Excellence
2018 Cancer Annual Report
RUSH
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Excellence means many things when it comes to cancer care at Rush. It drives our multidisciplinary care teams to provide the most advanced care to our patients. It lives within our researchers, who have dedicated their lives to uncovering the mysteries of treating cancer and finding innovative ways to fight it. It extends into our ancillary services, such as cardio-oncology and molecular genetics, which help us tailor care to each patient’s unique needs and biology.

And that’s just the beginning.

At Rush, we recognize that cancer research and treatment have reached a pivotal moment when health care providers can efficiently and effectively analyze each individual patient’s case at more granular levels. We know more about treating the whole patient using supportive services and data technology, and can better handle each case thanks to breakthroughs in clinical trials.

Only a few medical centers in the country can perform comprehensive genetic testing and align specific treatment for each patient’s unique cancer case, bolstered by the best treatment options, expert multidisciplinary teams, clinical trials and strategic partnerships, all in one place. Rush has laid the groundwork to join those few.

Through our partnership with Tempus — a biotechnology company that collects, stores and analyzes genetic data, clinical information and tissue samples — our cancer specialists are further personalizing treatment options for our patients.

Additionally, in late 2018, Rush appointed Mia Levy, MD, PhD, as the Sheba Foundation Director of the Rush University Cancer Center. Since her arrival, Levy, a medical oncologist who specializes in breast cancer and is a nationally recognized leader in biomedical informatics, has taken the lead on growing Rush into a destination cancer center — one that attracts patients from across the country, with data-informed care and advice that’s unmatched in the Chicago region. Learn more about Levy and the future of cancer care at Rush on page 6.

We are also bringing every element of excellence to life in plans for our new, state-of-the-art outpatient building dedicated to cancer and neurologic care that is scheduled to open in 2022. Learn more about the planning and development of the new building on page 7.

None of this would be possible without 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.

Above all, excellence comes down to the people involved in cancer care at Rush. At each and every level, our staff is dedicated and committed to our patients, and they raise our standards of care every day.

Cancer Center Message

Cancer Center Leadership

Mia Levy, MD, PhD
The Sheba Foundation Director
Rush University Cancer Center

Ruta Rao, MD
Medical Director
Rush University Cancer Center

Timothy M. Kuzel, MD
Interim Deputy Director
Rush University Cancer Center
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 and clinical activities; and the colleges of Rush University.

Recognition and accreditations

- Rush is accredited by the Commission on Cancer (CoC), a quality program of the American College of Surgeons (ACS).
- The Coleman Foundation Blood and Bone Marrow Transplantation Clinic is accredited by the Foundation for the Accreditation of Cellular Therapy (FACT).
- 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.
- For the fifth consecutive year, Rush University Medical Center’s lobectomy program received the highest possible rating — three stars — from the Society of Thoracic Surgeons (STS).
- 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 2018, Rush received Vizient’s Quality Leadership Award, ranking No. 2 among 99 academic medical centers. It is the sixth consecutive time Rush has been ranked among the top five in the study and the tenth time since the University HealthSystem Consortium, now part of Vizient, began the study in 2005. Rush is the only medical center in Illinois to have received this award. The 2018 study evaluated participating medical centers and hospitals on the basis of safety, timeliness, effectiveness, efficiency, equity and patient centeredness.
- The Rush Radiosurgery program is one of the few Novalis-certified radiosurgery centers in the country.
- Cancer services at Rush are consistently ranked among the best in the country by *U.S. News & World Report*. 
Comprehensive clinics

Rush University Cancer Center is committed to helping patients and their families cope with the 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 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 Cancer Integrative 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
- Research in radiation oncology
- Research in nuclear medicine
- Fellowship in hematology/medical oncology
- Fellowship in orthopedic oncology
- Fellowship in hospice and palliative medicine
- Residency in general surgery

Supportive care

Rush University Cancer Center is committed to helping patients and their families cope with the psychological, emotional and spiritual challenges often associated with a cancer diagnosis. Available support services at Rush include the following:

- Specific urgent care walk-in clinic 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.
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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
- Sarcoma
- Spine tumors

The cancer center also has tumor conferences for a number of other disease sites. See pages 27 to 29 for a complete list of disease site conferences.

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
In late 2018, Rush welcomed Mia Levy, MD, PhD, as the new director of the Rush University Cancer Center.

Coming to Rush is a homecoming for Levy. She grew up in the Chicago suburbs and graduated from Rush Medical College in 2003. It is also deeply personal. “It’s been a journey of the heart,” Levy says. “My mother was diagnosed with metastatic breast cancer during my first year of medical school, and she received her medical care here at Rush. I saw firsthand how we can treat cancer as a chronic disease for many patients. My mother lived for seven years with metastatic breast cancer before she passed. She saw me graduate from medical school, get married and have my first child. She lived a wonderful life and had a good quality of life.”

Levy, in turn, became a medical oncologist specializing in breast cancer and completed a doctorate in biomedical informatics.

**Precision oncology**

Levy is helping to elevate Rush’s precision oncology efforts. “Precision medicine is about trying to understand how we can tailor treatment to each patient,” says Levy. “How can we predict which patients are likely to be at risk for cancer? Which patients are likely to benefit from a particular treatment?”

These answers are often linked with data — which is right in Levy’s wheelhouse. Before coming to Rush, Levy helped build data-driven, clinical decision support functionality at Vanderbilt-Ingram Cancer Center at Vanderbilt University Medical Center in Nashville.

“Dr. Levy has helped shape the field of precision oncology,” says Larry Goodman, MD, CEO of the Rush System and of Rush University Medical Center. “That leadership and deep understanding of the challenges clinicians face in accessing, interpreting and applying genomic data will accelerate how Rush’s multidisciplinary teams devise treatment plans that are unique to each patient.”

**A learning health care system**

Levy specializes in determining how to apply technology, such as electronic medical records and data science, to advance the entire cancer care continuum and cancer research.

When implementing clinical decision support at Vanderbilt, Levy and her colleagues opened new ways for researchers and physicians to use data. “We made the data available for researchers, enabling them to ask questions for discovery purposes, to understand quality of care, and to improve clinical processes and care,” she explains.

This resulted in a learning health care model in which providers leveraged the data collected as a part of routine care for treating patients and created a cycle of continuous learning.

“The concept behind a learning health care system is that the care of the patient I saw yesterday informs the care of the patient I’m seeing today. And the care of the patient I’m seeing today will inform the care of the patient I see tomorrow,” says Levy. “This is what I’m most excited to bring to Rush. It’s a bold goal. But it’s the right time. Our ability to do data science for discovery gives us an opportunity to continuously learn from the experiences of all of our patients, not just the five percent who participate in clinical trials.”

**A destination cancer center**

Levy has taken the lead on growing Rush into a destination cancer center.

Developing a destination cancer center revolves around excellent care with multidisciplinary teams, novel diagnostics and therapeutics for patients, and a learning health care system.

“To bring this to the people of Chicago is so aligned with where my passion is, where my heart is, and where the heart of Rush is as an institution,” says Levy.
As Rush’s cancer program continues expanding, construction is now under way for its physical hub for comprehensive cancer care. Located on Rush’s downtown Chicago campus, the state-of-the-art building will house the Rush University Cancer Center, as well as neurological services and clinical research. It is scheduled to open in 2022.

“We are excited about the prospect of growth and becoming a destination cancer center,” says Patricia Nedved, MSN, CENP, associate vice president of ambulatory transformation at Rush. “This building will give us the additional space we need to care for our complex patients and conduct important clinical research.”

Over the past year and a half, Nedved has led a team in planning and designing the 10-story, 500,000-square-foot outpatient center. The center will bring all the outpatient services for comprehensive cancer care together under one roof. This includes radiation therapy, labs, infusion therapy, integrative medicine, imaging, clinics, physician offices, diagnostic and treatment areas, and pharmacy.

A team effort
Rush staff and patients have been intimately involved in every major decision about the building.

