

2018 CANCER PROGRAM

Annual Report with 2017 statistics



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“Our Comprehensive Cancer Center continues to conduct research that will benefit our patients through precision medicine, clinical trials, new discoveries and more.”

—Boris Pasche, MD, PhD, FACP / Director, Comprehensive Cancer Center

COMPREHENSIVE CANCER CENTER OF WAKE FOREST BAPTIST HEALTH

The Wake Forest Baptist Health Comprehensive Cancer Center is among a distinguished group of cancer centers acknowledged as the nation’s leaders in the fight against cancer.

Established in the early 1960s, our Cancer Center became a National Cancer Institute (NCI)-designated cancer center in 1974. Demonstrating its continued commitment to excellence, the Cancer Center received the additional NCI designation as a “Comprehensive” Cancer Center in 1990. It is currently recognized as one of only 49 NCI comprehensive cancer centers in the nation. *U.S. News & World Report* ranks the Cancer Center as the best cancer hospital both in North Carolina and its neighboring states – Georgia, South Carolina, Tennessee and Virginia.

The Cancer Center’s mission is to reduce cancer incidence, morbidity and mortality in the catchment area, nationally and internationally through cutting-edge research and treatments, education and outreach, and multidisciplinary training. The catchment area includes the Piedmont and southern Appalachian region, an area of 58 contiguous counties in North Carolina, Tennessee, Virginia and West Virginia.

The region served by the Cancer Center has significant health disparities issues when compared to national averages for cancer incidence and mortality. To target these issues, the Cancer Center conducts basic, clinical and population research on the prevention, detection and treatment of cancer, translating this knowledge into strategies to improve patient outcomes and reduce the occurrence of cancer. In addition, the Cancer Center established an Office of Cancer Health Equity in 2014 that is focused on conducting culturally relevant navigation, offering ongoing community outreach and engagement opportunities, and providing education and resources to patients throughout our catchment area.

There are 129 nationally and internationally renowned experts at the Cancer Center who provide specialized treatment through 13 disease-oriented and thematic teams: brain (neuro-oncology), breast, cancer survivorship and control, gastrointestinal, genitourinary, gynecologic, head and neck, hematologic malignancies, lung, melanoma, pediatric oncology, precision medicine and phase I, and sarcoma.

Research activities at the Cancer Center are led by 158 faculty members from 35 departments who conduct research across four programs: Cancer Prevention and Control, Neuro-Oncology, Cancer Genetics and Metabolism, and Signaling and Biotechnology.

The Cancer Center is committed to building interdepartmental and transdisciplinary research teams, continuing to excel in research excellence while serving as the main tertiary referral center for the catchment area. Strong collaborations have been established with other entities within Wake Forest to advance the mission of the Cancer Center, such as the Clinical and Translational Science Institute, the Center for Precision Medicine, the Sticht Center for Healthy Aging and Alzheimer’s Prevention, the Translational Alcohol Research Center, the Tobacco Control Center of Excellence, the Institute for Regenerative Medicine, the Maya Angelou Center for Health Equity and the Virginia Tech-Wake Forest University School of Biomedical Engineering and Science. Collaborations between research faculty conducting laboratory science and clinical research ensure that our patients are offered novel therapies and fast access to advanced cancer care.

With nearly 200 clinical trials offered to patients each year, the Cancer Center provides more cancer-related clinical trials than any other hospital in western North Carolina. These trials provide the opportunity for patients to have access to the newest therapies, prevention techniques and survivorship strategies. Patients receive treatment in our state-of-the-art facility, an 11-story cancer hospital, which houses all inpatient and outpatient clinical services, an oncology intensive care unit, an outpatient pharmacy, imaging, cancer patient support services and more. Having all services related to a patient’s cancer journey in one building provides an exceptional environment for patients, family members and caregivers. Additionally, the Cancer Center has expanded its clinical and research activities to several hospitals in the region including Davie, High Point, Lexington and Wilkes medical centers in the Wake Forest Baptist Health system.

CANCER REGISTRY

The Cancer Registry works with physicians, administration, researchers and health care planners to provide support for cancer program development, ensure compliance with reporting standards and serve as a valuable resource for cancer information with the ultimate goal of preventing and controlling cancer.

The Cancer Registry functions in accordance with guidelines set by the American College of Surgeons (ACS) and the North Carolina Central Cancer Registry. It plays an important role in ensuring that the cancer program is accredited by the ACS' Commission on Cancer and that the Breast Care Center is accredited by the National Accreditation Program for Breast Centers.

The Cancer Registry manages and analyzes clinical cancer information for the purpose of education, research and outcome measurement. The primary functions of the Cancer Registry are to collect relevant data, conduct lifetime follow-up and disseminate cancer information. The registry also participates in hospital-based, state and national studies and research.

The Cancer Registry collects all malignant neoplasms and benign brain and central nervous system neoplasms. The registry also collects selected benign neoplasms and metastatic squamous cell and basal cell carcinoma of the skin approved by the Cancer Committee. The cancer data set includes patient demographics, cancer identification, extent of disease (stage), prognostic indicators, treatment, recurrence and outcome information.

The Cancer Registry collects the cancer data if patients are seen at the following locations:

- » Medical Plaza – Clemmons
- » Medical Plaza – Premier
- » Provider-based clinics (Lexington, Elkin and Mount Airy)
- » Statesville practice
- » Wake Forest Baptist Health Davie Medical Center
- » Wake Forest Baptist Health Lexington Medical Center
- » Wake Forest Baptist Health Wilkes Medical Center
- » Wake Forest Baptist Medical Center (main campus)

In 2018, High Point Medical Center became a part of Wake Forest Baptist Health. The High Point Medical Center's Cancer Registry maintains the collection of cancer data for that facility.

The Cancer Registry manages and analyzes clinical cancer information for the purpose of education, research, and outcome measurement.

The Cancer Registry continues to participate in the ACS' Rapid Quality Reporting System (RQRS). RQRS is a reporting and quality improvement tool that provides real clinical-time assessment of hospital-level adherence to quality of cancer care measures. The ACS requires only the submission of breast, colon and rectal cancer cases. Submission of all sites is projected to be required by 2020.

Lifelong follow-up is performed annually on patients in the registry. Follow-up directly benefits patients and physicians by reminding them of the need for medical checkups. Continued surveillance ensures early detection of possible recurrence or a new primary. Outcome data provides survival information reflecting the effectiveness of treatment modalities. The Cancer Registry fulfills requests for cancer data from staff physicians, allied health professionals, outside institutions and requests for follow-up information from other cancer registries. All data requests are handled with the utmost care for the patient's confidentiality.

The Cancer Registry maintains data management and regulatory reporting on cancer statistics for various health care agencies. As required by law, cancer cases are reported to the North Carolina Central Cancer Registry. The data submitted is shared with the North American Association of Central Cancer Registries and the U.S. Centers for Disease Control and Prevention's National Program of Cancer Registries. In addition, newly diagnosed cancer cases are submitted to the Commission on Cancer's National Cancer Database, a comparative database for ongoing assessment of cancer patient care that is a joint project of the American College of Surgeons and the American Cancer Society.

The Association of North Carolina Cancer Registrars helps cancer registrars in the state maintain their continuing education hours by providing up-to-date educational workshops. The National Cancer Registrars Association serves as the premier education, credentialing and advocacy resource for cancer data professionals.



CANCER COMMITTEE

The Cancer Committee is one of the major components of being an approved cancer program of the American College of Surgeons (ACS). The committee is responsible for planning, initiating, stimulating and assessing all cancer-related activities. The committee must be a multidisciplinary, standing committee that meets at least quarterly.

ACTIVITIES

- » Clinical and programmatic goals are established, implemented and monitored each year.
- » The Cancer Program Annual Report is compiled and published as an educational activity of the committee. Published journal articles and abstracts are included.
- » Quality management activities and improvements are planned, reviewed and implemented each year.
- » Studies that measure quality and outcomes are completed so that patients receive care that is comparable to national standards.
- » A patient navigation process, driven by a community needs assessment, is established to address health care disparities and barriers to care for patients.
- » A process to disseminate a treatment summary and follow-up plan to patients who have completed cancer treatment is developed, implemented and monitored.
- » Benchmark reports from the ACS' National Cancer Database are evaluated to improve the quality of care.
- » A process to integrate psychosocial distress screening is monitored each year.
- » The effectiveness of community outreach activities is monitored each year.
- » The percentage of patients accrued to cancer-related clinical trials is monitored each year.
- » The American Joint Committee on Cancer's TNM staging by the managing physician is monitored.
- » Cancer conferences are reviewed and monitored for frequency, multidisciplinary attendance, total case presentation and prospective case presentation.
- » The College of American Pathology's scientifically validated data elements outlined on the surgical case summary checklist of the CAP publication, Reporting on Cancer Specimens, are reviewed and monitored.
- » Nursing competency is evaluated annually as well as the rate of oncology-certified nurses to RNs.
- » The Cancer Registry data and activities are evaluated and monitored for case-finding, accuracy of data collection, abstracting timeliness, quality, follow-up and data reporting.
- » A subcommittee monitors the activities of the Breast Care Center.
- » ACS' standards are established, implemented, monitored, evaluated, achieved and documented to ensure Commission on Cancer and NAPBC accreditation.
- » The rectal cancer program director presents annually to the cancer committee for the National Accreditation Program for Rectal Cancer.

CANCER COMMITTEE MEMBERS

Edward Levine, MD, Chair \ Surgical Oncology

Caitlin Bozick, MS, CGC \ Genetic Counselor

Typhany Morrison-Brooks \ Cancer Services

Akiko Chiba, MD / Surgical Oncology

Wendy Cox \ Sr. Business Analyst, Oncology Service Line

Kelly Cronin, MD \ Diagnostic Radiology

Kathy Flowers, MBA, BSN, RN, NE-BC \ Manager, Radiation Oncology

Janet Forrest, MHA, FACHE \ Administrative Director, Oncology Service Line

Carl Robert Grey, MD \ Palliative/Supportive Care

Kathryn Greven, MD \ Radiation Oncology

Marissa Howard-McNatt, MD \ Surgical Oncology / Breast Care Center / Cancer Liaison Physician

Inez Inman, BS, RHIT, CTR \ Cancer Registry

Carrie Klamut \ American Cancer Society

Richard McQuellon, PhD, HSP-P \ Psychosocial Oncology and Cancer Patient Support Programs

Reggie Munden, MD, DMD, MBA \ Interim VP Cancer Services

Stacey S. O'Neill, MD, PhD \ Pathology

Amy Pace, MSW \ Care Coordination

William Jeff Petty, MD \ Hematology / Oncology

Susan Poindexter, BSN, RN \ Nursing Education Coordinator, Hematology / Oncology

Rebecca Rankin \ Director of Administration, Comprehensive Cancer Center

Brandy Strickland Snyder, PharmD \ Pharmacy

Shanna Steelman, WHNP \ Breast Care Center

Thuy Vu, MS, CGC \ Genetic Counselor

Wendy Watson, RD, CSO, LDN \ Nutritionist

CANCER REGISTRY STAFF

Inez Inman, BS, RHIT, CTR \ Manager

Janice Boggs, RHIT, CTR \ Oncology Data Analyst

Jenean Burris, RHIT, CTR \ Oncology Data Analyst

Cindy McAlpin, BA, CTR \ Oncology Data Analyst

Tammie Miller, RRT, CTR \ Oncology Data Analyst

Pamela Childress-Obenauf, BA, CTR \ Oncology Data Analyst

Kimberly Ortiz, BS, CTR \ Oncology Data Analyst

Shawnetta Peebles, RHIT, CTR \ Oncology Data Analyst

Michael Serwint, MD, CTR \ Oncology Data Analyst

Querube Storti, RRT, CTR \ Oncology Data Analyst

Terri Swan, CTR \ Oncology Data Analyst

2018 CANCER ACTIVITIES





More than 450 patients were seen in the survivor's clinic making it the busiest year to date.

BREAST CARE CENTER

The multimodality Breast Care Center celebrated its 19th anniversary in January 2019. In 2018, 360 patients were seen with breast cancer in the Breast Care Center. The center's goal is to provide state-of-the-art care for the full spectrum of breast diseases in a patient-focused environment. All new cases are reviewed by our multimodality team with the mammographers, genetic counselors, a radiation oncologist and other oncologists before the patient is seen in clinic.

Typically, patients are seen by a multidisciplinary group consisting of surgeons, a radiation oncologist, a plastic surgeon, nurse practitioners, a genetic counselor and a medical oncologist, if necessary. The Breast Care Center had its National Accreditation Program for Breast Centers (NAPBC) certification renewed in 2018, with full continuing accreditation of the center.

Our breast surgery team consists of two breast surgery trained physicians: Marissa Howard-McNatt, MD, as the director of the center, and Akiko Chiba, MD, who completed her breast surgery fellowship at Mayo Clinic. Edward Levine, MD, our division head and surgical oncologist, also sees breast cancer patients. Our medical oncology team is represented by Alexandra Thomas, MD, who is the leader of the breast hematology oncology division. She is also the co-leader of the Breast Disease Oriented Team, along with Dr. Howard-McNatt. The other breast medical oncologists include Susan Melin, MD, Tiffany Avery, MD, Katherine Ansley, MD, Steven Sorscher, MD, and Heidi Klepin, MD, in the breast hematology and oncology section. Doris Brown, MD, PhD, heads the breast radiation oncology section.

This Breast Care Center's 3-D tomosynthesis mammography unit continues to thrive, with locations at the Comprehensive Cancer Center, Medical Plaza – Clemmons and Wake Forest Baptist Health Outpatient Imaging. Screening and diagnostic imaging are offered on the unit. The number of mammograms increased in 2018 due to the use of tomosynthesis. In February 2018, we adopted the SAVI SCOUT® surgical guidance system. This system uses nonradioactive, electromagnetic wave technology to detect a reflector that

is placed in the target tissue days to weeks before surgery. Since that time, we have performed 122 Savi localization procedures.

The Savi system has enabled the surgeons to have their first case (7 am) in the operating room be an image-guided lumpectomy. This saves both time and money as the operating team is not waiting for a patient to arrive from mammography. The Savi system also has enabled the mammographers to increase their biopsy procedure volume. Overall, the Savi system has had a successful implementation at our institution.

The Breast Cancer Survivor's Clinic in Clemmons is thriving. More than 450 patients were seen in the survivor's clinic making it the busiest year to date. Run by nurse practitioners, the clinic sees patients who are more than two years out from their initial breast cancer diagnosis. The survivor's clinic not only provides monitoring of these patients but in-depth psychosocial and health maintenance of these high-risk women. In combination with the benign breast clinic in Clemmons, a total of 778 patients were seen at the Clemmons location in 2018.

The Breast Care Center hosted the 13th Annual Breast Cancer Symposium in October 2018. Lectures covered a wide range of topics, from genetics and imaging to treatment and survivorship issues for breast cancer patients. The annual event provides continuing education to community providers with the goal of improving health care for those with breast disease.

Research is a key component of the Breast Care Center, which actively supports cooperative group breast trials from the NRG Oncology, the Alliance and SWOG Cancer Research Network. The Breast Care Center also has a variety of institutional research initiatives that have led to several publications in prestigious journals, including *Annals of Surgical Oncology* during the past year, and several presentations at national meetings including the Society of Surgical Oncology Annual Cancer Symposium, the American Society of Breast Surgeons and the San Antonio Breast Cancer Symposium.

