Neurosurgery
Head and Neck Surgery
Gynecologic Oncology and Reproductive Medicine
Breast Surgical Oncology
Orthopaedic Oncology
Thoracic and Cardiovascular Surgery
Plastic Surgery
Urology

Surgical Outcomes Fiscal Year 2015
Our mission is to advance oncologic surgery in the nation and the world through safe, high-quality, multidisciplinary patient care, research and education.

Our vision is to be the most transformative oncologic surgery program in the world.

#endcancer #oncsurgery
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It is an honor to present the inaugural Division of Surgery Surgical Outcomes Report for Fiscal Year 2015. The report stems from our mission to advance oncologic surgery in the nation and the world through safe, high-quality, multidisciplinary patient care. It specifically demonstrates the breadth of cancer care provided by each of our nine departments. Through innovation and the dedication of our providers, we have simultaneously achieved exceptionally low mortality rates and high clinical volumes.

In FY15, we performed 19,649 operations, making us the highest volume National Cancer Institute (NCI)-designated comprehensive cancer center individually listed in the University HealthSystem Consortium (UHC) clinical database. These volumes represent the culmination of a two decade-long continuous quality improvement program that was recently noted in Critical Care Medicine to have achieved a 57% less than expected hospital-adjusted mortality rate and a significant reduction in ICU utilization.

In this report, you will find more detailed data on our surgical outcomes and volumes from each of our nine departments. Notably, we performed the most craniotomies, breast reconstructions, femur tumor resections, major hepatectomies and lung lobectomies of the NCI-designated comprehensive cancer centers individually listed in UHC in FY15. Our year was also highlighted by a select team of our plastic surgeons and doctors from Houston Methodist Hospital performing the first ever skull and scalp transplant, with the patient also simultaneously receiving a kidney and pancreas transplant.

In each department’s section, you will learn about the care provided, the care providers, innovative procedures developed and hear from a patient about his or her cancer journey.

You will learn about our advances in minimally invasive surgery through a division-wide program called MINTOS. Utilizing new techniques and robotics, our surgeons perform operations that lead to shorter hospital stays, quicker recovery times and better cosmetic outcomes for patients.

Within the institution, our surgeons lead several multidisciplinary treatment programs, including the Skull Base Tumor Program, which has tripled its number of faculty, patient visits and procedures during the last decade. As well, our Enhanced Surgical Recovery Program, the Urinary Tract and Pelvic Reconstruction Program, and the Learning Cancer Outcomes Research Program are each distinctively optimizing perioperative and functional results for cancer patients.

Each section of the report also profiles researchers that are changing cancer care paradigms, like the new Glioblastoma Moon Shot, which is discovering immune therapies and vaccines for brain cancer. Our surgeon-scientists and co-investigators in their respective labs are also studying genetic and targeted cancer therapies, the microenvironment of tumors and the development of novel flaps for tissue reconstruction, just to name a few.

Finally, our Surgical Outcomes Report informs you about the education programs we offer in each department. In total, we support 15 surgical fellowships, which have accumulated nearly 1,000 graduates.

Our vision is to be the most transformative oncologic surgery program in the world. To do so, we are expanding our network and providing advanced surgical care in multiple Houston-area locations, including Bay Area, Katy, Memorial City, Sugar Land and The Woodlands, and with national partners in Arizona, Florida and New Jersey.

As Division Head, I am particularly proud of the iCARE values that our faculty and teams demonstrate. Surgical care of cancer patients can be challenging for all involved. With this report we renew our commitment to our partners and patients to provide the most compassionate and expert care possible.

We hope you find our report as interesting, informative and inspiring as we do.

Stephen Swisher, M.D.
Head, Division of Surgery
@sgswisher
**By-the-numbers**

**Total case volumes**

The above graph shows FY15 data for the top 25 National Cancer Institute (NCI)-designated comprehensive cancer centers individually listed in the University HealthSystem Consortium (UHC) clinical database.

**FY15 total surgery hours**

69,988

**FY15 cases by service**

- Breast Surgical Oncology: 9%
- Gynecologic Oncology: 6%
- Head and Neck Surgery: 14%
- Neurosurgery: 6%
- Orthopaedic Oncology: 4%
- Plastic Surgery: 11%
- Surgical Oncology: 26%
- Thoracic and Cardiovascular Surgery: 8%
- Urology: 16%
By-the-numbers

Robotic case volumes

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Research funding activity

- FY14: $12.9 million* (includes annual funding from the Cancer Prevention and Research Institute of Texas (CPRIT))
- FY15: $26 million*

- Federal training grants: 2
- U cooperative agreements: 2
- Peer reviewed grants & contract/subcontracts: 44
- Peer reviewed non-federal grants: 30
- Peer reviewed federal grants: 113
- NCI Specialized Programs of Research Excellence (SPORE) grants: 4
Moon Shots

The Moon Shots Program at MD Anderson is an unprecedented effort to dramatically accelerate the pace of converting scientific discoveries into clinical advances that reduce cancer deaths.

The program comprises 12 multidisciplinary moon shot teams representing these cancers:

- Breast and ovarian cancers (Surgery leader: Anil Sood, M.D., professor of Gynecological Oncology and Reproductive Medicine)
- B-cell lymphoma
- Chronic lymphocytic leukemia
- Colorectal cancer
- Glioblastoma (Surgery leaders: Amy Heimberger, M.D., and Frederick Lang, M.D., professors of Neurosurgery)
- High-risk multiple myeloma
- Human papillomavirus-related cancers (Surgery leaders: Erich Sturgis, M.D., professor of Head and Neck Surgery; Lois Ramondetta, M.D., professor of Gynecologic Oncology and Reproductive Medicine; and Kathleen Schmeler, M.D., associate professor of Gynecologic Oncology and Reproductive Medicine)
- Lung cancer (Surgery leader: Stephen Swisher, M.D., head of the Division of Surgery)
- Melanoma (Surgery leader: Jeffrey E. Gershenwald, M.D., professor of Surgical Oncology)
- Myelodysplastic syndromes/Acute myeloid leukemia
- Pancreatic cancer (Surgery leader: Jason Fleming, M.D., professor of Surgical Oncology)
- Prostate cancer

Each team is pursuing innovative projects prioritized for greatest patient impact. For example, an early success in ovarian cancer is the development of a new surgical protocol, called the Anderson Algorithm. It allows for an individualized approach to surgery that has led to better results for patients. (Read each department’s research for more highlights.)

Implementation of the Moon Shots Program began with six moon shots in February 2013. Six more moon shots were chosen in Fiscal Year 2015. The ultimate goal is to apply knowledge gained from the program to all cancers.

Learn more about our moon shots, click here.
A unique program at MD Anderson develops and integrates advanced surgical technologies and techniques to improve patient care.

By Brittany Cordeiro

In 2006, the Division of Surgery launched a distinctive program called MINTOS, Minimally Invasive New Technology in Oncologic Surgery, to enhance the surgical care of cancer patients.

The program started with one robotic machine and four urology surgeons at the helm, led by Surena Matin, M.D., medical director, MINTOS. “We had no precedent or mold to follow, so we forged our own way,” Matin says.

Part of the early work for MINTOS included assessing the needs of the Division of Surgery and creating a program that followed the MD Anderson multidisciplinary approach to cancer care. The result was developing one platform for all surgical specialties to operate, educate and conduct research.

Ten years later, MINTOS includes four robotic machines and 40 surgeons across six specialties: urology, gynecologic oncology, plastic surgery, thoracic surgery, head and neck surgery, and surgical oncology; and all areas are transforming oncologic surgery.

Tailoring the surgical approach

MD Anderson surgeons use the da Vinci® robotic surgery system, which has four robotic arms that can be equipped with very small surgical tools and 3-D cameras. A surgeon makes small cuts to insert the tools, and uses a computer to control the robotic arms and make precise movements. (da Vinci® requires direct input and can’t be programmed to operate without human intervention.)

“The robotic approach allows us to remove cancers in areas that traditionally would require an open and invasive surgery to access, or in areas that surgically we could not access well,” says Neil Gross, M.D., associate professor of Head and Neck Surgery.

Fewer open and invasive surgeries with large incisions means shorter hospital stays, quicker recovery times and better cosmetics for patients.

Matin says this is personalized medicine for cancer surgeons. “Minimally invasive tools allow us to tailor the surgical procedure for the patient’s benefit, so not every patient has to have a traditional surgery,” he says.

Candidates for robotic-assisted surgery often include patients undergoing prostatectomy, nephrectomy, hysterectomy, thoracic procedures, colectomy and head and neck surgery.

MD Anderson surgeons also hold an unparalleled advantage in robotic-assisted surgery for cancer patients: they are technically skilled and experts in the disease.

Using robotics across surgical specialties

Urologic surgeons are pioneers of robotic-assisted minimally invasive surgery at MD Anderson. They conduct over 70% of the robotic procedures.
Led by John Davis, M.D., associate professor of Urology, the urology team has performed nearly 3,800 robotic operations since 2009.

The most common procedure is a robotic prostatectomy for prostate cancer. MD Anderson urologic surgeons are skilled at nerve-sparing techniques that may help men keep urinary and sexual function.

Further for a patient's benefit, a robotic prostatectomy results in fewer complications and less blood loss and urinary tract scarring.

Urologic surgeons are able to perform robotic retroperitoneal lymphadenectomy with equal quality as open surgery. This procedure removes retroperitoneal lymph nodes in patients with testicular cancer. A robotic approach is advantageous for patients because it reduces hospital length of stay and postoperative pain.

In head and neck surgery, Gross is conducting transoral robotic operations (TORS) for human papillomavirus (HPV)-associated oropharyngeal cancers. These cancers are commonly found on the tonsils and the base of the tongue.

TORS, a minimally invasive approach, is a significant change since traditional surgery for oropharyngeal cancers requires opening the jaw. "I can now use instruments smaller than my fingers to operate, and the outcome is better quality of life for the patient," Gross says.

Gross is studying TORS versus non-surgical treatment options for cancer patients and investigating new surgical techniques for HPV-related cancers. (Read more about his research on page 24.)
Another surgical specialty using the robotics platform is reconstructive plastic surgery, pioneered by Jesse Selber, M.D., associate professor of Plastic Surgery. Selber uses the robotics platform and innovative microsurgical techniques to harvest and transplant tissue to create cosmetically-pleasing and functional flaps.

The outcome for patients is less scarring and improved function compared to the traditional surgical approach. Selber performs reconstructions in all body areas, but mainly in head and neck, and breast. (Read more about Selber’s work on page 36.)

Using robotics for head and neck surgery, and reconstructive plastic surgery is still emerging, as both fields adopted the technology about five years ago. “A lot of what we do is pretty unusual and unique, and we’re the only ones in the world doing it,” Selber says.

MD Anderson oncologic surgeons are also leaders in advanced minimally invasive robotic approaches for rectal cancer, led by George Chang, M.D., director of clinical operations, MINTOS.

Chang, professor of Surgical Oncology, uses robotics for complex diseases traditionally treated by an open surgical approach. As a result, patients experience improved recovery and quicker return to their normal routines or to their next phases of multidisciplinary treatment.

