



2014

CANCER PROGRAM ANNUAL REPORT

WITH 2013 STATISTICS



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Giant Cell Carcinoma

Courtesy of Dr. A. Julian Garvin, Department of Pathology

Comprehensive Cancer Center

AT WAKE FOREST BAPTIST MEDICAL CENTER



"We are extremely proud of the achievements of our Comprehensive Cancer Center as we strive to deliver the best care possible to our patients, their families and caregivers."

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

The Comprehensive Cancer Center at Wake Forest Baptist Medical Center was founded in the early 1960s and became a National Cancer Institute-designated cancer center in 1974, shortly after the National Cancer Act was placed into law. The Cancer Center received an NCI "comprehensive" designation in 1990. It is one of the longest-standing NCI centers, and we are proud to be a part a very distinguished group of only 41 NCI-designated comprehensive cancer centers in the country. In addition, the Cancer Center is currently ranked as the #1 cancer hospital in the state of North Carolina by U.S. News & World Report.

The mission of the Cancer Center is to improve the lives of cancer patients by focusing basic, clinical and population sciences on the problems of cancer prevention, early diagnosis and novel treatment. The membership of the Cancer Center is comprised of more than 125 faculty members from 34 departments. The Cancer Center's research is divided into four programs: Cell Growth and Survival, Cellular Damage and Defense, Clinical Research, and Cancer Prevention and Control. To facilitate the scientific and translational goals of the programs, the Cancer Center has established three Centers of Excellence, in brain, breast and prostate cancer.

The Cancer Center recognizes the importance of building cross-departmental and transdisciplinary team approaches to advance the science and treatment of cancer. Teams have been developed in cancer genomics, tumor microenvironment, nanotechnology, imaging, novel anticancer drugs, novel anticancer devices, cancer survivorship, tobacco control and cancer health disparities. Collaborations with other centers and schools within the institution are an essential element to the success of this research. The Cancer Center has strong connections with the Wake Forest Institute for Regenerative Medicine, the Center for Human Genomics and Personalized Medicine, Wake Forest Innovations, the Wake Forest University undergraduate Departments of Physics and Chemistry, and the Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences.

The Cancer Center is the main tertiary referral center for patients in a large geographic region. It provides a multidisciplinary approach to treatment in a state-of-the-art facility. A six-story expansion of the Cancer Center opened in December 2013. The new portion of the building contains acute care oncology inpatient beds and an oncology intensive-care unit, in addition to

the existing floors, which house all outpatient oncology services as well clinical trial staff. This new building provides an exceptional environment for patients, family and caregiver experience. Cutting-edge research and precision medicine is available to all patients, who have access to approximately 200 clinical trials.

The Cancer Center was founded with a strong community orientation and continues this tradition by addressing cancer issues that are important to the region's large contingents of African-Americans, Latinos, Native Americans, rural poor and pockets of urban poor. The Cancer Center works closely with the Medical Center's Maya Angelou Center for Health Equity, which was founded by the renowned poet to address health disparities across the region and the nation. We also established a Cancer Health Equity initiative in 2012 with the sole mission of addressing the needs of our patients in both culturally and linguistically relevant ways. As an example, we hired a Hispanic Clinical Trial Navigator in mid-2014 to provide navigation services, clinical trial education and community outreach specifically to our Hispanic population in their native language.

The primary functions of the Cancer Registry are to collect relevant data, conduct lifetime follow-up and disseminate cancer information.

Cancer Registry

The Cancer Registry works with physicians, administrators, 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 (ACoS). It plays an important role in ensuring that the cancer program is accredited by the Commission on Cancer and that the Breast Care Center is accredited by the National Accreditation Program for Breast Centers.

The Cancer Registry is involved in managing and analyzing 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 projects.

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. Effective Jan. 1, 2012, the registry began the collection of the provider-based clinics cancer cases. The registry began the collection of cancer cases diagnosed on or after Jan. 1, 2013, for Wake Forest Baptist Health Lexington Medical Center.

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, newly diagnosed cases are reported to the North Carolina Central Cancer Registry (NC-CCR). The data submitted is shared with the North American Association of Central Cancer Registries (NAACCR) and the U.S. Centers for Disease Control and Prevention's National Program of Cancer Registries (CDC-NPCR). In addition, cancer cases are submitted to the Commission on Cancer's National Cancer Data Base (NCDB). The NCDB is a comparative database for ongoing assessment of cancer patient care and is a joint project of the American College of Surgeons (ACoS) 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 (ACoS). 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

- ▶ 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/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.
- ▶ The AJCC 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.
- ▶ The Cancer Registry data and activities are evaluated and

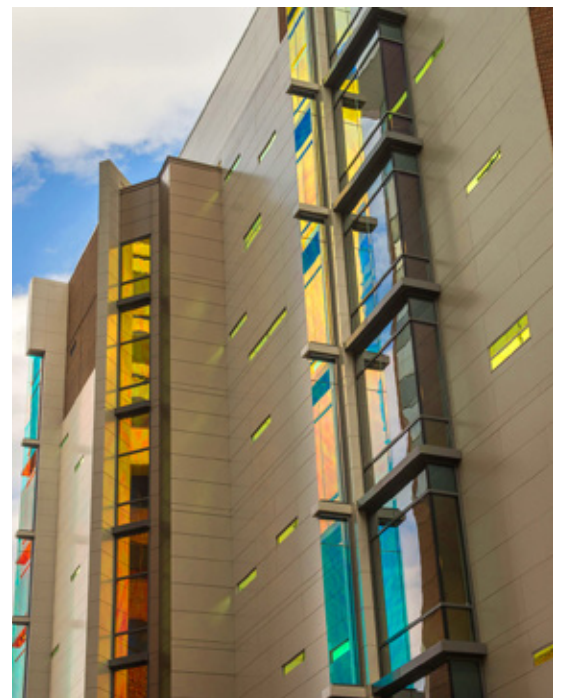
- ▶ monitored for casefinding, accuracy of data collection, abstracting timeliness, follow-up and data reporting.
- ▶ A subcommittee monitors the activities of the Breast Care Center.

Cancer Committee Members

Edward Levine, MD, Chair \ Surgical Oncology
Amanda Backus, MHA, CAPM, AT-Ret \ Business Planner
Joseph Bonkowski, PharmD, MHA, MS \ Pharmacy, Oncology Service Line
Dale Browne, MD \ Otolaryngology
Tina Evans, RN, BS, CBCN \ Survivorship \ Navigation Program Manager
Inez Evans Inman, BS, RHIT, CTR \ Cancer Registry
Audrey Bell Farrow, MBA, MHA \ Clinical Research Management
Ronda Granger, MSW, LCSW, ACM \ Care Coordination
Kathryn Greven, MD \ Radiation Oncology
Sally Hauser, MSN, ANP-BC \ Breast Care Center
Lisa Hodges, RN, BSN, OCN \ Nursing
Marissa Howard-McNatt, MD \ Surgical Oncology \ Breast Care Center \ Cancer Liaison Physician
Carrie Klamut \ American Cancer Society
Nadja Lesko, MD \ Diagnostic Radiology
Glenn Lesser, MD \ Hematology and Oncology
Richard McQuellon, PhD \ Cancer Patient Support Program
Judith Messura, DMD \ Dentistry
Lisa Odom, MBA, MHA, RHIA \ Health Information Management
Shadi Qasem, MD \ Pathology
Rebecca Rankin \ Director of Administration \ Comprehensive Cancer Center
Justin Rushford, MBA, MHA \ Planning Manager \ Strategic & Business Planning
Carolyn Scott, MBA, BSN, RN \ Director of Nursing
Nathan Streer, MD \ Palliative Care \ Hospice
Kerry Synder-Husted, RT, RTT, MBA \ Administrative Director, Cancer and Blood Disorders Service Line

Cancer Registry Staff

Inez Evans Inman, BS, RHIT, CTR \ Manager
Janice Boggs, RHIT, CTR \ Oncology Data Analyst
Jenean Burris, RHIT, CTR \ Oncology Data Analyst
Pamela Courcy \ Oncology Data Analyst
Donna Mabe, RHIT, CTR \ Oncology Data Analyst
Kimberly Ortiz, CTR \ Oncology Data Analyst
Shawnetta Peebles, RHIT, CTR \ Oncology Data Analyst
Michael Serwint, MD, CTR \ Oncology Data Analyst
Patricia Spry, CTR \ Oncology Data Analyst
Terri Swan, CTR \ Oncology Data Analyst





