

Patient Preparation

For practical purposes, collection of laboratory specimens for determining the concentration of body constituents should be done when the patient is in a basal state, best described as in the early a.m., after awakening and about 10 to 14 hours after the last ingestion of food. Normal values are generally defined during this collection period. This collection period also expedites the collection and the examination of specimens and enhances productivity and quality control within the laboratory. The fasting patient may drink water if necessary to be comfortable. (An exception is the fasting blood specimen for gastrin assay).

When specimens are not collected in the basal state, interpretation of findings must include consideration for the effects of diurnal rhythm, eating, physical activity, and the clinical status of the patient with regard to his degree of emotional or physical stress. Some commonly known variations due to the above are as follows:

- Postprandial plasma glucose, phosphate, alkaline phosphatase, and lipid increase, and potassium decrease. Turbidity (moderate) due to postprandial lipemia may interfere with many laboratory tests and should routinely be avoided. Light, low fat diet has no effect on serum urea, bicarbonate, chloride, potassium, creatinine, cholesterol, calcium, uric acid, alkaline phosphatase, and acid phosphatase.
- Stress produces leukocytosis, lymphopenia, eosinopenia, and hypoferrremia.
- When compared to early a.m. values, there is a relative afternoon decrease in adrenocortical activity demonstrated by decreased plasma cortisol and increased eosinophil levels.
- Another reason for diurnal changes is related to shifts in body fluids based upon changes in posture. A standing posture results in more extracellular fluid at the expense of intravascular fluid. Therefore, protein (including lipoproteins), cholesterol, and triglycerides, and blood cells, which are trapped intravascularly increase in concentration on standing. Changes of up to 1% can occur in normal individuals and to an even greater extent (up to 20%) in patients with fluid and electrolyte or cardiovascular abnormalities. These changes are variable and unpredictable.
- Even moderate exercise can cause an increase in blood glucose, lactic acid, serum proteins, and some enzymes derived from muscle (SGOT and CK).
- I.M. injections can increase serum CK.

Interference of drugs has been so complicated and difficult to evaluate that false abnormal (and occasionally false normal) findings should be considered when findings are unexpected. Drugs have numerous documented interferences with laboratory tests, based on pharmacologic effect, or direct effect of the drug or its metabolites on the test involved.

- The subject is so complicated and often method-dependent so that it is wisest to avoid drugs for at least 4 to 24 hours prior to blood studies and 48 to 72 hours prior to urine studies. This may be impractical routinely, but is best achieved in the case of blood studies by withholding drugs until the fasting a.m. specimen is obtained.
- Although there are many compilations of the effect of drugs, the magnitude of these effects are poorly documented; in addition, many effects are pharmacologic or toxic, and there is abundant individual variability as to responsiveness or sensitivity. Drugs or drug metabolites which have direct chemical interference on chemistry assays may be commonly method dependent; documentation is again inadequate.
- An example of pharmacologic or toxic effect is the hyperuricemia accompanying thiazide diuretic therapy.
- A striking interference of notable clinical significance is the falsely-elevated catecholamines when a patient receives 1-dopa which interferes with the fluorescent assay for catecholamines.
- For practical purposes, unless drug interference or potential interference can be avoided (Example: VMA assay instead of catecholamine assay in patients receiving 1-dopa), drug therapy should be discontinued and abnormal studies repeated.
- Direct drug interference is least likely in blood tests, as drug concentrations are usually very low; however, drugs or their metabolites frequently are concentrated in the urine, in sufficient amounts to interfere significantly with assays.
- Most often drug effects cause false elevations, rather than falsely low values.

As an example of falsely low values, oral contraceptives cause a rapid fall in serum vitamin B₁₂ levels and in some instances, the levels are indistinguishable from vitamin B₁₂ deficiency of any cause.

- Drugs especially when given IV (example: ascorbic acid), or metabolites capable of acting as reducing substances often interfere with assays such as glucose, uric acid, or creatinine.

Medications have been demonstrated not to interfere with specific studies. Drugs have not been known to cause:

- A decrease in urinary albumin, acetone, aldosterone, catecholamines, chlorides, creatinine, glucose, porphyrins, protein, or serotonin.
- An increase in urinary calcium or potassium.
- An increase in blood ACTH, calcium, bicarbonate, LDH, glucose tolerance, and triglycerides.
- A decrease in blood alkaline phosphatase, amylase, ammonia, creatinine, SGOT, SGPT, glucose, iron, lipase, globulin, prothrombin time, TBG, and VMA.

Tranquilizers should be discontinued 48 to 72 hours before urine specimens are collected for steroid studies (ketosteroid or ketogenic steroids).

Coffee, tea, chocolate, or bananas should be avoided 48 hours before collecting specimen for VMA and serotonin (5-HIAA); however, such interference is method-dependent, and these restrictions are unnecessary with some VMA methods.

X-ray studies involving IV or oral administration of absorbed contrast media may interfere with laboratory studies. Some guiding rules and specific notes are as follows:

- A. Intravenous pyelogram has been shown to interfere with:
 - Urine protein determinations-since the iodized compounds excreted can cause a false-positive precipitation test qualitatively, one should utilize a dye binding method that is not affected. However, the quantitative turbidimetric protein determination in the urine will be falsely increased.
 - Urinary ketogenic steroids-contrast media by acting as a reducing substance can cause false-low values in these adrenal steroid assays.
 - Urinary glucose semiquantitatively-this is due to the production of a grey-black Clinitest® reaction masking any glucose and producing a false-positive test for hemogenistic acid (alkaptonuria).
 - Endocrine assays-the contrast media represents complex organic compounds with high content of iodine and is capable of acting as a reducing agent; adequate information and experience is not available. It is recommended that all blood and urine hormonal assays be avoided for at least 48 hours after an IVP.

— Bilirubin-since some IVP dye is also excreted by the liver, when liver function studies are to be done, there should be a 24 to 48 hour delay if preceded by an IVP.

— Specific gravity or osmolality-there is a marked increase which interferes with concentration tests for renal function or routine urinalysis.

- Cholecystography-the oral administration of contrast media for gallbladder studies can interfere with:
 - Endocrine assays in the urine or blood-since adequate information and experience is not available, such tests should be delayed for 48 hours following administration of gallbladder dyes.
 - Urine protein quantitative determination-may be falsely increased.
- Myelography-the contrast media will interfere with examination of spinal fluid which includes the protein and cell count or microscopic exam.
- Barium meal or enema (upper and lower GI series)-in general, oral or IV contrast media should not be given for at least 8 hours prior to obtaining specimens for laboratory studies requiring fasting blood specimens. Flavored barium sulfate may have 3% sucrose and should significantly influence blood glucose levels (fasting, glucose tolerance, 2-hour postprandial). The barium sulfate also interferes with the microscopic exam for ova and parasites in feces.

Bacteriology Specimens:

The circumstances leading to collection of a specimen with the least amount of contamination and maximum concentration of pathogens vary from source and type of specimen. Collection of specimens should generally be the responsibility of the physician familiar with the patient's lesion or disease. Preparation for direct inoculation of media, immediate transport to the laboratory, and/or use of holding media should be made before obtaining specimen.

For special function or response such as a glucose tolerance test, special preparation or instructions to patient may be required. These instructions should be explicitly written for personnel performing the tests and for the patient. In general, whenever feasible, the patient should be informed as to the reason that a particular specimen is being obtained.

“Oily” laxatives may interfere with microscopic examination of feces.

Barium enemas will interfere with microscopic exam of feces.