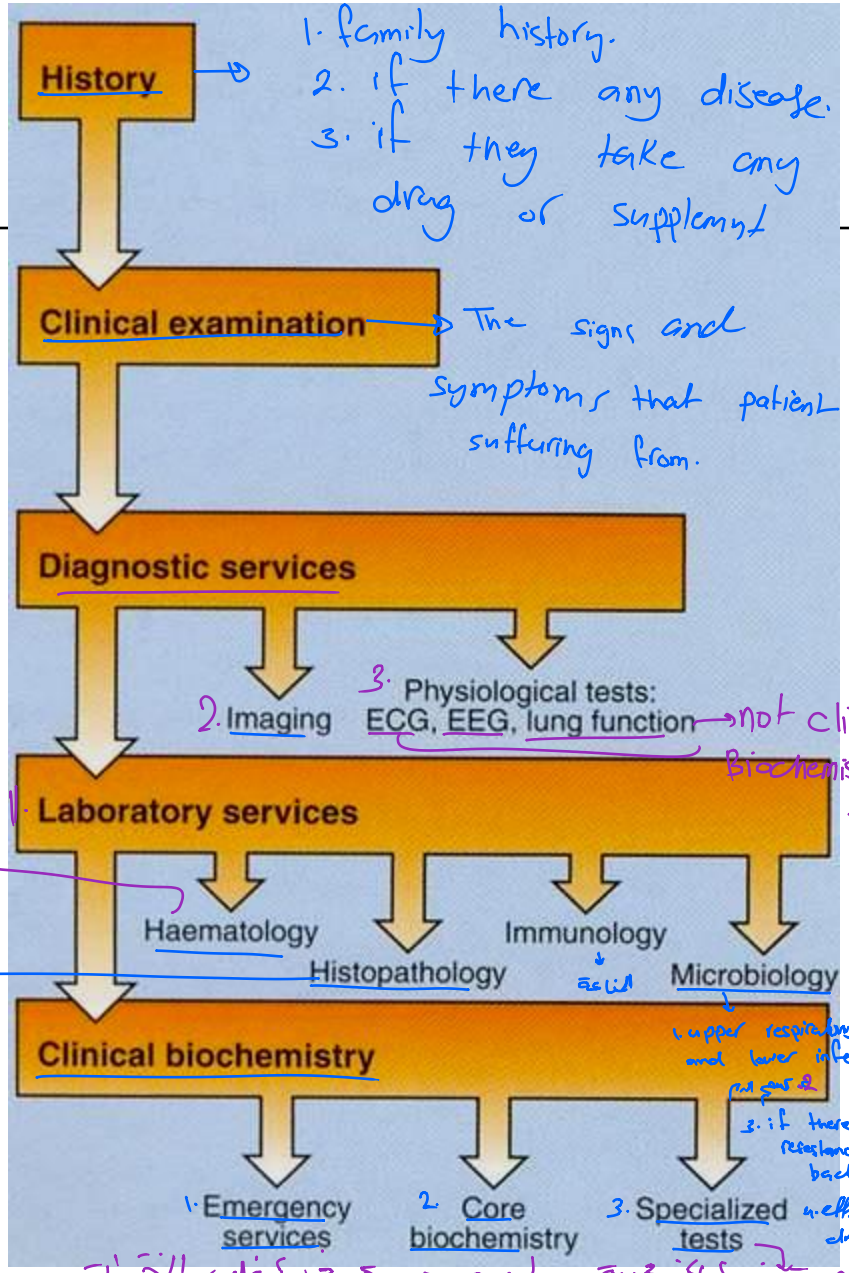
Monitoring: sequential recording, keep watch over analyte

لـ مراقبة تطور و تحسن المرض

An assessment of the future course and outcome of a patient's disease

The place of clinical biochemistry in medicine

Clinical biochemistry tests comprise over one-third of all hospital laboratory investigations



1. family history.
2. if there any disease.
3. if they take any drug or supplement

The signs and symptoms that patient suffering from.

not clincal Biochemistry tests

علم دم يتم عند دكتور مختص

زراعة أنسجة

يتم أخذ عينة لمعرفة اذا الورم benigns or malegnant.