CARE COORDINATION

Nurse case managers and social workers are integral members of the health care team, providing services to patients and families. Staff members work collaboratively with other team members to assure that patients' and family members' needs are addressed. Arrangements for post-discharge care are handled by the case manager or social worker. Services may include crisis intervention and counseling, and referrals for home health or DME (durable medical equipment), hospice or other local resources.

Patients being followed in the outpatient oncology clinics also have the services of a social worker available to them. The social worker follows patients who may need counseling or crisis intervention, assistance with transportation to and from medical appointments, referrals to local resources and information regarding medication assistance programs.



COMMUNITY OUTREACH / PUBLIC EDUCATION

One of the Comprehensive Cancer Center's goals is promoting public awareness of cancer. Prevention and early detection are stressed through educational programs and activities. The following were highlights of our public awareness program:

- » Seasons of Survival – Discussion of medical management, exercise, nutrition, relaxation and stress management techniques.
- » Fair of Community Resources / Hispanic Support Group / Provide resource information.
- » Health fair at churches – Distribution of cancer information pamphlets.
- » Kick Butts Day – A national day of activism, organized by the Campaign for Tobacco-free Kids, that empowered youth to stand out, speak up and seize control against Big Tobacco. Presentations included lung cancer prevention, symptoms and treatment.
- » Strollin' Colon – Health fair regarding colorectal cancer awareness.
- » Community Mural Art Project – Community project focused on increasing health/wellness, drug prevention and positive youth engagement.
- » N.C. Cancer Prevention and Control 11th Annual Cancer Survivorship Summit – Provided survivorship resources and other cancer information.
- » Relay for Life – Educational materials regarding melanoma and breast cancer.
- » Lung Cancer Initiative of N.C.: A Network of Hope and Action – Presentations included gamma knife, lung cancer with brain metastases, robotic surgery, lung cancer immunotherapy and low-dose CT lung cancer screening.
- » Colon Cancer Coalition Race – Get Your Rear in Gear.
- » Athena's Run – Educational information and statistics on gynecologic cancer.
- » 17th Annual Pink Ribbon Talks: Breast Cancer Survivor Conference.
- » Breast Cancer Awareness – Importance of screening and testing options.
- » 4 U Day – Games, make-up, food and information.
- » LUNGe Forward 5K and 1K Run, Walk & Rally – Proceeds benefited the Lung Cancer Initiative of N.C.
- » Updates in lung cancer from American Society of Clinical Oncology.
- » Smoking Cessation Youth Camp Day.
- » Post-traumatic Stress After Cancer.
- » Living on the Edge GYN Survivor Conference.
- » Oral cancer screening.

CANCER PREVENTION AND CONTROL RESEARCH PROGRAM

The Cancer Prevention and Control (CPC) Program is focused on scientific discovery across the cancer continuum that translates into clinical, community and policy strategies to improve cancer outcomes. Program members prioritize research relevant to the Wake Forest Baptist Comprehensive Cancer Center (WFBCCC) catchment area: 4.1 million residents in 58 counties, predominantly Appalachian (n=46) and non-metropolitan/rural (n=37) regions.

The 23,100 annual new cancer cases and 9,000 cancer deaths in the WFBCCC catchment area are 3% and 5% higher than nationwide rates for all cancers combined. The CPC Program conducts locally relevant, rigorous and translatable research across three specific aims:

- 1) Promote healthy lifestyles that reduce the risk of cancer incidence, morbidity and mortality;
- 2) Improve survivorship experiences and outcomes; and
- 3) Accelerate the discovery, efficacy, and implementation of best and promising practices in cancer prevention and control.

Our program includes 34 scientific members in 15 departments and sections. Program members have secured over \$9.2 million in extramural cancer-related research funding to achieve these aims. Some of the major ongoing projects include:

PRIMARY PREVENTION AND EARLY DETECTION OF CANCER

- » Evaluating New Nicotine Standards for Cigarettes
- » Effective Communication on Tobacco Product Risk and FDA Authority
- » Comparing Graphic to Text-only Warning Labels to Discourage Cigarillo Smoking by Young Adults
- » The National Coalition Network for Tobacco and Cancer-free Living Centers for Disease Control and Prevention
- » Building Social Networks to Improve Physical Activity and Weight Loss in Latino Parents
- » Mobile Health Intervention for Family Smoking Cessation in Romania
- » Tobacco Use During the Transition to Adulthood
- » Consumer Perceptions of Health Claims in Vape Shops
- » Synaptic Correlates of Vulnerability and Resilience to Alcohol-use Disorders
- » Wake Forest Translational Alcohol Research Center

SURVIVORSHIP

- » A Prospective Study of the Impact of Breast Cancer on Symptoms and Functioning
- » A Stepped-care Telehealth Approach to Treat Distress in Rural Cancer Survivors
- » Work Ability in Young Adult Survivors: A Quantitative Investigation
- » Understanding and Predicting Fatigue, Cardiovascular Decline and Events After Breast Cancer Treatment
- » Prepare to Care, A Supported Self-Management Intervention for Head and Neck
- » Optimizing Health-related Quality of Life Measurement in Adolescent and Young Adults
- » Influence of Prostate Cancer Treatment on Work Experience with Focus on Race and Income
- » EHealth Mindful Movement and Breathing to Improve Gynecologic Cancer Surgery Outcomes
- » Targeting IRE-1A to Protect Against Radiation Therapy-induced Bone Loss
- » Brain Mechanisms Supporting Mindfulness Mediation-based Chronic Pain Relief

EFFICACY AND IMPLEMENTATION OF BEST AND PROMISING CPC PRACTICES

- » Effectiveness and Implementation of mPATH-CRC: A Mobile Health System for Colorectal Cancer Screening
- » Consumer Perceptions of Health Claims in Vape Shops
- » Implementation of Smoking Cessation Services within NCI NCORP Community Sites with Lung Cancer Screening Programs
- » The Quit Kit: Pilot test of a Novel, Clinic-based Strategy to Promote Smoking Cessation



A full range of surgical options for gynecologic cancers is offered, including radical cytoreductive and exenterative procedures as well as laparoscopic and robotic-assisted.



GYNECOLOGIC ONCOLOGY

As an integral part of the Comprehensive Cancer Center, the Section on Gynecologic Oncology provides comprehensive care for patients with pre-malignant and malignant gynecologic disease.

This includes surgical management, chemotherapy and radiation therapy in conjunction with colleagues in radiation oncology. There is a strong collaborative relationship with surgical oncology, medical oncology and interventional radiology. In 2018, Gynecologic Oncology treated over 200 newly diagnosed gynecologic malignancies, predominantly diseases of the uterine corpus and ovary.

The Section on Gynecologic Oncology provides expert consultation and management of gynecologic malignancies diagnosed regionally including the Comprehensive Cancer Center's 19-county service area. Evaluation at outreach clinics is offered in Greensboro, Hickory and Lexington to allow patients improved access to subspecialty cancer care. Inpatient and outpatient care is coordinated by a nurse navigator, two nurse practitioners and additional dedicated nursing and administrative support staff.

The full range of surgical options for gynecologic cancers is offered, including radical cytoreductive and exenterative procedures as well as minimally invasive surgery whenever feasible. Under the leadership of Michael Kelly, MD, use of laparoscopic and robotic-assisted surgical techniques has grown substantially. As a result, many patients can be discharged the same day or within 24 hours of surgery. In this regard, early recovery after surgery is a major focus in the surgical management of gynecologic malignancies.

Patients with gynecologic cancers are offered participation in clinical trials initiated by investigators at Wake Forest Baptist Health, as well as through national collaborative groups (for example, NRG Oncology) and partnerships with industry. Open trials emphasize the management of newly diagnosed and recurrent ovarian cancer using novel chemotherapy and biological agents.

The Comprehensive Cancer Center, through Surgical Oncology, is nationally recognized for its peritoneal malignancy program incorporating hyperthermic intraperitoneal chemotherapy (HIPEC). Gynecologic Oncology is presently using this modality in gynecologic malignancies. There is now a protocol incorporating HIPEC in newly diagnosed ovarian and peritoneal cancer. In development are protocols using HIPEC in recurrent ovarian carcinoma and second-look minimally invasive procedures.

A dedicated, multidisciplinary tumor board composed of gynecologic oncologists, radiation oncologists, gynecologic pathologists and diagnostic radiologists meets regularly to discuss challenging cases.

In September 2017, David Shalowitz, MD, joined the Gynecologic Oncology faculty. In addition to his clinical practice, he leads the section's research efforts in cancer care delivery and health policy. This involves local, regional and national investigations of gynecologic cancer care delivery including quality improvement initiatives to ensure that patients receive the highest standard of care.

In August 2018, Janelle Pakish, MD, joined the Gynecologic Oncology faculty after completing a fellowship in gynecologic oncology at MD Anderson Cancer Center. In addition to clinical gynecologic oncology, she has an interest in clinical trials and immunotherapy in gynecologic malignancies.

The Section on Gynecologic Oncology includes:

- » Samuel S. Lentz, MD, Professor and Section Head
- » Michael G. Kelly, MD, Associate Professor
- » David I. Shalowitz, MD, MSHP, Assistant Professor
- » Janelle B. Pakish, MD, MS, Assistant Professor

HEAD AND NECK ONCOLOGY

Head and neck cancer continues to constitute a significant proportion of cancers seen at Wake Forest Baptist Health.

In 2017, 520 patients were seen with tumors of the oral cavity, oropharynx, larynx, salivary gland, sinonasal cavity, thyroid and other head and neck sites. Our Cancer Center is among the busiest hospitals in the Southeast and Mid-Atlantic in the treatment of head and neck cancer patients, which demonstrates our referring providers' confidence in our team's care delivery. Members of our team have subspecialty training and years of experience focused on the treatment and survivorship of head and neck cancer patients.

The number of patients treated includes a large incidence of oral cavity and laryngeal cancers, most of which are tobacco-related. In addition, our team cares for an increasing population of patients with HPV-associated oropharyngeal cancers, mirroring the national trend.

The coordination of multiple disciplines in the care of head and neck cancer patients is essential. A multidisciplinary Head and Neck Oncology Tumor Board meets weekly and is staffed by representatives of the following departments:

- » Otolaryngology: J. Dale Browne, MD, Christopher Sullivan, MD, Joshua Waltonen, MD, and Hafiz Patwa, MD (General Head and Neck Oncology / Skull Base Surgery / Thyroid Tumors / Head and Neck Cancer Reconstruction)
- » Radiation Oncology: Kathryn Greven, MD, and Bart Frizzell, MD
- » Medical Oncology: Mercedes Porosnicu, MD, and Thomas Lycan, DO
- » Dentistry Division: Judith Messura, DMD, and David Kretzschmar, DDS
- » Pathology
- » Diagnostic Radiology
- » Speech and Language Pathology
- » Nutrition


Consultations with adjunctive services are coordinated. Each new patient is evaluated by appropriate team members, and a treatment plan is recommended to the patient and referring physician. Resident attendance at the clinics is encouraged for educational benefits. In addition to discussion of new cases, didactic lectures are presented, and progress of new or ongoing clinic trials is described.

These conferences facilitate more effective physician consultative planning and management decisions. Involvement of a dedicated head and neck cancer nurse navigator allows for efficiency in scheduling appointments and improving patient convenience.

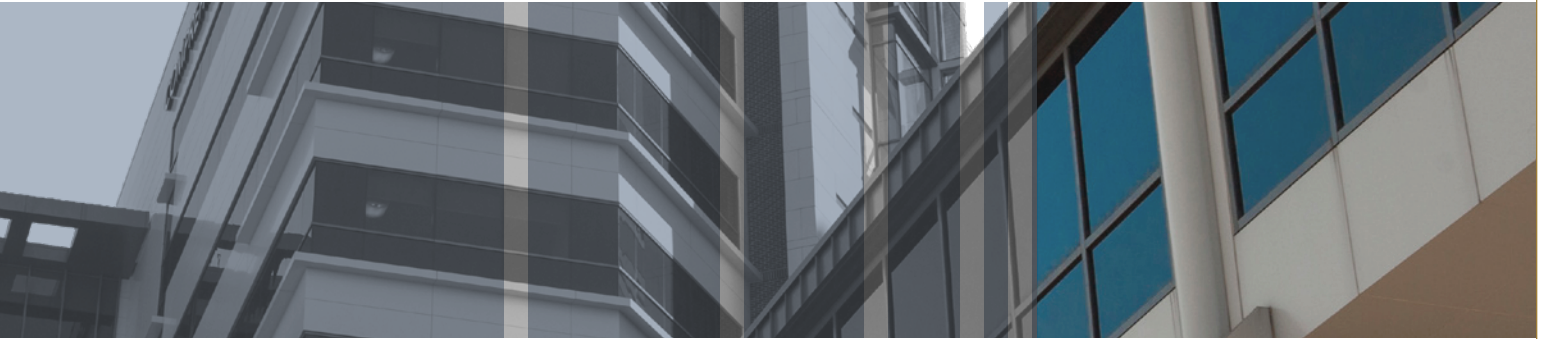
Current surgical, radiation and chemotherapeutic strategies emphasize state-of-the-art techniques that are designed to maximize cure rates while preserving function. Surgeons have expertise in free tissue transfer with microvascular reconstruction, allowing restoration of form and function that may be disrupted during large head and neck ablative surgeries.

Approximately 100 microvascular free flap procedures are performed each year. Minimally invasive surgical techniques available to select patients include endoscopic transoral laser resection of laryngeal tumors and transnasal endoscopic resection of skull base. In addition, we have a robust experience in transoral robotic surgery, especially for the increasingly common HPV-related oropharyngeal cancers. Advanced protocols using the most up-to-date strategies for radiotherapy and chemotherapy are offered to appropriate patients in either definitive or adjunct treatment settings. The Gamma Knife stereotactic radiation unit is nationally known and available as well for select patients.

Multiple research trials are underway, an important component of the treatment and surveillance of head and neck cancer patients. Several publications in prestigious journals and presentations at national meetings result each year from these trials.



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HEMATOLOGY AND ONCOLOGY

The Section on Hematology and Oncology is composed of 42 MD and PhD full-time faculty who are involved in clinical and translational research and emphasize access to the most effective treatments and clinical trials. With advances in biologic agents and immunotherapy, the value of subspecialty care and access to novel agents through clinical trials has continued to increase. Our physicians emphasize clinical research and the multidisciplinary care of patients with all types of cancer.

Participation of hematology and oncology physicians is critical to the success of tumor board conferences that emphasize communication and consensus recommendations for patients. These conferences exist for the cancers most commonly diagnosed at our institution including breast, colon, head and neck, leukemia, lung, lymphoma and prostate. The full spectrum of hematologic and oncologic disorders is expertly treated by the section's faculty.

Specific areas of research focus include the Prostate, Breast and Brain Tumor Centers of Excellence within the Comprehensive Cancer Center. Other areas of subspecialty expertise include bone marrow and stem cell transplants, head and neck cancers, gastrointestinal cancers, genitourinary cancers, specialized geriatric oncologic care, leukemia and lymphoma, lung cancer, melanoma, myelodysplasia, myeloma and sarcoma.

