Nutrisoft : www.nutrisoft.xyz
Principles of Nutritional Laboratory Testing
<h1 style="text-align: center;"> </h1>

Nutrition-wise, laboratory testing is used to estimate and quantify nutrient availability in biological fluids and tissues. It is a great tool for the assessment of nutrient insufficiency, frank deficiencies, and excesses. According to Krause Food and Nutrition 14th Edition, Laboratory data are the only objective data used in nutrition assessment that is "controlled", that is the validity of the method measurement is checked each time a specimen is assayed by also assaying a sample with a known value to ensure efficiency and accuracy of the test result.
<h2 style="text-align: left; line-height: 1.5;">Purpose: Why Nutritional Laboratory Testing</h2>
Apart from the fact that professionals can use laboratory test results to support the physical/clinical findings and subjective data to determine a personalized nutritional assessment which leads to a more targeted intervention, the lab values also provide objective data useful in monitoring and evaluating interventions.

For example, it can be used to assess progress and manage side effects such as inflammation, aberrant lipid and glucose metabolism, and poor immune health.

Furthermore, because numeric values do not themselves suggest a personal judgment, this kind of data can often be passed onto a patient or client without implicit or perceived blame. It helps in validating other assessment methods.
<h2 style="text-align: left; line-height: 1.5;">Specimen Types</h2>

The specimen or sample to be tested ideally reflects a high percentage of the total body content of nutrients to be assessed just like sample and population as in statistics.

However, often the best specimen is not readily available. I highlighted below the most common specimen/sample for laboratory analysis (Krause Food and Nutrition

Therapy).

Whole blood: Must be collected with an anticoagulant if the entire content of the blood is to be evaluated. The two common anticoagulants for whole blood analyses are ethylenediaminetetraacetic acid, a calcium chelator used in hematologic analyses, and heparin (which maintains the blood in its most natural state).

Blood cells: Separated from uncoagulated whole blood for measurement of cellular analyte content: Red blood cells (indicate a 120-day window into intracellular and membrane composition), various blood components like white blood cells, protein-bound molecules, and others.

Plasma: The uncoagulated fluid that bathes the formed elements (blood cells).
<blockquote style="text-align: center;">
Read more: Vitamin K: Uses, Functions and Deficiency
</blockquote>

Serum: The fluid that remains after whole blood or plasma has coagulated. Coagulation proteins and related substances are missing or significantly reduced.

Urine—Contains a concentration of excreted metabolites and potential toxins.

Feces—Important in identifying various gastrointestinal functional parameters including inflammatory markers, microbiology, mycology, parasitology, digestive markers, and nutritional analyses when nutrients are not absorbed and therefore are present in fecal material.

Saliva—laboratory analysis to identify endocrine, inflammatory, infectious, immunologic, some nutrients, and other parameters with buccal cell or whole saliva samples.

Genomic—expanding beyond the historical metabolic macro and micronutrient testing, genomic polymerase chain reaction (PCR) assays are emerging genomic clinical indicators for nutrigenetic and nutrigenomic influences on the metabolism of an individual.

Expired Air— The concentration of expired gases is a noninvasive and useful estimate of bacterial metabolism. Emerging measurements of expired nitric oxide and ketosis may be useful in estimating inflammatory or ketotic status in selected medical conditions.
<blockquote style="text-align: left;">Read more: Laboratory Values for Nutritional Assessment</blockquote>

Hair—An easy-to-collect tissue; most commonly measuring minerals; usually a poor indicator of actual body levels.

Other tissues—Fat biopsies have been used to estimate vitamin D stores in research studies.

<h2 style="text-align: left; line-height: 1.5;">Interpreting Laboratory Data</h2>

Just like all data, nutrition data can be quantitative, semiquantitative, or qualitative. Quantitative- how much, how often, how fast.

 Semiquantitative- many, most, how, often, how, fast. Qualitative color, shape, species. Quantitative data is less ambiguous or more objective than other types of observation which gives it an advantage. It is advised that one should be extremely cautious about using a single isolated laboratory test value to make an assessment, this made other methods so important too.

One disadvantage of an isolating value is that it could be misleading especially when used without the context of an individual's lifestyle habits, clinical status, dietary, medical, and genomic histories. It is especially important to monitor laboratory values when contemplating nutritional interventions that involve potentially unsafe levels beyond upper limits such as mineral-like selenium or fat-soluble vitamins.

When monitoring patients for changes in nutrition test values, one must consider how much change is necessary to give confidence that a difference is significant. The change required for statistical significance has been called a critical difference.

It is calculated from measurement of the variances calculated from repeated measurements of an analyte:

<li style="font-size: 16px; text-align: left; line-height: 1.5;"> specimens that have been obtained, at several different times, from each of several healthy persons (intrasubject variation); and
<li style="font-size: 16px; text-align: left; line-height: 1.5;">separate samples from a large specimen pool (analytic variation).

In practice, assessments are not based on the measurement of a single analyte at one point in time except in the case of severe deficiencies or dangerous excesses. Changes in laboratory tests may have biological significance (e.g., the patient’s condition is improving) long before statistical significance is achieved.

The changes in laboratory data may precede changes in other nutritional indices, but generally, although not always, the data available should point to the same conclusion.

Laboratory testing is very important to ensure efficient nutrition intervention and it is very important for clinical nutritionists and Registered dietitians to work hand in hand with other health care teams to offer the best care to patients or clients.

