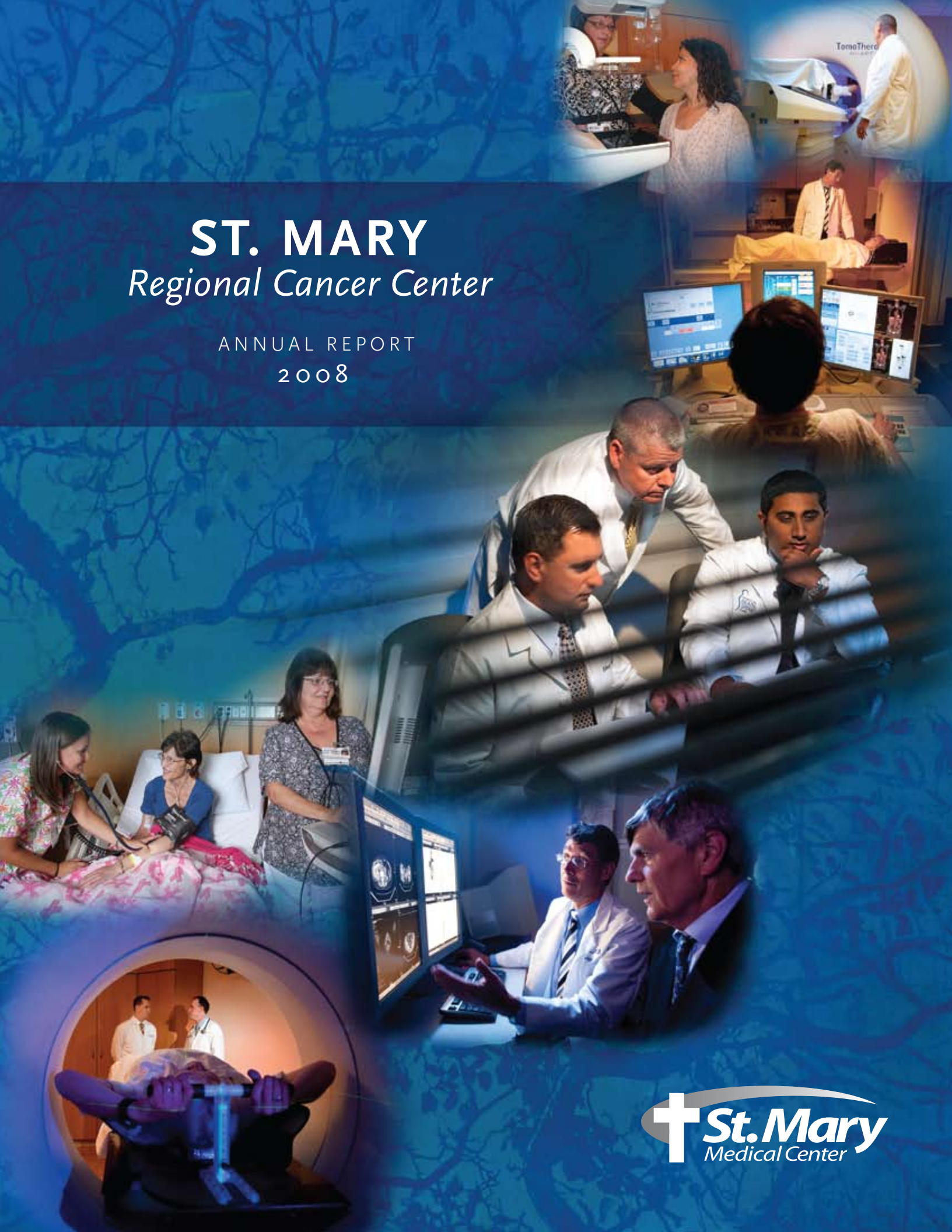


ST. MARY

Regional Cancer Center

ANNUAL REPORT
2008



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1 CHAIRMAN'S REPORT



ST. MARY REGIONAL CANCER CENTER CONTINUES ITS RELENTLESS PURSUIT TO FIGHT CANCER

4 In 2008, the St. Mary Regional Cancer Center continued its mission to provide patients with the most accurate and advanced diagnostic and treatment technologies available. These advances enable our oncology experts to detect cancer in its earliest stages – when it is the most curable – and help improve the level of comfort for patients undergoing treatment. St. Mary's outstanding cancer physicians and sustained investment in new technology, facility improvements, and community outreach have been a tangible testament to our commitment to saving lives. With vigorous support from the Board of Directors, hospital leaders, and dedicated specialists, the Cancer Center persists in its tireless efforts to deliver patient-centered care that meets the highest standards of quality and safety.