Hematology-focused faculty lead the institution's apheresis program and special hematology lab in addition to managing a busy protocol support laboratory and maintaining multidisciplinary clinics for patients with a variety of benign hematologic conditions. A nationally recognized Psychosocial Oncology Program, established more than two decades ago, continues to be led and staffed by section faculty as well. A multidisciplinary Precision Oncology Program has leveraged

state-of-the-art tumor genome sequencing technology to identify and match specific cancer genetic signatures with treatments targeting genes that drive the cancers growth.

The goals of these and other team efforts are to:

- » Individualize the care of patients with cancer and blood disorders.
- » Meet the medical, emotional and informational needs of patients and their families.
- » Provide access to cutting-edge clinical trials.

The section maintains a longstanding commitment to training the hematology and oncology practitioners of the future—15 clinical fellows are continuously enrolled in our three-year Hematology and Oncology Fellowship Training Program, which is accredited by the Accreditation Council for Graduate Medical Education. The training program also participates in and is compliant with the Quality Oncology Practice Initiative, which is a program instituted by the American Society of Clinical Oncology to ensure patient-centered quality care and provide a mechanism for continuous quality assessment and quality improvement within our patient care programs. Hematology and Oncology faculty members remain committed to the educational mission of the Wake Forest School of Medicine and play major teaching roles in the medical student curriculum and the internal medicine resident and physician assistant student training programs. They also serve as clinical and research mentors for a large number of medical students, residents, graduate students and post-doctoral fellows involved in cancer-related bench or clinical research activities.

As a group, Section of Hematology and Oncology faculty remain committed to providing state-of-the-art novel therapies to our patients. The clinical mission of the

section is also supported by 25 physician assistants and nurse practitioners. Multiple faculty members serve in leadership positions within a variety of national oncology cooperative trial groups including:

- » The Alliance for Clinical Trials in Oncology (a merging of the cooperative groups Cancer and Leukemia Group B, North Central Clinical Trials Group and American College of Surgeons Oncology Group).
- » Adult Brain Tumor Consortium.
- » The Wake Forest National Cancer Institute Community Oncology Research Program (NCORP) Research Base (NCORP is a National Cancer Institute-funded cooperative group headquartered at Wake Forest that develops and leads cancer prevention and control clinical trials and cancer care delivery research protocols within a network of community oncology practices across the country).

In 2018, section members enrolled approximately 576 patients on a full spectrum of treatment, non-treatment and ancillary clinical trials including phase I, II and III cooperative group, investigator-initiated and industry-sponsored studies.

As part of our educational mission, section faculty lead the Charles L. Spurr Piedmont Oncology Symposium, which was established over 30 years ago as the Piedmont Oncology Association by Dr. Spurr, the founding director of our Cancer Center. The symposium occurs semi-annually and brings together regional and national experts to provide CME updates for hematology and oncology physicians, fellows, nurses and research staff throughout the Southeast. This symposium facilitates the dissemination of research to busy general oncologists in our region.

A number of faculty members also maintain active funded basic and translational science laboratories in addition to their clinical duties. The focus of these lab efforts includes:

- » Developing new treatment strategies for patients with melanoma.
- » Finding novel therapeutics for patients with acute leukemias, and understanding the mechanisms of resistance of current leukemia therapies.
- » Evaluating novel therapeutics to prevent and treat graft-versus-host disease.

Hospital-based activity for the section continues to be centered around five inpatient services:

- » Two general hematology and oncology services.
- » A leukemia service.
- » A blood and marrow transplant service.
- » A hospitalist-run service that pairs hospitalists and hematologist/oncologist consultants to care for patients with medical complications of their malignant and hematologic disorders.

Hematology and Oncology faculty continuously staff a busy inpatient consult service. A smooth transition between inpatient and outpatient care is a major goal of our efforts to provide outstanding patient care.

In addition to the inpatient and outpatient activities at Wake Forest Baptist Medical Center in Winston-Salem, Hematology and Oncology faculty also maintain full-time, full-service practices in Clemmons, Elkin, High Point, Lexington, Mount Airy and Statesville.

A strong relationship exists with the Veterans Administration facilities in Kernersville and Salisbury. The oncology services for these facilities are primarily provided by cross-appointed faculty members and members of the Hematology and Oncology Section. These locations allow military service members and their dependents to receive cancer and blood-disorder care much closer to home than was previously possible.

In 2018, section members enrolled approximately 576 patients on a full spectrum of treatment, non-treatment and ancillary clinical trials including phase I, II and III cooperative group, investigator-initiated and industry-sponsored studies.



OPHTHALMOLOGY

The Wake Forest Baptist Health Eye Center and the Department of Ophthalmology offer comprehensive ophthalmic tumor diagnosis and treatment to people in western North Carolina, South Carolina, eastern Tennessee, southwestern Virginia and West Virginia. Primary and secondary neoplasms of the eye, ocular adnexa and orbit are evaluated and treated using state-of-the-art technology.

The most common primary malignant intraocular neoplasm in adults is choroidal melanoma. The incidence of choroidal melanoma is about six people per 1 million population, and 30 to 40 new patients with this diagnosis are evaluated and treated annually at the Eye Center. Large intraocular melanomas are often treated by enucleation or removal of the eye. Currently, most eyes can now be salvaged and treated by iodine 125 radioactive plaque application. This treatment is a combined surgical-radiation modality in which a radioactive implant is sutured to the eye wall overlying the tumor, delivering a dose of radiation to the melanoma in order to cause regression. This procedure has been performed at our institution for over 25 years and is performed by Craig Greven, MD, in conjunction with the Department of Radiation Oncology and Kathryn Greven, MD. Another technique, transpupillary thermotherapy, is a laser procedure that can be used to treat small melanomas of the choroid as well.

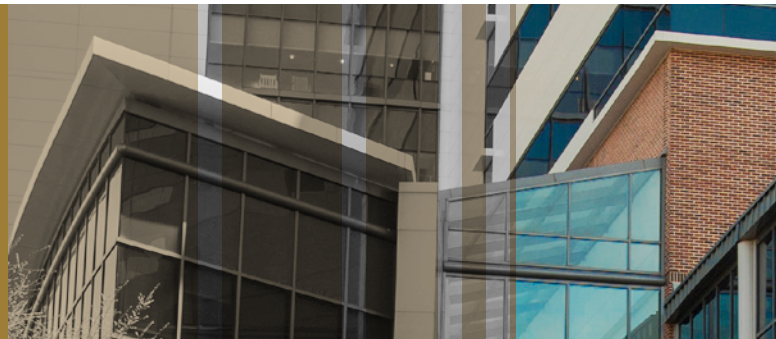
Tumors of the eyelids and orbit are managed by Alejandra Valenzuela, MD, of the orbital and oculoplastic surgery service. Lymphoma, a malignancy with frequent orbit

involvement in adults, and rhabdomyosarcoma, the most common primary malignant orbital tumor in childhood, often present to the orbital service for evaluation. Our surgeons work closely with physicians in the departments of Neurosurgery, Otolaryngology and Hematology / Oncology to provide a multidisciplinary approach to tumors occurring in the sinuses and anterior cranial fossa that may encroach upon the eye and orbit. For tumors that occur on the eyelids and face, Dr. Valenzuela works closely with colleagues in the Department of Dermatology, who use techniques to minimize eyelid and facial tissue loss with tumor removal that, in turn, minimizes the complexity of oculofacial repairs enhancing functional and cosmetic outcomes.

Malignant tumors of the ocular surface are treated by Matthew Giegengack, MD, a corneal and external disease specialist. Malignancies of ocular surface may be treated surgically, with cryotherapy or with topical chemotherapy. Many of these management strategies have been developed at our Eye Center. Treatment regimens are tailored to the individual patient and may include one or all three modalities in an effort to preserve vision and limit complications of treatment. In addition to treatment of neoplasms, Dr. Giegengack is expert in ocular surface reconstruction.

Eye Center physicians use a multidisciplinary approach in the management of ocular and orbital neoplasms. The collaborative efforts of the Eye Center and other specialists at Wake Forest Baptist allow state-of-the-art oncologic treatment for patients.

There are three primary categories of tumors treated by Orthopaedic Oncology: soft-tissue tumors, bone tumors, and bone lesions.



ORTHOPAEDIC ONCOLOGY

Orthopaedic Oncology, part of the Cancer and Musculoskeletal service lines, is committed to the comprehensive and specialized care of patients with tumors.

Within these service lines, there are two fellowship-trained orthopaedic oncologists, Scott Wilson, MD, and Cynthia Emory, MD, MBA, who see adult and pediatric patients in the Comprehensive Cancer Center three days a week and can see new patients within 24 to 72 hours of referral. Colleagues in Medical Oncology, Radiation Oncology, Musculoskeletal Radiology and Pathology are immediately available for consultation and collaboration, contributing greatly to the team approach. Drs. Wilson and Emory facilitate the needs of patients, often collaborating with other surgical specialists at the medical center—including surgical oncologists, spine surgeons, pediatric surgeons, vascular surgeons and plastic surgeons—to maximize patient outcomes and the treatment of complex conditions.

There are three primary categories of tumors treated by Orthopaedic Oncology: benign and malignant soft-tissue tumors, benign and malignant bone tumors, and metastatic bone lesions.

Every year, more than 500 operations are performed for orthopaedic tumors or tumor-related conditions. Initiation of treatment typically starts with a biopsy to determine the type of tumor. Most biopsies are now performed as small needle biopsies in the office, avoiding the cost, risk, pain and inconvenience of an open biopsy in the operating room. Patients will often know their diagnosis on the same day as their office biopsy, facilitating rapid implementation of treatment.

New technologies are routinely embraced. The orthopaedic oncology surgeons use intraoperative CT and computer navigation for complex pelvic tumor surgery, improving the accuracy of identifying exactly where the tumor is in multiple dimensions. Limb-sparing operations, where resection of malignant bone tumors is followed by innovative reconstruction techniques—including modular endoprostheses, allograft utilization, and vascularized bone and tissue transfers—are often performed, allowing limbs to be saved that previously would have required amputation.

Patients with these tumors are routinely treated with limb salvage techniques due to advances in earlier detection and adjuvant treatment with chemotherapy and or radiotherapy. An extremely close working relationship with faculty from both Medical Oncology and Radiation Oncology has further developed our multidisciplinary team approach for the treatment of bone and soft-tissue sarcomas.

Benign lesions of bone and soft tissues are encountered more frequently than primary malignant tumors and account for many of the surgeries performed. However, many benign bone and soft-tissue lesions can be treated without surgery, with the diagnosis obtained by a variety of studies including radiographs, nuclear bone scans, CT scans, MR imaging, and needle or open biopsy. This reliance on sophisticated radiographic imaging has led to a close working relationship with faculty members from the musculoskeletal radiology section of the Department of Radiology.

Because of the complexity of tumors, interdepartmental communication is critical. Being part of one Comprehensive Cancer Center ensures that we have seamless communication, not only to improve patient care but also to improve the patient experience. These collaborations also lead to innovative research with colleagues in several other departments and other academic centers. The Orthopaedic Oncology team recently completed a multicenter clinical trial that investigated a novel surgical treatment for metastatic tumors of the arm with an innovative and minimally invasive implant to improve patients' pain and function. This device was recently approved by the Food and Drug Administration, and this device has created a new and minimally invasive surgical option for patients that previously did not exist.

Regular orthopaedic oncology teaching conferences are part of the core curriculum to train the next generation of orthopaedic surgeons in addition to an annual orthopaedic oncology review course. Multidisciplinary conferences enable the Orthopaedic Oncology team to review the clinical findings in conjunction with the radiology and pathology of tumors with colleagues from other disciplines so that the team can make optimal treatment recommendations for patients.

PALLIATIVE / SUPPORTIVE CARE

SUPPORTIVE CARE OUTPATIENT ONCOLOGY CLINIC

Jennifer Gabbard, MD, and Carl Grey, MD, available on the third floor of the Comprehensive Cancer Center, assist patients in managing any uncontrolled symptom related to their cancer in general or related to side effects of treatment, such as pain, fatigue, nausea, shortness of breath, loss of appetite, anxiety, depression, neuropathy (nerve pain), etc., that can interfere with everyday functioning.

They also can address emotional issues, such as the stress of having a serious illness and loss of identity. The goal of the clinic is to provide a safe haven for patients and their families and to improve overall quality of life and function. The Supportive Care team is also available upon request for patients who are admitted to the hospital. Interested patients should speak with their primary oncologist for a referral.



Jennifer Gabbard, MD



Carl Grey, MD

PATIENT FAMILY ADVISORY COUNCIL

The Patient Family Advisory Council of the Comprehensive Cancer Center started in May 2013 and is dedicated to bringing patient volunteers and medical center staff together to enhance and promote our family-centered care philosophy.

Patients or family members share personal experiences and perspective with the goal of improving the overall care and experience. The team partners to improve policy and procedures, gives valuable input to various initiatives across Wake Forest Baptist Health and participates in giving back to others.

The council sponsors a Coffee Time meeting quarterly, alternating between inpatient and outpatient settings within the Cancer Center. This time is spent in dialogue with current patients and families sharing stories of past and present journeys. In addition, it is a time to learn about immediate concerns that need to be addressed. The team has provided feedback for the Quietness Campaign, participated in Just for You Day and Celebration for Life events, been involved in medical resident training, and implemented food delivery for Gamma Knife patients and families.

PEDIATRIC ONCOLOGY

The Pediatric Oncology Program sees approximately 70 new oncology patients per year. A dedicated hematology/oncology unit in Brenner Children's Hospital contains 16 private inpatient beds, six outpatient clinic rooms and a day hospital/observation area. Both the inpatient unit and outpatient clinic underwent renovations in 2018. Patients come from the Piedmont and central/western North Carolina, as well as southwest Virginia and southern West Virginia. Most referrals come from pediatricians and family practitioners.

Pediatric Oncology is staffed by seven pediatric hematologists/oncologists:

- » Marcia Wofford, MD, associate dean for student affairs for Wake Forest School of Medicine, who continues to practice pediatric hematology/oncology.
- » Tom McLean, MD, who is section chief of Pediatric Hematology/Oncology, medical director of the inpatient and outpatient pediatric hematology/oncology services, and mentor for the medical school's learning communities ("houses").
- » Natalia Dixon, MD, who oversees the pediatric hemoglobinopathy and hemophilia programs. Her primary interests are in pediatric hematology, specifically anemia, general non-malignant hematology, hemoglobinopathies, and thrombotic and hemorrhagic disorders in children.
- » Kevin Buckley, MD, whose interests include general pediatric hematology/oncology, infections in immunocompromised populations and immune reconstitution after chemotherapy. In addition to pediatric hematology/oncology, he is also board certified in pediatric infectious diseases.
- » Thomas Russell, MD, who practices general pediatric hematology/oncology and has expertise in pediatric sarcomas. He is also associate director of the Pediatrics Residency Program.
- » David Kram, MD, who practices general pediatric hematology/oncology and has developed expertise in pediatric neuro-oncology, working in collaboration with members of the Cancer Center's Brain Tumor Center of Excellence.
- » Cristina Fernandes, MD, who practices general pediatric hematology/oncology and has expertise in long-term follow-up of pediatric cancer survivors.

