# Clinical Practice Today



10 Regionalized Therapies Can Prolong Life for Patients with Metastatic Cancer

Treatments can be positive adjuncts to standard systemic therapies





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New Protocol Using **13** Hepatitis C-Positive Kidneys Increases Transplants

Retinal Imaging Repository 14 Augments Resources to Study Neurodegenerative Disease



#### **Clinical Practice Today**

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Since 2017, hundreds of thousands of individual images have been added to the repository

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# News Briefs

# Remote Cardiac Rehabilitation Program Launched During COVID-19 Response

A Duke Heart and Population Health Sciences collaboration to launch remote cardiovascular rehabilitation using digital monitoring was accelerated this spring as a response to COVID-19.

In early April, the first patients participated in prescribed rehabilitation activities tracked digitally with wearable devices. Specialists at the Duke Health Cardiopulmonary Rehabilitation Center monitored results to provide feedback and guidance. Recorded data included an electrocardiogram rhythm strip. In the future, a remote data review will include blood pressure, weight, and glucose level.

Duke's effort is among the first remote cardiovascular rehabilitation programs in the nation, says William E. Kraus, MD, a cardiologist, medical director of Duke Cardiopulmonary Rehabilitation, and advocate for remote rehabilitation.

"The urgency of our concerns about the effect of COVID-19 on patients with cardiovascular complications prompted us to move forward more rapidly than we planned," says Kraus. "Fortunately, we had already created an interface with Duke's medical infrastructure and established the key partnerships."

Remote rehabilitation may improve participation among patients recovering from cardiothoracic surgery, myocardial infarction, heart failure, and related conditions. Patient uptake of cardiovascular rehabilitation stands at about 15% in the U.S., Kraus says, although the percentage is "somewhat greater" in Duke's on-site rehabilitation program. Supporting the value of cardiac rehabilitation, a recent review of 180-day, all-cause rehospitalization and mortality among 240 cardiovascular rehabilitation patients reported a 40% reduction among patients who participated in a prescribed rehabilitation program. This was based on an analysis of Duke patients between 2010 and 2012, Kraus says.

# Hereditary Prostate Cancer Linked to Family History of Breast, Ovarian Cancers

A Duke study published in March 2020 in the *Journal* of *Clinical Oncology* found that if a man's female relatives have a history of breast and ovarian cancers, the man's risk for prostate cancer is also significantly increased, and that information should guide screening, testing, and treatment.

Previous studies have shown that certain cancers including breast, ovarian, pancreatic, and prostate are linked by inheritable mutations in *BRCA1* and *BRCA2* genes. The researchers built on that existing knowledge by examining the health and family history records of approximately 620,000 men over age 40. They also examined the risk for prostate cancer in men with a family history consistent with Lynch syndrome (hereditary nonpolyposis colorectal cancer).

Researchers found that the risk for prostate cancer varied by family history of cancer but was most strongly associated with early onset disease, defined as a prostate cancer diagnosis in men under age 56. A family history of hereditary prostate cancer conveyed the greatest relative risk for all prostate cancer subtypes combined, followed by hereditary breast and ovarian cancers and Lynch syndrome. The strongest risks associated with family history were observed for early onset disease in all cancer types, consistent with the contribution of genetic factors to disease occurrence.



# Effects of COVID-19 on the Health Care Industry: Current and Future Directions

By Meredith Lidard Kleeman

"The ability for physicians to see all sorts of patients

and not be restricted

and age limitations has been a lifesaver."

via telemedicine

based on location

How has the pandemic changed health care in the U.S.?

Although it's too soon to know what long-term effects the novel coronavirus will have on the U.S. health care system, it's clear that health care

organizations will need to reimagine many aspects of their operations in order to survive.

### Providers Fully Embracing Telemedicine and Telehealth

Health care spending dropped sharply in March and April 2020 as hospitals canceled

or postponed elective and nonessential procedures. In-person clinical visits also plummeted, leading to a rapid shift in telemedicine and telehealth adoption.