2014 CANCER ACTIVITIES

Adenocarcinoma of the Lung

Courtesy of Dr. A. Julian Garvin, Department of Pathology

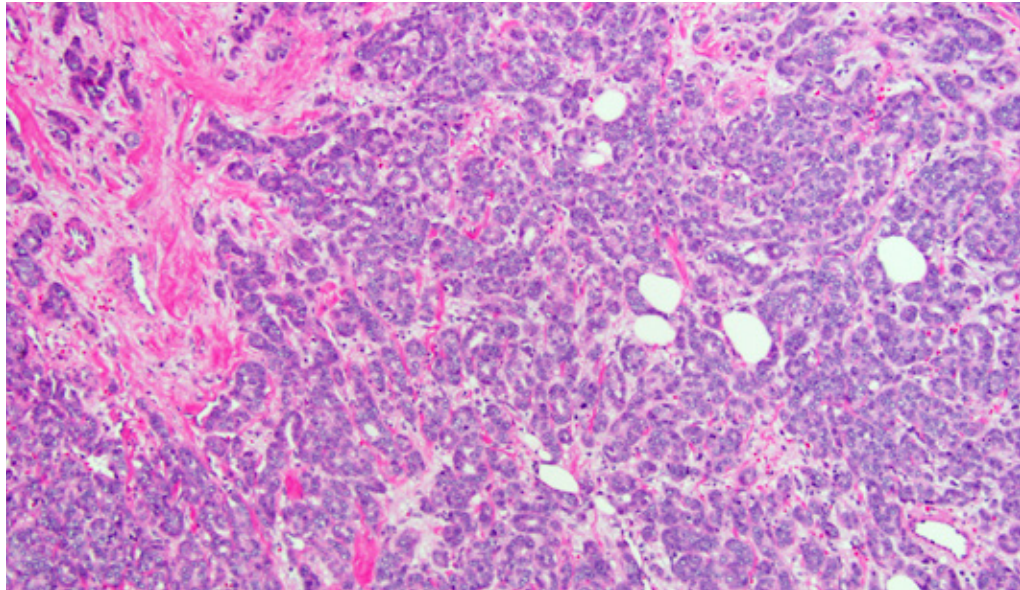
In 2014, 350 patients were seen with breast cancer, making this our highest number of patients seen to date.

Breast Care Center

The multimodality Breast Care Center celebrated its 14th anniversary in January 2014. In 2014, 350 patients were seen with breast cancer, making this our highest number of patients seen to date. 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 prior to being seen in clinic. Typically, patients are seen by a multidisciplinary group consisting of a surgeon, radiation oncologist, plastic surgeon, genetic counselor and medical oncologist, if necessary.

The Breast Care Center is certified by the National Accreditation Program for Breast Centers. This accreditation is the product of expertise from a variety of disciplines working together for the benefit of patients.

This Breast Care Center's 3D Tomosynthesis mammography unit, the latest breakthrough in mammography, continues to thrive at our Medical Plaza–Clemmons and at Outpatient Imaging locations. Screening and diagnostic imaging are offered on the unit. Breast tomosynthesis minimizes the effect of overlapping breast tissue during imaging because the camera moves over the breast, taking images from multiple angles. Tomosynthesis provides a more accurate view of the



breast and allows doctors to more effectively pinpoint the size, shape and location of any abnormalities. This can lead to better detection and fewer callbacks.

The Breast Cancer Survivor's Clinic in Clemmons is thriving. 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.

The Breast Care Center hosted the Ninth Annual Breast Cancer Symposium at Wake Forest University's Bridger Field House in September 2014. Lectures

covered a wide range of topics from genetics to imaging to treatment and survivorship issues for breast cancer patients. The annual event is intended to provide 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. The Breast Care Center also has a variety of institutional research initiatives that have led to several publications in prestigious journals and presentations at national meetings.

Cancer Prevention and Control Research Program

The Cancer Prevention and Control Research Program has more than 29 funded cancer control projects totaling more than \$7 million for breast, lung, prostate and colon cancer. These projects focus on molecular epidemiology and genetics (including gene/diet interactions), cancer prevention, rural/ minority health, tobacco control and survivorship (including symptom management, quality of life and late effects of treatment). In these areas, investigators are exploring the role of the genes and gene/environment interactions in susceptibility to cancer, developing unique approaches to educating health care providers and patients to promote tobacco cessation, and understanding factors involved in the decision to initiate tobacco use and patterns leading to dependence.

The program also studies smokeless tobacco use among college students and use of new tobacco products. Investigators have been exploring survivorship care planning among rural older adults, and they have been developing interventions to reduce exposure to agricultural pesticides. They are also testing interventions to improve quality of life in health and well-being among cancer survivors and to reduce late effects of cancer treatments.

Some of the major ongoing projects include:

MOLECULAR EPIDEMIOLOGY/ GENETICS

- ▶ Genetic susceptibility to prostate cancer progression
- ▶ Germline and somatic changes in prostate cancer progression
- ▶ Gene-hormone interaction and risk of breast cancer

TOBACCO CONTROL

- ▶ Effective communication on tobacco product risk
- ▶ Smokeless tobacco use in college students
- ▶ Implementing evidence-based tobacco cessation strategies in oncology clinics
- ▶ The National Coalition Network for Tobacco and Cancer-free Living Centers for Disease

RURAL/MINORITY HEALTH

- ▶ Community participatory approach to pesticide exposure and neurological outcomes for Latinos
- ▶ Cancer-related follow-up care experiences in rural cancer survivors
- ▶ Survivorship care planning and communication for rural breast cancer survivors

SURVIVORSHIP

- ▶ Reducing lung cancer survivor anxiety with brief device-guided breathing
- ▶ A virtual yoga intervention for cancer patients
- ▶ Post-traumatic growth in breast cancer survivors
- ▶ Acupuncture in the treatment of hot flashes
- ▶ Preventing anthracycline cardiovascular toxicity with statins
- ▶ Early imaging detection of CV injury after cancer
- ▶ Cardiovascular and cerebrovascular function in brain tumor survivors
- ▶ End of treatment transition to follow-up care among early stage lung cancer survivors



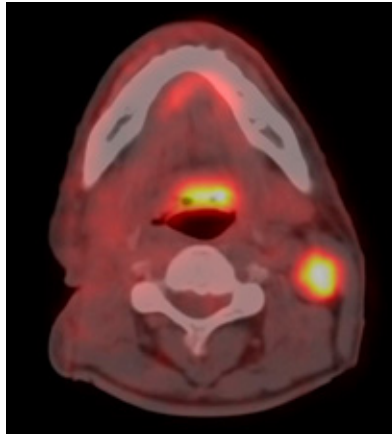
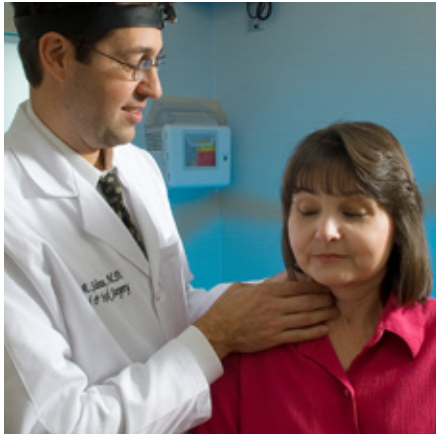
Department of Care Coordination

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 patient 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.



Head and Neck Oncology

Head and neck cancer continues to make up an increasing proportion of cancers seen at Wake Forest Baptist Medical Center. In 2013, 481 patients were seen with tumors of the oral cavity, oropharynx, larynx, salivary gland, sinonasal cavity, thyroid, and other head and neck sites, up from 378 in 2012.

The number of patients treated represents a large incidence of oral cavity and oropharyngeal tumors, as well as laryngeal cancers treated relative to national incidence figures. These figures confirm the recognition of excellence and confidence in care delivery of the head and neck cancer team at Wake Forest Baptist.

