Before there was talk of “death panels,” there were so-called “God Committees,” which decided who among those suffering from life-threatening End Stage Renal Disease (ESRD) would receive life-saving kidney dialysis and who would not and would therefore die. These hospital-based committees were necessary because dialysis was extremely expensive and the number of dialysis machines was limited. To end this rationing of care, the U.S. Congress voted, with less than 30 minutes of debate, to include coverage of ESRD in the 1972 amendments to the Social Security Act. This guaranteed that anyone diagnosed with irreversible kidney disease would be covered by Medicare—no matter how old, or young, they were.

At the time, there were only about 7,000 people with ESRD. Fast forward 39 years. Today, there are close to half-a-million people with ESRD in the United States, at an estimated cost of $40 to 50 billion per year—and the fastest growing group of ESRD patients are people over 75.

Back when kidney disease treatment was first placed under the Medicare umbrella, there were only two effective treatments for ESRD—kidney transplantation and dialysis, a far-from-ideal mechanical filtration of the
blood. Today, almost four decades later, those are still the only options for patients whose kidneys have failed.

**Back to basics**

That is why the Harvard Stem Cell Institute’s Kidney Disease Program is so important. Led by Benjamin Humphreys, MD, PhD, and Andrew McMahon, PhD, the program’s main goal is to use stem cell biology and high-level cell biology to advance our understanding of the basic function of the kidney, what occurs when it’s injured and how it repairs itself.

**HSCI’s consortium approach**

The HSCI Kidney Program is one of, if not the most substantial efforts of its kind in the world, with 35 Principal Investigators and more than 100 scientists, including developmental biologists, zebrafish experts, experts in microscopy, and specialists in mouse models of kidney disease. The goal of this consortium that assembles these leaders from the major Harvard-affiliated hospitals, Harvard Medical School, and the Faculty of Arts and Sciences, is to identify new treatments for humans with kidney injury and kidney failure. The strategy is to bring these kidney investigators together through inter-lab meetings, think tanks and seed grants, to develop collaborative approaches to tackle the most challenging problems in the field: namely, identifying new regenerative therapies for patients suffering from kidney disease.

The Kidney Program has already narrowed its focus to one particular region of the kidney, the proximal tubule, a part of the kidney that is most susceptible to injury but that also has the greatest repair capacity. Understanding this repair process offers the hope of designing new therapies that accelerate repair, or prevent the repair capacity from becoming diminished.

**Defining new protocols**

One of the group’s main areas of research involves developing protocols to direct embryonic stem cells, or induced pluripotent stem cells, to become proximal tubule epithelial cells. In addition to being a source for cellular therapy, these cells would provide a limitless source for toxicity testing of new drugs, as well as open the door to additional therapies by providing researchers with a better model of genetic kidney diseases.