"I'm an allergist in private practice, and we went from 0% to 100% [telemedicine visits] in mid-March in a number of days," explains American Medical Association president Susan Bailey, MD. "Telemedicine enabled us to continue seeing our patients virtually, and we were able to keep the doors open for a few patients who had to come in for in-person treatments." More virtual visits also allowed for increased space to implement proper social

distancing measures.

"The ability for physicians to see all sorts of patients via telemedicine and not be restricted based on location and age limitations has been a lifesaver for many of us in clinical practice," Bailey adds.

As part of its emergency response, the Centers for Medicare & Medicaid Services

(CMS) quickly pivoted to paying parity for phone calls and video visits, and private insurers followed suit. Whether those payments will remain at parity is unknown; congressional action will be required to make the changes permanent.

Although most states fully or partially reopened in June, physicians are still seeing a drop in face-toface visits compared with visit rates before the pandemic began, says Ann Greiner, president and chief executive officer of the Primary Care

Photo credit: Maksim Tkachenko/iStock.

Collaborative, a not-for-profit organization that advocates for an effective and efficient health care system. Although practices are offering wellness

and chronic care visits, many patients are choosing not to come in.

Physicians can use patient health data to conduct wellness checks on their most vulnerable patients and reach out to them about safety measures to protect themselves from contracting the coronavirus. During these phone calls, practice staff can also ask has reemphasized the importance of providing high-quality care for patients with chronic conditions.

The pandemic

whether patients need to schedule a telemedicine or in-person visit to address any health concerns.

Although the global pandemic has revealed the promise of telehealth, it has also revealed drawbacks. Physicians are seeing an exacerbation of chronic conditions among patients because of delayed in-person care, as telemedicine isn't always able to offset the benefits of seeing patients in an office setting.

### Federal Assistance, Value-Based Payments Helping to Keep Practices Open

The federal government has dispersed hundreds of billions of dollars in funds to help hospitals and health systems cope, but many small physician practices are struggling to stay afloat. Some practices have received financial help from the Paycheck Protection Program and the Coronavirus Aid, Relief, and Economic Security (CARES) Act. In addition to federal relief funds, some practices received cash infusions through the CMS Accelerated and Advance Payment Program and quality-based bonus payments from some insurance partners. The value-based payment model has allowed some practices to keep their doors open. Many health care providers anticipate further adoption of value-based payment models because of their emphasis on quality. The pandemic has

reemphasized the importance of providing high-quality care for patients with chronic conditions who are most susceptible to COVID-19. Yet, value and quality are nebulous terms, Bailey says, and the health care industry needs "to take a hard look at what value really means and how we can really measure it" before meaningful reimbursement changes can be achieved.

# Supply Chain's Effects on Personal Protective Equipment (PPE)

The just-in-time supply chain and rapid delivery of health care goods has been the standard operating model for hospitals and clinics since the advent of online purchasing. This model has allowed organizations to operate on a leaner budget and freed up storage space for unnecessary stockpiles of inventory. Unfortunately, this model led to a catastrophic lack of PPE for health care workers on the front lines.

The U.S. has not only become dependent on foreign sources of manufacturing for PPE, but also for medications. "It's clear that we need much more robust manufacturing in the U.S.," Bailey says. "We need to build up American sources and learn how to stockpile things in a way that makes economic sense."

Physician practices will need to examine their budgets and find ways to fund large quantities of PPE. "I think that we'll be using PPE on a routine basis for the foreseeable future," Bailey adds. "We have to have the supplies we need and not depend on next-day delivery." **V** 

# Cardiometabolic Clinic Offers Collaborative Care for Patients with Comorbidities

#### By Tim Pittman

Duke specialists working independently to treat patients with diabetes, cardiovascular disease, kidney and liver disease, and related comorbidities have joined forces to create a distinctive multidisciplinary clinic dedicated to the challenges of cardiometabolic disease.