A multidisciplinary Head and Neck Oncology Tumor Board meets weekly, and is staffed by representatives of the following departments:

- ▶ Otolaryngology Department – J. Dale Browne, MD, Christopher Sullivan, MD, and Joshua Waltonen, MD (General Head and Neck Oncology/Skull Base Surgery/Thyroid Tumors/Head and Neck Cancer Reconstruction)
- ▶ Radiation Oncology – Kathryn Greven, MD, Bart Frizzell, MD, and James Urbanic, MD
- ▶ Medical Oncology – Mercedes Porosnicu, MD, Marcelo Bonomi, MD, and Maria Matsangou, MBChB

- ▶ Dentistry Department – Judith Messura, DMD
- ▶ Pathology – James Cappellari, MD
- ▶ Diagnostic Radiology – Daniel Williams, MD

Consultations with nutritionists, speech/language pathologists and other 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, related clinical research projects and didactic topics of interest are presented.

The coordination of multiple disciplines in the care of head and neck cancer patients is essential. These conferences allow for better patient convenience and timing of appointments, as well as closer and more effective physician consultative planning and management decisions in such a setting.

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 can be disrupted

during large head and neck ablative surgeries. Minimally invasive surgical techniques include endoscopic resection techniques such as transoral robotic surgery (TORS), which have proven invaluable in treatment of tumors of the pharynx and larynx for many patients. Endoscopic resection of selected skull base tumors through a nasal approach is also offered. Advanced protocols utilizing 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 under way, 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.

Hematology and Oncology

The Section on Hematology and Oncology emphasizes clinical and translational research and the multidisciplinary care of patients with cancer and hematologic diseases. The full spectrum of Hematologic and Oncologic disorders are expertly treated by the Section's faculty while areas of special multidisciplinary focus include the Prostate, Breast and Brain Tumor Centers of Excellence within the Comprehensive Cancer Center. Other areas of particular programmatic expertise include clinical and research programs involving patients with leukemia and lymphoma, myelodysplasia, lung cancer, head and neck cancers, gastrointestinal cancers, genitourinary cancers, sarcoma, melanoma, and those requiring marrow and stem cell transplants or specialized geriatric oncologic care. Hematology faculty in the Section 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. The goals of these and other team efforts are to:

- ▶ To optimize the care of patients with cancer and blood disorders.
- ▶ To meet the medical, emotional and informational needs of patients and their families.
- ▶ To enhance the opportunity for focused clinical and translational research.

Forty-two MD and PhD members compose the full-time faculty of the Section of Hematology and Oncology, and the clinical mission of the Section is also supported by 24 Physician Assistants and Nurse Practitioners. During the 2013–2014 academic year, this group accounted for a total of 3,835 new patient encounters and over 72,900 return outpatient visits. During this time, the marrow transplant service provided 90 patients with potentially life-saving bone marrow or stem cell transplants. In addition, the Section maintains a longstanding commitment to training the Hematology and Oncology practitioners of the future; 12 clinical fellows are continuously enrolled in our three-year, ACGME-accredited Hematology and Oncology Fellowship training program. The training program also participates

in and is compliant with the QOPI initiative—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 Medical Center at large 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. 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 CALGB [Cancer and Leukemia Group B], NCCTG [North Central Clinical Trials Group] and ACOSOG [American College of Surgeons Oncology Group])
- ▶ ABTC (Adult Brain Tumor Consortium).
- ▶ The Wake Forest NCORP Research Base (A National Cancer Institute-funded cooperative group headquartered at Wake Forest which 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.)



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In 2013–14, section members enrolled over 660 patients on a full spectrum of treatment and non-treatment clinical trials.

In 2013-2014, Section members enrolled over 660 patients on a full spectrum of treatment and non-treatment clinical trials including phase I, II and III cooperative group, investigator-initiated and industry sponsored studies. As part of our educational mission, Section faculty continue to 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 semiannually and brings together regional and national experts to provide CME updates for Hematology and Oncology physicians, fellows, nurses and research staff throughout the Southeast.

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 include:

- ▶ The development of 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.
- ▶ Understanding and enhancing the oncolytic activity of the vesicular stomatitis virus and using this virus as part of a multitargeted strategy for patients with head and neck cancers.
- ▶ 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 (BMT) service and a hospitalist-run service that pairs hospitalists and hematologist/oncologist consultants to care for



patients with medical complications of their malignant and hematologic disorders. In addition, Hematology and Oncology faculty continuously staff a busy inpatient consult service. A smooth transition between inpatient and outpatient care is a goal of our efforts to provide excellent patient care.

In addition to the inpatient and outpatient activities at Wake Forest Baptist Medical Center, Hematology and Oncology faculty also maintain full-time, full-service practices in Clemmons, Elkin, Lexington, Mount Airy and Statesville. A regional practice based at the Veterans Hospital in Salisbury is staffed by five faculty members, and allows military service members and their dependents to receive cancer and blood disorder care much closer to home than was previously possible.





Department of Ophthalmology

The Wake Forest Baptist Health Eye Center and the Department of Ophthalmology, part of the Division of Surgical Sciences at Wake Forest School of Medicine, 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 12 to 20 new patients with this diagnosis are evaluated and treated annually at the Eye Center. Previously, intraocular melanomas were treated by enucleation, removal of the eye. Although some melanomas still need to be treated by this modality, many 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 shrink it. This procedure is performed by Craig Greven, MD, in conjunction with the Department of Radiation Oncology. Also, transpupillary thermotherapy is a new laser procedure that can be used to treat melanomas of the choroid.

Tumors of the eyelids and orbit are managed by R. Patrick Yeatts, MD, an orbital and oculoplastic surgeon. 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. Dr. Yeatts works closely with surgeons in the Department of Neurosurgery and Otolaryngology, providing 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, Dr. Yeatts works closely with colleagues in the Department of Dermatology, who use techniques to minimize eyelid

tissue loss with tumor removal, that, in turn, enhances functional and cosmetic results.

Malignant tumors of the ocular surface are treated not only by Dr. Yeatts but also by Matthew Giegengack, MD, a corneal and external disease specialist. Malignancies of ocular surface may be treated surgically, with cryotherapy or with topical chemotherapy. 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. A focus of Dr. Yeatts' current investigation is the use of topical chemotherapy agents in treating ocular surface neoplasms. 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.

Orthopaedic Oncology

Orthopaedic Oncology, part of the Department of Orthopaedic Surgery, is committed to comprehensive and specialized care of patients with tumors. Within the department, there are two fellowship-trained orthopaedic oncologists, Scott Wilson, MD, and Cynthia Emory, MD, who see adult and pediatric patients in the Comprehensive Cancer Center three days a week and make every attempt to see new patients within 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 general surgical oncologists, spine surgeons, pediatric 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 400 operations are performed for orthopaedic

tumors or tumor-related conditions. Initiation of treatment 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 free vascularized bone and tissue transfers—are routinely performed and have allowed limbs to be saved that previously would have required amputation. The majority of patients with primary malignant tumors of bone and soft tissue previously 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 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 of these tissues and account for many of the surgeries performed. However, many benign bone and soft tissue lesions can be treated without surgery, with the diagnosis being confirmed 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. This has led not only to improved patient care but also to innovative research with colleagues in several other departments. Funded research projects with direct translation to patient care are currently underway focusing on the prevention of radiation-induced fibrosis. Regular orthopaedic oncology teaching conferences are part of the core curriculum within the residency program in addition to an annual full-day orthopaedic oncology review course. Regularly scheduled 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.

A special effort is made to see all new tumor patients within one week, and most can be seen within 24 to 48 hours for urgent referrals.



Palliative Care Program

The Palliative Care Program provides effective and efficient care in a compassionate, holistic and humane manner to patients with a serious, chronic or life-threatening illness. The philosophy of care focuses on reducing suffering from illness-associated symptoms and improving overall quality of life. Care encompasses recognition that comfort and psycho-social/emotional

support of the patient and their family are essential.

The program provides housewide consultation services and ambulatory services through the Palliative Care Clinic. An interdisciplinary team of doctors, nurse practitioners, nurses, pharmacists, social workers and chaplains help provide this comprehensive care.

Consultative and support services are available to patients and their families throughout their hospital stay, and assistance is provided with planning for post-hospital care. Assistance may include: discussion of health care options, pain and symptom management, advance care planning, and/or planning for discharge with consideration of the patient's autonomy and personal choices.