“We’ve had regular meetings with targeted groups, including physicians, nurses and medical assistants, and teams from infusion, pharmacy, imaging, integrative medicine, radiation oncology, guest services and more,” says Nedved. “They have influenced all aspects of the building, from the work spaces and procedure rooms to the functionality and workflow.”

One of the biggest highlights of the building is the ability to co-locate clinical services. For example, breast imaging will live on the same floor as breast oncology and breast surgery.

“Having the services in one location will make it easier for patients and will foster further collaboration among the care teams,” says Nedved.

Patient input has also been a top priority. The Cancer Patient Advisory Council has weighed in on design elements, the use of technology within the building, clinical care spaces and more.

“It has been very helpful getting our patients’ perspectives on the importance of bringing light, color and a feeling of hope into the building,” says Nedved.

As construction continues, the people who will work and receive care in the new building will stay involved, ensuring that it best reflects Rush’s vision for a destination cancer center.
International spinal tumor registry

Metastatic tumors to the spine can lead to everything from pain and fractures to neurological compression and paralysis. "Metastatic tumors to the spine are very common in patients with cancer, but the care these patients receive can be quite varied," says spinal neurosurgeon John O’Toole, MD, MS.

Rush is helping to further streamline and improve treatment for spinal tumors as part of the AOSpine Knowledge Forum – Metastatic Tumor Research and Outcome Network (MTRON), an international metastatic spine tumor network. O’Toole is the principal investigator at Rush. Co-investigators include orthopedic spinal oncologist Matthew Colman, MD; spinal neurosurgeons Vincent Traynelis, MD, Harel Deutsch, MD, Richard Fessler, MD, PhD and Ricardo Fontes, MD, PhD; and radiation oncologists Aidnag Diaz, MD, and Dian Wang, MD, PhD.

Rush is contributing to MTRON’s two global objectives: 1) to create a network of spine oncology centers using the same data fields and platforms that will facilitate and encourage specific prospective studies, and 2) to have a baseline registry that will be used to gather information about patients diagnosed with metastatic spine tumors. The registry will collect clinical, diagnostic and therapeutic data, along with patient outcomes, including adverse events, local control, survival and general and disease-specific health-related quality of life data.

There are 26 centers participating in the registry across the world, and Rush is the only participating center in the Chicago area. Rush’s strong multidisciplinary team dedicated to spine tumors was one of the reasons it was chosen as a participating center.

“The idea with the multicenter, international approach is to examine various prognostic factors in these patients and the treatments of these patients across multiple centers to find out which characteristics can predict patient-reported quality of life outcomes, as well as morbidity, mortality and local control of their tumors,” says O’Toole. “When we pool patient data from all 26 centers, we have much more power to answer important research questions about our patients.”

To be included in the registry, patients must be age 18 or older, and they must have a metastatic tumor to the spine with a plan for some type of treatment (e.g., surgery, radiation, chemotherapy or a combination).

“Patients have been enthusiastic about participating,” says O’Toole. “They are also getting an even closer examination of their own quality of life. As we collect this data, we look at it in real time. If we find that a patient is not showing improvement with treatment, we can make a decision for a different treatment for that specific patient.”

As patients with metastatic disease are living longer than ever before with the advent of powerful new immunotherapy, directed therapy agents and cancer genomics, O’Toole notes that it is time to re-evaluate how to treat metastatic tumors to the spine.

“We are rethinking some of our decision-making and treatments for these patients,” he says. “We’re not just focusing on palliative pain control for the next few months. We’re talking about long-term pain control, good local control of the tumor, spinal stability, and the preservation of neurological function for years in many of these patients.”
Advanced surgical treatment for lymphedema

Rush is one of a few academic medical centers in the Chicago area to offer surgical treatment options for patients who are suffering with lymphedema resulting from lymph node removal during their cancer treatment. In 2018, Rush welcomed plastic and reconstructive surgeon Deana Shenaq, MD, a highly trained microsurgeon who specializes in vascularized lymph node transfer and lymphovenous bypass surgery.

During vascularized lymph node transfer, Shenaq is able to transplant healthy lymph nodes from elsewhere in the body to replace those that were removed, using microvascular techniques to provide blood flow to these transplanted nodes. During lymphovenous bypass, she reroutes lymphatic channels of the arms or legs to small nearby veins, bypassing nonfunctional parts of the lymphatic system.

In addition to surgical interventions, Rush’s occupational therapy team offers a complete, evidence-based program of massage, bandaging, exercises and skin care, all managed by certified lymphedema therapists — including therapists who specialize in managing lymphedema after breast cancer treatment.

Rush also offers ICG lymphangiography, a state-of-the-art diagnostic technology that uses a fluorescent dye to trace lymph drainage, pinpoint blockages and identify working lymphatic channels.

Addressing prostate cancer disparities in Chicago

Urologist Christopher Coogan, MD, and third-year Rush Medical College student Jay Ogunkeye are addressing health disparities in Chicago when it comes to prostate cancer incidence and mortality.

Through their research, they looked at the incidence and mortality for prostate cancer in West Side neighborhoods, such as Austin, North Lawndale and Garfield Park, compared to the more affluent neighborhoods downtown and north of the Loop, such as Lincoln Park and Lakeview.

They found that men living on the West Side of Chicago are 1.5 times more likely to be diagnosed with prostate cancer in comparison to men living downtown or on the North Side. Men in these neighborhoods are also more than three times more likely to die from prostate cancer.

“These men are so close in proximity, but they’re living drastically different lives when it comes to how different factors impact their life expectancy,” says Ogunkeye, who is a Reddy Fellow at Rush.

To address these disparities, Coogan and Ogunkeye created an intervention plan using evidence from their research to target neighborhoods with the worst outcomes.

They partnered with a church on the West Side located in a neighborhood with a high incidence of and mortality from prostate cancer. They provided prostate cancer education on signs and symptoms of prostate cancer, collected contact information and urologic history, and performed a free prostate-specific antigen (PSA) test to screen men for prostate cancer risk. They then called all patients with their results and offered appointments with a urologist to patients who had elevated PSA.

“Health disparities related to prostate cancer outcomes remain significant in Chicago and throughout the country,” says Ogunkeye. “While considerable work remains, this project demonstrates that simple, low-cost screening interventions can be effective in increasing community awareness and improving health equity for high-risk communities.”

Deana Shenaq, MD
Using 3-D technologies for complex orthopedic cancer surgery

The orthopedic oncology program at Rush, led by the director of orthopedic oncology, Steven Gitelis, MD, is one of a few institutions in the country using and conducting research on patient-specific 3-D printed models of spinal and pelvic tumors to help plan cancer procedures. These models can be made specifically to each patient’s anatomy, and incorporate the tumor, nerves, vessels and bone into the model. Gitelis and his colleagues, orthopedic oncologist Alan Blank, MD, MS, and orthopedic spinal oncologist Matthew Colman, MD, use these models to plan and perform advanced cancer surgeries, while preserving normal anatomy and patient function.

“When we have large tumors requiring complex resections, these 3-D models give us a tactile feel for the actual anatomy. We can better appreciate how close important structures are to the cancer,” says Blank. “They help us better determine how to remove the tumor with a safe margin.”

3-D printed custom implants can also be developed based on these models and are used in pelvic reconstructions. Blank, Gitelis and Colman are using these implants and researching the potential for these technologies to improve surgical precision and, ultimately, patient outcomes.

“In the short term, these custom implants are resulting in more efficient surgeries, we hope, fewer complications and potentially better function for patients,” Blank says.

Quality improvement: patient access

This year, the Cancer Committee undertook a quality improvement effort to improve efficiencies related to patient access, including getting new patients in to see a provider in a timely manner and making sure patients were able to see the right provider at the right time.

During the project, the quality improvement team found that services are highly segregated by specialty. This resulted in a wide range of clinical availability and a lack of standardization across the center. To address these issues, the team identified several opportunities, including creating one phone number for patients to call to schedule an appointment with a cancer service line; creating specialty-level scheduling rules for traditional and comprehensive clinics; enhancing Epic automation and workflows; and modifying existing operational workflows to ensure timely care.