Patients with multiple conditions, often associated with diabetes or cardiovascular disease, must organize regular visits to primary care, cardiology, and endocrinology. Many require additional consults with nephrologists, hepatologists, and related specialists.

Managing multiple risk factors is challenging because of the need to collaborate with multiple specialists, says Neha J. Pagidipati, MD, MPH, a cardiologist who leads the new Duke Cardiometabolic Prevention Clinic.

"For patients who need this level of comprehensive, coordinated care, we know that a multidisciplinary clinic offers a more effective model," Pagidipati says.

"Our patients typically have many uncontrolled risk factors contributing to chronic conditions that can be difficult to manage within a single clinic or specialty," Pagidipati explains. "By working with their PCPs and approaching the care of these patients as a team, we are more

"The patients are happier. Clinicians are happier, too."

effective. The patients are happier. Clinicians are happier, too."

The clinic includes several cardiologists as well as an endocrinologist, nephrologist, and hepatologist. Several advanced practice providers play key roles.

> The clinic addresses cardiometabolic disease by providing education, promoting lifestyle changes, prescribing and monitoring medications, managing side effects, and

ordering diagnostic tests. The clinic treats patients with the following risk factors:

- Obesity and related weight-management issues
- Uncontrolled high cholesterol, including statin intolerance, as well as the potential use of PCSK9 inhibitors for patients who require higher-intensity cholesterol medication
- Uncontrolled or hard-to-control type 2 diabetes mellitus
- Resistant hypertension
- Resistant dyslipidemia
- Nonalcoholic fatty liver disease

The coordinated care philosophy ensures that the metabolic team develops personalized treatment approaches that often involve new therapies emerging from clinical trials and research. Although the time lag between trial results and new guideline recommendations can stretch to decades, Pagidipati and her colleagues bring new approaches to patients more rapidly.

# Creating an Eco-Friendly Health Care Facility

By Meredith Lidard Kleeman

Environmental changes are affecting human health. Many medical experts believe that climate change is one of the leading public health issues of the 21st century. Furthermore, pollution has become a major cause of death and disease.

Ironically, the health care sector is a main contributor to pollution. A 2016 study published in *PLOS One* found that the U.S. health care system is responsible for 10% of the nation's greenhouse gas emissions.

Creating a climate-smart health care facility can not only benefit the environment but also reduce the cost of care and fulfill the health care sector's mission to improve patient well-being.

Amy Collins, MD, is an emergency physician and senior clinical advisor for physician engagement at Health Care Without Harm, an international nongovernmental organization that works to transform health care worldwide. She shares the following tips for creating a sustainable and climate-smart medical facility.

**1** Connect with your organization's sustainability team. Many hospitals and clinics have already implemented some simple eco-friendly changes, such as using energy-efficient light bulbs and providing recycling containers. But there is always the potential to do more, including transitioning to renewable energy. "Find out if your facility has already made a commitment to sustainability," Collins advises. "Talk to leadership about making that commitment and joining Practice Greenhealth," she says, which is one of the leading membership and networking organizations that provide sustainability solutions.

2 Educate yourself, your practice, and your patients. Connect with groups in the health care sustainability community, such as Health Care Without Harm, and invite a speaker to deliver a presentation to your staff. Inform your patients about any new environmentally friendly efforts, and make a commitment to the Health Care Climate Challenge, an initiative of Health Care Without Harm that supports climate-smart solutions in health care.

**3** Take individual action in your own practice. Remind staff about sorting waste appropriately. Red bag waste (i.e., biohazardous waste) is one of the most expensive waste streams to manage, Collins explains, and can cost 10 times more to properly dispose of than solid waste. Other actions include switching from single-use devices to reusable options when possible, providing prescriptions electronically, and limiting medication quantities and refills. Because pharmaceuticals are often disposed of improperly, "they have an environmental impact beyond the industry's carbon footprint," Collins adds.