Pediatric Oncology

The Pediatric Oncology program gains about 60 new oncology patients per year. It accepts newly diagnosed patients through age 18. A dedicated hematology/oncology unit in Brenner Children's Hospital contains 16 private inpatient beds, five outpatient clinic rooms and a day hospital/observation area. 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 six pediatric hematologists/oncologists: Marcia Wofford, MD, Tom McLean, MD, Sharon Castellino, MD,

Natalia Dixon, MD, Kevin Buckley, MD, and Thomas Russell, MD. It has four pediatric nurse practitioners, a physician's assistant, a doctor of pharmacy, two clinical research associates and a patient navigator. 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, child life specialist, art therapist and chaplain. Pediatric Oncology receives professional support from therapists, nutritionists and pediatric pharmacists. 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.

There is a dedicated, long-term follow-up program with a focus on education and cancer control for adolescent and young adult survivors. The Children's Cancer Support Program (CCSP) is staffed with a full-time counselor/director, with the focus being patient education as well as many levels of individual and group, social and psychological support for active and

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There is a dedicated, long-term follow-up program with a focus on education and cancer control for adolescent and young adult survivors.

off-therapy patients and families. The CCSP conducts a support group for adolescents and has a Pediatric "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). Dr. Marcia Wofford, the former section chief, is now Associate Dean for Student Affairs for Wake Forest School of Medicine. She continues to practice pediatric hematology/oncology. Dr. Tom McLean serves as the section chief of Pediatric Hematology/Oncology and is also a mentor for the medical school's recently created learning communities ("houses"). Dr. Sharon Castellino is COG Principal Investigator for Wake Forest. She has an interest in childhood cancer survivorship and late effects of childhood cancer treatment. She will be the principal investigator for an

upcoming international COG clinical trial for Hodgkin's disease. Dr. Natalia Dixon is the director of 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. Dr. Kevin Buckley is the medical director of the inpatient and outpatient pediatric hematology/oncology services. His interests include general pediatric hematology/ oncology, infections in immunocompromised populations and immune reconstitution after non-myeloablative chemotherapy. In addition to pediatric hematology/ oncology, Dr. Buckley is also board certified in pediatric infectious diseases. Dr. Thomas Russell practices general pediatric hematology/oncology. He has a wide range of clinical interests and is also a dedicated and enthusiastic

educator. He is an Associate Director of the Pediatrics Residency Program. In addition to the pediatric hematologists/oncologists, Pediatric Oncology has active COG members from the disciplines of surgery, pathology, radiation oncology, radiology, nursing, pharmacy, cytogenetics and data management.



Pharmacy

Pharmacy Patient Care Services combines a clinical, educational and research mission in its services to patients and staff. Pharmacists and pharmacy technicians are involved in medication reconciliation to improve transitions of care, and pharmacists actively participate on the patient care team to optimize drug-related



outcomes for patients. The team in 2014 prepared more than 30,000 doses of intravenous chemotherapy across both inpatient and outpatient care areas.

The Community Pharmacy provides drug-specific pharmaceutical care plans and routine patient follow-up. Pharmacists also secure access to limited distribution oral oncology agents. Over 29,000 prescriptions were dispensed in the Cancer Center community pharmacy in 2014 with over 1,500 prescriptions for oral chemotherapy. The pharmacy team works with insurance companies to minimize the time from physician prescribing to delivery to the patient.

Fulfilling its educational mission, Pharmacy Patient Care Services offers a postgraduate year 2 specialty pharmacy residency program to train pharmacists to care for cancer

patients. It also trains medical students and residents through participation on the patient care team. Students from regional schools of pharmacy also are incorporated into the care team.

As part of its research mission, Pharmacy Patient Care Services provides oversight through protocol review and research committee participation. Pharmacy operations ensure proper storage and preparation of investigational agents. Pharmacy residents, pharmacy students and clinical pharmacists present research projects at regional and national professional meetings.

Pharmacy Patient Care Services are global leaders in adoption of automated intravenous medication preparation through its partnership with Loccioni. Since 2012, more than 13,000 doses have been compounded on the Italian made APOTECA chemotherapy compounding robot. Using high-precision robotics helps ensure safety in preparation for patients, family members and employees. In the past year, the department became a pilot site for a new device that works with APOTECA to assist technicians in preparing chemotherapy that cannot be made on the robot. Eventually all chemotherapy will be made and tracked on one coordinated system, globally a first of its kind.



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 in the 2014 fiscal year:

- ▶ Pink Night Basketball game
- ▶ Community Day at First Calvary Baptist Church
- ▶ Lung Cancer Initiative of North Carolina
- ▶ Senior Services—Breast Navigation
- ▶ "Women and Cancer: What You Should Know if IT Happens to You." A talk given at St. Peter's World Outreach Church
- ▶ "Healthy Men and Healthy Communities, What You Don't Know WILL Kill You!" A talk given at St. Peter's World Outreach Church.
- ▶ Dash Stadium—Breast Navigation
- ▶ 8th Annual Breast Cancer Symposium
- ▶ Annual Flow Motors Drive for the Cure
- ▶ Annual pink ribbon talks
- ▶ Take a Break With Us Day
- ▶ BestHealth lecture: "3D Mammography—A Significant Advancement in Early Breast Cancer Detection"
- ▶ 3D Mammography: WFBMC first in the area
- ▶ ActionHealth annual health fair
- ▶ Employee health fair
- ▶ Skin cancer screening
- ▶ "Look Good Feel Better" program
- ▶ North Carolina Survivorship Summit
- ▶ Get Your Rear in Gear
- ▶ National Cancer Survivors Day
- ▶ Susan G. Komen for the Cure, Race for the Cure, Komen Northwest NC Affiliate
- ▶ American Cancer Society Relay for Life
- ▶ Gentle yoga



Prevention and early detection are stressed through educational programs and activities.

Radiation Oncology and its affiliated practices treat more than 150 patients per day with radiation therapy.

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, nine radiation physicists and two radiation biologists. The department enjoys the Outpatient Comprehensive Cancer Center building with 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.

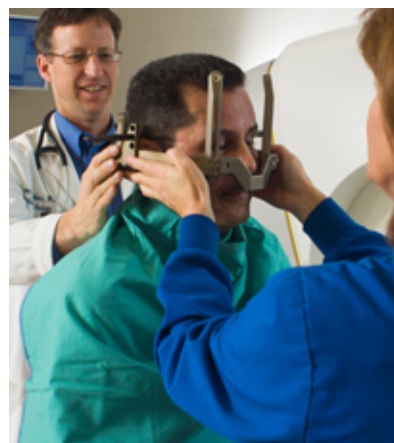
The Radiation Oncology Residency Training Program attracts high-quality residents and currently has seven serving. The ratio of applicants to positions is about 100 to one. Radiation physics and both classical/molecular radiation biology are taught to the residents, who also spend six to 12 months performing basic laboratory research. The department received an NIH/NCI T32 Training Grant established in 2005. Focused on translational radiation oncology for post-doctoral fellows in clinical radiation oncology, biology and physics, the program now has four trainees.

Clinical and basic research activities are with NIH/NCI grants, foundation/society grants and industry grants totaling \$640,000. 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. 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.

The Gamma Knife Stereotactic Radiosurgery (GKSRS) program was initiated in 1999 and continues to be one of the seven busiest in the United States, treating about 30 patients per month. The Stereotactic Body Radiotherapy (SBRT) program is one of the select few in the nation, with nearly a decade of experience treating more than 4,400 patients in that time. Other new 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 and Volumetric Arc Therapy (VMAT).

Radiation Oncology has four affiliated practices in west central North Carolina that are staffed with physicians and physicists from Wake Forest Baptist: Hugh Chatham Memorial Hospital in Elkin, Lexington Medical Center—Radiation Oncology, Caldwell Memorial Hospital in Lenoir and Iredell Memorial Hospital in Statesville. Iredell Memorial Hospital physicians joined our professional



staff in February 2014 in addition to the physics services previously provided. In total, Radiation Oncology and its affiliated practices treat more than 150 patients per day with radiation therapy, making this largest provider of radiation therapy services in the Piedmont Triad and north central North Carolina.

