Laboratory assessment

Israa Shatwan

Laboratory assessment

- Biochemical indicators can include assessment of blood and urine samples for levels of variety of nutrients and\or their by products or for levels of nutrients links enzyme activities.

Israa Shatwan

Analysis can be used to determine

- Actual levels of nutrients in relation to expected values.
- plasma V.C, red cell folate.
- The activity of nutrient dependent enzyme.
- Transketolase for thiamin.
- The activity of nutrient- related enzyme.
- Alkaline phosphatase for V.D.

Israa Shatwan

Analysis can be used to determine (Cont'd)

- The rate of nutrient-dependent reaction.
- Clotting time for V.K.
- The presence of nutrient carriers or its saturation level.
- Retinol binding protein, transferrin.
- Levels of nutrient related products.
- Lipoprotein levels.

Israa Shatwan

Assessment of Proteins status

Albumin

- Half-life: 18-20 day
- Body pool size (g\kg body weight):3-5
- Clinical use: Sever malnutrition
- Influencing factor:
- Hydration status; renal and liver disease; trauma, surgery, sepsis; edema; dietary protein; burns; zinc status; hypothyroidism

Assessment of Proteins status

Retinol- binding protein

- Half-life: 12h
- Body pool size (g\kg body weight):0.0002
- Clinical use: acute depletion
- Influencing factor:
- Chronic renal failure ,and liver disease; cystic fibrosis ; dietary protein; burns; vitamin A and zinc status; hyperthyroidism

Assessment of Proteins status

Fibronectin

- Half-life: 15h
- Body pool size (g\kg body weight):
- Clinical use:
- Influencing factor:
- Trauma , infection, stress, burns.

Assessment of Proteins status

Transferrin

- Half-life: 8-9 day
- Body pool size (g\kg body weight):< 0.1
- Clinical use: limited chronic deficiency
- Influencing factor:
- Pregnancy , acute hepatitis, infection, oral contraceptives, end-stage hepatic disease, neoplastic disease, high dose antibiotic therapy, iron status, dietary protein.

Assessment of Proteins status

Prealbumin

- Half-life: 2 day
- Body pool size (g\kg body weight):0.010
- Clinical use:
- Influencing factor:
- Stress, hyperthyroidism, active chronic inflammatory disease, dietary protein, steriod administration.

Israa Shatwan

Assessment of iron status

- Hemoglobin
- Indicator of: Anemia (diagnosis of late stage iron deficiency).
- Advantages:
- Simple to measure; important functional and public health consequences.
- Disadvantages:
- Anaemia occurs without iron deficiency; adjustment of thresholds needed for age, sex, pregnancy, altitude, smoking and some ethnic groups.

Israa Shatwan

Assessment of iron status

- Haematocrit
- Indicator of: Proportional volume of red blood cells (RBCs) in whole blood.
- Advantages:
- Simple to measure.
- Disadvantages:
- Same as haemoglobin; depends on factors affecting centrifuge e.g. stable power supply.

Assessment of iron status

- Ferritin
- Indicator of: Size of iron stores.
- Advantages:
- Reflects iron status.
- Disadvantages:
- ferritin is an acute phase protein so concentration is increased in inflammatory disease and sub-clinical infection.

Assessment of iron status

- Transferrin
- Indicator of: Saturation of <15% with high Total iron binding capacity (TIBC) indicates iron deficiency.
- Advantages:
- Proportion of transferrin bound to iron.
- Disadvantages:
- varies diurnally and after meals; sample easily contaminated with iron from outside sources; low in chronic disease.

Israa Shatwan

Assessment of iron status

- Total iron binding capacity (TIBC)
- Indicator of: Total capacity of circulating transferrin bound to iron.
- Advantages:
- Increased in iron deficiency, low in inflammatory disorders.
- Disadvantages:
- Large overlap between normal values and values in iron deficiency.

Israa Shatwan

Blood Glucose

- A blood glucose test measures the amount of a sugar called glucose in a sample of your blood.
- The test may be done while you are fasting or at random.
- If you are having a fasting glucose blood test, you should NOT eat or drink for 8 hours before the test.

Israa Shatwan

Blood Glucose

Glucose Level	Indication
From 70 to 99 mg/dL (3.9 to 5.5 mmol/L)	**Normal fasting glucose**
From 100 to 125 mg/dL (5.6 to 6.9 mmol/L)	**Impaired fasting glucose (pre-diabetes)**
126 mg/dL (7.0 mmol/L) and above on more than one testing occasion	**Diabetes**

Israa Shatwan

Blood Glucose

- **Oral Glucose Tolerance Test (OGTT)**
- Levels applicable except during pregnancy. Sample drawn 2 hours after a 75-gram glucose drink.

Glucose Level	Indication
Less than 140 mg/dL (7.8 mmol/L)	**Normal glucose tolerance**
From 140 to 200 mg/dL (7.8 to 11.1 mmol/L)	**Impaired glucose tolerance (pre-diabetes)**
Over 200 mg/dL (11.1 mmol/L) on more than one testing occasion	**Diabetes**

Israa Shatwan

Glycosylated hemoglobin (HbA1c)

- The normal range for HbA1c levels is 5- 7.5% of hemoglobin.
- Used to monitor long-term blood glucose control (approximately 1 to 3 months prior).

Israa Shatwan

Serum lipid test

- **LDL:** 70-130 mg/dl (lower numbers are better).
- **HDL:** more than 40-60 mg/dl (high numbers are better).
- **Total cholesterol:** less than 200 mg/dl (lower numbers are better).
- **Triglycerides:** 10-150 mg/dl (lower numbers are better).

Israa Shatwan

Assessment of folate

- The normal range is 2.7 - 17.0 nanograms per milliliter (ng/mL).
- Lower-than-normal folic acid levels may indicate:
- Inadequate diet, Malabsorption syndrome, Malnutrition, Anemia due to folate deficiency.

Israa Shatwan

Assessment of vitamin B12

- Values of less than 200 pg/ml are a sign of a vitamin B12 deficiency.
- Causes of vitamin B12 deficiency include:
- Not enough vitamin B12 in diet, Diseases that cause malabsorption, and Pregnancy.

Israa Shatwan

Assessment of sodium

- The normal range for blood sodium levels is 136 to 146 milliequivalents per liter (mEq/L).
- Helps to evaluate hydration status or neuromuscular, kidney, and adrenal functions.

Israa Shatwan

Assessment of potassium

- The normal range for blood potassium levels is 3.5 to 5.1 milliequivalents per liter (mEq/L).
- Helps to evaluate acid-base balance and kidney function; can detect potassium imbalances.

Israa Shatwan

Blood Tests During Pregnancy

- Blood Type: The blood test will diagnose your blood type. You will either be A, B, AB or O.
- Glucose Levels.
- Iron Levels.
- Hemoglobin Levels.

Israa Shatwan

Case study 1

- Example: Jim's recent blood test shows that his cholesterol is 200 mg/dl.

Case study 2

Sarah Jones is 28 y.o.

She is breastfeeding her 2 month-old son.

She is 5 feet, 6 inches tall

She weighs 130 pounds.

She smokes 10 cigarettes/day.

Her hemoglobin is 10.8 gm/dl.