One of the biggest improvements was an effort to consolidate several phone numbers for patients to call to make an appointment into one phone number and access center, (312) CANCER-1. This ensured that patients’ calls were routed appropriately — resulting in timely care and answers to their questions and concerns.

Additionally, the team utilized decision trees, an Epic functionality, to assist in scheduling. This tool guides the scheduler to ask the patient specialty-specific questions. At the end of the decision tree, the system prompts the scheduler to an appointment with a specific provider based on the answers. This ensures patients are being scheduled with the appropriate provider and enhances the information available to the provider prior to the appointment.

The Cancer Center is also close to finalizing a new mechanism for scheduling that will allow more patients to be scheduled on the first call, with the goals of improving patient satisfaction and getting patients into the clinics faster.
In the weeks leading up to spring break, most college seniors are preparing to blow off steam and enjoy a week away from the school grind. But when 25-year-old Anna Wassman found a lump in her breast a few weeks before spring break, her plans — and life — took a sharp turn. “I was doing my routine self-check, and I found a lump,” says Wassman.

After a breast ultrasound and biopsy, Wassman was diagnosed with hormone-receptive-positive, HER2 positive, invasive ductal carcinoma.

“I am big on planning and controlling things in my life, but this was out of my control,” she says. Instead, Wassman focused on something she could control: getting the best care possible to fight it.

A team in her corner

Her best friend put Wassman in touch with her sister, Rush breast surgeon Andrea Madrigrano, MD. Madrigrano connected Wassman with Rush’s breast cancer coordinator Madeline McIntosh, RN, to get her scheduled with Rush’s comprehensive breast cancer team.

Wassman met with Madrigrano, medical oncologist Ruta Rao, MD; radiation oncologist Parul Barry, MD; and genetic counselor Kelly Burgess, MS.

Her team quickly recognized Wassman’s unique concerns as a patient who was considerably younger than the average breast cancer patient. Wassman opted to have surgery first, which then gave her time to recover, finish classes and graduate before starting chemotherapy.

“My care team respected and understood my concerns and worked with me to develop a care plan,” she says.

Madrigrano adds: “At Rush, our patients are part of the team. That team approach, personal touch and close relationship are what every patient can expect here.”

Path back to health

Wassman opted for a bilateral mastectomy. During the surgery, Madrigrano worked side-by-side with breast reconstructive surgeon Anuja Antony, MD, who started preparing Wassman for breast reconstruction.

After recovering from surgery, Wassman was able to finish her senior year and graduate with her class.

The Rush touch

Wassman has been cancer-free since her surgery and is now in the adjuvant stage of her care plan. This has included chemotherapy, targeted therapy and ovarian suppression, all given with the goal of reducing the risk of distant recurrence. She will also be taking tamoxifen for the next five to 10 years.

“Everyone at Rush — from the doctors and nurses to the front desk staff and people who scheduled my appointments — has been consistently helpful, compassionate and knowledgeable,” she says.

To read more of Anna Wassman’s story, visit rush.edu/anna.
Personalized Care for Patients with Gynecologic Cancers

Over the past several years, the gynecologic oncology program at Rush has seen tremendous growth; it’s one of the highest-volume programs in the Chicago area.

Gynecologic oncologists from Rush also bring academic medicine into the community, providing patients throughout the Chicago area with the best possible care and access to clinical trials.

In addition to caring for patients at Rush’s three system hospitals, Rush University Medical Center, Rush Oak Park Hospital and Rush Copley Medical Center in Aurora, gynecologic oncologists from Rush also see patients at offsite clinics in the northern and southern suburbs and Kankakee county. Patients can generally be seen within a week.

“We are committed to bringing care to patients in their communities,” says Amina Ahmed, MD, director of the gynecologic oncology program at Rush. “While many patients come to our downtown location at Rush University Medical Center, we provide the most current and convenient care to our patients at all of our locations.”

A team approach

The gynecologic oncology team has grown in the past year. In addition to Ahmed and Summer Dewdney, MD, Rush welcomed additional board-certified gynecologic oncologists Jean-Marie Stephan, MD, and Andras Ladanyi, MD, in 2018.

The team meets in a weekly tumor board conference, working alongside medical oncologist Lydia Usha, MD, pathologists Pincas Bitterman, MD, and Ritu Ghai, MD, and radiation oncologists Neilayan Sen, MD, and Parul Barry, MD.

Together, the gynecologic cancer team discusses patients’ cases and develops personalized care plans for each patient.

The gynecologic oncology team also includes advanced practice providers Jennifer Klingbeil, PA-C, Theresa Nuesto, PA-C, Sandra Obilade, NP, and Margaret Wilson, PA-C, who enable seamless provision of the best possible care.
We have seen that immunotherapies can be beneficial for treating recurrent gynecologic cancers. We have been able to do genetic sequencing and tissue testing for patients, which shows us their individual sensitivities to different treatments.

Amina Ahmed, MD
Director, Gynecologic Oncology

Ladanyi and Stephan have brought expertise in novel surgical techniques, using the da Vinci Surgical System, including sentinel lymph node dissection for endometrial cancer. The program will continue to grow and offer the most innovative surgical treatment for patients who have gynecologic cancers.

The gynecologic cancer program also partners with Tempus — a biotechnology company that collects, stores and analyzes genetic data, clinical information and tissue samples — to provide advanced care to patients who have gynecologic malignancies by using data-driven precision medicine.

At Rush, all patients who have advanced-staged or recurrent gynecologic cancers are offered Tempus testing coupled with tissue banking at the Rush biorepository.

“Working with Tempus, we have seen that immunotherapies can be beneficial for treating recurrent gynecologic cancers,” says Ahmed. “We have been able to do genetic sequencing and tissue testing for patients, which shows us their individual sensitivities to different treatments.”

Under the direction of principal investigator Dewdney, Rush also offers clinical trials for gynecologic malignancies through Gynecologic Oncology Group (GOG) Partners and NRG Oncology, both of which are sponsored by the National Cancer Institute. The team evaluates all patients for eligibility and offers patients a trial during their care if appropriate.

Open and upcoming gynecologic cancer clinical trials at Rush

<table>
<thead>
<tr>
<th>Trial Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>NRG-GY009</td>
<td>Pegylated Liposomal Doxorubicin Hydrochloride With Atezolizumab and/or Bevacizumab in Treating Patients With Recurrent Ovarian, Fallopian Tube, or Primary Peritoneal Cancer</td>
</tr>
<tr>
<td>NRG-GY005</td>
<td>Cediranib Maleate and Olaparib or Standard Chemotherapy in Treating Patients With Recurrent Platinum-Resistant or Refractory Ovarian, Fallopian Tube, or Primary Peritoneal Cancer</td>
</tr>
<tr>
<td>NRG-GY006</td>
<td>A Randomized Phase II Trial of Radiation Therapy and Cisplatin Alone or in Combination With Intravenous Triapine in Women with Newly Diagnosed Bulky Stage IB2, Stage II, IIIB, or IVA Cancer of the Uterine Cervix or Stage II-IVA Vaginal Cancer.</td>
</tr>
<tr>
<td>GOG PARTNERS</td>
<td>A Study in Ovarian Cancer Patients Evaluating Rucaparib and Nivolumab as Maintenance Treatment Following Response to Front-Line Platinum-Based Chemotherapy</td>
</tr>
<tr>
<td>GOG PARTNERS – GOG 3018 OVAL STUDY</td>
<td>A Study of VB-111 With Paclitaxel vs Paclitaxel for Treatment of Recurrent Platinum-Resistant Ovarian Cancer (OVAL)</td>
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<tr>
<td>GOG 3032 – TESARO MOONSTONE TRIAL</td>
<td>A Phase 2 Open-Label, Single-Arm Study to Evaluate the Efficacy and Safety of the Combination of Niraparib and TSR-042 in Patients With Platinum-Resistant Ovarian Cancer</td>
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Visit rush.edu/gyne-onc-trials for a full list of gynecologic cancer trials at Rush.
Managing Breast Cancer Risk for More People

Among women eligible for screening mammograms, at least 6 percent have a high risk of breast cancer.