Training surgeons on microsurgical tools

Investing in robotic machines and new microsurgical technologies means ensuring surgeons know how to use them. Pamela Soliman, M.D., and Brian Bednarski, M.D., co-direct the MINTOS education program, which hosts an annual Education and Laboratory Course offered to MD Anderson surgical trainees, fellows and faculty.

Course leaders teach the fundamental principles of advanced laparoscopic and robotic techniques, discuss and demonstrate the latest tools, and direct hands-on training courses in the Microsurgical and Endoscopic Center for Clinical Application (MECCA) laboratory. MECCA hosts 17 integrated workstations that simulate the operating room.

“We are the first division-wide program at MD Anderson to offer this type of education to all trainees,” Matin says. Due to the success of the course, MINTOS education leaders recently started offering a highly regarded robotic cadaver course.

Advancing surgery through research

MINTOS’ third area of focus is research on minimally invasive and robotic surgical advances. Prominent projects include studying fluorescent imaging for robotic and laparoscopic surgery, and using telemedicine throughout the perioperative experience – before, during and after surgery.

Soliman, associate professor of Gynecologic Oncology and Reproductive Medicine, is leading research on the use of fluorescent imaging in robotic and laparoscopic surgery to help map diseased lymph nodes in patients with endometrial and cervical cancer.

Known as the firefly technique, fluorescent imaging in robotic surgery allows surgeons to perform sentinel lymph node biopsies (SLNB) without using radioactive materials. (SLNB is a procedure to identify, remove and examine the first few lymph nodes where cancer cells are most likely to spread from a primary tumor.)
“Early studies in endometrial cancer suggest that fluorescent imaging may have a higher sensitivity to identify sentinel lymph nodes compared to other mapping techniques,” Soliman says. Ultimately, she believes that SLNB may replace a lymphadenectomy – the current standard of care to remove lymph nodes – in women with endometrial cancer. “This could potentially decrease the morbidity of surgical staging,” Soliman says. (Read more on her research on page 20.)

A second novel project is the MINTOS Perioperative Telemedicine initiative. It seeks to integrate new information and communication technologies to improve surgical care, and access to it.

Led by Matin and Matthew Katz, M.D., associate professor of Surgical Oncology, in collaboration with John Papadopoulos, M.D., assistant professor of Urology, and Bednarski, assistant professor of Surgical Oncology, the project is harnessing mobile technology (e.g., iPads) to efficiently deliver care to patients and to extend care to underserved and rural communities.

“We basically want to supplant the need for outpatient visits at the hospital with visits at home, using technology that most people already have,” Katz says. It also gives patients a direct line to their health care provider.

The project, in its third year, is supported by an AT&T Foundation grant. It includes two sub-projects: teledischarge and telerounding.

Teledischarge

The teledischarge project follows routine post-surgical discharge procedures, but instead of patients returning to the hospital for follow-ups, the health care team schedules teleconferences (audio and real-time video). Patients also can schedule video conferences at any time they would otherwise phone the health care team for assistance.

The audiovisual communication closely resembles standard face-to-face clinical interactions, Katz says. So doctors can gather information from wounds and drains, and assess a patient’s anxiety or confusion.
The goals of teledischarge include:

- Improving patient satisfaction
- Improving critical information transfer and processes
- Reducing the rate and severity of short-term, post-hospitalization complications
- Reducing costs of postoperative care

“Overall, we hope to increase our quality of care by incorporating mobile technologies, and so far, it's proven to be effective,” Katz says.

An initial patient satisfaction survey showed that most agreed or strongly agreed that their postoperative care was better because of video conferencing, that they could easily communicate with their doctor and even communicate better by video conference than by phone. Patients also agreed that video conferencing with their doctor was an important part of their recovery and that their health information was secure using technology.

The next steps include using the teledischarge project data to standardize discharge practices across specialties and conduct subsequent studies on the specific role of postoperative telemedicine technologies.

Telerounding

The telerounding project uses telepresence – a real-time audiovisual connection on an iPad – to evaluate and manage postoperative inpatients. This is instead of a health care practitioner visiting a patient's bedside to do an assessment.

In 2015, the perioperative telemedicine project team conducted a televideorounding pilot study, in which 40 patients who had minimally invasive urologic procedures received a combination of practitioner bedside rounding and televideorounding.

Upon discharge, patients on the study were given a questionnaire to evaluate their satisfaction with their care and telerounding experience. Results showed most patients agreed that their hospital care was better because of telerounding, that telerounding should be a regular part of care in the hospital and that they could easily communicate with their doctor using telerounding.

“Anytime you can leverage technology and improve communication, you have an opportunity to improve patient safety and satisfaction,” Papadopoulos says.

The pilot study also concluded that mobile technology with secure and encrypted videoconferencing apps can overcome the cost and personal health information compliance barriers. Researchers are planning a follow-up study.

The perioperative telemedicine researchers have also worked with a software company to develop a care pathway program that starts preoperatively to help patients understand the next steps in their care.

The software will be loaded on an iPad, for example, and programmed for the patient. “It could notify a patient that it's time to take his medication or he's due for an X-ray,” Katz says.
A new study of the care pathway program is expected to start in 2016. “Ultimately, we want to help improve communications and the patient’s life,” Katz says.

The next 10 years

MINTOS education and research efforts are donor- and industry-funded.

“We could not do what we do without the funding support of our patients and other donors. They are truly outstanding to our cause,” Matin says. Such donations enabled the program to start sponsoring research grants. The first two projects will start in 2016.

For the program’s clinical efforts, MD Anderson has purchased more than $12 million in surgical technology. This has allowed surgeons to continually expand their robotic case volume. In Fiscal Year 2015, MINTOS surgeons performed 1,174 robotic surgeries, almost twice the volume since the program’s inception.

“In 10 years we will do minimally invasive surgery even better, with less pain and smaller scars,” Matin says. “We’ll use navigation technology and advanced imaging to peer beyond the visible spectrum, and precisely discern the healthy tissue we want to leave untouched and the diseased tissue we want to excise.”
A new approach to surgical care at MD Anderson is optimizing perioperative outcomes for cancer patients.

By Thomas Aloia, M.D.

The perioperative period (before, during and after surgery) is associated with intense emotional and physical stress from pain, inflammation, immune suppression, rapid depletion of liver glycogen stores, negative nitrogen balance, insulin resistance and an environment for proangiogenesis. While many of these responses to surgical intervention are important for healing and recovery of function after surgery, if left uncontrolled they may also have significant negative impacts on long-term outcomes, particularly for cancer patients.

In 2013, as part of their ongoing quality improvement efforts, the Division of Anesthesiology and Critical Care and the Division of Surgery at MD Anderson began implementing the principles of optimal perioperative care pathways into clinical practice. These protocols are based on evidence for four principles of care:

- Avoiding long periods of fasting
- Reducing patient anxiety through education and expectation setting
- Minimizing narcotic use
- Using goal-directed fluid therapy

These principles provide the foundation for Enhanced Surgical Recovery Programs (ESRPs) in eleven procedure types, including: liver, bladder, breast, gynecologic, thoracic, brain, head and neck, pancreatic, spine, colorectal and HIPEC. The mission of these programs is to implement proven and emerging innovations in perioperative care to deliver safe, effective and value-based cancer care for an increasing number of patients.

Progress to date

In 2015, nearly 800 patients received care at MD Anderson using enhanced recovery regimens. The result was at least a 25% reduction in median length of hospital stay with stable readmission rates. Several of the programs have also reported reduced rates of perioperative complications. Most importantly, ESRPs have observed better symptom control and improved recovery profiles, allowing more patients to return to their intended oncologic therapies.

We think there is a real possibility that the environment and interventions we do at the time of surgical resection of cancer can significantly lower the risk of recurrence and prolong life.

There is clear evidence that patients undergoing care on enhanced recovery pathways benefit from reduced symptom burden, improved functionality and timely return to adjuvant therapies when integrated into their care plan. Extrapolating these initial results to the entire surgical practice at MD Anderson would make it possible to gain an estimated 8,000 inpatient hospital days.
Leading research

Each of the ESRP teams have active research programs, which are publishing novel data on outcomes, comparative effectiveness and cost effectiveness in health care delivery research journals. Also, many of the ESRP teams are launching randomized clinical trials to test various aspects of the protocols. MD Anderson is uniquely positioned for these clinical trials, as we are the leader in cancer-focused ESRPs.

Enhanced Recovery Program

Surgery Leaders

Liver Surgery .................................. Thomas Aloia, M.D.
Thoracic Surgery ................................ David Rice, M.D.
.................................................. Reza Mehran, M.D.
Gynecologic Surgery ........................ Pedro Ramirez, M.D.
.................................................. Larissa Meyer, M.D.
Colorectal Surgery ............................ Miguel Rodriguez-Bigas, M.D.
.................................................. Brian Bednarski, M.D.
.................................................. Craig Messick, M.D.
Pancreatic Surgery ............................ Matthew Katz, M.D.
.................................................. Jason Fleming, M.D.
Bladder Surgery ................................ Jay Shah, M.D.
Spine Surgery .................................. Claudio Tatsui, M.D.
.................................................. Laurence Rhines, M.D.
HIPEC Surgery ............................... Keith Fournier, M.D.
.................................................. Andrea Hayes-Jordan, M.D.
Breast Surgery ............................... Makesha Miggins, M.D.
Head and Neck Surgery ..................... Carol Lewis, M.D.
Brain Surgery ............................... TBD
Breast Surgical Oncology

Overview

Breast cancer is the most common cancer in women, but can also affect men. Treatment is a multidisciplinary effort, with surgery being the most common intervention.

The Department of Breast Surgical Oncology at MD Anderson specializes in the surgical treatment of benign and malignant breast disease. Doctors and staff in the department collaborate closely with colleagues in Breast Medical Oncology, Breast Pathology, Breast Radiation Oncology, Diagnostic Radiology, Genetics, Cancer Prevention and Screening, and Plastic and Reconstructive Surgery.

“We have a unique, multi-team clinic in the Breast Center. Instead of seeing a medical oncologist one day, radiation oncologist the next day and surgeon the day after that, a patient meets the entire care team on the same day to develop a personalized treatment plan,” says Kelly Hunt, M.D., chair of Breast Surgical Oncology.

“This approach shortens the time it takes to get a patient’s care plan in place and started by almost 30%,” Hunt says. It also helps identify patients for clinical trials or research studies that test new treatments. The multi-team clinic has a 64% greater rate of clinical trial participation than standard clinical practices where patients see multiple doctors on different days.

Breast Surgical Oncology has 24 surgeons who provide exceptional surgical care for patients with breast cancer and other diseases of the breast. Last year, they saw 2,186 new patients and consults, and performed 1,682 operations in the Nellie B. Connally Breast Center at MD Anderson. They also see patients...
at MD Anderson in the Bay Area, Katy, Memorial City, Sugar Land and The Woodlands. The team performs multiple procedures including:

- Mastectomy
- Tissue-sparing breast surgery, including skin-sparing, nipple-sparing and partial mastectomy
- Axillary lymph node assessment, including sentinel lymph node biopsy techniques

**Highlights**

Breast surgeons at MD Anderson are advancing the field. One of the key innovations the program utilizes is sentinel lymph node surgery.