Sustainable health care requires collaboration clinicians need to work with other health care stakeholders, Collins explains. "It's very difficult for a physician to implement an initiative in isolation or in a single department," she says. However, their voices are crucial. "Physicians can be very powerful advocates for climate solutions," Collins adds. ♥



# New Neurology Division Brings Consultative Care to Diverse Settings

By Lindsay Kenton and Lori Malone

A patient hospitalized for a heart attack may suddenly have a stroke. A patient hospitalized for a metastatic tumor may suddenly have a seizure. Providers within Duke's new Division of Hospital Neurology specialize in helping patients with complex, overlapping conditions across all three Duke hospitals.

In this Q&A, division chief Matthew W. Luedke, MD, discusses this expanded approach to patient care and the role of neurohospitalists in helping to fill gaps in inpatient and outpatient settings.

### How would you describe the new division and the benefits it brings to patient care?

Luedke: We are a multispecialty team of neurologists who provide inpatient neurological care—regardless of service line, regardless of where patients are receiving treatment within the hospital settings. Most of our department's other divisions tend to be subspecialty focused and located in a single space; for example, our neurocritical care faculty provide comprehensive care but exist within our neuro ICU. Some neurology patients may not be able to come to dedicated units, often because they're also dealing with complex non-neurological issues.

This is where our neurohospitalists shine: treating patients with liver failure in the medical ICU as they are having seizures, helping patients in the surgical ICU as they are having a stroke, or treating patients who need acute epilepsy care in the ED. There's a whole panoply of neurological disease that happens frequently in the setting of other disease that needs to be managed.

# How will Hospital Neurology affect Duke's other clinical divisions?

Luedke: I believe the new division will help our colleagues provide better patient care. Neurohospitalists sometimes see things that aren't visible to outpatient neurologists; for example, we may observe that patients with a certain disease have frequent readmissions because they don't understand what to expect in the outpatient setting. Seeing enough patients like this allows us to support our outpatient colleagues in managing complex cases.

# Do neurohospitalists need specific board certification or additional training?

Luedke: There's currently no board-specific certification dedicated to neurohospitalism, so we all bring our subspecialty expertise to patient care and work as a team. The field of acute care neurology is complicated enough with advances in stroke care and evolving paradigms in neurointensivism and pain management, so it's very helpful to be able to take advantage of each other's expertise in an intradisciplinary way and ensure the very best coordinated care for our patients. Communicating Effectively with Older Patients Who Have Cognitive Impairment



The size of America's older population is expected to increase dramatically in the next three decades. As the aging population grows, the number of individuals living with cognitive impairments, such as dementia and Alzheimer's disease, will also increase.

PCPs are on the front lines of diagnosing and treating patients with age-related cognitive impairments. Many patients with cognitive impairment have at least one chronic condition, and health care providers are tasked with communicating treatment recommendations clearly and concisely. Lorraine Sease, MD, a Duke family medicine physician, offers the following tips for physicians on effective communication with their older patients.

**Talk to patients one-on-one.** If the patient is comfortable, Sease encourages physicians to speak to patients in a one-on-one setting. "It can be hard for family members to let the patient talk," she explains. Other providers, such as a physician assistant or nurse, can gather more information from the family member or caregiver at the same time.

Gathering a full patient history is imperative when determining appropriate treatment, but time constraints can be challenging. Sease asks her patients' family members to submit written information that she can review before the visit.

#### Direct patients and caregivers to support networks.

"Helping families navigate caregiving challenges is one of my hardest issues," Sease says. The behavioral issues that are often associated with dementia and Alzheimer's disease, such as agitation, aggression, and major personality changes, can create safety concerns for caregivers. Sease advises patients and caregivers to call the Alzheimer's Association 24/7 helpline if they have questions (800-272-3900). Additionally, many states provide family support programs that are free to their residents, such as North Carolina's Duke Dementia Family Support Program, which offers resources for staying engaged while social distancing.