More than 1,000 new cancer patients were diagnosed and treated at St. Mary Medical Center in 2008. St. Mary is one of a core group of cancer centers in the nation to earn certification approval from the American College of Surgeons (ACoS) Commission on Cancer. Not only has St. Mary received ACoS certification for the last 18 years, but it also has earned approval with commendation for the last six years. The ACoS Commission on Cancer reserves this distinction for hospitals that ensure their patients and families have access to a comprehensive range of services required to diagnose, treat, and prevent cancer, along with the holistic support they need to cope with and recover from the disease.

Also in 2008, the St. Mary Regional Cancer Center earned three-year accreditation for its radiation oncology services from the American College of Radiology (ACR). St. Mary is one of only nine facilities in the state, and the only one in Bucks County, to have received this accreditation, which recognizes the achievement of the highest practice standards. These distinctions from both the ACR and the ACoS demonstrate St. Mary Medical Center's utmost devotion to quality and safety in its delivery of patient care.



PREVENTION & EARLY DETECTION

Cancer remains the second leading cause of death in our community. Moreover, among all counties in Pennsylvania, Bucks County is expected to report the third highest number of new cancer cases in 2008, according to the Pennsylvania Department of Health. In view of this, it is the utmost priority of the St. Mary Regional Cancer Center to implement preventive measures and heighten awareness to protect the community and to help cancer patients discover their disease as early as possible.

Knowing if one is at high risk for a particular cancer plays an important role in prevention and early detection. The St. Mary Family Risk Evaluation Program continues to expand and provide genetic counseling to individuals with personal or family histories of cancer, including breast, ovarian, and colorectal cancers. Screening for these particular cancers is key. The goal of the program is to assess individual and family cancer risk and provide patients with options for cancer screenings and prevention.

Our efforts to protect patients, visitors, colleagues, and volunteers include our no-smoking policy. Since

2007, St. Mary Medical Center has had a 100 percent smoke-free campus. In addition, St. Mary sponsors the "Stop Smoking ...Now!" program for our colleagues and the community. The five-session course is provided by the Bucks County Health Improvement Project (BCHIP) and funded by the Bucks County Tobacco Control Project and the Pennsylvania Department of Health.

In the fall of 2008, a commitment to community health outreach led to the launching of the St. Mary Breast Health Initiative. This special service provides free clinical breast examinations and free screening mammograms to uninsured women 40 and older who meet certain financial guidelines. In addition, the initiative, supported by a grant from the Philadelphia Affiliate of Susan G. Komen for the Cure®, hosted a community education program on breast health in the Bensalem School District.

For the fourth consecutive year, St. Mary has been the Medical Partner in the Philadelphia Breast Cancer 3-Day Walk, a national fund-raising event held every October to help fund breast cancer research. St. Mary also continues to host free community cancer-screening days for the detection of skin and prostate cancers.