Pediatric Oncology has four pediatric nurse practitioners, two physician assistants, three doctors of pharmacy and two clinical research associates. There are numerous dedicated pediatric hematology/oncology nurses for clinic and hospital work, as well as a home and school visitation program for children with cancer.

The Pediatric Oncology Psychosocial Team is composed of a social worker, counselor, psychologist, child life specialist, art therapist and chaplain. Pediatric Oncology receives professional support from therapists, nutritionists and pediatric pharmacists.

Brenner Children's Hospital contains 16 private inpatient beds, six outpatient clinic rooms and a day hospital/observation area.

There is a weekly Pediatric Oncology team meeting as well as a pediatric tumor conference every other week, which includes pediatric surgeons, radiation oncologists, pathologists, radiologists, residents and medical students.

The Children's Cancer Support Program (CCSP), staffed with a full-time counselor/director, focuses on patient education as well as many levels of individual and group, social and psychological support for on-therapy and off-therapy patients and families. The CCSP has a "Peds Pal" program that pairs interested medical students with specific patients for emotional and psychosocial support.

Pediatric Oncology is an active member of the Children's Oncology Group (COG). Pediatric Oncology also has active COG members from the disciplines of surgery, pathology, radiation oncology, radiology, nursing, pharmacy, cytogenetics and data management. The primary research conducted by Pediatric Hematology/Oncology is enrollment of patients into COG clinical trials, although section members are also involved in several investigator-initiated research projects, including an innovative male fertility program.

Over 50,000 prescriptions were dispensed in the Cancer Center community pharmacy in 2018, with over 5,758 prescriptions for oral chemotherapy.



PHARMACY

Oncology pharmacists serve an important role on the multidisciplinary team for cancer patients and provide medication management services across the care continuum. Pharmacists work closely with other health care professionals to develop institutional guidelines and assist with evidence-based decisions for treating patients. Pharmacy staff also assist patients through transitions of care, oral chemotherapy management, infusion therapy and self-care at home.

Advancements in cancer treatments have become more complex involving immunotherapy, targeted therapies and pharmacogenomic testing. Aggressive approvals of new oncologic drugs by the Food and Drug Administration in 2018 resulted in a total of 16 new therapies.

In the acute care setting, the pharmacy team completes admission medication reconciliation, patient education and discharge medication review and facilitates delivery of medications to the bedside. The pharmacy team is actively involved with the patient care team in ensuring that medications are appropriate—patient safety is a top priority.

In the ambulatory setting, the pharmacy team supports safe and effective processing of intravenous chemotherapy orders in eight infusion clinics. Using several important safety checks in verifying and compounding chemotherapy, the pharmacy team prepared over 49,500 patient-specific infusions during the 2018 fiscal year.

The Pharmacy Department is a global leader in adopting automated intravenous medication preparation for hazardous drugs. Using high-precision robotics helps ensure safety in preparation for patients and family members, and it protects employees. Over the last year, 85% of all chemotherapy was made on the chemotherapy robot at the Wake Forest Baptist Medical Center campus in Winston-Salem.

In addition to compounding services, clinical pharmacists are embedded in the ambulatory multispecialty medical oncology clinic to provide direct patient and provider

education, monitor adherence, improve access to medications and serve as an authoritative resource on the optimal use of medications to treat cancer patients.

In the home setting, Wake Forest Baptist Health's community and specialty pharmacies provide home infusion therapies, drug-specific pharmaceutical care plans and routine patient follow-up. Pharmacists secure access to limited distribution oral oncology agents through Wake Forest Baptist Health-operated pharmacies. Over 50,000 prescriptions were dispensed in the Cancer Center community pharmacy in 2018, with over 5,758 prescriptions for oral chemotherapy.

The pharmacy team works proactively with insurance companies to minimize the time from physician prescribing to delivery to the patient. The pharmacy also has a dedicated team of pharmacy technicians that assists with prior authorizations and other medication-related needs and provides on-call services 24/7.

The Department of Pharmacy also fulfills an educational and research mission. The Investigational Drug Service provides oversight of approximately 250 investigational drug studies through protocol review and research committee participation. Pharmacy staff are responsible for preparing, verifying orders, dispensing and managing inventory of investigational medications to ensure compliance with research standards. The team works closely with research coordinators and the medical team to provide patient education and other pharmacy needs.

The postgraduate specialty pharmacy residency program expanded in 2018 and trains pharmacists to care for cancer patients. Pharmacists also educate medical students and residents through participation on the patient care team. The Department of Pharmacy works with three regional schools of pharmacy, and students are also incorporated into the pharmacy care model.

PHILANTHROPY

REMARKABLE BREAKTHROUGHS BEGIN WITH CONSIDERATE, CARING DONORS

The Comprehensive Cancer Center thrives on the generosity of individual donors whose foresight embraces possibilities for life-saving innovations. In addition to federal grants, foundation and industry support, philanthropists offering gifts large and small demonstrate a remarkable commitment to our mission.

In 2018, patients, families and others in this community contributed just over \$4.3 million. Their support touches every area of the Cancer Center, from clinical care and patient support through the Cancer Patient Support Program to research. Many of the contributions made in 2018 fueled high-risk/high-reward oncology research.

One example of an inspiring partnership for giving is the one formed with Wake Forest University undergraduate students nearly 40 years ago. The students host a series of campus fundraising events honoring the memory and spirit of alumnus Brian Piccolo, and their proceeds support research at the Cancer Center. In 2018, the amount raised for the year topped \$500,000 for the first time in the history of the Piccolo Fund.

Individual contributors also make a tremendous impact for the Cancer Center, where every dollar given touches the lives of patients and families. In 2018, Stephen Doughton Jr. and his family, including his parents Susan and Mark, hosted their 11th annual golf tournament. The event raised \$35,000 for leukemia research, reflecting their commitment to the Cancer Center's Hematology and Oncology Program that saved Stephen's life following his diagnosis of chronic myelogenous leukemia in 2006.

"It is incredibly touching to see my patients like Stephen, now with children of their own, reaching out to be a part of finding cures for blood cancers," said Bayard Powell, MD, chief of the Section on Hematology and Oncology. "The Doughtons have been a driver of groundbreaking research. I really enjoy playing in their golf tournament every year—great people and a great cause."

Sometimes philanthropy takes the form of a legacy or estate gift that endows a fund, as Vincent DeLuca of Bedford, Virginia, was moved to do. Vincent and his wife Elizabeth were so touched by her nursing care team that it inspired them to create the Elizabeth DeLuca Continuing Education Fund. Vincent endowed the fund through an estate gift honoring Elizabeth upon her passing. Elizabeth's legacy and this fund will ensure that nurses and nurse aides are continuously offered opportunities to advance themselves professionally and to learn leading-edge oncology patient care.

More modest gifts also contribute to patient aid and research, and pooled contributions can truly bring hope to patients and families. As Janet Stephens Forrest, MHA, FACHE, administrative director of the Oncology Service Line, expressed on learning of Vincent DeLuca's gift, "The philanthropic spirit that lives in many generous individuals makes Wake Forest Baptist Health the leading institution it is today."

For more information about how you can support Wake Forest Baptist Health's Comprehensive Cancer Center, please contact Allison Brouillette at 336-716-2275 or abrouill@wakehealth.edu.



Oncology nurses and staff

Clinical and basic research activities are funded by grants totaling \$1.3 million from the NIH, NCI, foundations/societies and industry.



RADIATION ONCOLOGY

Radiation Oncology continues to grow as it strives to become a top 10 radiation oncology department nationally. There are currently 10 radiation oncologists, 10 radiation physicists and two radiation biologists in the department.

The department is located in the outpatient Comprehensive Cancer Center building and provides multidisciplinary cancer care from medical and surgical oncology as well as diagnostic radiology. With in-department CT/PET and MRI scanners as radiation therapy simulation devices, the department is one of the most technologically sophisticated in the world.

The Radiation Oncology Residency Training Program attracts high-quality residents and currently has seven serving. The ratio of applicants to positions is about 100 to one. Radiation physics and both classical/molecular radiation biology are taught to the residents, who also spend six to 12 months performing basic laboratory research. The department received a National Institutes of Health/National Cancer Institute T32 Training Grant in 2005 that ended in 2015. Four trainees have completed the program, which focuses on translational radiation oncology for post-doctoral fellows in clinical radiation oncology, biology and physics.

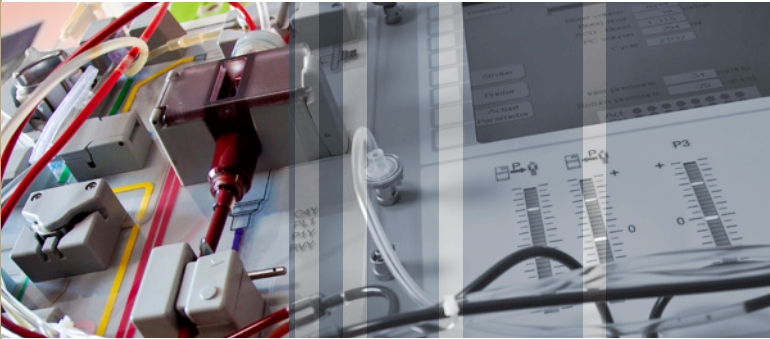
Clinical and basic research activities are funded by grants totaling \$1.3 million from the NIH, NCI, foundations/societies and industry. Novel radiation dose modifying agents and the study of radiation injury to the normal tissues are two areas under active investigation in the Radiation Biology laboratories. Researchers have partnered with NASA to investigate countermeasures for knee and hip joint degradation during spaceflight. Bio-anatomic radiation therapy treatment planning and delivery, integrating functional and bio-physiological imaging with MRI, MR spectroscopy and positron emission tomography are all areas of active investigation by the Radiation Physics section. Our physics department has ongoing studies to provide efficacy testing of products designed to improve irradiation-induced cutaneous damage.

The Gamma Knife Stereotactic Radiosurgery Program was initiated in 1999 and continues to be one of the seven busiest in the United States, treating approximately 45 patients per month. The Stereotactic Body Radiotherapy Program is one of the select few in the nation, with nearly a decade of experience treating more than 5,500 patients in that time. Other programs and technologies now in clinical use include high-dose rate brachytherapy, brachytherapy simulation and treatment planning utilizing the Integrated Brachytherapy Unit, fractionated stereotactic radiotherapy, intensity modulated radiation therapy, image-guided radiation therapy and Volumetric Arc Therapy.

Radiation Oncology has three affiliated practices in west central North Carolina that are staffed with physicians and physicists from Wake Forest Baptist Health: Hugh Chatham Memorial Hospital in Elkin, Wake Forest Baptist Health Lexington Medical Center Radiation Oncology and Iredell Memorial Hospital in Statesville. Iredell Memorial Hospital physicians joined our professional staff in February 2014, adding to the physics services previously provided. In total, Radiation Oncology and its affiliated practices treat more than 180 patients per day with radiation therapy, making this the largest provider of radiation therapy services in the Piedmont Triad and north central North Carolina.

In the past year, the main campus and regional practices consulted over 3,500 patients, saw 5,500 in follow-up and treated approximately 2,500 with external beam radiation therapy and approximately 1,500 with special procedures including Gamma Knife / Stereotactic radiosurgery, prostate and gynecologic brachytherapy, total body irradiation and image-guided radiation.

In summary, the Department of Radiation Oncology is well positioned locally, regionally, nationally and internationally as a leader in the treatment and research of radiation therapy for malignant and select benign diseases.



The SCTCT Program has performed transplants on more than 2,500 patients since the first transplant was performed in May 1990.

STEM CELL TRANSPLANT AND CELLULAR THERAPY PROGRAM (FORMERLY BLOOD AND MARROW TRANSPLANT PROGRAM)

In fall 2018, the Blood and Marrow Transplant Program was officially renamed the Stem Cell Transplant and Cellular Therapy Program (SCTCT). This name change reflects the addition of clinical trials to include immune cellular therapy, which is a type of cancer treatment that uses genetically modified cells from a patient's own immune system to find and attack cancer cells. Currently there are two clinical trials open using cellular therapy with the anticipation of other trials opening as well as offering cellular therapy commercially in 2019.

The SCTCT Program has performed transplants on more than 2,500 patients since the first transplant was performed in May 1990, and it serves patients from the Piedmont region and surrounding states. In 2018, 112 patients with a spectrum of hematologic malignancies and diseases of the bone marrow received autologous or allogeneic stem cell transplants. Patients also received cellular therapy interventions including donor lymphocyte infusions to counter relapsed disease and stem cell re-infusions to treat graft rejection.

There has been tremendous growth in the Bone Marrow Transplant Program by offering transplants to a population of patients who previously would not have been able to proceed to transplant due to age or lack of a matched human leukocyte antigens (HLA) donor. The oldest transplant patient in 2018 was 78 years old, and this was accomplished through a partnership between the SCTCT Program and the Physical Medicine and Rehabilitation Clinic to identify the rehabilitation needs for patients older than 65 before and after the actual transplant. Patients who do not have an HLA-matched donor now may be able to proceed with transplant if a haplo-identical related donor is available.

Autologous transplants provided in the Outpatient Transplant Program expanded beyond myeloma to include patients with lymphoma. This would not have been possible without the

partnership from nursing, pharmacy and the SCTCT nurse coordinators. Data shows that providing transplants in the outpatient setting improves quality of the experience and decreases the overall financial burden of care.

The SCTCT Program is made up of a multidisciplinary team that includes physicians, advanced practice providers, pharmacists, nurse coordinators, financial coordinators, psychologists, social workers, nurses, dieticians, physical therapists, the stem cell processing team, the apheresis team and the HLA tissue typing specialists. SCTCT physicians work with collaborators throughout the institution to provide clinical trials to optimize transplant outcomes through post-transplant therapies to suppress disease recurrence, develop novel therapeutics for relapsed and refractory hematologic malignancies, identify protocols to treat graft versus host disease, create protocols to measure treatment toxicities and develop interventions to mitigate the toxic effects of chemotherapy.

The SCTCT Program is accredited by the Foundation of Accreditation of Cellular Therapy and maintains a quality management plan that monitors and measures all aspects of bone and marrow transplant. Strong performance and quality metrics have allowed the SCTCT Program to be included in the excellence networks with many of the larger insurer groups. The quality initiatives include building and maintaining community partnerships throughout the institution and the state; following SCTCT survivor health concerns; identifying outcome predictors to assess fitness for transplant in patients older than 65; and patient satisfaction and medication adherence through enhanced education before the transplant, during the transplant and before discharge.

CANCER SECOND OPINION PROGRAM

The Cancer Center Second Opinion Program was launched February 2017 under the direction of the Oncology Service Line. The mission of the program is to create an exceptional patient experience by providing patients diagnosed outside our facility/affiliates with a complete and expedited second opinion; to empower patients with knowledge of their condition and treatment options; and to elicit comprehensive clinical recommendations that lead to the highest quality and timely treatment options.