**Review medications.** Clinicians may sometimes prescribe medications and forget to consider whether that medication is still indicated months or years later. Older patients often see multiple health care providers, and their PCP may not be aware of all the medications that a patient has been prescribed. "It's easy when you're a new provider to look at a medication list and say, 'These three drugs are probably not worthwhile.' It's harder when you've been seeing somebody for 10 years, and these things have added on over the years," Sease explains. She makes an effort to regularly review medications with patients and recommends that patients ask their providers whether they still need a specific drug that has been prescribed.

# Regionalized Therapies Can Prolong Life for Patients with Metastatic Cancer

By Lori Malone

CT scan of the abdomen shows metastatic liver cancer.

Treatments can be positive adjuncts to standard systemic therapies.

Although systemic therapy for metastatic cancer remains the standard of care and the cornerstone of most cancer treatments, regionalized therapies are giving Duke surgical oncologists another option in their armamentarium for patient-centered care, helping to extend survival rates without increasing toxicity of systemic chemotherapy.

### Hepatic Artery Infusion (HAI)

Duke is currently the only medical center in the Southeast performing HAI therapy, which facilitates chemotherapy delivery at concentrations 300 to 400 times stronger than could be achieved intravenously. HAI is administered directly to the liver via a subcutaneous abdominal wall pump.

"The most common use of HAI is for metastatic colorectal cancer to the liver; a less common use is for unresectable intrahepatic cholangiocarcinoma," says Michael Lidsky, MD, a gastrointestinal surgeon and surgical oncologist who recently launched an HAI program at Duke. Lidsky explains there are three scenarios in which HAI therapy is typically applied:
Unresectable setting. "For patients who have too many tumors or tumors located in parts

of the liver where resection isn't possible, we can use HAI to control the liver disease, which ultimately improves survival."

- Conversion therapy. "For patients who have borderline resectable liver tumors, we can use HAI along with chemotherapy to downstage or shrink the disease, making surgical resection possible. Up to one-half of these patients are able to have the tumors converted to resectable status, and survival after surgery in this scenario is just as good as if the tumors were resectable from the beginning."
- Adjuvant setting. "For patients with resectable liver metastases, HAI can prolong life, delaying if not preventing—recurrence in the liver. In this scenario, the survival rate at 10 years with HAI is similar to that at five years with resection and chemotherapy alone, so essentially it doubles the survival."

# Isolated Limb Infusion (ILI)

In ILI therapy, a high dose of a heated chemotherapy agent is used to treat in-transit melanoma of the extremities to avoid damage to the rest of the body. Using percutaneous

Photo credit: Scott Camazine/Science Source.

catheters in the extremity, chemotherapy is infused at up to 30 times stronger than can be given systemically and is washed out of the body at the end of the procedure.

"Some cutaneous malignancies—most commonly melanoma, but often squamous cell carcinoma and Merkel cell carcinoma—can present as hundreds of in-transit lesions on a patient's arm, leg, or trunk that bleed and ulcerate, and it would be impossible to surgically resect them all," says surgical oncologist Georgia M. Beasley, MD, MHSc. "With ILI, patients don't get the systemic side effects they get from chemotherapy, and it's relatively well tolerated."

### Talimogene Laherparepvec (T-VEC)

Duke is one of the largest centers in the Southeast offering T-VEC therapy (Amgen, Inc., Thousand Oaks, CA) for in-transit melanoma of the extremities. T-VEC is an injectable oncolytic virus therapy made from a genetically modified herpes virus that shrinks melanoma cells in the skin and lymph nodes while avoiding healthy cells.

"We know that systemic therapies, like immunotherapies, will work in about 40% of patients with in-transit melanoma of the extremities," says Beasley. "Unlike organ metastasis, these skin lesions cause wounds that can be very difficult to care for. Although we generally recommend treating the whole body first with immunotherapy, many patients fail it or have significant wound problems, so we can use regional therapies like T-VEC."

