

Urinalysis And Digestive Enzymes

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Urinalysis involves the chemical, physical as well as the microscopy technique of urine sample analysis. The urine is excreted through the urinary system. The urinary system is a system that comprises the kidneys, urinary bladder, ureters, and urethra (Simerville et al., 2005, p. 100). The urine moves from the kidney through the ureter into the urinary bladder, where it's stored for a while, and then it's excreted through the urethra. This system performs numerous functions in the human body. The functions include regulating blood pressure as well as the volume by controlling water excretion, regulating plasma solute/ion concentrations by adjustment of the urine compositions, stabilization of blood pH, nitrogenous waste removal, conservation of important nutrients and water as well as aiding the detoxification of poison in the liver (Woolhandler et al., 1989, p. 21). As a result, urine sample analysis provides vital information regarding an individual's health. This urinalysis can show diseases like renal infection like kidney stones or calculi and glomerulonephritis, diseases in the urinary tract, and diabetes mellitus, among other diseases.

Medical practitioners perform urinalysis for several reasons. The first reason is the diagnosis of systemic or metabolic diseases affecting renal functioning, such as heart failure, which can cause decreased kidney blood flow and pre-eclampsia in pregnancy, which can cause the protein in sample urine to increase. Second, urinalysis can be done as a general procedure for a medical checkup (Woolhandler et al., 1989, p. 29). Third, endocrine disorders are diagnoses like infertility that involve low levels of luteinizing hormone (LH) or follicles stimulating hormone (FSH). Fourth, monitoring diabetes patients' glucose levels. Fifth, urinalysis is used in the pregnancy tests. And lastly, it is used in drug use screening.

Urinalysis Involves The Chemical, Microscopic As Well As The Physical Urine Analysis.

The physical parameters include the analysis of normal and abnormal parameters. The normal urine color is clear yellow because of the Uribilin presence. The abnormal urine color includes red, black or brown, as well as a cloudy appearance. The abnormal color and cloudy appearance are a result of the white or red blood pigments or cells presence and can point out renal or urinary tract diseases or infection, gallbladder or liver diseases, among other health conditions (Woolhandler et al., 1989, p. 21). The normal urine gravity ranges between 1.002 to 1.028. Gravity is the measurement of the particles' number present in the sample of urine, the urine concentration. A sample of urine having raised specific gravity shows diarrhea, vomiting glycosuria, dehydration as well as incorrect ADH secretion. A decreased specific gravity shows the presence of diseases such as pyelonephritis and renal failure (Simerville et al., 2005, p. 100).

The chemical parameters are also examined. These chemical parameters are analyzed using a relatively accurate and inexpensive dipstick test, the Uristix, from different brands or Bayer. This test utilizes the use of a plastic stick coated with a reagent that is dipped or placed into a sample of urine. As a result, the reagent changes color as per the protein or glucose presence. A dipstick glucose test is grounded on the double sequential enzymes' reactions (Hoberman et al., 1993, p. 123). An enzyme, glucose oxidase, facilitates or catalyzes hydrogen peroxide and glycolic acid formation from glucose oxidation when it is present in a sample of urine. Another enzyme, peroxidase, facilitates or catalyzes the potassium iodide reaction with hydrogen peroxide that oxidizes the chromogenic color starting from green to brown. The normal urine contains less glucose concentration that is less than 0.1 percentage. On the other hand, a dipstick protein test involves a basis on the principle of protein-error-of-indication. At a pH that is constant, protein presence shows a green color. The color ranges from yellow, which indicates a negative test, to green, then to green-blue (Somerville et al., 2005, p. 100). The normal urine contains a concentration of protein that is below 100ug/ml. However dipstick tests are semi-quantitative, other means are used in determining the proteins as well as the glucose levels such as the BCA assay (Woolhandler et al., 1989, p. 21).

The BCA assay used the chemical reduction caused by proteins to Cu^{1+} from Cu^{2+} in a media that has alkaline conditions. First, a blue solution is formed from the chelation of proteins with copper in an alkaline medium. This biuret reaction results from the peptides that have over three amino acids. Dipeptides, as well as single amino acids, do not produce a biuret reaction; however, tri-peptides or larger proteins or polypeptides react and produce a light blue or violet complex absorbing light on 540nm (Hoberman et al., 1993, p. 123).

