تفريغ كلينكال

المحاضرة: *Introduction*

الصيدلاني لة: *Alaa' Otoum*

Seul Academy

لجان الدفعات

Clinical Biochemistry for Pharmacy

Introduction

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

CLINICAL BIOCHEMISTRY

- Clinical biochemistry, chemical pathology and clinical chemistry

* أهم اشي تكون الفحص دقيق ليش ؟!
لأنه إذا كانت الفحوصات مش دقيقة وخطأ بالتالي
رح تكون الـ diagnosis خطأ والدواء خطأ والجرعة خطأ
وممكن يصير عنه أمراض .

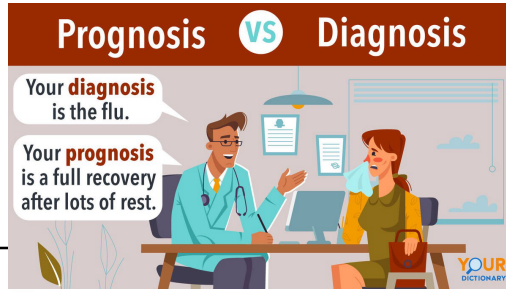
- The test must be performed as accurately as possible
- Biochemical tests are used extensively in medicine for both diagnosis and prognosis of diseases

يعني أنا وظيفتي أتعرف أقرأ فحوصات بس أنا ما بشخّص
لباقي الدين يروح على الدكتور ما بخطي دواء على راسي .

- Your role as a **pharmacist** (*Terminology knowledge, understand basis of lab test, effect of disease and drugs on the diagnostic test*)

Biochemical tests

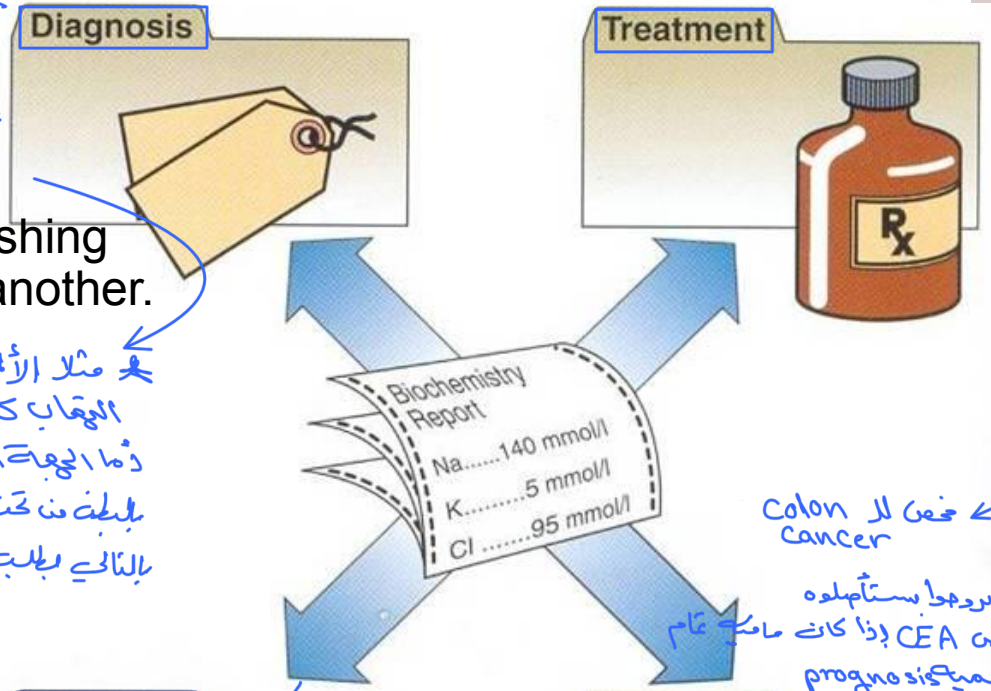
Qualitative and quantitative analysis



يعني مثلا شخص عنده ألم بالبطن
أنا لازم أعرف من وين الألم وبنيت
بالزبط وكان جيت بيسأل وعشان أقدر
أعرف بالزبط شو مشكلته بطلب منه
يعمل فحوصات.