### Isolated Liver Perfusion Device

Duke is currently participating in a national clinical trial of a novel metastatic ocular melanoma therapy: Melphalan Hydrochloride for Injection for Use with the Delcath Hepatic Delivery System (Melphalan/HDS; Delcath Systems, Inc., New York, NY). The system delivers a high-dose chemotherapy agent directly to the liver, minimizing side effects by filtering the agent from the blood. "Ocular melanoma tends to metastasize to the liver," Beasley explains, "and when that happens, it often involves almost the whole liver. Removing one lesion doesn't help. The Delcath system shows promise in these cases, so we're excited to be participating in this trial and looking forward to the results."

### Hyperthermic Intraperitoneal Chemotherapy (HIPEC)

HIPEC is a regionalized treatment strategy for peritoneal carcinomatosis, which occurs in up to 17% of people with metastatic colorectal cancer. During HIPEC, a chemotherapy agent is heated to between 41°C and 43°C and administered intraoperatively after debulking surgery to eradicate any microscopic cancer cells that remain after all gross tumor has been removed.

"During HIPEC administration, we shake the patient for about 90 minutes to distribute the chemotherapy throughout the abdominal cavity," says Dan G. Blazer III, MD, a general surgeon and surgical oncologist who specializes in HIPEC treatment.

"It's best accepted for disseminated low-grade appendiceal neoplasms and primary peritoneal malignancies and is more controversial for highergrade gastrointestinal and gynecologic malignancies," he says, adding that some long-term results are excellent, particularly when HIPEC is used to treat low-grade appendiceal neoplasms. "We're seeing five- and 10-year survival rates measured in the 70% to 80% or higher range in those cases," he says.

Duke has offered HIPEC since 2008 and continues to participate in national multi-institutional research efforts to further study the therapy.

"Physicians should be familiar with these therapies, which can be great options for the right patients. We're happy to evaluate any patient who might benefit from them, especially when standard-ofcare chemotherapy begins to fail or when patients aren't achieving expected results," says Lidsky. ♥



# Overcoming Hurdles in Clinical Decision Support

By Katherine Kahn

Clinical decision support (CDS) encompasses a variety of tools (Box 1) that can be delivered on various platforms, ranging from smartphones to cloud-based software programs. If not implemented properly, CDS can become an aggravating stumbling block for many clinicians. Robert Greenes, MD, PhD, professor of biomedical informatics at Arizona State University and the Mayo Clinic in Arizona, offers tips on successfully implementing CDS in physician practices.

### Customization

"A lot of the concerns I see on usability are bad design and bad user interface," Greenes says. EHR/CDS vendors are not necessarily the culprits, he explains—they just aren't able to adapt to every practice's needs. Having a good working relationship with the EHR or CDS vendor is crucial, and, in some instances, it may be a good investment to hire experts for help with customization, he adds.

#### BOX 1. Types of CDS

- Reminders and alerts
- Clinical guidelines/reference information
- Condition-specific order sets
- Patient data reports
- Documentation templates
- Diagnostic support

### Accurate Alerts

Crafting an alert or CDS tool to be as accurate as possible is another key to success. If there are too many obstacles to triggering the alert under the right context, "providers will either turn it off, if they have that option, or ignore it," Greenes says. When providers turn these alerts off, the quality of patient care can decrease. To set up relevant alerts, clinicians can focus on the "Five Rights" (Box 2).

# Up-to-Date CDS Tools

"Another challenge is keeping [CDS] up-to-date," Greenes explains. "Rules change, and order sets may change." Although larger health care systems have dedicated staff to do this, smaller practices should consider appointing an interested staff member to keep the system updated or consult their EHR/CDS vendor for assistance. **V** 

#### BOX 2. "Five Rights" for CDS Implementation 1. The *right information* (e.g., guidelines, expert consensus)

- 2. Delivered to the *right people* (appropriate care team members)
- 3. Via the *right channel* (e.g., EHR, mobile devices, patient portals)
- 4. In the *right format* (e.g., order sets, dashboards, flow sheets)
- 5. At the *right point* in workflow (to streamline decision making/action)

Photo credit: Charday Penn/iStock.

