At the Rush University Cancer Center, we approach cancer care in new, innovative ways every day. From the latest advances in immunotherapy to minimally invasive surgical techniques, cancer clinicians at Rush provide advanced, yet personalized care.

Innovation at Rush also extends beyond the latest research and medical advances. We understand that it takes more than medications and surgeries to treat cancer. It takes a coordinated partnership between clinicians and supportive care providers to treat the whole patient from diagnosis through survivorship.

In addition to presenting our 2014 cancer registry numbers (see p. 23), this report also highlights innovations in the following areas:

- Research
- Treatments
- Surgical techniques
- Multidisciplinary collaborations

**Chair’s Report**

**Improving Patient Care**

At Rush, not only do we provide comprehensive, personalized care to our patients, we also launch new programs and quality initiatives to improve care. Below are some examples of this commitment:

**Dedication to Supportive Care:** Rush is part of The Coleman Foundation Supportive Oncology Initiative, an innovative effort between eight Chicago medical centers to implement improvements in supportive oncology. Through this initiative, Rush is building and improving support services that help reduce the physical and emotional burdens of cancer through pain and symptom management, psychosocial support, integrated complementary therapies and more. These services also help improve the effectiveness of many treatment therapies.

**Survivorship Care:** In 2015, Rush implemented a survivorship pilot program to provide a treatment summary and survivorship care plan to curative patients with breast, colorectal, lung and gynecologic cancers. The principal care provider (medical oncologist or advanced practice provider) who coordinated oncology treatment for the patient creates the survivorship care plan and is also responsible for delivering and discussing the summary care plan with the patient. Each patient’s summary care plan is documented in the patient’s electronic medical records. The cancer center is modifying the process based on learnings from the pilot and will be rolling survivorship care planning to other cancers.

**Quality Improvements:**

The infusion center at Rush launched a process improvement initiative to improve the administration of pegfilgrastim, which can help fight infections in patients whose immune systems are suppressed from certain cancers and/or chemotherapy treatments. The nursing team developed a process improvement to do the following:

- Standardize treatment options
- Ensure evidence-based practice
- Provide consistent delivery of the medication
- Improve patient satisfaction
- Meet reimbursement guidelines
- Decrease the nursing time obtaining prior authorization

Patients either used an on-body injector or they returned to the clinic to receive the injection. Part of the improvement process also included educating the nursing team, educating patients and collaborating with physicians to trial the on-body device.
NATIONALLY RENOWNED STEM CELL TRANSPLANT LEADER: This year, Görgün Akpek, MD, MHS, prior Johns Hopkins trainee/faculty and founding director of the Banner MD Anderson Cancer Center’s stem cell transplant program in Gilbert, Arizona, joined the Rush University Cancer Center as The Coleman Foundation professor and section chief in stem cell transplantation and cellular therapy. He leads a transplant team involved in clinical research to improve outcomes and to develop more effective and safer transplant modalities for patients with hematologic malignancies and bone marrow failure syndromes.

REDUCING THE EFFECTS OF LYMPHEDEMA: Occupational therapists at Rush offer lymphedema therapy for cancer patients who are experiencing swelling, aching, skin rash or functional challenges. A pilot program at Rush is exploring the possibility that early detection and management of early stage subclinical lymphedema for breast cancer patients may prevent the condition from progressing to a more chronic stage.

COLLABORATIVE THYROID CANCER CARE: This year, Rush launched a new thyroid cancer program led by Brian Kim, MD. The multidisciplinary team includes specialists from endocrinology, otorhinolaryngology/head and neck surgery, endocrine surgery, pathology, oncology and radiation oncology. Clinicians present complex cases at the thyroid cancer tumor board, allowing the team to pool their knowledge to determine a personalized treatment plan for each patient.

EXPANDED CANCER GENETIC SERVICES: The Rush Inherited Susceptibility to Cancer (RISC) program’s dedicated genetic counselor, Kelly Burgess, MS, CGC, has helped expand cancer genetics services to include more patients, including those with colon polyposis, multiple endocrine neoplasia type 2 and sarcoma. The RISC program was also selected to be part of the Ambry Genetics Laboratory launch of tumor testing with a new gene panel, which allows testing for tumor and germline mutations simultaneously.

I 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.

In addition, I would like to extend my gratitude to everyone involved in the cancer program for their dedication and commitment to our patients. At each and every level at Rush, staff make unique contributions that raise our standards of care.

Aidnag Diaz, MD, MPH
Chair, Cancer Committee

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RUSH UNIVERSITY CANCER CENTER
AT A GLANCE

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 clinical activities; and the colleges of Rush University.

COMPREHENSIVE CLINICS

Rush, which serves both 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 the 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:

- Bone marrow transplants
- Brain cancer
- Breast cancer
- Chest and lung tumors
- Gastrointestinal cancers
- Gynecologic cancers
- Head and neck cancers
- Leukemias
- Lymphomas
- Melanoma and soft tissue tumors
- Multiple myeloma
- Myelodysplastic/myeloproliferative neoplasms
- Prostate cancer
- Sarcomas
- Spine tumors
- Thyroid cancers
SUPPORT SERVICES
Rush University Cancer Center is committed to helping patients and their families cope with potential psychological, emotional and spiritual challenges often associated with a cancer diagnosis. Available support services at Rush include the following:

- **Social work services** include a licensed clinical social worker dedicated to cancer patients at Rush, as well as a social worker from the American Cancer Society.
- **Psychotherapy** and other psychosocial oncology services help patients, caregivers and families manage stress and physical symptoms.
- **Nutrition counseling** with a registered dietitian to help improve overall health and manage treatment side effects.
- **Palliative care services**, 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.
- **Support groups** and activities, many on the Rush campus.
- **Survivorship care planning** that includes a comprehensive plan for patients and their primary care physicians regarding the care received and follow-up recommendations.
- **Integrative therapies** — such as acupuncture and massage therapy — are available through the Cancer Integrative Medicine Program.
- **A Susan G. Komen patient navigator** to help remove barriers that prevent women from getting regular screening mammograms.
- **A genetic counselor** dedicated to the cancer center sees patients with suspected predispositions to breast, gynecologic and gastrointestinal cancers, along with rare endocrine tumors and sarcomas.

RESIDENCY AND FELLOWSHIP PROGRAMS
- Residency in radiation oncology
- Residency in nuclear medicine
- Fellowship in hematology/medical oncology
- Fellowship in orthopedic oncology
- Fellowship in hospice and palliative medicine
- Residency in general surgery

ADVANCING MEDICINE THROUGH RESEARCH
The Rush University Cancer Center fosters research across four broad programs that aim to deepen our understanding of cancer to better prevent, detect and treat it:

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

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).

