

Chronic Kidney Disease and Kidney Failure



Yesterday

- One third of diabetic patients were destined to develop kidney failure.
- Two lifesaving renal replacement therapies, dialysis and renal transplantation, developed through fundamental NIH research in the 1960s, were increasingly available; however, neither was ideal.
- Dialysis left patients feeling washed out and unable to work. Patients suffered from disabling bone disease, dementia caused by aluminum intoxication, and severe fatigue from uncontrollable anemia. High cardiovascular disease death rates limited life expectancy.
- Some patients were lucky enough to get a kidney transplant, which greatly improved their quality of life and life expectancy. However, transplantation was not common, and acute rejection resulted in transplantation failure rates of 30 to 50 percent.
- No methods were available to screen diabetic patients for early signs of kidney injury, so preventive treatments were not possible.
- Few treatments for kidney disease were available, and the importance of controlling blood sugar and blood pressure was not recognized.
- Kidney failure was increasing at epidemic rates. Through the 1980s and 1990s, the number of patients developing end-stage kidney failure nearly doubled each decade.

Today

- An estimated 23 million American adults have chronic kidney disease. Currently the NIH spends \$655 million on kidney disease research.
- With good care, fewer than 10 percent of diabetics develop kidney failure.
- Management of complications has markedly improved the quality of life of dialysis patients. Dialysis dementia due to aluminum toxicity no longer occurs.
- Premature death due to cardiovascular disease and all other causes are higher in adults with chronic kidney

disease. Individuals with chronic kidney disease are 16 to 40 times more likely to die than to progress to kidney failure. High cardiovascular death rates in dialysis patients are also a serious problem.

- Transplantation is widely available, although limited organ availability has resulted in longer waiting times.
- Transplant failure due to acute rejection is much less common, with one-year success rates exceeding 90 percent.
- Kidney disease can be detected earlier by standardized blood tests to estimate renal function and monitoring of urine protein excretion. New drugs better control blood pressure and slow the rate of kidney damage by about 50 percent. An NIH education campaign informs patients and their doctors about the importance of early detection of kidney disease <http://www.nkdep.nih.gov/>.
- The disease pathways that cause damage to the kidney filter (glomerulus) are becoming better understood.
- Because kidney disease often runs in families, the NIH has carried out several genetic studies of kidney disease. Researchers are learning how to identify genetic markers that might predict who will get kidney damage, especially in African-Americans.
- As a result of improved treatment, the number of new dialysis patients has stabilized.
- The savings to Medicare for each patient who does not progress to dialysis is estimated to be \$250,000 per patient. Overall estimated Federal savings from recent improvements in preventing kidney disease is approximately \$1 billion per year.
- The Medicare program spends approximately \$24 billion per year for care of the over 525,000 U.S. patients with end-stage kidney failure. This represents nearly 6 percent of Medicare expenditures. Including the cost to other payors and out-of-pocket expenses, the total annual bill for treating kidney failure is over \$35 billion.

Tomorrow

- The continued development and testing of new detection strategies, therapies, and community education will result in fewer people developing advanced chronic kidney disease and kidney failure, requiring less need for dialysis and transplantation. The NIH is conducting research that will help us realize these benefits for patients.
- As researchers pinpoint additional genetic variants, they are learning how to identify genetic markers that might predict who will get kidney damage, identify key disease pathways, and new drug treatment strategies. These genetic studies are yielding clues about how to intervene earlier in disease progression and to intervene more effectively. We want to extend the success in preventing or delaying progression to end-stage kidney disease in people with diabetes to other common causes of kidney injury such as high blood pressure, glomerulonephritis, and cystic disease.
- Accelerated cardiovascular disease is the main cause of death in kidney disease patients. Ongoing longitudinal studies will determine new risk factors for accelerated cardiovascular disease, and may permit individualized prevention strategies.
- If detected sufficiently early, it may be possible to restore lost kidney function. More aggressive management of diabetes and high blood pressure, as well as drugs that target kidney fibrosis, may give patients additional years of life without dialysis.
- For those patients who need dialysis, NIH is studying whether more frequent dialysis improves physical function and cardiovascular health. Studies are also underway to examine the factors that influence the functioning of fistulas—a surgically-created site used to access blood—in patients undergoing hemodialysis.
- Despite our best immunosuppressant therapies, a number of patients with kidney transplants still lose their transplanted kidney due to chronic rejection. Better strategies to maintain the function of transplanted kidneys and prevent chronic scarring are likely to emerge from on-going basic research and improved imaging methods.

- The best hope for reducing the human and economic costs of chronic kidney disease and end-stage renal disease lies in prevention. The NIH's National Kidney Disease Education Program works to bridge the gap between scientific evidence and clinical practice by focusing on the minority communities at highest risk of kidney disease and the healthcare professionals who serve these patients <http://www.nkdep.nih.gov/>.

For more information, contact The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK):

NIDDKinquiries@nih.gov

www.niddk.nih.gov