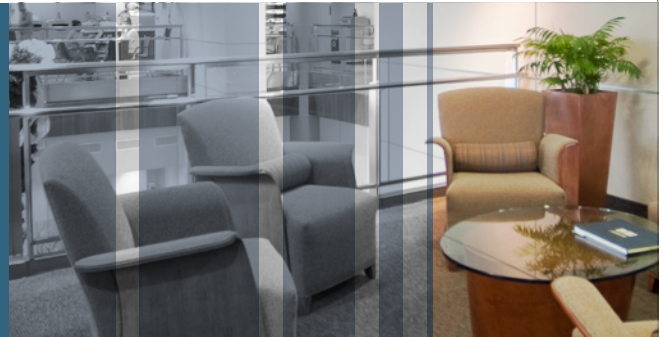
The Second Opinion Program team consists of a clinical navigator, patient advocate and medical records specialist. This team provides initial intake, ensuring medical records are gathered and reviewed to provide a “concierge” service for the patient. In conjunction with the multidisciplinary cancer specialists and their clinic staff, the patient is

provided exceptional service, ending with a personalized care management plan.

Since the program’s launch, 268 patients have been enrolled and 233 completed full evaluations. Of these patients, 52% have chosen to stay for all or a portion of their care at our Cancer Center. Among second-opinion patients, 4% have had a diagnosis change while coming through this program, and 22% of patients have had a different treatment recommendation compared to their outside provider.

It remains evident that the Cancer Second Opinion Program continues to succeed in providing patients an exceptional service while pulling together our great resources at the Cancer Center.

Programs and services are integrated into the ongoing care of patients in order to make professional assistance available easily and in concert with medical care.



SUPPORTIVE CARE AND SURVIVORSHIP SERVICES

The Comprehensive Cancer Center at Wake Forest Baptist Health provides programs and services that are integrated into the ongoing care of patients in order to make professional assistance available easily and in concert with medical care. For example, all patients are screened periodically for distress when they are seen by their cancer health care provider. The integration of personalized, patient-centered care at the point of delivery of medical services is a unique aspect of care at our Cancer Center.

The Psychosocial Oncology and Cancer Patient Support programs were designed to address the emotional distress and psychosocial needs of patients and family members. The mission of these programs is to reduce suffering and enhance quality of life of patients as well as caregivers during the diagnosis, treatment and survivorship process,

from the beginning of care throughout the life span. These programs are woven into a broader network of professional services that are part of the supportive care and survivorship services network for our health system and community. Research has shown that patients who access three or more supportive care services are likely to have increased satisfaction and better overall outcomes.

Access to such services is readily available to all of our patients treated in medical oncology, surgical oncology and radiation oncology. Many studies have reported the efficacy of psychosocial interventions and the importance of quality of life to patients. One example of an innovative program integrated into the care of our patients is the interactive group drumming intervention study conducted by Ruth Moskop, PhD, and John Beck, a faculty member with the

University of North Carolina School of the Arts and Wake Forest University. They are providing a directed study on the benefits of therapeutic drumming on stem cell transplant patients as well as an informal drumming circle for all patients and family members.

The Psychosocial Oncology and Cancer Patient Support programs are staffed by approximately 25 volunteers and six professionals trained in counseling, administrative support and therapeutic music. We also have massage therapy, musicians, tai chi and yoga available for patients and families. Most of our volunteers are either veteran cancer patients themselves or have been caregivers for patients over the years. They bring deep listening and empathy that have been finely tuned through their own experience. Volunteers provide hospitality, empathic listening and a welcome presence for all patients attending our cancer center. One of our volunteers, paraphrasing Mother Teresa, commented, "I may not be able to do great things as a volunteer, but I can do small things with great love." Both professional staff and volunteers perform a very important navigation function by helping to connect patients and families to needed services.

A hallmark of our program is the integration of our services into the ongoing medical care of patients. For example, we can see patients for counseling or other services such as massage while they are being seen for medical treatment. It is not uncommon for our staff to be counseling with a patient during their chemotherapy treatment. This reduces the necessity for travel and overall cost to the patient for their care. This dimension of integrated psychosocial care is rare in cancer care facilities given the logistical challenge to doing so. Fortunately, we are supported by an annual fundraiser called Winterlark, private philanthropy and institutional funds to provide these services to patients with cancer and caregivers without charge.

The Psychosocial Oncology and Cancer Patient Support programs provide counseling services, patient education, patient advocacy, educational/support groups, teaching, financial aid and research activities nested within the Section of Hematology and Oncology in the Comprehensive Cancer Center. We also are able to provide specialized cancer recovery and survivorship-skills training for patients.

The psychosocial care of distressed patients is linked to important outcomes. For example, successful treatment of depression can enhance recovery as well as reduce the cost of treating patients.

The supportive care and survivorship network within Wake Forest Baptist provides many other services, such as massage therapy, healing touch, Reiki (a form of alternative

medicine in which the practitioner transfers "universal energy" to the patient to encourage healing), therapeutic music, recreation therapy, supportive chaplain services, palliative care, social work services, nutritional guidance and patient financial assistance. We also have identified additional services in the community and in our own integrative medicine clinic (for example, acupuncture) that can be helpful to patients. Supportive care and survivorship services are made available by a host of professionals within our institution (see below for details).

The Psychosocial Oncology and Cancer Patient Support programs facilitate many of these professional services during the course of patient care. While a significant proportion of cancer patients may need professional psychosocial care, all of our patients can benefit from kindness, deep listening and compassion.

The Psychosocial Oncology and Cancer Patient Support programs promote these qualities in all of our health care providers and support staff. We provide the type of care that facilitates physical, emotional and spiritual healing in patients. We know that the quality of life of our patients can be enhanced by timely and early interventions to help patients maintain their lifestyle even while undergoing life-changing therapies in a cancer center. As one patient suggested, "I'm not going to give up my life just because I'm in treatment. I intend to live. I intend not only to survive but to thrive through my treatment with all the help I can get."

SUPPORTIVE CARE AND SURVIVORSHIP SERVICES

- » **Gentle Yoga:** These classes are open to cancer patients and survivors and their close family members or friends. Mats and equipment are available. Classes are held in the Meditation Room, second floor, outpatient Cancer Center. Individual sessions may be set up free of charge.
- » **Guided Imagery and Hypnosis:** Suggestive guidance in a trance state helps patients manage pain and nausea and improve coping.
- » **Massage Therapy:** Eight types of massage are offered in the Cancer Center, at the Sticht Center and at Medical Plaza – Miller.
- » **Meditation Room:** Located on the second floor of the outpatient Cancer Center, this room is set aside for quiet meditation or prayer.
- » **Mindful-based Stress Reduction:** Learn practices to cultivate calmness and relaxation.
- » **Therapeutic Music:** Light relaxing music is offered through a trained harpist and a group of volunteer musicians.

SUPPORTIVE SERVICES

- » **Genetic Counseling:** Conducts risk assessment for hereditary cancer syndromes.
- » **Nutrition Counseling and Education:** Available at the outpatient Cancer Center to help manage treatment-related nutrition side effects such as weight loss, nausea, sore or dry mouth, constipation or diarrhea, taste changes and difficulty swallowing. Symptoms can often be minimized with some dietary changes.
- » **Palliative Care:** Enhances quality of life, and prevents and relieves suffering of patients with serious and/or terminal illness.
- » **Pastoral Care:** Chaplains are available for individual consultation, prayer and planning of advance directives. A chaplain leads a brief meditation on the first Wednesday of every month at 1:30 pm in the Meditation Room on the second floor of the Cancer Center. Additionally, services are held in Davis Memorial Chapel on Sunday at 10 am and Monday, Wednesday and Friday at noon.
- » **Conversations of Love (Advance Directive Education):** In an informal setting, one of Wake Forest Baptist's chaplains leads discussions about how individual values shape goals for medical care during times of illness, and how advance care planning can assist in ensuring that these goals be honored during moments of serious illness. Through proactive conversations with loved ones, family members and friends can provide a gift of love through understanding the goals of care.
- » **Patient Financial Resources Services:** Resource recovery specialists provide financial relief to patients and families who do not have the resources to pay for health care services. These specialists will assist patients and families in establishing payment plans, pursuing financial assistance from Medicaid and agency programs, and applying for charity care and other discounts.
- » **Patient Advocate:** Cancer Services Inc. assists patients and families in addressing the financial and social challenges that people with cancer often encounter.
- » **Physical Therapy (PT) and Occupational Therapy (OT):** PT rehabilitates gross motor skills. OT improves specific movements and tasks. Lymphedema management helps reduce enlargement, fullness and achiness after a lumpectomy.
- » **Social Work Services:** Located on the third floor of the outpatient Cancer Center, Social Work Services can assist with finding financial resources, coping with illness, caregiver stress, working with the medical team to set up and coordinate home care, ordering medical equipment, and general information and referral.

SUPPORTIVE CARE AND SURVIVORSHIP SERVICES – 2018 CLINICAL TRACKING

CLINICAL CONTACTS

Support Room Hem/Onc (# pts)	567 contacts
Support Room Radiation (# pts)	327 contacts
Patient/Family Contact: (Unscheduled: Clinic/Hospital)	98 contacts
Outpatient Counseling Session (# pts)	834 contacts
HOA, HOB, HOC (# pts)	256 contacts
Solid Tumor: Inpt Interview/Ind Counseling (#pts)	4 contacts
Leukemia: Inpt Interview / Ind Counseling (#pts)	636 contacts
BMT Assessment (#pts)	187 contacts
BMT: Inpt Interview / Ind Counseling (#pts)	158 contacts
Surgical Onc: Inpt Interview / Ind Counseling (#pts)	208 contacts
GynOnc: Inpt Interview / Ind Counseling (#pts)	8 contacts
RadOnc: Inpt Interview / Ind Counseling (#pts)	1 contact
Crisis Intervention (#pts)	23 contacts
Student Intern Patient Contacts (#pts)	864 contacts
Student Intern Hours	928 hours
Phone Contact (Pt-Related)	1130 contacts
Financial Aid to Patients	706 contacts

SUPPORT GROUPS

Coffee & Conversation for Caregivers	67 attended
CPSP Welcome Hour	87 attended
AYA Support Group	27 contacts
Seasons of Survival	16 contacts
TOTAL OUTPATIENT CONTACTS	1,119 contacts
TOTAL INPATIENT CONSULTS	1,271 contacts

SUPPORTIVE CARE SERVICES

Harp Therapy (#pts)	208 contacts
Mind-Body Classes (i.e., tai chi and yoga)	245 contacts
Massage (#pts)	757 contacts
Drum Circle (#pts)	160 contacts
Total Hours of Live Music	263 hours
TOTAL SUPPORTIVE CARE CONTACTS	1,370 contacts

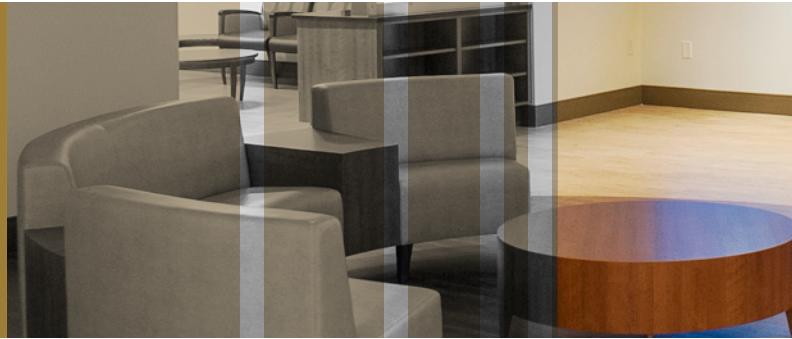
VOLUNTEER SERVICES

Support Room Hem/Onc	27,189 contacts
Support Room Radiation	11,813 contacts
Resource Room	159 contacts
Total Hours	3,142 hours
TOTAL CONTACTS	39,161 contacts

MEETINGS / EVENTS

Volunteer Education / Meetings	3 volunteers
Community Liaison / Meetings	20 liaisons
Community Presentation (including support groups)	32 presentations
Teaching Students / Residents / Fellows on-campus	48 presentations
Health Team Meetings / Rounds	14 meetings
Committee Meetings (medical center)	57 meetings
Medical Center Staff Support / Consult with Interdisciplinary Staff	103 events
Staff Development (education conferences / staff meetings)	86 events

1,491 major operative cases and more than 8,472 outpatient visits in 2018.



SURGICAL ONCOLOGY

Surgical Oncology is a key component of the Comprehensive Cancer Center. It is extensively involved in multimodality consultations for the care of patients with diseases of the breast, endocrine tumors, melanoma and sarcoma as well as the full spectrum of gastrointestinal malignancy from esophagus to anus. The service is very busy, with 1,491 major operative cases and more than 8,472 outpatient visits in 2018.

The clinical service includes eight fellowship-trained surgical oncologists, two surgical oncology fellows, four surgical house officers, two to three medical students, five advanced practitioners and four clinic nurses. Edward Levine, MD (chief of the service), Russell Howerton, MD, Perry Shen, MD, Marissa Howard-McNatt, MD, Kostas Votanopoulos, MD, PhD, Jennifer Cannon, MD, Clancy Clark, MD, and Akiko Chiba, MD, serve as the clinical faculty. Specialized advanced practitioners Shanna Steelman, NP, and Renee Haynes, NP support the breast care clinic, with surgical oncology care support from Nathan Ogilvie, PA (inpatient), and Stephanie Staley, NP (outpatient).

CLINICAL INITIATIVES

The multimodality Breast Care Clinic (BCC) was founded in January 2000 and is an integral part of Surgical Oncology. The BCC evaluates about 125 breast patients every week, with 379 new breast cancer cases evaluated in 2018. The BCC is staffed by surgical oncology, medical oncology, radiation oncology, advanced nursing practitioners, plastic surgeons, research nurses, clinic navigators and genetic counselors.

The BCC was among the first to be recognized by and continues to be certified by the National Accreditation Program for Breast Centers, and accreditation was renewed for three years in 2018. The BCC facilitates complex multimodality care in a setting that fosters participation in state-of-the-art research trials. Dr. Howard-McNatt is the director of the clinic and supervised an expansion of the clinic to the Clemmons office. Last year, we expanded our faculty with the addition of Dr. Chiba to the breast service

with Drs. Howard-McNatt and Levine. The clinical work in breast cancer works hand in hand with the research team in the BCC.

In 2018, the BCC cared for 356 cases compared to 365 new breast cancer patients in 2016; 350 in 2015; 347 in 2014; 277 in 2013; 235 in 2012; 252 in 2011; 184 in 2010; and 211 in 2009. This represents a nearly two-fold increase in new breast cancer cases over the past decade. The BCC enjoys one of the best payor mixes in the institution, and competes well within Forsyth County for patients. The clinic in Clemmons is doing well and is predominantly for benign breast disease and survivorship; the clinic is nearly full in its seventh year of operation. Within the Cancer Center, the breast surgery effort strongly supports the breast cancer disease-oriented team, which Dr. Howard-McNatt co-chairs.

Dr. Howard-McNatt updated the biopsy technique for non-palpable breast tumors. The Savi System (SAVI SCOUT®) surgical guidance system uses non-radioactive, electromagnetic wave technology to detect a reflector that is placed in the target tissue days to weeks before surgery. Since we adopted the system in February 2018, we have performed 122 Savi localization procedures, and the overall number of image guided lumpectomies has increased from 181 in 2017 to 219 as of November 2018. The Savi system enables patients to be the first case in an operating room (7 am) since the patient can have the Savi placed weeks in advance of the surgery and in lieu of starting with a wire localization procedure. This is more convenient for patients and saves both time and money as the operating team is not waiting for a patient to arrive from needle localization in mammography. This new technology is the first upgrade for localizing breast lesions in decades. This also will enable breast cancer surgeries to be performed off campus.

