When it comes to cancer, experience matters. At the Rush University Cancer Center experience drives everything we do.

A seamless integration of personalized medicine and cutting-edge research is the Rush experience.

Our experienced multidisciplinary teams provide patients with comprehensive care. Cancer care at Rush takes various forms — advanced diagnostics, advanced therapies, subspecialists who are leaders in their field, research that supports our clinical mission, and clinical trials that offer novel treatments to our patients.

Our experienced supportive care specialists address all of the challenges of cancer. Rush's supportive care program offers distress screening, psychosocial services, pain management, nutritional counseling, complementary therapies (e.g., acupuncture, massage therapy), palliative care services, occupational therapy, financial counseling and support, and transportation services.

Our experienced clinical trials team offers innovative trials that help treat our patients and advance cancer research. This year, the continued growth of cancer clinical trials at Rush has focused on earlier phase options for our patients, as well as more options that align with our current patients’ needs. These studies offer our patients more innovative choices earlier on in their treatment. Rush has also experienced a continued diversification of our trial portfolio to better serve our patients. This year, our patients have remained on studies longer than in past years.

Our experienced researchers are discovering new ways fight cancer at a molecular level. The cancer center further strengthened Rush's translational cancer research program by adding a new section of research into hematology and oncology. This section brings together clinicians and researchers who collaborate on ways to bring research from the bench to the bedside — and from the bedside to the bench.

Our experienced partners are helping Rush clinicians use big data to personalize care. Rush’s partnership with Tempus — a Chicago-based biotechnology company that collects, stores and analyzes genetic data, clinical information and tissue samples — is helping our providers further personalize treatment options based on data-informed decisions.

Our clinicians are committed to constantly improving the patient experience. For example, the gynecology oncology clinic at Rush was receiving high patient experience scores in a wide range of areas, including care providers, staff and access. However, the clinic scored lower in the “moving through your visit” category. To address this, the gynecologic oncology clinic did a quality study focused on how to improve this aspect of the patient experience.

The study helped the clinic determine ways to help improve the patient experience, which included improving signage, informing patients about clinic delays, changing the management of providers’ schedules, starting lab draws earlier, starting provider clinics earlier, and educating patients at the time they make their appointment. After implementing these improvements, the overall patient experience increased to the 98th percentile.

In this report, you’ll learn about the Rush experience at every level of cancer care, including the following:

- Precision medicine
- State-of-the-art surgical techniques
- Multidisciplinary care
- Advanced therapies
- Innovative screening options
- Integrative psychosocial medicine

An experienced team

We would like to take this opportunity to thank the many organizations with which Rush collaborates to provide high-quality patient care, including the Commission on Cancer of the American College of Surgeons and the American Cancer Society.

We would also like to extend our gratitude to everyone in the cancer program for their dedication and commitment to our patients. At each and every level, our staff make unique contributions that raise our standards of care.

Robert DeCresce, MD
Interim Director, Cancer Center

Aidnag Diaz, MD
Chair, Cancer Committee

Timothy M. Kuzel, MD
Acting Deputy Director, Cancer Center
Table of Contents

4  Rush University Cancer Center At a Glance
6  Using Precision Medicine for Lung Cancer
8  Advanced Breast Cancer Services
11  Personalized Medicine for Head and Neck Cancers
12  Comprehensive Melanoma Care
14  Treating Endocrine Cancers
16  State-of-the-Art Surgical Treatments for Gastrointestinal Cancers
18  Lung Cancer Screening: Saving Lives Through Early Detection
20  Rush University Cancer Center Happenings
23  Disease Site Programs
26  2016 Cancer Registry Report
28  Representative Publications
The Rush University Cancer Center comprises all cancer-related clinical, research and educational efforts at Rush, crossing 20 departments, divisions and sections; inpatient and outpatient areas; professional and clinical activities; and the colleges of Rush University.

**COMPREHENSIVE CLINICS**
Rush, which serves adults and children with cancer, is home to The Coleman Foundation comprehensive clinics. These multidisciplinary clinics apply a team approach to patient care. The clinical team gathers to discuss each patient’s condition, review diagnostic tests and develop a treatment plan, often in collaboration with the patient’s diagnosing physician.

The comprehensive clinics are dedicated to the following:
- Blood cancers and bone marrow transplants
- Brain cancer
- Breast cancer
- Chest and lung tumors
- Gastrointestinal cancers
- Head and neck cancers
- Inherited susceptibility to cancer
- Leukemias
- Lymphomas
- Multiple myelomas
- Myelodysplastic/myeloproliferative neoplasms
- Prostate cancer
- Spine tumors

The cancer center also has tumor conferences for a number of other disease sites. See pages 23-25 for a complete list of disease site conferences.

**SUPPORTIVE CARE**
The Rush University Cancer Center is committed to helping patients and their families cope with the physical, psychological, emotional and spiritual challenges often associated with a cancer diagnosis.

Available support services at Rush include the following:
- **Urgent care walk-in clinic** specifically for cancer patients at Rush to help limit emergency room visits and hospitalizations for common symptoms such as edema, nausea, vomiting, pain and difficulty breathing.
- **Social work services**, including licensed clinical social workers dedicated to cancer patients at Rush, as well as a social worker from the American Cancer Society.
- **Psychotherapy and other psychosocial oncology services** to help patients, caregivers and families manage stress and physical symptoms.
- **Nutrition counseling** with a registered dietitian to help improve overall health and manage side effects.
- **Palliative care**, with recently expanded services that focus on reducing pain, stress and other symptoms.
- **Pastoral services** from chaplains at Rush to support the spiritual and emotional health of patients and families.
- **Survivorship care planning** that includes a comprehensive plan for patients and their primary care physicians regarding the cancer care received and follow-up recommendations.
- **Integrative therapies** — such as acupuncture and massage therapy — through the Integrative Psychosocial Medicine Program.
- **Genetic counselors** dedicated to the cancer center to counsel patients with suspected predispositions to breast, gynecologic and gastrointestinal cancers, along with rare endocrine tumors and sarcomas.
RESEARCH THAT ADVANCES MEDICINE
The Rush University Cancer Center fosters research across four broad programs that aim to advance the prevention, detection and treatment of cancer:

• Cancer biology
• Clinical, behavioral and translational research
• Molecular signatures and cancer outcomes
• Tumor immunology

Spotlight: Rush’s Integrative Psychosocial Medicine Program

In 2014, Margaret Cooper was diagnosed with metastatic breast cancer and came to Rush University Medical Center for a second opinion.

“[Medical oncologist] Melody Cobleigh, MD, told me, ‘We can manage it so you can continue to work full time and live your life,’ ” Cooper says.

While chemotherapy and radiation could help keep the cancer in check, Cooper was also dealing with the psychological effects of a cancer diagnosis. “I felt like I lost all my value,” she says.

Cobbleigh recommended that Cooper start seeing Catalina Lawsin, PhD, a psychologist in Rush’s Integrative Psychosocial Medicine Program. “I needed someone to help guide me through this journey,” Cooper says. “Dr. Lawsin helped me see that it’s normal to feel anxious, and she helped me deal with it.”

Rush’s Integrative Psychosocial Medicine Program offers psychological counseling, nutritional counseling, acupuncture and massage. Cooper also receives acupuncture.

“Acupuncture helps to offset the negative side effects of chemotherapy and radiation, such as hot flashes, pain, nausea and fatigue,” explains Angela Johnson, MSTOM, MPH, Dipl OM, LAc, a Chinese medicine practitioner at Rush who specializes in acupuncture for people with cancer.

Since starting acupuncture, Cooper has experienced decreased bone pain, improved concentration, and she generally feels “stronger, more confident, and emotionally better prepared to deal with everything.”

After a diagnosis of metastatic breast cancer, Margaret found hope and strength with a combination of innovative medical care and comprehensive support care.
The lung cancer program at Rush is leading the way in bringing precision medicine to lung cancer patients through its partnership with Tempus, a biotechnology company that brings genomic data into the clinical setting by collecting, storing and analyzing genetic data, clinical information and tissue samples. “As we enter the era of personalized medicine, we are excited to partner with Tempus to provide tailored therapies to our lung cancer patients,” says Michael Liptay, MD, thoracic surgeon and chairperson of Cardiovascular and Thoracic Surgery.

In addition to DNA and RNA sequencing, Tempus collects clinical information and outcomes data for each patient, and provides immunohistochemistry staining, which reveals driver mutations that could be potentially actionable with targeted molecular therapies.

The lung cancer team at Rush can use this comprehensive information to select treatments specific to the genetic profile of each patient’s unique tumor. This hyper-personalized approach further enhances Rush’s already impressive lung cancer program — which includes advanced minimally invasive surgery from a nationally ranked thoracic surgical team, and a multidisciplinary medical oncology team that has been internationally recognized for quality and excellence.

Genetic profiling
Lung cancer surgeons at Rush send a sample of each lung tumor they remove to Tempus for molecular sequencing to further understand what is driving a particular tumor’s growth.

“There are some standard biomarkers that are tested for, and there are some accepted agents we use when those markers are present,” says Liptay. “Tempus screens for about 600 different genes, which helps us understand the specific personalized signature of each patient’s tumor and customize treatment to the fingerprint of their tumor.”

Thoracic surgeon Christopher W. Seder, MD, agrees: “Having the genetic profile of each tumor allows us to compile huge amounts of data that becomes very powerful when linked with clinical information. We are pushing back the frontiers of medical knowledge in lung cancer treatment.”

Tempus also matches patients to potential clinical trials for their specific tumor type and genetic profile. “The goal is to link DNA and RNA profiling of the patient’s tumor with clinical trials in which we could potentially enroll the patient,” says Seder.