Axillary lymph node assessment is a core component of breast cancer care that provides staging information and removal of lymph nodes involved by cancer. While essential for care, traditional axillary surgery can cause lymphedema, a debilitating condition that includes arm swelling. Axillary lymph node surgery can also lead to numbness and nerve damage.

Doctors in Breast Surgical Oncology were among the first to utilize sentinel lymph node surgery. This is a less radical procedure that aims to remove the first few nodes that accept lymphatic drainage from the primary breast tumor.

“Sentinel node surgery provides accurate staging and focuses on the nodes most likely to contain metastatic disease from the primary tumor. This limits the surgery to what needs to be removed and leaves other uninvolved (healthy nodes) intact,” Hunt says. “This improves a patient's quality of life because we are minimizing side effects like lymphedema.” (Read research on next page to learn more.)

Another advanced surgical technique pioneered at MD Anderson is skin- and nipple-sparing mastectomy. During this type of mastectomy, the surgeon removes the breast tumor while saving the breast skin, nipple and areola (darker skin around the nipple). For eligible patients, this technique facilitates reconstruction with improved cosmetic outcomes.

The breast surgical team is also a leader in minimally invasive approaches for localizing small breast tumors and lymph nodes. They have used radioactive seed localization for breast lesions too small to be seen or felt during surgery and for localizing small deposits of metastatic disease in the axillary lymph nodes. With these techniques, a tiny radioactive seed is placed in the abnormal breast tissue or lymph node by the radiologist usually on the day prior to surgery. In the operating room, a probe is used to locate the seed and target the removal of the abnormal tissue, leaving normal tissue intact.

“With breast cancer survival rates getting better and better, our work is moving beyond extensive surgical procedures to developing surgical techniques that improve the general well-being of the patient after surgery,” Hunt says.

**Education**

MD Anderson created a multidisciplinary Breast Surgical Oncology Fellowship program in 2002. Henry Kuerer, M.D., Ph.D., professor of Breast Surgical Oncology, directs the program, which has had 41 graduates. The program admits four top trainees per year, making it the largest of 52 programs in the United States. It is one of the most sought-after training programs, with an average of 75 applicants each year.
Research

Researchers in Breast Surgical Oncology are constantly seeking new and better ways to treat breast cancer.

Hunt is leading research on less invasive surgical approaches to breast cancer.

“It has been hard for physicians and patients to accept that you’re going to do something less radical and still get the same results,” Hunt says.

As part of a national trial, she recently published results of a study of almost 900 patients with early (stage II) breast cancer. This phase III trial enrolled patients who had breast-conserving therapy (lumpectomy with radiation) and positive sentinel lymph node biopsy to either surgical observation or complete axillary lymph node dissection.

The results showed no significant difference in survival between women undergoing sentinel node surgery alone versus complete axillary node dissection. The study concluded that, in this patient group, removing the rest of the axillary lymph nodes doesn’t improve survival, but it can increase morbidity.

“You can do less surgery and have the same cancer outcomes. This has caused a change of practice across the world, and now we’re looking at the same paradigm in women with advanced breast cancer,” Hunt says.

Surgeons in Breast Surgical Oncology are also on the cutting edge of non-surgical therapies. Elizabeth Mittendorf, M.D., Ph.D., associate professor of Breast Surgical Oncology, is studying vaccines that can stimulate an immune response in breast cancer patients who are disease-free, but are at high risk for recurrence.

Mittendorf is studying several vaccines; the one furthest along is NeuVax. It incorporates the E75 peptide, which is derived from the tumor antigen HER2, combined with a substance called GM-CSF.

NeuVax is being evaluated in an international phase III clinical trial led by Mittendorf. The trial randomized 750 patients to vaccine versus placebo to determine if vaccination reduces recurrence rates. Mittendorf is also leading a phase II trial evaluating NeuVax in combination with trastuzumab, a second immunotherapeutic drug that targets HER2.

“In previous studies we have seen no recurrences in almost 50 patients who were vaccinated after receiving trastuzumab,” Mittendorf says. This trial builds on her work showing trastuzumab can enhance the response to vaccination and a clinical trial showing the combination of the two therapies to be safe.

Mittendorf’s research could have a profound impact on breast cancer patients who undergo rigorous therapies and still face the risk of recurrence. “Our early trials suggest that vaccines that can stimulate a CD8 T cell (type of white blood cell that kills cancer or infected cells) response can decrease the risk of recurrence by about 50%,” she says.
Breast Surgical Oncology volumes and outcomes

Multi-team clinic visits for newly diagnosed patients

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Partial mastectomies with oncoplastic reconstruction*

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Breast surgery cases

main hospital & Houston-area locations*

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Skin-sparing and nipple-sparing surgery case volumes

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<td>21</td>
<td>60</td>
<td>71</td>
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</tbody>
</table>

*MD Anderson’s main hospital is in Houston, in the Texas Medical Center. Houston-area locations include MD Anderson in the Bay Area, Katy, Memorial City, Sugar Land and The Woodlands.
Overview

Five main types of cancer, collectively referred to as gynecologic cancers, affect a woman’s reproductive organs. Risk for these cancers increases with age, and some have a genetic basis.

Providing world-class comprehensive care of women with gynecologic cancers is the focus of the Department of Gynecologic Oncology and Reproductive Medicine at MD Anderson. It treats:

- Ovarian cancer
- Uterine cancer
- Cervical cancer
- Vaginal cancer
- Vulva cancer

The department treats these cancers and other gynecologic diseases with novel therapeutics and advanced surgical techniques to ensure the best outcomes for patients. Its treatments include:

- Complex ovarian cancer debulking surgery
- Sentinel node evaluation for uterine, cervix and vulvar cancers
- Fertility-sparing techniques, including radical trachelectomy, a highly specialized procedure that may help some women keep the ability to have children
- Minimally invasive surgeries, including robotic and laparoscopic radical hysterectomy
- Enhanced recovery protocols
- Chemotherapy, biologic and immunotherapy
“Each patient is unique and deserves targeted care, which often requires a multidisciplinary approach. We are unique as a surgery department because we also provide chemotherapy,” says Karen Lu, M.D., chair of Gynecologic Oncology and Reproductive Medicine.

The department’s team of 26 doctors provide expert care to patients in the Laura Lee Blanton Gynecologic Oncology Center at MD Anderson. In Fiscal Year 2015, they attended 3,516 new patient visits and consultations, and performed 1,201 operations.

Doctors also see patients at MD Anderson in the Bay Area, Katy, Memorial City, Sugar Land and The Woodlands, and Texas Woman’s Hospital and Lyndon B. Johnson Hospital in Houston. The department’s team includes 14 research faculty, making it the country’s largest gynecologic oncology department.

Gynecologic Oncology and Reproductive Medicine also has services to help prevent gynecologic cancers. These include a colposcopy clinic for pre-invasive cervix, vaginal and vulvar disease, and a high risk clinic for women at inherited risk for ovarian and endometrial cancer. It also has an Oncofertility Clinic to give men and women options to preserve fertility before cancer treatment.

Gynecologic Oncology and Reproductive Medicine’s exceptional patient care earned a No. 7 national ranking for adult gynecology in U.S. News & World Report’s 2015-2016 Best Hospitals survey.

Highlights
Notably, Gynecologic Oncology and Reproductive Medicine experts developed an individualized approach to surgery that has led to better outcomes for patients. The approach was developed under the MD Anderson Breast and Ovarian Cancer Moon Shot Program (see page 5) and addressed a key issue for women with advanced ovarian cancer: whether surgery or chemotherapy should come first as frontline treatment.

The new surgical protocol is named the Anderson Algorithm. Since applying it, surgeons have achieved complete removal of all visible tumor in more than 80% of patients undergoing upfront surgery. For those receiving chemotherapy first, complete removal has been achieved in 76% of patients, up from 60%.

In 2014, the department initiated the Enhanced Surgical Recovery Program (ESRP) in Gynecologic Surgery to impact patient outcomes before, during and after an operation (see page 12).

Postoperatively, the program has changed traditional practice by encouraging early feeding, early mobilization, timely removal of tubes and drains, and use of innovative pain medication protocols. The results are shorter hospital stays, fewer complications after surgery, reduced overall health care costs and improved patient satisfaction, says Pedro Ramirez, M.D., one of the leaders of the ESRP in Gynecologic Surgery and professor of Gynecologic Oncology and Reproductive Medicine.

Education
The four-year Fellowship in Gynecologic Oncology, which began in the 1950s, is the largest such program in the United States. Michael Frumovitz, M.D., associate professor of Gynecologic Oncology and Reproductive Medicine, directs the program, which has had 170 graduates. Three physicians are chosen each year to complete the clinical and research training. The department has a T32 grant from the National Cancer Institute (NCI) to support the research and training during the first two years of the fellowship. The department also has the Felix Rutledge Fellowship, a one-month elective rotation for third-year obstetrics and gynecology residents.

Less invasive surgery gets a triathlete back on track
By Brittany Cordeiro
When triathlete Maria Lea De Jesus was diagnosed with early stage cervical cancer in 2014 after a routine Pap test, her fear was being sidelined from her sport.

“I run a lot. I just can’t sit still,” De Jesus, 49, says. She’s completed over 10 marathons — a 26.2-mile run — and an Ironman triathlon — a 2.4-mile swim, followed by a 112-mile bike ride and a 26.2-mile run.

De Jesus works as an ultrasound technologist at MD Anderson. A co-worker recommended she see Kathleen Schmeler, M.D., associate professor of Gynecologic Oncology and Reproductive Medicine, for her care.

De Jesus had a simple hysterectomy as part of Schmeler’s ConCerv trial, an innovative study of less radical surgery for cervical cancer. The approach removes the uterus and cervix as well as surrounding lymph nodes. It’s an alternative to the standard radical hysterectomy, which in addition removes surrounding parametrial tissue and the top part of the vagina.

The less invasive procedure has fewer side effects and helped De Jesus get back to work and training sooner, Schmeler says. De Jesus completed a half-marathon mountain run in Canada and the Ironman 70.3 Austin less than six months post-surgery.

Her advice to other women: don’t skip your Pap test. Catching cancer early, De Jesus says, allowed her to have a simple procedure, fast recovery and go on with her life cancer-free.
Research

Gynecologic Oncology and Reproductive Medicine physicians are international leaders focused on providing exceptional patient care while linking basic science with clinical and translational research to develop the next-generation of innovative approaches to treatment and prevention of gynecologic cancers.

Investigators in Gynecologic Oncology and Reproductive Medicine have been awarded two Specialized Programs of Research Excellence, or SPORE, grants from the NCI. One grant focuses on ovarian cancer and the other grant focuses on endometrial cancer. These large research grants aim to understand the molecular mechanisms underlying these cancers and then rapidly translate this new knowledge into clinical trials for improved treatment or prevention strategies within five years.

The Endometrial SPORE team has made significant advances in novel therapeutics and improved prevention strategies. These include an innovative treatment that delivers siRNA, a synthetic molecule, using a nanoliposome formulation; studying the poly (ADP-ribose) polymerase (PARP) inhibitor as a targeted therapy; and identification of the molecular mechanisms that link obesity with increased endometrial cancer risk.

