To “boost innovation in the fight against cancer” as part of the reignited Cancer Moonshot, the Biden administration, on Thursday, February 2, 2023, announced CancerX (1). According to the administration, this public-private partnership “will build on previous models deployed by successful HHS [US Department of Health and Human Services] InnovationX program accelerators such as KidneyX [The Kidney Innovation Accelerator]” (2).

In the 5 years between Thursday, April 26, 2018—when ASN and the Trump administration established KidneyX (3)—and the announcement about CancerX earlier this year, HHS has launched several similar initiatives, including InnovationX, LymeX, PandemicX, and PreventionX. These public-private partnerships are housed in the Office of the Assistant Secretary for Health at HHS and structured similarly to highlight unmet needs, support innovation, advance solutions, and build community to overcome challenges that private markets and government agencies cannot solve alone. Representatives Larry Bucshon, MD (R-IN), and Suzan DelBene (D-WA)—who co-chair the Congressional Kidney Caucus—and Senators Ben Cardin (D-MD) and Todd Young (R-IN) have been tireless advocates for the more than 37 million Americans with kidney diseases. Having successfully secured $20 million in funding to support KidneyX since fiscal year (FY) 2020, they are currently seeking an additional $25 million in funding for FY 2024. Their leadership has also resulted in congressional acclaim for KidneyX, making it synonymous with bold innovation. Due to this bipartisan, bicameral support, it is not surprising that the Biden administration used KidneyX as a model to spur innovation in other diseases, especially as part of reigniting the Cancer Moonshot.

To accomplish its mission of accelerating “innovation in the prevention, diagnosis, and treatment of kidney diseases,” KidneyX is built on four pillars (3):

1. Offering funding opportunities through prize competitions for unmet needs in kidney diseases
2. Coordinating regulatory and payment policies across HHS—including the National Institutes of Health, Food and Drug Administration (FDA), and Centers for Medicare & Medicaid Services (CMS)—to clarify pathways to commercializing innovations
3. De-risking commercialization to attract outside investment capital and partnerships
4. Creating a sense of urgency on behalf of people with kidney diseases

By evaluating each of these pillars, ASN can help HHS, the rest of the kidney community, the Congressional Kidney Caucus, and the Senate KidneyX champions assess the first 5 years of KidneyX and plan for its future.

Pillar 1: Offering Funding Opportunities. In its first 5 years, KidneyX designed, supported, and completed six separate prize competitions:

- Artificial Kidney Prize Phase One
- Artificial Kidney Prize Phase Two
- COVID-19 Kidney Care Challenge
- Patient Innovator Challenge, which was funded by the National Kidney Foundation (NKF)
- Redesign Dialysis Phase One
- Redesign Dialysis Phase Two

Through these six competitions, KidneyX has awarded approximately $17 million to 75 winners in 26 different US states (as well as one recipient in the United Kingdom, supported directly by ASN). Besides starting to bring new innovators into the kidney community, KidneyX’s winners have included university-based start-ups, such as Relavo; researchers from other fields, such as those at VaseBio, who can apply their expertise toward unmet needs, creating kidney diseases accurately reflect the patient population.”

Dr. Califf responded to ASN and NKF on Tuesday, February 14, 2023, emphasizing: “FDA recognizes the morbidity and mortality associated with kidney disease, the unmet needs of patients living with kidney disease, and the urgent need to make additional treatment options available, particularly for underserved minorities.” He added, “FDA looks forward to continued productive and valued interactions with ASN and NKF to help facilitate the development and availability of effective and safe therapies for people living with kidney disease.”

Pillar 2: Coordinating Payment Policies across HHS. Based on its ongoing focus on the payment landscape, ASN included recommendations concerning this issue in a response to a CMS Request for Information (CMS-5409-NC) on Tuesday, February 1, 2022 (10). In its response, ASN “called for increased transparency and predictability in the Medicare payment systems.”

For TPNIES, CMS requires evidence of improved care, including: “a demonstrated ability to protect and promote public health” (12). The FDA uses a 510(k) clearance to demonstrate that a new medical device is similarly safe and effective in comparison with another cleared device with the same intended use.

For years, ASN and other members of the kidney community have also raised concerns about two new payment designations within the Medicare End Stage Renal Disease Prospective Payment System, which is also known as “the bundle.” Through the Transitional Drug Add-on Payment Adjustment (TDAPA), eligible new drugs can receive a temporary pass-through payment outside of the bundle, and the Transitional Add-on Payment Adjustment for New and Innovative Equipment and Supplies (TPNIES) is intended to incentivize early adoption of eligible new and innovative equipment, such as home dialysis machines.

For TPNIES, CMS requires evidence of improved care, specifically for people eligible for Medicare coverage. Additionally, by requiring evidence of substantial clinical improvement that is not clearly defined, TPNIES requires an even higher, and less clear, threshold than TDAPA. In fact, the Taber Hemodialysis System from KidneyX winner Onset Medical is the only medical device to receive TPNIES approval from CMS.