For the past three decades, the five-year survival for lung cancer patients has remained under 20 percent overall. However, the evolution of precision medicine, early detection and immunotherapies is starting to have a significant impact on lung cancer survival.

“The clinical teams at Rush work tirelessly to help our patients not only survive, but thrive after being diagnosed with cancer. Our team never forgets that having our patients’ trust is a privilege, and it motivates us to do everything possible to help them in their battle against lung cancer.” ~ Philip Bonomi, MD, medical oncologist at Rush
Nationally recognized excellence in lung cancer surgery: For the fourth consecutive year, the Society of Thoracic Surgeons designated Rush as a three-star program for lobectomy (the most common surgery for lung cancer). This is the society’s highest rating, bestowed upon only the top 5 percent of thoracic surgery programs in the United States. The surgeons at Rush perform more than 86 percent of lobectomies for stage I lung cancer in a minimally invasive fashion, compared to less than 50 percent nationally.

Internationally recognized quality: The International Association for the Study of Lung Cancer named the Rush lung cancer program one of five worldwide recipients of the foundation’s inaugural Cancer Care Team Award. This award recognizes programs that provide the highest quality patient care. Rush was one of two programs in the United States to earn this award, which was presented at the 18th World Conference on Lung Cancer in Yokohama, Japan.

Best in Class Lung Cancer Care

“There is a culture that exists, a philosophy of care that is reflected by all of the staff. Knowledge, experience, access to research and innovative treatments are all important when looking for the best care, but so is having a team that believes the patient’s spirit, family, dignity and goals are just as important. That is, and has been for decades, the culture of my care team at Rush.”

~ Jill Feldman, a lung cancer patient at Rush

3-D organoid cultures
Rush is also collaborating with Tempus to develop 3-D organoids — live tumor cells that can be used to test how individual patients respond to specific cancer treatments.

Unlike traditional cultures that grow at the bottom of a culture dish, 3-D organoid cultures are more representative of the properties of a real tumor. Researchers are able to more accurately test different chemotherapy agents on the 3-D organoid to determine how the tumor responds to the treatment.

“We can use part of a patient’s tumor to grow a 3-D culture, and then treat it with different agents,” says Seder. “We could potentially get to the point where we would be able to remove a person’s lung tumor and know very quickly the specific agent that tumor will respond to best.”

Complementing the lung cancer biorepository
The Tempus partnership also complements Rush’s lung cancer biorepository — one of the largest in the country, housing more than 4,000 tissue and blood samples. Over the past 10 years, the primary focus of the biorepository has been identifying proteins that are likely to predict whether a patient has cancer or a benign lung nodule, and if cancer, to help determine how aggressive the lung cancer is.

“This data helps us select the subset of patients who might benefit from additional chemotherapy or targeted treatments,” says Seder. “For example, we could have a patient who has a very small lung cancer, which may not normally be treated with chemotherapy. But their blood sample profile may suggest that it is an aggressive cancer that is likely to recur. That then begs the question, would additional chemotherapy lower that individual’s risk of recurrence?”

Patient Jill Feldman with Philip Bonomi, MD
IMPROVING THE BREAST SURGERY EXPERIENCE

This year, Rush was one of the first centers in Illinois to start using the SAVI SCOUT Radar Localization System, an advanced tissue-locating technology used on women who need surgery to remove non-palpable breast lesions.

“When a woman has a lesion in the breast that we need to take out but can’t feel, we need a way to localize the area so we can know exactly what to remove,” says breast surgeon Andrea Madrigrano, MD.

This new technology is an improvement over a wire placement technique — which surgeons and breast radiologists have been using since the 1970s — in which radiologists place a hooked wire in the breast through the skin to the abnormality using ultrasound or X-ray guidance with local anesthesia. Breast radiologists place the wire in the morning on the day of surgery. During the surgery, the surgeon then uses the wire as a guide to remove the abnormality in the operating room.

Wire localization requires a high degree of coordination between radiology and surgical scheduling. This can lead to delays that require a woman to wait a long time between the wire placement and the surgery on the day of surgery.

“We needed a way to uncouple breast imaging from the day of the surgery,” says Madrigrano.

With the SAVI SCOUT, a breast radiologist inserts a radar wave reflector the size of a grain of rice in the patient’s breast before surgery to mark the location of the lesion, using ultrasound or X-ray mammography guidance.

“The radar reflector is essentially a little marker, and it can be placed into the breast — using an extremely thin needle under image guidance — days or weeks before surgery,” says Madrigrano. “Because this step is out of the way in advance, it completely changes the patient’s day of surgery experience.”

Breast surgeons can then target the affected tissue within 1 millimeter of the reflector — ultimately sparing healthy tissue.

In addition to enhancing the patient’s surgical experience by decreasing the amount of time they are in the hospital on the day of their surgery, the more precise localization of the surgical site enables surgeons to plan the procedure more strategically. That advantage may lead to needing to remove less tissue and a better appearance of the breast after surgery.

“Ultimately, this wireless technology benefits patients by increasing comfort and satisfaction during a stressful time,” Madrigrano said.

Rush has used the SAVI SCOUT on about 100 patients, and Madrigrano and her colleagues are currently working on two clinical trials with this innovative approach. One study compares wire procedures and SAVI procedures — looking at operative times, margin status, patient experience, and the radiologists’ and surgeons’ experiences. The second is a pilot study for using the SAVI SCOUT for sentinel node biopsy after neoadjuvant chemotherapy.

Advanced Breast Cancer Services

Rush’s experienced breast cancer specialists provide personalized care to patients, while offering the most advanced surgical and diagnostic techniques.

Left to right: Andrea Madrigrano, MD, and Peter M. Jokich, MD
Breast cancer patients at Rush have a number of breast reconstruction options after a mastectomy or lumpectomy. The program at Rush focuses on both the aesthetics of breast reconstruction and the psychological effects of losing one or both breasts.

“Breast cancer surgery can be disconcerting and disfiguring,” says Anuja Antony, MD, MPH, a plastic and reconstructive surgeon at Rush. “One of our goals is to help restore our patients’ sense of femininity and wholeness.”

“Breast cancer surgery can be disconcerting and disfiguring,” says Anuja Antony, MD, MPH, a plastic and reconstructive surgeon at Rush. “One of our goals is to help restore our patients’ sense of femininity and wholeness.”

Antony is a national leader in prepectoral breast reconstruction — an evolution of direct-to-implant reconstruction. During prepectoral breast reconstruction surgery, the surgeon places the implant in the prepectoral area in front of the muscle.

“The benefits for our patients are a nice, natural look; minimal scarring; faster recovery; and less pain after surgery,” says Antony.

Decades ago, prepectoral breast reconstruction was associated with higher risks and more complications — along with a less natural looking implant. However, advances in both mastectomy and lumpectomy techniques and in reconstruction itself have changed the trajectory of prepectoral reconstruction postsurgical outcomes.

“We have now found that prepectoral reconstruction does not result in an increased risk of complications; in fact, it has been associated with fewer complications,” says Antony.

Rush is one of the largest and most experienced centers in the Chicago area at performing prepectoral breast reconstruction. Based on its volumes, outcomes and expertise in this technique, Rush was recruited as part of a three-center clinical trial that is studying outcomes of this procedure. Antony has also been doing grand rounds at medical centers in Chicago, nationally and internationally to teach other surgeons about this procedure.

Comprehensive breast reconstruction options

The breast reconstruction program at Rush offers the full range of advanced breast reconstruction options:

- Prepectoral breast reconstruction
- Direct-to-implant (single-stage) immediate breast reconstruction
- Delayed/staged reconstruction
- Regenerative human acellular tissue implants
- Microvascular tissue flap procedures, including TRAM flap and DIEP flap
- Combined tissue expander and implant reconstruction with latissimus flap
- Nipple-sparing procedures
- Lumpectomy/partial mastectomy and oncoplastic reconstruction (breast reduction/lift at the same time of lumpectomy/mastectomy)
IMAGING FOR DENSE BREAST TISSUE
While studies show at least a 30 percent reduction in breast cancer mortality since the implementation of routine screening mammography, mammography alone cannot always detect breast cancers in dense breast tissue.

“Women who have dense breasts are at a higher risk for breast cancer, and it’s harder to see cancers on a mammogram in dense breasts,” says Peter M. Jokich, MD, director of the Regenstein Breast Imaging Center at Rush. “Some cancers can be hidden in the dense tissue.”

To better detect these cancers, Rush offers automated breast ultrasound (ABUS), a supplemental screening for women who have dense breast tissue. Rush was the first medical center in Chicago to offer ABUS.

“Breast tissue shows up as either white or gray-black tissue on a mammogram, with the white being fibroglandular tissue and the gray being fatty tissue. But cancer also shows up as white, so if there is a cancer in the white fibrogrlandular tissue on an X-ray mammogram, it often cannot be perceived with mammography alone,” says Jokich. “However, ABUS uses sound waves without radiation/X-rays and is able to pick up the little cancers that may not be visible on a mammogram.”

Digital screening mammography typically finds about five cancers for every 1,000 screening mammograms. ABUS supplemental screening detects an additional four cancers per 1,000 screenings that are not seen on a mammogram in the dense tissue.

Supplemental ABUS screening increases the detection of node negative cancers and interval cancers — cancers detected via clinical symptoms between screenings that have a worse prognosis.

“By adding supplemental ABUS screening, we’re finding more cancers — and we’re finding them small and in early stages,” says Jokich.

ABUS is a cheaper and easier option than breast MRI for women with dense breast tissue who have an average breast cancer risk. While breast MRI is the most sensitive screening test available, it is typically reserved for women who have a very high risk of breast cancer, including those who are BRCA gene mutation positive.