Esophageal cancer is evaluated by a multimodality team led by Dr. Levine. The team was previously awarded grants from the National Cancer Institute to evaluate new imaging technology, which could help define the patients who achieve a complete response to chemotherapy and radiation. The results of these research efforts have been

published and are widely cited, and our multimodality team serves as a regional reference clinic for care of patients with cancer of the esophagus. Newer approaches to therapy, including minimally invasive esophagectomy, are now part of the standard care for these patients. The team includes not only surgical oncology but radiation and medical oncology, as well as gastroenterologists with specific experience and expertise in esophageal cancer. These efforts are supported by an advanced nurse coordinator.

HepatoPancreaticoBiliary (HPB) surgery, which relates to complex liver and pancreas surgery, is led by Dr. Shen with Drs. Clark and Howerton. Dr. Shen heads a clinical team supported by a weekly CME-accredited HPB multimodality conference. The group is now working on minimally invasive approaches to hepatic resection, including several successful robotic resections. This year, Dr. Shen introduced a new therapy for pancreatic (and other) cancers: IRreversible Electroporation (IRE). IRE allows for treatment of locally advanced tumors that were not previously operable, and we are among the first centers to offer this treatment. Newer approaches to liver surgery have afforded improved outcomes not only to patients with primary hepatic tumors but those with cancers metastatic to the liver as well. Extensive experience with newer approaches to pancreatic tumors and disease has led to streamlined care plans for patients as well as research initiatives for pancreatic patients.

The HPB service has continued to expand and lead the region for complex consultations. Last year, clinic time was added in Greensboro for Drs. Shen and Clark to further expand the HPB efforts. The HPB surgery program performed a total of 125 cases in 2018. The following is the breakdown of cases and mortality/LOS outcomes:

- » Hepatobiliary procedures: 68 (90-day mortality 2.9%), 32% of cases were performed using minimally invasive techniques (laparoscopic or robotic) with a median LOS of four days.
- » Pancreatic procedures: 57 (90-day mortality 1.8%), 26 Whipple operations with no deaths. 12% of cases were performed using minimally invasive techniques (laparoscopic or robotic) with a median LOS of seven days.

These mortality outcomes are comparable to the best cancer centers in the United States. The robotic surgery program continues to grow with Dr. Shen recently performing his 100th robotic procedure.

Dr. Votanopoulos continues his efforts to bring surgical oncology expertise beyond the main campus. He leads the general surgery effort at the Veterans Administration Hospital in Salisbury, while maintaining an increasingly active practice at the Cancer Center on the main campus. He has a broad-based surgical oncology practice and has been increasingly active in research. Dr. Votanopoulos has initiated research into using organoids grown from fresh harvested

tumor tissue in collaboration with the regenerative medicine team. This has led to grant applications with major presentations/publications in 2018. The potential of this approach resulted in his being honored with a Dean's Hero Award with research funding support.

Dr. Cannon brings additional expertise in the care of endocrine tumors to the Surgical Oncology team. She has already expanded the capabilities for treatment of the full spectrum of endocrine tumors of the thyroid and parathyroid. She has also initiated minimally invasive adrenal gland (adrenalectomy) procedures.

Our Hyperthermic IntraPeritoneal Chemotherapy (HIPEC) Program, led by Dr. Levine, celebrated its 27th anniversary on Dec. 30. Our total experience (now 1,561 cases in 1,401 patients) is truly first class. The program continues to flourish despite several new centers in the region and many more nationally now competing with us. Drs. Levine, Shen and Votanopoulos performed 85 HIPEC cases in 2018. All cases are followed in our prospective data registry, which is one of the largest experiences with this complex modality worldwide. The HIPEC team, led by Dr. Levine and supported by MD Anderson and the University of Pittsburgh, published the first randomized trial for cancer of the appendix (for any stage of disease) this year: "A Multicenter Randomized Trial to Evaluate Hematologic Toxicities after HIPEC with Oxaliplatin or Mitomycin in Patients with Appendiceal Tumors," *Journal of the American College of Surgeons*, 2018; 226: 434-445.

This HIPEC program continues to draw patients from around the country and is linked to a variety of research initiatives, such as the largest quality-of-life study for HIPEC patients. Dr. Levine was awarded a research grant from the Smith Family Foundation to continue to lead the field with groundbreaking research into the genetics of cancer of the appendix, which has led to the first whole exome sequencing of the DNA from these unusual tumors.



EDUCATION

Surgical Oncology faculty members are dedicated to teaching the next generation of physicians to care for those with oncologic diseases. Trainees on service are included as part of the team bringing clinical expertise to patients who require cancer staging, treatment and follow-up due to malignancy.

Extensive clinical experience in a tertiary referral setting provides the surgical know-how for dealing with rare and unusual neoplasms. Fellows, house staff, and the medical and physician assistant students on the service are extensively involved in multimodality consultations for the care of cancer patients with diseases of the breast, endocrine tumors, melanoma and sarcoma as well as the full spectrum of gastrointestinal malignancies, from esophagus to anus. This includes preoperative and postoperative care in addition to operative management. The Breast Cancer Center also hosts house officers from Gynecology, Internal Medicine and Family Medicine.

A weekly multidisciplinary/multimodality surgical oncology conference, led by Dr. Levine, meets Fridays at noon in the Cancer Center and serves as the CME-accredited "tumor board" for the institution. This is supplemented by a CME-accredited HPB tumor conference meeting, led by Dr. Shen, each Tuesday at noon. On Oct. 12, 2018, Surgical Oncology sponsored its 13th annual breast cancer symposium, led by Dr. Howard-McNatt.

Our Surgical Oncology Fellowship was initiated in 2010. The two-year fellowship is for general surgeons seeking additional qualifications and training in advanced techniques in surgery and oncology training. All of the fellows who have completed the program have obtained faculty positions, at Georgetown, Johns Hopkins (two), Louisiana State University, Eastern Virginia University, the Medical College of Wisconsin and Hoekstra University. The American Board of Surgery created the certification program in Surgical Oncology in 2013. Our application to the Board of Surgery for accreditation was approved in 2014, and our fellowship is now fully accredited. It is one of only 25 programs in North America to be so honored. In 2017, we graduated/placed our seventh Surgical Oncology fellow (Michael Kunczewitch, MD) and recruited our ninth and 10th Surgical Oncology fellows (Omeed Moaven, MD, and Chris Mangieri, MD).

RESEARCH

Surgical Oncology actively supports research in basic science, translational science and clinical arenas. The surgical oncology research program led to 66 authorships for faculty in 51 individual peer-reviewed manuscripts in 2018. These publications span the gamut from basic science to translational and clinical issues relevant to several

tumors. Further, our efforts to make research available to trainees has borne fruit, as nine residents and fellows were co-authors on our manuscripts in 2018. Our clinical research was highlighted by a publication, coauthored by Dr. Levine, in the *New England Journal of Medicine* on the practice changing MSLT-2 trial, which showed that complete lymphadenectomy is not routinely required for melanoma metastatic to sentinel lymph nodes.

Surgical Oncology also collaborates with investigators in the Alliance group, as well as other members of the Comprehensive Cancer Center, including Public Health Sciences, Exercise Physiology, Gastroenterology, Cancer Biology, Radiology, Nuclear Medicine, Medical Oncology and Radiation Oncology. Clinical trials in association with the NRG are coordinated by Dr. Levine, who serves as the principal investigator.

In 2018, Surgical Oncology enrolled nearly 150 patients on treatment protocols and 2,106 on tissue-procurement studies. The surgical oncology faculty had a total of 21 research protocols open during 2018. Currently, the clinical and research faculty of Surgical Oncology holds more than \$500,000 in active extramural funding, as well as receiving significant philanthropic assets for cancer research.

Translational research projects evaluating genetic and proteomic changes associated with cancer of the breast, GI and hepatobiliary malignancy, as well as peritoneal carcinomatosis, are ongoing. Dr. Levine continued studies of the genetics of cancer of the appendix, and published new data on genomic signatures predictive of outcomes for this disease. Dr. Votanopoulos continues to be prolific in publication of manuscripts related to gastric and appendiceal cancer as well as HIPEC procedures. His published manuscript on organoids grown from tumors (removed by our team) was honored by a Dean's Hero award this year. It was a first-in-class manuscript on the growth of organoids with immune function. Drs. Shen and Clark have a focused clinical effort in pancreatic and hepatobiliary malignancy evaluating innovative ways to treat primary and metastatic liver tumors. Dr. Clark has also initiated innovative research evaluating Fitbit data for predicting outcomes for older patients undergoing major cancer surgery. Drs. Howard-McNatt and Chiba both published research this year evaluating breast cancer care and treatment.

The surgical oncology research team recently merged with the Comprehensive Cancer Center research program entirely. Drs. Shen, Howard-McNatt and Votanopoulos are co-leaders of the GI, Breast and Melanoma DOT's, respectively. Dr. Levine remains senior advisor to the Cancer Center director, institutional principal investigator for the NRG cooperative oncology group, and director of the Tumor Tissue Pathology Resource lab (Tumor Bank).

CANCER SURVIVORSHIP PROGRAM

Wake Forest Baptist Medical Center is strategically expanding its overall Cancer Survivorship Program.

In 2018, we began to broaden and intensify our focus on cancer survivors. Stacy Wentworth, MD, joined our faculty as medical director of cancer survivorship. She will be working with teams already taking care of our cancer survivors to enhance and grow our survivorship services.

This year, plans were approved for a dedicated Cancer Survivorship Clinic located on the second floor of the Comprehensive Cancer Center. Expected to open in spring 2019, this clinic will serve as a hub for cancer survivorship services and a connection point for cancer survivorship offerings across the system and in the community. Weekly

disease-focused clinics staffed by advance practice providers from the patient's medical care team, as well as volunteers and members of the Cancer Patient Support team, will focus on connecting our cancer survivors to resources to aid them on their journey to wellness after treatment.

This year, survivorship was also added to the care of early stage lung cancer patients. This pilot program targeted patients receiving surgery or radiation for their lung cancer. It adds to the growing number of disease-specific survivorship clinics that we offer including breast, lymphoma, bone marrow transplant and more.

The Urologic Oncology program brings together clinicians from multiple departments in the Medical Center to provide multidisciplinary cancer care and carry out innovative clinical trials to improve care of patients with genitourinary malignancies.



UROLOGIC ONCOLOGY

The Urologic Oncology Program within the Comprehensive Cancer Center brings together clinicians from multiple departments within Wake Forest Baptist Health to facilitate the provision of multidisciplinary cancer care to carry out innovative clinical trials to improve the care of patients with genitourinary malignancies.

Through the activities of the genitourinary oncology group, special expertise is directed toward the diagnosis, staging, treatment and follow-up of patients with tumors of the bladder, kidney/ureter, prostate, testis and other genitourinary sites. The latest techniques including laparoscopic and robotic approaches are offered to patients.

The genitourinary clinical trial group established about five years ago consists of basic scientists, urological, medical and radiation oncologists. They oversee the success of numerous in-house, industry and cooperative oncology group trials through Alliance, the National

Institute of Health and the Radiation Therapy Oncology Group. Through these mechanisms, patients have access to clinical trials for most genitourinary malignancies that incorporate multiple modalities of treatment to produce the best possible treatment outcome. Between 2010 and 2018, accrual to genitourinary oncology clinical trials has more than tripled. In addition to the clinical activities noted above, the urologic group also supports, through additional collaborations, significant translational and basic research efforts in Urologic Oncology.

The Section of Urologic Oncology, part of the Department of Urology, includes Ronald Davis, MD, MBA, Ashok Hemal, MD, Ram A. Pathak, MD, and Dan Rukstalis, MD. The group works closely with rest of the genitourinary oncology team, including Rhonda Biting, MD, Michael Goodman, MD, and Christopher Thomas, MD, from Medical Oncology, and Bart Frizzell, MD, from Radiation Oncology besides a team from basic research.

DEPARTMENTAL INITIATIVES

Upper Tract Urothelial Carcinoma

Urothelial carcinoma of the ureter can be a potentially difficult diagnosis with a wide variety of treatments offered. Both Drs. Hemal and Pathak offer minimally invasive alternatives to the traditional open surgery. They also have co-authored several publications and have given both national and international talks about the subject. The procedure, as it stands today, was pioneered at Wake Forest Baptist by Dr. Hemal and has since been refined with the newer generations of the robot in his recent publication (Hemal AK *J Endourol* 2018; 32:133-138). The key to the success of robotic surgery lies in the management of the distal ureter as mentioned in their recent publication (Pathak RA, Hemal AK. *Eur Urol Focus* 2018; 4:657-661). In their meta-analysis, a total of 204 patients underwent robot-assisted radical nephroureterectomy with a mean operating time of 229.7 minutes, mean blood loss of 189 ml, and mean length of stay of 3.65 days. They have also developed a step-by-step overview of the procedure and disseminated this knowledge at national and international conferences and were featured in the February 2019 issue of *AUA Newsmagazine* of the American Urological Association.

Prostate Cancer

Prostate cancer, from localized to metastatic, is treated by the team of urologists, radiation oncologists and dedicated genitourinary oncologists. Drs. Hemal, Pathak and Rukstalis offer surgical extirpative therapy for prostate cancer.

Drs. Hemal and Pathak have pioneered a new treatment for low-risk, localized prostate cancer, robotic total prostatectomy, which involves removal of the totality of prostate tissue, sparing the seminal vesicles and vas deferens and preserving erectile function, antegrade ejaculation and urinary continence.

Drs. Pathak and Hemal have presented their data regarding robotic prostatectomy across the Centers for Disease Control's classes of obesity at the Southeast Section AUA findings that surgeon experience is critical in managing patients with difficult anatomy. Patients had similar perioperative parameters with no increase in complications across all obesity classes.

Drs. Pathak and Hemal have also recently developed an individualized, patient-specific treatment strategy to approach lymph node dissection in patients with prostate cancer. In their manuscript, they offer lymph node dissection to certain highly suspicious, low-risk and all intermediate and high-risk patients (Pathak RA, Hemal AK *Transl Androl Urol* 2018; 7:S498-504). The use of fluorescence enhancement during lymph node dissection greatly improves lymph node positivity rate and is laying the groundwork for potential sentinel lymph node biopsy. They have showcased their

work in video format (Pathak RA, Hemal AK *Journal of Endourology: Part B: Videourology* 2018).

Diagnosis of prostate cancer can be greatly enhanced by improvement in imaging techniques. Dr. Rukstalis investigated newer imaging modalities for the detection of prostate cancer. He served as co-author of the AUA policy statement on the use of multiparametric magnetic resonance imaging (mpMRI) in the diagnosis, staging and management of prostate cancer. Improved imaging capability such as MRI has made a difference in prostate cancer detection and treatment.

The policy statement concludes that information obtained by mpMRI "represents a significant addition to traditional imaging techniques for the management of prostate cancer. mpMRI has the potential to improve the timely identification of clinically significant prostate cancer. Enhanced targeting approaches has the potential to reduce the cost of care through the reduction of unnecessary or inaccurate prostate biopsy procedures."