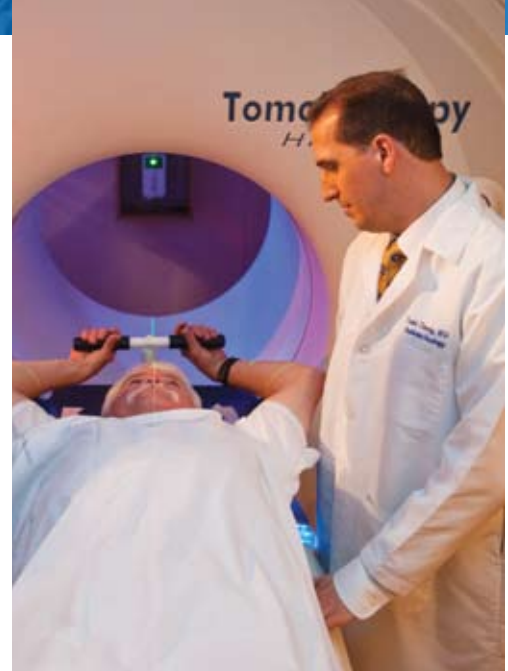
DIAGNOSIS & IMAGING

To support the early detection of cancer, St. Mary offers digital mammography, lung CAD, and PET/CT. In 2008, the Medical Center invested more than \$3 million to acquire a high-field Open MRI system, and became the first center in the nation to offer this breakthrough technology. The Hitachi OASIS scanner delivers outstanding image quality in an open environment, making it ideal for claustrophobic patients, as well as patients with large builds or limited mobility. By using a strong magnet and motion-compensation technology for clearer imaging, it gives doctors high-quality diagnostic information for every region of the body.

The St. Mary Breast Center offers all women digital mammography, rather than the traditional film-based technology. In 2008, a new digital mammography unit was acquired, providing the largest field of view available. The new unit gives radiologists more accurate, easier-to-read scans. For patients, the new unit means that women with larger breasts only need to have a single scan per view rather than a series of scans that image mere sections of the breast. Patient comfort is enhanced by the unit's ergonomic design and ability to reduce exam times.

For women whose mammograms indicate the need for further testing, the St. Mary Breast Center purchased a Mammotome® Breast Biopsy System to facilitate minimally invasive biopsies, and a Neoprobe Bluetooth® wireless probe used to extract abnormal tissue from the breast. In addition, St. Mary introduced MRI-guided stereotactic breast biopsy this year to more precisely locate the site of an abnormal growth.

Also in 2008, St. Mary advanced its established stereotactic surgery program, enabling neurosurgeons to perform minimally invasive brain biopsies using a highly sophisticated, lightweight stereotactic frame. The technology is used commonly for biopsies of deep-seated tumors, or infectious or inflammatory lesions that may be difficult or dangerous to access through an open technique. The technology allows a neurosurgeon to target the desired spot precisely and then use a slender biopsy needle to safely reach it within one millimeter accuracy. The result is that suspicious tissue can be extracted with the least amount of trauma to the brain, allowing patients to heal quickly. This shortened recovery time is critical as it means that treatment, if needed, can begin almost immediately.



ADVANCED TREATMENT & CARE

St. Mary continues to offer some of the most sophisticated cancer treatment technology in the region, including Wide-bore Computed Tomography (CT), High-Dose Rate (HDR) Brachytherapy, and Highly Integrated Adaptive Radiotherapy (HI-ART) TomoTherapy. HI-ART TomoTherapy, which was first offered at St. Mary in late 2007, is available at only a select group of cancer centers nationwide. HI-ART TomoTherapy allows for higher doses of radiation to be administered safely while zeroing in on the tumor. Before treatment begins, the tumor is imaged in real time, permitting more accurately customized doses of radiation to penetrate to the lesion while sparing nearby healthy organs and cells.

In 2008, the St. Mary Regional Cancer Center continued its multidisciplinary focus in the treatment of cancer. Multidisciplinary cancer conferences facilitate consultation among surgeons, medical oncologists, radiation oncologists, diagnostic radiologists, pathologists, and other cancer specialists. This multidisciplinary philosophy results in improved care designed to meet the individual needs of each patient.

Cancer patients whose treatment requires a hospital stay are admitted to St. Mary's Inpatient Oncology Unit, which was relocated and modernized this year.

This smartly redesigned space features family-friendly private rooms, offering patients and their loved ones the maximum degree of comfort and medical efficiency. New patient beds are equipped with built-in scales, bed alarms, and chair-positioning features. In 2008, a continued improvement in the reduction of nosocomial pressure ulcers was noted on the unit.

For the convenience of family members and visitors, each state-of-the-art room on the unit is furnished with a fold-out loveseat so that loved ones can stay overnight if they wish. An attractive community room is equipped with a refrigerator and microwave.