Most of these high-risk patients don’t know they’re predisposed to the disease. As a result, they tend not to get the screening MRIs, chemoprevention or genetic testing and counseling that the National Comprehensive Cancer Network guidelines recommend for them.

The breast cancer team at Rush has set out to solve this problem. 

Lydia Usha, MD, director of the Rush Inherited Susceptibility to Cancer (RISC) Clinic, and Lisa Stempel, MD, acting director of the Regenstein Breast Imaging Center at Rush, are leading an initiative to determine the breast cancer risk of every woman who gets a mammogram at Rush — and connect those at high risk with needed services.

Automated risk assessment and data collection

At the heart of the initiative is powerful software, developed by CRA Health, that rapidly assesses patients’ risk using multiple statistical models. Each model draws on different sets of factors in a patient’s family and medical history; the results indicate the potential benefit of different interventions:

- Patients who have an increased five-year risk (1.66 percent or more) according to the Gail model may benefit from breast cancer chemoprevention medications.
- Patients who have an increased lifetime risk (20 percent or more) according to the Tyrer-Cuzik model may benefit from screening MRIs in addition to screening mammograms.
- Depending on the results of several models that estimate patients’ likelihood of having BRCA1, BRCA2 or other mutations, genetic testing and counseling may be recommended.

Everyone who gets a mammogram at Rush completes a recently expanded intake questionnaire using a tablet that feeds their data directly to the software in addition to known history data that is already in Epic, Rush’s electronic medical records system.

Those patients who have a high risk, according to any model, may be referred to the RISC Clinic, where they’ll receive follow-up services tailored to their needs.

Benefits beyond breast cancer risk assessment

Once someone is identified as a carrier of a mutation linked to breast cancer, their first-, second- and third-degree relatives become eligible for genetic testing.

And, because some mutations increase the risk of cancer at multiple disease sites, risk management can extend beyond breast cancer. For example, women with CHEK2 mutations have a high risk of both breast and colon cancers, so they’re eligible for more frequent colonoscopies.

“The field is advancing very rapidly,” says Usha. “We’ll likely continue expanding our targeted drug options, targeted screening modalities and cancer prevention.”
A broad portfolio of clinical trials

Home to leading breast cancer investigators, Rush is recruiting for a range of medical, surgical and radiologic clinical trials. The breast cancer team is dedicated to making these trials accessible to more patients.

“We have a new navigation system in place in which we identify all new cancers and determine who may be eligible for a clinical trial before the patient is seen in our multidisciplinary clinic” says Andrea Madrigrano, MD, a breast surgeon.

The trials available at Rush include novel options for a wide range of patients:

- **TULIP**, a phase III trial, is evaluating the efficacy of SYD985 ([vic-]trastuzumab duocarmazine) for patients who have had progression during or after at least two HER2-targeting treatments for locally advanced or metastatic disease, or progression during or after (ado-)trastuzumab emtansine treatment.

- **CO40016**, a phase III trial, is evaluating the efficacy of ipatasertib plus paclitaxel in patients who have PIK3CA/AKT1/PTEN-altered, locally advanced or metastatic, triple-negative breast cancer; or hormone receptor-positive, HER2-negative breast cancer.

- **BR005**, a phase II trial, aims to explore the feasibility of breast-conserving treatment without surgery in patients with complete clinical/radiologic response after neoadjuvant chemotherapy.

Visit rush.edu/breast-trials for a full list of current breast cancer clinical trials available at Rush.

Comprehensive breast imaging for dense breast tissue

Almost 50 percent of all women have dense breast tissue, which, like cancer, appears white on screening mammograms. Up to one-third of all breast cancers are not visible in dense breasts with standard mammography.

To address this challenge, Rush has become a leader in breast cancer screening for women who have dense breasts. Rush’s comprehensive breast imaging program includes 2-D digital mammography, tomosynthesis (3-D), automated breast ultrasound (ABUS) and breast MRI. The program is also pursuing additional screening modalities.

These advanced screening technologies make it easier to detect breast cancer in dense breast tissue.

“Tomosynthesis helps us differentiate between overlapping normal tissue and true masses or distortions in the breast,” says Paula Grabler, MD, acting director of breast imaging. “It helps us find those little cancers hidden by dense tissue.”

Taking this a step further, Rush also offers supplemental ultrasound screening with ABUS for women with dense breasts.

“ABUS gives us a three-dimensional reconstructed image of the entire breast, allowing us to see through dense tissue using sound waves,” says Stempel. “When we add ultrasound in addition to mammography, we significantly increase the ability to find small, invasive breast cancers.”

Together, tomosynthesis and ABUS find significantly more small invasive cancers compared to screening with digital mammography alone. On average, ABUS detects an additional three to four cancers per 1,000 women.

Rush offers breast imaging services at the following convenient locations throughout the Chicago area:

- **Rush University Medical Center** | Chicago
- **Rush South Loop** | Chicago
- **Rush River North** | Chicago
- **Rush Lakeview** | Chicago
- **Rush Oak Park Hospital** | Oak Park
- **Rush Oak Brook** | Oak Brook
- **Rush Copley Medical Center** | Aurora

Almost 50 percent of all women have dense breast tissue, which, like cancer, appears white on screening mammograms. Up to one-third of all breast cancers are not visible in dense breasts with standard mammography.
Patients who have head and neck cancers know they are in excellent hands when they come to Rush. “From the moment our patients walk into our offices, through their surgeries, and after they’re discharged from the hospital, our patients often tell us that they have never been treated better,” says otolaryngologist/head and neck surgeon Kerstin Stenson, MD, director of the head and neck cancer program. “They recognize that they’re getting the best treatment possible from an experienced, compassionate team — and that they aren’t just a number to us. That all stems from the collaborative, patient-centered culture here at Rush.”

Over the past two years, the program has launched its enhanced recovery after surgery (ERAS) protocol, which focuses on optimizing head and neck patients’ preoperative, interoperative and postoperative experiences. “When you talk about head and neck cancer, you’re talking about cancers and treatments that affect what makes us human, including speech, swallowing and appearance,” says Samer Al-Khudari, MD, otolaryngologist/head and neck surgeon. “Our patients often require major surgeries and/or intense treatment interventions. Our goal is to do everything we can to improve their overall outcomes. That’s where ERAS comes in.”

Improving the Patient Experience for Head and Neck Cancers

A collaborative effort

ERAS is a collaborative effort between the head and neck surgeons, anesthesiologists, nurses and allied health professionals — all coming together with the patient at the center. There are several goals for the ERAS protocol, including preoperative education and preparation; faster recovery in the hospital; shorter length of stay; improved recovery after discharge; decreased use of opioids; and better overall pain control.

The protocol starts before surgery. “We make sure our patients have the appropriate preoperative counseling and planning to address their needs and manage comorbidities,” says Al-Khudari. “We also put a strong emphasis on preoperative patient education. So, by the time patients are ready for surgery, they know what to expect, and they know that they have a whole team of support.”

Through the ERAS protocol, head and neck cancer patients typically meet with a speech-language pathologist before surgery because many head and neck surgeries affect patients’ ability to speak and swallow. At these appointments, speech-language pathologists conduct baseline function tests. Patients also have a chance to ask questions and understand the recovery process. This helps patients know what to expect, set realistic goals and avoid frustrations during recovery.

“Overall, it empowers our patients to be part of the process,” says Peter Revenaugh, MD, facial plastic and reconstructive surgeon.
Multifactorial steps for success

ERAS is rooted in evidence-based data that has found that implementing about 15 preoperative, interoperative and postoperative protocols can help improve patients’ outcomes.

“Efforts to improve patient outcomes do not focus on just one factor,” says Al-Khudari. “All of these small changes collectively can have a significant effect on patients’ recovery.”

Some of the steps include preoperative glucose loading to stabilize glucose levels during and after surgery; getting patients ambulating within 24 hours after surgery; and using a combination of non-narcotic pain medications.

One of the unique challenges facing head and neck cancer patients is nutrition. “Before implementing ERAS, it was two or three days before patients would get optimal nutrition, but we are now starting nutrition within about two hours after surgery,” says Revenaugh. “While we still need more data, we do know that getting back to nutrition sooner is a good thing for recovery.”

