Urine Analysis

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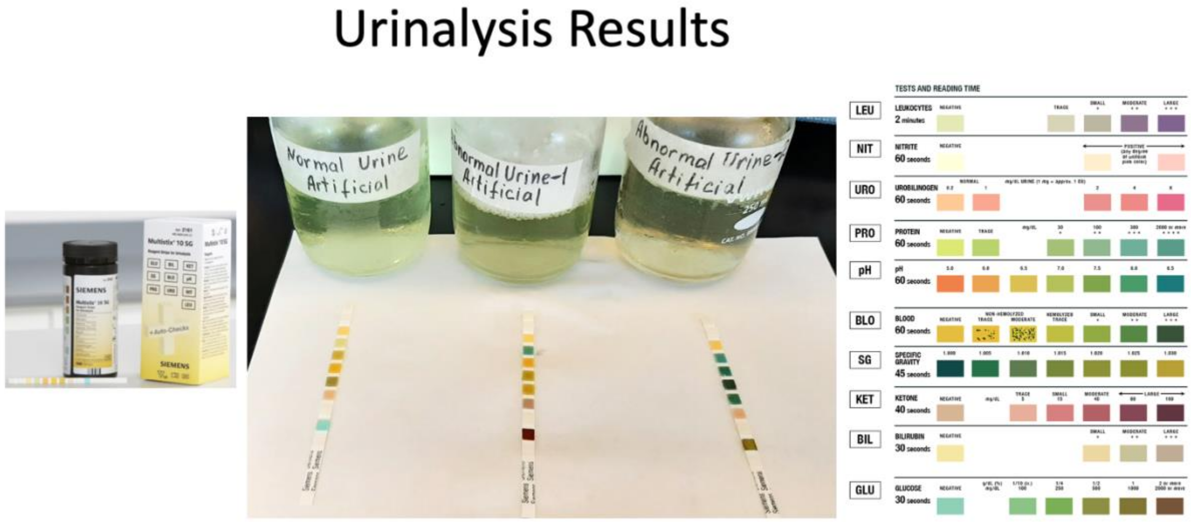

Homeostasis is maintained via the removal of body byproducts, including urea, excess salts, and water in the form of urine. The urinary tract functions include eliminating waste products, reabsorption salts, water, regulation of blood pressure, sugars, and maintenance of homeostatic balance in the plasma. Other organs involved in eliminating waste products are the liver, lungs, and skin; however, the most central organ is the kidney. The excretory system is composed of the kidneys, ureters, collection tubes, bladder, and urethra. The anatomy of the kidney consists of three parts; medulla, cortex, and hilum.

The cortex is granular as it contains more than a million nephrons, which form the major structural and physiological units of the kidney. The nephron is constituted of the renal corpuscle, tubule, and a network of capillaries. The corpuscle capillaries are known as glomerulus, and the cup-like structure is known as the Bowman's capsule. There are three different tubules: Proximal Convoluted Tubule (PCT), the ascending and descending Loop of Henle, and the Distal Convoluted Tubule (DCT).

The afferent arteriole receives blood from the renal artery. The blood then enters and circulates in the glomerulus. Ultrafiltration occurs when blood pressure forces some water and salts to cross the capillaries into Bowman's capsule. Blood enters the PCT through the efferent arteriole. The majority of the solutes get reabsorbed from the blood via tubular reabsorption in the PCT. Toxins are removed from the blood in addition to the regulation of filtrate pH through the secretion of ammonia. Sodium and chloride ions are reabsorbed from the filtrate in the ascending Loop of Henle. Aquaporin present in the descending Loop of Henle allows water to diffuse across into the interstitial fluid. The filtrate becomes diluted as it travels to the distal convoluted tubule (DCT). Sodium, Chloride, and Hydrogen Carbonate are reabsorbed to maintain the pH. Final reabsorption of water and salts occurs in the collection tubule. The dilute urine is transported to the bladder via the ureter ("The excretory system", 2020)

The urinalysis test is used to detect complications of the urinary tract, diabetes, and kidney diseases, amongst other conditions. The color, concentration, and composition of the urine are used to diagnose probable conditions. Urinalysis tests are carried out in three phases: physical, chemical, and microscopic examination. Physical evaluation entails assessing the color and appearance of urine. Chemical testing involves comparing normal standard values of solutes such as Bilirubin, Protein, glucose, urobilinogen, Specific Gravity, pH, ascorbic acid, hemoglobin, leucocyte, and ketones. A microscopic exam is carried out when the chemical analysis shows inconsistent parameters. It checks red blood cell count, leukocytes, bacteria, yeasts, and crystals (Fareed, 2020).

Objective: The purpose of the laboratory session was to conduct rapid multistix urine analysis, record, and interpret the results.

Materials: A urine sample for analysis should be collected early in the morning; however, urine samples taken at any other time can be used. The container used for collection should be narrow and conical-like to facilitate easy testing. Dipsticks and strip reference pad or the strip bottle can be used to check for variances in color.

Methods: The urine strip is immersed in the urine sample. The sample is gently shaken to prevent spilling to ensure the urine comes into contact with the strip. After about 2-3 minutes, the strips are removed from the urine samples and cross-referenced against the strip reference pad on the dipstick bottle. The dipsticks and urine samples are discarded after use.

Results: The urine strip from the normal urine sample has no significant color changes except on the specific gravity parameter. On the glucose, protein, and specific gravity positions, the second urine sample strip switches to color.The third urine sample strip changes color on the blood, glucose, and pH slots.

Discussion: The first and second urine samples have color changes on the specific gravity parameter. Specific gravity indicates the concentration of urine that depends on the intake of water and solutes, thus not directly interpreting disease or complications. However, specific gravity concentrations are checked when dealing with athletes and players to indicate illegal supplement use. The second and third sample strips indicate significant glucose concentrations in the urine, which is a sign of glycosuria. It may be due to too much glucose intake such that the body cannot reabsorb it anymore. Alternatively, it may be an indicator of diabetes, whereby insulin is unable to convert glucose, and thus the accumulation can only be eliminated in the urine. Protein concentrations evident in the second sample strip is characteristic of proteinuria. Small amounts of protein in urine are normal, but the high concentration in the strip may be indicative of a kidney problem due to the inability to reabsorb proteins fully. The third sample strip shows a varying pH from the normal value. The urine sample pH value is 6.5- alkaline. pH is affected by the diet and thus could vary. However, it could also imply a urinary tract infection or kidney failure. Blood present in the third sample strip may be normal unless there are symptoms such as painful urination. Additionally, the presence of blood cells in women maybe as a result of the menstrual cycle. Therefore, further testing, such as microscopic analysis can be carried out as liver disease, and kidney complications may result in erythrocytes in urine ("Urinalysis - Understand the Test & Your Results", 2020)

References

Fareed, K. (2020). Urinalysis (Urine) Test: Types, Drugs, Alcohol, Results and Interpretation. Retrieved 27 July 2020, from https://www.medicinenet.com/urinalysis/article.htm

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