المناعة

1. upper respiratory and lower infection

3. if there any resistance of bacteria

4. efficacy of drug.

موجودة في أماكن محددة.

موجودة في أغلب المختبرات

The patient they have colonic cancer
↳ The level of CEA (cancer Biomarker) high.

دائما خلال عملية العلاج راح تيم عملية فحص ال CEA لتحديد اذا كان المريض حالته في تحسن أولا.

prognosis.

The clinical biochemistry tests

1. Core biochemical tests

Sodium, potassium, chloride and bicarbonate → electrolyte → E + G → glucose.
↳ if the patient have: nausea, vomiting, diarria (cause dehydration).

Urea and creatinine → kidney

Calcium and phosphate → bons

Total protein and albumin → liver and kidney

Bilirubin and alkaline phosphatase → liver and gallbladder
↳ high level if there a problem in bons.

ALT and AST → Liver

γ-glutamyl transpeptidase → Liver and gallbladder → GGT
alcoholic

Creatinine kinase → heart

H^+, PCO_2, and PO_2 (blood gases) → Respiratory tract disease (asthma) patient

Glucose → diabetic patien, if patient take any drug will increase level of glucose.

Amylase → pancreas, GI

The clinical biochemistry tests

2. Specialized tests

Hormones → Sex hormons.

Specific proteins → α-keto protein

Trace elements → Zinc, Cromium, cupper.

Vitamins → B12, Vitamin D.

Drugs

Lipids and lipoproteins → LDL, HDL or cholesterol.

DNA analysis → diagnosis of family disease → white blood cells only contain DNA (nucleous). → cystic fibrosis.

Gentamycine → serious side effect. → oto toxicity, nephro toxicity.

3. Emergency tests

Urea and electrolytes

Blood gases

Amylase → pancreatitis.

Glucose → hypo or hyperglycemia.

Salicylates → Toxicity.

Paracetamol → Toxicity.

Calcium

Importance of clinical chemistry

- A working knowledge of clinical chemistry and biochemistry is essential for the pharmacist to effectively communicate and interact with other health professionals.

- This course provides the basic information in lab medicine that is necessary for the pharmacist.

Sample collection and processing

- **Specimens used for biochemical analysis:**

1. Venous blood, arterial blood, capillary blood
   serum vs plasma
2. Urine
3. Faeces
4. CSF
5. Sputum and saliva
6. Tissue and cells
7. Aspirates, e.g. pleural fluid, synovial fluid, intestinal, pancreatic pseudocytes
8. Calculi (stones)

* ليش ما بقدر استخدم ال serum لقياس ال glucose level.

لما رجفر عينة ال serum بالبداية بحطها في test tube فاضي
وبستنى عليها نص ساعة بعدين بعمل centrifugation
وبوخذ ال serum