One area that Revenaugh and his team have studied closely is reducing opioid use and better pain management. “We have fewer patients leaving the hospital on opioid medications, and their pain control is better than it was before we started the ERAS program,” he says.

Before ERAS, 90 percent of head and neck cancer patients left the hospital on narcotic medications. After implementing ERAS, only 20 percent of patients are leaving the hospital on narcotics. At the same time, patients are reporting less pain.

“Instead of just numbing the pain with opioids, the ERAS medication regimen includes using a combination of medications to attack all the different causes of pain,” says Revenaugh. “During patients’ hospital stays, we give them different medications, such as anti-inflammatory and medications that address nerve pain. This has been very effective for pain control.”

Program spotlight: Microvascular reconstruction for head and neck cancers

The head and neck reconstruction team at Rush specializes in facial reanimation and microvascular reconstruction. All of the surgeons did their residencies in head and neck surgery, followed by fellowship training in head and neck microvascular reconstruction. They focus on oncologic and functional reconstruction for patients who have head and neck cancers, skin cancers, and other cancers that affect the head and neck.

“It used to be that patients who had head and neck cancers would just have to live with the often-significant after-effects of these surgeries and treatments,” says Al-Khudari. “Now, we can improve patients’ quality of life and appearance, and get them past their treatment with functional results.”

These are historically long, complex surgeries with variable outcomes, according to Revenaugh. To address the unique challenges of these cases, the head and neck reconstruction team has standardized the surgical approach. This effort has resulted in impressive success rates above the national average.

“Success rates around the country for microvascular flap reconstructions have been reported in the low 90th percentile; our success rate at Rush is in the 98th to 99th percentile. That is a testament to the surgeons we have here and programs that we have,” says Revenaugh.

The program continues to grow with the addition of facial plastic and reconstructive surgeon Ryan Smith, MD, in 2018. The team also offers services at several Rush locations, including Rush University Medical Center, Rush South Loop and Rush Oak Brook.

We have fewer patients leaving the hospital on opioid medications, and their pain control is better than it was before we started the ERAS program.

Peter Revenaugh, MD
Facial Plastic and Reconstructive Surgeon

Left to right: Peter Revenaugh, MD, and Ryan Smith, MD
The bone marrow transplant (BMT) program at Rush has experienced exponential growth in the past year — including a new chairperson, alternative donor transplantations and a successful fast-track clinic.

The program also continues to be a leader in quality. “As confirmed by annual reports by the Center for International Blood and Marrow Transplant Research registry, we are at 100 percent survival for the first 100 days,” says Celalettin Ustun, MD, chairperson of the Section of Bone Marrow Transplant and Cell Therapy. “An institution can only get those kinds of outcomes by having a high level of expertise and knowledge, along with very caring providers.”

Alternative donor transplantations

This year, BMT specialists did the first cord blood transplant in 10 years at Rush — opening up transplant opportunities for a wider number of often underserved patients.

“For patients who do not have half-matched (haploidentical) family members, like children, parents or siblings, or matched related or unrelated donors, we can give them a chance for transplantation by using umbilical cord blood donors,” says Ustun.

Cord blood transplant is particularly important for minority patients. “The minority population is minimally represented in the national marrow donor program,” says Sunita Nathan, MD, associate director of the BMT program. “But cord blood is more tolerated even if the donor units are not a perfect match. We are ensuring that no patient who needs a transplant will go without.”

Fast-track clinic

To help safely facilitate BMT patients’ transition from inpatient to outpatient care, Rush launched the fast-track BMT clinic in summer 2018. Housed in the inpatient BMT unit, the fast-track clinic functions as an outpatient clinic that is open to patients year-round, including weekends and holidays.

“The fast-track clinic has helped our patients tremendously,” says Nathan. “We’ve been able to send them home from inpatient care earlier because they know they can come to the fast-track clinic if they experience side effects; we’ve helped them avoid emergency room visits; and we can administer infusions, blood and fluids that we can’t do in a traditional outpatient setting. Overall, it has led to a very smooth transition of care.”

Seeing patients quickly has been one of the key benefits. “The changes these patients can experience can be so dramatic even within 24 hours,” says Nathan. “We can intervene immediately.”

Ustun adds: “Patients are also being taken care of by the same people throughout their entire continuum of care, which offers them a more consistent and personalized experience.”
Treatment spotlight: Bringing CAR-T to Rush

Over the past year, a multidisciplinary team at Rush has been putting the infrastructure in place to start offering CAR-T cell therapy to patients who have multiply relapsed refractory lymphoma or acute lymphoblastic leukemia. Earlier this year, Rush was the second center in Chicago to be certified to offer tisagenlecleucel (Kymriah) and will be able to offer Axicabtagene ciloleucel (Yescarta) later this year.

To qualify for a bone marrow transplant, patients must be chemoresponsive. CAR-T is one option for getting patients to qualify for transplant.

“The treatment has very good response rates,” says Nathan. “While the duration of response remains to be established, the ability to put people into remission is quite impressive — and that's what they need to get to transplantation.”

Ustun adds: “The response is encouraging and can be long-lasting in some cases. In other cases, it may actually be curative. But there is still more research needed.”

Bringing CAR-T to Rush has required training and preparation across several disciplines to prepare for possible side effects of treatment — including cytokine release syndrome, neurologic toxicity and organ dysfunction.

“It is a highly toxic treatment, which requires a multidisciplinary team with a lot of knowledge,” says Ustun. “We've had extensive training within each of the areas involved, including BMT, hematology/oncology, neurology, the medical intensive care unit, the neuro-intensive care unit and the emergency department.”

Provider spotlight: Celalettin Ustun, MD

This year, Rush welcomed Celalettin Ustun, MD, as the new chairperson of the Section of Bone Marrow Transplant and Cell Therapy.

“Rush has always had a highly reputable cancer program, but the institution has made cancer a top priority — and it is putting resources and plans behind that goal,” Ustun says. “It’s very exciting to be part of that vision.”

He quickly learned what makes Rush stand apart in a highly competitive health care market: the people. “Providers and staff at every level, from doctors and advanced practice nurses to CNAs and other allied health professionals, are passionate about patient care and committed to serving our patients,” says Ustun.

Since Ustun's arrival, he has worked with his colleagues to continue growing the program. Through these efforts, Rush recently recruited three new BMT physicians who are joining Rush in summer 2019.

In addition to patient care, the new recruits will help grow the clinical and translational research component of the program. One of the recruits will have his own lab that will be researching the immunologic aspect of transplantation.

Patients are being taken care of by the same people throughout their entire continuum of care, which offers them a more consistent and personalized experience.

Celalettin Ustun, MD
Chairperson, Section of Bone Marrow Transplant and Cell Therapy
Molecular analysis of brain tumors enables Rush’s neuro-oncology team to personalize treatment and improve its effectiveness for patients

**Tailor-made therapy**

Precision medicine is not yet a part of the standard of care in brain cancer treatment. Rush, however, wanted to raise the bar for patients. To do that, the neuro-oncology team has partnered with Tempus to use precision medicine to customize care, better assess brain tumor mutations and tailor each patient’s treatment.

Tempus specializes in molecular and clinical data analysis to help the Rush neuro-oncology team better understand brain tumors at the molecular level. By getting that information through molecular sequencing, the team can learn how patients’ tumors differ and what they can do to treat their tumors more effectively.

“Patients will come in with what looks like a low-grade type of tumor under the microscope,” says neuro-oncologist **Clement Pillainayagam, MD**. “But when the molecular sequencing is done, the signature is more consistent with a higher-grade brain tumor. Therefore, we treat it more aggressively because we know this tumor has the potential to act aggressively.”

Molecular sequencing is done on almost every patient. If a tumor grows and another surgery is required, Pillainayagam collaborates with neurosurgeons at Rush to ensure the specimen is properly prepared for Tempus. Then Tempus evaluates the changes. The hope is that by analyzing molecular changes on tumor recurrence, the team can better understand the tumor’s resistance to therapy.