In the past year, the the main campus and regional practices consulted 2,400 patients, saw more than 4,400 in follow-up and treated more than 1,550 with external beam radiation therapy and more than 500 with special procedures including GK/SRS, 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.

Supportive Care and Survivorship Services

The Comprehensive Cancer Center has two programs designed to address the emotional needs of patients and family members. The unique integration of psychosocial support and counseling services into the Hematology and Oncology Clinic distinguishes the Comprehensive Cancer Center from many others in the nation and strengthens the capability to provide multidimensional care. Such an integrative model allows for interdisciplinary collaboration and the delivery of mental health services in conjunction with medical care.

PSYCHOSOCIAL ONCOLOGY SERVICES

THE CANCER PATIENT SUPPORT PROGRAM (CPSP)

The mission of the Cancer Patient Support Program is to provide social support for cancer survivors and family members with the goal of enhancing quality of life during the diagnosis and treatment process. Services from this program are provided at no charge to the patient and family members.

There are six full-time equivalent staff members and about 30 weekly core volunteers who provide a variety of services in the clinic and hospital. Services delivered by professional staff include individual and family counseling, inpatient consultation/liaison work, music/harp therapy, new patient survivorship orientation and educational groups, and education and training for staff at Wake Forest Baptist. The CPSP also supports inpatient therapeutic massage on a referral basis and assists with financial and temporary housing support for patients in need.

Volunteers are active in hospital visitation and providing hospitality and refreshments in the Hematology and Oncology and Radiation



Oncology clinics. These core volunteers are supported by another group of about 80 community volunteers who are active in the annual Winterlark fundraiser, the annual Survivor's Day Celebration and numerous celebration activities throughout the year.

THE PSYCHOSOCIAL ONCOLOGY PROGRAM (POP)

The Psychosocial Oncology Program began as the Psychological Services arm of the Cancer Center in 1988, with the purpose of providing psychological assessment and counseling for patients and family members suffering from more intense psychological disturbance. Patients often need help with symptom management, including anxiety and depression, family conflict and communication conflicts with the health care team. Additional services include general supportive counseling and specific behavioral procedures, including relaxation training and stress management. This program provides psychological screening and quality-of-life assessment for all bone marrow transplant patients prior to transplantation.

The POP also maintains active research and teaching agendas. Current lines of research focus on fear of cancer recurrence and the long-term quality of life of patients undergoing extreme treatments (such as stem cell transplantation) as well as the variables affecting patients' and caregivers' attitudes toward the completion of advance directives. Staff members publish and present findings at local and national conferences, and look to research findings to inform clinical practice.

Teaching activities have included a psychosocial seminar for fellows, lectures to first- and second-year medical students on medicine and psychosocial issues in oncology, and chemotherapy classes within the hospital. The POP is funded through fee-for-service activity and grants.

The Cancer Patient Support and Psychosocial Oncology programs have been designed to meet a wide range of patient needs. Most cancer patients and their families do not need intensive psychosocial care, but rather supportive services provided through volunteers and professional counselors. CPSP and POP are positioned to take care of intensely disturbed patients as well as those proceeding through a "normal" crisis during diagnosis and treatment. Studies conducted in the outpatient clinic have shown that a new cancer diagnosis is extremely distressing, yet can be modified by a simple orientation procedure.

The CPSP and POP programs represent unique offerings within the administrative structure of the Comprehensive Cancer Center and Section of Hematology and Oncology. Additional supportive care services are available in the hospital, including massage therapy, psychiatry, social work, pastoral care and others. Because both the CPSP and POP are located within Comprehensive Cancer Center clinics (Hematology and Oncology, radiation therapy and surgery), they are highly visible and well received. The CPSP and POP continue to help patients and family members maintain quality of life during and after treatment. The two programs made about 25,000 patient/family contacts in FY13.

INTEGRATIVE MEDICINE

- ▶ **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 Comprehensive 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 CompRehab.
- ▶ **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** 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, 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 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 lead 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 (PFRS):** 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 (SWS):** Located on the third floor of the Outpatient Comprehensive 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.

Cancer Survivorship Program

The Comprehensive Cancer Center has continued to develop its Cancer Survivorship Program. In July 2014, the program became a department of the Cancer and Blood Disorders Service Line and has been providing focused cancer survivorship follow-up care to breast cancer patients in two clinics at Wake Forest Baptist Health Medical Plaza–Clemmons. These clinics typically see 15 to 20 patients

per week for long-term survivorship follow-up care. The lung cancer survivorship clinic began seeing lung cancer survivors in January 2015. The clinic providers are nurse practitioners with a specialty in the care of breast and lung cancer patients.

The program manager meets with patients during their follow-up visit for the purpose of assessing and

coordinating connections to services and resources that may be needed by the patient. The program manager also facilitates the transition of the patient from active treatment into follow-up care.

The Cancer Center is dedicated to the continued growth and development of the Cancer Survivorship Program.

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 melanoma, sarcoma, endocrine tumors and diseases of the breast, as well as the full spectrum of gastrointestinal malignancy from esophagus to anus. The service is very busy, with approximately 1,500 major operative cases and more than 8,000 outpatient visits.

The clinical service includes eight fellowship-trained surgical oncologists, two surgical oncology fellows, four surgical house officers, two to three medical students, four advanced practitioners and three nurses. Edward Levine, MD (Chief of the Service), Russell Howerton, MD, Perry Shen, MD, John Stewart, MD, Marissa Howard-McNatt, MD, Kostas Votanopoulos, MD, Jennifer Cannon, MD, and Clancy Clark, MD, serve as the clinical faculty. Specialized advanced nurses support the breast care clinic, immunotherapy services, inpatient surgical oncology and gastrointestinal tumor care. The clinical research effort is supported by two research nurses and two full-time data managers.

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 100 breast patients every week, with more than 350 new breast cancer cases evaluated in 2014. The BCC is staffed by surgical oncology, medical oncology, radiation oncology,

advanced nursing practitioners, plastic surgeons, research nurses, clinic navigators and a genetic counselor. The BCC was among the first to be recognized by and continues to be certified by the NAPBC. The BCC facilitates complex multimodality care in a setting that fosters participation in state-of-the-art research trials. Dr. Howard-McNatt recently became the director of this clinic, and leads an expansion of the clinic to the Clemmons office.

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 of 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.

A clinical immunotherapy service has been initiated by Dr. Stewart, supported by specialized nursing. This immunotherapy program treats patients with metastatic melanoma and renal cell cancer with high dose interleukin-2 therapy, as well as

newer immunomodulatory agents, such as ipilimumab. This effort supports a variety of immunotherapy treatments as well as a robust docket of research trials.

HepatoPancreaticobiliary (HPB) surgery relates to complex liver and pancreas surgery, led by Dr. Shen with Drs. Howerton and Clark. Dr. Shen leads a clinical team supported by a multimodality conference. The team is now working on minimally invasive approaches to hepatic resection, and has performed several successful "robotic" resections. 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 service is very busy, with approximately 1,500 major operative cases and more than 8,000 outpatient visits.



Dr. Votanopoulos continues his efforts to bring surgical oncology expertise beyond the main campus to our affiliated Veterans Administration Hospital in Salisbury, N.C. He leads the General Surgery effort at the VA–Salisbury while maintaining an active practice on the main campus. He has a broad-based surgical oncology practice and has been increasingly active in research and has recently completed his PhD, as well.

Dr. Jennifer 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 innovative treatment of malignant disease that has spread throughout the peritoneal cavity with cytoreductive surgery and Hyperthermic Intraperitoneal Chemotherapy (HIPEC) is nationally and internationally recognized. This program is led by Dr. Levine with the support of Drs. Shen, Stewart and Votanopoulos. We currently perform about 100 HIPEC cases annually, with more than 1,200 cases followed in our prospective data registry for HIPEC survivors. Ours is one of the largest experiences worldwide with this complex modality. Dr. Levine, with the HIPEC team, published the largest single institutional experience

with HIPEC, with over 1,000 patients treated, in the *Journal of the American College of Surgeons* 2014; 518: 573-587. This HIPEC program continues to draw patients from around the country and is linked to a variety of research initiatives, including the largest quality-of-life study for HIPEC patients worldwide. Dr. Levine was recently awarded a research grant from the National Organization for Rare Diseases (NORD) to continue the groundbreaking research into the genetics of cancer of the appendix, which commonly benefits from therapy with HIPEC.