In 2008, St. Mary Medical Center became an affiliate member of the National Lymphedema Network. St. Mary's outpatient Lymphedema Therapy program helps people who experience abnormal swelling caused by excessive buildup of lymph fluid. This is great news for cancer patients who face this chronic state after their surgery, radiation therapy, or chemotherapy.

As proper nutrition is key to cancer care, consultations are offered to both inpatients and outpatients. An oncology dietitian meets with patients and their families to complete a nutritional assessment. Based on patients' individual needs, the dietitian advises them on how to get their required nutrients throughout the course of treatment and recovery.



HEALING

St. Mary Regional Cancer Center treats its patients based on the understanding that their mental, emotional, and spiritual facets are just as crucial as their physical well-being. Because they are treated as a whole person, cancer patients have an opportunity for more complete and meaningful healing.

To support this balanced, holistic approach, the St. Mary Holistic Center offers various services, learning tools, and classes that help patients cope more effectively, heal more completely, and feel more rejuvenated. In addition, the Community League of St. Mary, through its Healing Ministries initiative, offers free or low-cost holistic services to help our cancer patients with the emotional and physical challenges that arise during diagnosis, treatment, and recovery.

Patients find solace through St. Mary's cancer support groups and programs. Our Breast Cancer Support Group, as well as the Man to Man® support group, and the Look Good ... Feel Better® program, sponsored by the American Cancer Society, are a valuable resource to our patients, offering comfort, information, and understanding.

EDUCATION

In May 2008, St. Mary Medical Center held its annual oncology Continuing Medical Education (CME) conference. A record attendance of 118 physicians, physician assistants, nurse practitioners, and registered nurses learned about new imaging advances in lung and breast cancer screening; the use of breast MRI for high-risk patients; multidisciplinary management of ovarian cancer; advances in radiation oncology; and treatment updates for prostate, colorectal, and lung cancer.

Great strides were made in 2008 by the St. Mary Regional Cancer Center in the realms of technology for cancer detection and treatment, quality and safety in delivery of care, and enhanced comfort for our patients. We look forward to 2009, when St. Mary will be able to take new aim at fighting cancer by becoming one of the first centers in the region to offer Frameless Stereotactic Radiosurgery (SRS). This advanced method of delivering a one-time application of a large dose of radiation will enable our experts to treat cancerous brain tumors without anesthesia, pain, or bleeding. Patients will experience only minimal recovery time. St. Mary oncology experts are working diligently to bring cutting-edge cancer treatments such as Frameless Stereotactic Radiosurgery right here to Bucks County.

Through sophisticated advances and patient-centered care, the St. Mary Regional Cancer Center demonstrates its steadfast commitment to serving our community and saving lives.

Michael P. Mann, DO, FACOI, FACP
Chairman

2 2008 CANCER PROGRAM ACTIVITIES



*Robert E. Reilly, DO
Medical Director, Oncology Research*

Throughout 2008, the physicians and staff of the St. Mary Regional Cancer Center conducted community programs to promote cancer awareness and educate the general public. The following cancer-related programs were offered for colleagues and the community.

BREAST CANCER SCREENINGS

October 2008

Launched in the fall of 2008, the St. Mary Breast Health Initiative provided 42 free clinical breast examinations and offered 33 free screening mammograms to uninsured women in our community.

In addition, the St. Mary Make Every Day About Living Colleague Wellness Program offered free clinical breast exams to our colleagues during Breast Cancer Awareness Month.

PROSTATE CANCER SCREENINGS

September 2008

At a community awareness program, 10 men between the ages of 30 and 77 were screened for prostate cancer. Prostate-Specific Antigen (PSA) screenings resulted in two abnormal results, and Digital Rectal Exams (DRE) resulted in one abnormal result.

SKIN CANCER SCREENINGS

May 2008

St. Mary Regional Cancer Center hosted two skin cancer screenings: one for colleagues and one for our community members. In addition to the free screening, participants received educational materials from the American Academy of Dermatology (AAD). A total of 131 participants – 71 percent between the ages of 50 and 70 years – were screened. As a result, 53 were referred for biopsies.