SPOTLIGHT
RUSH CANCER CARE IN THE COMMUNITY
The Rush University Cancer Center at Rush Oak Park Hospital provides expert care to patients.

Clinicians at Rush provide expert care in Oak Park to patients with the following cancers:

- Breast
- Chest and lung
- Gastrointestinal
- Head and neck
- Hematologic

Rush Oak Park Hospital offers the following cancer services:

- Infusion center
- Radiation therapy center
- CT imaging
- Pharmacy
- Laboratory services
RECOGNITION AND ACCREDITATIONS

- Rush received the 2014 Outstanding Achievement Award from the American College of Surgeons’ Commission on Cancer. Rush has received this triennial award all four times since the award was created in 2004; Rush is one of only six hospitals in the U.S. to have done so.

- The Coleman Foundation Blood and Bone Marrow Transplantation Clinic is accredited by the Foundation for the Accreditation of Cellular Therapy.

- Rush’s pathology and clinical laboratories are accredited by the Joint Commission.

- Four times in a row, Rush has received Magnet status — the highest recognition for nursing excellence — from the American Nurses Credentialing Center.

- The Regenstein Breast Imaging Center at Rush is an American College of Radiology-accredited Center of Excellence. This designation is awarded to centers that have received full accreditation in mammography, breast ultrasound, and stereotactic and ultrasound-guided needle biopsies.

- The Association for the Accreditation of Human Research Protection Programs has awarded Rush full accreditation with distinction in Community Programs, giving special recognition to Rush’s community-based participatory research.

- In 2015, Rush received the University HealthSystem Consortium’s (UHC) Quality Leadership Award, ranking No. 2 among more than 100 academic medical centers. Rush is the only medical center in Illinois to receive this award.

- The Rush Radiosurgery program is one of the few Novalis-Certified radiosurgery centers in the country.

PERSONALIZED CARE THROUGHOUT THE CHICAGO AREA

Cancer specialists at Rush focus on treating and researching particular cancers. And they offer care in an environment designed around patients’ needs. Rush’s outpatient cancer center in Chicago provides access to multiple cancer specialists and services in a single location that includes the following features:

- Technology that allows doctors and patients to review test results together
- Access to integrative therapies such as psychotherapy, massage and acupuncture
- Private and semi-private chemotherapy infusion stations
- Resource center with educational materials and computers

Doctors and nurses from Rush also see patients in a number of other locations in the Chicago area. Wherever your patients make their first appointment, they’ll get the same high level of care. And their care team will work with them to find the most convenient location for their treatment needs.

Visit www.rush.edu/cancer-locations for a complete list of locations, maps, directions and more information on which specialists are available at which locations.

Hematologist/oncologist Agne Paner, MD, (left) and oncology-certified nurse Toreend Enecio RN, MSN, MHA.
A GROWING BIOREPOSITORY
POWERING RESEARCH ACROSS DISEASE SITES

Over the past decade, thoracic surgeons and research scientists at Rush have built one of the world’s largest institutional repositories of blood and tissue samples from patients with benign and malignant thoracic tumors.

“When we started in 2004, our goal was to have a resource that could be used for two purposes,” explains biochemist Jeffrey A. Borgia, PhD. “Our primary goal was to develop a blood test for the early detection of lung cancer. But we also wanted to develop novel blood tests to help guide treatment decisions for patients with advanced-stage thoracic malignancies and promote long-term survival for these patients.”

In the intervening years, both goals have evolved. Since the advent of low-dose CT for lung cancer screening, researchers at Rush have refocused on detection methods that will complement imaging technology. They have also built the foundation for an expansion of the biorepository that will allow them to collect samples from — and conduct research that benefits — a broader range of cancer patients.

USING BIOMARKER PROFILES TO IMPROVE LUNG CANCER SCREENING

In late 2013, the U.S. Preventive Services Task Force recommended annual lung cancer screening with low-dose CT for people between 55 and 80 with a 30-pack-year smoking history (one pack year equals smoking one pack a day for a year or two packs a day for six months, and so on).

“But we know that more than 95 percent of the nodules we identify with CT scanning will be benign,” says Christopher Seder, MD, a thoracic surgeon at Rush. “So we’re left with a dilemma: Do we put these patients through the risk and anxiety of an invasive procedure, or the risk and anxiety of watching and waiting? Or, can we find an easier way to determine whether the nodule is malignant?”

Seder, Borgia and other researchers at Rush are in the process of answering this last question. Using Rush’s biorepository, they have identified several biomarkers that may help physicians distinguish stage I non-small cell lung cancer from benign pulmonary nodules with a simple blood test.

And in November 2015, at the annual meeting of the Southern Thoracic Surgical Association, they presented research showing that a previously validated biomarker panel combined with radiographic and clinical data predicted malignancy with even greater accuracy than the biomarker panel alone had done (see table below).

SAVING EFFORT, EXPENSE — AND LIVES

A blood assay that tests for these biomarkers is likely several years away from commercial availability. But the researchers believe this type of multifaceted approach to screening and diagnosis will eventually spare patients and the health care system — significant effort and expense.

Still, it would solve only one of the two major lung cancer screening puzzles that researchers are trying to crack. The other, of course, is this: While patients with a 30-pack-year smoking history are the only population that has been shown to benefit from screening, many patients who develop lung cancer don’t meet the screening guidelines. As a result, lung cancer is still usually diagnosed in its later stages.

So Borgia’s next project is to validate new biomarker panels with the aim of developing a “pre-screening” blood test that would identify additional populations that could benefit from screening. Accordingly, Rush will soon begin collecting blood samples from patients who come in for lung cancer screenings — about 10 percent of whom fall outside of current screening guidelines.

BUILDING A “POWERHOUSE” BIOREPOSITORY

Later this year, Borgia’s team will also start collecting samples from patients with breast cancer, head and neck cancers and hematologic cancers, such as lymphoma and leukemia. And these samples will come via institutions across the Chicago area, including Rush, John H. Stroger, Jr. Hospital of Cook County, Rush Oak Park Hospital, Riverside Medical Center and DuPage Medical Group.

“Over the last year, we’ve built the foundation for a multi-institutional, multi-disease site model that will make this a powerhouse repository,” he says. “We’re building a new facility for processing specimens and we’re putting infrastructure in place to make this facility a resource for all cancer research at Rush.”

The new infrastructure includes, most notably, the integration of repository data with patients’ electronic medical records.