The Ovarian SPORE team has led the field in improving early detection methods and targeted therapeutics for ovarian cancer subtypes. Early detection studies have resulted in expanded diagnostic markers and development of “point of service” screening assays. Exciting clinical studies of anti-angiogenic treatments have shown great promise, as have studies for personalized treatment of low-grade and high-grade ovarian cancers.

Within the innovative surgery team, Pamela Soliman, M.D., associate professor of Gynecologic Oncology and Reproductive Medicine, is studying sentinel lymph node (SLN) surgery for women with high-risk endometrial cancers. The less invasive procedure could serve as a staging tool for endometrial cancers, decrease morbidity and change the standard of care.

Soliman leads a single-institution prospective study which will determine the sensitivity, specificity and false-negative rate of SLN mapping and PET/CT in the detection of positive lymph nodes.

In March 2015, Soliman presented early results of 60 evaluable patients (patients were considered evaluable if SLN mapping was attempted and a full lymphadenectomy was performed). The study showed that each patient with positive lymph nodes also had a positive SLN, meaning no false negatives were found. Further, the researchers identified at least one SLN in 92.3% of patients and bilateral SLN in 60.7% of patients.

“If our results continue to be promising, we can determine if sentinel lymph node mapping alone would have an impact on overall survival of these women,” Soliman says.

Ramirez is also studying surgical techniques to advance treatment options for gynecologic cancer patients and improve their quality of life. As leader of the Innovative Surgery Group since 2005, he is helping spearhead 14 prospective and 13 retrospective active surgical trials.

Most notable of these trials is a prospective randomized clinical trial of laparoscopic or robotic radical hysterectomy versus abdominal radical hysterectomy in patients with early stage cervical cancer, evaluating recurrence-free survival and overall survival.

The 740-patient trial is being conducted at 23 hospitals throughout the world. “The trial will shed light on important outcomes such as sentinel node mapping, pelvic floor dysfunction, quality of life and cost between the two surgical approaches,” Ramirez says. The trial is expected to complete accrual in 2017.
Gynecologic Oncology volumes and outcomes

Gynecologic Oncology case volumes

- FY11: 874
- FY12: 1038
- FY13: 1327
- FY14: 1345
- FY15: 1201

Oncofertility Program patient volumes

- FY13: 103
- FY14: 301
- FY15: 386

Cancer surgeries by disease site

- Uterine: 46%
- Ovarian: 35%
- Cervical: 13%
- Vulva and vaginal: 6%

Surgical cases by approach

- Open: 44%
- Laparoscopic: 42%
- Robotic: 14%
Overview

In addition to cancer-related outcomes, head and neck cancers and their treatment can affect vital functions, such as swallowing, chewing, speaking, hearing and seeing.

Using innovative surgical techniques, the Department of Head and Neck Surgery at MD Anderson strives to ensure the best oncological and functional outcomes.

The department treats patients with benign and malignant head and neck tumors. These include:

- Thyroid and parathyroid gland
- Salivary gland, oral cavity, larynx and pharynx
- Paranasal sinus and skull base
- Melanoma and non-melanoma skin cancers
- Sarcomas of the soft tissue and bone ocular, orbital and ocular adnexal malignancies

Head and Neck Surgery uses an integrated multidisciplinary approach with partners in rehabilitation medicine, radiation oncology and medical oncology.

“We work every day to cure our patients with head and neck cancer, while preserving or restoring critical functions of speech and swallowing,” says Randal Weber, M.D., chair of Head and Neck Surgery.

Weber and his team of 37 doctors provided consultation, prevention, treatment and rehabilitation services to 8,727 new patients in Fiscal Year 2015. They also performed 3,255 operations.
The team offers services in five areas:
- Head and neck surgical oncology
- Head and neck endocrine surgery
- Oral oncology and maxillofacial prosthodontics
- Speech pathology and audiology
- Ophthalmology

All of these services treat patients in the Head and Neck Center at MD Anderson in Houston. Head and Neck surgical oncologists are also available at MD Anderson in the Bay Area, Katy and Sugar Land. Specialized labs and clinics within the Head and Neck Center include the Oral Cancer Prevention Clinic, the Voice Laboratory and the Swallowing Outcomes Research Laboratory. In these areas, patients work to regain the ability to speak and swallow after treatment for cancer of the voice box and throat.

The department’s oral oncology and prosthetics (known as maxillofacial prosthodontics) area provides dental and oral rehabilitation to patients before and after treatment. It also designs and places specialized oral implants to ensure the highest quality of life after surgery.

**Highlights**

Head and Neck Surgery’s exceptional patient care earned a No. 5 national ranking among ear, nose and throat departments in U.S. News & World Report’s 2015-2016 Best Hospitals survey.

The department also includes expert multi-specialty programs, such as the Skull Base Tumor Program, directed by Ehab Hanna, M.D., professor of Head and Neck Surgery, and Franco DeMonte, M.D., professor of Neurosurgery. Over the last decade, the program has tripled the number of faculty, patients and procedures.

Program members lead the way in minimally invasive surgery to treat skull base tumors. This approach allows surgeons to perform complex procedures with less impact on patients. This leads to fewer complications, decreased rehabilitation and lower morbidity. The skull base surgery team has treated the largest number of malignant tumors in this area with minimally invasive procedures in North America.

In addition, great strides have been made in skull base tumor research. Most notable is the isolation of the first cell line of sinonasal undifferentiated carcinoma, one of the most deadly types of skull base tumors. “This significant milestone has been recognized worldwide. It will undoubtedly open the door to much needed research into these tumors, which until now could not be studied in the laboratory,” Hanna says.

**Education**

Head and Neck Surgery offers a Head and Neck Surgical Oncology Fellowship that provides trainees with experience in clinical, translational and/or basic science research. The fellowship is directed by Amy Hessel, M.D., associate professor of Head and Neck Surgery, and has had 45 graduates since 2000.

The department also provides advanced training in maxillofacial prosthetics and oncologic dentistry. Fellows in oral oncology learn to treat, manage and rehabilitate patients with prosthetics. The oral oncology fellowship is directed by Theresa Hofstede, D.D.S., associate professor of Head and Neck Surgery, and has had 41 graduates since 2000.
Research

Head and neck cancers have increased 125% in the United States in the last two decades, mostly due to the human papillomavirus (HPV). These HPV-associated oropharyngeal cancers are commonly found on the tonsils and the base of the tongue.

Neil Gross, M.D., associate professor of Head and Neck Surgery, is researching new treatment techniques for HPV-associated oropharyngeal cancers so that patients have fewer long-term side effects and a better quality of life.

Gross is studying transoral robotic surgery (TORS), a minimally invasive procedure that uses computer technology, specialized surgical instruments and advanced 3-D imaging to remove tumors.

Working with Brandon Gunn, M.D., associate professor of Radiation Oncology, Gross is also studying intensity modulated proton therapy (IMPT), a targeted radiation treatment that delivers precise radiation to the tumor. It effectively treats the cancer, while sparing surrounding healthy tissue.

Since patients treated for HPV-associated oropharyngeal cancers have a good prognosis with a high cure rate, Gross is investigating how quickly and to what level patients recover after IMPT and TORS. He is using digital wristband monitoring to measure their rate of recovery, hoping to better define the impact of treatments on their quality of life.

“If this study is successful, then the method can be applied to other forms of therapy, including radiation and chemotherapy. It could also be applied to other disease sites in the head and neck, such as the salivary, thyroid and larynx,” Gross says. “Ultimately, we hope the study results will help patients make better informed treatment decisions.”

Stephen Y. Lai, M.D., Ph.D., associate professor of Head and Neck Surgery, is using functional MRI technologies to research novel treatments for thyroid cancer and treatment-related side effects for patients with HPV-associated oropharyngeal cancer. Lai’s research could improve patient survival rates and enhance their quality of life.

“Anaplastic thyroid cancer has a median survival rate of six months from the time of diagnosis,” Lai says. “We’re studying how to maximize the efficacy of current therapies by tailoring radiation treatments for each patient.” Lai is using MRI to assess metabolic changes that indicate how tumors respond to radiation and chemotherapy treatments.

Patients who receive radiation therapy for oropharyngeal cancer may develop mandibular osteoradionecrosis (ORN) – a deterioration of the jawbone – later in life. Through the use of dynamic contrast-enhanced MRI (DCE-MRI), Lai is following the natural history of mandible exposure to radiation in an effort to identify patients who may develop ORN. This discovery may allow physicians to intervene earlier to prevent this life-altering complication.

Lai is also investigating targeted therapies for head and neck cancer, including studies of the microRNA miR27a*, which controls critical signaling pathways in the disease.

“I am proud to work with a fantastic multidisciplinary team of colleagues and trainees,” Lai says. His collaborative team includes radiation oncologists, oral oncologists, speech and language pathologists, radiologists, imaging specialists and trainees.
Head and Neck Surgery volumes and outcomes

Skull base procedures
endoscopic & open volumes

<table>
<thead>
<tr>
<th>Year</th>
<th>Endoscopic Volumes</th>
<th>Open Volumes</th>
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<tr>
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<tr>
<td>FY12</td>
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<td>562</td>
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<tr>
<td>FY15</td>
<td>613</td>
<td>581</td>
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</table>

Laryngectomy

The above graph shows FY15 data for the top 25 National Cancer Institute (NCI)-designated comprehensive cancer centers individually listed in the University HealthSystem Consortium (UHC) clinical database.

Oncoplastic operations*

**FY15**

- **342** volume
- **0.3%** 30-day mortality rate
- **1.2%** total flap loss rate
- **7.9** average length of stay

*Combines techniques of head and neck surgery with plastic reconstructive surgery*
Neurosurgery

Overview

Brain and spine tumors can affect important functions, such as emotions, thought, speech, vision, hearing and movement.

Because these tumors often grow next to areas that control these functions, deft surgical skill is needed to remove them.

The Department of Neurosurgery at MD Anderson treats benign and malignant tumors of the central nervous system. These include tumors of the brain, spine, skull base and peripheral nerves, such as:

- Acoustic neuromas
- Chordomas
- Ependymomas
- Gliomas
- Metastatic brain tumors
- Meningiomas
- Medulloblastoma
- Pituitary tumors

With 1,847 new patients and consults seen in Fiscal Year 2015, the department’s 13 neurosurgeons deal with rare tumors on a daily basis in the Brain and Spine Center at MD Anderson and MD Anderson in Memorial City and Katy. They use advanced surgical technologies and procedures to remove tumors as safely as possible. These include:
Awake craniotomy: the patient is awakened during the operation to verify his or her ability to think, speak, move or reason. This procedure is regularly used to map tumors before removing them.

Brainsuite®: highly advanced operating room for brain and spine patients. The intraoperative MRI system provides real-time imaging during surgery. MD Anderson is one of only two locations in Texas with this system.

Gamma Knife Radiosurgery: non-invasive, outpatient, accurate tumor targeting with a single dose of radiation.

The department has performed nearly 30,000 operations in 25 years. In FY15, its surgeons completed 1,200 operations on patients with brain and spine tumors — more than any hospital in the nation.