CLINICAL RESEARCH

As a Cooperative Group affiliate of the Mayo Clinic, the St. Mary Regional Cancer Center collaborates with prominent research organizations such as the Eastern Cooperative Oncology Group (ECOG) and the Cancer Trials Support Unit (CTSU), both supported by the National Cancer Institute (NCI). St. Mary also participates in research sponsored by major pharmaceutical and biomedical companies. These affiliations give St. Mary patients access to clinical trials that were previously available only at large academic hospitals. These would include, for example, cancer vaccine trials and trials involving biological modifiers. During 2008, 56 oncology patients were screened for clinical trials, and 8 were eligible for enrollment.



FAMILY RISK EVALUATION PROGRAM

The Family Risk Evaluation Program educates individuals and families about the role of heredity in cancer risk, provides them with up-to-date information regarding cancer screening and prevention, and supports them throughout the



genetic counseling and testing process. In 2008, 115 individuals were referred to the Family Risk Evaluation Program. Genetic counseling sessions were provided for 54 patients; 26 patients underwent genetic testing.

DIAGNOSTIC RADIOLOGY

More than 1,000 PET/CT studies were completed in Radiology, which is more than double those completed in 2007. Nearly 18,000 mammograms were performed in the Breast Center.

RADIATION ONCOLOGY

Approximately 12,000 radiation treatments were delivered to 515 patients, and 153 brachytherapy treatments were performed.

OUTPATIENT INFUSION & CHEMOTHERAPY

The OP Infusion/Chemotherapy Suite delivered services to 2,663 patients in 2008.

PATHOLOGY

Surgical pathology cases, which include biopsies and resections, totaled 11,088. The department performed 1,200 non-gynecological cytology examinations, which included fine needle aspirations, bronchial brushings, and body fluids. The Clinical Laboratory performed over 3 million tests.

The Department of Pathology and Laboratory Medicine is accredited by the College of American Pathologists, the American Association of Blood Banks, the State of Pennsylvania, and the Federal Government through the Clinical Laboratory Improvement Amendments (CLIA) program. Staffed by two pathologists, both certified in anatomic and clinical pathology, the laboratory offers access to the newest diagnostic modalities, including molecular pathology, through the use of its own resources and a carefully selected group of reference laboratories.

LYMPHEDEMA THERAPY

St. Mary's Klose-trained, certified lymphedema specialists use Complete Decongestive Therapy (CDT) to treat abnormal swelling caused by excessive buildup of lymph fluid. CDT is a non-invasive program that includes Manual Lymph Drainage (MLD) massage, compression bandaging, therapeutic exercise, and a personalized education in self-care. Furthermore, St. Mary added the Flexitouch® system to its treatment plan. The Flexitouch pneumatic compression pump allows patients to successfully manage their lymphedema from home.

St. Mary's Lymphedema Therapy program has seen dramatic growth. In 2008, there were 110 lymphedema evaluations completed, representing a



39 percent increase in lymphedema therapy referrals over the previous year. The increased demand for lymphedema therapy services resulted in the hiring of an additional certified lymphedema specialist in March 2008.

BREAST HEALTH INITIATIVE

In October 2008, St. Mary Medical Center began the Breast Health Initiative to provide the underserved populations of lower Bucks County with free screenings and educational awareness programs for the early detection of breast cancer. These services are provided at the St. Mary Regional Cancer Center, St. Mary Breast Center, and Bucks County Health Improvement Partnership (BCHIP) Adult Health Clinic in Bensalem, where women also are given access to primary healthcare services for their families.

Free clinical breast exams, breast self-awareness education, and free screening mammograms are offered through the Breast Health Initiative, which is supported by a \$40,000 grant from the Philadelphia Affiliate of Susan G. Komen for the Cure®.

In 2008, the Breast Health Initiative received 61 intake calls. Through the initiative, 42 clinical breast exams and 33 screening mammograms were performed. Two women were referred for further assessment. In addition, 68 women from the community attended a program about breast health.