EDUCATION

Faculty members of Surgical Oncology are dedicated to teaching the next generation of physicians to care for those with oncologic diseases. Trainees on service are part of a team bringing considerable clinical expertise to serve patients who require cancer staging, treatment and follow-up due to primary, recurrent or metastatic malignancy. A substantial portion of clinical effort is also devoted to the resection of metastatic disease, including that of the liver, lung, peritoneum and lymph nodes. Extensive clinical experience in a tertiary referral setting provides the surgical know-how for dealing with rare and unusual neoplasms. With this rich background, fellows, house staff and medical students on the service are extensively involved in multimodality consultations for

the care of cancer patients with melanoma, sarcoma, endocrine tumors and diseases of the breast, 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 BCC also hosts house officers from Gynecology, Internal Medicine and Family Medicine.

A weekly multidisciplinary/multimodality surgical oncology conference, which serves as the CME-accredited “tumor board” for the institution, meets Fridays at noon in the Cancer Center. This is supplemented by a CME-accredited HPB tumor conference meeting weekly on Tuesdays at noon. On Sept. 26, 2014, Surgical Oncology sponsored its 9th annual breast cancer symposium.

A 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 to complete the program have obtained faculty positions (at Georgetown, Johns Hopkins and Louisiana State University). The American Board of Surgery recently created a new certification program in Surgical Oncology. Our application to the Board of Surgery for accreditation was approved this year and our fellowship is now fully accredited (one of only 23 programs in North America so honored).

RESEARCH

Surgical Oncology actively supports research in basic science, translational science and clinical arenas. Clinical trials in association with the NRG are coordinated by Dr. Levine, who serves as their principal investigator. Surgical Oncology also collaborates with investigators in the new Alliance group, as well as other members of the Comprehensive Cancer

continues on next page

Center, including Public Health Sciences, Exercise Physiology, Gastroenterology, Cancer Biology, Radiology, Nuclear Medicine, Medical and Radiation Oncology. In 2014, Surgical Oncology enrolled 297 patients on treatment protocols and more than 1,700 on tissue-procurement studies. The surgical oncology faculty had a total of 33 research protocols open during the year. Currently, the clinical and research faculty of Surgical Oncology holds more than \$500,000 in active extramural funding 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 initiated such studies of the genetics of cancer of the appendix, and recently, published the first genomic analysis of this disease. Dr. Votanopoulos has been prolific in publication of manuscripts related to gastric cancer as well as HIPEC procedures. Drs. Shen and Clark have a focused clinical effort in pancreatic and hepatobiliary malignancy. They have initiated clinical research projects evaluating innovative ways to treat primary and metastatic liver tumors. Dr. Stewart's more basic research has been awarded a grant from the National Cancer Institute to

evaluate potential applications for oncolytic viruses in solid tumors. He is also interested in immunotherapy and clinical proteomics, as well as delivery of cancer care to underserved populations. Dr. Howard-McNatt published research this year evaluating the impact of genetic testing for familial breast cancer on surgical decision-making.

These efforts led to the publication of 14 peer-reviewed manuscripts in 2014, as well as major presentations at leading surgical and oncology societies. These publications span the gamut from basic science to translational and clinical issues relevant to several tumors.

Urologic Oncology

The Urologic Oncology program within the Comprehensive Cancer Center brings together clinicians from multiple departments in the Medical Center 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 prostate, bladder, kidney/ureter, testis and other genitourinary sites. The latest techniques including laparoscopic and robotic approaches are offered to patients. The genitourinary clinical trial group established about two years ago consists of basic scientists, urological, medical and radiation oncologists. They oversee the success of numerous in-house and cooperative oncology group trials through the Cancer and Leukemia Group B (CALGB) and Radiation Therapy Oncology Group (RTOG). 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 2013, accrual to genitourinary oncology clinical trials has 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 K.C. Balaji, MD; Ronald Davis, MD, MBA; Ashok Hemal, MD; and Dan Rukstalis, MD. The group works closely with rest of the genitourinary oncology team, including Christopher Thomas, MD, and Rhonda Biting, MD, from medical oncology, and Bart Frizzell, MD, from radiation oncology.





2013 CANCER DATA

Wilm's Tumor of Kidney

Courtesy of Dr. A. Julian Garvin, Department of Pathology

2013 CANCER REGISTRY DATABASE

TOTAL CASES*	NUMBER	PERCENT
Lung	503	11.4
Breast	429	9.7
Melanoma of skin	290	6.6
Colorectal	289	6.5
Oral cavity, pharynx	270	6.1
Prostate	265	6
Brain, CNS	231	5.2
Kidney, renal pelvis	220	5
Leukemia	205	4.6
Pancreas	172	3.9
NH lymphoma	162	3.7
Bladder	120	2.7
Thyroid	114	2.6
Multiple myeloma	92	2.1
Larynx	80	1.8
CMPD, MDS	77	1.8
Uterus	76	1.7
Esophagus	67	1.5
Ovary	63	1.4
Connective tissue	59	1.3
Liver	58	1.3
Stomach	52	1.2
Other endocrine	52	1.2
Other female	44	1
Anus, anal canal	41	0.9
Small intestine	40	0.9
Other skin	36	0.8
Mets SCCa/BCCa	36	0.8
Hodgkins disease	34	0.8
Cervix	32	0.7
Unknown primary	29	0.7
Bone	25	0.6
Eye	21	0.5
Gallbladder, biliary	20	0.5
Other urinary	19	0.4
Testis	19	0.4
Retroperitoneum	16	0.4
Nasal, sinus	16	0.4
Other hemato	7	0.2
Other digestive	7	0.2
Ill-defined	6	0.1
Other male	5	0.1
Pleura, med, heart	3	0.1
Thymus	3	0.1
Peripheral nerves	2	0.045
Trachea	2	0.045
Total Cases	4,409	100

GENDER	NUMBER	PERCENT
Male	2,275	51.6
Female	2,134	48.4

RACE

White	3,729	84.6
Black	612	13.9
Other	58	1.3
Unknown	10	0.2

ETHNICITY—HISPANIC

Male	40	0.9
Female	43	1

CLASS OF CASE

Analytic/new	3,665	83.1
Non-analytic/recur	394	8.9
Consults, dx workup	350	7.9

RESIDENCE

North Carolina	3,720	84.4
Other states in USA	687	15.6
Outside of USA	2	0.05

PATIENT HISTORY

Family history	2,654	60.3
Tobacco history	2,724	61.9
cigarette	891	
cigar/pipe	16	
snuff/chew/smokeless	97	
combination use	15	
previous use	1,705	
Alcohol history (2 or more drinks/day)	564	12.8
current use	387	
past history	177	

PRIMARY NEOPLASMS

One primary only	3,162	71.7
First of two primaries	143	3.2
Second primary	666	15.1
Third primary	149	3.4
Fourth primary	30	0.7
Fifth primary	11	0.3
Sixth primary	1	0.02
Eighth	1	0.02
Benign neoplasms	246	5.6

*Includes malignant, in-situ, selected benign cases; newly diagnosed, recurrent and consult cases

COMPARISON OF 2013 WFBMC, STATE AND NATIONAL DATA

PRIMARY SITE	WFBMC		NORTH CAROLINA		USA	
	CASES	PERCENT	CASES	PERCENT	CASES	PERCENT
Lung	438	13.6	8,559	15.2	228,190	13.7
Breast	319	9.9	7,666	13.7	234,580	14.1
Prostate	209	6.5	8,316	14.8	238,590	14.4
Colorectal	208	6.5	4,852	8.6	142,820	8.6
Kidney, renal pelvis	202	6.3	1,887	3.4	65,150	3.9
Oral cavity, pharynx	194	6	1,348	2.4	41,380	2.5
Melanoma of skin	186	5.8	2,371	4.2	76,690	4.6
Leukemia	159	5	1,332	2.4	48,610	2.9
Pancreas	156	4.9	1,322	2.4	45,220	2.7
NH Lymphoma	119	3.7	2,076	3.7	69,740	4.2
Thyroid	105	3.3	1,267	2.3	60,220	3.6
Uterus	74	2.3	1,442	2.6	49,560	3
Brain, CNS	68	2.1	715	1.3	23,130	1.4
Bladder	60	1.9	2,360	4.2	72,570	4.4
Multiple myeloma	58	1.8	755	1.3	22,350	1.3
Larynx	58	1.8	529	0.9	12,260	0.7
Soft Tissue	52	1.6	360	0.6	11,410	0.7
Ovary	50	1.6	731	1.3	22,240	1.3
Esophagus	48	1.5	550	1	17,990	1.1
Liver, bile ducts	44	1.4	688	1.2	30,640	1.8
Stomach	40	1.2	689	1.2	21,600	1.3
Small intestine	36	1.1	278	0.5	8,810	0.5
Cervix	22	0.7	385	0.7	12,340	0.7
All Others	309	9.6	4,966	8.8	104,200	6.3
Total Cases	3,214	100	56,164	100	1,660,290	100

Note: Includes newly diagnosed invasive cancer cases (for USA, includes bladder in-situ cases).