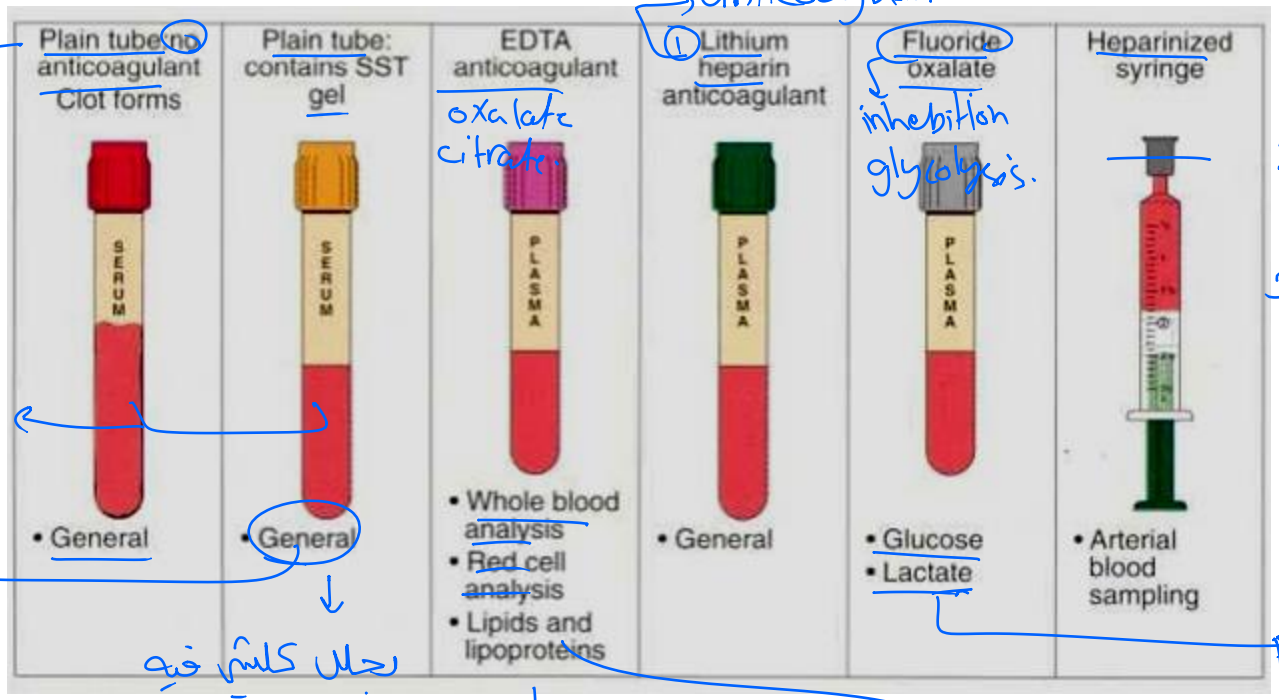
خلال النص ساعة يلي بستنى ال Red blood cells عملية ال glycolysis
فيها تبكون شغالة ← بالتالي ال glucose في العينة راح يقل
عن القراءة الصحيحة للمريض ← قراءة غلط.

plasma → coagulation → بعمل centrifugation مباشرة
بعد سحب العينة ← وبقيسه
→ or use anticoagulant with floride

floride → inhebition the glycolysis pathway.
← بالتالي ال glycolysis في ال RBCs وقف ← ما راح يصير في
تغير في level glucose in the blood.

← بالتالي ممكن استنى على العينة مدة من الوقت قبل ما أعملها
centrifugation وعادي ما راح يكون في خلل في الفحص