The art of distinguishing one disease from another.

مثلا الألم في الجهة اليمين ولفوق ممكن
الهقاب كبد أو مرارة، عيني ولتحت زايده
أما الجهة اليسار ممكن بالغالب تولون.
بالبطن من تحت ممكن UTI أو مشكلة بالرحم.
بالتالي بطلب يعمل فحوصات مثلا
liver enzyme



Monitoring: sequential recording, keep watch over analyte

CEA: biomarker protien
تفرزه الخلايا السرطانية
فحص للـ colon cancer

فإذا فحصت للمريض وطلع في منه. بروحوا يستأصلوه
ويعطوه جرعات كيماوي. يرجع يفحص CEA إذا كان ماشي تمام
أما إذا كان فيه معناها رجع. هذا بسميه prognosis
يعني لازم أعرف الـ out come.

مسح

Examine for the presence or absence of a disease.

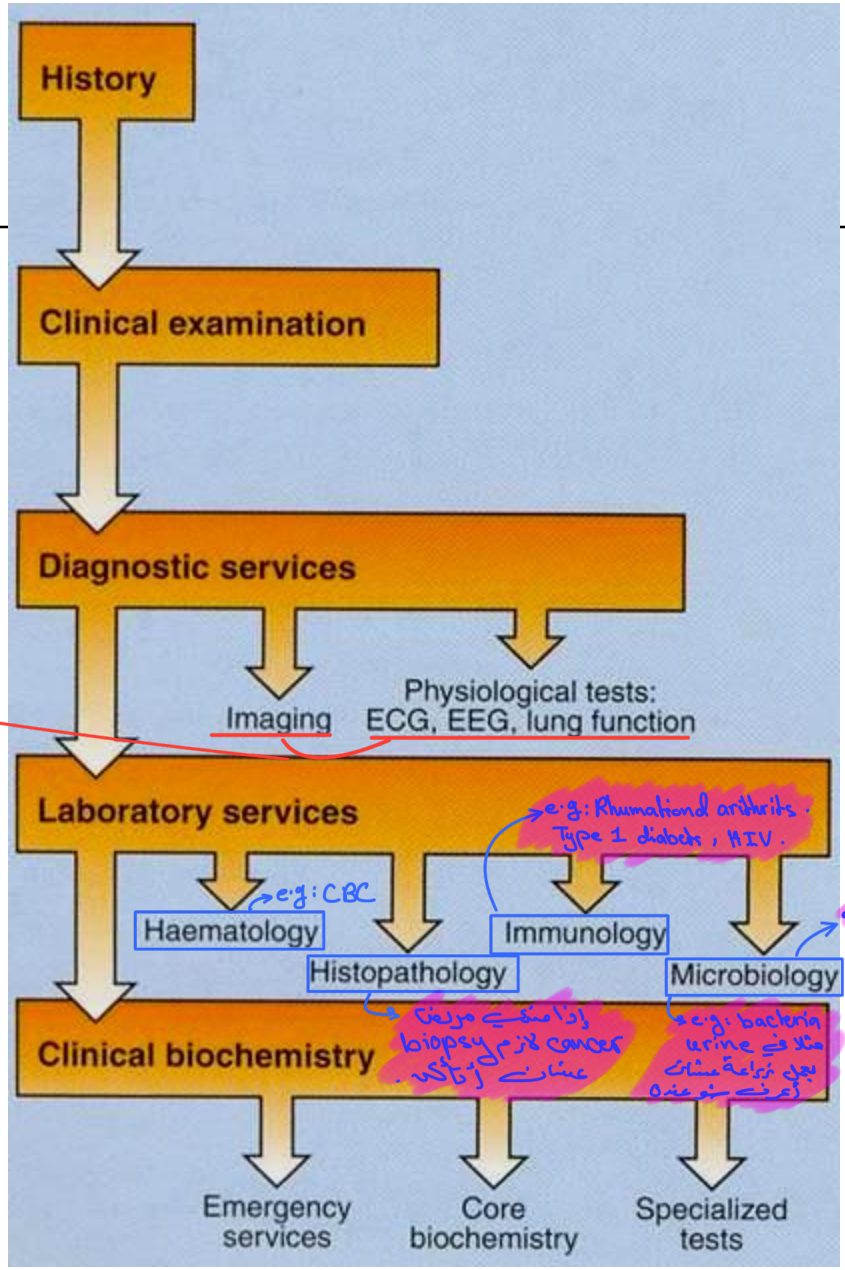
مجموعة من الناس.
مثلاً في مسح فحوصات
للأطفال عند الولادة حتى لا عاد منع
فبرجع بعمل screening
لفحص اللي عنده:
1. G6PDH → favism (الفول)
2. Congenital hypothyroidism
حيرمل الفحص لانه
من أول أسبوع بنعملوا للطفل

