

Innovations in Oncology





Innovations in Oncology



KNIGHT
CANCER
Institute

20 cm

► The OHSU tram leaving Marquam Hill heading down to our new buildings at the South Waterfront.



Message from the director

Dear friends and colleagues:

We are excited to present the 2018 OHSU Cancer Committee Annual Report with a comprehensive look at the OHSU Knight Cancer Institute.

As the director of the Knight Cancer Institute, it is my job to continually reinforce our mission to “end cancer as we know it” and provide world-class, compassionate, individualized care for everyone in the Pacific Northwest and beyond.

On the heels of the opening of our Knight Cancer Research Building in September, we are expanding at the South Waterfront with two additional buildings opening in the Spring of 2019: Center for Health & Healing Building 2 – an extension of our clinical enterprise — and the Rood Family Pavilion, our home away from home for patients who travel more than fifty miles for care.

In this annual report, you will learn about the many things that position us as a knowledge leader in Oregon:

- Our efforts in precision immunotherapy featuring our leader, Dr. Richard Maziarz, and the groundbreaking work he and his team are doing for patients all over the world.
- A spotlight on the Cancer Early Detection Advanced Research Center lead by Dr. Sadik Esener to improve outcomes for cancer patients by finding cancer earlier.
- Precision oncology and SMMART trials will shape how advanced metastatic cancers are treated across several diseases.
- New advancements in clinical care, such as scalp cooling and pre-surgical wire localization.
- Robot-enhanced surgeries, ideal for head and neck surgery, to expand precision oncology.

OHSU Knight Cancer Institute continues to transform the way we care for our patients, and will continue to extend our expertise to the community. Working together, we envision a world freed from the burden of cancer.



Brian Druker

Brian Druker, M.D.

Director, OHSU Knight Cancer Institute
JELD-WEN Chair of Leukemia Research
Investigator, Howard Hughes Medical Institute

OHSU highlights



Community service

OHSU provides more than 200 community health programs in rural and urban areas across Oregon. In Fiscal Year 2017, the value of OHSU's contributions to the community totaled \$437 million.



Research

OHSU award dollars: \$462 million

NIH funding ranking: 28th

Amount of funding focused on clinical trials: More than \$80 million in Fiscal Year 2018

Invention disclosures: 151

OHSU ranks No. 52 on the Reuters 100: The World's Most Innovative Universities 2016.

OHSU placed in the top 20 of Nature's Index 2017 Innovation ranking, which measures the quality and quantity of research by institutions and universities worldwide.



Education

OHSU helps educate more than 5,500 students and trainees each year.



Facilities and employees

Employees: 16,478

OHSU occupies more than 7.9 million square feet of space on approximately 400 acres.



Nationally Recognized

U.S. News & World Report's Best Hospitals rankings reflect excellence in risk-adjusted survival and readmission rates, volume, patient experience, patient safety and quality of nursing, among other indicators. According to the U.S. News & World Report's Best Hospitals 2018-2019 rankings: OHSU Hospital ranks No. 1 in Oregon, OHSU Knight Cancer Institute ranks 28 in the nation.

Blazing a trail to end cancer as we know it

Following a successful \$1 billion fundraising campaign, OHSU Knight Cancer Institute is excited to embark on pioneering new methods of precision oncology and early detection. A state-of-the-art cancer research facility, a new model of combining scientific disciplines, and expanded clinical trials will translate scientific discoveries into next-generation detection tests, tools and treatments. We've recruited some of the most renowned clinicians and scientists in the country to lead the effort.



Knight Cancer Institute accolades, accreditations and recognitions

The first center in the Pacific Northwest to offer the first FDA-approved CAR-T cell therapy (Novartis's Kymriah).

NCI Designated Comprehensive Cancer Center: OHSU has been accredited by the Commission on Cancer since 1940. OHSU has recently been reaccredited by the Commission on Cancer after the most recent survey found 100 percent compliance in all 34 standards. This continues OHSU's flawless score rating for the past three consecutive surveys, a span of nine years.

One of 12 National Cancer Institute-designated centers to receive NCI award to increase HPV vaccine coverage.

OHSU is one of five Drug Resistance and Sensitivity Centers established by the NCI to explore how acute myeloid leukemia cells evolve and adapt.

Established two new funding opportunities to foster collaborations with Cancer Research UK for early detection.



Clinical and research staff

Since the Knight Cancer Challenge was announced in 2013, the OHSU Knight Cancer Institute has recruited more than 480 researchers, post-docs, clinicians and administrative staff. To date, there are more than 1,200 doctors, nurses and research staff.



Community Service

The OHSU Knight Cancer Institute's Community Partnership Program has provided money, training and technical assistance for community-led projects serving all 36 Oregon counties since its launch in 2014. Earlier this year, the program reached a funding milestone of distributing more than \$2 million to projects across the state.

Changing the landscape of cancer care in Oregon

► The Knight Cancer Research Building opened in September, 2018 on the South Waterfront.



With the assistance of significant philanthropic gifts and investment by state government, OHSU is under construction on the South Waterfront along the Willamette River in Portland. These infrastructure expansions and upgrades will make an impact by offering dedicated research facilities and an improved patient/family experience.