Other cancers often examine mutational burden. For more aggressive tumors like glioblastomas, however, doing so can indicate how aggressive the tumor is and how responsive it might be to immunotherapy checkpoint inhibitors.

Tempus testing also involves a blood sample to check for genetic mutations that could be contributing to the tumor. “We’re picking up things we otherwise might have missed or that might have predisposed the patient to cancer,” Pillainayagam says.

Using precision medicine, the neuro-oncology team has placed some patients on newer protocols or started others on systemic agents that will be more effective.

“This new information allows us to be better at prognosticating our patients,” says **Aidnag Diaz, MD**, radiation oncologist. “These markers give us a better idea of how to guide our patients.”
Program Spotlight: Rush Adolescent and Young Adult Brain Tumor Clinic

After seeing many glioblastomas in young patients between the ages of 16 and 30 being evaluated by the neurosurgery team, Pillainayagam and neuro-oncologist Joo Yeon Nam, MD, developed the Rush Adolescent and Young Adult Brain Tumor Program.

The program targets patients diagnosed with brain tumors between the ages of 15 to 39. Their tumors can sometimes be more aggressive than older patients, but it's unclear why. Pillainayagam’s team uses precision medicine to find out how these tumors behave differently.

Clinical trials open doors of possibilities

Brain tumors, especially high-grade gliomas, are not curative, and the survival rate is poor, particularly for glioblastoma. To offer as many options as possible for patients, Rush offers a number of clinical trials to help patients get access to novel treatments that are not yet widely available.

“It’s a partnership, with an altruistic component on the side of the patients,” Pillainayagam says. “Most of my patients say, ‘I know there are risks and benefits, but I want to see if this works. And if not, maybe it will help someone else.’”

Currently, Rush has a trial open for glioblastoma patients with a tumor that recurs after the standard of care. Treatment as part of the trial includes a vaccine in addition to bevacizumab, the standard of care. This nationwide trial is for patients who have certain immune markers that allow the vaccine to work. Rush is the only hospital in the Chicago area that has this trial open.

Rush also has a clinical trial open in radiation oncology in which protons vs. photons are used to determine which is more effective. The theoretical advantage is that there will be a lesser volume of brain parenchyma (functional tissue) that receives radiation because protons are a little sharper.

“There’s a theoretical possibility that we will see some improvement in patients’ cognition after treatment with proton radiation,” says Diaz.

Clinical trials for brain cancer at Rush also offer patients another kind of benefit — excellence in comprehensive care. “Brain tumors occur in both the fields of neurology and oncology, and we have great programs in both at Rush,” Pillainayagam says.

Visit rush.edu/brain-cancer-trials for a list of current brain cancer clinical trials available at Rush.
Patients with early- to advanced-stage colon, liver, pancreatic and other gastrointestinal cancers will find a full spectrum of care and state-of-the-art treatments at Rush.

Every Tuesday, Rush clinicians who specialize in gastrointestinal (GI) cancer gather for a multidisciplinary conference to discuss their patients’ care. Over the past two years, the number of clinicians at these weekly conferences has increased as Rush has focused on building a comprehensive GI cancer program.

A strong multidisciplinary team

Three additional medical oncologists recently joined the Rush team, and they are all experts on the latest drug and biological treatments for GI malignancies, including immunotherapy, targeted therapy and clinical trials. In 2017, Rush also welcomed several renowned GI surgeons who specialize in minimally invasive surgical techniques, including robotic procedures. The multidisciplinary team also includes radiation oncologists, gastroenterologists, colorectal surgeons, geneticists, pathologists, nutritionists, social workers and nurse navigators.

“GI oncology requires a team approach because these patients often require multiple treatments, including surgery, radiation and systemic therapies, such as chemotherapies, immunotherapies and targeted agents,” says Shikha Jain, MD, medical oncologist. “It’s really important that all of these different disciplines are all actively involved in each patient’s care from start to finish.”

The weekly multidisciplinary conferences are working meetings. “We talk about each patient and review films and pathology results,” says Sam Pappas, MD, division chief of surgical oncology. “We might talk about treatment sequencing or whether it is smart to go with surgery first or treat them medically first to get a better response. Then all the specialists involved in the patient’s care meet with the patient to discuss what we talked about at the conference.”

Novel surgical treatment

In addition to expanding the breadth of knowledge on the GI cancer team, Rush offers the most advanced treatments — which includes clinical trials — available to patients with various types of GI cancers. The number of active clinical trials available to GI cancer patients is continuing to increase. Visit rush.edu/GI-cancer-trials for a list of current GI cancer clinical trials available at Rush.
Many of these trials involve novel treatments for patients who have advanced disease. For instance, Rush is testing a new type of low-dose brachytherapy radiation device called CivaSheet in patients who have pancreatic cancer, advanced rectal tumors and intra-abdominal sarcomas.

When these tumors are located close to major blood vessels or other critical structures that cannot be surgically removed, there is a risk that some cancer cells will remain after surgery. In the trial, surgeons place the CivaSheet, which is a piece of flexible mesh coated with high-dose radioisotope, in areas with suspected cancer before closing the incision. After delivering a potent radiation treatment to kill any remaining cancer cells, the mesh is bioabsorbed.

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**GI oncology requires a team approach because these patients often require multiple treatments, including surgery, radiation and systemic therapies.**

*Shikha Jain, MD*  
Medical Oncologist

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**Precision medicine for GI cancers**

In partnership with the biotechnology company Tempus, the GI cancer team is also launching clinical trials that use genomic sequencing to determine which patients will respond best to targeted therapies, chemotherapy and immunotherapies.

“There is much more to learn about what biomarkers predict response to targeted therapies and immunotherapies,” says *Ashiq Masood, MD*, director of GI medical oncology. “Some patients have known markers, but do not respond to the therapy. In other cases, patients who do not have the recognized markers respond to therapy.”

To get a better understanding of tumor markers, Rush plans to genomic sequence all advanced staged GI tumors. “We are trying to personalize medicine from an oncology standpoint and trying to treat all patients as unique individuals with their own tumor biology,” says medical oncologist *Audrey Kam, MD*.

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**Improving colorectal cancer screening**

The National Colorectal Cancer Roundtable set an “80 percent by 2018” goal to get 80 percent of adults age 50 and older screened for colorectal cancer. While nationwide data from 2018 is not yet available, 2015 data showed an additional 3.8 million older adults were screened for colon cancer in 2015 compared to 2013.

However, colon cancer experts agree that more progress is needed. Too many patients don’t get a colonoscopy, in part because the test is invasive, time-consuming, and expensive, according to gastroenterologist *Joshua Melson, MD, MPH*.

To identify how precision medicine and other innovative approaches might improve colon cancer screening, the American Gastroenterological Association (AGA) convened a consensus conference in 2018 with 21 physician experts, including Melson who served as a chair for the conference.

“The current approach of pushing colonoscopies on all patients has not quite worked,” Melson says. “We’re looking for ways to tailor screening to specific patient groups, taking into account biological markers and patient characteristics like being overweight.”

For instance, conference participants discussed using stool and blood tests to identify DNA and other markers linked to a higher risk of colon polyps. When these tests identify patients with a low risk, those individuals may need less frequent colonoscopies, while patients at high risk may need more frequent colonoscopies.

AGA also recognized the need to track patients who get stool and blood tests over time. “When stool tests are positive, do those patients get colonoscopies? If they don’t, then this approach is not helping them,” Melson says.

Rush physician-researchers are studying additional ways to improve colon cancer screening. As detailed in *Gastroenterology*, Rush was one of 12 hospitals in the United States and Europe to look at colon cancer risk in patients with very small polyps (1 to 5 mm) removed during colonoscopy. The study found small polyps that, upon pathology review, had high-risk features were not associated with increased large polyp growth. The study questions the need for pathology interpretation of high-risk features in these small polyps. “This research may lead to changes in how we risk stratify patients with very small polyps in terms of how soon they need another colonoscopy,” says Melson, a coauthor on the study.
Technology-driven innovations, leading-edge clinical trials and a committed approach to multidisciplinary care at Rush are helping to improve the outlook for patients diagnosed with lung cancer.