Thanks to an initiative led by Bala Hota, MD, MPH, Rush’s chief research information officer, the biorepository’s database will be using information from Epic to automatically associate each blood sample with clinical data collected during a specific visit. “The associations we’re making will now be much more accurate,” Borgia says. “Which means that we will be able to better determine which treatments work best at which stages of disease.”

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Innovative Research

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Using biomarker profiles to improve lung cancer screening

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LOWERING CARDIAC RISK THROUGH CARDIO-ONCOLOGY

While cancer-related survival continues to improve, an unexpected consequence is an increase in cardiovascular problems among cancer survivors.

“During survivorship years, heart disease is the second leading cause of morbidity and mortality, after second malignancy and recurrence,” says Tochi Okwuosa, DO, director of the cardio-oncology program at Rush. “As patients are living longer, we realize that certain cancer treatments have cardiovascular consequences, which sometimes extend after treatment is completed.”

However, personalized treatment protocols and collaborative care between oncologists and cardiologists at Rush are helping to lower cardiac risks and successfully manage resulting cardiac conditions.

ADDRESSING THE HEART-CANCER CONNECTION

Although necessary for treating and often curing cancers, both chemotherapy and radiation have noted cardiotoxicities. Certain chemotherapy agents, such as bevacizumab and trastuzumab, can cause critically high blood pressure, heart failure, heart attack and more. Additionally, radiation to the chest can increase the risk of heart attacks, heart valve disease, pericardial disease and other heart issues.

Through the cardio-oncology program at Rush, cardiologists and oncologists work together to address the cardiac implications of treatment. “I’m not making decisions in isolation,” says Okwuosa. “The oncologists and I work collaboratively and are in constant communication, which benefits our patients.”

ASSESSING AND TREATING CARDIAC RISK FACTORS

For cancer patients who have existing cardiac conditions, such as coronary artery disease or heart failure, Okwuosa works with the patients’ cancer clinicians prior to treatment to determine the best methods to manage these problems before starting treatment. “We discuss the most effective agents to use and the safest ways to deliver these agents,” says Okwuosa.

Comprehensive cardiac care is also important during cancer treatment. Heart failure, high blood pressure and rhythm problems may develop during treatment in otherwise healthy patients.
For example, treatment for hematologic cancers and malignancies, such as high-dose chemotherapy and stem cell transplant, pose significant cardiac risks. Yet without these treatments, many patients would not survive.

Consequently, each patient undergoes cardiac function tests before starting treatment. “We carefully screen patients to determine the risks these treatments pose,” says John Maciejewski, MD, PhD, a hematologist/oncologist at Rush. “We may have to make adjustments based on cardiac function if we anticipate treatment could potentially worsen the patient’s pre-existing cardiac problems.”

CARDIAC IMPLICATIONS FOR SURVIVORS

Some of the biggest cardiac risks among cancer survivors are heart failure and heart attack, with high blood pressure being a major risk factor. So Okwuosa works with survivors to determine the most appropriate evidence-based treatments and therapies for long-term management of their heart conditions.

“To control cancer survivors’ blood pressures, I put them on blood pressure medications that have also been shown to reduce the risk of heart failure, such as ACE inhibitors or beta blockers,” says Okwuosa.

Further, certain cardiovascular surgical treatments to treat cancer-related heart conditions are more effective than others for survivors. For example, a mechanical valve replacement is preferred over tissue valve replacement in a cancer survivor who has aortic stenosis.

“Inflammation from radiation never goes away,” says Okwuosa. “Therefore, if you put a tissue valve replacement in a person who has had radiation, that tissue will get inflamed and cause the same problems. However, a mechanical valve made of metal and plastic would not.”

PROTECTING THE HEART IN BREAST CANCER RADIATION

Radiation treatment for left-sided breast cancer can increase a woman’s risk for developing heart disease as she ages. “We are concerned about the heart because we are curing more people, and they are living long enough to develop the side effects of cancer treatment,” says Katherine Griem, MD, a radiation oncologist at Rush.

To help lower this risk, radiation oncologists at Rush use the deep inspiration breath hold (DIBH) technique to deliver radiation to the left breast with minimal radiation exposure to the heart. Rush is one of the few medical centers in the Chicago area offering DIBH.

HOW IT WORKS

1. Prior to treatment, patients undergo a CT scan of the heart, lungs and breast — both at rest and while holding a deep breath. This scan enables the radiation oncologist to design the radiation to target the breast precisely and individualize each patient’s treatment.

2. The radiation oncology team coaches patients through a practice treatment.

3. During the treatment, sophisticated imaging technology using an infrared camera monitors the patient’s breathing and chest motion. When her chest is in the optimal position, the patient holds her breath for approximately 25 seconds, while treatment is delivered. This allows for consistent deep breath hold position for each daily treatment.

During survivorship years, heart disease is the second leading cause of morbidity and mortality, after second malignancy and recurrence.”

— Director of the cardio-oncology program at Rush Tochi Okwuosa, DO

1. Cardiac Ventricle
2. Left Descending
3. Aorta Whole Heart

Radiation oncologist Katherine Griem, MD

BENEFITS OF DIBH

With DIBH, patients’ left anterior descending artery is exposed to 50 percent less radiation than with free breathing.
ADVANCING CARE FOR SPINAL TUMORS

Eradicating spinal tumors is a uniquely challenging task. At Rush, a leading center for spinal oncology, spinal surgeons draw upon their expertise and utilize the most advanced approaches to give spinal tumor patients a fighting chance at being cancer-free.

NEGATIVE-MARGIN RESECTION

For bulky, localized malignant tumors in most other parts of the body — the leg, for instance — the gold standard is to remove the tumor intact with a wide cuff of normal tissue. This approach, en bloc resection with negative margins, dramatically reduces local recurrence and improves survival.

“It’s the only way to ensure that you eliminate every single tumor cell because you aren’t cutting into the tumor or scraping it out,” says Matthew Colman, MD, an orthopedic oncologist and spinal surgeon at Rush. “You are taking it out in one piece, as well as capturing any stray cancer cells in the tissues around the tumor.”

Historically, however, negative-margin resection has not been an option for many primary bone tumors in the spine, including chondrosarcomas, chordomas and osteosarcomas.

“When the tumor is completely contained within the vertebral bone, we can remove them with negative margins,” says John O’Toole, MD, a spinal neurosurgeon at Rush who specializes in spinal oncology. “But for the spine, a lot of these tumors present when they are so invasive or large that negative margins are not possible.” And unfortunately, when any cells remain after resection, these particular cancers recur and spread — at alarmingly high rates.