Knight Cancer Research Building

In September 2018, OHSU opened a state-of-the-art research facility aimed at cutting-edge approaches and early detection for cancer. Located at the South Waterfront campus, the 320,000-square-foot building will bring together 650 employees, including researchers from different scientific disciplines, under one roof. The building will house the Cancer Early Detection Advanced Research Center, or CEDAR, led by nanotechnology expert Sadik Esener. Researchers will also investigate computational biology, population health, precision medicine and related fields. This facility will be a resource for Oregonians and people across the country as we strive to defeat cancer.

“We are grateful for the state’s investment in our mission to end cancer as we know it, and we look forward to celebrating the scientific achievements that will take place within these walls,” said Brian Druker, M.D., director of the OHSU Knight Cancer Institute.

Center for Health & Healing Building 2

Opening in 2019, the new 15-story Center for Health and Healing Building 2 will

serve many purposes. The Knight Cancer Institute will use the upper six floors for oncology clinics, infusion services and clinical trials. The offices’ design incorporates precision medicine in a patient-centered care environment. A skybridge will connect the new building to the existing Center for Health and Healing 1. The additional floors at the new building will provide surgical suites for ambulatory care procedures, lab services, pharmacy and additional clinical space for other medical disciplines.

Rood Family Pavilion

Nearly half of OHSU’s adult and pediatric patients live in rural Oregon or neighboring states. Finding temporary housing in Portland can be challenging and costly when they need to travel to OHSU for complex treatments such as surgery, bone marrow transplants or participation in clinical trials. Opening this year, this guesthouse — named in honor of Gary and Christine Rood of Vancouver, Washington — will meet a sizable demand for comfortable, affordable housing convenient to OHSU with 76 rooms on the top five floors, as well as conference facilities and urgent care on the ground floor. On-site amenities will include communal kitchens, a fitness room, indoor and outdoor children’s play areas, and an expansive garden. Ronald McDonald House Charities of Oregon and Southwest Washington will furnish, equip and provide programming for the pediatric portion of the guest house, and contract with OHSU to operate the entire facility.

Community cancer care

Community care makes hard times easier

Monica Butler of Hillsboro, Oregon considers herself a conqueror, having faced breast cancer and moved on with her life. When she received her diagnosis in 2015, she chose to get her oncology care at Legacy Good Samaritan Medical Center through the OHSU Knight-Legacy Health Cancer Collaborative. She selected the center because it was easily accessible from her job, which she maintained throughout her chemotherapy. She also chose it because for her, the Alphabet District in Portland meant something more to her than just cancer treatment.

► Patient Monica Butler shops with her mother at the Portland State University Farmer's Market.





◀ Monica Butler pictured on her 250 mile hike on the Camino de Santiago, following completion of her cancer treatment.

“I figured if I was going to be going to this place regularly, I wanted it to be someplace fun,” she said. “So, I wrapped my medical care into somewhere I enjoy going. I always took a walk through the beautiful neighborhoods after my treatment to clear my head. My kids would come along with me and we would have lunch. I was very confident in my care there. I had an amazing doctor and the staff became like friends.”

Because of the OHSU connection, Butler was able to participate in two clinical trials during her treatment. OHSU Knight Cancer Institute has neighborhood-based clinics throughout the Portland Metro area in Gresham, East Portland, Tualatin, Beaverton and Northwest Portland. Community clinics allow patients to stay local while getting personalized oncology treatment and access to the OHSU system of expertise. “I was so grateful that there was something so close to home,” she said.

After a year of chemotherapy, surgery, radiation and hormone therapy clinical trial, Butler went on a pilgrimage.

“I finished radiation July 3 and I walked 250 miles on the Camino de Santiago in Spain starting on Sept. 10,” she said.

“I made that goal so my year wouldn’t be all about cancer, it would be about traveling the Camino.”

Precision immunotherapy

CAR-T immunotherapy: A launching pad to future treatment

The OHSU Knight Cancer Institute is an early adopter and one of a handful of certified treatment centers in the nation to offer chimeric antigen receptor T-cell, or CAR-T, immunotherapy.

When the Food and Drug Administration approved the first use of CAR-T immunotherapy in 2017, the agency hailed it as a historic action, marking the first gene therapy approved and available in the U.S. Initially, the regulatory body approved CAR-T immunotherapy as a treatment for acute lymphoblastic leukemia and lymphoma, or ALL, in children and young adults. OHSU Doernbecher was the first hospital in the Pacific Northwest to offer this treatment to pediatric and young adult patients with ALL. Subsequently, relapsed, refractory diffuse large B-cell lymphoma, or DLBCL, in adults received the second indication, first by Kite Therapeutics and then in 2018 by Novartis.

“The potential for this therapy is huge,” said Richard Maziarz, M.D., medical director of the Adult Blood and Marrow Stem Cell Transplant and Cellular Therapy Program in the OHSU Knight Cancer Institute. “Whether it will be realized, that’s to be determined. But having the opportunity to offer this therapy to our patients this early in the process is critical.”

Novel therapy brings new hope

Maziarz was the senior investigator for the CTL109 (tisagenlecleucel) clinical trial that led to the approval of Kymriah for DLBCL. OHSU is one of six hospitals on the West Coast that also offers Yescarta (axicabtagene ciloleucel), another cell-based gene therapy, for types of Non-Hodgkin lymphoma in adults.

“We’re at the forefront of something new,” Maziarz said. “One of the potential benefits of CAR-T is that we believe the expected set of risks will be more controlled, more contained. Now our

focus is to limit these treatment-associated risks, which will only enhance the clinical outcome. When we send people home after the course of treatment, they can anticipate long-term results.”