"In our multidisciplinary lung cancer clinic, we do a comprehensive review and evaluation of every case and relay our recommendations for a plan to the referring provider," says Marta Batus, MD, medical oncologist.

Early detection of lung cancer has always been key to better survival rates, and a shift toward more lung cancer screening has helped drive improvements. But according to Rush experts, new technology is speeding up the delivery of more effective treatments for lung cancers at all stages.

"I've been treating lung cancer for 44 years," says medical oncologist Philip Bonomi, MD, "and the last four years have been, by far, the most incredible in terms of exponential progress and patient outcomes."

**Precision medicine at work**

Since 2016, Rush has partnered with Tempus, a biotech company that gathers and analyzes tissue samples, genetic data and clinical data to help specialists create personalized treatment plans. With patient consent, Rush surgeons immediately send a sample of every excised lung tumor to Tempus, where it’s tested for 595 potential gene mutations that could be driving the cancer. The full genetic profile that Tempus sends back enables the Rush team to identify the treatment strategies best able to target that exact tumor.

"In the past, everyone received the same kind of treatment for a particular kind of cancer," says thoracic surgeon Christopher Seder, MD. "But every tumor has different drivers. Now, we can see how your adenocarcinoma is different from others and make better decisions about the drug that’s most likely to work on it."

Tempus also helps Rush identify clinical trials appropriate for each tumor and is using clinical data from the Rush electronic medical records system to build a powerful lung tumor database that complements Rush’s efforts to capture long-term outcomes of patients treated at Rush up to 10 years ago.

"This allows us to see if there’s a pattern to recurrence," says Michael Liptay, MD, chairperson of cardiovascular and thoracic surgery. "If a patient comes to us with a tumor blueprint that’s similar to one in the database, the information we already have will help us identify measures we can take now to head off recurrence down the road."
Organoids enable research on real, live tumors

Tempus’ modeling lab is also growing 3-D organoids, which are used at Rush to research precision lung cancer treatment. Organoids are reproductions of live tumor cells that mimic actual tumor behavior more closely than a single layer of cells in a dish. Researchers at Rush are studying the effectiveness of testing individual tumors’ responses to standard of care, targeted, off-label and combination therapies.

Seder recently received a $50,000 grant to conduct research into some fundamental questions about how organoids can help drive treatment choices.

Seder predicts this technology will enable him and his colleagues to quickly test potential therapies on a patient’s own organoid to see which will be most effective.

I’ve been treating lung cancer for 44 years, and the last four years have been, by far, the most incredible in terms of exponential progress and patient outcomes.

Philip Bonomi, MD
Medical Oncologist

National leaders in thoracic surgery

Rush’s thoracic surgery program has long been a national leader, with an emphasis on minimally invasive techniques for procedures such as lung resection, esophagectomy and mediastinal masses. The team performs more than 1,000 surgeries annually and specializes in minimally invasive video-assisted thoracoscopic surgery (VATS) lobectomies. More than 86 percent of lobectomies for stage I lung cancer at Rush are minimally invasive, compared to less than 60 percent nationally.

Minimally invasive procedures offer proven benefits for patients. Oncologic outcomes and long-term survival are equivalent to those achieved by open surgeries, but patients experience less pain and fewer complications and are able to return to normal activity much more quickly.

For the fifth consecutive year, Rush University Medical Center’s lobectomy program received the highest possible rating — three stars — from the Society of Thoracic Surgeons (STS). Only 12 programs in the country achieved this distinction.

Additionally, the International Association for the Study of Lung Cancer named Rush as one of just five worldwide recipients of the foundation’s inaugural Cancer Care Team Award for programs that provide the highest quality patient care.

Clinical trials zero in on lung cancer

As an academic medical center, Rush is committed to breaking new ground in treating lung cancer.

Some of the currently enrolling trials that are promising for lung cancer patients include the following:

- Testing immunotherapy after surgical resection
- Testing immunotherapy for ALK positive and EGFR mutation lung cancer patients that progressed after tyrosine kinase inhibitors
- A novel immunotherapy combination trial (CX-072) that is available to lung cancer patients with high tumor mutational burden.
- The CX-009 trial that offers a salvage treatment option for select patients with a novel antibody drug conjugate.

Mary Jo Fidler, MD, medical oncologist, is in the process of opening trials that test immunotherapies in the preoperative setting with and without radiation treatment. And radiation oncologist Gaurav Marwaha, MD, is developing a novel protocol for patients who have locally advanced non-small cell lung cancer, which incorporates a well-tolerated chemotherapy and radiation regimen and post-treatment immunotherapy.

Visit rush.edu/lung-cancer-trials for a complete list of current lung cancer clinical trials available at Rush.
SBRT for lung cancer

The stereotactic body radiation therapy (SBRT) program for lung cancer patients at Rush has treated more than 100 cases in just under two years. The program provides quality care to patients with early stage lung cancers who are either not surgical candidates or refuse surgery.

“Our quality and consistency have been the keys to our success, and our outcomes are phenomenal,” says Gaurav Marwaha, MD, radiation oncologist. “Our outcomes are comparable to surgery, with local tumor control rates at 90 to 95 percent over a five-year period, and the vast majority of our patients have little to no side effects.”

Lung cancer patients meet with a team of doctors, including thoracic surgeons, radiation oncologists and medical oncologists to best understand their treatment options. “We discuss the benefits and risks of surgery and SBRT, and we make a decision together with the patients on what’s best for them,” says Marwaha. “We’re all in the same room, at the same time. Rush has truly been a pioneer in this real-time, multidisciplinary, patient-centered decision-making approach.”

Marwaha and his team are starting to offer SBRT on a case-by-case basis to patients with oligometastatic disease. “This is very preliminary, but we’ve seen that SBRT may help some of these patients stay on other therapies that are working well for them and help them live more quality years.”

While more research is needed in this area, Marwaha notes that standards of care for treating lung cancer are rapidly changing and improving.

“Treating lung cancer now is vastly different, even from just a few years ago,” he says. “From a radiation standpoint, we’re getting better at understanding what we’re treating and minimizing radiation exposure to the body’s healthy tissues. We’re also learning more about radiation and the interaction with the immune system. Testing for various genomic factors in lung tumors helps us personalize our treatment, whether it’s determining radiation dose or even when not to treat at all. All of this translates directly into better patient experiences and better outcomes.”

Rush has truly been a pioneer in this real-time, multidisciplinary, patient-centered decision-making approach.

Gaurav Marwaha, MD
Radiation Oncologist

The Rush Lung Center

Excellent lung care at Rush happens in multiple departments, including thoracic surgery, pulmonology and critical care medicine.

In 2019, lung experts from these departments and others will come together in the new Rush Lung Center, which will offer comprehensive, patient-centered care for all forms of lung disease alongside cutting-edge research into new ways to prevent and treat lung disease.

Michael Liptay, MD, who will serve as the center’s director, envisions it as “a national destination for lung care that will help Rush build on our success treating lung cancer and apply it to other conditions,” such as emphysema, interstitial lung disease and lung failure.