# New Protocol Using Hepatitis C-Positive Kidneys Increases Transplants

By Tim Pittman

Duke specialists have transplanted more than 60 hepatitis C virus (HCV)-positive kidneys into recipients who did not have the virus as part of a multidisciplinary initiative to address the acute organ shortage.

The HCV-positive organ transplant program has cut the wait time for some recipients in half from an average of five years to between two and 2.5 years, says Matthew J. Ellis, MD, a nephrologist and medical director of the Duke kidney transplant program. Some patients receive organs within a month of being placed on the transplant list, he adds. Blood types affect transplant compatibility and waiting time.

As part of the initiative, patients are counseled about the risk associated with HCV-positive organs and advised about antiviral therapy; they must consent to accepting an HCV-positive organ before participating in the program.

The kidney transplants and subsequent elimination of the virus were successful, Ellis says. The antiviral Mavyret (AbbVie, Chicago, IL), a glecaprevir and pibrentasvir combination taken orally once a day, is used to clear the HCV infection. No patient or allograft losses were reported, he adds, and the glomerular filtration rate (GFR) of the patients who have received transplants averages about 55 mL/min.

"It's harder to quantify how well the transplanted kidney is doing, but the GFR is about average for patients who do not have HCV," Ellis says. The HCV-positive organ transplant program is part of a Duke collaboration among the transplant, infectious disease, and hepatology programs. The Duke Institutional Review Board (IRB) created a protocol to oversee monitoring and therapy.

The initiative has resulted in twice as many kidney transplants as that of other organs, says Cameron R. Wolfe, MBBS, infectious disease specialist and IRB principal investigator. Through mid-June, the initiative has resulted in HCV-positive organ transplants involving 63 kidneys, 25 hearts, 17 lungs, and 27 livers.

The origin of HCV-positive organ transplants dates back more than five years when the FDA approved the first effective antiviral therapies. Shortly after the drugs were approved, two clinical studies assessing HCV-positive organ transplants prompted major transplant centers to examine the feasibility. Those two key clinical trials—Exploring Renal Transplants Using Hepatitis C Infected Donors for HCV-Negative Recipients (EXPANDER-1) and Transplanting Hepatitis C Kidneys into Negative Kidney Recipients (THINKER-1)—were influential in advancing pilot programs involving HCV-positive organ transplants.

"For years, when we looked at the data associated with HCV-positive kidneys, we understood that the organ did not last as long as an organ that was not infected," Ellis says. "But the positive effect of cutting the wait time in half is greater than the risk for kidney longevity." In fact, the health of the transplanted organ may prove to be longer than expected, Ellis says, after the virus is cleared. **U** 



Retinal Imaging Repository Augments Resources to Study Neurodegenerative Disease

**By Lindsay Kenton** 

"Imaging of the eye may assist clinicians in making a diagnosis earlier in the disease

course and also

future study."

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for comparison and

A growing global registry of deidentified, multimodal retinal and optic nerve images may have important implications for the diagnosis and treatment of individuals with neurodegenerative disease.

The registry of images is part of the Duke Neurodegenerative Disease Retinal Imaging (DNRI) repository initiative, led by retinal surgeons Dilraj Grewal, MD, and Sharon Fekrat, MD. The housed images are being studied to assess whether they can function as a diagnostic tool, as using these images for diagnosis would be much less invasive,

expensive, and time consuming to acquire than current diagnostic methods. Through optical coherence tomography angiography and ultrawidefield fundus photography, researchers capture highresolution images and evaluate individuals with dementia as well as those at risk for dementia.

"Because of the noted cor-

relation between ocular pathology and select neurodegenerative diseases, imaging of the eye may assist clinicians in making a diagnosis earlier in the disease course and also create a baseline for comparison and future study," Grewal says. "If we can diagnose Alzheimer's earlier, we may be able to enroll patients into clinical trials earlier, with a more accurate diagnosis. At the very least, we can deploy lifestyle changes that may slow the progression of dementia."