“Postoperative stereotactic radiosurgery has allowed us to gain control over many positive-margin cases and prevent disease recurrence in ways that standard radiation treatments never could.”

— Spinal neurosurgeon John O’Toole, MD

SURGICAL PRECISION

Because of their expertise and skill sets, spinal surgeons at Rush are often able to achieve negative margins for even larger, more invasive tumors.

These technically demanding procedures require a tremendous amount of pre-operative planning, including modeling the tumor and mapping the procedure using sophisticated computer software. That planning carries into the operating room, where the surgeons then use real-time computer navigation to guide every cut.

“We need an intimate understanding of the anatomy — where the tumor is, where it isn’t, which structures we need to sacrifice to get the tumor out, and which can we preserve,” Colman says. “Technologies like 3-D computer navigation help make the 3-D reality of the tumor easier to conceptualize.”

MULTIMODAL TREATMENT

Another benefit of this exacting process is that it ensures the surgeon is performing the right procedure and using the right adjuvant and/or neoadjuvant therapies.

For instance, when it is necessary for gross total resection to be intralesional — which typically means microscopically positive margins — postoperative stereotactic radiosurgery (SRS) can help kill stray cancer cells and reduce the chance of recurrence. This nonsurgical therapy delivers a single high dose of radiation to the tumor site using the TrueBeam STx system.

“Our use of postoperative SRS has allowed us to gain control over many positive-margin cases and prevent disease recurrence in ways that standard radiation treatments never could,” O’Toole says. “It helps us give our patients better outcomes.”
“We’re able to completely remove tumors that not long ago would have necessitated, for instance, very high leg amputations. Achieving that type of outcome definitely requires a team effort.”  
— General surgeon Jonathan Myers, MD

IMPROVING OUTCOMES FOR PELVIC SARCOMAS

Given the rarity of pelvic sarcomas, assembling a care team that includes experts from medical, orthopedic and radiation oncology, general surgery, pathology, radiology and interventional radiology might seem like a luxury. At Rush, however, it’s par for the course.

Rush has long been a busy center for sarcomas in the extremities, which included pioneering limb preservation efforts led by orthopedic oncologist Steven Gitelis, MD. More recently, Rush created a pelvic sarcoma sub-program. “It’s a unique program for extremely rare tumors,” says Marta Batus, MD, a medical oncologist at Rush. “Even though these tumors are uncommon, there is a demand for comprehensive care, and that’s simply not available at most hospitals.”

In fact, multidisciplinary treatment has been shown to improve outcomes for pelvic sarcomas — and it’s easy to see why. “In the abdomen, there is a lot of space for them to grow, so they can become much larger than extremity tumors,” Batus says. “And they often invade both bone and vital organs.”

“We’re able to completely remove tumors that not long ago would have necessitated, for instance, very high leg amputations,” adds Jonathan Myers, MD, a general surgeon at Rush. “Achieving that type of outcome definitely requires a team effort.”

MULTIDISCIPLINARY PLANNING

This teamwork is evident at the weekly sarcoma board, where all of the specialists convene to review cases.

Each case is presented, discussed and planned down to the smallest detail. Depending on the tumor type and where it’s located, the group determines which surgeons need to be involved, whether to use adjuvant and/or neoadjuvant chemotherapy or radiation therapy, and which clinical trials may be appropriate.

“It truly benefits our patients to have all of these specialists in one room, giving their opinions about which approaches to use,” says Batus. “Because we see a lot of these cases, we are able to draw on both our individual and collective experience to produce optimal results.”

COMBINING SURGICAL SKILLS

Once the group feels confident in the plan, they assemble the specific combination of specialists to carry it out. Not surprisingly, the team typically includes multiple surgeons to handle the often complicated, labor-intensive resections.

For example, on one case involving a sacral chordoma that was invading the bladder and rectum, Myers and Matthew Colman, MD, an orthopedic oncologist and spinal surgeon at Rush, brought in a urologist to assist with the bladder resection and a plastic surgeon to close the wound posteriorly using a vertical rectus flap. On another case, a gynecologic oncologist helped to resect a tumor that involved the uterus and ovaries.

“Any one of us is an expert in our own individual discipline, but a complex operation demands multiple skill sets and backgrounds of expertise,” Colman says. “Everything goes more smoothly, and the results are more reliable, when we work in concert.”
Clinicians at Rush are taking a new approach to treating certain cancers by incorporating immunotherapy into patients’ care plans. Rather than using chemotherapy to kill cancer cells, clinicians are also using immunotherapies to harness a patient’s immune system to identify and eliminate cancer cells.

With the discovery of immune checkpoint inhibitors, anti-PD1 (nivolumab and pembrolizumab) and anti-CTLA4 (ipilimumab) antibodies, the barriers that prevent the immune system from identifying and destroying the cancer are removed. “These checkpoint inhibitors have delivered on the promise of effective immunotherapy,” says Nick Pfanzelter, MD, a medical oncologist at Rush. “More important, they do so with a manageable toxicity profile.”

Most notably, certain immunotherapy regimens used for patients at Rush have provided longer survival and improved quality of life compared to standard chemotherapy. For example, in non-small cell lung cancer, immune checkpoint inhibitors are associated with longer overall survival and less side effects than chemotherapy. The hope for some of these immune therapies is that patients, even those with advanced disease, will go into remission that may be prolonged in some cases.

The American Society of Clinical Oncology named immunotherapy as the top cancer advance of 2015. Not only are patients at Rush benefiting from immunotherapy, but clinician researchers are also studying ways to further improve and expand the use of immunotherapy.

“We’re just scratching the surface with immunotherapy,” says Philip Bonomi, MD, a medical oncologist at Rush. “In the next 10 to 15 years, I believe we will see significant advances in cancer.”
Five years ago, one-year overall survival for patients with metastatic melanoma was about 25 percent. Today, with combination immunotherapy, one-year overall survival for metastatic melanoma is 85 percent.

KEY PLAYERS
Currently, immunotherapy is most successful in melanoma, lung and kidney cancers. One hypothesis is that the high mutational burden associated with these cancers is better targeted by the immune system.

INCREASING OVERALL SURVIVAL IN METASTATIC MELANOMA
Immunotherapy has redefined how clinicians treat melanoma — and expected outcomes for patients. “Over the course of five years, we’ve gone from having no options for patients with metastatic melanoma to having four or five options,” says Pfanzelter.