Lung cancer screening, smoking cessation and patient education aimed at disease prevention will also be part of the center’s expanded programming across the system, along with support services and follow-up care for patients.
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; Davis Tabriz, MD; Jordan Tasse, MD

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

**Pathologists:** Ira Miller, MD; Vijaya Reddy, MD

**Pediatric and adult oncology nursing coordinators:** Ann Bernardi, RN; Patti Piesecki, APRN

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

**Pediatric palliative medicine specialist:** Rani Ganesan, MD

**Pediatric physician:** Laura Deon, MD

**Pediatric psychologist:** Katherine McLean, PhD

**Pediatric social worker:** Erika Owens, MSW

**Plastic and reconstructive specialists:** Amir Dorafshar, MD; Gordon Derman, MD; Deana Shenaq, MD

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

**Radiology:** Gregory White, MD; John Ebersole, MD; Mike Ralls, MD

**Surgical oncologist:** Cristina O’Donoghue, MD, MPH

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

**Neuro-oncologists:** Clement Pillai, MD; Joo Yon Nam, 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 surgeons:** Pete Batra, MD; Bobby Tajudeen, MD

**Pathologists:** Paolo Gattuso, MD; Ritu Ghai, MD; Sukriti Nag, MD; Xinhai (Robert) Zhang, MD

**Plastic and reconstructive surgeons:** Anuja Antony, MD, MPH; Amir Dorafshar, MD; Catherine Hertl, MD; Keith Hood, MD; Deana Shenaq, MD

**Radiation oncologists:** 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

**Breast surgeons:** Rosalina Alvarado, MD; Darius Francescatti, MD; Andrea Madrigano, MD; Cristina O’Donoghue, MD, MPH; Claudia Perez, DO

**Diagnostic radiologists:** Anne Cardwell, MD; Carol Corbridge, MD; Lavanya Chekuri, MD; Janice Dieschbourg, MD; Brandie Fagin, MD; Paula Grabler, MD; Anita Nagamine, 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; Amir Dorafshar, MD; Catherine Hertl, MD; Keith Hood, MD; Deana Shenaq, MD

**Radiation oncologists:** Parul Barry, 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 Heden, MD

**Endocrinologists:** Brian Kim, MD; Elizabeth McAninch, MD

**Medical oncologist:** Mary Jo Fidler, MD

**Otolaryngologist/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; 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: Anuradha Bhama, MD; Joanne Favuzza, DO; Dana Hayden, MD; Theodore Saclarides, MD

Gastroenterologists: Faraz Bishehsari, MD; Salina Lee, MD; Joshua Melson, MD, MPH

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

Interventional radiologists: Bulent Arslan, MD; Sreekumar Madassery, MD; David Tabriz, MD; Jordan Tasse, MD; Ulku Cenk Turba, MD

Medical oncologists: Shikha Jain, MD; Audrey Kam, MD; William Leslie, MD; Ashiq Masood, MD

Pathologists: Lin Cheng, MD; David Cimbaluk, MD; Shriram Jakate, MD; Ira Miller, MD, PhD

Plastic and reconstructive surgeons: Amir Dorafshar, MD; Keith Hood, MD; Deana Shenaq, MD

Radiation oncologists: Neilayan Sen, MD; Dian Wang, MD, PhD

Radiologists: Joy Sclamberg, MD; Gregory White, MD

Surgical oncologist: Sam Pappas, MD

Thoracic surgeons: Andrew Arndt, 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

Medical oncologists: Shikha Jain, MD; Timothy M. Kuzel, MD; John Showel, MD

Plastic and reconstructive surgeons: Amir Dorafshar, MD; Keith Hood, MD; Deana Shenaq, MD

Radiation oncologist: Dian Wang, MD, PhD

Urologists: Edward Cherullo, MD; Christopher Coogan, MD; Shahid Elkhal, MD; Lev Elterman, MD; Narendra Khare, MD; Laurence Levine, MD; Andrew Stephenson, MD, MBA; Srinivas Vourganti, MD

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

Gynecologic Cancers

Clinical Specialists

Gynecologic oncologists: Amina Ahmed, MD; Summer Dewdney, MD; Andras Ladanyi, MD; Jean-Marie Stephan, MD

Medical oncologist: Lydia Usha, MD

Pathologists: Pincas Bitterman, MD; Ritu Ghi, MD; Lei Yah, MD

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

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

Head and Neck Cancers

Clinical Specialists

Facial plastic and reconstructive surgeons: Peter Revenaugh, MD; Ryan Smith, MD

Medical oncologists: Mary Jo Fidler, MD; John Showel, MD

Neuroradiologists: Sumeet Dua, MD; Miral Jhaveri, MD

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

Pathologists: Paolo Gattuso, MD; Ritu Ghi, 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: Carolyn Jones, MD

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

Palliative medicine specialists: Jacqueline Cameron, MD; Elane Chen, MD; Jaime Lewis, MD; Sean O’Mahony, MB, BCh, BAO; Mei-Ean Yeow, MB, BCh

Pathologists: Ira Miller, MD, PhD; Nicholas Ward, MD

Radiologist: Amjad Ali, MD

Stem cell transplantation specialists: Sunita Nathan, MD; Celalettin Ustun, 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.

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; Bulent Arslan, MD; Jordan Tasse, MD; Ulku Cenk Turba, MD

Medical oncologists: Shikha Jain, MD; Audrey Kam, MD; William Leslie, MD; Ashiq Masood, MD

Plastic and reconstructive surgeons: Amir Dorafshar, MD; Keith Hood, MD; Deana Shenaq, 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:** Bulent Arslan, 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:** Paolo Gattuso, MD; Ritu Ghai, MD; Mark Pool, MD  
**Plastic and reconstructive surgeons:** Amir Dorafshar, MD; Keith Hood, MD; Deana Shenaq, 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; 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

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**Melanoma and Cutaneous Cancers**

**Clinical Specialists**

**Dermatologists:** Mitchell Bressack, MD; Kevin Cavanaugh, MD; Elizabeth Damstetter, MD; James Ertle, MD; Claudia Hernandez, MD; Faiyaaz Kalimullah, MD; Sheetal Mehta, MD; Marianne O'Donoghue, MD; Warren Piette, MD; Arthur Rhodes, MD  
**Dermatopathologist:** Vijaya Reddy, MD  
**Diagnostic radiologist:** Joy Sciamberg, MD  
**Head and neck surgeons:** Samer Al-Khudari, MD; Kerstin Stenson, MD  
**Medical oncologist:** Timothy M. Kuzel, MD  
**Neurosurgeon:** Lorenzo Muñoz, MD  
**Orthopedic oncologists:** Alan Blank, MD; Matthew Colman, MD; Steven Gitelis, MD  
**Pathologist:** Vijaya Reddy, MD  
**Plastic and reconstructive surgeons:** Anuja Antony, MD; Amir Dorafshar, MD; Catherine Hertl, MD; Keith Hood, MD; Peter Revenaugh, MD; Deana Shenaq, MD; Ryan Smith, MD  
**Radiation oncologist:** Parul Barry, 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

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**Pediatric Cancers**

**Clinical Specialists**

**Neuro-oncologists:** Clement Pillainayagam, MD; Joo Yeon Nam, MD  
**Orthopedic oncologists:** Alan Blank, MD; Matthew Colman, MD; 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 surgeons:** Amir Dorafshar, MD; Christina Tragos, MD  
**Radiation oncologist:** Aidnag Diaz, MD, MPH

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**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  
**Plastic and reconstructive surgeons:** Amir Dorafshar, MD; Keith Hood, MD; Deana Shenaq, MD  
**Radiation oncologists:** Aidnag Diaz, MD; Dian Wang, MD, PhD

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

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**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; Ping Miller, MD; Mei-Ean Yeow, MB, BCh  
**Psychosocial oncology specialists:** Rebecca Hunter, PhD; Sarah Thilges, PhD; Vanessa Tirone, PhD; Allison Gaffey, PhD  
**Chinese medicine practitioner:** Angela Johnson, Dipl. OM, MSTOM, MPH, Lac  
**Massage therapists:** Michelle Haugen; Tanya Tucci
## Cancer Registry Report 2018

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<th>Primary Site</th>
<th>Total</th>
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<th>Non-Analytic</th>
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<td>Rectum &amp; Rectosigmoid Junction</td>
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<td><strong>SKIN (excluding basal &amp; squamous cell carcinomas)</strong></td>
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<td>Kidney &amp; Renal Pelvis</td>
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<td><strong>EYE &amp; ORBIT</strong></td>
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<td>Cranial Nerves &amp; Other Nervous Systems</td>
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<tr>
<td><strong>MISCELLANEOUS</strong></td>
<td>83</td>
<td>38</td>
<td>45</td>
<td>36</td>
<td>47</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>3,403</td>
<td>2,713</td>
<td>690</td>
<td>1,519</td>
<td>1,884</td>
</tr>
</tbody>
</table>
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.