SUPPORT SERVICES

The Breast Cancer Support Group meets monthly and explores topics such as coping with a diagnosis, treatment options, and how to make treatment decisions. The group also discusses communicating with family and friends about the disease. Man to Man[®], which meets monthly, is a prostate cancer support group that addresses the needs and interests of its participants. Past discussions have covered treatment options, managing side effects, and diet and nutrition. The Look Good...Feel Better[®] program teaches beauty techniques to women who are actively undergoing cancer treatment. The program is designed to help women address the appearance-related side effects of radiation and chemotherapy.

SOCIAL SERVICES

The oncology social worker is available to patients and family members on the Inpatient Oncology Unit. The social worker also is available to outpatients in the Regional Cancer Center and those referred by the physician. Services provided include psychosocial assessment, community resource referral, information on support groups, education, and crisis intervention. The social worker also can assist patient and family members in understanding insurance coverage and benefits associated with discharge planning needs. The oncology social worker works closely with supportive care, home care, physicians, nurses, and other interdisciplinary team members.

SPIRITUAL CARE

In 2008, members of the Spiritual Care team visited with every patient receiving care on the Inpatient Oncology Unit. Our certified chaplains also are available to meet with outpatients treated at the Regional Cancer Center. In addition, Spiritual Care facilitated six bereavement support sessions, and offered memorial services in the St. Mary Chapel for families and their loved ones.



HEALING MINISTRIES/ HOLISTIC SERVICES

Over the course of the year, the Holistic Center served 117 cancer patients, providing them with free or low-cost services to reinvigorate their overall health.

PALLIATIVE CARE/SUPPORTIVE CARE

The Palliative Care/Supportive Care program is designed to support patients and their families throughout the course of the illness. The goals of the program are to prevent and relieve suffering, as well as to support the best possible quality of life for patients and their families. The Palliative Care/Supportive Care program was consulted for 828 patients in 2008.

ONCOLOGY NURSING EDUCATION

To enhance patient safety and improve medication reconciliation across the continuum of care, Nursing Education focused on chemotherapeutic agents. A different agent was introduced and reviewed by oncology nurses each month, with a focus on adverse effects and their management, mechanism of action, indications, usual dosing, drug interactions, and monitoring. In addition, Nursing Education presented a program on "Pain Management in the Elderly" in collaboration with the Bucks County Long Term Care Consortium.

3 CANCER REGISTRY REPORT



Established in 1987, the Cancer Registry is an integral part of St. Mary Medical Center's cancer program. The registry maintains an electronic database on more than 16,500 patients diagnosed and/or treated with reportable cases of cancer at the St. Mary Regional Cancer Center. The database is used for the collection, management, and analysis of data. In compliance with state and national mandates, the registry submits data to the Pennsylvania Department of Health Bureau of Statistics and Research and to the American College of Surgeons (ACoS) through the Commission on Cancer's National Cancer Data Base (NCDB). The data collected in the registry is routinely audited for accuracy and completeness by the Cancer Committee physicians and the appointed liaison physician.

In 2008, there were 1,018 new cancer cases accessioned into the Cancer Registry, of which 924 cases were analytic (diagnosed and/or administered a first course of treatment at St. Mary) and 94 cases were non-analytic (diagnosed and administered a first course of treatment elsewhere). Since the reference date of January 1, 1987, the registry has a total number of 16,850 cases. To be in compliance with the American College of Surgeons, the Cancer Registry must maintain a 90 percent follow-up rate. In 2008, the registry maintained a successful follow-up rate of 90 percent on more than 6,000 eligible patients. The registry also responds to all inquiries from other facilities for follow-up information in accordance with confidentiality standards. Quality improvement projects, in which the registry participates, reinforce the St. Mary Regional Cancer Center's commitment to quality of care and service.