Types of containers used in the collection of blood specimens

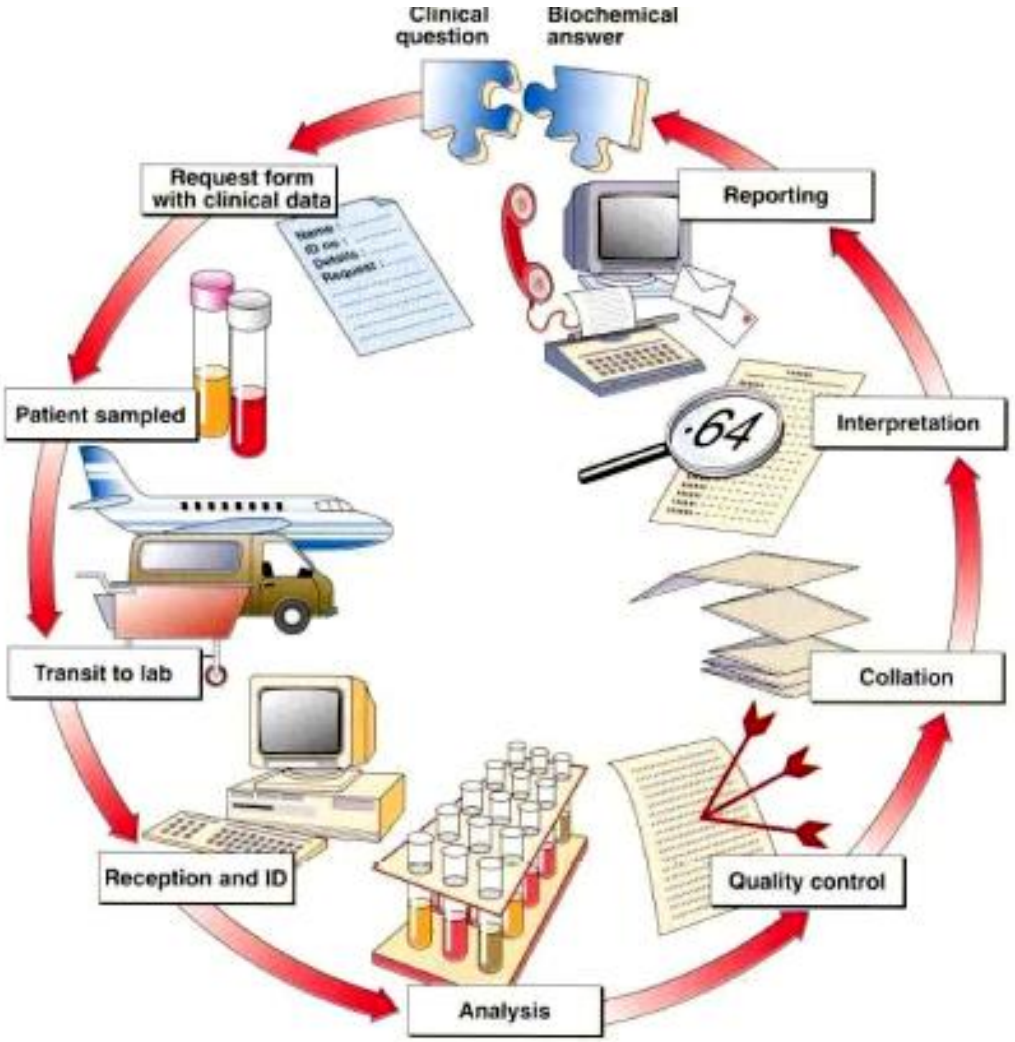


هيك بتكون خلصت اول محاضرة ان شاء الله
إنها تكون بسيطة ويعطيكم العافية
زميلتكم مرام الزيادي ❤❤

Sampling errors

- Blood sampling technique
- Prolonged stasis during venopuncture
- Insufficient specimen
- Incorrect specimen container
- Inappropriate sampling site
- Incorrect specimen storage

Analysing the specimen



Interpretation of results

- Value obtained with a particular parameter is interpreted as increased, decreased or within normal (reference) range

- **Reference values:** Values obtained from individuals who are in good health as judged by other clinical and laboratory parameters, after suitable standardization and statistical analysis, under definite laboratory conditions.

- **Normal (Reference) Range:** Values within which 95% normal healthy person's fall. The cut off values are set as mean reference value +/- N times standard deviation, of a normal healthy population; where N varies between 1, 2 and 3.

Quality Control

- A major role of the clinical laboratory is the measurement of substances in body fluids or tissues. To fulfill these aims the data generated has to be **reliable** for which strict quality control has to be maintained.

- Quality control is defined as the study of those sources of variation, which are the responsibility of the laboratory, and the procedures used to recognize and minimize them.

- Quality control involves consideration of a reliable analytical method. Reliability of the selected method is determined by its accuracy, precision, specificity and sensitivity

Quality Control

- **Accuracy** has to do with how close the mean of a sufficiently large number of determinations on a sample is to the actual amount of substance present and is dependent on the methodology used.
- **Precision** refers to the extent to which repeated determination on an individual specimen vary using a particular technique and is dependent on how rigorously the methodology is followed.
- **Specificity** is the ability of an analytical method to determine solely the analyte it is required to measure.
- **Sensitivity** is the ability of an analytical method to detect small quantities of the measured analyte.

Quality Control

- Analytical methods **require calibration**, the process of relating the value indicated on the scale of the measuring device to the quantity required to be measured. Calibration is done using standard, the solution with which the sample is compared to arrive at the result.

- **Standard solutions** refer to the known amount of a substance in a solution in which its concentration is expressed in terms of moles or in weights per unit volume.

Biological factors affecting the interpretation of results

- Sex of the patient.
- Age of the patient.
- Effect of diet.
- Time when sample was taken.
- Stress and anxiety.
- Posture of the patient.
- Effects of exercise.
- Medical history.
- Pregnancy.
- Drug history.

Case history 1

A blood specimen was taken from a 65-year-old woman to check her serum potassium concentration as she had been on thiazide diuretics for some time. The GP left the specimen in his car and dropped it off at the laboratory on the way to the surgery the next morning.

Immediately on analysing the sample, the biochemist was on the phone to the GP. Why?

Comment on page 152.