Excludes basal and squamous cell skin cancers, in-situ (except for bladder in USA column), benign neoplasms, non-analytic cases, and consultations.

WFBMC—exact figures

NC—projected figures from NC-Central Cancer Registry Facts and Figures 2013

USA—projected figures from American Cancer Society Cancer Facts and Figures 2013

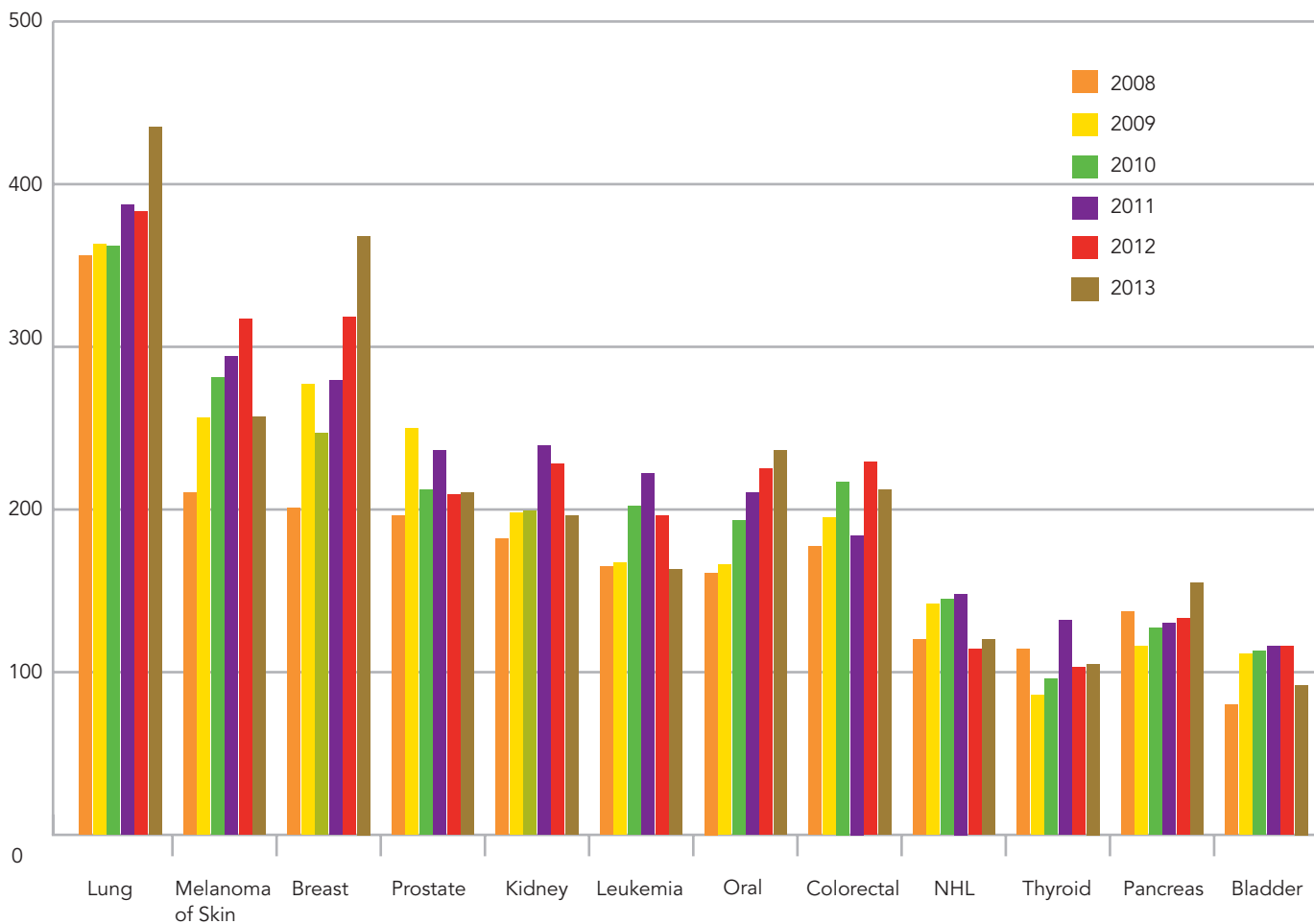
PRIMARY SITE DISTRIBUTION 2013

Site	Total	Class of Case*			Gender and Race							
		A	NA	C	white male	white female	black male	black female	other male	other female	unk male	unk female
Total cases	4409	3665	394	350	1947	1782	290	322	33	25	5	5
Oral cavity, pharynx	270	236	20	14	159	74	19	9	7	1	1	0
lip	12	10	2	0	8	4	0	0	0	0	0	0
tongue	69	60	7	2	47	17	2	1	1	0	1	0
gum	17	15	2	0	6	10	0	0	1	0	0	0
floor of mouth	10	10	0	0	7	2	1	0	0	0	0	0
palate	12	12	0	0	3	3	2	2	2	0	0	0
other mouth	27	22	1	4	13	9	1	1	2	1	0	0
salivary, malignant	20	18	0	2	11	5	1	2	1	0	0	0
salivary, benign	40	39	0	1	24	14	0	2	0	0	0	0
tonsil	31	24	3	4	19	8	3	1	0	0	0	0
oropharynx	9	9	0	0	5	1	3	0	0	0	0	0
nasopharynx	6	5	1	0	4	0	2	0	0	0	0	0
pyriform sinus	3	3	0	0	3	0	0	0	0	0	0	0
hypopharynx	13	9	3	1	8	1	4	0	0	0	0	0
other oral cavity	1	0	1	0	1	0	0	0	0	0	0	0
Digestive system	746	603	69	74	346	252	84	49	6	6	2	1
esophagus	67	56	2	9	49	7	8	2	0	0	1	0
stomach	52	41	5	6	25	16	7	4	0	0	0	0
s intestine	40	36	3	1	17	14	5	4	0	0	0	0
colon	195	131	36	28	71	86	16	18	2	1	1	0
rectosigmoid	9	6	2	1	6	3	0	0	0	0	0	0
rectum	85	75	5	5	42	27	6	8	1	1	0	0
anus/anal canal	41	36	3	2	17	9	12	2	0	0	0	1
liver	58	44	7	7	27	13	15	1	1	1	0	0
gallbladder	5	4	0	1	1	2	1	0	0	1	0	0
biliary	15	12	0	3	6	7	1	0	0	1	0	0
pancreas	172	155	6	11	82	65	13	9	2	1	0	0
other digestive	7	7	0	0	1	4	1	1	0	0	0	0
Respiratory sys	604	518	42	44	306	218	41	33	3	3	0	0
nasal cavity	14	13	0	1	9	5	0	0	0	0	0	0
sinuses	2	2	0	0	1	1	0	0	0	0	0	0
larynx	80	64	12	4	54	18	6	1	1	0	0	0
lung-non small	441	380	29	32	215	161	33	27	2	3	0	0
lung-small cell	62	55	1	6	26	29	2	5	0	0	0	0
trachea	2	2	0	0	1	1	0	0	0	0	0	0
thymus	3	2	0	1	0	3	0	0	0	0	0	0
Pleura/Med/Heart	3	3	0	0	2	1	0	0	0	0	0	0
Bone	25	25	0	0	12	7	1	4	1	0	0	0
Hematopoietic system	381	265	39	77	183	137	31	28	0	2	0	0
multiple myeloma	92	59	9	24	36	30	14	10	0	2	0	0
lymphoid leukemia	40	24	9	7	21	12	4	3	0	0	0	0
myeloid leukemia	140	119	9	12	62	61	7	10	0	0	0	0
other	32	23	2	7	20	7	3	2	0	0	0	0
CMPD, MDS	77	40	10	27	44	27	3	3	0	0	0	0