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

مثلا مريض عنده hypatitis
يعني بها تكون liver enzyme
عالية فبعد ما أعطيه العلاج
برجع بفليه يفحص مرة ثانية
إذا رجعت الـ liver enzyme طبيعي
معناها الـ prognosis الكويس.

The place of clinical biochemistry in medicine

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



The clinical biochemistry tests

1. Core biochemical tests

الأهم وبعملوهم بأي مختبر عادي
يعني ما بدي بهاد مختص عشان أطلع هاي الفحوصات .

Sodium, potassium, chloride and bicarbonate

Urea and creatinine

Calcium and phosphate

Total protein and albumin

Bilirubin and alkaline phosphatase

ALT and AST

γ-glutamyl transpeptidase

Creatinine kinase

H^+, PCO_2, and PO_2 (blood gases)

Glucose → for diabetes

Amylase → indecation for problem in pancreas or GI

هيك لما بنفحصوا في المختبر بكون Veinous ليش؟؟
لأنه ممنوع واحد من طلبي ياخذ arterial blood لأنه بكون ضغطه عالي فاحتمالية يصير عنده تزفي بكون عالي.
* إذا الـ (Blood gases) عادة بتنعمل arterial لكن هاد الـ core test بعملوها Veinous .

The clinical biochemistry tests

2. Specialized tests

- Hormones
- Specific proteins
- Trace elements
- Vitamins
- Drugs
- Lipids and lipoproteins
- DNA analysis

3. Emergency tests

- Urea and electrolytes
- Blood gases
- Amylase
- Glucose
- Salicylates
- Paracetamol
- 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.

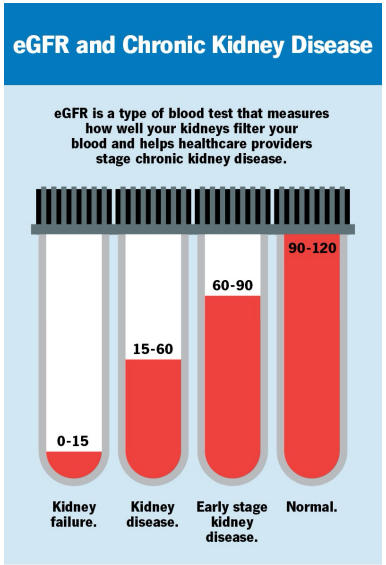
مثال

eGFR : estimated glomerular filtration rate to measures how well your kidneys are working.

This type of tests examines for :-

1- diabetics patients.

2- hypertensive patients.