Brandon Hayes-Lattin, M.D., medical director in the Division of Hematology and Medical Oncology at OHSU and of the OHSU Knight Cancer Institute’s Adolescent and Young Adult Oncology Program, said

the response of initial patients at OHSU is very promising.

“Our experience at OHSU has been very exciting, producing manageable toxicities and remarkable responses in cancers that didn’t have any hopeful standard chemotherapy options,” he said. “This targeted method is exciting because it could replace other immunotherapies that nonspecifically turn on the immune system



◀ Richard Maziarz, M.D., medical director of the Adult Blood and Marrow Stem Cell Transplant and Cellular Therapy Program.

such as checkpoint inhibitors or allogeneic bone marrow transplantation, and it does not require an immune match as with the donor bone marrow transplant. This is a major step toward finding the holy grail of cancer immunotherapy: an immune attack that successfully kills cancer cells without damaging healthy cells.”

More wide-ranging trials in 2019 and beyond

The next set of trials will likely expand into other hematologic cancers, Hayes-Lattin said, such as chronic lymphocytic leukemia and multiple myeloma. Also, he anticipates new trials of CAR-T therapy in first-line or second-line treatment for adult lymphoma and childhood ALL.

“It will be exciting to bring these treatment options in earlier and earlier to fend off some of the detrimental effects on the body from these diseases and repeated cycles of chemotherapy currently used to treat them,” Hayes-Lattin said.

Advancing personalized immunotherapy

Becoming a CAR-T certified center requires more than just the right equipment and staff training, Hayes-Lattin emphasized. Embracing this novel therapy also requires embracing

cross-disciplinary, interdepartmental support to create an infrastructure of quality review and operations oversight for this specific therapy.

“Our CAR-T program touches a broad array across OHSU,” he said. “It involves not only the blood and marrow transplant and hematology group, but also extensive interaction with neurosciences intensive care unit, the emergency department and the medical intensive care unit.”

And the program is likely to expand, he believes.

“Though we can only treat a limited set of cancers with CAR-T immunotherapy now, prospects are very promising that we will expand this therapy in the next several years to many other diseases, including solid organ cancers.”

Maziarz is also excited about the possibilities.

“Genetically engineered cell products are going to explode over the course of the next decade,” he said. “This is not the end of the line; this is the starting point. For example, a gene replacement therapy for congenital blindness has become the third gene therapy approved by the FDA in early 2018.”

CAR-T immunotherapy process

CAR-T immunotherapy uses patients' own T-cells to attack cancerous B-cells. In this therapy, technicians extract patients' cells and reengineer them to specifically target the CD19 marker on those B-cells, then reinfuse the adapted cells into the patient. Currently, there are two FDA-approved CAR-T therapy commercial products: Kymriah and Yescarta.



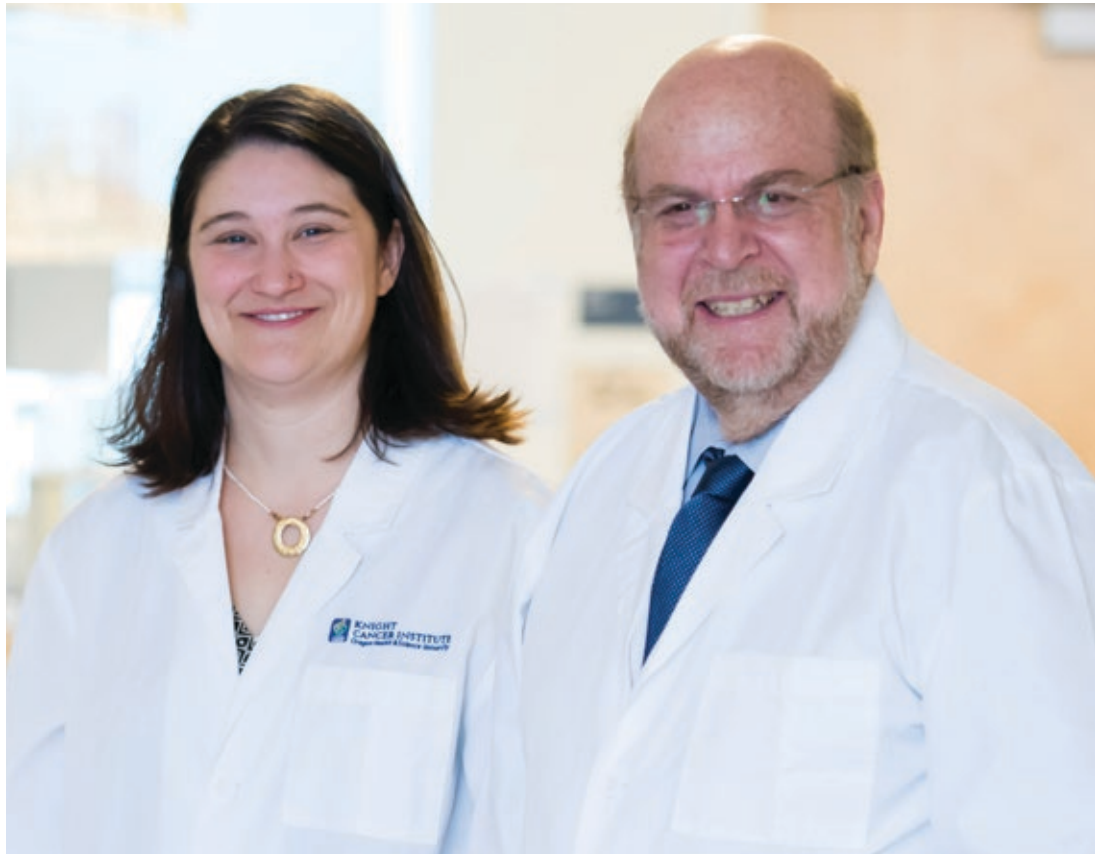
◀ Brandon Hayes-Lattin, M.D., medical director in the Division of Hematology and Medical Oncology.