“MRI is very expensive; it takes a longer time to perform; and we have to start an IV and inject gadolinium contrast. There are also a lot of false positives with MRI,” says Jokich. “The bottom line is that MRI should not be used for screening all women with dense breasts. With digital mammography and ABUS, women with an average risk can get a very comprehensive breast screening that’s faster, less costly and less invasive.”

COMPREHENSIVE BREAST IMAGING OPTIONS
Rush is designated as a Breast Imaging Center of Excellence by the American College of Radiology. Rush offers the full range of breast imaging options:

- Screening digital mammography (2-D mammogram)
- Diagnostic mammography
- Tomosynthesis (3-D mammogram) for screening and diagnosis
- Automated breast ultrasound (ABUS) screening
- Diagnostic ultrasound
- Breast MRI

Breast imaging is available at Rush University Medical Center, Rush Lakeview, Rush River North, Rush Oak Park Hospital and Rush Copley Medical Center. It will also be available at Rush’s newest locations in the South Loop and Oak Brook in late 2018 and 2019, respectively.

1/3 of cancers are not visible in dense breasts

40 percent of women have dense breasts

Women with extremely dense breasts have a four- to six-fold increased risk for breast cancer
Rush’s head and neck program is working closely with Tempus — a biotechnology company that collects, stores and analyzes genetic data, clinical information and tissue samples — to gain better understanding of the genomics of rare, aggressive head and neck cancers. Tempus also provides information about how certain types of tumors respond to targeted treatments and specific genetic alterations. This information can be used to better counsel patients about their prognosis.

“It’s so powerful to be able to get the gene sequencing of a particular tumor, and to understand which approaches that tumor will respond to,” says otolaryngologist/head and neck surgeon Kerstin Stenson, MD, director of the head and neck cancer program.

This data is particularly useful for patients who have run out of treatment options and those who have rare cancers, such as skull base tumors and mucoepidermoid (salivary gland) cancers.

Further, the collaboration with Tempus has the potential to improve and expand treatment options for patients and improve clinicians’ approach to treatment. “Tempus is another unique tool that has the potential to help us treat our patients in a more personalized, effective way and, in many cases, help them beat cancer,” says Pete Batra, MD, the co-director of the Rush Center for Skull Base and Pituitary Surgery and chairperson of the Department of Otorhinolaryngology, Head and Neck Surgery.

Comprehensive patient care
The Tempus partnership has added an exciting new dimension to the already impressive head and neck cancer patient experience at Rush.

In the weekly head and neck tumor conference, a multidisciplinary team of highly skilled otolaryngologists/head and neck surgeons, medical oncologists, facial plastic and reconstructive surgeons, pathologists, radiation oncologists and other specialists work together to review cases and determine personalized treatment plans.

“Patients’ care has been vetted through a group of about 20 experts who work together to get to the best options for our patients,” says Stenson. “We all put the patient at the center.”

SPOTLIGHT ON ORAL CANCER

Rush is one of the few institutions in the Chicago area that performs sentinel lymph node biopsies for oral cavity cancer. To guide the procedure, clinicians at Rush also use a radio tracer material called lymphoseek, which is less painful, stays in the lymph node longer and is more accurate than the traditional radiopharmaceutical.

“Sentinel node biopsy has been very accurate in predicting who needs a neck dissection and more treatment, and who can just be observed,” says Stenson.

This approach is also easier for patients. Five or six years ago, patients had to undergo a bilateral blunt dissection for clinicians to get the same information they can now get with a sentinel node biopsy. “One sentinel lymph node represents the whole nodal basin, which allows us to avoid performing a bilateral open neck dissection — sparing the patient from two or three hours of surgery, a longer recovery time and a lot of risk,” says Stenson.
NEW PROCEDURE BRINGS CHEMO TO MELANOMA
Surgical oncologist Cristina O’Donoghue, MD, MPH, is sparing advanced melanoma patients the wrenching choice of life over limb with a state-of-the-art limb-sparing surgical treatment. O’Donoghue is one of fewer than 30 surgeons in the country who perform isolated limb infusion (ILI), a minimally invasive procedure that delivers high doses of chemotherapy to an affected arm or leg but not the rest of the body.

“Amputation has been the only option for many with with advanced malignancies of the limb such as melanoma, sarcoma and other cutaneous cancers,” O’Donoghue says. “But being able to temporarily isolate the flow of blood to and from the limb means very powerful chemotherapy is now an option.”

A subset of patients do not have a full response to immunotherapies or other drugs used to treat melanoma. Chemotherapy drugs are not usually effective against melanomas and can lead to severe side effects. With ILI, however, surgeons can isolate the arm or leg and deliver powerful doses of chemotherapy directly to the disease site, while sparing the rest of the body.

How it works
During the procedure, O’Donoghue stops blood circulation to the limb with a tourniquet. She then manually infuses chemotherapy drugs into the limb using a series of catheters while the patient is under a general anesthesia. After 30 minutes, the limb is flushed clear of the chemo with a saline solution, the tourniquet is removed and circulation is restored.

ILI is a more advanced version of isolated limb perfusion, a regionalized chemotherapy technique developed in the 1950s that involves the more invasive process of bypassing the flow of blood to the limb via a major artery. Performing the chemo infusion via catheters involves less surgery, which means the patient can receive ILI again if the cancer recurs.

“Isolated limb perfusion remains a very viable option for many patients, but the minimally invasive nature of ILI can provide even more life- and limb-saving options,” O’Donoghue says.

ILI is also used to treat patients who have advanced sarcomas.

ILI by the numbers
O’Donoghue is lead author of the largest assessment of isolated limb infusion (ILI) at a single center in the United States. “Isolated Limb Infusion: A Single-Center Experience with Over 200 Infusions,” published in the Annals of Surgical Oncology in October 2017, found that ILI saves limbs, extends lives and is well tolerated by most people.

O’Donoghue reported the following results for the 163 patients who underwent ILI from 2007 to 2016:

- **5 DAYS** Median hospital stay
- **88%** of patients had no worse side effects than redness and swelling in the treated limb
- **60%** of melanoma patients responded to ILI
- **30 MONTHS LONGER** Melanoma patients who responded to the ILI procedure lived 30 months longer than those who didn’t respond.
The melanoma tumor board at Rush meets twice a month with a team of experts that includes medical oncologists, surgical oncologists, dermatologists, pathologists and radiation oncologists. The tumor board reviews the cases of most melanoma patients who are above stage II.

This multidisciplinary approach, along with significant medical and surgical advances, has helped improve the overall outlook for patients. Six years ago, overall survival for a patient diagnosed with metastatic melanoma was about nine months. Now, with either combination targeted therapy or combination immunotherapy, overall survival rates at one year are over 80 percent.

“We’ve taken a disease where most patients died in a matter of months and turned it into one where the vast majority of patients are alive and doing well at least a year later — and some for many years later,” says Nick Pfanzelter, MD, medical oncologist.

Dermatologist Sheetal Mehta, MD, also notes: “Over the last five to 10 years, we have seen significant advances in immunotherapy for patients who have advanced melanoma. These patients have a better prognosis than they have had in the past.”

About half of melanomas have a mutation in the BRAF gene, and physicians can use targeted therapies — such as BRAF inhibitors alone or with a MEK inhibitor — to attack the cancer cells with an activated BRAF pathway. The other half of patients who do not have the BRAF mutation can be treated with immunotherapy agents, including a combination of ipilimumab and nivolumab or pembrolizumab. These combinations have significantly improved tumor response and in some cases produce durable remission. Many trials of new approaches or combinations of these approaches are also available.

The Melanoma Surveillance Clinic at Rush uses photographic surveillance to carefully monitor high-risk patients for new or changing moles, which could indicate early and curable melanoma.

“Early detection is critical to improving outcomes for melanoma patients,” says Mehta.

Detecting a new or changing mole in patients who have dozens or even hundreds of moles on the skin is challenging or impossible without comparison to photographic baseline.

The surveillance program, led by dermatologist Arthur R. Rhodes, MD, MPH, uses photographic surveillance, in which all visible moles and all anatomic sites of the total skin surface are compared to a photographic baseline, seeking the presence of a new or changed mole that could indicate early melanoma. Photographic baseline consists of at least 28 images of the total skin surface.

Studies have shown that dermatologists who use photographic surveillance detect melanoma at an earlier stage, when it is curable with simple excision. Photographic surveillance in high-risk patients results in fewer biopsies, re-excisions and pathology evaluations.

Rhodes is also focused on monitoring high-risk, non-white patients. While melanoma is about 15 times less common in these patients compared to white patients, mortality tends to be higher due to delayed diagnosis.

“The common misconception that sun exposure is responsible for all cases of melanoma leads to lower survival rates due to delays in seeking medical evaluation for a new or changing mole in relatively sun-protected areas,” says Rhodes.

Through the surveillance clinic, Rhodes and his team educate people of all skin types and ethnicities about their melanoma risk, methods of self-examination and partner-assisted examination, as well as the importance of high-risk patients being monitored. As melanoma and abnormal moles tend to aggregate in families, families also need to be educated and screened for high-risk moles and early melanoma.

Rhodes stresses to patients and colleagues that anyone — regardless of skin color — can develop melanoma, and that early detection is the key to reducing melanoma-related mortality.
AVOIDING OVERTREATMENT FOR THYROID CANCER
The thyroid cancer team at Rush is committed to tailoring therapy to avoid overtreating patients who have less aggressive cancers. Rather than removing the entire thyroid and treating patients with radioactive iodine, as was standard practice for the majority of patients in the past, physicians at Rush are taking a more personalized, nuanced approach.

“Many patients have mild disease and will do really well if we don’t overtreat them,” says endocrinologist Brian Kim, MD, director of the thyroid cancer program at Rush. “We are committed to personalizing treatment to each specific case to maximize patients’ lives and minimize side effects.”

