

A Story of Brokenness, Hope, and Restoration

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The book of Genesis begins with a narrative of God as the Creator: “In the beginning God created the heavens and the earth” (Gen. 1:1). Affirming this truth, the psalmist declares: “For he spoke, and it came to be; he commanded, and it stood firm” (Ps. 33:9). The apostle Paul says just as much when he ascribes to God the unique prerogative of giving “life to the dead” and calling “those things which do not exist as though they did” (Rom. 4:17 NKJV). The biblical narrative also states that God created humans “in his own image” (Gen. 1:27), which suggests, among other things, endowment of humans by their Creator with attributes not found in the rest of creation.

At the end of the Creation week, everything God had made was indeed “very good” (Gen. 1:31). Scripture does not tell us how long the original state of perfection lasted before sin entered the world, and with sin came pain, suffering, and death. If we understand design to infer the capacity to fashion material substance from a mental template, it is conceivable that the Omnipotent vested humans with the capacity to think (*design*) and act in order to equip them as co-workers in the plan of the restoration of fallen humanity. The apostle Paul affirms this when he states that “we are co-workers in God’s service” (1 Cor. 3:9).

The co-working of God and humans is especially revealed by our capacity to design and fabricate equipment whose medical applications minimize human pain and suffering. Ever since I was diagnosed with end stage renal disease (ESRD, or kidney failure) almost 20 years ago, I have relied heavily on dialysis therapy for survival.

The term “dialysis” refers to the process of separating substances in a liquid based on their ability to pass through a membrane. In a clinical setting, the dialysis procedure purifies blood in patients who have been diagnosed with kidney failure. Two forms of dialysis are currently used in clinical settings. In peritoneal dialysis, a solution (dialysate) is infused into the abdominal cavity for a predetermined time. Through the peritoneal membrane, which lines the abdominal cavity, waste diffuses from the blood into the dialysate and the waste-laden dialysate is periodically replaced with fresh solution as prescribed by the physician. In hemodialysis, a human-made membrane (dialyzer) is used to filter wastes and remove extra fluid from the body.

ESRD ranks high on the list of diseases associated with failure of body organs.¹ The dialysis machine is bulky, but its centerpiece is a small structure referred to as the “dialyzer” and is essentially an artificial kidney. Blood and the dialyzing fluid are funneled into this dialyzer, where the two fluids come very close to each other but flow in opposite directions, a phenomenon referred to as countercurrent flow. This flow arrangement creates a concentration gradient between the two fluids, providing the impetus for the waste to diffuse from blood into the cleaning fluid. The dialysis process occurs along the entire length of the cellophane membrane separating the two fluid chambers and at the end, the clean blood is returned to the body while the waste-laden fluid is drained away.

The artificial kidney has improved the quality of medical care and drastically reduced the mortality associated with ESRD.² In the United States alone, over 600,000 people are currently receiving some form of treatment due to ESRD.³ According to the World Kidney Day website, 8%–10% of the global population suffers from kidney diseases, which now rank high among the major non-communicable diseases.⁴ According to the World Health Organization (WHO) bulletin, kidney disease presents risks “across the socioeconomic spectrum from poverty to affluence, from malnutrition to obesity, in agrarian to post-industrial settings, and along the life course from newborns to older people.”⁵

The human kidney is a relatively small organ, the size of a human fist. Most people have two of them and they are stuck at the back of the abdominal cavity from where they silently do their job of maintaining constancy of the body's internal environment. The functions they perform include (1) regulating the body's electrolyte levels; (2) maintaining proper fluid volume and blood pressure; (3) signaling the bone marrow to make hemoglobin, which transports gases throughout the body; and (4) regulating the acidity and alkalinity of body fluids.

For both artificial and natural kidneys, solute movement depends on four critical factors: (1) the concentration gradient between the two solutions, (2) the surface area of the dialyzing membrane, (3) the amount of time the two fluids are in close proximity, and (4) the permeability of the dialyzing membrane.

Although it is necessary that human beings be maintained on dialysis following loss of kidney function, human intervention can only go so far. It turns out that the artificial kidney only contributes about 15% of the functions performed by the natural organ. It is therefore no wonder that the health of a patient on dialysis never truly returns to its pre-disease state but is maintained at a new normal. To me, this is a constant reminder that the brokenness we experience in this life will only be healed completely when the Creator makes "everything new" (Rev. 21:5).

A third option available to some ESRD patients involves receiving a donated organ. Transplantation of a donor kidney has the potential to restore body functions to a level sufficient to maintain homeostasis.⁶ This enables a longer life with fewer health problems than is possible with those maintained on dialysis therapy. But there is a caveat here too: unless the donor and recipient are identical twins, all other recipients of a transplanted organ have to be on a regimen of immunosuppressant drugs in order to forestall organ rejection.

As I reflect on my experience as a patient with ESRD, I am encouraged by God's foresight and equipping that has given me extra years to celebrate life. Although there is pain and suffering in this

fallen world, there is also beauty and grace, and we need to celebrate this. When the apostle Paul pleaded for release from his suffering, he received a most precious promise: “My grace is sufficient for you, for my power is made perfect in weakness” (2 Cor. 12:9). Pain and suffering may be the lot of humans in their fallen state, but God has already provided sufficient grace and hope of restoration. Like the apostle Paul, we too can “glory in tribulations, knowing that tribulation produces perseverance; and perseverance, character; and character, hope. Now hope does not disappoint, because the love of God has been poured out in our hearts by the Holy Spirit who was given to us” (Rom. 5:3–5 NKJV).

NOTES

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1. JE Hall. Diuretics, kidney diseases. In: Guyton and Hall textbook of medical physiology. 13th ed. Philadelphia (PA): Elsevier, 2016; pp. 440–441.
2. M Mineshima. Optimal design of dialyzers. In: Kawanishi H, Takemoto Y, editors, Scientific Aspects of Dialysis Therapy: JSDT/ISBP Anniversary Edition, Contributions to Nephrology, Basel: Karger; 2017; 189:204–209. doi:10.1159/000450802.
3. Hall, op. cit.
4. Chronic kidney disease.: <https://www.worldkidneyday.org/faqs/chronic-kidney-disease/> [accessed June 25, 2020]; US Dept. of Health and Human Services, National Vital Statistics Report. Washington, DC; 2018. https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_05.pdf [accessed June 25, 2020].
5. VA Luyckx, M Tonelli, JW Stanifer. The global burden of kidney disease and the sustainable development goals. Bulletin of the World Health Organization 2018; 96(6):414–422D. Published online April 20, 2018. doi:10.2471/BLT.17.206441.
6. 6. Hall, op. cit.

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