“Patient quality of life is very important,” says Raymond Sawaya, M.D., chair of Neurosurgery. “One of the unique strengths of our department is the subspecialized expertise of our faculty. This allows us to remove even rare, difficult and hard-to-reach tumors, and preserve as much functionality as possible for the patient.”

Although the neurosurgery team is highly specialized in patient care, they do not work alone.

Neurosurgery faculty direct many collaborative programs and research efforts. These include the Skull Base Tumor Program, Brain Tumor Research Program, a Specialized Program of Research Excellence (SPORE) grant for brain cancer research and the Glioblastoma Moon Shot Program (see page 28).

“We want to bring all neurology-related disciplines together to eliminate brain tumors as a threat to patient lives,” Sawaya says.

**Highlights**

While the idea of brain surgery certainly seems invasive in nature, the neurosurgery team has introduced and expanded several minimally invasive techniques.

The department has used laser interstitial thermal therapy on brain tumors for several years. This procedure involves inserting a probe directly into the tumor, where thermal heat destroys it. Heat levels are monitored in real time in the Brainsuite. Claudio Tatsui, M.D., assistant professor of Neurosurgery, is the first in the world to use this technique for spinal tumors.

The number of endoscopic skull base surgeries also grew nearly 30% over the past year.

These minimally invasive procedures typically result in quicker recovery, fewer complications and less damage to healthy tissue than traditional open surgery.

The department recently introduced Nexstim Navigated Brain Stimulation to help with pre-surgery planning. This noninvasive system maps brain functionality before the operation. The extra preparation can improve patient safety and outcomes.

**Education**

Jeffrey Weinberg, M.D., professor of Neurosurgery, directs the country’s largest Neurosurgical Oncology Fellowship. More than 70 fellows have completed the program since 1991. Fellows are exposed to a variety of cases and have access to the Microsurgical and Endoscopic Center for Clinical Applications (MECCA) Laboratory. This state-of-the-art lab contains OR-caliber equipment and has hosted 30 courses since it opened January 2012.

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**Mom-to-be beats a deadly cancer**

**By Meagan Raeke**

2002 was an amazing year for Tracey Schoettelkotte. She turned 30, graduated from law school, married and became pregnant with her first child. But on Christmas Day, everything hit the floor — literally. Schoettelkotte fell and couldn’t get up.

An emergency CT scan revealed she had glioblastoma, the most aggressive and deadliest brain cancer. Schoettelkotte was told she had three months to live. But she refused to give up. Instead, she headed straight to MD Anderson.

At her first appointment, Schoettelkotte met Raymond Sawaya, M.D., chair of Neurosurgery. “Dr. Sawaya asked me if I was ready to fight the fight,” Schoettelkotte says. “I said, ‘Yes!’ Finally, I had hope.”

Because Schoettelkotte’s tumor was affecting her speech, an awake craniotomy was quickly scheduled for New Year’s Eve. Sawaya woke her during the surgery to test her speech.


Schoettelkotte was four-and-a-half months pregnant when her brain tumor was removed. Now, nearly 13 years later, she remains cancer-free, and her son, Jeffrey, a healthy pre-teen.
Research

Glioblastoma is the most common malignant adult primary brain tumor. This highly aggressive cancer is diagnosed in 15,000 patients each year. Only 5% to 10% are alive five years after diagnosis.

Amy Heimberger, M.D., and Frederick Lang, M.D., professors of Neurosurgery, are directors of MD Anderson's Glioblastoma Moon Shot. Their goal is to improve the five-year survival of glioblastoma to 40%.

Heimberger's research goal is to make immunotherapy the new standard of care for glioblastoma patients. Immunotherapy activates the immune system to fight off cancer cells and hinders the immune suppression that allows the tumors to thrive.

As director of the Brain Tumor Immunology and Immunotherapy Lab, Heimberger is developing a robust portfolio of immune therapies. In 2003, her lab was the first to attempt precision immunotherapy in glioblastoma patients. The groundbreaking clinical trial tested a peptide vaccine that prompts the immune system to target the epidermal growth factor variant III (EGFRvIII) receptor found on the gliomas. The phase II clinical trial was a cooperative study with John Sampson, M.D., at Duke University Medical Center.

“The results showed a median survival of 26 months, nearly double the standard of care. Furthermore, none of the recurring tumors studied expressed the EGFRvIII receptor,” Heimberger says.

The results were published in the Journal of Clinical Oncology in 2010, and the approach received U.S. Food and Drug Administration's Breakthrough Therapy Designation. The final phase III clinical trial results are expected in 2016.

Lang is director of clinical research for the Brain Tumor Research Program and, with Juan Fueyo, M.D., professor of Neuro-Oncology, leader of the Brain Cancer SPORE. Lang's research involves developing "living" biological therapies. The primary efforts are Delta-24-RGD, a modified cold virus that destroys gliomas without harming healthy brain tissue, and mesenchymal stem cells, special bone marrow cells that deliver therapies to brain tumors.

In 2014, Lang and Fueyo, who engineered the virus, completed a first-of-its-kind phase I clinical trial of the virus. After treatment of recurrent tumors, 15% of patients saw a complete response with no evidence of tumor for more than three years. "This is a remarkable result rarely seen in glioma patients," Lang says.

The treatment was also clinically beneficial for 66% of patients, helping it receive FDA fast track status. The preliminary results were published in Neuro-Oncology and presented at the 2014 Society for Neuro-Oncology Annual Meeting.

A multi-center phase II clinical trial of the virus is expected to begin in 2016. Researchers are also developing the next generation of the virus, Delta-24-RGDOX.

In addition, Lang's team will soon begin a clinical trial to test delivering the virus using mesenchymal stem cells taken from bone marrow, rather than directly injecting the virus into the tumor. His team discovered these stem cells target brain tumors after injection into the blood stream. “Mesenchymal stem cells should improve viral spread and increase the beneficial effects of the virus,” Lang says.
Neurosurgery volumes and outcomes

Spine cases volumes

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Mortality rate% & case volume

Craniotomy

Stereotactic radio surgery procedures brain & spine volumes

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<tr>
<th>Year</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
<th>FY14</th>
<th>FY15</th>
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<td>4 459</td>
<td>41 483</td>
<td>78 552</td>
<td>78 605</td>
</tr>
</tbody>
</table>

The above graph shows FY15 data for the top 25 National Cancer Institute (NCI)-designated comprehensive cancer centers individually listed in the University HealthSystem Consortium (UHC) clinical database.
Orthopaedic Oncology

Overview

Most cancers of the bone and soft tissue require extensive surgery with specialized orthopaedic surgeons, who can resect the tumor and then perform reconstruction to give the patient the best possible functional outcome.

The Department of Orthopaedic Oncology at MD Anderson provides specialized care to adults and children with benign and malignant tumors of the skeleton and soft tissue. These include, but are not limited to:

- Soft tissue sarcomas
- Osteosarcoma
- Ewing’s sarcoma
- Chondrosarcoma
- Chordoma
- Spine tumors
- Metastatic bone disease
- Giant cell tumors
- Aggressive bone cysts

The department also treats general orthopaedic issues as they relate to MD Anderson patients, including:

- Pathologic fractures
- Avascular necrosis
- Degenerative joint disease
- Muscle and tendon dysfunction
- Compartment syndrome and infections
“Our goal is not just to remove the cancer, but to save the patient's limb and maximize function,” says Valerae O. Lewis, M.D., chair of Orthopaedic Oncology, whose team of five surgeons uses the most advanced surgical and reconstructive techniques.

Orthopaedic surgeons also use state-of-the-art real-time imaging in the operating room. By directing tools and equipment in relation to the patient’s anatomy, they can remove the tumor more precisely. The result is improved clinical outcomes.

In Fiscal Year 2015, the team encountered 1,494 new patients and consults in the Thoracic-Orthopaedic Center and Sarcoma Center at MD Anderson, and performed 771 operations.

**Highlights**

Sarcomas of the pelvic bone are some of the most challenging to treat. Hemipelvectomy, which involves surgically removing part of the pelvis, with or without removal of the corresponding leg, to treat pelvic sarcoma patients is among the department’s specialties. The extent of this surgery varies depending on the location and size of the tumor. Lewis and colleagues established a multidisciplinary pelvic sarcoma team to provide unmatched care to patients with these challenging tumors. Though pelvic sarcoma is rare, Lewis and her team performed more than 30 resections in FY15.

While surgeons focus on removing the tumor and saving as much of the normal tissue as possible, the job doesn't end in the operating room. "We have developed an outcomes program to help sarcoma patients return to normal activities, and help them appropriately set expectations and gauge their progress," Lewis says.

After a tumor is removed, several reconstructive options are available. "Our program also helps patients decide on the best reconstructive option for them and their lifestyle," Lewis says.

Through its Learning Cancer Outcomes Research Program, the orthopaedic team collects and analyzes data for patients who have undergone sarcoma surgery. Using real-time visual analytics, patients can see their progress in recovery compared to others with similar disease and treatment.

**Education**

The department offers a Musculoskeletal Oncology Fellowship directed by Lewis. Fellows train in the multidisciplinary care of benign and malignant bone and soft tissue tumors. Two fellows per year are accepted for the fellowship, which lasts one or two years. The first year focuses on clinical work and the optional second year is primarily research. Since 1999, 28 fellows have graduated from the program.

Orthopaedic Oncology also sponsors the annual MD Anderson musculoskeletal oncology review course. The national program provides an in-depth review of diagnosis and treatment options.

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Susan Belt has no limits – even after cancer took her pelvis.

Belt’s journey started with pain in the back of her leg. A visit to her hometown doctor revealed a cancerous tumor in the soft tissue of her thigh.

At the suggestion of her doctor, Belt traveled from Hutchinson, Kansas, to MD Anderson in Houston for treatment. There, she met Valerae O. Lewis, M.D., chair of Orthopaedic Oncology.

“Dr. Lewis was very positive and knowledgeable, and made me feel comfortable,” Belt says.

Belt had chemotherapy first to shrink the tumor. When it didn’t shrink, Belt learned that the surgery to remove the tumor required removing half of her pelvis, which included her hip joint, too.

“I knew living without a hip would be a challenge, but I’m a pretty stubborn person,” Belt says. “I decided cancer wasn’t going to change my active way of life.” And, she was right.

After surgery in 2006, Belt worked as the only waitress at her sister’s restaurant. Now 58 and a stay-at-home housewife, she bikes, walks, plays sports with her two grandkids and is an avid gardener.

“I have to do things slower, but I know I can accomplish anything I want to,” Belt says. She remains cancer-free.
Research

The Orthopaedic Oncology department includes a robust research program that spans basic science to clinical and translational research. Its basic science research program focuses on mouse models, targeted therapy and molecular mechanisms for the spread of bone cancer.

Patrick Lin, M.D., professor of Orthopaedic Oncology, is working on a genetically engineered mouse model of sarcomas, with an emphasis on Ewing's sarcoma. He hopes to find novel mutations and genes that are important in disease development. “This may lead to new research on potential treatment targets,” Lin says.

Specifically, Lin is working on a genetic screen to find cooperating mutations that work with Ewing’s sarcoma fusion gene EWS-FLI1. To this end, his team is growing mesenchymal stem cells from mice in cell culture and inducing expression of EWS-FLI1. Then, they infect cells with a retroviral shRNA library that screens the mouse genome for mutations that enable EWS-FLI1 to transform cells. The cells are injected back into mice to see which ones develop tumors.