Specialists in Rush’s dedicated thyroid cancer tumor conference work together to create these individualized plans. This approach has resulted in fewer invasive biopsies, fewer aggressive surgeries, decreased use of external radiation and an increase in thyroid nodule monitoring.

Subspecialists working together
Rush’s thyroid cancer tumor conference is one of only a few in the Chicago area. It includes an experienced team of endocrinologists, endocrine surgeons, otolaryngologists/head and neck surgeons, oncologists, pathologists, radiation oncologists and other subspecialists.

Extensive surgical expertise
Rush’s program is unique in that it brings together two types of specialists — otolaryngologists/head and neck surgeons and endocrine surgeons — who specialize in the surgical treatment of thyroid cancer.

“Together we offer a wide range of surgical options — from minimally invasive thyroidectomy to complex oncologic surgery that can involve tracheal resections and extensive lymph node dissections,” says endocrine surgeon Katherine Heiden, MD. “Occasionally, our endocrine surgeons and otolaryngologists perform surgery as a team for our patients who have more complex, advanced thyroid cancers.”

Kim notes: “Although the two subspecialties often have different approaches and different areas of surgical expertise, they come together to do what is best for the patient.”

The surgical team is highly skilled in the following capabilities:

- Minimally invasive thyroidectomy
- Function-sparing neck dissection, removal of complex substernal and mediastinal tumors, and tracheal resection with primary anastomosis
- Surgeon-performed intraoperative ultrasound and biopsy
- Intraoperative nerve monitoring

An endocrinologist focused exclusively on thyroid cancer
Before and after surgery, patients at Rush receive care from an endocrinologist focused on thyroid cancer. The thyroid cancer program at Rush is one of only a handful in the United States that offers this level of subspecialty expertise.

“We are unique in that Brian [Kim] focuses solely on thyroid cancer. Most other institutions have endocrinologists handling thyroid cancer cases while also treating patients for diabetes or pituitary issues, for example, but he concentrates only on thyroid cancer,” says otolaryngologist/head and neck surgeon Kerstin Stenson, MD, director of the head and neck cancer program at Rush.

As a national clinical leader in thyroid cancer care, Kim coauthored the American Thyroid Association’s most recent guidelines for hypothyroidism and gives lectures on the management of thyroid cancer for several academic societies.
THE MOST ADVANCED TREATMENT FOR NEUROENDOCRINE TUMORS

Patients in Illinois with metastatic neuroendocrine cancer no longer have to travel abroad or out of state to receive peptide receptor radionuclide therapy (PRRT) — a targeted therapy used to treat metastatic endocrine cancers. Rush University Medical Center is now one of the few medical centers in the United States that offers this advanced therapy to patients.

PRRT was recently approved by the U.S. Food and Drug Administration (FDA), and prior to its approval, Rush provided the drug to a limited number of patients under FDA-authorized compassionate use. Rush is the first site in Illinois providing PRRT to patients in the general population.

“This therapy has the potential to revolutionize care for those with advanced neuroendocrine tumors that cannot be surgically removed,” says Xavier M. Keutgen, MD, director of the neuroendocrine tumor program at Rush — the only program of its kind in the Chicago area.

How it works

“While relatively rare, there are about 15,000 to 20,000 people diagnosed with neuroendocrine tumors each year in the United States,” says Keutgen.

Physicians in Europe have used PRRT since the mid-1990s to treat neuroendocrine cancers with excellent outcomes.

Patients receiving PRRT are injected with a radiopharmaceutical that consists of an octreotide — a synthetic hormone — along with a small amount of radioactive material. This drug travels through the bloodstream, delivering doses of radiation to neuroendocrine tumor cells while sparing healthy cells.

Neuroendocrine tumor cells are unique in that they have somatostatin receptors on their cell surface, and PRRT targets only these somatostatin receptors. Since octreotide mimics somatostatin (a growth-inhibiting hormone), it causes PRRT to bind with the neuroendocrine tumor cells’ somatostatin receptors.

Comprehensive care

PRRT adds to Rush’s advanced neuroendocrine tumor program, which includes an expert team of surgeons, interventional radiologists, medical oncologists, endocrinologists, gastroenterologists, pathologists and other subspecialists.

Together, they offer the most advanced diagnostic, medical and surgical modalities for patients with neuroendocrine tumors. Last year, for example, Rush became the first hospital in Illinois to offer the most sensitive diagnostic test for neuroendocrine tumors. The 68 Gallium DOTATATE PET/CT scanner is a sophisticated functional imaging technology that allows experts at Rush to pinpoint tumor location with more than 90 percent accuracy.

Keutgen and his surgical oncology colleagues also perform advanced complex liver resections for patients with metastatic neuroendocrine tumors using a novel tissue-sparing approach.

These tumors are usually deemed unresectable by traditional standards. But these newer techniques allow surgeons to remove neuroendocrine liver tumors with minimal blood loss, while keeping the architecture of the liver intact. This prevents the complications typically encountered with extensive liver removal.

“Patients who have neuroendocrine tumors need a team of experts who know all the available options and can determine the best approach for a particular type of tumor,” Keutgen says. “And Rush is the only place in Chicago — and one of the few in the world — where they can find it.”

“This therapy has the potential to revolutionize care for those with advanced neuroendocrine tumors that cannot be surgically removed.”

~ Xavier M. Keutgen, MD, director of the neuroendocrine tumor program
REGIONAL TARGETED THERAPY

Patients with late-stage gastrointestinal cancers have historically had few life-saving or life-prolonging options available. The abdominal peritoneal lining makes it an inherently difficult area in which to treat cancers with traditional chemotherapy. Rush, however, now offers hyperthermic intraperitoneal chemotherapy (also known as HIPEC) — a novel and effective treatment for certain patients with advanced abdominal cancers.

Sam G. Pappas, MD, division chief of surgical oncology at Rush, is among a limited number of surgical oncologists in the nation with expertise in HIPEC.

HIPEC is a regional targeted therapy that combines surgery and a one-time, internal, heated chemotherapy treatment. Surgical oncologists at Rush first remove the tumor in the abdominal cavity, then immediately apply a heated chemotherapy solution, warmed to 42 degrees Celsius (109 degrees Fahrenheit), to the abdominal cavity. The chemotherapy stays in the cavity for about 90 minutes before the surgeons wash it out and close the incisions.

“The combination of heat and chemotherapy is a powerful weapon against these cancers; the two are synergistic,” says Pappas.

The heat improves chemotherapy’s effectiveness in targeting and destroying microscopic cancer cells that could otherwise eventually develop into tumors. The surgeon applies the treatment only to the abdominal cavity, unlike traditional chemotherapy, which circulates body-wide. This targeted approach spares healthy cells throughout the body — resulting in fewer side effects than traditional systemic chemotherapy and radiation.

HIPEC is an aggressive surgical treatment for advanced GI cancers, and it is not appropriate for all patients. It can often take up to 10 hours for the surgery and treatment, and patients must stay on average 10 days to two weeks in the hospital. A multidisciplinary team of specialists at Rush — including surgical oncologists, medical oncologists and radiation oncologists — reviews each patient’s case, tumor histology and likelihood that the cancer will go into remission after the procedure before recommending HIPEC.

For those who meet the criteria, this cutting-edge procedure is a game-changer. It has added years to the lives of patients with certain types of stage IV abdominal cancers who have few, if any, other treatment options. It allows physicians to treat incurable cancers more as chronic diseases in some cases.

“The HIPEC procedure leads to significant prolongation of survival for certain tumor histologies,” Pappas says. “For example, mesothelioma in the belly cavity used to have less than two years survival. With HIPEC, the expected survival is an excess of five years.”

Rush’s team of renowned surgical oncologists, colorectal surgeons and general surgeons are providing innovative and effective surgical options to patients facing gastrointestinal cancers.

HIPEC can be used to treat the following abdominal tumors:

- Appendix
- Colorectal
- Gastric
- Mesothelioma
- Ovarian
- Peritoneal
ENHANCED RECOVERY AFTER SURGERY

The colorectal surgery team at Rush has implemented an enhanced recovery after surgery (ERAS) program to help improve patients’ experiences and recovery after colorectal cancer surgery. ERAS emphasizes patient engagement and education, and a multidisciplinary team approach.

Surgeons, anesthesiologists, clinic staff, OR staff, nurses, dietitians, pharmacists, case managers, physical therapists and clinical resource managers all work with patients and each other before, during and after the surgery to implement protocols to help patients recover more quickly.

Through ERAS, patients are able to drink clear liquids up to three hours before surgery, rather than fasting for 12 hours. They also have a 16-ounce carbohydrate drink about three hours before surgery, which has been found to help decrease the metabolic stress of surgery and insulin resistance, improve postoperative muscle function, and reduce lean body mass losses — all of which contribute to a faster recovery.

From the surgical perspective, colorectal surgeons use minimally invasive approaches whenever possible. “Using minimally invasive techniques helps decrease patients’ inflammatory response, while also providing smaller incisions and faster recovery,” says colorectal surgeon Joanne Favuzza, DO.

Additionally with ERAS, anesthesiologists focus on administering medications during surgery that will not hinder the patients’ recovery.

“We’ve found that if we can prevent some of the patient’s stress response during surgery, the patient will do better,” says anesthesiologist Asokumar Buvanendran, MD. “So we decrease the utilization of IV opioids and narcotics. Instead, we are able to give pain medications to the targeted area where they are having surgery. Avoiding narcotics and opioids decreases patients’ nausea, vomiting, constipation and all of the other associated side effects of these medications that often prolong the length of stay.”

After surgery, the ERAS team focuses on controlling patients’ pain and getting them eating, drinking and walking as soon as possible. “Walking immediately after surgery improves bowel function and often enables patients to get discharged sooner,” says Favuzza.