Early detection initiative

CEDAR applies team-science to early detection research

Improving outcomes for cancer patients is more than just discovering better treatments. Finding and treating cancer early, before it becomes aggressive and metastatic, is one of the most promising ways to increase survivorship. Detecting and stopping lethal cancers at the earliest stage is the mission of the Cancer Early Detection Advanced Research Center, or CEDAR, an institution recently launched by the Knight Cancer Institute.

► Bree Mitchell, Ph.D., executive director at CEDAR, and Sadik Esener, Ph.D., a nanotechnology and nanomedicine expert and director at CEDAR.



“We are at a pivotal scientific moment because many new approaches, such as liquid biopsies for detection and immunotherapies for treatment, are emerging from research laboratories,” said Sadik Esener, Ph.D. a nanotechnology and nanomedicine expert and the director at CEDAR.

CEDAR is one of the few centers in the nation to focus on early cancer detection. Also, CEDAR’s strong philanthropic investment allows for an internal mechanism for funding projects, which expedites the process of discovery.

“We are pushing the envelope in our model,” said Bree Mitchell, Ph.D., executive director at CEDAR. “First, it’s rare in academia to have a singular focus. Second, philanthropic funding allows us to take risks and be wrong a lot, so we learn from failure and find creative ways to solve problems, which is not how traditional funding works. It also frees our researchers to focus on discovery and pursuing the most promising ideas in cancer science.”

An industry/academic hybrid model

“To ensure a comprehensive approach, we require experts with knowledge in electronics, optics, biology and cancer. It’s crucial that we have a multidisciplinary team working closely together,” said Esener.

This world-class team of 140 scientists will be working in loosely organized research hubs and sharing equipment and space. The projects they work on are pre-selected for scientific rigor, innovation, feasibility and the potential impact on patient lives.

“Our model at CEDAR is one enormous lab, where people move more fluidly between projects and have multiple opportunities for mentorship,” Mitchell said. “We’re offering the freedom to think creatively and explore to see where the science leads. Ideas for CEDAR projects can come from anyone. Teams develop project proposals and those that meet the standards of the CEDAR project advisory board will receive funding and move forward, with milestone measurements built into the process.”

Liquid biopsy among first priorities

Detection has been a daunting field: how do you identify asymptomatic cancer, differentiate lethal from nonlethal cancers, and locate where those cancer cells are in the body? If you can, then how do you perform these screenings noninvasively and repeatedly?

One of CEDAR’s first projects will be to develop liquid biopsy assays that can serve as early warning tools to gauge disease risk.

“We believe CEDAR will provide the infrastructure, equipment and technology needed to advance our understanding of cancer and accelerate the pace of discovery,” Esener said. “Our goals are to improve survival rates, reduce the need for harsh treatments with long-term side effects, and prevent unnecessary treatment.”

Five program areas at CEDAR



Population Health: The development of longitudinal cohorts of individuals with elevated risk of developing cancer and understanding risk stratification.



Biology: Understanding basic biology concepts around transition from pre-malignant to lethal malignancy with an emphasis on systems biology and development of experimental model systems for early cancer.



Liquid Biopsy: Biomarker discovery in material found in proximal fluids such as CHC's, platelets, extracellular vesicles, proteins and circulating RNA using multi-omic analysis techniques.



Technology Development: Development of low-cost, minimally invasive screening and diagnosis technologies through effective separation and analysis methods of biomarkers, identified by the liquid biopsy discovery or existing known biomarkers.



Early Therapy: Early therapy focused on prevention of lethal disease development possibly through gene editing or silencing or other precision interventions.



◀ Test tubes being used for research at the Knight Cancer Research Building.

CEDAR biorepository

To facilitate early detection of cancers, OHSU and the VA Portland Health Care System are creating a comprehensive biorepository of tissue and fluid samples from patients suspected of having prostate and breast cancer (among others) as well as a control group. CEDAR will utilize this prospective collection of samples to identify early markers for cancer.

Precision oncology

► Gordon B. Mills, M.D., Ph.D., is one of the most highly cited medical scientists in the world, holding more than 20 patents in novel technologies and molecular biomarkers. His role at OHSU is to integrate research across multiple areas.



Unique, trifold approach to molecular medicine

Creating a new paradigm in precision treatment, Knight Cancer Institute Precision Oncology Program is identifying and targeting mechanisms of resistance as they emerge in real time through a rational combination therapy based on deep, longitudinal molecular characterization with a technology platform unmatched in the world.

“This program is designed to cross all boundaries and consider therapy as a single opportunity focused on drug combinations, which is very different from what others are doing,” said Gordon Mills, M.D, Ph.D., director of Precision Oncology at OHSU Knight Cancer Institute. “The other unusual aspect to our approach is a deep molecular characterization analysis for DNA, RNA and protein structure of the tumor. By analyzing this micro-environment characterizing the tumor ecosystem over time, we can see how the tumor changes with therapy and that informs how to treat each patient and which combination is likely to be beneficial. This is the cutting-edge of molecular analysis applied in real time to treatment decisions.”

