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**Renal system disease**, any of the diseases or disorders that affect the human urinary system. They include [benign](https://www.merriam-webster.com/dictionary/benign) and malignant tumours, infections and inflammations, and obstruction by calculi.

Diseases can have an impact on the elimination of wastes and on the conservation of an appropriate amount and quality of body fluid. Many of the [manifestations](https://www.merriam-webster.com/dictionary/manifestations) of renal [disease](https://www.britannica.com/science/disease) can be accounted for in terms of disturbance of these two functions, and the alleviation of symptoms in those renal diseases that cannot be cured depends on knowledge of how these two functions are affected. The eliminatory process does not, of course, end with the formation of [urine](https://www.britannica.com/science/urine); the urine has to pass down the ureters to the bladder, be stored there, and voided, usually under voluntary control. The whole mechanism can be deranged by structural changes in the lower urinary tract, by infection, or by neurological disorders that lead to abnormal emptying of the bladder. Disturbance of the lower urinary tract is an important cause of pain and distress, notably during pregnancy and in the elderly; and it can lead toserious and progressive damage to the kidneys, either by interfering with the drainage of urine or by allowing bacterial infection to have access to the kidney.

## Effects of abnormal renal function on body fluid

Renal disease in its [diverse](https://www.merriam-webster.com/dictionary/diverse) forms can lead to bodily deficits or excesses of water, sodium, potassium, and magnesium, and also to [protein](https://www.britannica.com/science/protein) deficits occasioned by great losses of protein in the urine. Inability of the kidney to function normally may lead to retention in the blood of the waste products of protein metabolism, such as [urea](https://www.britannica.com/science/urea) and [uric acid](https://www.britannica.com/science/uric-acid), and of other nitrogenous [compounds](https://www.merriam-webster.com/dictionary/compounds) such as creatinine. There may be abnormally high levels of [phosphates](https://www.britannica.com/science/phosphate) in the blood, which in turn can lead (for reasons about which there is still some disagreement) to low blood levels of [calcium](https://www.britannica.com/science/calcium). The [calcium deficiency](https://www.britannica.com/science/calcium-deficiency) can cause [tetany](https://www.britannica.com/science/tetany), a condition marked by muscular spasms and pain, and calcium may be lost from the bones in the process of restoring normal calcium levels in the blood and tissue fluid. For descriptive purposes, changes in volume, changes in [composition](https://www.merriam-webster.com/dictionary/composition), and protein depletion of renal origin will be discussed separately, but these disturbances can and often do coexist.

Though body fluid is most readily apparent in the bloodstream, it is present, and in larger amounts, in the tissues, both between the cells (interstitial fluid) and within them (intracellular fluid). [Extracellular fluids](https://www.britannica.com/science/extracellular-fluid), which include interstitial fluid and [blood plasma](https://www.britannica.com/science/plasma-biology), amount to 25 percent of body weight and contain [sodium](https://www.britannica.com/science/sodium) as their predominant cation(positive ion; metals and hydrogen in solution are cations). [Intracellular fluids](https://www.britannica.com/science/intracellular-fluid), amounting to 33 percent of body weight, have [potassium](https://www.britannica.com/science/potassium) as their predominant cation. These various “compartments” of body fluid are in osmotic [equilibrium](https://www.merriam-webster.com/dictionary/equilibrium), so that if solute (e.g., sodium chloride) is added to the extracellular compartment so as to increase the concentration of the extracellular solution, water will join it to reduce the concentration, and that compartment will increase. An increase in [extracellular fluid](https://www.britannica.com/science/extracellular-fluid), if it is considerable, may be clinically apparent as [edema](https://www.britannica.com/science/edema), a swelling of the tissues by fluid, which can usually be displaced by firm pressure. Edema is present in [acute](https://www.merriam-webster.com/dictionary/acute) [inflammation](https://www.britannica.com/science/inflammation) of the kidney (nephritis), in protein deficiency of renal origin, and in chronic [nephritis](https://www.britannica.com/science/Bright-disease) complicated by [heart failure](https://www.britannica.com/science/heart-failure) associated with abnormally high blood pressure; a factor common to all these states is failure of the kidneys to excrete sodium and water in adequate amount.