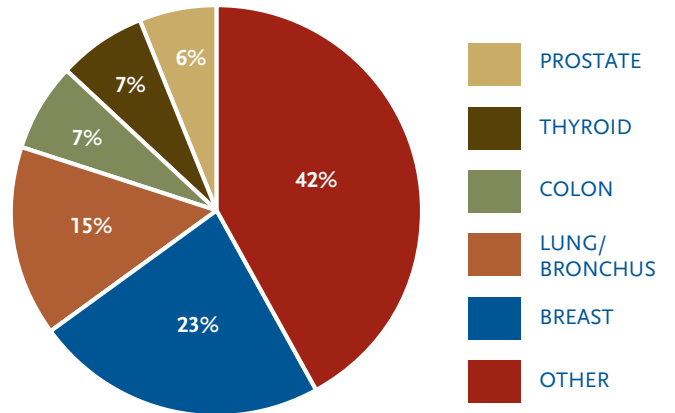
TABLE 1
2008 Primary Site Table

Adrenal Gland	2	Lung/Bronchus	137
Anus & Anal Canal	4	Lymph Nodes/NHL/HL	27
Bladder	54	Mediastinum/Pleura	5
Blood/Bone Marrow	14	Oral Cavity/Pharynx	29
Bone	1	Other	14
Brain/Central Nervous System	22	Ovary	9
Breast	213	Pancreas	16
Cervix Uteri	9	Prostate	60
Colorectal (Colon 68, Rectum/Recto-sigmoid Junction 20)	88	Retroperitoneum	2
Corpus Uteri	42	Skin/Melanoma	35
Esophagus	8	Small Intestine	4
Fallopian Tube	1	Soft Tissue	6
Gallbladder	10	Stomach	10
Gastrointestinal Tract	1	Testis	3
Kidney/Renal Pelvis	14	Thyroid	63
Larynx	9	Ureter	4
Liver	4	Vulva	4
		TOTAL	924

The Primary Site Table in this report shows a breakdown of the anatomical sites for all the cancers diagnosed and/or treated at St. Mary Medical Center in 2008 (Table 1).

The Frequency of Cancer graph represents the most common cancers diagnosed and treated at St. Mary Medical Center in 2008 (Graph 1). Breast cancer is the most frequently diagnosed cancer at St. Mary, with 213 new cases, accounting for 23 percent of our analytic caseload in 2008. There were 137 new cases of lung cancers, accounting for 15 percent; 68 cases of colon cancer, accounting for 7 percent; 63 cases of thyroid cancer, accounting for 7 percent; and 60 cases of prostate cancers, accounting for 6 percent.

GRAPH 1
Frequency of Cancer – 2008 Top 5 Sites

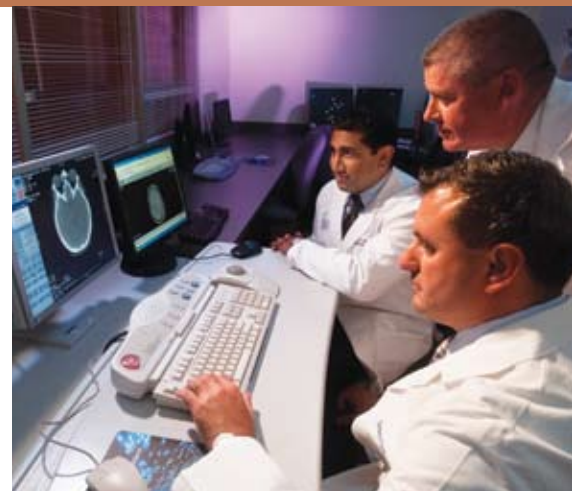


4 MULTIDISCIPLINARY CANCER CONFERENCES

The multidisciplinary Cancer Conference meets at least three times a month to discuss the various cancer diagnoses and treatment options for patients at St. Mary Medical Center. Each conference focuses on a general cancer concern, breast cancer, or thoracic oncology. All of these conferences are multidisciplinary and involve active participation by physician specialists of Medical Oncology, Radiation Oncology, Pathology, Radiology, General Surgery, and Internal Medicine. The conferences are well-attended and provide not only a forum for discussion of individual patient treatment plans, but also an informative educational conference for members of the hospital community.