When the colorectal team at Rush studied outcomes for 263 patients — 71 treated with ERAS and 192 non-ERAS — it found that ERAS patients recovered faster and had fewer complications than those not treated with ERAS. The lengths of stay for ERAS patients was 4.4 days, compared to 6.6 days in the non-ERAS group. And, there were no superficial surgical site infections in ERAS patients, compared to 13 in the non-ERAS group.
For years, my very dearest friend and I would sit on the phone together, have coffee and smoke cigarettes,” Gina remembers. “Then she was diagnosed with lung cancer and died from it. Even though I saw what she and her family went through, I was still in denial that anything could happen to me.”

Taking control
At age 70, Gina got a wake-up call to start taking control of her health: She was diagnosed with breast cancer.

She had a mastectomy at Rush and was soon cancer-free. With a new lease on life, she began running, cut down to three cigarettes a day, and started listening to shamanic drum chants and doing positive-thinking exercises. She also continued her regular breast cancer follow-ups at Rush with medical oncologist Melody Cobleigh, MD, and nurse practitioner Teri Dougherty, NP.

Gina’s smoking history and age put her at a high risk for lung cancer, so Dougherty recommended a lung cancer screening test — a low-dose CT scan. (See page 19 for lung cancer screening criteria.)

Early detection
The test revealed a tumor in Gina’s left lower lobe. “I didn’t have any symptoms, and I would never have gone for a screening on my own,” says Gina.

Only 15 to 20 percent of lung cancer patients are diagnosed in stages I and II, when the disease is most curable. “If you catch lung cancer early, it can be a curable disease,” says Christopher W. Seder, MD, a thoracic surgeon at Rush who treated Gina. “Lung cancer screening is one of the most effective ways we can detect it early.”

A curable disease
Seder performed a minimally invasive, video-assisted lobectomy, removing the left lower lobe. During the surgery, Seder found several cancerous lymph nodes, which indicated Gina needed chemotherapy as well. Seder coordinated Gina’s care with Marta Batus, MD, a medical oncologist at Rush who managed Gina’s chemotherapy. Gina received four chemotherapy treatments, coming to Rush every 21 days for treatment.

“As a lifelong smoker, Gina knew the risks of smoking — but, like many people, she pushed these thoughts out of her mind.”

“Dr. Seder, Dr. Batus and the nurses spelled everything out for me,” she says. “They made me feel so comfortable and confident.”

Batus explains, “When we detect cancers at earlier stages, patients are in better shape to tolerate and complete their treatment with fewer complications, and Gina did beautifully throughout her treatment.”

Gina is now cancer-free — and back to enjoying her life.

Screening saves lives
Research has found that lung cancer screening is actually more effective at saving lives than mammograms and colonoscopies. Yet many patients who meet the criteria for screening still aren’t getting screened.

“If Gina hadn’t undergone the lung cancer screening, it’s possible she wouldn’t have found the lung cancer until it was at a later stage, and she would have needed either more extensive treatments or non-curative treatments,” says Seder.
LUNG CANCER SCREENING PROGRAM AT RUSH

According to the National Lung Screening Trial (NLST), lung cancer mortality was reduced by 20 percent after three rounds of annual lung cancer screening.

The lung cancer screening program at Rush has been designated as a screening center of excellence by the Lung Cancer Alliance. This designation notes that the program diligently follows best practices and offers proper multidisciplinary treatment to each patient who undergoes screening and each patient who has concerning findings on the test.

The core team includes the following:

- Two lung screening nurse coordinators who navigate care
- Two thoracic radiologists
- A thoracic surgeon
- A pulmonologist

RUSH LUNG CANCER SCREENING BY THE NUMBERS FOR RUSH UNIVERSITY MEDICAL CENTER AND RUSH OAK PARK HOSPITAL

660 patients scanned between February 2015 and April 2018

24 diagnosed lung cancers (a 3.6 percent detection rate)

13 of these 24 patients were treated with minimally invasive VATS

14 cancers were diagnosed from baseline scans

11 out of these 14 patients had early-stage non-small cell lung cancer

12 out of these 24 patients had early-stage lung cancers (stages I and II)

9 patients were diagnosed with other cancers, including sarcoma, invasive ductal carcinoma, thyroid cell carcinoma, renal cell carcinoma and lymphoma

Talk to your patients about lung cancer screening. They may be candidates for this life-saving test if they meet the following criteria:

- Are between 55 and 77 years old (for Medicare coverage) or between 55 and 80 years old (for commercial insurance coverage)
- Are a current smoker or a former smoker who quit in the last 15 years
- Have a 30-pack-year smoking history (i.e., one pack per day for 30 years or 2 packs per day for 15 years)

Lung cancer screening is available at Rush University Medical Center in Chicago, Rush Oak Park Hospital in Oak Park and Rush Copley Medical Center in Aurora.
GLIOBLASTOMA CLINICAL TRIALS
The neuro-oncology program at Rush is offering several new clinical trials — led by Clement Pillainayagam, MD, and Joo Yeon Nam, MD — that are studying novel treatments for patients with glioblastoma (GBM), the most aggressive form of newly diagnosed primary brain malignancies.

The first trial is a phase II study comparing the effectiveness of treatment with an experimental vaccine drug, DSP-7888 dosing emulsion (DSP-7888), in combination with bevacizumab vs. bevacizumab alone in patients with recurrent or progressive GBM, following initial therapy.

Another purpose of the study is to learn more about DSP-7888, which may help a patient’s immune system kill or slow the growth of cancer cells that have a Wilms’ tumor 1 gene (WT1) protein.

The second trial is a phase 3b study for the management of ocular side effects in subjects with EGFR-amplified GBM receiving depatuxizumab mafodotin (ABT-414).

The third trial, NRG BN001, is led by Aidnag Diaz, MD, and is looking into whether proton radiotherapy can be as effective as photon radiotherapy in controlling the progression of GBM with a milder side effect profile. In addition to these three GBM trials the neuro-oncology team is also conducting a phase II study of BRAF/MEK inhibitors in papillary craniopharyngiomas.

GENETIC TESTING FOR CANCER
The Rush Inherited Susceptibility to Cancer (RISC) program continues to expand its services to include the following:

- **Metastatic prostate cancer:** BRCA1/2 testing for metastatic prostate cancer.
- **Metastatic breast cancer:** Genetic testing for breast cancer predisposition for women with metastatic breast cancer.
- **Germline genetic testing:** Two years ago, the RISC program began working with Ambry Genetics Laboratory on a slow rollout for a new test that pairs somatic tumor profiling with germline genetic testing, called TumorNext. “This allows us to provide more targeted therapies for each patient’s cancer,” says medical oncologist Lydia Usha, MD, director of the RISC program.
- **Colorectal and endometrial cancer:** TumorNext-Lynch for patients with colorectal and endometrial cancers whose tumors show abnormal immunohistochemistry (IHC) screening for Lynch syndrome.

3-D PRINTED BONE AND JOINT DEVICES FOR SARCOMA
As part of Rush’s limb salvage program, Steven Gitelis, MD, director of orthopedic oncology, is helping to develop 3-D printed bone and joint devices for sarcoma patients.

Using 3-D printing technology will help improve the long-term durability and function of cancer prosthetics, according to Gitelis. “With current prosthetic devices, the tendons and ligaments reattach to the metal, but the implants don’t have the correct geometry for the tissues,” says Gitelis. “3-D printing allows us to engineer larger pores for soft tissue ingrowth and smaller pore diameter for bone ingrowth into the metal.”

The benefit for patients is improved durability and stability of the joint, which decreases the risk of dislocation. “It also aids in muscle function because if the muscles don’t reattach to the device, then the patients will limp,” says Gitelis. “When the tendons heal and attach to the device, we can better recreate normal walking function for our patients.”

The 3-D printed prosthetics are currently being developed for lower extremities, and they will be available for both pediatric and adult patients.
MULTI-PARAMETRIC MRI-GUIDED DOSE ESCALATED RADIOTHERAPY FOR LOCALIZED PROSTATE CANCER

Radiation oncologist Dian Wang, MD, PhD, and his colleagues — including urologists, medical oncologists and radiologists — in the prostate and genitourinary cancer program at Rush are currently enrolling patients in a novel phase II study utilizing advances in image guidance and radiotherapy techniques for patients with localized prostate cancer.

Patients are treated with a course of image-guided radiotherapy utilizing volumetric arc therapy to the prostate and seminal vesicle +/- pelvic lymph nodes, followed by a stereotactic body radiotherapy boost. The nodules found on multi-parametric MRI that demonstrate bulky, high-grade disease are receiving the highest dose, which is otherwise unachievable with conventional radiotherapy treatment.

Early results of the study, which were presented at the 2018 Genitourinary Cancers Symposium – American Society of Clinical Oncology (ASCO) meeting, reported acute genitourinary and gastrointestinal adverse events, demonstrating that this novel approach was tolerable for patients with minimal acute toxicity.

QUALITY OF CARE AND UTILIZATION IMPROVEMENT IN THE INFUSION CENTER

Rush’s cancer committee partnered with Rush University Medical Group and Rush University Medical Center’s Information Services to measure the quality of care and utilization of the infusion space.

Prior to the study, there was no way to know exactly how long patients spend in each step of care. Additionally, there was an inherent challenge in keeping patients up-to-date on delays in care and the status of the infusion center, which, ultimately, led to patient dissatisfaction. The goal of the study was to create a visible screen monitoring the utilization and status of the center, in real time.

The infusion center is now monitoring utilization via a series of manual entry points in the patient’s electronic medical record. The goal of these data points is to effectively track each appointment.

RESEARCHER PROFILE: VINEET GUPTA, PHD

Targeting Tumor-Associated Macrophages for Next Generation Immunotherapies

“This is a truly exciting time to be working on cancer research,” says Vineet Gupta, PhD, the vice chair for research and innovation at Rush University Medical Center. “We are finding novel treatments and approaches that may eventually make the majority of the cancers we see treatable and manageable.”