This work stems from Lin’s discovery of the first mouse model to form primitive sarcomas as the result of expression of the Ewing’s sarcoma fusion gene EWS-FLI1. His team noted in this model that the EWS-FLI1 gene by itself was not sufficient to induce sarcoma formation in primitive mesenchymal tissue. They also reported that osteosarcomas could be induced by mutating P53 and Rb in murine osteoblasts. These are a more differentiated cell than the mesenchymal cells that give rise to Ewing-like sarcomas in mice.

Lin’s team is working to establish proof of principal for their current work to induce sarcomas with a viral library composed of shRNA. “This then becomes a powerful tool to study many different types of sarcoma,” Lin says.

For its clinical research, Orthopaedic Oncology has one of the largest sarcoma databases in the field to establish and examine best practices and clinical outcomes.

Justin Bird, M.D., assistant professor of Orthopaedic Oncology, is conducting research to define which clinician-, patient- and therapist-reported outcome measures are most appropriate for orthopaedic oncology. “Our work is patient-centered and is helping us better understand how to appropriately evaluate our interventions and the related outcomes,” Bird says.

His research team recently conducted a study to evaluate the current orthopaedic outcome measures for their validity, reliability and responsiveness (ability to detect change over time). They found that 78% of the outcome measures were either poor measures of responsiveness or did not have data to determine the responsiveness of the tool.

The team is also conducting research to determine how to best share outcome data with patients and clinicians. They are testing a unique approach: visual analytics to deliver outcome data to patients in the clinic in real time. “This work is helping us understand how to communicate this information to patients, their caregivers and clinicians,” Bird says.
Orthopaedic Oncology volumes and outcomes

Mortality rate % & case volume
Femur tumor resection

Hemipelvectomy volumes

The above graph shows FY15 data for the top 25 National Cancer Institute (NCI)-designated comprehensive cancer centers individually listed in the University HealthSystem Consortium (UHC) clinical database.
Plastic Surgery

Overview

Radical procedures are often necessary to maximize the cancer-fighting benefits of surgery. But these operations can create tissue defects in patients.

When there are missing structures and tissue following treatment, the Department of Plastic Surgery at MD Anderson steps in to restore form and function and improve aesthetics for patients. The department’s surgeons have pioneered techniques that are the gold standard for care and perform complex surgeries not done elsewhere.

“We have the chance to improve a patient’s quality of life, and our colleagues rely on us to do so,” says Charles Butler, M.D., chair of Plastic Surgery. “Knowing we can reconstruct essentially any defect allows them to be more aggressive with tumor resections to save a patient’s life.”

Butler and his team of 21 plastic surgeons perform a host of procedures. These include:

- Tissue flaps
- Skin grafts
- Free-tissue transfer
- Reconstruction of all body areas (breast, torso, extremities, pelvis, head and neck, and trunk)
- Soft tissue transplantation

In addition to common reconstructions, the team executes innovative procedures such as:

- Robotic and minimally invasive plastic surgery
- Lymphedema surgery
Complex abdominal wall reconstruction

Complex head and neck reconstruction

Reconstructions are not limited to cancer type. Plastic surgeons manage the results of care from all diseases and also treat wounds, infections, tissue loss and injuries from cancer therapies. In Fiscal Year 2015, the Plastic Surgery team saw 3,269 new patients and consults, and performed 4,290 operations at MD Anderson. Plastic surgeons also see patients at MD Anderson in Katy and Sugar Land.

Highlights

In the past year, Plastic Surgery has made enormous strides in patient care. It has created novel strategies to improve patient outcomes in head and neck, breast and abdominal wall reconstruction.

Advances in abdominal wall reconstruction include minimally invasive component separation, biologic mesh use and soft tissue flaps. The Plastic Surgery team has also refined techniques for complex head and neck reconstruction, which often requires multiple free flaps. In head and neck cases, vascular imaging and computer-aided design help to reconstruct missing bone using portions of the jaw.

“Unlike other centers, we care for all head and neck reconstructive issues. This helps us be thought leaders and improve patient care,” Butler says.

Plastic surgeons treat rare cancers of the ocular and orbital areas as part of the Orbital Oncology and Ophthalmic Plastic Surgery program. Specific cancers they treat include conjunctival tumors, eyelid cancers, lacrimal gland tumors, orbital tumors and uveal melanoma.

Plastic surgery also focuses its expertise on less common, but vital, procedures for patients. These include: sacrectomy, pelvic and perineal, penile, hemipelvectomy, desmoid tumor and sarcoma reconstructions.

To improve a patient’s form and aesthetics, the surgical team has advanced the specialty of perforator flap surgery. This is a reconstructive technique to remove skin and/or subcutaneous fat from one area to reconstruct a damaged area. The team also created new techniques for anterolateral thigh and deep inferior epigastric perforator flaps.

Notably, a select team of plastic surgeons led by Jesse Selber, M.D., associate professor of Plastic Surgery, performed a complex procedure called vascularized composite allotransplantation. It simultaneously transplants several kinds of tissues, such as skin, muscle and bone. MD Anderson surgeons were part of the first ever skull and scalp transplant, with the patient also receiving a kidney and pancreas transplant.

The plastic surgeons’ skills go beyond the operating room to creating new imaging methods. These include vascular imaging for blood flow, identification of vascular perforator anatomy and in-flap monitoring techniques. They also have developed the latest in computer-aided design for bone reconstruction. These methods help surgeons navigate more precisely during surgery and track their instruments in relation to the patient’s anatomy.

Education

Plastic Surgery has the Clinical Fellowship in Microvascular Reconstructive Surgery. This one-year fellowship exposes nine trainees to a range of ablative and reconstructive surgeries for cancer patients. Matthew Hanasono, M.D., professor of Plastic Surgery, is the director, and Patrick Garvey, M.D., associate professor of Plastic Surgery, is the associate director of the fellowship, which has had 150 graduates since 1988.

Sarah Rykowski is a chief prosecutor in the U.S. Army. In 2013, she was stationed in Seoul, South Korea, when she discovered a lump in her right breast.

Rykowski decided to see a doctor at her next post in Oklahoma. There, a mammogram and biopsy revealed early stage infiltrating ductal carcinoma.

“I called my mom and Godmother, and cried,” Rykowski, 34, says. Nine days later, she had a modified radical mastectomy, followed by chemotherapy.

“My body changed, and I hated it;” Rykowski says. For women in the U.S. Army, dress uniforms are contoured to their body, specifically uniforms are tailored to bras.

Rykowski was referred to Charles Butler, M.D., chair of Plastic Surgery, for breast reconstruction. Butler says her case was challenging. He performed four surgeries over 18 months to construct a right breast and nipple to match her left breast.

“Dr. Butler worked a miracle and gave me the best possible outcome, so I could feel good about my body,” Rykowski says.

She also says she feels as much of a normal person as she ever could. For her, this means riding her 22-year-old thoroughbred, Pete, exercising and continuing her military service cancer-free.
In addition, Plastic Surgery offers an Ophthalmic Plastic and Reconstructive Surgery Fellowship, which is directed by Bita Esmaeli, M.D., professor of Ophthamlic Plastic Surgery, and has had 14 graduates since 2001. The two-year fellowship exposes two trainees to the surgical management of cancers of the eyelid, conjunctiva and orbit. It also includes external rotations in other areas of ophthalmic plastic surgery.

Research

Multidisciplinary research programs in Plastic Surgery focus on understanding the molecular basis for disease and developing novel concepts in tissue transfer, repair, replacement and regeneration to improve surgical outcomes.

Anshu Mathur, Ph.D., associate professor of Plastic Surgery, heads the Tissue Regeneration and Molecular Cell Engineering Lab (TRAMCEL). The lab is home to innovative work that is applied to reconstructive therapy for cancer patients, Mathur says.

Her work focuses on engineered biologics, using biologically derived material to engineer a structure. She is mixing protein polymers to make scaffolds that mimic the high mechanical strength and support of collagen using a nanofabrication technique called electrospinning. The goal is to enable surgeons to make patient-specific scaffolds from a machine.

Qixu “Luke” Zhang, M.D., Ph.D., assistant professor of Plastic Surgery, is engineering skin and muscle constructs for soft tissue reconstruction. Notably, Zhang led a study to characterize a decellularized musculofascial extracellular matrix. He discovered that such a matrix maintains its 3-D architecture and strong mechanical properties. It also enables cell growth when implanted or can be a carrier of stem cells for therapeutic musculofascial regeneration and reconstruction.

Zhang is also using human adipose-derived stem cells to engineer vascularized soft tissue flaps. These stem cells are an ideal autologous (from the patient) cell source because they are easy to harvest and self-renew, Zhang says. “They also have lots of potential for precision medicine.”

Mark Clemens, M.D., assistant professor of Plastic Surgery, is leading research on breast implant-associated anaplastic large cell lymphoma (BI-ALCL), a rare form of cancer that can develop in the scar tissue around a breast implant.

“The disease is commonly misdiagnosed with suboptimal treatment, but we are starting to understand its molecular etiology, so we can treat and ultimately prevent it,” Clemens says.

MD Anderson’s BI-ALCL multidisciplinary research team is led by Clemens and Roberto Miranda, M.D., professor of Hematopathology, in collaboration with breast surgical oncologists, pathologists and lymphoma oncologists. One of the team’s early successes was creating new patient treatment guidelines adopted as official recommendations by many international plastic surgery societies.

Selber is a leader in the adoption of new technology and biomaterials in plastic surgery. In a novel study, Selber is comparing the accuracy of two postoperative tissue-monitoring methods: transcutaneous tissue oxygen monitoring of free flaps and intermittent surface Doppler monitoring. The study will estimate the sensitivity, specificity, positive predictive value and negative predictive value for each method used alone or in combination.

Hanasono helps lead clinical outcomes research in reconstructive surgery for head and neck cancers with the goal of improving function and aesthetics. This includes reconstruction of the maxillary, facial nerve, skull base, tongue and pharyngoesophageal. Such research has helped set the standard of care for many of these cancer reconstructions.

Researchers established the technique of using skin flaps transferred from one body part to another, such as the anterolateral thigh flap. “It has a low rate of complications and very good post-surgical speech and swallowing results,” Hanasono says.

Current research is focusing on the use of autologous fat grafts to improve aesthetic results, and on understanding the natural history and best treatment options for osteoradionecrosis (injury to the facial and jaw bones caused by oncology radiation).

Butler is leading research in abdominal wall reconstruction. His team has demonstrated the significant value of primary fascial closure compared to mesh bridging, proving a reinforced repair — closing the fascial over the mesh — has a seven-fold lower recurrence rate, regardless of defect size.

His team has also proven that biologic meshes can be used in contaminated cases, and discovered safe and effective techniques for desmoid tumor resection.

Butler is also working on a novel technique for minimally invasive component separation of the abdominal wall. He showed that using tunnel incisions to perform the fascial releases and the dissection between the muscles reduces complications and improves outcomes for patients.

