
FACTORS EFFECTING LABORATORY RESULTS

2- Life style and Individual variations

A patient's diet, health status and lifestyle factors can all have a pre-analytical influence on laboratory parameters.

i- Diet and nutritional status

Fasting, calorie restriction, food exclusion diets, malnutrition and dehydration can all affect laboratory results. The significance of some laboratory tests is dependent on controlling dietary factors, e.g. fasting prior to assessing the effect of intervention in a patient with previously high triglyceride levels.

In other scenarios, assessing dietary factors can help to interpret unexpected laboratory results, e.g. a vegetarian diet can result in decreased levels of vitamin B12, a low carbohydrate diet can cause increased ketone levels (as part of urinalysis) and a high protein diet can result in increased uric acid levels.

**** Fasting for 12 hours prior to laboratory testing may be helpful or even necessary to get the most accurate result for the following tests, which are affected by the ingestion of certain foods:**

- ➔ Triglycerides: for most patients fasting is not required for lipid testing, but may be useful for monitoring in people with high triglyceride levels
- ➔ Uric acid: fasting is not usually required in practice to get accurate results but the effect of recent dietary intake may help to explain unexpected results

Malnutrition has varying effects on laboratory results, depending on the nature of the patient's nutritional status. Malnutrition is classically thought of as a deficiency of

protein and energy, with or without micronutrient deficiencies. However, malnutrition may be defined as under-nutrition, over-nutrition or deficiency of specific nutrients.

Malnutrition should be considered as a cause for results such as decreased ferritin, folate and vitamin B12 levels.

Dehydration can be considered as a cause of sodium and potassium imbalances, and can also affect numerous other indices, such as creatinine and urea, albumin, lipids and haematology indices.

ii- Caffeine

The effect of caffeine on laboratory parameters has not been fully studied. It has a short half-life of three to seven hours, but this varies among individuals. Caffeine intake causes transient increases in blood glucose levels and impairs glucose tolerance. It can also affect other specialised investigations such as interpretation of metanephrines.

iii- Alcohol

The effect of alcohol consumption on laboratory investigations depends on the duration and extent of use. Acute (transient) effects of alcohol consumption (within two to four hours) include decreased serum glucose. While chronic effects of alcohol consumption include vitamin and mineral deficiencies due to replacement of food with alcohol or as a result of interference of absorption of vitamin and minerals.

iv- Tobacco smoking

Regular smoking and exposure to nicotine can have both acute and chronic effects on laboratory investigations. Within one hour of smoking one to five cigarettes,

plasma/serum concentrations of fatty acids, adrenaline, glycerol, aldosterone and cortisol are increased.

People who are chronic smokers may have persistent increases in leukocyte counts, heavy metals, lipoproteins, tumour markers and haematocrit (PCV), and decreases in the activity of some enzymes (e.g. angiotensin-converting enzyme).

v- Exercise

The effect of exercise on laboratory parameters is dependent on the health status of the patient, air temperature during exercise and intake of food and water during or following exercise. Extreme exercise or vigorous exercise in a person unfamiliar to this level of activity can result in changes to some laboratory parameters. Thyroid function is known to be altered in people undergoing high-intensity exercise. Other analytes that can be increased by exercise include urea, creatinine, lactate dehydrogenase, and prothrombin time. Most of these effects are likely to be transitory (e.g. persistent for a few hours to a few days after exercise), but this depends on individual patient factors.

2- Medicines

The medicines (drugs) that a patient is taking can significantly affect some laboratory results, therefore this needs to be taken into consideration when interpreting results.

****** It is good practice to note the medicines that a patient is taking on the laboratory request form, especially if they may potentially influence results, e.g. hormone replacement therapy being taken when requesting endocrine tests.

Medicines may also cause a biological effect to the patient which would account for an altered result. For example some antibiotics (e.g. cotrimoxazole and erythromycin),

cardiovascular medicines (e.g. amiodarone and propranolol), Non-steroidal anti-inflammatory drugs “NSADs” (e.g. piroxicam), gastrointestinal medicines (e.g. omeprazole) may account for a raised prothrombin time (PT) result in a patient taking warfarin.

Many medicines have an effect on the balance of sodium and potassium in the body, e.g. diuretics.

** When monitoring the serum concentration or effect of a medicine, the laboratory test needs to be timed depending on the drug’s metabolism, e.g. a blood sample for testing lithium levels should be collected 10–14 hours after the last dose and a sample for testing digoxin should be collected at least eight hours after the last dose.