Getting SMMART

OHSU has instituted a series of studies utilizing this design concept, the Serial Measurement of Molecular and Architectural Responses to Therapy, or SMMART, trials. The goals are to increase the spectrum of patients who benefit, decrease toxicity of therapy, and increase depth and durability of response. Initially, these pilot projects focus on breast cancer.

In one of the SMMART trials, patients will start on a single drug. Serial measurements (with a goal to have tumor biopsy analysis available within 10 working days) will guide combination therapy decisions.

“Based on this information, we will continue to use the original drug and add a drug that is predicted by the effects of the first drug on the tumor profile to work in that specific patient,” Mills said. “We start with a single agent and then add another, which is a novel approach. We have the ability to take information generated by the tumor sample and analyze it through computational biology approaches, then integrate those results into tumor board suggestions of effective therapies for that patient. Change over time provides high information content that has not previously been integrated into patient care.”

And it’s working, Mills added, noting a significant number of exceptional responders in the pilot studies.

“The expectation in clinical trials with advanced disease is that maybe 10-15 percent of participants will show any response, but in the pilot studies 70 percent fit the exceptional response category. This is remarkable evidence that selecting combination therapy will have major impact on patients,” he said.

At the end of 2018, the OHSU Knight Cancer Institute has three SMMART-based trials actively recruiting patients with breast cancer: a phase 1 inpatient dose escalation trial, an off-label combination trial, and a phase 2 trial of PARP/PD-1 inhibitors.

Breast cancer just the beginning

Mills said though using breast cancer for proof of concept trials, he anticipates extending these concepts to additional diseases, with programs already in development for pancreatic cancer, prostate cancer and leukemia.

“We are at an inflection point where we are changing the life history for cancer patients,” said Mills. “We are focusing on the key critical question of what makes each person’s cancer different.”

► OHSU Knight Cancer Institute Director Brian Druker, M.D., talks with Gordon Mills, M.D., Ph.D., director of precision oncology for the OHSU Knight Cancer Institute and a professor in the OHSU School of Medicine.



SMMART research

The SMMART (Serial Measurements of Molecular and Architectural Responses to Therapy) Program is a next-generation precision medicine platform that OHSU is using in multiple trials, involving patients with metastatic prostate cancer, breast cancer and pancreatic cancer, as well as patients with intermediate-to-poor prognosis acute myeloid leukemia, or AML. Two of the SMMART trials will initiate therapy consisting of a combination of FDA-approved drugs chosen for SMMART participants through comprehensive molecular profiling of their tumors (including comprehensive DNA, RNA and protein analysis), as well as functional assays that measure the responses of an individual's cancer cells to the SMMART drugs. In addition, SMMART is also a multifaceted research program, intensely focused on understanding cancer heterogeneity and mechanisms of resistance to treatment. OHSU will distribute biospecimens from the clinical trial to a variety of research labs for examination with the multi-scale imaging modalities available within OHSU Center for Spatial Systems Biomedicine. This collaborative research project brings together a multidisciplinary team from across OHSU to discover 'omic and architectural features that manifest with the development of resistance to cancer treatments.

Additional precision oncology programs in development at OHSU

- Inpatient dose escalation and off-label trials in prostate, pancreas and AML
- Window of opportunity trial in pancreatic cancer
- KRAS targeted therapy in leukemia, phase I
- Personalized drug screening in ovarian cancer

New advancements in clinical care

Scalp cooling to minimize hair loss

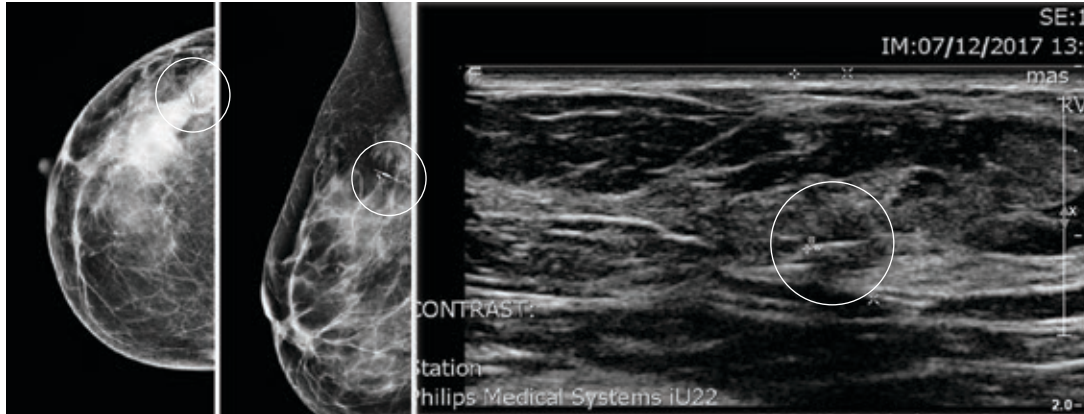
Knight Cancer Institute offers scalp cooling for hair retention as an option for cancer patients with neoadjuvant or adjuvant therapy.

“The machine we use circulates a coolant through a tight-fitting cap that maintains a fixed temperature through the whole course of treatment,” said Michael A. Savin, M.D., breast medical oncologist at OHSU Knight Cancer Institute. “The process reduces—but does not eliminate—hair loss in some patients.”