The kidneys in such edematous states need not themselves be diseased; for example, normal kidneys, in a patient with heart failure, may retain sodium when handicapped in their function by poor circulation and by abnormal amounts of sodium-retaining hormones, such as aldosterone. Increase in extracellular fluids is the only volume change that is both common and easily discernible in renal disease, but the opposite condition, sodium depletion or clinical [dehydration](https://www.britannica.com/science/dehydration-physiology), is more commonly the result of vomiting and [diarrhea](https://www.britannica.com/science/diarrhea) when they are complications of terminal renal disease. Sodium and water depletion can be recognized by a lack of elasticity in the superficial tissues and by poor filling of the blood vessels, as well as by signs of impaired circulation, including a fall in [blood pressure](https://www.britannica.com/science/blood-pressure) and an increase in pulse rate. Though changes inntracellular fluid volume occur in some diseases, especially when the potassium content of the body is affected, there is no easy way of detecting them.

## Disorders of urine flow

If little or no [urine](https://www.britannica.com/science/urination) appears, it may be because the kidneys are forming little urine (oliguria) or none (anuria); or it may represent a holdup in the bladder or urethra affecting the outflow from both kidneys. About one person in 500 is born with only one kidney, and loss of a kidney from disease or accident is not rare. The loss of a single kidney does not substantially affect an individual’s ability to eliminate wastes, as long as the other kidney functions normally. In cases in which complete obstruction of the remaining ureter occurs, patients will experience effects similar to obstruction of the entire lower urinary tract. Partial or complete failure to form urine is treated in the section on acute renal failure, obstructive conditions in the section on diseases of the urinary tract.

In instances of damage to [nervous](https://www.britannica.com/science/nervous-system) control, certain typical clinical situations may be [differentiated](https://www.merriam-webster.com/dictionary/differentiated), corresponding to different modes of disordered urinary flow: (1) Lack of conscious inhibition of micturition because of damage to the [cerebral](https://www.merriam-webster.com/dictionary/cerebral) cortex or, more commonly, from psychological causes results in a need to micturate that cannot be suppressed even though the [bladder](https://www.britannica.com/science/urinary-bladder) volume may be quite small; micturition is precipitate and continues until the bladder is empty. (2) Transverse lesions or other damage to the [spinal cord](https://www.britannica.com/science/spinal-cord) above the sacral reflex centres that cause paralysis of the lower half of the body produce at first a bladder that is atonic (lacking in physiological tone). This bladder becomes greatly distended; the detrusor relaxes and reflex micturition is abolished. Pressure finally rises sufficiently to overcome the spasm of the sphincters and urine is voided in small amounts. Further accumulation and partial voiding of the overflow recur (overflow incontinence). Under these conditions the bladder readily becomes inflamed, which may cause disability or death from chronic ascending urinary infection. [Intermittent](https://www.merriam-webster.com/dictionary/Intermittent) drainage of the bladder with a catheter may be necessary, or firm pressure on the lower abdominal wall may be used to avoid overdistension and to develop an “automatic” bladder after some time. This is a small capacity organ (around 150 millilitres) with frequent emptying; there is reflex control mediated through the sacral segments of the spinal cord; the higher centres do not restrain the detrusor, and the internal sphincter relaxes more readily. Voluntary assistance from the abdominal muscles helps in this situation if these too have not been paralyzed. There is, however, always some residual urine from incomplete emptying and a risk of infection. In some cases, pressure building within the bladder can be transmitted to the kidneys; without medications or more frequent bladder emptying to relieve the pressure, the kidneys will incur damage. (3) In contrast, there is the isolated, or “autonomous,” bladder resulting from damage to the central [nervous system](https://www.britannica.com/science/nervous-system) below the sacral cord reflex centres or to the nerves supplying the bladder and urethra. The bladder becomes tense but contracts only weakly so that, while small amounts of urine are voided, the residual urine may be as high as 200–300 millilitres. This condition is known as active incontinence as opposed to the overflow incontinence of the automatic bladder. Here again, more effective emptying of the bladder by catheter drainage may be helpful.