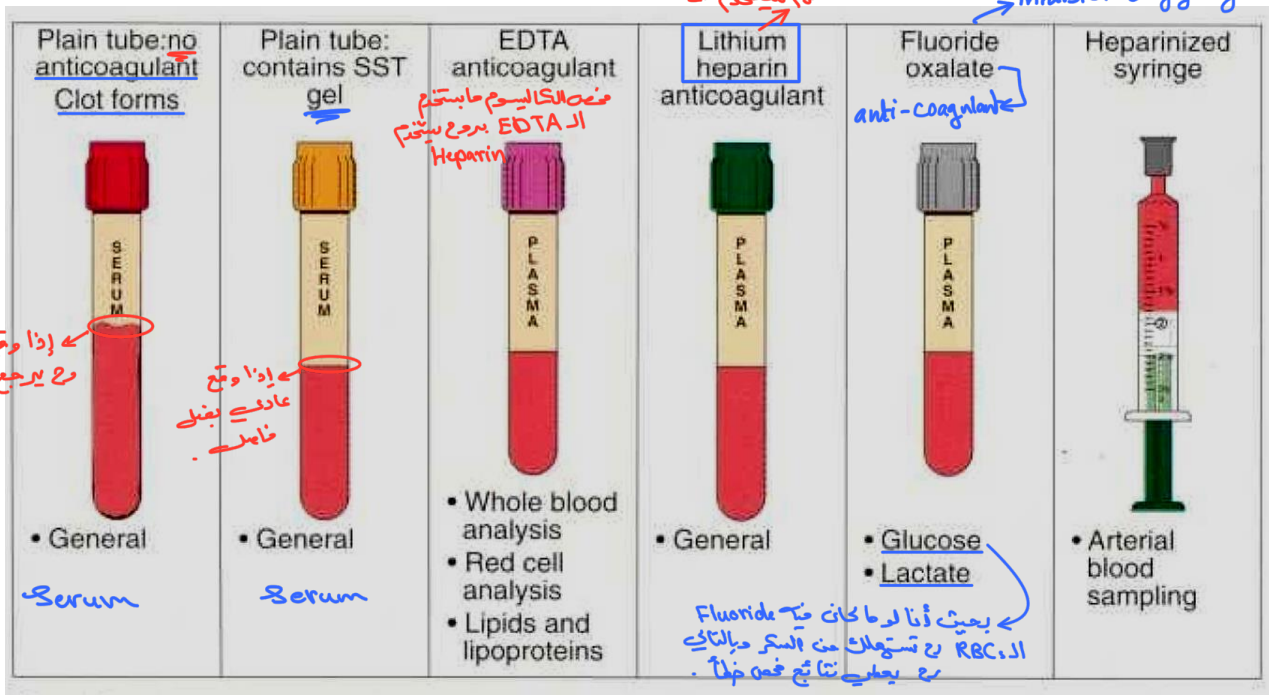


Sample collection and processing

- **Specimens used for biochemical analysis:**

1. Venous blood, arterial blood, capillary blood
   - serum vs plasma
     - plasma → يحتوي على anticoagulant
     - serum → ما يحتوي على anticoagulant
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)

Types of containers used in the collection of blood specimens



الأخطاء اللي ممكن تصير :-

Sampling errors

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

مثلا زي القطعة اللي زي المطاط بحطها على الايد لما أعمل فحص في حالة بدي أفحص الـ lactate ممنوع أحطها.

إذا مثلا سحبت العينة بشكل بطيء ممكن يصير عندي tissue damage وبالتالي نتيجة خطأ.

مثلا العينة كميتها قليلة.