The microscopic parameters are also analyzed. The urine is analyzed microscopically after staining to show urinary crystals, bacteria, mucus or cells, and their presence shows the presence of disease or infection (Hoberman et al., 1993, p. 123).

The digestive enzymes are enzymes in the digestive system. The digestive system encompasses the digestive system or alimentary tract that starts at the mouth and ends at the anus and other additional organs like the pancreas, liver, and tongue. This digestive system is like a tube and is open on both ends, the anus as well as the mouth. Substances passing through this digestive system are outside the human body because they can pass through it as it happens in the skin (Kararli, 1995, p. 45). The substances in the digestive system are absorbed into the body when they come in contact with anybody cells. The digestive epithelial cells absorb these substances into blood in a process known as absorption (Kararli, 1995, p. 45). The food is first broken down into simple molecules before absorption into the body by other processes such as enzymatic reactions and chewing processes. As a result, the small particles are absorbed into the blood as well as the cells and are distributed in the whole body. This process of food breakdown is what is referred to as digestion.

Hormones and nerve complexes control the food movement in the digestive system starting from the esophagus all through to the anus (Fallingborg, 1999, p. 45). These hormones and nerves influence food propulsion through the smooth muscle contraction in the tract lining and also influence enzyme

secretion, which aids in chemical food breakdown. The wave contraction and relaxation movement changes called peristalsis cause the food to move through the digestive tract (Kararli, 1995, p. 45). The same relaxation and contraction occur in both the small and large intestines, allowing the mixing of digestive enzymes with food as well as the movement of this mixture in the digestive tract parts.

Various other organs aid the digestive tract in food digestion as well as absorption. The mouth cell secretes an enzyme called amylase, which breaks the carbohydrates into small molecules. The tongue and the mouth aid in the breakdown of food molecules into small ones, increasing the surface area of this food for enzyme reactions. Stomach cells secrete hydrochloric acid, which gives an acidic condition for protein breakdown in early stages, as well as enzymes that break proteins into small particles (Whitcomb and Lowe, 2007, p. 199). Other enzymes are produced in the small intestine that aid in the breakdown of food so that it can be absorbed into the body. At the same time, the small intestine contains villi that increase the surface area for absorption of food (Whitcomb and Lowe, 2007, p. 199). The pancreas is another source of enzymes. This pancreas produces digestive enzymes as well as bicarbonates through the ducts of the bile into small intestines. Fats are emulsified by the salts made in the liver passing through the common duct into the small intestine. Therefore, for the absorption of food to occur, food must be broken down into small particles by enzymes. Every enzyme has a specific substrate to bind to. For instance, amylase breaks down carbohydrates into disaccharides and monosaccharides, and proteins are broken down into amino acids by peptidase, as well as lipids into fatty acids and glycerol by lipase enzyme (Fallingborg, 1999, p. 47).

Carbohydrate Digestion By The Salivary Amylase

Starch is broken down into small particles by the amylase enzyme that is produced in the mouth by the salivary glands. The saliva is clear in color and has a pH value of 7.4. When simple carbohydrates and Benedict's solution are heated, the color of the mixture changes from blue to brick red or orange-red. This test is based on the reducing producing properties of the simple sugar. The color changes from blue then green, then orange, then brick red, depending on the simple sugar amount (Fallingborg, 1999, p. 55). When saliva is added to starch, it breaks down more starch into the simple sugar and indicates orange. Temperature reduces enzyme activities. As a result, it reduces its effectiveness in the breakdown of starch into small molecules. This is because temperature increase denatures the enzyme and affects its binding site, and therefore, starch cannot be broken down into simple molecules. The Lugol test shows the starch presence by reacting with it and producing a deep-blue-black color.

Proteins Digestion By The Pepsin Enzyme

This peptic enzyme contains a pH value that is optimum and remains adapted to the low stomach pH that is below 2. The stomach pH is a result of the hydrochloric acid secretion from the gastric glands' parietal cells (Whitcomb and Lowe, 2007, p. 199). This acid changes the produced pepsinogen into

pepsin. In human beings, about 15 percent of proteins are broken down into glycerol and amino acids by the pepsin enzyme in the stomach. The remaining protein percentage is digested in the small intestine by other protein enzymes like trypsin produced by the pancreas, as well as peptidase in the small intestine lining (Fallingborg, 1999, p. 85).

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