In his lab, Gupta and his colleagues are successfully developing novel, immune-targeted small molecule compounds that target tumor-associated macrophages (TAMs). “The more TAMs a patient has in their tumor, the poorer their outcome is,” says Gupta. “We have been developing compounds to reduce the number of TAMs in a tumor.”

Gupta and his colleagues have seen these compounds reduce tumor burden and growth in experimental tumor models of melanoma, breast cancer, lung cancer and pancreatic cancer. A collaborative study, recently presented at the American Association for Cancer Research (AACR) Annual Meeting by Gupta’s collaborator David DeNardo, PhD, from Washington University, St. Louis, found significant efficacy of the new compounds in experimental models using them as a single agent and in combination with various checkpoint inhibitors.

Rush’s translational cancer research program has continued to grow and evolve in the past few years under the leadership of Gupta and Timothy M. Kuzel, MD, chief of the division of hematology, oncology and cell therapy. The two created a section of research in hematology and oncology that consists of clinicians and researchers who meet regularly to discuss their research and collaborate.

“This type of shared knowledge fosters collaboration and helps us move our research forward to get it from the bench to the bedside and the bedside to the bench,” says Gupta. “Research is very well integrated with clinical practice at Rush, unlike other institutions where the two are often very siloed. As researchers at Rush, we have a tight interface with patients, which really personalizes the work we’re doing.”

GYNECOLOGIC ONCOLOGY TRIAL

The gynecologic-oncology program at Rush offers several clinical trials through the National Cancer Institute (NCI). These trials are led by Summer Dewdney, MD, Amina Ahmed, MD, and Edgardo Yordan, MD.

One new trial is looking at a novel agent for the upfront treatment of ovarian, fallopian tube or primary peritoneal cancer. The trial uses atezolizumab, a monoclonal antibody against PD-L1 that has been found to be expressed in ovarian cancers. This is a national collaborative research trial by NRG Oncology, funded by the NCI.
The cutaneous lymphoma clinic at Rush brings together renowned dermatologists, dermato- and hemato-pathologists, and hematologist-oncologists who specialize in the diagnosis and treatment of this unusual spectrum of hematologic malignancies.

“Most of these malignancies are easier to treat and more tolerable than a bad case of psoriasis or eczema; people can live with and manage this disease pretty well,” says dermatologist Warren Piette, MD, director of the clinic.

Rush offers innovative treatments and several clinical trials for the small percentage of patients who have more severe cutaneous lymphoma. Specifically, patients at Rush who have at least three cutaneous lymphoma plaques may be eligible for hypericin, a synthetic medication applied topically twice a week and activated with fluorescent lights.

Additionally, medical oncologist Timothy M. Kuzel, MD, worked on a study for a new systemic drug for cutaneous lymphoma patients (alcanza), which has demonstrated significantly higher rates of durable responses than previous standard therapies. The results were published this past year in The Lancet Oncology. Several other trials for this disorder are currently under way at Rush for patients with more refractory disease.

Rush also has a successful photopheresis program for patients with Sézary syndrome, the most severe form of cutaneous lymphoma. “One reason that we have a high success rate and high completion rate with photopheresis is that each patient receiving photopheresis works one-on-one with a highly trained nurse,” says Danica Uzelac, RN, BSN, CCRC, photopheresis nurse manager.

During photopheresis, patients are connected to a machine that removes some of their blood and puts it through a centrifuge system to get a concentrated collection of white blood cells. The white blood cells are treated with a drug called uvadex and ultraviolet light, then returned to the patient.

“The treatment has a regulatory effect on the T-cells and helps improve patients’ symptoms, making their skin feel less itchy and less inflamed,” explains Uzelac.

Finally, symptom management is vital in this disorder. Pruritus, or itching, is a debilitating side effect of cutaneous lymphoma. Trials testing novel topical treatments to help palliate pruritus are also under way.

Medical oncologist Nick Pfanzelter, MD, worked on a recent phase I trial combining anti-CSF-1 receptor (cabiralizumab) — a new immunotherapeutic agent that targets tumor-associated macrophages (TAMs) — with anti-PD-1 (nivolumab) for patients with advanced solid tumors. In pancreatic cancer, and other cancers, high levels of TAMs are associated with poor prognosis.

“Cabiralizumab inhibits TAMs, which will hopefully augment the immune response that some of our more standard immunotherapies provide,” says Pfanzelter.

The study — which was presented at the Society for Immunotherapy of Cancer annual meeting — found that cabiralizumab was a safe treatment. And preliminary evidence found a durable clinical benefit of using cabiralizumab plus nivolumab in some heavily pre-treated patients with advanced pancreatic cancer.

This year, the orthopedic oncology program at Rush became the first program in the country to launch an electronic clinical registry database, PatientIQ. The registry — led by orthopedic oncologists Alan Blank, MD, MS, Matthew Colman, MD, and Steven Gitelis, MD — will follow patients over several years, which will provide a longitudinal study of patients with rare orthopedic oncologic conditions, such as bone and soft tissue sarcomas.

The registry utilizes the patient-reported outcomes measurement information system (PROMIS), which consists of questionnaires that ask patients about their functionality and pain. Rather than relying solely on physician evaluations — standard procedure in the past — this patient-reported approach offers more personalized and meaningful data.

“Each year, we hope to enroll 500 to 700 patients into the database, which will allow us to perform retrospective studies as well as eventually prospective studies — all with the long-term goal of improving our patients’ outcomes,” says Blank.
Disease Site Programs

BONE AND SOFT TISSUE SARCOMAS
CLINICAL SPECIALISTS

Adult medical oncologist: Marta Batus, MD

Adult surgical oncologists: Cristina O’Donoghue, MD, MPH; Sam Pappas, MD

Diagnostic radiologists: James Cameron, MD; John Meyer, DO; Anthony Zelazny, MD

General surgeon: Jonathan Myers, MD

Interventional radiologist: Bulent Arslan, MD

Orthopaedic oncology surgeons: Alan Blank, MD, MS; Matthew Colman, MD; Steven Gitelis, MD

Pathologists: Leonidas Arvanitis, MD; Jerome Loew, MD; Brett Mahon, MD; Ira Miller, MD; Vijaya Reddy, MD

Pediatric medical oncologists: Lisa Giordano, MD; Paul Kent, MD; Nupur Mittal, MD

Pediatric palliative medicine specialist: Rani Ganesan, MD

Pediatric physiatrist: Laura Deon, MD

Pediatric psychologist: Katherine McLean, PhD

Pediatric social worker: Erika Owens, MSW

Plastic and reconstructive specialist: Gordon Derman, MD

Radiation oncologist: Dian Wang, MD, PhD

Pediatric surgeon: Srikumar Pillai, MD

BRAIN AND SKULL BASE TUMORS
CLINICAL SPECIALISTS

Medical oncologists (skull base tumors): Mary Jo Fidler, MD; John Showel, MD

Neuro-oncologists: Clement Pillainayagam, MD; Joo Yeon Nam, MD

Neuroradiologists: Sharon Byrd, MD; Miral Jhaveri, MD; Mehmet Kocak, MD

Neurosurgeons: Richard Byrne, MD; Lorenzo Muñoz, MD

Pathologists: Leonidas Arvanitis, MD; Paolo Gattuso, MD; Ritu Ghai, MD; Sukriti Nag, MD

Pediatric hematologist/oncologist: Lisa Giordano, MD; Paul Kent, MD; Nupur Mittal, MD

Radiation oncologist: Aidnag Diaz, MD, MPH; Neilayan Sen, MD

Speech pathologists: Mike Hefferly, PhD; Michele Simer, MS

BRAIN TUMOR CONFERENCE
Tuesdays, 11:30 a.m. to 12:30 p.m. Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building

BREAST CANCER
CLINICAL SPECIALISTS

Diagnostic radiologists: Anne Cardwell, MD; Carol Corbridge, MD; Janice Dieschbourg, MD; Mineya Dondalski, MD; Brandie Fagin, MD; Paula Grabler, MD; Peter Jokich, MD; Gene Solmos, MD; Lisa Stempel, MD

Medical oncologists: Melody Cobleigh, MD; Ruta Rao, MD; April Swoboda, MD; Lydia Usha, MD

Pathologists: Paolo Gattuso, MD; Ritu Ghai, MD

Plastic and reconstructive specialists: Anuja Antony, MD, MPH; John Cook, MD; Gordon Derman, MD; Catherine Hertl, MD; Keith Hood, MD; Christina Tragos, MD

Radiation oncologists: Parul Barry, MD; Neilayan Sen, MD

Surgical oncologists: Darius Francescatti, MD; Andrea Madrigrano, MD; Cristina O’Donoghue, MD, MPH; Claudia Perez, DO; Norman Wool, MD

BREAST TUMOR CONFERENCE
Mondays, noon to 1 p.m. Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building

ENDOCRINE AND THYROID CANCERS
CLINICAL SPECIALISTS

Diagnostic radiologists: Amjad Ali, MD; Sumeet Virmani, MD

Endocrine surgeons: Katherine Heiden, MD; Xavier Keutgen, MD

Endocrinologists: Tiffany Hor, MD; Brian Kim, MD; Mahtab Sohrevardi, MD

Medical oncologist: Mary Jo Fidler, MD

Otolaryngologists/head and neck surgeons: Samer Al-Khudari, MD; Kerstin Stenson, MD

Endocrinologists: Tiffany Hor, MD; Brian Kim, MD; Mahtab Sohrevardi, MD

Medical oncologist: Mary Jo Fidler, MD

Otolaryngologists/head and neck surgeons: Samer Al-Khudari, MD; Kerstin Stenson, MD

Pathologists: Paolo Gattuso, MD; Ritu Ghai, MD; Ji-Weon Park, MD

Radiation oncologists: Aidnag Diaz, MD, MPH; Neilayan Sen, MD

ENDOCRINE TUMOR CONFERENCE
Second Wednesday of the month, 8 to 9 a.m.