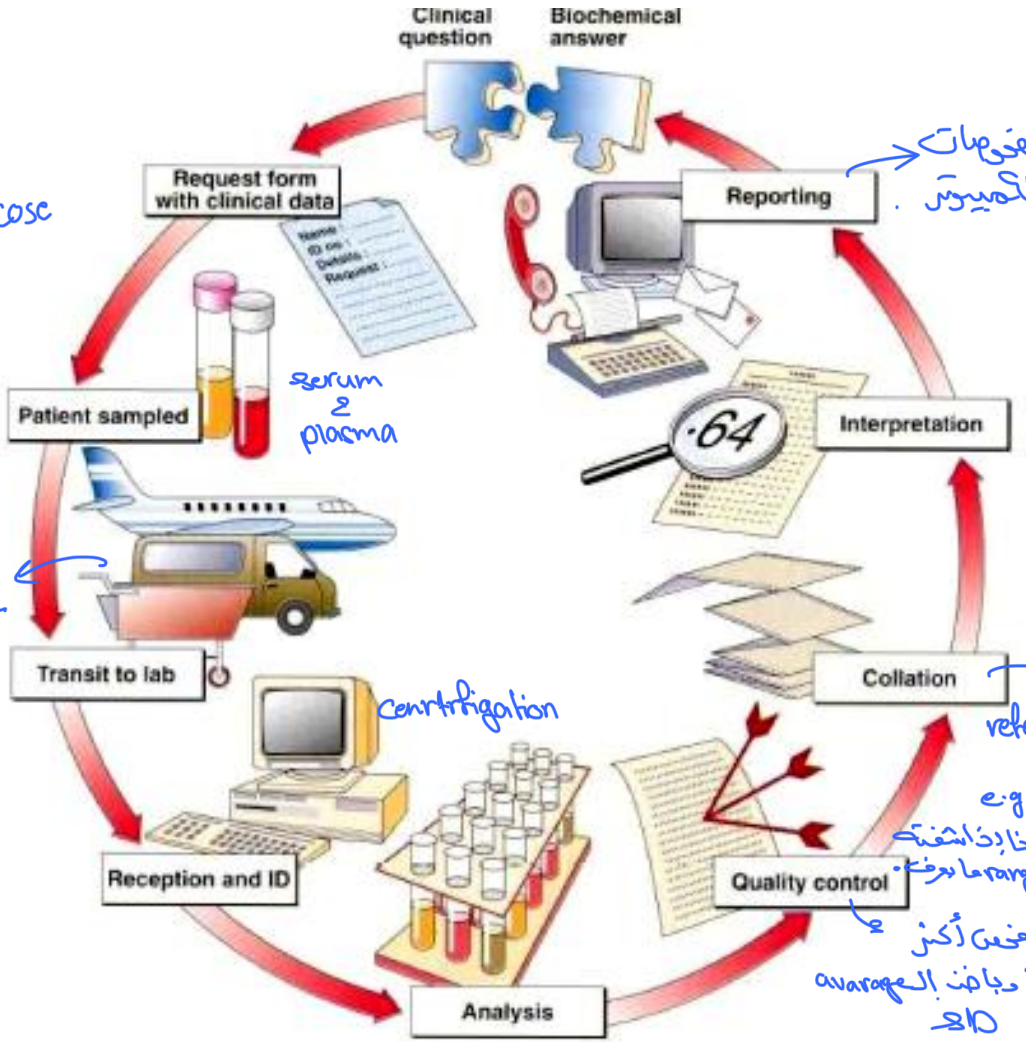
زي مثلا لما حكينا ما بصير تكون نوع الـ EDTA الـ Na EDTA.

مثلا أخذت عينة من الـ venous وهي لازم تكون من الـ arterial

مثلا عندي عينة دم والجو برد اهكي انه عادي تفل بالسيارة بعدها الجو برد أكيد لا.

- لأنه رح يصير عندي Hemolysis وبالتالي رح تطلع القراءات خطأ.

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.

لأنه بالأخير بدي أرجع للـ range

- **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.

بدون standard ما بقدر أحسب أي شي

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.

K^+ intracellular
Hemolysis
بالتالي الـ K^+ بطلع
كمان برا بالتالي
كمان بطلع الفحص
K^+ كتير عالي .