On Thursday, May 11, 2023, the House Committee on Ways and Means’ Subcommittee on Health (which has jurisdiction over Medicare) held a hearing on medical innovation and access to care. During the hearing, several members of Congress expressed their concerns about barriers faced by
device companies in obtaining insurance coverage after the FDA BDD, thereby stalling innovation and limiting patient options. Among those demanding clear metrics for insurance coverage was Representative DeBiane, who has previously sponsored legislation that would provide traditional Medicare coverage for breakthrough devices.

Pillar 3: De-Risking Commercialization. To encourage investment in the kidney arena, KidneyX has held annual in-person and virtual summits (including one on Monday, June 12, 2023, in Washington, DC), pitch sessions at ASN Kidney Week in 2019 and 2022, and Capital Market Days (in London, England, and virtually) and continues to connect network and other entrepreneurs with experts in the kidney community. Last month, KidneyX initiated a webinar series on kidney entrepreneurship that focuses on common pitfalls preventing the advancement of kidney technologies with strategies to overcome them, trends shaping the xenotransplantation and artificial kidney markets, current patient flows for dialysis to understand where artificial kidneys can provide the most benefit, and the existing landscape of emerging technologies in home dialysis and kidney transplant (13).

In 2022, the FDA cleared devices developed by two KidneyX prize winners. VenoStent received BDD from the FDA on its innovative vascular access technologies, while Alocin received $1.25 million in Phase 1 and 2 Small Business Innovation Research funding. During its first year, the NKF Innovation Fund supported $4.5 million in grants to 12 companies across HHS, de-risk commercialization to attract outside investment capital and partnerships, and create an even greater sense of urgency on behalf of people with kidney diseases. Such an approach would prove that “we are making a critical difference.”

In addition to funding the KidneyX Patient Innovator Challenge, NKF in 2022 launched the NKF Innovation Fund, “a new investment program aimed at fundamentally disrupting the treatment and prevention of kidney disease” (15). During its first year, the NKF Innovation Fund supported three KidneyX Winners: NKF-funded Prizes: Prizes (formerly Renovate), Kuleana/University of Washington, and Relavo. Relavo has also received $1.25 million in Phase 1 and 2 Small Business Innovation Research funding from the National Science Foundation.

Demonstrating KidneyX’s unique potential to excite, catalyze, and activate private markets to support innovation in kidney health, other winners to receive additional funding after their prize award include:
- VenoStent: $2.5 million in seed funding
- VasoRef: $3.5 million in follow-on grant funding from the California Institute for Regenerative Medicine
- NintiCap Medical: $3.2 million from the Michigan Biomedical Venture Fund

The Kidney Project/University of California, San Francisco, School of Medicine: $6.7 million from Amgen Ventures, the John and Marcia Goldman Foundation, and other contributors

Mikromatrix Medical: $20 million in Series C financing, followed by $43 million initial public offering (IPO)

Outset Medical: $27.9 million in its IPO

In evaluating KidneyX, it is important to question whether this level of private funding is enough. Have KidneyX’s prize competitions (jointly administered by ASN and HHS) done enough to de-risk commercialization to attract outside investment capital and partnerships? The KidneyX Steering Committee is well positioned to consider this and related questions.

Pillar 4: Creating a Sense of Urgency. On Wednesday, July 10, 2019, the Executive Order on Advancing American Kidney Health (EO 13879) was signed, making it the nation’s first presidential directive focused on overarching policy objectives for one disease. On that day, the success of KHI, HHSS’s commitment to KidneyX, and unified advocacy by ASN and the rest of the kidney community helped make improving kidney health federal policy in the United States.

To “encourage the development of an artificial kidney,” the executive order requested that HHS “produce a strategy for encouraging innovation in new therapies through the Kidney Innovation Accelerator (KidneyX), a public-private partnership between the Department and the American Society of Nephrology” (16). This request helped amplify the community’s advocacy efforts, galvanize support in Congress, capture the attention of the media and investors, and focus the KidneyX Steering Committee on the Redesign Dialysis and Artificial Kidney Prize.

Beyond the executive order, KidneyX has involved people with kidney diseases in everything it does: serving as members of the KidneyX Steering Committee (NKF Chief Executive Officer Kevin Longino and musical artist David Rush), incorporating the patient perspective as scored criteria in all submissions, including patients as judges on review panels, and offering a Patient Innovator Prize.

At KHI Strategy Committee, Member Glenda V. Roberts said when she received the ASN President’s Medal at Kidney Week 2022, “I think that the most exciting project that’s going on is KidneyX, because KidneyX is facilitating innovation.”

After 5 years, KidneyX has made considerable progress despite the COVID-19 pandemic, a change in presidential administrations, and an expanded portfolio of innovative accelerators at HHS. During the Biden administration, the Office of the Assistant Secretary for Health at HHS has been responsible for KidneyX as a public-private partnership with ASN, HHS Assistant Secretary for Health Admiral Rachel L. Levine, MD, has been hugely supportive of KidneyX, and ASN members, leadership, staff, and I, as well as the rest of the kidney community—co-founders, representatives, KidneyX Steering Committee, and Representatives Buchd and DeBiane and Senators Cardin and Young—owe our gratitude and appreciation.