Five years ago, one-year overall survival for patients with metastatic melanoma was about 25 percent. Today, with combination immunotherapy, one-year overall survival for metastatic melanoma is 85 percent. Utilizing a combination of nivolumab and ipilimumab has significantly improved tumor regression and even remission. “If we use nivolumab, we can achieve a one-year overall survival of about 65 percent, but if we combine it with ipilimumab, we can improve that one-year overall survival to 85 percent,” says Pfanzelter.

For therapy with ipilimumab, patients receive one 12-week treatment, which includes four infusions every three weeks.

“Almost 10 years out, melanoma does not recur in about 20 percent of patients who received ipilimumab,” says Pfanzelter. “Remission that lasts at least 10 years is amazing for a person with metastatic melanoma.”

EXTENDING MEDIAN SURVIVAL IN LUNG CANCER
In the last year, the U.S. Food and Drug Administration (FDA) approved seven new drugs, including immune checkpoint inhibitors nivolumab and pembrolizumab, for lung cancer. In a study comparing nivolumab to docetaxel (the gold standard treatment for lung cancer in the second line therapy setting), nivolumab extended median survival by three months.

“These results are significant in this disease,” Bonomi says. “This treatment not only beat docetaxel in terms of survival, but it is also less toxic for patients.”

Rush recently participated in a large phase three international trial to determine the effectiveness of pembrolizumab immunotherapy in patients whose tumor expressed PDL-1, a protein related to the way pembrolizumab works. The trial found that two doses of pembrolizumab improved cancer control and, more important, overall survival benefit when compared to docetaxel, similar to nivolumab.

“The study found that everyone in the group lived longer. But it also showed that people who had a higher amount of expression of PDL-1 did particularly well,” says Mary Jo Fidler, MD, a medical oncologist who was the Rush principal investigator for the trial.

The results of the study suggest immunotherapy should be used before docetaxel in treatment for patients who have PDL-1 expression, according to Fidler.

Despite significant clinical breakthroughs in the past year, immunotherapy is still in its early stages in lung cancer treatment. Rush has a number of clinical trials underway and in pipeline looking at how to best combine and utilize these therapies.

“We’re just starting to learn about the benefits of immunotherapy in lung cancer,” says Bonomi. “We don’t have long-term overall survival like we have in melanoma, but the hope is that combining immune therapies can get us there.”

RECOGNIZING THE BENEFITS OF IMMUNOTHERAPY FOR KIDNEY CANCER
Since the early 1990s, kidney cancer has been treated with immune modulators, with a small percentage of patients having long-term responses to interleukin-based therapies. In November 2015, the FDA approved nivolumab as the first immunotherapy agent for kidney cancer.

“We currently only use immunotherapy for kidney cancer after a patient fails standard therapy,” says Pfanzelter. “It’s too soon to tell, but my suspicion is it will end up being the first line of therapy, probably in combination with the drugs we currently use as the first line treatment.”

When used in the second line, nivolumab extends survival almost six months for patients with renal cell carcinoma.

Researchers at Rush are studying other innovative ways to engage the immune system for treating kidney cancer. A recent clinical trial at Rush looked at developing a vaccine created from the kidney tumor removed from the patient’s body. The goal is to generate an immune response to the specific tumor in a patient’s body.

“The different approaches to immunotherapy are changing rapidly,” says Pfanzelter. “Right now we’re focused on antibodies that nonspecifically disinhibit the immune system. But in this era of personalized medicine, we’re going to be able to do even better than that in coming years.”

ON THE HORIZON
Early clinical trial findings suggest that immunotherapy may also slow the growth of several other types of cancer, including the following:

- Bladder
- Breast
- Colon
- Head and neck
- Liver
FOCUS ON QUALITY OF LIFE FOR HEAD AND NECK CANCER

Supportive care services play a crucial role in the care and treatment of patients with head and neck cancers. In many cases, patients who undergo surgery need adjuvant therapy six weeks following their surgery. For these therapies to be most effective, patients require comprehensive supportive care that includes nutrition counseling, swallowing therapy and dental care.

“These support services are just as important as the treatments themselves because if patients are malnourished, unable to swallow or suffer with serious oral hygiene issues, adjuvant therapy could cause additional problems that would significantly affect outcomes and patients’ overall health,” says Aidnag Diaz, MD, MPH, a radiation oncologist at Rush.

TREATMENT INNOVATIONS

A nurse navigator dedicated to head and neck cancer helps coordinate the following supportive care services for head and neck cancer patients:

FOCUS ON SUPPORTIVE CARE

Supportive care services play a crucial role after adjuvant therapy, as well. “Patients may successfully get through aggressive chemoradiation treatment programs, but if they cannot maintain swallowing therapy, adequate dental care with fluoride treatments and/or physical therapy with range-of-motion exercises, they will lose function,” says Kerstin Stenson, MD, a head and neck surgeon at Rush.

Each week, the head and neck cancer team meets in a dedicated tumor conference to determine the best course of treatment — which includes supportive care services — for their patients.

SUPPORT SERVICES

A nurse navigator dedicated to head and neck cancer helps coordinate the following supportive care services for head and neck cancer patients:

**SPEECH-LANGUAGE THERAPY:** Speech and swallowing therapy helps patients maintain and preserve function.

**NUTRITION COUNSELING:** A dedicated dietitian helps patients maintain their weight and hydration despite functional limitations.

**PSYCHOSOCIAL ONCOLOGY:** Distress screening helps reveal the severity of patients’ psychosocial, financial and behavioral hardships — and what services could help.

**PHYSICAL AND OCCUPATIONAL THERAPY:** These therapies focus on improving arm and neck range of motion and the functional effects of lymphedema.

*The nurse navigator can also help coordinate referrals to dentists who are experienced in addressing treatment-related oral side effects, such as tooth decay, gum disease and jaw problems.*
The head and neck cancer program at Rush offers comprehensive care that focuses on the whole patient. That means aggressively treating and often curing these cancers, while also focusing on supportive care and quality of life.

To do this, the program offers advanced minimally invasive procedures, along with coordinated support services that help improve treatment outcomes and preserve patients’ quality of life.

MINIMALLY INVASIVE SURGICAL TECHNIQUES

ENDOSCOPIC RESECTION FOR SINUS AND SKULL BASE TUMORS

Because sinus and skull-based tumors are often located next to critical structures like the eyes, brain and major blood vessels, access to these areas is always a challenge. However, skull base surgeons at Rush can often remove these tumors using a minimally invasive approach with transnasal endoscopes.

