

# Acute renal failure / Repetitorium

 For more information see *Acute Renal Failure, Acute Renal Failure (Pediatrics)*.

## Acute renal failure

Glomerular filtration is the process by which filtration of plasma occurs through the capillary wall of the glomeruli and the visceral sheet of Bowman's capsule, which surrounds the capillary wall through its processes (= podocyte pedicles). The other two processes involved in the formation of definitive urine are tubular reabsorption and tubular secretion. Through the tubular secretion of  $H^+$  ions, the kidneys regulate the pH of the blood.

### Causes

- prerenal

Decreased renal blood flow, eg due to systemic hypovolaemia, reduced minute cardiac output or reduced effective arterial volume (ascites, sepsis, hepatorenal syndrome), leads to a potentially reversible obstruction of the functional renal circulation, while the nutritional circulation may not be fundamentally affected, as long as there is an early restoration of normal flow.

- renal

Damage to the renal parenchyma occurs mainly due to ischemic (long-term limitation of functional and nutritional circulation), nephrotoxic (ATB therapy - especially aminoglycosides, chemotherapy, radiocontrast agents, nonsteroidal antirheumatic drugs - NSAIDs); also due to acute hemolysis or urate toxicity (tumor lysis syndrome).

- postrenal

Obstruction of urine outflow leads to vesico-ureteral reflux and subsequent pressure atrophy of the renal parenchyma.

### ASL stage

- Oliguric (anuric)

- retention of  $H^+$ ,  $K^+$ : hyperkalemia -> heart rhythm disorders (leading to AV-block, ventricular fibrillation, asystole) appearing on the EKG recording as flattened P-waves, spiked T-waves, widening of the QRS complex in severe hyperkalemia (above 6.5 mmol/l). The therapeutic solution is the administration of insulin (increases the entry of potassium into the cells), pH adjustment (hyperkalemia can be accompanied by acidosis - tubule cells tend to "exchange" potassium for hydrogen) and the administration of a  $\beta$ -adrenergic substance .
- retention of water and other ions: hypervolemia
- retention of organic substances

- Polyuric

Increase in GFR (glomerular filtration rate) and excretion of retained substances. With unincreased GFR, polyuria is a manifestation of the failure of the concentrating function of the tubules.

In the reversible phases and also in the "end-stage renal disease" stage, hemodialysis is often the only hope for the patient to improve the condition.

## Links

### Externí odkazy

<https://en.wikipedia.org/wiki/Hyperkalemia>

### Source

- VÍZEK, Martin. *Repetitorium* [ online ]. [ cit. 2012-01-08 ]  
<<https://web.archive.org/web/20130512032641/http://pf.lf2.cuni.cz/vyuka/repetitorium.html>>

### Reference

### Literature used

- ČEŠKA, Richard, et al. *Intern.* 1st edition. Prague: Triton, 2010. 855 p.
- GUYTON, Arthur C and John E HALL. *Textbook of Medical Physiology.* 11th edition. Elsevier, 2006. 0 p. 11;