Savin said though scalp cooling is not recommended for patients on anthracyclines or for metastatic cancers, there is still a large pool of patients who could benefit. Unfortunately, he said, the biggest constraint is financial, as health insurers usually don’t cover scalp cooling.

► Michael A. Savin, M.D., breast medical oncologist at OHSU Knight Cancer Institute, meets with a patient.





◀ Images of a wire-free reflector placed in a breast.

The vendor of the device OHSU uses, Paxman, caps patients' out-of-pocket expense at \$2,200. Another constraint is logistically coordinating "chair time," as the process adds an hour or more to infusion time.

Thus far, local patients have tolerated the process well and Savin has received no negative feedback.

"Hair loss occurs in most women who have breast cancer chemotherapy, and it is often an emotionally painful experience," Savin said. "Hair loss is a kind of scarlet letter, a constant reminder of the disease. Hair is a critical element of a person's self-image. I have known patients to refuse treatment that could determine their survival because of fear of losing their hair. By offering scalp cooling, we give breast cancer patients the option to try to minimize hair loss if they are willing to accept the conditions and odds."

Radar replaces wires in breast cancer surgery

For many breast cancers surgeries, patients have presurgical wire localization to identify the tumor site for the surgeon. Though effective, patients often report discomfort

and stress from the procedure. In 2018, OHSU introduced new technology that uses a tiny, wire-free device called a reflector that the surgeon tracks by radar wave detection as an alternative to wire localization.

"We are very excited to offer this technology to patients to improve our patients' experience with lumpectomy surgery. We also hope that this technique will improve accuracy of tumor identification and removal," said breast surgical oncologist Arpana M. Naik, M.D. "The evidence for this is still emerging, but one U.S. study suggested improved accuracy in detecting the tumor and better rates of obtaining clean margins, which is an ongoing concern for lumpectomies. The data are encouraging, and thus far, our patient satisfaction has been very good."

Unlike the wire placement, the reflector does not move once it is placed within the breast lesion that requires removal. Therefore, patients can get the reflector placed days or weeks in advance, rather than on the same day of surgery. Not only does this streamline surgery scheduling, but it also drastically cuts down on patient wait times on the day of surgery.

In selecting the technology, OHSU chose the radar method compared to other emerging options in part because it has no radioactivity exposure, a common concern among patients, Naik said. At this time, there are some limitations to the radar technology where wire localization may still be the best option for certain patients, such as with deep tissue tumors. However, Naik said OHSU is offering the wire-free method to patients undergoing lumpectomy who appear to be good candidates for the reflector placement.

“We believe the reflector localization is a less stressful, more comfortable experience for our breast cancer patients, that maintains or even improves upon results obtained by traditional wire localization methods,” she said.

Precision surgery enhanced by newest robot

In 2018, OHSU became the first institution on the West Coast to offer the Intuitive da Vinci SP (Single Port) system for transoral and urologic robotic surgery as well as colon and rectal surgeries, in the effort to expand precision surgical services and offer the most advanced services in the Pacific Northwest.

The newest robot is the most advanced of its kind, fitting three fully-wristed instruments and a flexible camera through a single channel, designed for working in tight, narrow spaces. In the case of head and neck surgery, this

technology is ideal for treating cancers of the oral cavity, larynx and pharynx.

“From the perspective of transoral surgery, the new single port robot offers incredibly streamlined instrumentation, with more dexterity and greater exposure to the pharynx and larynx. This expands the delicate surgical services we can provide patients,” said Ryan J. Li, M.D., a specialist in otolaryngology-head and neck surgery, and director of the Head and Neck Robotic Surgery Program at OHSU. “This new-generation robotic platform greatly facilitates the exploration and excision of small primary tumors and occult cancers, offering a chance for surgical cure and reduced, precisely targeted radiation doses.”

In 2010, head and neck surgeons at OHSU were the first in the Pacific Northwest to offer transoral robotic surgery, or TORS, with the original Intuitive da Vinci Si system, a service that helped mitigate the adverse effects of open surgery. TORS provides a much less invasive surgical option for select cancers, which makes an enormous difference for patient functional outcomes, Li said, as the majority of side effects for cancer in the throat involve swallowing and speech problems. The new robotic upgrade facilitates even more precise surgical access, potentially expanding utility of transoral approaches to other upper aerodigestive tract sites, such as the larynx.

“The complement of head and neck TORS surgeons, radiation and medical oncologists,

Comprehensive Robotics Program

The acquisition of the da Vinci SP and an additional da Vinci Xi surgical system for outpatient procedures at the new Center for Health and Healing Building 2 is part of an expansion in the robust OHSU Comprehensive Robotics Program, which began in 2006. Across disciplines, OHSU has 27 robotic-trained surgeons. These surgeons performed more than 600 robotic-assisted procedures in 2018, with an increase of 16 percent or greater anticipated in 2019 using the newly expanded fleet of four surgical robots.

speech and language pathologists, and the dedicated supporting staff at OHSU create a comprehensive multidisciplinary care team for patients experiencing the stress of cancer,” Li said. “The SP is exactly what we’ve needed to evolve the services we offer. This is a special time in the care of head and neck patients.”

Dr. Liana Tsikitis, Associate Professor of Surgery, Division of Gastrointestinal and General Surgery and Commission on Cancer Chair, also states, “The robotic Xi system brings improved visualization and dissection in the operating room



◀ Dr. Christopher Amling, M.D., F.A.C.S., professor of urology and Jen-Jane Liu, M.D., assistant professor of urology sit with the new Xi robot.

with shorter length of stay and improved outcomes. Colorectal surgeons at OHSU have embraced this cutting edge technology and with the recent purchase of the Davinci SP robot they will provide a more efficient platform of Transanal Minimally Invasive Surgery (TAMIS).”