“With endoscopic resection we’re avoiding large incisions and radical disassembly of the facial soft tissue or boney skeleton,” says Pete Batra, MD, a skull base surgeon at Rush. “We’re using natural orifices to tackle the tumor at its site of origin as opposed to taking everything apart, removing the tumor and then putting it all back together.”

While some patients may still require radical surgery, Batra notes that about 70 percent of the patients he sees are candidates for endoscopic resection. Batra performs several of these procedures each week, and works collaboratively with neurosurgeons, ophthalmologists, medical oncologists, radiation oncologists, pathologists and other specialists at Rush to optimize care for these patients.

BENEFITS OF ENDOSCOPIC RESECTION
• Shorter hospital stay
• Less bleeding
• Faster return to normal activity
• Fewer cosmetic side effects

TRANSORAL ROBOTIC SURGERY

Transoral robotic surgery (TORS) is a minimally invasive procedure that can treat throat, tonsil, tongue and larynx cancer.

The surgeon uses a guided endoscope to access the back of the mouth. The surgeon is able to visualize the area with high-resolution, 3-D technology that provides more magnification than surgical loupes. The surgeon can maneuver two robotically guided instruments in all directions — and into areas that are difficult or impossible to access with open surgery.

“With TORS, I am able to enter transorally and then take out the cancer and surrounding tissue without damaging any other areas to get to the cancer,” says Samer Al-Khudari, MD, a head and neck cancer surgeon at Rush.

BENEFITS OF TORS

Recovery after TORS is significantly faster than recovery from open surgery. Many patients who receive TORS return to work in about two weeks, while it takes most patients four to six to recover from open surgery.

Other benefits of TORS include the following:
• Lower risk of swallowing problems
• Quicker return to eating and drinking
• Higher speech function
• Lower doses of radiation required

A TORS surgery in which Al-Khudari removed tonsil cancer from a patient. The view above illustrates the level of magnification possible with this surgical technique. “Using TORS it is almost like we are able to sit inside the mouth to do the surgery. We are able to reach anything we need to in a very small space without damaging healthy tissue,” Al-Khudari notes.
Many advanced bladder cancer patients at Rush are eligible for minimally invasive robotic cystectomy and intracorporeal urinary diversion, which offers fewer postoperative complications and a faster recovery than open surgery and extracorporeal urinary diversion.

Rush is one of few medical centers in the Chicago area that offers robotic cystectomy and intracorporeal urinary diversion. “It’s a very technically demanding operation that is only being done in major academic medical centers like Rush,” says Leslie Deane, MBBS, a urologist at Rush.

Using the da Vinci Surgical System, a urologist precisely removes the bladder and constructs a urinary diversion intracorporeally. This complex procedure offers comparable outcomes to open surgery with significantly fewer risks.

For example, there is substantially less blood loss when this procedure is done robotically. “There is some data that suggests that cancer surgery patients who receive blood transfusions do worse overall from a cancer-related standpoint, so we try to minimize that as much as possible,” Deane says. “Doing this surgery robotically certainly helps. People who undergo robotic surgery rarely require blood transfusions.”

Robotic surgery can also benefit patients with less aggressive bladder cancer. “When there are isolated lesions in the bladder in which the rest of the bladder is negative, we can easily do a partial cystectomy robotically to spare the bladder,” says Deane.

### ROBOTIC SURGERY VS. OPEN SURGERY

<table>
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<tr>
<th></th>
<th>ROBOTIC CYSTECTOMY AND INTRACORPOREAL URINARY DIVERSION</th>
<th>OPEN CYSTECTOMY AND EXTRACORPOREAL URINARY DIVERSION</th>
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<td>• Extra-strength acetaminophen</td>
<td>• Patient-controlled analgesia</td>
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<td></td>
<td>• Local anesthetic on the incision site</td>
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<td><strong>PAIN MANAGEMENT, HOME</strong></td>
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<td>• Narcotic painkillers</td>
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<td></td>
<td>• Extra-strength acetaminophen</td>
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<td>• 20 to 40 percent transfusion rate</td>
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<td><strong>RETURN TO NORMAL ACTIVITY</strong></td>
<td>3 to 4 weeks after surgery</td>
<td>6 to 8 weeks after surgery</td>
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INNOVATIVE DIAGNOSTICS FOR GENITOURINARY CANCERS

To diagnose both prostate and bladder cancer, clinicians at Rush utilize a wide range of advanced risk assessment and diagnostic methods. These comprehensive tests not only improve accuracy in diagnosis and staging, but also help improve treatments.

MORE ACCURATE CYSTOSCOPY FOR BLADDER CANCER

Rush’s advanced cystoscopy utilizes narrow-band imaging to examine the inside of the bladder and urethra. This technology more accurately detects non-muscle invasive bladder cancer than traditional white-light imaging. It also is able to detect hard-to-detect tumors that may have been missed with less advanced technology.

“We’ve had people come from other centers with a normal cystoscopy, but when we look at their bladder with narrow-band imaging, we discover a lesion,” says Deane. “Our diagnostic accuracy is quite high.”

COMPREHENSIVE RISK ASSESSMENT AND DIAGNOSTIC TESTING FOR PROSTATE CANCER

Urologists at Rush go well beyond prostate-specific antigen (PSA) testing when it comes to prostate cancer screening. Rather, clinicians take several comprehensive steps to assess risk and ultimately diagnose the prostate cancer.

STEP 1: RISK ASSESSMENT

Urologists at Rush use the following tools to assess risk:

- Michigan Prostate Score (MiPS): Evaluates the risk of cancer by looking at total PSA, free PSA and two genes, TMPRSS2 and PCA3. Combining these markers provides a more accurate risk assessment than PSA alone.
- 4K score: Assesses the risk of having aggressive prostate cancer by looking at four kallikreins in the blood, total PSA, free PSA, intact PSA and human kallikrein 2 (hK2).

STEP 2: DETERMINING WHETHER TO DO A BIOPSY

If the risk assessment tests indicate a high risk for prostate cancer, patients receive an MRI and ultrasound of the prostate to determine if a biopsy is appropriate.

Rush was the first medical center in Chicago to utilize this cutting-edge technology that fuses MRI imaging and real-time ultrasound to detect suspicious lesions on the prostate gland. The imaging helps determine if a biopsy is necessary; and if so, the specific area of the prostate to target.

STEP 3: TARGETED BIOPSY

The MRI fusion technology allows for more accurate, comprehensive and targeted biopsies compared to traditional transrectal biopsies, which are only able to detect cancers in the posterior peripheral zone of the prostate. While this is the area where most prostate cancers develop, there is potential to miss lesions that develop in the central and anterior regions.