Endocrine Clinic Suite, 250 Professional Building

THYROID CANCER TUMOR CONFERENCE
Every fourth Wednesday, 8 to 9 a.m. Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building
**GASTROINTESTINAL CANCERS**

**CLINICAL SPECIALISTS**

**Colorectal surgeons:**
Joanne Favuzza, DO; Dana Hayden, MD; Theodore Saclarides, MD

**Gastroenterologists:**
Faraz Bishehsari, MD; Salina Lee, MD; John Losurdo, MD; Joshua Melson, MD, MPH; Peter Sargos, MD

**General surgeons:**
Daniel Deziel, MD; Keith Millikan, MD; Jonathan Myers, MD; Benjamin Veenstra, MD

**Interventional radiologists:**
Bulent Arslan, MD; Jordan Tasse, MD; Ulku Cenk Turba, MD

**Liver radiotherapist:**
Neilayan Sen, MD

**Medical oncologists:**
Audrey Kam, MD*; William Leslie, MD

**Pathologist:**
Shriram Jakate, MD

**Radiation oncologist:**
Dian Wang, MD, PhD

**Surgical oncologist:**
Sam Pappas, MD

**Thoracic surgeons:**
Andrew Arndt, MD; Gary Chmielewski, MD; Michael Liptay, MD; Christopher Seder, MD

**Transplant hepatologists:**
Costica Aloman, MD; Sheila Eswaran, MD, MS; Sujit Janardhan, MD, PhD; Nancy Reau, MD; Nikunj Shah, MD

**Transplant surgeons:**
Edie Chan, MD; Martin Hertl, MD, PhD; Erik Schadde, MD

**GASTROINTESTINAL TUMOR CONFERENCE**

Tuesdays, 12:30 to 1:30 p.m. Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building

**GENITOURINARY CANCERS**

**CLINICAL SPECIALISTS**

**General surgeons:**
Timothy Kuzel, MD; Nick Pfanzelter, MD; John Showel, MD

**Medical oncologists:**
Audrey Kam, MD*; William Leslie, MD

**Pathologist:**
Shriram Jakate, MD

**Radiation oncologist:**
Dian Wang, MD, PhD

**Surgical oncologist:**
Sam Pappas, MD

**Thoracic surgeons:**
Andrew Arndt, MD; Gary Chmielewski, MD; Michael Liptay, MD; Christopher Seder, MD

**Transplant hepatologists:**
Costica Aloman, MD; Sheila Eswaran, MD, MS; Sujit Janardhan, MD, PhD; Nancy Reau, MD; Nikunj Shah, MD

**Transplant surgeons:**
Edie Chan, MD; Martin Hertl, MD, PhD; Erik Schadde, MD

**GENITOURINARY TUMOR CONFERENCE**

Last Tuesday of the month, 7 to 8 a.m. Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building

**GYNECOLOGIC CANCERS**

**CLINICAL SPECIALISTS**

**Medical oncologist:**
Lydia Usha, MD

**Pathologists:**
Paolo Gattuso, MD; Ritu Ghai, MD

**Radiation oncologists:**
Aidnag Diaz, MD, MPH; Neilayan Sen, MD

**Surgical oncologist:**
Sam Pappas, MD

**Urologists:**
Edward Cherullo, MD*; Christopher Coogan, MD; Shahid Ekbal, MD; Lev Elterman, MD; Jerome Hoeksema, MD; Narendra Khare, MD; Laurence Levine, MD; Srinivas Vourganti, MD

**GENITOURINARY TUMOR CONFERENCE**

Fridays, 7 to 8 a.m. Pathology Conference Room, 562 Jelke Building

**HEAD AND NECK CANCERS**

**CLINICAL SPECIALISTS**

**Neuroradiologists:**
Sumeet Dua, MD; Miral Jhaveri, MD

**Otolaryngologists/head and neck surgeons:**
Samer Al-Khudari, MD; Pete Batra, MD; Thomas Nielsen, MD; Kerstin Stenson, MD; Bobby Tajudeen, MD

**Pathologists:**
Paolo Gattuso, MD; Ritu Ghai, MD

**Radiation oncologists:**
Aidnag Diaz, MD, MPH; Neilayan Sen, MD

**HEAD AND NECK TUMOR CONFERENCE**

Wednesdays, 7 to 8 a.m. Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building

**HEMATOLOGIC CANCERS**

**CLINICAL SPECIALISTS**

**Dermatologist:**
Warren Piette, MD

**Geneticist:**
Wei-Tong Hsu, MD

**Hematologist/oncologists:**
Lisa Boggio, MD; Irene Delghian-Paz, MD; Sefer Gezer, MD; Deborah Katz, MD; Seo-Hyun Kim, MD*; Melissa Larson, MD; Agne Paner, MD; Jamile Shammo, MD; Mindy Simpson, MD; Parameswaran Venugopal, MD

**Pathologists:**
Paolo Gattuso, MD; Ritu Ghai, MD

**Radiologist:**
Amjad Ali, MD

**Stem cell transplantation specialists:**
John Maciejewski, MD, PhD; Sunita Nathan, MD

**HEMATOLOGIC CANCER CONFERENCES**

*Leukemia:* Mondays, 1 to 2 p.m.
*Lymphoma:* Thursdays, 8 to 9 a.m.
*Multiple myeloma:* every other Friday, 8 to 9 a.m.
*Myelodysplasia/myeloproliferative disorders:* every other Friday, 9 to 10 a.m.

**LIVER CANCER**

**CLINICAL SPECIALISTS**

**Diagnostic radiologist:**
Ryan Braun, MD

**Hepatologists:**
Sheila Eswaran, MD, MS; Nancy Reau, MD; Nikunj Shah, MD

**Interventional radiologists:**
Osman Ahmed, MD; Bulent Arslan, MD; Jordan Tasse, MD; Ulku Cenk Turba, MD

**Medical oncologist:**
William Leslie, MD

**Surgical oncologist:**
Sam Pappas, MD
Transplant surgeons: Edie Chan, MD; Martin Hertl, MD, PhD; Erik Schadde, MD

LIVER CANCER CONFERENCE
First and third Friday of the month, 7 to 8 a.m.
4th Floor, Tower, Suite 04413

LUNG AND THORACIC CANCERS
CLINICAL SPECIALISTS
Diagnostic radiologist: Palmi Shah, MD
Interventional radiologists: Osman Ahmed, MD; Bulent Arslan, MD; Jayesh Soni, MD; Jordan Tasse, MD; Ulku Cenk Turba, MD
Medical oncologists: Marta Batus, MD; Philip Bonomi, MD; Mary Jo Fidler, MD
Palliative medicine specialist: Elaine Chen, MD
Pathologists: PaoloGattuso, MD; Philip Bonomi, MD; Mary Jo Fidler, MD
Pulmonary medicine specialists: Robert Balk, MD; Elaine Chen, MD; Prema Nanavaty, MD; Michael Silver, MD; Betty Tran, MD, MS; Abhaya Trivedi, MD; Mark Yoder, MD
Radiation oncologist: Gaurav Marwaha, MD
Thoracic surgeons: Andrew Arndt, MD; Gary Chmielewski, MD; Nicole Geissen, DO; Justin M. Karush, DO; Michael Liptay, MD; Christopher Seder, MD

LUNG AND THORACIC TUMOR CONFERENCE
Thursdays, 10 to 11 a.m. Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building

MELANOMA AND CUTANEOUS CANCERS
CLINICAL SPECIALISTS
Dermatopathologist: Motunrayo Adisa, MD
Diagnostic radiologist: Joy Sclamberg, MD
Head and neck surgeons: Samer Al-Khudari, MD; Kerstin Stenson, MD
Medical oncologists: Timothy Kuzel, MD; Nick Pfanzelter, MD
Neurosurgeon: Lorenzo Muñoz, MD
Ophthalmologist: Adam Cohen, MD
Pathologist: Vijaya Reddy, MD
Plastic and reconstructive specialists: Gordon Derman, MD; Catherine Hertl, MD; Peter Revenaugh, MD; Ryan Smith, MD*
Surgical oncologist: Cristina O’Donoghue, MD, MPH

MELANOMA AND SOFT TISSUE TUMOR CONFERENCE
Wednesdays, 11 a.m. to noon Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building

PEDIATRIC CANCERS
CLINICAL SPECIALISTS
Neuro-oncologists: Clement Pillainayagam, MD; Joo Yeon Nam, MD
Orthopedic oncologist: Steven Gitelis, MD
Pediatric hematologist/oncologists: Lisa Boggio, MD; Lisa Giordano, MD; Paul Kent, MD; Nupur Mittal, MD; Mindy Simpson, MD
Pediatric neuroradiologists: Sharon Byrd, MD; Mehmet Kocak, MD
Pediatric neurosurgeon: Lorenzo Muñoz, MD
Plastic and reconstructive specialist: Gordon Derman, MD
Radiation oncologist: Aidnag Diaz, MD, MPH

SPINE TUMORS
CLINICAL SPECIALISTS
Neurosurgeons: Richard Fessler, MD, PhD; Ricardo Fontes, MD, PhD; John O’Toole, MD, MS
Neuro-oncologists: Clement Pillainayagam, MD; Joo Yeon Nam, MD
Orthopedic surgeons: Matthew Colman, MD; Kern Singh, MD
Radiation oncologist: Aidnag Diaz, MD

SPINE TUMOR CONFERENCE
Thursdays, 9 a.m. to noon Woman’s Board Cancer Treatment Center, 500 S. Paulina St.