For urologic cancers, the da Vinci SP allows for a single incision instead of the five to seven small cuts needed with the standard robot.

“Our urologic oncologists will be some of the first in the nation to evaluate the benefits of the new SP,” said Jen-Jane Liu, M.D., an OHSU urologic oncology surgeon. “The single port platform will enable us to continue performing precision surgery through fewer incisions.”

► Through OHSU Rehabilitation Services, cancer patients can join a group exercise class tailored specifically for them. The class meets twice a week for aerobic conditioning, strength training, stretching and education.



Oncology prehabilitation

Many cancer patients finish treatment and enter survivorship with significant and life-impacting side effects. OHSU now offers a prehabilitation program to optimize patient health before or early in their treatment with the goal of minimizing or preventing these side effects. The program encourages referrals to any or all of our many oncology specialists in multiple services including physical therapy, occupational therapy, speech therapy for cognition, nutrition, social work, financial services and integrative medicine.

Encouraging exercise during oncology treatment: Evidence suggests that exercise can decrease side effects from chemotherapy, endocrine and immunotherapy, radiation and surgery. OHSU Rehabilitation Services gives referred patients a thorough evaluation and an individualized exercise plan prepared by oncology physical therapy specialists as they start and progress through their cancer treatment. Additionally, Rehabilitation Services now offers the option of joining an oncology group exercise class for all referred

cancer patients during treatment. The class meets at OHSU's Center for Health & Healing 1 for an hour twice a week (Thursdays and Saturdays) for aerobic conditioning, strength training, stretching and education.

Streaming nutrition classes: Based on patient surveys, the most common interest among oncology patients is nutrition. To reach a broader audience, clinical oncology dietitian Amanda E. Bryant R.D., C.S.O., L.D., held eight cooking classes in 2018 that were livestreamed on the OHSU Knight Cancer Institute's Facebook page (www.facebook.com/OHSUKnight). The classes show how to incorporate nutrition guidelines into a healthy, plant-based diet. The class videos are available on the Facebook page.

Food Rx: Through a grant, OHSU Knight Cancer Institute is piloting a voucher program for breast cancer patients to encourage increased consumption of fruits and vegetables. The vouchers allow breast cancer patients in financial need to buy fresh, frozen, dried or canned fruits, vegetables, beans and herbs at local farmers markets and WinCo, a grocery store chain.

Multidisciplinary lymphatic program planned for 2019

Secondary lymphedema is an unfortunate consequence of oncology treatment for about 20 percent of breast cancer survivors, often regarded as an incurable, progressive, disfiguring and disabling disorder that is difficult to predict and treat. To address this challenging issue, OHSU is establishing a comprehensive program to serve our region with the goals of education, prevention, conservative therapy and surgery.

Lymphedema prevention and treatment is a growing specialty, so the OHSU program will concentrate on producing consistent and reliable data on patients to further understanding for early detection and monitoring. OHSU is making a capital investment in equipment to measure bioimpedance, or the resistance of the tissues to current. This noninvasive measurement will establish a baseline before procedures on all patients undergoing sentinel lymph node biopsy or axillary lymph node dissection. Then OHSU will continue to measure and monitor these parameters at regular intervals for the first two to three years after patients' cancer intervention. This technology allows for early identification of progression by measuring changes in extracellular fluid on the cancer limb in comparison to the non-cancerous side.

Meanwhile, representatives from surgical oncology and physical therapy are developing a comprehensive system to identify high-risk patients in order to provide those patients with education on both the disease and prevention.

“We want a program focused on education, surveillance, prevention and conservative intervention, so we are initially focusing on bringing people together from different specialties — physical therapy, surgical oncology, plastic surgery and oncology — to treat the whole patient at risk for this very complex disease,” said plastic and reconstructive surgeon Allison Nauta, M.D., who is leading the program.

For lymphedema that does not respond to compression and conservative measures, Nauta is specialty trained in vascularized lymph node transfer and lymphovenous bypass. To bring these surgical options to Oregonians, OHSU is looking at another capital investment in equipment in 2019.

“The availability of these surgical approaches to lymphedema is important to building the program and it would be a big piece of the puzzle that we can offer patients who currently don't have alternatives,” Nauta said. “But the backbone of our program will be early detection and prevention.



◀ A patient is treated for lymphedema.

Accountability and quality improvement measures

As a Commission on Cancer accredited facility, the OHSU Cancer Committee reviews the quality of patient care using selected accountability and quality improvement measures. Accountability measures are designed to promote improvements in the delivery of care while quality improvement measures are designed to monitor the need for quality improvements.

Below, please find OHSU's 2016 performance rates for three accountability measures and six quality improvement measures from five primary sites, including breast, colon, rectum, gastric and lung.