“This technology has increased our diagnostic yield for high-grade cancer,” says Deane. “We’re finding more central gland lesions (closer to the urethra or in the anterior part of the gland) than we typically would as well, and that’s a direct result of the MRI.”

TREATMENT IMPROVEMENTS

Rush’s tailored approach to diagnosing prostate cancer has resulted in fewer unnecessary biopsies and more personalized treatments. Other benefits include the following:

- **TARGETED TREATMENTS:** “Our diagnostic technologies have opened up the possibility for doing targeted cryoablation of specific lesions and help us determine if a patient needs surgery,” says Leslie Deane, MBBS, a urologist at Rush.
- **SURGICAL IMPROVEMENTS:** “The MRI gives us a good idea as to how close the tumor is to the capsule that surrounds the prostate, so that we know if it’s safe to spare the nerves on that side versus having to do wider margins to reduce the risk of recurrence,” says Deane.
- **IMPROVED RADIATION EFFICACY:** “The MRI technology in particular helps us plan our radiation treatment field,” says Dian Wang, MD, PhD, a radiation oncologist at Rush. “For instance, we can be more precise and deliver a much higher dose to the intra-prostatic lesion(s) defined on imaging through either radioactive implant or advanced stereotactic body radiation treatment technology.”
- **LESS TREATMENT TOXICITY:** “This technology allows us to use less overall radiation to the prostate, which can potentially improve tumor control, reduce radiation dose to adjacent critical organs such as the rectum and bladder, and result in less toxicity side effects,” Wang says.
DISEASE SITE PROGRAMS

BONE AND SOFT TISSUE SARCOMAS

CLINICAL SPECIALISTS
Diagnostic radiologists:
John Meyer, DO; Anthony Zelazny, MD
Medical oncologist:
Marta Batus, MD
Orthopedic surgeons:
Matthew Colman, MD; Steven Gitelis, MD
Pathologists:
Leonidas Arvanitis, MD; Jerome Loew, MD; Brett Mahon, MD; Ira Miller, MD; Vijaya Reddy, MD
Pediatric hematologist/oncologist:
Paul Kent, MD
Pediatric physiatrist:
Laura Deon, MD
Plastic and reconstructive specialist:
Gordon Derman, MD
Radiation oncologists:
Ross Abrams, MD; Dian Wang, MD, PhD
Surgical oncologists:
Steven Bines, MD; Jonathan Myers, MD

SARCOMA CONFERENCE
Wednesdays, 9 to 10 a.m.
Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building

BRAIN AND SKULL BASE TUMORS

CLINICAL SPECIALISTS
Medical oncologists:
Mary Jo Fidler, MD; John Showel, MD
Neuro-oncologist:
Nina Paleologos, MD
Neuroradiologists:
Sharon Byrd, MD; Miral Jhaveri, MD; Mehmet Kocak, MD
Neurosurgeons:
Richard Byrne, MD; Lorenzo Muñoz, MD
Neurologist:
R. Mark Wiet, MD
Ophthalmologists:
Adam Cohen, MD; Thomas Mizen, MD
Otolaryngologist/head and neck surgeon:
Pete Batra, MD
Pathologists:
Leonidas Arvanitis, MD; Paolo Gattuso, MD; Ritu Ghai, MD; Sukriti Nag, MD
Pediatric hematologist/oncologist:
Paul Kent, MD
Radiation oncologist:
Aidnag Diaz, MD, MPH
Speech pathologists:
Mike Heffery, 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; Mireya Dondalski, MD; Paula Grabler, MD; Peter Jokich, MD; Gene Solmos, MD; Lisa Stempel, MD
Medical oncologists:
Melody Cobleigh, MD; Katherine Kabaker, MD; Ruta Rao, MD; Lydia Uska, MD
Pathologists:
Paolo Gattuso, MD; Ritu Ghai, MD
Plastic and reconstructive specialists:
Anuja Antony, MD, MPH; John Cook, MD; Gordon Derman, MD; George Kouris, MD
Radiation oncologists:
Katherine Gried, MD; Jessica Zhou, MD
Surgical oncologists:
Steven Bines, MD; Darius Francescatti, MD; John Greager, MD; Katherine Kopkash, MD; Andrea Madrigano, MD; Thomas Witt, MD; 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 radiologist:
Amjad Ali, MD
Endocrine surgeon:
Katya Heiden, MD
Endocrinologists:
David Baldwin Jr., MD; Raquel Carneiro, MD; Leon Fogelfeld, MD; Tiffany Hor, MD; Brian Kim, MD; Elizabeth McAninch, MD; Mahtab Sohrevardi, MD
Medical oncologist:
Mary Jo Fidler, MD
Otolaryngologists/head and neck surgeons:
Samer Al-Khudari, MD; Joseph Allegretti, MD; Thomas Nielsen, MD; Kerstin Stenson, MD
Pathologists:
Paolo Gattuso, MD; Ritu Ghai, MD; Ji-Weon Park, MD
Radiation oncologist:
Jessica Zhou, MD

ENDOCRINE TUMOR CONFERENCE
First 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:
Marc Brand, MD; Joanne Favuzza, DO; Bruce Orkin, MD; Marc Singer, MD

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Gastroenterologists:
Faraz Bishehsari, MD; Salina Lee, MD; John Losurdo, MD; Joshua Melson, MD, MPH; Sohrab Mobharan, MD; Peter Sargon, MD

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

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

Medical oncologists:
Marisa Hill, MD; William Leslie, MD; Lauren Wiebe, MD

Pathologist:
Shriram Jakate, MD

Radiation oncologists:
Ross Abrams, MD; Dian Wang, MD, PhD

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

Transplant hepatologists:
Costica Aloman, MD; Sheila Eswaran, MD; 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
Urologists:
Christopher Coogan, MD; Leslie Deane, MBBS; Shahid Ekbal, MD; Lev Elterman, MD; Jerome Hoeksema, MD; Narendra Khare, MD; Kalyan Latchamsetty, MD; Laurence Levine, MD; Charles McKiel Jr., MD; Dennis Pessis, MD

