

# THE MAIN METHODS OF REPLACEMENT OF RENAL FUNCTION IN THE CASE OF PATIENTS WITH END-STAGE CHRONIC RENAL INSUFFICIENCY

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**Abstract:** Dialysis is the main clinical preoccupation of nephrology. Each hospital runs haemodialysis units and ambulatory peritoneal dialysis (CAPD) units. Several such centres are independent and function on demand all over the country, for citizens and tourists alike. These are specifically designed for kidney transplant patients, providing pre-operational assessments and post-transplant follow up of patients who received kidney allografts.

**Keywords:** dialysis, renal disease, human, end-stage renal disease

**Rezumat:** Dializa reprezintă principala preocupare clinică a nefrologiei. Fiecare spital deține secții de hemodializă și secții de dializă peritoneală ambulatorie continuă (DPAC). Unele dintre aceste centre sunt independente și funcționează la cerere pe tot cuprinsul țării, pentru cetățeni și turiști deopotrivă. Ele au fost create special pentru pacienții care au suferit un transplant de rinichi, oferind servicii de consult pre-operatoriu și asistență post-operatorie pacienților care au beneficiat de un transplant de rinichi.

**Cuvinte cheie:** dializă, dializă renală, uman, dializă renală finală

## INTRODUCTION

### Dialysis

Dialysis represents a method of removing from the blood, residues, toxins and water overload and of restoring the hydroelectrolytic equilibrium. These functions are normally performed by the kidneys.

The two main forms of dialysis are haemodialysis and peritoneal dialysis. Dialysis is absolutely necessary in the case of end-stage chronic insufficiency – when the renal function is reduced to 10-15% of the normal values.

Dialysis performs the following functions:

- removes toxins, salt and water overload in order to prevent their accumulation in the organism;
- maintains certain chemical substances (potassium, sodium and bicarbonate) at a level free of risks;
- contributes to the control of arterial pressure.

Renal insufficiency is sometimes reversible. Certain cases of acute renal insufficiency are healed by means of treatment, and dialysis is required only for a short period of time until the renal function starts working

again. In the event of chronic or end-stage renal insufficiency, the kidneys do not heal and the patients need dialysis for the rest of their lives.

### Haemodialysis

Haemodialysis involves the usage of an "artificial kidney" (hemodialyzer) with the purpose of removing from the blood, toxins, fluid overload and chemical substances.

Haemodialysis represents a method of extra renal epuration by means of which the toxins are being removed from the uremic blood and the acido-basic and hydroelectrolytic equilibrium is restored. It cannot replace the kidney's endocrine and metabolic functions. The dialysis machine controls the removal of water overload and monitors the entire procedure.

In haemodialysis, blood and the haemodialysis fluid, flow in opposite sides across a semi-permeable membrane which allows the crossing of the metabolites with undesirably high concentrations but not that of the blood's proteins and figurative elements. The device that embodies the semi-permeable membrane is called a dialyzer- artificial kidney.

### Peritoneal dialysis

The peritoneal dialysis uses as a dialysis method the peritoneum. The dialysis solution is run (through an opening, of course) into the peritoneal cavity and the exchanges between this and the blood from the peritoneal interstitial take place through the peritoneal membrane. In this way an artificial ascites is created, and this needs to be renewed 4 times a day.

Thus, the peritoneum acts like an imperfect semi-permeable membrane: it is permeable for water and substances having small molecular weight and impermeable for the elements within blood.

The epuration of uremic toxins takes place through diffusion and convection. The removal of toxins is performed with the help of certain special dialysis toxins introduced into the peritoneal cavity. The water and electrolytes exchanges between blood and the dialysis solution are located at the peritoneum's level.

Peritoneal dialysis is carried out at home by the patient, either through CAPD (continuous ambulatory peritoneal dialysis) which lasts for 30-40 minutes, 4-5 times a day or APD (automatic peritoneal dialysis)- while the patient is asleep. CAPD gives the patient more

## CLINICAL ASPECTS

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freedom as they can dialyze at home, workplace, however, after fulfilling certain conditions.

In peritoneal dialysis (PD) a flexible catheter is run, by means of a minimum surgical procedure, through the patient's peritoneal cavity.

This catheter allows the periodical (manual or automatic) insertion of a certain quantity of a sterile solution found on the market, with a specific chemical composition established in advance, into the peritoneal cavity of the patient (the creation of an artificial ascites).

The peritoneal dialysis is first carried out after approximately 10 days after the implantation, in order to ensure the necessary time for cicatrization and to minimize the risk of leaking of peritoneal fluid. During this time, wash-ups with a small quantity of dialysis solution are necessary.

The physical procedures, which in the case of haemodialysis (HD) take place within the filter, are performed, where PD is concerned, within the peritoneal blood capillary which comes into contact with this artificial ascites and thus, the fluid that results is periodically removed through the same catheter.

The peritoneal dialysis is slower and does not produce alteration of the total amount of blood of haemodialysis. The Tenckhoff catheter is frequently used as a means of access, and consists of 3 segments: an external one to which the transfer set is adapted, a subcutaneous route and a punched intra-abdominal portion.

Drawing a comparison between the two, the peritoneal dialysis has a series of net advantages: it frees the patients from the routine of having to go to the dialysis clinic (the patient goes to the clinic once a month for investigations and the necessary material for performing PD the following month).

Peritoneal dialysis is more gentle to the cardiovascular system and more physiological too (taking place during the entire day, as the kidney works, and not only for 4 hours to 2 days as HD does), being recommended to patients having a difficult or impossible vascular abroad (for example diabetes) or an advanced stage of a cardiac disease; moreover it allows a better control of the anemia of patients with end-stage chronic renal insufficiency and a longer maintenance of the remaining diuresis.

### **Renal Transplant**

Patients with end-stage chronic renal insufficiency may choose from various types of treatment, such as dialysis and renal transplant. The patients considered suitable for a renal transplant are subject to a previous and complete medical examination. While waiting for a compatible kidney, the treatment consists of performing dialysis.

The renal transplant involves the surgical replacement of the sick kidney with a healthy one drawn from another person (donator). The healthy kidney ("graft") takes over the functions of the sick ones. One may live a normal life having a sole kidney, as long as this works properly.

The transplant in itself represents a surgical intervention. The surgeon places the new kidney within the abdomen and attaches it to the artery that brings oxygenated blood to the vein transporting dioxide of carbon from the kidney to the urethra which takes the urine from the kidney to the urinary bladder.

Any surgery involves risks; however the renal transplant is not a very difficult or complex surgical intervention. The period following the transplant is crucial. The physician will closely monitor the patient's evolution in order to make sure that the new kidney is functioning properly without being rejected by the organism.

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