Furthermore, Butler has developed the only validated dose-dependent abdominal radiation model in genetically identical rats. Recently, he used a bioprosthetic mesh seeded with adipose-derived stem cells to repair the negative effects of radiation therapy on the abdominal wall in these rats. The work also restored strength of the laparotomy to normal levels, Butler says.
Plastic Surgery volumes and outcomes

Caseload breakdown FY15

- 46% Plastic surgery only
- 54% Complex multi-team reconstructive cases

Cases by disease site FY15

- 51% Breast
- 24% Head and Neck
- 13% Trunk
- 5% Lower extremities
- 4% Upper extremities
- 3% Genitourinary

Breast reconstruction case volume

The above graph shows FY15 data for the top 25 National Cancer Institute (NCI)-designated comprehensive cancer centers individually listed in the University Health System Consortium (UHC) clinical database.
Surgical Oncology

Overview

Surgery is a vital part of care for many patients with cancer. It can help doctors diagnose and stage disease, treat it, relieve symptoms and prevent cancer from spreading or returning.

The Department of Surgical Oncology at MD Anderson treats patients with a wide variety of malignant and benign tumors. The department comprises numerous specialty sections:

- Acute Care General and Palliative Surgical Oncology
- Colorectal Surgery
- Endocrine Surgery
- Gastric-HIPEC
- Hepato-Pancreato-Biliary (HPB) Surgery
- Melanoma Surgery
- Pediatric Surgery
- Sarcoma Surgery

These sections provide assessments, treatment planning and surgical services to cancer patients to improve survival, shorten recovery times and minimize treatment-related side effects.

Each section strives to better identify patients who can benefit from surgery, and to advance and implement new surgical techniques. In particular, they are broadening the use of minimally invasive laparoscopic and robotic techniques to lessen the impact of surgery on patients.
Our constant drive for improvement, innovation and excellence is one of the major reasons our surgeons are amongst the best in the country,” says Jeffrey E. Lee, M.D., chair of Surgical Oncology. “Plus, our surgeons care deeply about patient surgical safety and quality of life.”

Lee and his team of 53 doctors attended 6,219 new patients and consulted, and performed 5,341 operations in Fiscal Year 2015. They see patients in the Child and Adolescent Center, Melanoma Center, Sarcoma Center, Gastrointestinal Center, Colorectal Center and Endocrine Center at MD Anderson. They also see patients at MD Anderson in Sugar Land and The Woodlands. The Surgical Oncology team also includes seven research faculty.

MD Anderson surgical oncologists collaborate across disciplines and surgical specialties, partnering with colleagues in medical oncology, radiation oncology and diagnostic imaging to integrate preoperative targeted therapies and immunotherapies. They collaborate with other surgery departments for multi-visceral resection, soft tissue resection and novel surgical therapeutics, such as limb perfusion.

Highlights
The HPB Surgery section treats cancers of the liver and pancreas. It often performs complex operations that other cancer centers have deemed to be “unresectable” disease. Despite this, the section has one of the lowest mortality rates following liver and pancreas operations.

In pancreatic surgery, the team has reported in international literature the highest rate of cure and longest rate of overall survival following surgery, says Matthew Katz, M.D., associate professor of Surgical Oncology.

In addition, pancreatic cancer surgeons have led multiple clinical trials over the past five years, all with the goal of maximizing patient survival and quality of life. The trials have helped surgeons understand how to improve delivery of existing pre- and post-operative drug and radiation regimes, and have tested the efficacy of new therapeutics. Surgeons have also studied ways to optimize each patient’s condition prior to surgery and evaluated genetic information in an attempt to create patient-centric treatment algorithms that employ surgery at a time most likely to lead to a favorable therapeutic outcome.

The Colorectal Surgery Section treats cancers of the colon, rectum and anus, specializing in the management of patients with low or advanced rectal cancers.

“We have unique expertise in sphincter preserving surgeries as well as complex surgery for primary and recurrent rectal cancer,” says George Chang, M.D., professor of Surgical Oncology.

Sphincter preserving surgeries can help patients avoid the need for a colostomy. “Many patients seek our care after being told elsewhere that their treatment would require a permanent colostomy,” Chang says. MD Anderson colorectal surgeons also are leaders in innovative minimally invasive robotic approaches, as described on page 6.

For patients with inherited colorectal cancer syndromes, the High Risk Cancer Clinic provides comprehensive genetic evaluation and advanced individualized treatment options.

Education
Surgical Oncology has numerous exceptional fellowships. Its hallmark Complex General Surgical Oncology Fellowship is a two- to three-year program and hosts seven new fellows each year. It is directed by

New trial keeps pancreatic cancer at bay
By David Berkowitz
For Shannon Magee, every day is a gift.
That’s how she views life about three years after being diagnosed with pancreatic cancer.

When a physician in Austin, Texas, discovered the tumor, Magee and her husband decided to make the 2 1/2-hour drive to MD Anderson.

They were met by Matthew Katz, M.D., associate professor of Surgical Oncology, who felt that a new national clinical trial he was leading was Magee’s best treatment option.

“Since pancreatic cancer has such a high recurrence rate, I was ready for my care team to throw everything they had at it,” Magee says.

Following chemotherapy and radiation, Katz performed a Whipple procedure. Part of Magee’s pancreas was removed along with half her stomach, a portion of her small intestine, 28 lymph nodes and her portal vein.

After recovering for a week in a specialized gastrointestinal cancer ward, Magee was able to return home for Thanksgiving.

As part of the clinical trial, she had four more months of chemotherapy. Now, two years after completion of the trial, Magee has no evidence of disease.

“They believe that having chemo and radiation first, before surgery, will become the new gold standard for treating pancreatic cancer,” Magee says.

She now shares hope with other pancreatic cancer patients and caregivers through myCancerConnection, MD Anderson’s one-on-one support program.
Elizabeth Grubbs, M.D., associate professor of Surgical Oncology, and has had 244 graduates since 1989. The HPB Surgery Fellowship is directed by Thomas Aloia, M.D., associate professor of Surgical Oncology, and has had three graduates since 2013; the Surgical Endocrinology Fellowship is directed by Nancy Perrier, M.D., professor of Surgical Oncology, and has had eight graduates since 2009; and the new International Surgical Oncology Fellowship, also directed by Aloia, has had one graduate since 2013.

The department also has a grant to train eight academic surgical oncologists each year in cancer research. Finally, it has surgery residents from six Houston programs rotate through its services each year and medical students who rotate through monthly.

Research

Surgical Oncology researchers are evaluating and perfecting surgical care across 16,000 square feet of lab space and with over 200 active studies. They expect to improve survival, shorten recovery times and minimize treatment-related side effects for cancer patients.

Jeffrey E. Gershenwald, M.D., professor of Surgical Oncology, is leading multidisciplinary efforts to advance personalized medicine and targeted therapies for patients with melanoma. His research focus is to develop better prognostic and predictive tools for clinicians to identify the risk of recurrence in patients with early stage melanoma.

Some patients with early stage disease at significant risk for recurrence may not have been previously identified as “at risk” and may benefit from adjuvant therapy. Parallel tools to identify patients who have low risk of recurrence can help clinicians provide enhanced care.

“These types of clinical tools can improve the quality of care and help patients make better treatment decisions,” Gershenwald says.

To develop one of these tools, his multidisciplinary and interdepartmental team is performing comprehensive analyses of patients’ disease signs and symptoms, pathology and molecular make-up, and then integrating the analyses. Next, they will perform a deep characterization of patients using whole exome sequencing and RNA profiling to identify molecular markers of relapse and patients who may benefit most from adjuvant therapy.

In 2015, as part of an international collaboration of over 300 researchers from more than five countries that was funded by The Cancer Genome Atlas program, Gershenwald co-led a five-year study identifying four cutaneous melanoma subtypes: BRAF, RAS, NF1, and Triple WT. The work was published in Cell. A subset of each of these genomic subtypes expressed immune signatures associated with improved survival, highlighting the profound importance of the immune system in this disease, Gershenwald says.

Surgical Oncology researchers Jennifer Wargo, M.D., and Zachary Cooper, Ph.D., are studying the molecular and immune system’s response to cancer therapy. Like Gershenwald, their work has focused on melanoma and could improve personalized medicine to help patients make treatment decisions.

In 2014, Wargo and Cooper’s paper in Clinical Cancer Research describing the immune effects of cancer therapy was the No. 1 cited paper.

“We’ve seen very promising results and expect to change the standard of care,” Cooper says.

Wargo and Cooper are also studying the microenvironment of tumors. They’ve identified cells in melanoma and pancreatic tumors that make tumors resistant to therapy and in contrast, gut bacteria in patients that can mediate resistance to therapy.

Last, they’re working to improve patient survival in a randomized phase II clinical trial using novel therapies, targeted therapy and immune checkpoint blockade to treat early-stage melanoma patients eight weeks prior to surgery. After surgery, the patients remain on medication for another 10 months.

“We’ve seen very promising results and expect to change the standard of care,” Cooper says.

Key to their success is being part of, with Gershenwald, the MD Anderson Melanoma Moon Shot Program. It is a collaborative, cross-discipline effort to better understand the disease and translate science discoveries into clinical care. ”
The above graphs show FY15 data for the top 25 National Cancer Institute (NCI)-designated comprehensive cancer centers individually listed in the University HealthSystem Consortium (UHC) clinical database.
Overview

Cancers in the lung and esophagus account for more deaths from cancer than the next three most common cancers (breast, prostate and colon) combined. For many of these cancers, surgery provides the greatest opportunity for cure.

Providing curative opportunities to a wider range of patients and delivering them with fewer side effects is the focus of the Department of Thoracic and Cardiovascular Surgery at MD Anderson.

The department treats all cancers within the chest. These include:

- Lung cancer
- Esophageal cancer
- Mesothelioma
- Mediastinal tumors
- Cancers of the chest wall
- Cancers of major blood vessels
- Cancers that originate in or invade the heart
- Cancers that spread to the lungs

The department treats these cancers using novel surgical techniques to ensure the best results for patients. These include:

- Minimally invasive surgery (thoracoscopic and robotic surgery)
- Organ-sparing resections (lung segmental and sleeve operations; esophageal endoscopic mucosal resection)
- Endobronchial and esophageal ultrasound for cancer staging
- Pancoast tumor resection with or without vertebrectomy
- Complex chest wall resection and reconstruction
- Jejunal and colonic interposition for esophageal reconstruction
- Heated intraoperative chemoperfusion for pleural cancers

In addition, the team performs more conventional open procedures, including:
- Wedge resection
- Lobectomy
- Pneumonectomy
- Esophagectomy

Surgery is often combined with chemotherapy, radiation therapy, immunotherapy or targeted therapies to further improve outcomes.

The department has a team of 10 surgeons and four researchers. They provide complete care to patients in the Thoracic Center at MD Anderson and at MD Anderson in Katy, Sugar Land and The Woodlands. The team saw 948 new patients and consults, and performed 1,790 operations in Fiscal Year 2015.

“We offer unique diagnostics, treatments and survivorship programs so patients can come to our center for every aspect of their cancer care,” says Ara Vaporciyan, M.D., chair of Thoracic and Cardiovascular Surgery. “Plus, we work across disciplines to ensure our patients receive the best care.”