Radiation oncologists:
Aidnag Diaz, MD, MPH; Jessica Zhou, MD

HEAD AND NECK TUMOR CONFERENCE
Wednesday, 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 Dehghan-Paz, MD; Sefer Gezer, MD; Stephanie Gregory, MD; Reem Karmali, MD; Debra Katz, MD; Melissa Larson, MD; Agne Paner, MD; Jamile Shamma, MD; Parameswaran Venugopal, MD
Palliative medicine specialists:
Elaine Chen, MD; Susan Nathan, MD; Sean O’Mahony, MB, BCh, BAQ; Mei-Ean Yeow, MB, BCh
Pathologists:
Jerome Loew, MD; Brett Mahon, MD; Ira Miller, MD
Radiation oncologist:
Ross Abrams, MD
Radiologist:
Amjad Ali, MD
Stem cell transplantation specialists:
Görgün Akpek, MD, MHS; John Maciejewski, MD, PhD; Sunita Nathan, MD

HEMATOLOGIC CANCER CONFERENCE
Leukemia: Mondays, 1 to 2 p.m.
Lymphoma: Thursdays, 8 to 9 a.m.
Multiple myeloma: every other Friday, 8 to 9 a.m.
Myelodysplasias/myeloproliferative disorders: every other Friday, 9 to 10 a.m.
Janet Wolter, MD, Clinical and Educational Conference Room, 1010 Professional Building
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; Bülent Arslan, MD; Jayesh Soni, MD; Jordan Tasse, MD; Ulku Cenk Turba, MD

Medical oncologist:
Marisa Hill, MD

Transplant surgeons:
Edie Chan, MD; Martin Hertl, 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

Interventional radiologists:
Osman Ahmed, MD; Bülent Arslan, MD; Jayesh Soni, MD; Jordan Tasse, MD; Ulku Cenk Turba, MD

Medical oncologists:
Marta Batus, MD; Philip Bonomi, MD; Mary Jo Fidler, MD

Pathologists:
Paolo Gattuso, MD; Ritu Ghai, MD; Mark Pool, MD

Palliative medicine specialist:
Elaine Chen, MD

Pathologists:
Paolo Gattuso, MD; Ritu Ghai, MD; Mark Pool, MD

Pulmonary medicine specialists:
Robert Balk, MD; Elaine Chen, MD; Carl Kaplan, MD; Prema Nanavaty, MD; Michael Silver, MD; Betty Tran, MD, MS; Mark Yoder, MD

Diagnostic radiologist:
Palmi Shah, MD

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

Dermatologists:
Jeffrey Altman, MD; Brian Bonish, MD; James Ertle, MD; Mark Hoffman, MD; Sheetal Mehta, MD; Warren Piette, MD; Arthur Rhodes, MD, MPH; Michael Tharp, MD

Diagnostic radiologist:
Joy Sclamberg, MD

Immunologists:
Amanda Marzo, PhD; Carl Ruby, PhD; Andrew Zloza, MD, PhD

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

Radiation oncologist:
Ross Abrams, MD

Surgical oncologists:
Steven Bines, MD; Keith Monson, MD

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

Orthopedic oncologist:
Steven Gitelis, MD

Pediatric hematologist/oncologists:
Lisa Boggio, MD; Paul Kent, 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 oncologists:
Ross Abrams, MD; Aidnag Diaz, MD, MPH

SPINE TUMORS

CLINICAL SPECIALISTS

Neuro-oncologist:
Nina Paleologos, MD

Neurosurgeons:
Richard Fessler, MD; Ricardo Fontes, MD, PhD; John O’Toole, MD, MS

Orthopedic surgeons:
Matthew Colman, MD; Kern Singh, MD

Radiation oncologist:
Aidnag Diaz, MD, MPH

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


## PRIMARY SITE

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<th>PRIMARY SITE</th>
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<th>NON-ANALYTIC</th>
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<td>Tonsil</td>
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<td>343</td>
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<td>245</td>
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<td>Esophagus</td>
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<td>Stomach</td>
<td>48</td>
<td>37</td>
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<td>Small Intestine</td>
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<td>Colon (excluding rectum)</td>
<td>104</td>
<td>83</td>
<td>21</td>
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<td>Rectosigmoid Junction</td>
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<td>Rectum</td>
<td>38</td>
<td>33</td>
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<td>23</td>
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<td>Anus, Anal Canal &amp; Anorectum</td>
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<td>Liver &amp; Intrahepatic Bile Duct</td>
<td>61</td>
<td>53</td>
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<td>Gallbladder &amp; Other Biliary Tract</td>
<td>18</td>
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<td>Pancreas</td>
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<td>Peritoneum, Omentum, &amp; Other Digestive Organs</td>
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<td><strong>RESPIRATORY SYSTEM</strong></td>
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<td>Lung &amp; Bronchus</td>
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<td>65</td>
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<td><strong>BONES &amp; JOINTS</strong></td>
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<td><strong>SOFT TISSUE</strong></td>
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<td>6</td>
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<tr>
<td><strong>SKIN</strong> (excludes basal &amp; squamous cell carcinomas)</td>
<td>72</td>
<td>54</td>
<td>18</td>
<td>42</td>
<td>30</td>
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<td>Melanoma — Skin</td>
<td>67</td>
<td>50</td>
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<td>Other Non-Epithelial Skin</td>
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<td><strong>BREAST</strong></td>
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<td>Prostate</td>
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<td>141</td>
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<td>Kidney &amp; Renal Pelvis</td>
<td>94</td>
<td>77</td>
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<td><strong>EYE &amp; ORBIT</strong></td>
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<td>189</td>
<td>29</td>
<td>101</td>
<td>117</td>
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<td><strong>ENDOCRINE SYSTEM</strong></td>
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<td>90</td>
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<td>Thyroid</td>
<td>72</td>
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<td>Other Endocrine (includes thymus)</td>
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<td>124</td>
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<td>Hodgkin Lymphoma</td>
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<tr>
<td>Non-Hodgkin Lymphoma</td>
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<td><strong>MULTIPLE MYELOMA</strong></td>
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<td><strong>LEUKEMIAS</strong></td>
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<td><strong>ILL-DEFINED &amp; UNSPECIFIED (Kaposi Sarcoma)</strong></td>
<td>7</td>
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<tr>
<td><strong>OTHER AND UNSPECIFIED</strong></td>
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<td><strong>TOTAL</strong></td>
<td>3,200</td>
<td>2,652</td>
<td>548</td>
<td>1,352</td>
<td>1,848</td>
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</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 FIRST CONTACT YEAR, 2010 - 2014

ANALYTIC CASE DISTRIBUTION
BY GENDER AND AGE AT DIAGNOSIS, 2014

TOP 10 ANALYTICAL SITES
IN COMPARISON TO NATIONAL, 2014

Data is based on stage as defined by the American Joint
Committee on Cancer (AJCC).
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).

Rush has received four consecutive outstanding achievement awards from the Commission on Cancer of the American College of Surgeons.