STANDARD 4.4 ACCOUNTABILITY MEASURES	2016 OHSU PERFORMANCE RATES	2016 COMMISSION ON CANCER EXPECTED PERFORMANCE RATE
BCSRT Radiation is administered within 1 year (365 days) of diagnosis to women under the age of 70 receiving breast conservation surgery for breast cancer.	90.9%	90%
HT Tamoxifen or third generation aromatase inhibitor is considered or administered within 1 year (365 days) of diagnosis for women with AJCC T1c or stage 2 or stage 3 hormone receptor positive breast cancer.	97.5%	90%
MASTRT Radiation therapy is considered or administered following any mastectomy within 1 year (365 days) of diagnosis of breast cancer for women with >= 4 positive regional lymph nodes.	90.9%	90%

**STANDARD 4.5
QUALITY IMPROVEMENT
MEASURES**

**2016 OHSU
PERFORMANCE
RATES**

**2016 COMMISSION ON
CANCER EXPECTED
PERFORMANCE RATE**

<p>nBx Image or palpation-guided needle biopsy (core or FNA) is performed to establish diagnosis of breast cancer.</p>	<p>91.6%</p>	<p>80%</p>
<p>G15RLN At least 15 regional lymph nodes are removed and pathologically examined for resected gastric cancer.</p>	<p>87.5%</p>	<p>80%</p>
<p>12RLN At least 12 regional lymph nodes are removed and pathologically examined for resected colon cancer.</p>	<p>96.3%</p>	<p>85%</p>
<p>LCT Systemic chemotherapy is administered within 4 months to day preoperatively or day of surgery to 6 months postoperatively, or it is considered for surgically resected cases with pathologic, lymph node-positive (pN1) and (pN2) NSCLC.</p>	<p>100%</p>	<p>85%</p>
<p>LNoSurg Surgery is not the first course of treatment for cN2, M0 lung cases</p>	<p>96.2%</p>	<p>85%</p>
<p>RECRTCT Preoperative chemo and radiation are administered for clinical AJCC T3N0, T4N0, or stage 3; or postoperative chemo and radiation are administered within 180 days of diagnosis for clinical AJCC T1-2N0 with pathologic AJCC T3N0, T4N0, or stage 3; or treatment is considered; for patients under the age of 80 receiving resection for rectal cancer.</p>	<p>94.4%</p>	<p>85%</p>



OHSU Cancer Committee

Melissa Alvarado, M.P.H., C.T.R.
Cancer Registry

Connie Amos, M.S.
Rehabilitation Services

Margy Bertoldi, R.N., M.P.H., B.S.N.
Knight Cancer Network

Kevin Billingsley, M.D.
Surgical Oncology

Amanda Bryant, R.D., C.S.O., L.D.
Clinical Nutrition

Malinda Burt, B.S.N., R.N., O.C.N.
BMT/Hematologic Malignancies

Monica Cfarku, R.N., M.S.N., B.M.T.C.N., C.C.M.
Community Hematology Oncology

Jeremy Cook, R.N., M.S.N., V.A.-B.C.
Adult Inpatient Oncology

Erin Corella, Pharm.D.
Pharmacy

Koenraad De Geest, M.D.
Gynecology Oncology

Chevella Del Rosario.
Epic Clinical Workflow

Ellen Distefano, R.N., M.N.
Oncology Quality

Lori Ellingson, M.S.N., R.N., C.N.S., A.O.C.N.
Adult Inpatient Oncology, Administration

Andrea Gepner, N.P.
Palliative Medicine

Kelly Hamman, M.S., C.G.C.
Genetics

Susan Hedlund, M.S.W., L.C.S.W., O.S.W.-C.
Family & Supportive Services

Katie Hennis, M.S.
Community Outreach

Heidi Judge
ACS Patient Navigation

Kenneth J. Kolbeck, M.D., Ph.D.
Interventional Radiology

Christian Lanciault, M.D., Ph.D.
Pathology

Jen-Jane Liu, M.D.
Urology Oncology

Caroline Macuiba, L.C.S.W., O.S.W.-C.
Adult Outpatient Oncology, Social Work

Christy Marchant, R.N., M.B.A., C.C.R.C.
Rehabilitation Services

Patrick McCormick,
Ambulatory Oncology

Nima Nabavizadeh, M.D.
Radiation Medicine, Cancer Liaison Physician

Amy Padgett.
American Cancer Society

Lisa Radcliff, D.N.P., A.O.C.N.P.
Community Hematology Oncology

Mindy Roberts, M.A.
Research Administration

Tim Siegel, M.D.
Palliative Medicine

Kara Skaflestad,
Marketing

Stephen Spurgeon, M.D.
Hematology and Medical Oncology

Linda Stork, M.D.
Pediatric Hematology and Oncology

Jessa Sweany, M.N., R.N., NE-BC.
Adult Inpatient Oncology

Charles Thomas, M.D.
Radiation Medicine

Michelle Thomas, M.B.A.
Epic Clinical Workflow

Liana Tsikitis, M.D.
General Surgery, Cancer Committee Chair

Eliana Turk, M.D.
Clinical Research

Gina Vaccaro, M.D.
Medical Oncology

OHSU Cancer Registry Team

Melissa Alvarado, M.P.H., C.T.R.

Lisa Batchelor, C.T.R.

Marsha Beal, R.H.I.T., C.T.R.

Lorraine Colwell, C.T.R.

Claudia Cooksie, C.T.R.

Bethany Dirik, B.A.

Jennifer Johnson, C.T.R.

Kristin Lakin, C.T.R.

Lori Lucente, C.T.R.

Teresa Mason, C.T.R.

Kathy Mayer, C.T.R.

Kira Mills

Shannon Ramos, B.S., R.H.I.T., C.T.R.

Melania Tolan-Hudson, R.H.I.T., C.T.R.

Laura Wallace, R.H.I.T., C.T.R.

Kimberly Young, C.T.R.