The department hosts an active lung cancer screening program for current and former smokers to help detect lung cancer at its earliest stage, when treatment is most effective.

Thoracic and Cardiovascular Surgery includes a Vascular Surgery Program. It provides diagnostic evaluation, medical, endovascular and operative care to cancer patients and survivors with various forms of vascular disease.

Thoracic surgeons are also part of MD Anderson’s Lung Cancer Moon Shot, a comprehensive program that aims to dramatically reduce lung cancer deaths.

### Highlights

Thoracic and Cardiovascular Surgery has a robust minimally invasive surgery program focused on reducing the pain and trauma associated with conventional open surgery. The program routinely performs video assisted thoracic surgery (VATS) for lung, thymic and esophageal cancers.

“Now, approximately 80% of early stage lung cancer is resected using minimally invasive techniques,” says David Rice, M.D., professor of Thoracic and Cardiovascular Surgery. A recent review of nearly 1,000 MD Anderson cases revealed that these techniques cut in half the number of postoperative complications.

Minimally invasive surgery is also part of the department’s enhanced recovery pathway. This includes elements such as preventive, multimodal and regional pain control, early ambulation and return to nutrition.
modulation of inflammation and prevention of post-operative nausea.

The department’s Endoscopic Mucosal Resection Program treats early stage esophageal cancer. Such techniques preserve the esophagus and stomach and avoid the need for radical surgery.

“The multidisciplinary program has been very successful at proving organ-sparing techniques are appropriate for early stage disease and result in a high cure rate,” says Wayne Hofstetter, M.D., professor and deputy chair of Thoracic and Cardiovascular Surgery, and director of esophageal surgery and research.

Education

The department has a two-year Thoracic Surgery Fellowship with two training tracks: general thoracic and cardiothoracic surgery. The program comprises leadership from MD Anderson, including Vaporciyan as program director, and the Memorial Hermann Heart & Vascular Institute. It is one of the most competitive training programs in the country, attracting up to three-quarters of the nation’s applicants each year. It has had 14 graduates.

Research

Thoracic and Cardiovascular Surgery has a robust research program to explore the cellular and molecular mechanisms of thoracic cancers. The department applies these discoveries to develop novel cancer prevention and treatment strategies.

One of its lead scientists and a pioneer in gene therapy is Jack A. Roth, M.D., professor and director of the W.M. Keck Center for Innovative Cancer Therapies at MD Anderson. He was among the first to identify and characterize a number of tumor suppressor genes for lung cancer and discover a way to deliver them to cancer cells using nanoparticles.

“The goal of our research is to develop drugs that can be more effective at killing cancer cells and less toxic for patients,” Roth says. His most successful experimental gene therapy drug is TUSC2/FUS1 nanovesicles.

TUSC2/FUS1 is a tumor suppressor gene that produces a protein to kill tumor cells. The same protein is harmless in normal cells. To reach the tumor, the gene is encased in tiny biodegradable spheres called nanovesicles and injected into a patient’s bloodstream.

The nanovesicles find and attach to tumors wherever they have spread in the body. Then, the nanovesicles dissolve, the gene is expressed and kills the cancer cells.

“This novel treatment can make tumors shrink and disappear, and be applied to any cancer,” Roth says. The TUSC2/FUS1 nanoparticle drug is in phase II clinical trials.

A National Cancer Institute Specialized Program of Research Excellence grant helps fund Roth’s research. He collaborates with thoracic medical oncologists at MD Anderson and scientists from The University of Texas Southwestern Medical Center.
Thoracic and Cardiovascular Surgery volumes and outcomes

**Esophageal procedures**

*Mortality rate% & case volume*

Lung lobectomy

*Endoscopic mucosal resection* 211

*Open* 384

*Minimally invasive surgery (MIS) 97*

**Lung resections**

*MIS and robotic volumes*

FY11 142
FY12 204
FY13 198
FY14 194
FY15 230

**Chest wall resections**

*Volumes*

FY12 53
FY13 54
FY14 61
FY15 66

The above graph shows FY15 data for the top 25 National Cancer Institute (NCI)-designated comprehensive cancer centers individually listed in the University Health System Consortium (UHC) clinical database.
Cancers of the male and female urinary tract and the male reproductive organs are known as genitourinary (GU) cancers. They can affect patients’ daily function, sexual health and general well-being.

The Department of Urology at MD Anderson treats GU cancers with exceptional care, helping to lessen the impact on patients and improve outcomes. GU cancers include:

- Prostate cancer
- Bladder cancer
- Kidney cancer
- Testicular cancer
- Penile cancer
- Urethral cancer
- Adrenal cancer

The department also treats urologic conditions such as:

- Erectile dysfunction
- Benign prostatic enlargement
- Urinary incontinence
- Kidney stones
- Uro-gynecologic disorders
- Benign urologic tumors

Urology has one of the most active GU cancer programs in the country. In Fiscal Year 2015, its team...
of 19 doctors saw 4,837 new patients and consults, and performed 3,676 operations and over 7,000 clinic-based procedures in MD Anderson's Genitourinary Cancer Center. Urologists also see patients at MD Anderson in the Bay Area, Katy and Sugar Land, to have seen a total of 12,122 unique patients in FY15.

Urologists primary treatment modalities include:

- Complex open surgery
- Minimally invasive surgery
- Multidisciplinary therapy
- Robotic surgery

“We provide advanced care to patients, treating locally-advanced and complex diseases, and successfully performing high-risk surgeries that no one else will do,” says Colin Dinney, M.D., chair of Urology. “And every treatment plan pays careful attention to quality of life issues and consideration of how normal body functions.”

**Highlights**

Urology treats a breadth of tumor types and therefore, has specialized cancer programs. Each program works with various disciplines, including medical oncology, radiation oncology, pathology and other surgical specialties, to provide the highest level of care. Urology also has a Urinary Tract and Pelvic Reconstruction Program to manage pelvic conditions that affect genitourinary function, as a result of cancer treatment or non-urologic cancer therapies.

The Prostate Cancer Program provides services to evaluate, diagnose and monitor patients at risk for cancer. Its diagnostic services use innovative imaging techniques such as transrectal ultrasound-guided prostate biopsy, Artemis (Eigen) MRI-Fusion biopsy and transperineal stereotactic ultrasound to find cancer early.

When prostate cancer is discovered, surgery is often the best treatment option. Surgeons in Urology use the latest technologies to treat patients with prostate cancer. In fact, MD Anderson treats the highest volume of patients in Houston with robotic-assisted prostatectomy and is in the top 10% of robotic prostate surgery nationally. They have also pioneered techniques in extended template pelvic lymph node dissection, a procedure to improve the staging of the tumor and increase curative outcomes.

The Kidney Cancer Program in Urology treats patients with unique minimally invasive surgery techniques, such as laparoscopic, robotic, kidney-sparing and multi-organ surgery. Collaborating across disciplines, Urology doctors are leaders in setting neoadjuvant and adjuvant standards for the treatment of advanced and metastatic disease.

The Bladder Cancer Program’s robust group performs all types of urinary reconstructions, many include using advanced robotics. With a comprehensive team approach, each patient receives a personalized care plan. Surgeons also use the latest bladder cancer detection techniques. Blue light cystoscopy causes the cancer to fluoresce and narrow band imaging improves visibility of critical structures so surgeons can remove tumors without damaging healthy organs, tissue or functions.

With blood in her urine and hot flashes, Ann Cox thought she either had a bladder infection or was going through menopause.

Instead, it was bladder cancer. After surgery to remove her bladder, Cox felt fine. Then, a year later she began feeling pain in her side.

Her cancer had returned. The mass was close to her left ovary and had spread to her left hip. She was given little chance of survival.

“I felt like I was in a nightmare where I was on a conveyor belt trying to walk away from the bad news, but I wasn’t getting anywhere,” Cox recalls.

Then she came to MD Anderson. A multidisciplinary team of experts quickly placed her on a much more hopeful path.

Following chemotherapy and radiation, Colin Dinney, M.D., chair of Urology, performed a pelvic exenteration in 2007 to remove Cox’s internal reproductive organs. A urostomy created an opening for her urinary system.

“This peace came over me because I knew I was at the right place with the best opportunity for treatment,” Cox says.

Now retired, the former bookkeeper enjoys life in Selmer, Tennessee, with her husband of 44 years and helps babysit her youngest of six grandchildren.
identified that aneuploidy characterized by UroVysion's FISH assay, and a unique panel of urine cytokines (CyPRIT), accurately predicts response to BCG.

Another aspect of the GU SPORE includes a career development program to train physician-scientists. Under this program, Neema Navai, M.D., assistant professor of Urology, is evaluating whether local T-staging of the primary bladder tumor can be improved by genomic information and pre-cystectomy imaging with a 3-T MRI. Jay Shah, M.D., assistant professor of Urology, is working to develop his “Surgical Journey” algorithm of enhanced recovery after surgery.

“Our goal is to reduce cancer incidence and mortality and to improve the quality of life for cancer patients,” Dinney says.

Under the direction of McConkey, with contributions by Dinney and Woonyoung Choi, Ph.D., assistant professor of Urology – Research, researchers identified two major intrinsic basal and luminal subtypes of muscle-invasive bladder cancer (MIBC), which is an aggressive disease. These subtypes are remarkably similar to the intrinsic subtypes of breast cancer. Knowing the subtypes can help doctors determine the best treatment for MIBC and prevent it from returning.

Each subtype is enriched with potentially clinically actionable genomic alterations and epigenetic signatures. McConkey and his team were the first to identify associations between tumor subtype and sensitivity to conventional cisplatin-based chemotherapy.

Dinney, with William Benedict, M.D., professor of Genitourinary Medical Oncology – Research, advanced a gene therapy called adenoviral interferon-α (Ad-IFNα) for superficial bladder cancer to reduce recurrence of the disease.

Dinney led a phase I clinical trial demonstrating that Ad-IFNα gene immunotherapy produced high, sustained levels of urine IFNα and clinical complete responses (disappearance of all signs of cancer) beyond 12 months in over 30% of patients with bacille Calmette-Guérin (BCG), known as BCG-unresponsive disease.

Subsequently, Dinney led a phase II clinical trial, sponsored by the Society of Urologic Oncology Clinical Trials Consortium, of Ad-IFNα in patients with BCG-unresponsive disease. Responses were also observed in over 30% of patients.

Other key bladder cancer research under the GU SPORE includes work by Kamat to identify a urine “signature” that predicts response to BCG. He has
These graphs show FY15 data for the top 25 National Cancer Institute (NCI)-designated comprehensive cancer centers individually listed in the University HealthSystem Consortium (UHC) clinical database.
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Head and Neck Surgery


Lira RB, de Carvalho AY, de Carvalho GB, Lewis CM, Weber RS, Kowalski LP. Quality assessment in head and neck oncologic surgery in a Brazilian cancer center compared with MD Anderson Cancer Center benchmarks. Head Neck. 2015 Nov 28. [E-pub ahead of print]


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This report was published by MD Anderson Division of Surgery. All correspondence should be addressed to the Division of Surgery - Unit 1447, MD Anderson Cancer Center, 1515 Holcombe Blvd., Houston, Texas 77030-4009, 713-794-5888.

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