The term high flux dialysis refers to a form of hemodialysis that was developed in recent years to improve the efficiency of dialysis. It has succeeded in both improving the quality of dialysis and in shortening dialysis times.

The essential element of high flux dialysis is the use of dialyzers (artificial kidneys) that have larger pores for the removal both of uremic toxins and of fluid. Blood urea nitrogen (BUN) is measured and followed as a reflection of all the toxins that the kidney normally removes. With high flux dialysis, BUN clearly is removed more quickly. But there is also now evidence that larger molecules may also play an important role in causing the uremic symptoms that are both annoying and dangerous to dialysis patients. Such molecules are too big to be removed by conventional dialysis, but are removed with high flux dialyzers. For example, a molecule called beta 2 microglobulin, which can have a role in causing arthritis in dialysis patients, is removed only by high flux dialysis. In fact there are already reports of patients with less joint pain when switched from conventional to high flux dialysis. Thus, the removal of larger molecules may prove to be a crucial benefit of high flux dialysis.

The larger pore size with high flux dialysis also allows much faster removal of fluid. Because of the risk of removing fluid too fast, and causing dangerous drops in blood pressure, a special device, called an ultrafiltration controller, is required. This device allows precise regulation of the volume that is removed, and avoids ever overshooting the amount removed. It also allows the accurate removal of very small volumes, as well as volumes up to four liters per hour, which can never be achieved with conventional dialysis. Finally, since the fluid is removed continuously and evenly, removal of large volumes is better tolerated with fewer symptoms.

Another important aspect of high flux dialysis is that higher blood and dialysate flows are used. With conventional dialysis, increasing the rate of blood flow (for example above 300 ml/min) minimally increases the amount
of dialysis. In contrast, with high flux dialyzers, when blood flow is increased up to 450 ml/min, significant improvements in dialysis efficiency can be obtained. Similarly, increasing the rate of dialysate flow allows faster removal of the toxins that are being cleared.

Nephrologists typically use some form of the technique called urea kinetic modeling to determine their dialysis prescription. Using national standards for adequacy of dialysis, and after taking residual renal function into account, urea kinetic modeling uses the dialyzer’s performance characteristics and the patient’s weight to derive an estimate of the time required for dialysis. Since high flux dialysis (also called high efficiency dialysis in some centers) is so much more efficient, it can allow significant reduction of dialysis times, often by 25 percent. Thus, the patient receives adequate dialysis, but minimizes the discomfort of long dialysis times. However, it is important to note that adequacy of dialysis must be maintained. Some patients may not be able to greatly shorten dialysis times when switching from conventional to high flux dialysis.

Several other aspects of modern dialysis, including the use of bicarbonate dialysate, are an essential part of high flux dialysis. However, they are now typically part of conventional dialysis as well. Bicarbonate is now routinely used as the dialysate buffer because the acetate that was used previously caused dilatation of blood vessels and resulted in low blood pressure. Another characteristic of high flux dialysis is that the membranes used are more biocompatible, and therefore are less likely to stimulate the body’s immune system. This minimizes the allergic symptoms as well as the changes in white blood cell counts that were previously caused by less biocompatible membranes.

The major possible disadvantage of high flux dialysis regards pyrogen reactions. These reactions, characterized by high temperatures in patients during dialysis treatments, are caused by small pieces of dead bacteria that can be found in the dialysate. Although these reactions are not dangerous, they are uncomfortable for patients, and typically require short hospitalizations for observation. Some nephrologists feel that because high flux dialyzers have larger pores, the bacterial particles can pass more easily
into the patient’s bloodstream, and that patients on high flux dialysis have more frequent pyrogen reactions. This observation remains to be confirmed.

Patients are not required to make any changes from their point of view in using high flux dialysis. Typically, they actually feel better, especially in terms of having less post-dialysis fatigue. High flux dialysis requires only minor technical adjustments in the dialyzing system, and will continue to be adopted by more and more dialysis centers throughout the country.