Site	Total	Class of Case*			Gender and Race							
		A	NA	C	white male	white female	black male	black female	other male	other female	unk male	unk female
Skin	362	308	38	16	221	131	5	3	1	1	0	0
melanoma	290	257	22	11	174	113	2	0	1	0	0	0
other skin	36	32	2	2	16	13	3	3	0	1	0	0
mets SCCa/BCCa	36	19	14	3	31	5	0	0	0	0	0	0
Peripheral nerves	2	2	0	0	1	0	0	1	0	0	0	0
Retroperitoneum	16	12	1	3	9	6	1	0	0	0	0	0
Connective tissue	59	52	3	4	17	28	6	7	1	0	0	0
Breast	429	368	33	28	1	347	1	75	0	3	0	2
Female genital system	215	206	5	4	0	171	0	42	0	2	0	0
vulva	34	34	0	0	0	24	0	10	0	0	0	0
vagina	5	5	0	0	0	5	0	0	0	0	0	0
cervix	32	30	1	1	0	27	0	5	0	0	0	0
uterus	76	74	1	1	0	58	0	17	0	1	0	0
ovary, malignant	53	52	0	1	0	42	0	10	0	1	0	0
ovary, borderline	10	8	2	0	0	10	0	0	0	0	0	0
other female	5	3	1	1	0	5	0	0	0	0	0	0
Male genital system	289	229	43	17	240	0	46	0	3	0	0	0
penis	4	2	1	1	4	0	0	0	0	0	0	0
prostate	265	210	40	15	220	0	43	0	2	0	0	0
testis	19	16	2	1	15	0	3	0	1	0	0	0
other male	1	1	0	0	1	0	0	0	0	0	0	0
Urinary system	359	313	38	8	200	107	27	20	3	2	0	0
kidney	210	196	11	3	99	70	18	20	1	2	0	0
renal pelvis	10	9	1	0	8	2	0	0	0	0	0	0
ureter	12	10	2	0	8	3	1	0	0	0	0	0
bladder	120	92	24	4	81	29	8	0	2	0	0	0
other urinary	7	6	0	1	4	3	0	0	0	0	0	0
Eye	21	20	1	0	9	11	1	0	0	0	0	0
Brain, CNS	231	186	25	20	84	117	7	18	3	0	1	1
brain, malignant	82	68	8	6	41	30	2	7	1	0	1	0
brain, benign	149	118	17	14	43	87	5	11	2	0	0	1
Thyroid/Endocrine	166	149	14	3	46	92	4	17	3	3	0	1
thyroid	114	105	7	2	29	66	1	13	1	3	0	1
adrenal	2	2	0	0	0	2	0	0	0	0	0	0
other malignant	1	1	0	0	0	1	0	0	0	0	0	0
other benign	49	41	7	1	17	23	3	4	2	0	0	0
Lymphoma	196	142	22	32	98	70	11	12	2	2	1	0
NHL	162	120	16	26	82	57	11	9	2	1	0	0
Hodgkins	34	22	6	6	16	13	0	3	0	1	1	0
Unknown primary	29	22	1	6	9	13	5	2	0	0	0	0
Ill-defined	6	6	0	0	4	0	0	2	0	0	0	0

*Class of Case: A—analytic, newly diagnosed NA—non-analytic, recurrence C—consultations, diagnostic workup

COMPARISON OF WFBMC MOST PREVALENT SITES BY YEAR newly diagnosed cases



A high-magnification fluorescence microscopy image of breast tissue. The image shows a complex network of glandular structures, likely ducts and acini, stained with a green fluorescent marker. The surrounding stroma is stained with a blue fluorescent marker. The overall appearance is a dense, interconnected pattern of green and blue structures.

2014 PUBLISHED ABSTRACTS

Breast Cancer

Courtesy of Dr. Frank Marini, Department of Regenerative Medicine

Published Abstracts

CANCER PREVENTION AND CONTROL (CPC)

CELL GROWTH AND SURVIVAL (CGS)

CELLULAR DAMAGE AND DEFENSE (CDD)

CLINICAL RESEARCH PROGRAM (CRP)

SURGICAL ONCOLOGY (SO)

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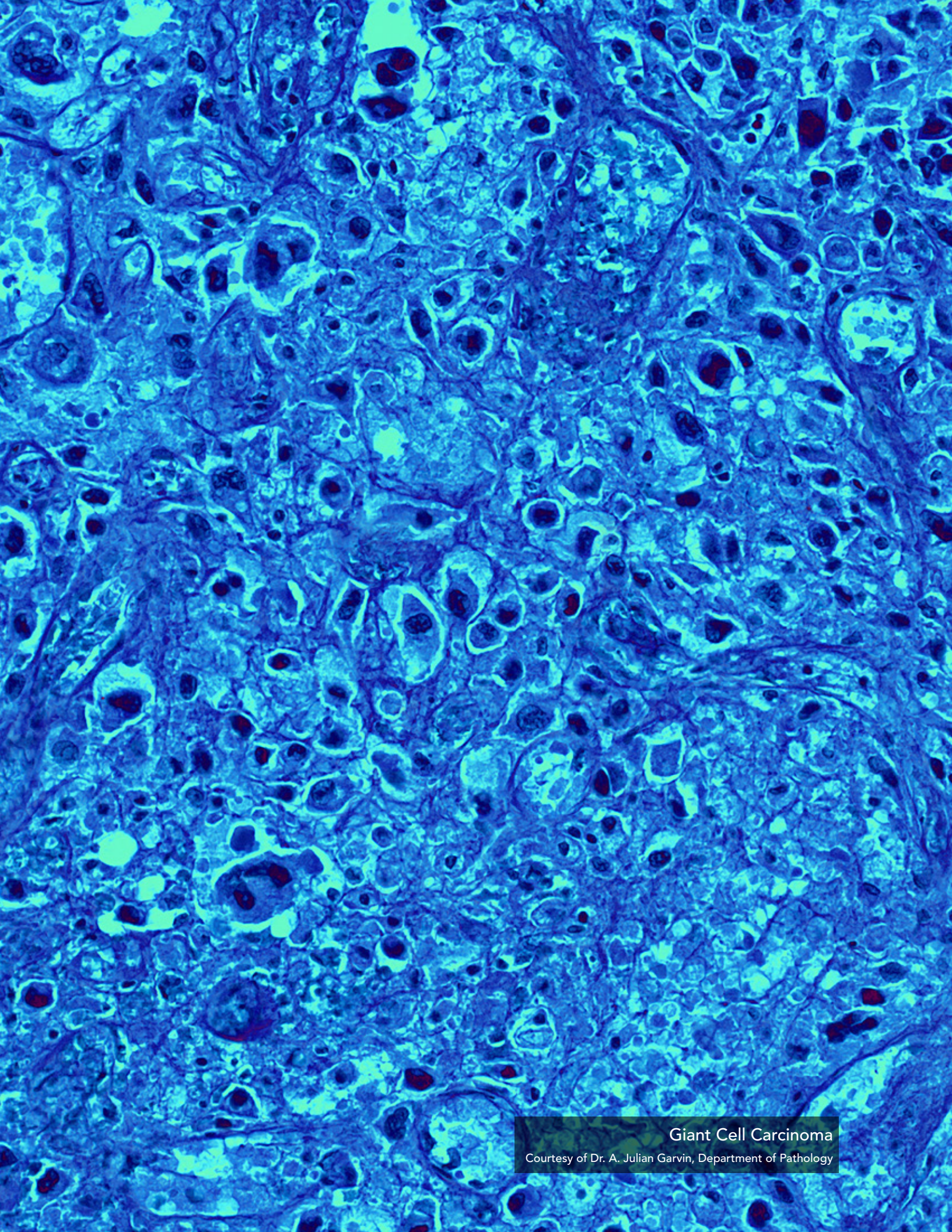
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Giant Cell Carcinoma

Courtesy of Dr. A. Julian Garvin, Department of Pathology



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