Dr. Rukstalis also offers focal cryoablation for appropriately selected patients and has given talks at various meetings regarding the role of ultrasound and early detection of prostate cancer.

Kidney Cancer

Kidney cancer has been a strong focus and initiative of the department this year. Localized kidney cancer is best managed by surgical therapy. The department offers minimally invasive options including robot-assisted partial nephrectomy by Drs. Hemal, Pathak and Rukstalis and laparoscopic cryoablation by Dr. Rukstalis. Depending on the mass size and morphology, certain treatments are preferred.

Dr. Hemal has published extensively this year on the surgical management of renal masses via partial nephrectomy. The purpose of partial nephrectomy, otherwise known as nephron-sparing surgery, is to save the kidney and remove the cancerous mass. Dr. Hemal and his team have developed a nomogram to predict the loss in nephrons after partial nephrectomy by using various patient parameters (Hemal AK *Eur Urol* 2018; 74:833-839).

Moreover, in patients with a solitary kidney, nephron-sparing surgery is paramount as it prevents patients from needing dialysis. Dr. Hemal was part of a multi-institutional publication describing the perioperative and functional outcomes after partial nephrectomy in patients with a solitary kidney. They found that when patients underwent partial nephrectomy, there was no significant compromise to renal function up to two years post-surgery (Hemal AK *J Robot Surg* 2018; doi:10.1007/s11701-018-0883-5).

Critical to performing a partial nephrectomy is the temporary cessation of blood flow to the kidney to allow

for safe excision of the renal malignancy. Dr. Hemal and team investigated this further by examining the warm ischemia time (WIT) among 600 patients undergoing robotic partial nephrectomy. They found that extended WIT was associated with poorer outcomes, indicating the importance of surgeon and hospital experience to limit the WIT to less than 20 minutes (Hemal *Urology* 2018; 120:156-161).

As part of another multi-institutional study, Dr. Hemal and team investigated robotic partial nephrectomy in patients with large renal masses and found that for T2a tumors (tumors greater than 7 cm but less than 10 cm), robotic partial nephrectomy represents a feasible operation with a high chance of success in appropriately selected patients (Hemal AK *BJU Int* 2018; 121:908-915).

Bladder Cancer

Bladder cancer is the fourth most common cancer in men and fifth most common malignancy overall. In the developed world, the vast majority of bladder cancer is urothelial carcinoma. Nonmuscle invasive bladder cancer (NMIBC) is of a lower stage and is treated by trans-urethral resection. If multiple and/or high-grade tumors are identified, resection may be followed by a six-week course of intravesical Bacillus Calmette-Guerin (BCG). This treatment is performed using live bacillus bacteria that have been weakened. The bacteria are instilled within the bladder. The temporary presence of the bacteria stimulates the patient's immune system to fight the bladder cancer. This is the most effective therapy for NMIBC, with response rates reported as high as 75% since its first documented use over 40 years ago. Typically, one-third of patients will fail to respond to BCG. However, the actual mechanism by which BCG is able to stimulate a patient's immune system to fight urothelial cancers in the bladder remains unknown.

The Wake Forest Baptist Health team led by Dr. Davis is using a novel blood-based assay to quantify a patient's immune system functionality. This test is largely based on the ability of granulocytes, a sub-type of white blood cells, to kill cancer cells in a laboratory setting. This assay was developed by biochemist Zheng Cui, MD, PhD, associate professor of pathology at Wake Forest Baptist Health. They enrolled 19 patients diagnosed with NMIBC and took blood samples before they underwent intravesical BCG treatment. These blood samples were run through the laboratory assay to calculate individualized "cancer-killing activity" scores for each patient. Of the 19 patients enrolled, 13 had a definitive clinical response to intravesical BCG, while six patients were definitive non-responders.

One variation of our assay was able to give a correct prediction of response to intravesical BCG for 14 of 19 patients. A second variation of our assay was able to give a correct prediction of response to intravesical BCG for 10 of

19 patients. Based on these preliminary results, the clinical response to intravesical BCG treatment may be predictable using this novel blood-based assay. Planning for future investigations is underway.

For muscle-invasive bladder cancer, the gold standard treatment is radical cystectomy and urinary diversion (continent or incontinent). Drs. Hemal and Pathak offer robotic cystectomy and totally intracorporeal diversion as a totally noninvasive manner to treat muscle-invasive bladder cancer. They reviewed the role of preoperative nutritional status, sarcopenia and frailty in patients undergoing cystectomy and actively counsel patients on the importance of overall health status and optimization before surgery (Pathak RA, Hemal AK *Transl Androl Urol* 2018; 7:S763-764). Moreover, apart from surgeon experience, the robotic team, which includes nurses, surgical technologists and bedside assistants, is key to performing robotic surgery, especially for patients with bladder cancer. Drs. Pathak and Hemal recently wrote an editorial regarding the rates and predictors of conversion to open surgery from laparoscopic or robotic surgery published in the *Journal of Endourology*. They found implementation of robotic technology to the management of muscle-invasive bladder cancer allows for better dissection, hemostasis and surgical proficiency (Pathak RA, Hemal AK *J Endourol* 2018; 32:495).

Molecular-guided Robotic Surgery Using Indocyanine Green and Near-infrared Fluorescence

Image-guided surgery involves using various adjunctive technologies that assist the surgeon in real time. An example of image-guided surgery in the field of robotic urology is molecular-guided surgery, utilizing indocyanine green (ICG) and near-infrared fluorescence. ICG is a nontoxic molecule that can be injected into the patient's bloodstream or pathologic organ of interest to delineate special properties of the tumor. For example, in patients undergoing partial nephrectomy, ICG greatly facilitates the procedure and has been shown to decrease the amount of time the kidney is clamped during the operation. In addition, it has shown several other benefits in upper tract urothelial carcinoma, adrenal cancer, bladder cancer, prostate cancer and cancers of the retroperitoneum. Recently, Drs. Pathak and Hemal published a video presentation that delves into the role of fluorescence-guided surgery in robotic uro-oncologic cases (Pathak RA, Hemal AK *Journal of Endourology: Part B: Videourology* 2018). They showcased current publications in the field and showed sample surgical clips with accompanying narration to demonstrate the benefits of image-guided surgery.

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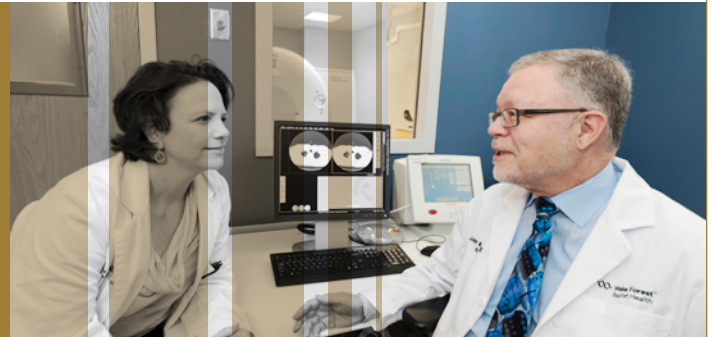
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The Thoracic Oncology Program offers more than 20 ongoing clinical research trials and a robust second opinion program, and is a Lung Cancer Screening Center of Excellence.



THORACIC ONCOLOGY

The Thoracic Oncology Program is a multidisciplinary working group composed of Thoracic Surgery, Medical Oncology, Interventional Pulmonary Medicine, Interventional Radiology and Radiation Oncology.

Lung cancer is the number one cause of cancer death in both men and women in the United States and worldwide. It is the number one cancer seen, diagnosed and treated at Wake Forest Baptist Health. L. James Wudel Jr., MD, and William Jeffery Petty, MD, lead the Thoracic Oncology Program. Dr. Wudel is associate professor in the Department of Cardiothoracic Surgery and director of Thoracic Surgical Oncology. He is recognized as one of the top robotic thoracic surgeons in the world. He has performed more than 1,000 robotic thoracic procedures to date, including lung resections, surgery for esophageal cancer and surgery for mediastinal tumors.

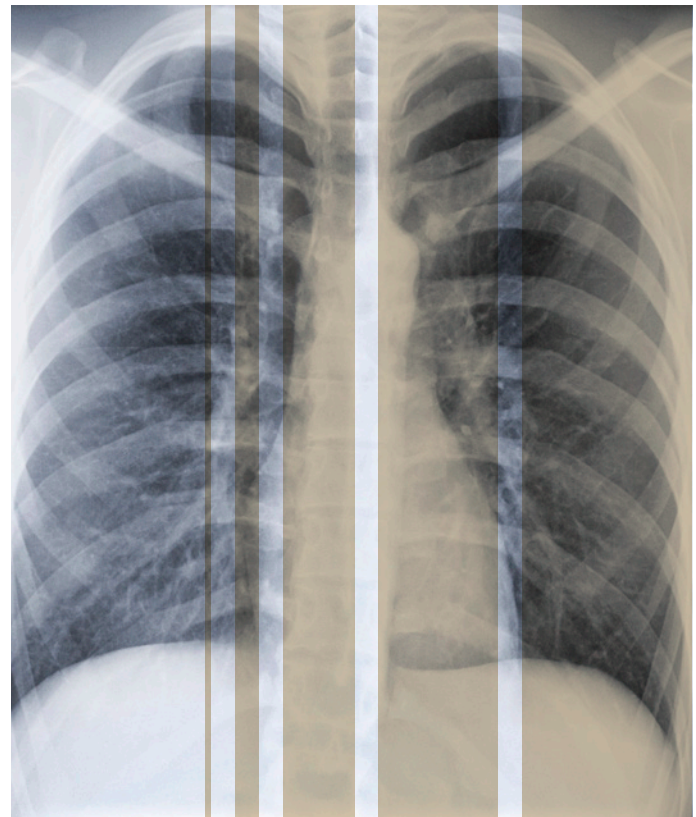
Dr. Petty is professor in the Department of Hematology and Oncology and associate professor in the Department of Cancer Biology. He is considered a national expert on lung cancer and is recognized for his many contributions to the field of lung cancer research. He is one of *U.S. News & World Report's* "Best Doctors."

The Thoracic Oncology Program is coordinated by Scarlett Hutchens, RN. The program meets weekly and is staffed by representatives from the following departments:

- » Cardiothoracic Surgery: Peter Smit, MD, and L. James Wudel Jr., MD
- » Radiation Oncology: William Blackstock, MD, Michael Farris, MD, and Corbin Helis, MD
- » Medical Oncology: Tamjeed Ahmed, MD, Stefan Grant, MD, Thomas Lycan, MD, William Petty, MD, and Jimmy Ruiz, MD
- » Interventional Pulmonary Medicine: Christina Bellinger, MD, Jonathan Bishop, MD, Travis Dotson, MD, Andrew Namen, MD, and Karl Thomas, MD
- » Interventional Radiology: Trevor Downing, MD

The Thoracic Oncology Program uses state-of-the-art techniques and technology to diagnose and treat lung cancer, including bronchoscopy with endobronchial ultrasound for staging and diagnosis, bronchoscopy with electromagnetic navigational localization and biopsy, percutaneous radiofrequency tumor ablation, and groundbreaking precision medicine and personalized genomic medicine.

The Thoracic Oncology Program offers more than 20 ongoing clinical research trials and a robust second opinion program, and is a Lung Cancer Screening Center of Excellence.



2017 CANCER DATA



2017 CANCER REGISTRY DATABASE

TOTAL CASES*	NUMBER	PERCENT
Lung	624	12.9
Breast	443	9.1
Prostate	342	7
Colorectal	317	6.5
Brain, CNS	290	6
Melanoma of skin	274	5.6
Oral cavity, pharynx	273	5.6
Leukemia	201	4.1
Kidney, renal pelvis	200	4.1
NH Lymphoma	188	3.9
Bladder	163	3.4
Pancreas	157	3.2
Thyroid	138	2.8
Uterus	117	2.4
Larynx	92	1.9
Multiple myeloma	84	1.7
Connective tissue	80	1.6
Esophagus	73	1.5
Liver, intrahepatic bile duct	70	1.4
Stomach	70	1.4
Ovary	61	1.3
Other endocrine	61	1.3
Unknown primary	61	1.3
Other female	60	1.2
Mets SCCa/BCCa	41	0.8
Other skin	40	0.8
Cervix	31	0.6
Anus, anal canal	31	0.6
Retroperitoneum	28	0.6
Small intestine	27	0.6
Hodgkins disease	27	0.6
Gallbladder, biliary	26	0.5
Other urinary	26	0.5
Bone	25	0.5
CMPD, MDS	24	0.5
Eye	22	0.5
Nasal, sinus	18	0.4
Other male	16	0.3
Testis	10	0.2
Ill-defined	8	0.2
Thymus	7	0.1
Other Hematopoietic	6	0.1
Pleura, mediastinum, heart	5	0.1
Other digestive	2	0.04
Trachea	1	0.02
Total Cases	4860	100

GENDER	NUMBER	PERCENT
Male	2594	53.4
Female	2266	46.6

RACE	NUMBER	PERCENT
White	4137	85.1
Black	625	12.9
Other	98	2

ETHNICITY-HISPANIC	NUMBER	PERCENT
Male	53	1.1
Female	43	0.9

CLASS OF CASE	NUMBER	PERCENT
Analytic/new dx	4256	87.6
Non-analytic/recurr	525	10.8
Dx workup	79	1.6

RESIDENCE	NUMBER	PERCENT
North Carolina	4138	85.1
Other States in USA	719	14.8
Outside of USA	3	0.06

PATIENT HISTORY	NUMBER	PERCENT
Family History	3140	64.7
Tobacco History	2965	61.1
cigarette	861	
cigar/pipe	21	
snuff/chew/smokeless	88	
combination use	13	
previous use	1982	
Alcohol History (2 or more drinks/day)	692	14.3
current use	518	
past history	174	

PRIMARY NEOPLASMS	NUMBER	PERCENT
One primary only	3342	68.8
First of two primaries	232	4.8
Second primary	809	16.6
Third primary	170	3.5
Fourth primary	34	0.7
Fifth primary	12	0.2
Sixth primary	3	0.06
Seventh primary	1	0.02
Ninth primary	1	0.02
Benign neoplasms	256	5.3

*Includes malignant, in-situ, selected benign cases, newly diagnosed, recurrent and diagnostic workup cases

COMPARISON OF 2017 WFBMC, STATE AND NATIONAL DATA

PRIMARY SITE	WFBMC		NORTH CAROLINA		USA	
	CASES	PERCENT	CASES	PERCENT	CASES	PERCENT
Lung	554	16.5	8,888	15	222,500	13.2
Breast	335	10	8,468	14.3	255,180	15.1
Prostate	270	8	7,577	12.8	161,360	9.6
Colorectal	254	7.6	4,602	7.8	135,430	8
Oral cavity, pharynx	245	7.3	1,532	2.6	49,670	2.9
Melanoma of skin	185	5.5	2,805	4.7	87,110	5.2
Leukemia	182	5.4	1,486	2.5	62,130	3.7
Kidney, renal pelvis	176	5.2	2,054	3.5	63,990	3.8
Bladder (includes in-situ)	163	4.8	2,516	4.2	79,030	4.7
NH Lymphoma	155	4.6	2,082	3.5	72,240	4.3
Pancreas	145	4.3	1,551	2.6	53,670	3.2
Thyroid	122	3.6	1,401	2.4	56,870	3.4
Uterus	105	3.1	1,667	2.8	61,380	3.6
Brain, CNS	97	2.9	744	1.3	23,800	1.4
Larynx	75	2.2	528	0.9	13,360	0.8
Connective Tissue	72	2.1	381	0.6	12,390	0.7
Multiple myeloma	63	1.9	934	1.6	30,280	1.8
Liver, intrahepatic bile duct	62	1.8	983	1.7	40,710	2.4
Stomach	60	1.8	796	1.3	28,000	1.7
Esophagus	53	1.6	561	0.9	16,940	1
Ovary	38	1.1	712	1.2	22,440	1.3
Small intestine	24	0.7	365	0.6	10,190	0.6
All other sites	370	11	6,716	11.3	130,110	7.7
Total Cases	3,361	100	59,349	100	1,688,780	100

NOTE: Includes newly diagnosed invasive cancer cases (includes bladder in-situ cases). Excludes basal and squamous cell skin cancers, in-situ (except for bladder), benign neoplasms, non-analytic cases, and diagnostic workups.

