

URINE ANALYSIS FOR NURSES.*

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Definition.—Urine is a watery fluid secreted by the kidneys. In health it contains a large variety of constituents derived from the breaking down of the fluids and tissues of the body from certain elements of the food.

Secretion.—There are two theories: First, that of Ludwig, who regards the kidneys essentially as filters through which the waste products pass from the blood out of the body. He regards the process purely as a physical one, depending on the principles of diffusion or osmosis, this process taking place in the tubules of the kidney.

The second theory is that of Bowman-Heidenhain, according to whom the kidney is essentially a secreting gland and the urine a mixture of certain characteristic elements, as urea, water, salts, &c., which are secreted by the epithelial cells of the urinary tubules. According to Bowman, the glomeruli are filters for water and inorganic salts, and the tubules true secretory structures for urea and related bodies. This is a physiological action. The best proof of this is that when the epithelium of the tubules is destroyed by disease, certain toxic products are retained in the blood, causing uremia, while the urine is more watery and contains a smaller percentage of its characteristic solids. Under pathological conditions the abnormal constituents, such as albumin in albuminuria, hemoglobin in hemoglobinuria, and sugar in glycosuria, seem to escape from the blood into the kidney through the glandular epithelium.

The Mechanism of Excretion.—Four factors are concerned in the mechanism of excretion: kidneys, ureters, bladder, and urethra. The kidneys secrete urine constantly into the ureters, which discharge their contents into the bladder by a series of spurts, the muscular contractions beginning at the kidney and going in waves to the bladder.

As the bladder fills, muscular contractions set up, forcing a few drops of urine into the urethra. These act as stimulæ to the nerve cells in the lumbar region of the spinal cord, and the person is conscious of the desire to urinate.

Properties of Normal Urine.

The chemical composition is very complex. It contains the end results of varied metabolism

of the body. Its importance in this respect is greater than the other excretory organs, as the lungs, skin, and intestines. The 24-hour amount in an adult is 1,200 to 1,600 c.c. The average is 1,500 c.c., or 3 pints. Women pass smaller quantities than men. Small-sized persons void less than large-sized individuals. Drinking of much liquid increases the amount, while free perspiration diminishes the average amount; considerably smaller quantities are passed in warm weather than in cold.

Oliguria: A diminished quantity.

Anuria: No urine, or a very small quantity, as in partial or complete suppression.

Polyuria: Markedly increased quantity.

Hydruria: An increased proportion of the watery constituents.

Directions for Collecting Urine.

1. Have two clean quart jugs.
2. Pass the urine at 7 a.m., throw this specimen away; then save in the jars all urine passed until 7 a.m. the next day, including that passed at 7. Mix and measure. A pint will do for laboratory examination. In suspected nephritis, separate day and night portions.

Methods of Collecting Urine.

(ADULTS.)

1. Heat in form of hot compresses, or hot-water bottle over bladder.
2. Enema. With this method the urine is usually lost in the female, but can be saved in the male.
3. Allow patient to sit up.
4. Auto-suggestion. Allow patient to hear running water from a tap.

(INFANTS.)

1. Warm cup or bowl under buttocks, with pressure over pelvis, when infant wakes and has a dry diaper.
2. Try suggestion number one when giving a bottle, for it is customary for an infant to urinate when feeding, or directly after.
3. A test tube may be strapped on the parts with adhesive plaster.

Colour.—Due to pigments. Normal colour is a clear, pale yellow, with straw or amber tints, but in health it may vary considerably according to the amount of water drunk. Dilute urines are usually pale; concentrated urines, deeply coloured. Colour is not a very trustworthy sign in urine examination.

On standing and on cooling, a normal urine, as a rule, precipitates—first, amorphous urates, which appear as an indefinite, feathery cloud; then uric acid crystals, and sometimes calcium oxalate crystals.

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