"If we're able to diagnose a neurodegenerative disease earlier and more easily with such ophthalmic images, it may help physicians and scientists

ultimately find an effective treatment," Fekrat adds.

The images of persons with neurodegenerative diseases contained in the DNRI repository are diagnosed by board-certified neurologists and include Alzheimer's disease (AD), mild cognitive impairment, Parkinson's disease, multiple sclerosis, amyotrophic lateral sclerosis,

Huntington's disease, and multiple system atrophy, among others. Individual images from

Photo credit: Thomas Porett/Science Source.

more than 800 patients currently in the repository are categorized according to diagnosis.

The images are being studied by multidisciplinary and multiinstitutional collaborators to determine whether these images may one day be used to make these diagnoses.

"As the prevalence of dementia grows as our society ages, we would benefit from

finding better ways to identify people who have neurodegenerative disease and those who are going to develop it," Grewal says. "Studying longitudinal images and observing changes in these images over time may have important implications with regard to studies of pharmaceutical interventions, as these images may be used to monitor treatment effect."

Fekrat notes that one of the major areas of focus by pharmaceutical companies has been amyloid plaque, which has been associated with AD but does not automatically indicate such a diagnosis. "More than 400 clinical trials studying medications to lessen or remove amyloid plaque have failed," she says. "Not everyone with amyloid has AD. Having the most accurate diagnosis is important when studying new medications."

Among Fekrat's and Grewal's findings from data in the DNRI repository is that the loss of blood vessels in the retina is present in those with AD compared to cognitively healthy individuals, but Fekrat adds, "We have so much more work

The biggest question is whether it is possible to diagnose a particular neurodegenerative disease by ocular imaging alone.

to do to be able to tell the difference among the various types of dementia using ophthalmic

images."

The biggest question is whether it is possible to diagnose a particular neurodegenerative disease by ocular imaging alone. Although this approach has not yet been validated, the use of artificial intelligence

and deep learning is helping researchers begin to distinguish imaging patterns in order to assign a particular diagnosis.

Since 2017, hundreds of thousands of individual images have been added to the DNRI repository, but researchers stress that many more are needed to draw clinically relevant conclusions that would change the current diagnostic paradigm. These images can also help further assess findings among different ethnicities and disease states and account for confounders such as diabetes and glaucoma.

To refer a patient who has been diagnosed with a neurodegenerative disease for ophthalmic imaging as part of this Institutional Review Board—approved study protocol, email dnri@duke.edu. (Fundus camera image on the previous page shows the human retina.)

To learn more or to refer a patient, call **844-790-2013** 



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Mechanical Circulatory Support for Patients With Advanced Heart Failure: A Focus on Left Ventricular Assist Devices Become more knowledgeable about the

benefits and limitations of left ventricular assist device (LVAD) therapy as well as recommendations for the use of LVADs in patients with advanced heart failure.

clinical.Med-IQ.com/a1316

### NEPHROLOGY



Transplanting HCV-Positive Kidneys Into HCV-Negative Recipients: What Do We Know?

Examine the rationale and current evidence for the transplantation of kidneys from hepatitis C virus (HCV)positive donors into HCV-negative recipients. clinical.Med-IQ.com/a1340

### ONCOLOGY



#### *Decision-IQ:* Management of HER2-Positive Breast Cancer With Brain Metastases: A Case-Based Activity

In this brief, case-based CME activity, meet

a 42-year-old woman with a history of human epidermal growth factor 2 (HER2)-positive breast cancer that metastasized to the brain and receive insights about the assessment, systemic treatment, and management of her condition. clinical.Med-IQ.com/a1329

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This brief activity explores the benefits and risks of available treatments for avascular necrosis, including emerging therapies such

as total talus replacement using 3D-printed prostheses. clinical.Med-IQ.com/a1319

### PULMONOLOGY



Biologics in the Treatment of Adults With T2-High, Uncontrolled Asthma

Learn about biologics approved by the United States Food and Drug Administration that are

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### UROLOGY



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