WFBMC—exact figures

NC—estimated numbers from NC Central Cancer Registry Facts and Figures 2017

USA—estimated numbers from American Cancer Society Cancer Facts and Figures 2017

PRIMARY SITE DISTRIBUTION 2017

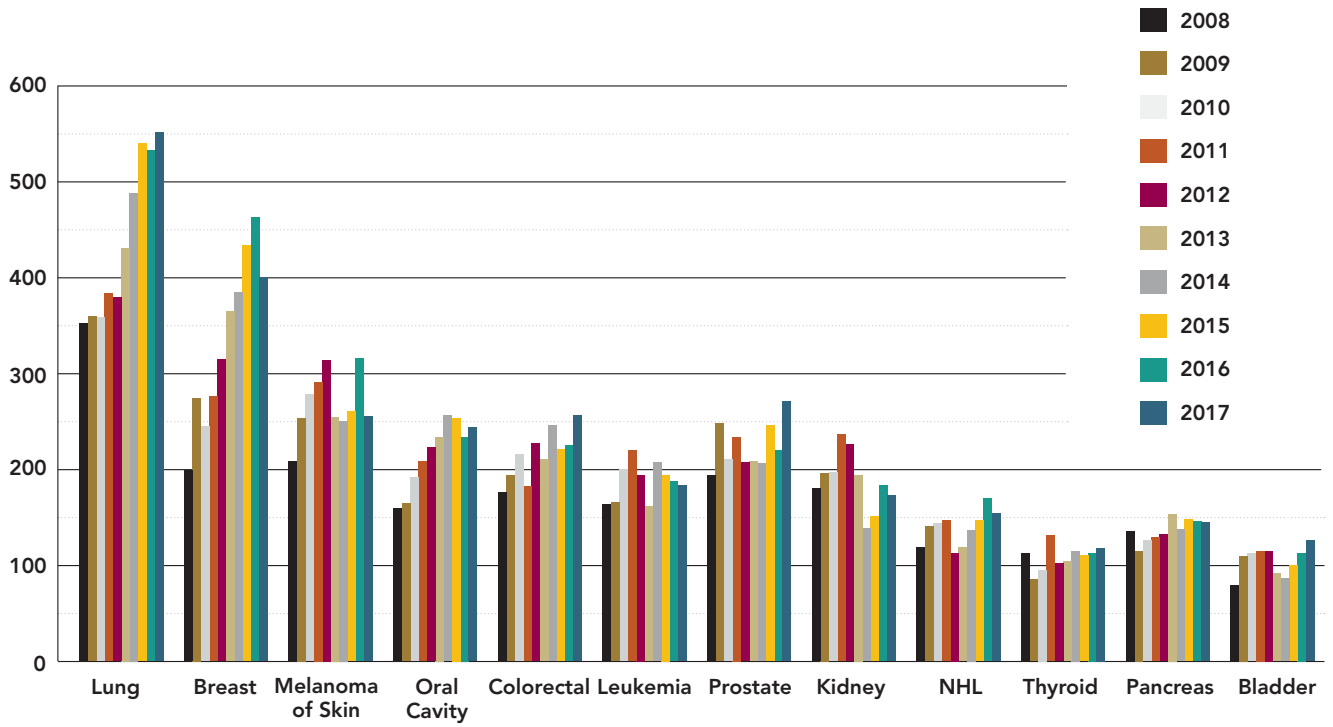
Site	Total	Class of Case*			Gender, Race, and Ethnicity							
		A	NA	C	white		black		other		hispanic	
					male	female	male	female	male	female	male	female
Total Cases	4860	4256	525	79	2180	1861	311	314	50	48	53	43
Oral cavity, pharynx	273	248	18	7	187	63	13	5	2	1	2	0
lip	15	12	3	0	14	1	0	0	0	0	0	0
tongue	94	85	8	1	61	26	3	1	2	0	1	0
gum	10	9	1	0	5	5	0	0	0	0	0	0
floor of mouth	15	15	0	0	10	3	2	0	0	0	0	0
palate	12	12	0	0	6	3	2	0	0	1	0	0
other mouth	27	24	2	1	17	9	0	1	0	0	0	0
salivary, malignant	17	15	1	1	10	4	1	2	0	0	0	0
tonsil	52	49	1	2	41	4	5	1	0	0	1	0
oropharynx	16	13	1	2	11	5	0	0	0	0	0	0
nasopharynx	3	2	1	0	2	1	0	0	0	0	0	0
pyriform sinus	2	2	0	0	2	0	0	0	0	0	0	0
hypopharynx	8	8	0	0	7	1	0	0	0	0	0	0
other oral cavity	2	2	0	0	1	1	0	0	0	0	0	0
Digestive system	773	665	76	32	376	241	68	54	10	12	8	4
esophagus	73	61	5	7	54	12	5	0	0	0	1	1
stomach	70	63	3	4	35	17	6	6	2	1	3	0
small intestine	27	24	2	1	15	9	0	2	0	0	1	0
colon	195	160	35	0	79	77	14	18	1	5	0	1
rectosigmoid	31	20	9	2	14	12	2	2	0	1	0	0
rectum	91	75	11	5	49	23	11	4	1	2	1	0
anus/anal canal	31	31	0	0	9	10	5	3	3	0	1	0
liver	70	62	7	1	36	14	11	4	2	1	1	1
gallbladder	11	10	1	0	3	4	2	1	0	1	0	0
biliary	15	12	1	2	9	5	0	1	0	0	0	0
pancreas	157	146	2	9	71	58	12	13	1	1	0	1
other digestive	2	1	0	1	2	0	0	0	0	0	0	0
Respiratory system	742	660	62	20	351	284	60	36	5	3	2	1
nasal cavity	12	11	1	0	6	4	0	2	0	0	0	0
sinuses	6	5	1	0	4	1	0	1	0	0	0	0
larynx	92	79	13	0	64	19	9	0	0	0	0	0
lung-non small cell	547	488	40	19	242	219	45	32	4	3	1	1
lung-small cell	77	69	7	1	32	37	5	1	1	0	1	0
thymus	7	7	0	0	3	4	0	0	0	0	0	0
trachea	1	1	0	0	0	0	1	0	0	0	0	0
Pleura, mediastinum, heart	5	4	1	0	3	2	0	0	0	0	0	0
Bone	25	23	2	0	10	9	1	1	1	0	3	0
Hematopoietic system	315	267	48	0	144	100	26	25	6	1	10	3
multiple myeloma	84	63	21	0	33	25	11	14	0	0	0	1
lymphoid leukemia	68	53	15	0	34	18	4	2	4	1	4	1
myeloid leukemia	115	111	4	0	53	41	8	8	1	0	4	0
other leukemia	18	18	0	0	8	5	3	0	0	0	1	1
CMPD,MDS	24	18	6	0	12	10	0	0	1	0	1	0
other	6	4	2	0	4	1	0	1	0	0	0	0

Site	Total	Class of Case*			Gender, Race and Ethnicity							
		A	NA	C	white		black		other		hispanic	
					male	female	male	female	male	female	male	female
Skin	355	316	37	2	227	116	5	2	4	0	1	0
melanoma	274	258	15	1	178	92	1	0	2	0	1	0
other skin	40	35	5	0	22	12	4	2	0	0	0	0
mets SCCa/BCCa	41	23	17	1	27	12	0	0	2	0	0	0
Retroperitoneum	28	25	3	0	7	17	1	3	0	0	0	0
Connective tissue	80	72	6	2	38	30	2	7	1	0	2	0
Breast	443	400	36	7	1	345	1	76	0	12	1	7
Female genital system	269	241	26	2	0	208	0	43	0	10	0	8
vulva	44	42	2	0	0	30	0	11	0	2	0	1
vagina	8	7	0	1	0	4	0	4	0	0	0	0
cervix	31	27	4	0	0	20	0	7	0	2	0	2
uterus	117	106	10	1	0	94	0	14	0	5	0	4
ovary, malignant	47	38	9	0	0	41	0	5	0	0	0	1
ovary, borderline	14	14	0	0	0	12	0	1	0	1	0	0
other female	8	7	1	0	0	7	0	1	0	0	0	0
Male genital system	368	296	71	1	282	0	68	0	8	0	10	0
penis	11	11	0	0	11	0	0	0	0	0	0	0
prostate	342	270	71	1	260	0	67	0	7	0	8	0
testis	10	10	0	0	8	0	0	0	0	0	2	0
other male	5	5	0	0	3	0	1	0	1	0	0	0
Urinary system	389	332	55	2	232	103	29	16	4	2	3	0
kidney	190	170	19	1	100	63	14	10	1	0	2	0
renal pelvis	10	8	2	0	4	3	0	2	0	1	0	0
ureter	11	11	0	0	7	3	1	0	0	0	0	0
bladder	163	131	31	1	112	50	13	4	3	1	0	0
other urinary	15	12	3	0	9	4	1	0	0	0	1	0
Eye	22	21	1	0	10	9	1	0	1	0	1	0
Brain, CNS	290	270	20	0	104	150	6	17	4	1	1	7
brain, CNS malignant	100	97	3	0	48	43	2	4	0	0	0	3
brain, CNS benign	190	173	17	0	56	107	4	13	4	1	1	4
Thyroid/Endocrine	199	176	22	1	60	93	11	14	0	5	6	10
thyroid	138	122	15	1	39	70	3	11	0	5	2	8
adrenal	6	5	1	0	3	3	0	0	0	0	0	0
other, malignant	2	2	0	0	0	0	0	0	0	0	2	0
other, benign	53	47	6	0	18	20	8	3	0	0	2	2
Lymphoma	215	176	37	2	113	69	12	12	3	1	2	3
NH Lymphoma	188	155	31	2	103	59	8	11	3	1	1	2
Hodgkins disease	27	21	6	0	10	10	4	1	0	0	1	1
Unknown Primary	61	57	3	1	30	20	6	3	1	0	1	0
Ill-defined	8	7	1	0	5	2	1	0	0	0	0	0

*Class of Case: A=analytic, newly diagnosed; NA=non-analytic, first seen with recurrent disease; C=diagnostic workup. Reportable by Agreement per Cancer Committee and sq intraepithelial neoplasia grade III are included under column A.

NOTE: Numbers include Wake Forest Baptist Medical Center main campus, provider-based clinics (Elkin, Lexington, Mt. Airy), Statesville practice, Davie Medical Center, Medical Plaza-Clemmons

COMPARISON OF WFBMC MOST PREVALENT SITES BY YEAR newly diagnosed cases



2018 PUBLISHED ABSTRACTS



*Published Abstracts:**CGM = Cancer Genetics and Metabolism Program**CPC = Cancer Prevention and Control Program**NRO = Neuro-Oncology Program**SBT = Signaling and Biotechnology Program*

1. Alphonse-Sullivan N, Taksler GB, Lycan T, Weaver KE (CPC), McTyre ER, Watabe K (NRO), Tatter SB, Isom S, Chan MD (NRO), Munley MT, Ruiz J (NRO), et al. Sociodemographic predictors of patients with brain metastases treated with stereotactic radiosurgery. *Oncotarget*. 2017;8(60): 101005-101. PMC5731851.
2. Arcury TA (CPC), Quandt SA, Sandberg JC (CPC), Miller DP, Jr. (CPC), Latulipe C, Leng X, Talton JW, Melius KP, Smith A, Bertoni AG. Patient Portal Utilization Among Ethnically Diverse Low Income Older Adults: Observational Study. *JMIR Med Inform*. 2017;5(4): e47. PMC5705857.
3. Avis NE (CPC), Coeytaux RR, Levine B, Isom S, Morgan T. Trajectories of response to acupuncture for menopausal vasomotor symptoms: the Acupuncture in Menopause study. *Menopause*. 2017;24(2): 171-179. PMC5266651.
4. Avis NE (CPC), Colvin A, Karlamangla AS, Crawford S, Hess R, Waetjen LE, Brooks M, Tepper PG, Greendale GA. Change in sexual functioning over the menopausal transition: results from the Study of Women's Health Across the Nation. *Menopause*. 2017;24(4): 379-390. PMC5365345.
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6. Batchelor TT, Gerstner ER, Ye X, Desideri S, Duda DG, Peereboom D, Lesser GJ (NRO), Chowdhary S, Wen PY, Grossman S, Supko JG. Feasibility, phase I, and phase II studies of tandutinib, an oral platelet-derived growth factor receptor-beta tyrosine kinase inhibitor, in patients with recurrent glioblastoma. *Neuro Oncol*. 2017;19(4): 567-575. PMC5464374.
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9. Blum W, Sanford BL, Klisovic R, DeAngelo DJ, Uy G, Powell BL (CGM), Stock W, Baer MR, Kolitz JE, Wang ES, Hoke E, et al. Maintenance therapy with decitabine in younger adults with acute myeloid leukemia in first remission: A phase 2 cancer and leukemia group B study (CALGB 10503). *Leukemia*. 2017;31(1): 34-39. PMC5214595.
10. Bonakdar M, Graybill PM, Davalos RV (NRO). A microfluidic model of the blood-brain barrier to study permeabilization by pulsed electric fields. *RSC Adv*. 2017;7(68): 42811-4281. PMC5753766.
11. Caress JB, Johnson JO, Abramzon YA, Hawkins GA (CGM), Gibbs JR, Sullivan EA, Chahal CS, Traynor BJ. Exome sequencing establishes a gelsolin mutation as the cause of inherited bulbar-onset neuropathy. *Muscle Nerve*. 2017;56(5): 1001-1005. PMC5494018.
12. Carpenter RL, Chan M (NRO), Zhu D, Watabe K (NRO), Metheny-Barlow L (NRO), Debinski W (NRO), Pasche BC (SBT), Qasem S (CGM), Xing F, Liu Y, Lo HW (NRO), et al. Combined inhibition of AKT and HSF1 suppresses breast cancer stem cells and tumor growth. *Oncotarget*. 2017;8(43): 73947-7396. PMC5650314.
13. Casimo K, Levinson LH, Zanos S, Gkogkidis CA, Ball T, Fetz E, Weaver KE (CPC), Ojemann JG. An interspecies comparative study of invasive electrophysiological functional connectivity. *Brain Behav*. 2017;7(12): e00863. PMC5745242.
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