Given Admiral Levine’s support, two consecutive presidential administrations’ interest in public-private innovation accelerators, like KidneyX, backing from the Congressional Kidney Caucus and Senate champions; the Executive Order on Advancing American Kidney Health; and KidneyX’s first 5 years of success, the time is right for ASN and the rest of the kidney community to advocate for the establishment of the HHS Office of Kidney Health and Transplantation. The announcement of the Organ Procurement and Transplantation Network Modernization Initiative by HHS’s Health Resources and Services Administration on Wednesday, March 22, 2023, creates even more momentum, with a new focus on the need for this approach (17).

As I noted in the April 2023 issue of ASN Kidney News, “the oversight, administration, and delivery of care for the more than 37 million Americans with kidney diseases, kidney failure, and kidney transplants are spread across the federal government” (18). Besides offering an ideal home for KidneyX, the HHS Office of Kidney Health and Transplantation would also enhance efforts to offer funding opportunities through prize competitions and other mechanisms, coordinate regulatory and payment policies across HHS, de-risk commercialization to attract outside investment capital and partnerships, and create an even greater sense of urgency on behalf of people with kidney diseases.

References

Table 1. KidneyX Steering Committee

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<thead>
<tr>
<th>Member</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Elazar Edelman, MD, PhD</td>
<td>Massachusetts Institute of Technology</td>
</tr>
<tr>
<td>Linda F. Fried, MD, MPH, FASN</td>
<td>VA Pittsburgh Healthcare System</td>
</tr>
<tr>
<td>RADM Michael Iademarco, MD, MPH</td>
<td>Department of Health and Human Services</td>
</tr>
<tr>
<td>Paul E. Klotman, MD</td>
<td>Baylor College of Medicine</td>
</tr>
<tr>
<td>Emily Levy, MBA</td>
<td>Synergy Partners</td>
</tr>
<tr>
<td>Kevin Longino</td>
<td>National Kidney Foundation</td>
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<tr>
<td>Sandeep Patel, PhD</td>
<td>Biomedical Advanced Research and Development Authority</td>
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<tr>
<td>Saira Ramasastry, MA, MS</td>
<td>Life Sciences Advisory</td>
</tr>
<tr>
<td>David Rush</td>
<td>Patient advocate</td>
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<tr>
<td>John R. Sedor, MD, FASN</td>
<td>Cleveland Clinic</td>
</tr>
<tr>
<td>Danilo Tagle, PhD</td>
<td>National Institutes of Health</td>
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<td>Bruce J. Tromberg, PhD</td>
<td>National Institutes of Health</td>
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Progressive CKD and Adverse Events: New UK Data

In patients with chronic kidney disease (CKD), adverse clinical events increase with disease stage and dialysis status, especially incident dialysis, reports a study in BMC Nephrology.

The analysis included data on 310,953 patients with CKD, identified from the UK Clinical Practice Research Datalink from 2004 through 2017. The study focused on selected adverse clinical events that may be difficult to measure in randomized trials. Event rates were compared by dialysis status and modality, baseline CKD stage, and observation period.

At index, 601 patients had dialysis-dependent CKD (DD-CKD). Among those with non-DD (NDD)-CKD, the disease stage was 3a in 71.7% of patients, stage 3b in 23.0%, stage 4 in 4.8%, and stage 5 in 0.4%. The median age was 67 years in the DD-CKD group versus 76 in the NDD-CKD group. Women accounted for 60.4% of patients with NDD-CKD, 39.2% with DD-CKD, and 39.1% with incident DD-CKD (IDD-CKD).

Patients with NDD-CKD had fewer comorbidities, higher hemoglobin, and lower C-reactive protein compared with the DD-CKD or IDD-CKD group. Within the NDD-CKD group, comorbidity was higher at lower estimated glomerular filtration rate levels.

Among patients receiving dialysis, the most frequent adverse clinical events were pneumonia/respiratory infection: incidence rate, 18.0 per 100 patient-years in the DD-CKD group and 19.9 in the IDD-CKD group compared with 9.3 in the NDD-CKD group. Incidence rates and all-event rates were generally higher in patients who were DD, including a 6.5-fold increase in hyperkalemia and a 6.9-fold increase in infection/sepsis in the DD-CKD group. In the IDD-CKD group, these increases were 7.4-fold and 9.4-fold, respectively.

Adverse event rates were higher during more recent observation periods. Mortality during follow-up was higher in the two dialysis groups and in patients with stage 4 or 5 disease in the NDD-CKD group. Adverse events and mortality were higher in patients receiving hemodialysis compared with peritoneal dialysis.

Among patients with CKD, rates of adverse clinical events and mortality are higher in patients who are DD and those with higher-stage CKD. Risks are particularly high in patients with IDD. The researchers conclude: “Our findings highlight the need to monitor patients with CKD for comorbidities and complications, as well as signs or symptoms of clinical adverse events, such as hyperkalemia, hypoproteinemia, retinal disorders, seizures, and infection/sepsis.”


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