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Mortality Trends Evaluation of Dialysis Adequacy Hemodialysis

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INTRODUCTION

In chemistry, dialysis is the process of separating molecules in solution by the difference in their rates of diffusion through a semipermeable membrane, such as dialysis tubing. Dialysis is a common laboratory technique that operates on the same principle as medical dialysis [1]. In the context of life science research, the most common application of dialysis is for the removal of unwanted small molecules such as salts, reducing agents, or dyes from larger macromolecules such as proteins, DNA, or polysaccharides. Dialysis is also commonly used for buffer exchange and drug binding studies. From this concept dialysis can be defined as a spontaneous separation process of suspended colloidal particles from dissolved ions or molecules of small dimensions through a semi permeable membrane [2]. Diffusion is the random, thermal movement of molecules in solution (Brownian motion) that leads to the net movement of molecules from an area of higher concentration to a lower concentration until equilibrium is reached [3]. In dialysis, a sample and a buffer solution (called the dialysate) are separated by a semi-permeable membrane that causes differential diffusion patterns, thereby permitting the separation of molecules in both the sample and dialysate. Due to the pore size of the membrane, large molecules in the sample cannot pass through the membrane, thereby restricting their diffusion from the sample chamber [1].

DESCRIPTION

By contrast, small molecules will freely diffuse across the membrane and obtain equilibrium across the entire solution volume, thereby changing the overall concentration of these molecules in the sample and dialysate [4]. Once equilibrium is reached, the final concentration of molecules is dependent on the volumes of the solutions involved, and if the equilibrated dialysate is replaced (or exchanged) with fresh dialysate (see procedure below), diffusion will further reduce the concentration of the small molecules in the sample. Dialysis can be used to either introduce or remove small molecules from a sample, because small molecules move freely across the membrane in both directions [2]. This makes dialysis a useful technique for a variety of applications. See dialysis tubing for additional information on the history, properties, and manufacturing of semipermeable membranes used for dialysis [1]. Dialysis is the process used to change the matrix of molecules in a sample by differentiating molecules by the classification of size. For example, dialysis occurs when a sample contained in a cellulose bag and is immersed into a dialysate solution. During dialysis, equilibrium is achieved between the sample and dialysate since only small molecules can pass the cellulose membrane, leaving only larger particles behind. Dialysis can be used to remove salts [3]. Also osmosis is another principle that makes dialysis work. During osmosis, fluid moves from areas of high water concentration to lower water concentration across a semi-permeable membrane until equilibrium. In dialysis, excess fluid moves from sample to the dialysate through a membrane until the fluid level is the same between sample and dialysate. Finally, Ultrafiltration which is the convective flow of water and dissolved solute down a pressure gradient caused by hydrostatic forces or osmotic forces. In dialysis, ultrafiltration removes molecules of waste and excess fluids from sample. They also function as part of the endocrine system producing hormones [1]. If you've had kidney disease for many years, or your kidneys have suddenly failed because of disease or injury, your doctor may recommend that you have dialysis, a treatment that replaces some of what the kidneys do, removing waste and excess fluid from your blood. It is sometimes used as a holding treatment while awaiting a kidney transplant. Here's how dialysis works. First, your doctor will need to create an access to reach your blood vessels. If you need dialysis only for a short period of time, that access will be made using a hollow tube, called a catheter [4]. Usually the catheter is placed into a large vein in your neck, chest, or leg near your groin. If you're having dialysis for a longer period of time, you'll need a more permanent access. To create this access, your doctor will connect one of your arteries to one of your veins. Then whenever you have

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dialysis, a needle is simply placed into this access area. During each dialysis session, your blood is removed from your body through the needle. It's sent across a special filter, which removes harmful substances from your blood. Then, your clean blood is sent back into your body.

CONCLUSION

Often, you'll visit a special center for dialysis about three times a week. Each session lasts three to four hours. Or, you may be able to do dialysis right at home three times a week or even daily. Before you perform dialysis at home, a nurse will teach you how to place the needle, how to clean the machine, and monitor your blood pressure during treatment. It's important when you're having dialysis that you do all of your scheduled sessions. Also, call your doctor right away if you have any problems, like swelling, redness, fever, a drop in blood pressure, or bleeding. These could be signs that you've developed an infection or other complication from your dialysis, and need medical attention.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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