PALLIATIVE AND SUPPORTIVE CARE
CLINICAL SPECIALISTS
Palliative medicine specialists: Jacqueline Cameron, MD; Elaine Chen, MD; Nelia Jain, MD; Ramandeep Kaur, MD; Neha Kramer, MD; Jaime Lewis, MD; Sean O’Mahony, MB, BCh, BA, Pringl Miller, MD; Mei-Ean Yeow, MB, BCh
Psychosocial oncology specialists: James Gerhart, PhD; Rebecca Hunter, PhD; Catalina Lawsins, PhD; Sarah Thilges, PhD; Vanessa Tirone, PhD; Allison Gaffey, PhD
Chinese medicine practitioner: Angela Johnson, Dip, OM, MSTOM, MPH, Lac
Massage therapists: Michelle Haugen; Tanya Tucci

*Starting at Rush after July 1, 2018
### 2016 Cancer Registry Report

<table>
<thead>
<tr>
<th>Primary Site</th>
<th>Total</th>
<th>Analytic</th>
<th>Non-Analytic</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORAL CAVITY &amp; PHARYNX</td>
<td>121</td>
<td>103</td>
<td>18</td>
<td>82</td>
<td>39</td>
</tr>
<tr>
<td>Lip</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Tongue</td>
<td>41</td>
<td>34</td>
<td>7</td>
<td>32</td>
<td>9</td>
</tr>
<tr>
<td>Salivary Glands</td>
<td>13</td>
<td>11</td>
<td>2</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Floor of Mouth</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Gum &amp; Other Mouth</td>
<td>25</td>
<td>22</td>
<td>3</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Nasopharynx</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Tonsil</td>
<td>15</td>
<td>14</td>
<td>1</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Oropharynx</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Hypopharynx</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Other Oral Cavity &amp; Pharynx</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>DIGESTIVE SYSTEM</td>
<td>487</td>
<td>395</td>
<td>92</td>
<td>252</td>
<td>235</td>
</tr>
<tr>
<td>Esophagus</td>
<td>41</td>
<td>35</td>
<td>6</td>
<td>31</td>
<td>10</td>
</tr>
<tr>
<td>Stomach</td>
<td>38</td>
<td>30</td>
<td>8</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Small Intestine</td>
<td>12</td>
<td>8</td>
<td>4</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Colon Excluding Rectum</td>
<td>109</td>
<td>83</td>
<td>26</td>
<td>42</td>
<td>66</td>
</tr>
<tr>
<td>Rectum &amp; Rectosigmoid Junction</td>
<td>57</td>
<td>46</td>
<td>11</td>
<td>35</td>
<td>22</td>
</tr>
<tr>
<td>Anus, Anal Canal &amp; Anorectum</td>
<td>16</td>
<td>11</td>
<td>5</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Liver &amp; Intrahepatic Bile Duct</td>
<td>85</td>
<td>69</td>
<td>16</td>
<td>63</td>
<td>22</td>
</tr>
<tr>
<td>Gallbladder</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Other Bilary Tract</td>
<td>10</td>
<td>9</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Pancreas</td>
<td>86</td>
<td>78</td>
<td>8</td>
<td>35</td>
<td>51</td>
</tr>
<tr>
<td>Retroperitoneum</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Peritoneum, Omentum, Mesentery, &amp; Other Digestive Organs</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Other Digestive Organs</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>RESPIRATORY SYSTEM</td>
<td>493</td>
<td>428</td>
<td>65</td>
<td>231</td>
<td>262</td>
</tr>
<tr>
<td>Nose, Nasal Cavity &amp; Middle Ear</td>
<td>12</td>
<td>11</td>
<td>1</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Larynx</td>
<td>35</td>
<td>27</td>
<td>8</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Lung &amp; Bronchus</td>
<td>446</td>
<td>390</td>
<td>56</td>
<td>198</td>
<td>248</td>
</tr>
<tr>
<td>BONES &amp; JOINTS (including Heart)</td>
<td>31</td>
<td>25</td>
<td>6</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>SOFT TISSUE (excluding Heart)</td>
<td>56</td>
<td>50</td>
<td>6</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>SKIN (excluding basal &amp; squamous cell carcinomas)</td>
<td>79</td>
<td>56</td>
<td>23</td>
<td>41</td>
<td>38</td>
</tr>
<tr>
<td>Melanoma —Skin</td>
<td>69</td>
<td>48</td>
<td>21</td>
<td>35</td>
<td>34</td>
</tr>
<tr>
<td>Other Non-Epithelial Skin</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>BREAST</td>
<td>556</td>
<td>467</td>
<td>89</td>
<td>6</td>
<td>550</td>
</tr>
<tr>
<td>FEMALE GENITAL SYSTEM</td>
<td>229</td>
<td>184</td>
<td>45</td>
<td>0</td>
<td>229</td>
</tr>
<tr>
<td>Cervix Uteri</td>
<td>38</td>
<td>36</td>
<td>2</td>
<td>0</td>
<td>38</td>
</tr>
<tr>
<td>Corpus &amp; Uterus, NOS</td>
<td>114</td>
<td>94</td>
<td>20</td>
<td>0</td>
<td>114</td>
</tr>
<tr>
<td>Ovary</td>
<td>37</td>
<td>28</td>
<td>9</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>Vagina</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Vulva</td>
<td>23</td>
<td>12</td>
<td>11</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Other Female Genital Organs</td>
<td>13</td>
<td>11</td>
<td>2</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>MALE GENITAL SYSTEM</td>
<td>235</td>
<td>164</td>
<td>71</td>
<td>235</td>
<td>0</td>
</tr>
<tr>
<td>Prostate</td>
<td>214</td>
<td>151</td>
<td>63</td>
<td>214</td>
<td>0</td>
</tr>
<tr>
<td>Testis</td>
<td>18</td>
<td>10</td>
<td>8</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Penis</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>URINARY SYSTEM</td>
<td>197</td>
<td>157</td>
<td>40</td>
<td>125</td>
<td>72</td>
</tr>
<tr>
<td>Urinary Bladder</td>
<td>73</td>
<td>65</td>
<td>8</td>
<td>54</td>
<td>19</td>
</tr>
<tr>
<td>Kidney &amp; Renal Pelvis</td>
<td>121</td>
<td>90</td>
<td>31</td>
<td>69</td>
<td>52</td>
</tr>
<tr>
<td>Ureter</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>EYE &amp; ORBIT</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>BRAIN &amp; OTHER NERVOUS SYSTEM</td>
<td>263</td>
<td>214</td>
<td>49</td>
<td>106</td>
<td>157</td>
</tr>
<tr>
<td>Brain</td>
<td>131</td>
<td>105</td>
<td>26</td>
<td>69</td>
<td>62</td>
</tr>
<tr>
<td>Cranial Nerves Other Nervous Systems</td>
<td>132</td>
<td>109</td>
<td>23</td>
<td>37</td>
<td>95</td>
</tr>
<tr>
<td>ENDOCRINE SYSTEM</td>
<td>154</td>
<td>137</td>
<td>17</td>
<td>57</td>
<td>97</td>
</tr>
<tr>
<td>Thyroid</td>
<td>99</td>
<td>89</td>
<td>10</td>
<td>29</td>
<td>70</td>
</tr>
<tr>
<td>Other Endocrine (including thymus)</td>
<td>55</td>
<td>48</td>
<td>7</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>LYMPHOMAS</td>
<td>211</td>
<td>172</td>
<td>39</td>
<td>110</td>
<td>101</td>
</tr>
<tr>
<td>Hodgkin Lymphoma</td>
<td>20</td>
<td>14</td>
<td>6</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Non-Hodgkin Lymphoma</td>
<td>191</td>
<td>158</td>
<td>33</td>
<td>99</td>
<td>92</td>
</tr>
<tr>
<td>MYELOMA</td>
<td>76</td>
<td>54</td>
<td>22</td>
<td>32</td>
<td>44</td>
</tr>
<tr>
<td>LEUKEMIAS</td>
<td>164</td>
<td>128</td>
<td>36</td>
<td>97</td>
<td>67</td>
</tr>
<tr>
<td>MESOTHERIOMA</td>
<td>11</td>
<td>11</td>
<td>0</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>KAPOSI SARCOMA</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>MISCELLANEOUS</td>
<td>57</td>
<td>34</td>
<td>23</td>
<td>31</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>3427</td>
<td>2784</td>
<td>643</td>
<td>1461</td>
<td>1966</td>
</tr>
</tbody>
</table>

**Analytic:** Cases diagnosed and/or received all or part of first course of care at Rush University Medical Center.

**Nonanalytic:** Cases diagnosed and all first course treatment completed elsewhere.

This chart represents the Cancer Registry Report by first contact.
NEW CANCER INCIDENCE BY DIAGNOSIS YEAR, 2012-2016

ANALYTIC CASE DISTRIBUTION BY GENDER AND AGE AT DIAGNOSIS, 2016

TOP 10 ANALYTICAL SITES IN COMPARISON TO NATIONAL, 2016
Representative Publications


derived immature myeloid cells are a main source of circulating suPAR contributing to proteinuric kidney disease. *Nat Med.* 2017;23(1):100-106.


Reyes HD, Miecznikowski J, Gonzalez-Bosquet J, Devor EJ, Zhang Y, Thiel KW,


The Rush University Cancer Center comprises all of the cancer-related clinical, research and educational efforts at Rush, crossing 20 departments, divisions and sections; inpatient and outpatient areas; professional clinical activities; and the colleges of Rush University.

For more information about cancer programs at Rush, or to refer a patient for an initial visit or a second opinion, please call (312) CANCER-1 (226-2371).

Visit rush.edu/cancer to learn more.