The majority of the cancer conferences are discussions of current patients, with as many patients as possible being reviewed prospectively (prior to initiation of treatment plan) in order to provide input from a variety of specialists. Physicians discussed a total of 98 cases in 2008 at eight breast and nine general cancer conferences. In addition, physicians discussed a total of 98 thoracic cases at 19 thoracic oncology conferences. The Cancer Conferences are committed to providing educational information to the hospital community about cancer diagnoses and treatment. The registry maintains accurate cancer conference data in compliance with the American College of Surgeons.

In addition, special topics on oncology, featuring a guest speaker, are given several times each year.



The following is a list of the programs offered in 2008:

JANUARY 17

Deborah K. Armstrong, MD

“Comprehensive Management of Ovarian Cancer: Current Treatment and Maximizing Quality of Life”

MAY 15

S. Gerald Sandler, MD

“Current Trends in Medical Management of ITP, New Perspective – Evolving Care”

AUGUST 7

Stephen Come, MD

“Current and Emerging Treatment Options for Breast Cancer”

SEPTEMBER 18

Alexander Parikh, MD

“Surgical Treatment of Metastasized Colorectal Cancer”

15

5 STATISTICAL REPORTS

STUDY 1: LUNG CANCER – A MULTIDISCIPLINARY APPROACH

BACKGROUND

Lung cancer is a very common cancer, with a prevalence second only to that of prostate cancer in men and breast cancer in women. Moreover, most lung cancers are diagnosed at an advanced stage, which confers a poor prognosis. Lung cancer is the leading cause of cancer death in the United States.

The American Cancer Society projected that 215,020 cancers of the lung would be diagnosed in the United States in 2008. They also projected that deaths related to lung cancer in 2008 would total 161,840 in the United States, accounting for 29 percent of all cancer-related deaths. Only 15 percent of all lung cancer patients live five years or longer after their initial diagnosis. Trends reveal that while modest gains have occurred in five-year survival rates among whites, survival rates have not changed in the African-American population.

For 2008, the Pennsylvania Department of Health projected 10,260 cases of lung cancer and 7,955 deaths from the disease.

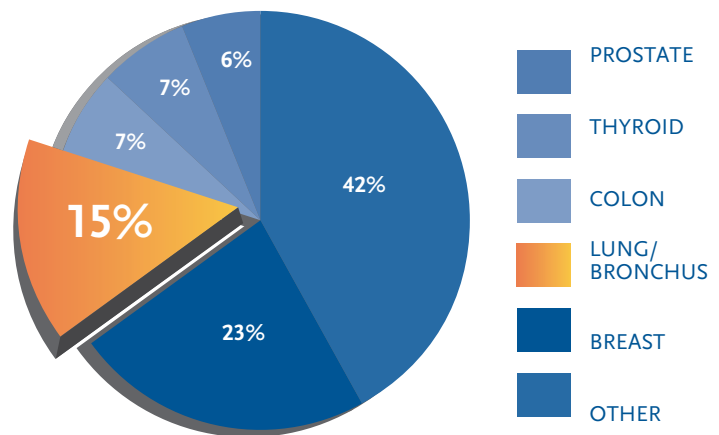
At St. Mary Medical Center, 137 new cases of lung cancer were diagnosed in 2008. This accounted for 15 percent of St. Mary's cancer cases, and lung cancer was the second most frequently diagnosed cancer after breast cancer (*Graph 2*).

Even though statistically lung cancer is more likely to strike men than women, 54 percent of St. Mary's lung cancer cases were in women. Small cell lung cancer represented approximately 15 percent of total lung cancer cases, which is consistent with the national average. One-third of the cases were in individuals between the ages of 60-69, and one-third were in individuals between the ages of 70-79.

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GRAPH 2

St. Mary Medical Center Frequency of Cancer – 2008



Graph 3 illustrates all 2008 St. Mary lung cancer cases by gender and age at diagnosis.

TYPES OF LUNG CANCER

The two major forms of lung cancer are non-small cell lung cancer and small cell lung cancer. Non-small cell lung cancer accounts for about 85 percent of all cases and small cell for about 15 percent.

Non-small cell lung cancer can be divided into three major histologic subtypes: squamous cell carcinoma, adenocarcinoma, and large cell cancer. (Among non-smokers, adenocarcinoma is the most common

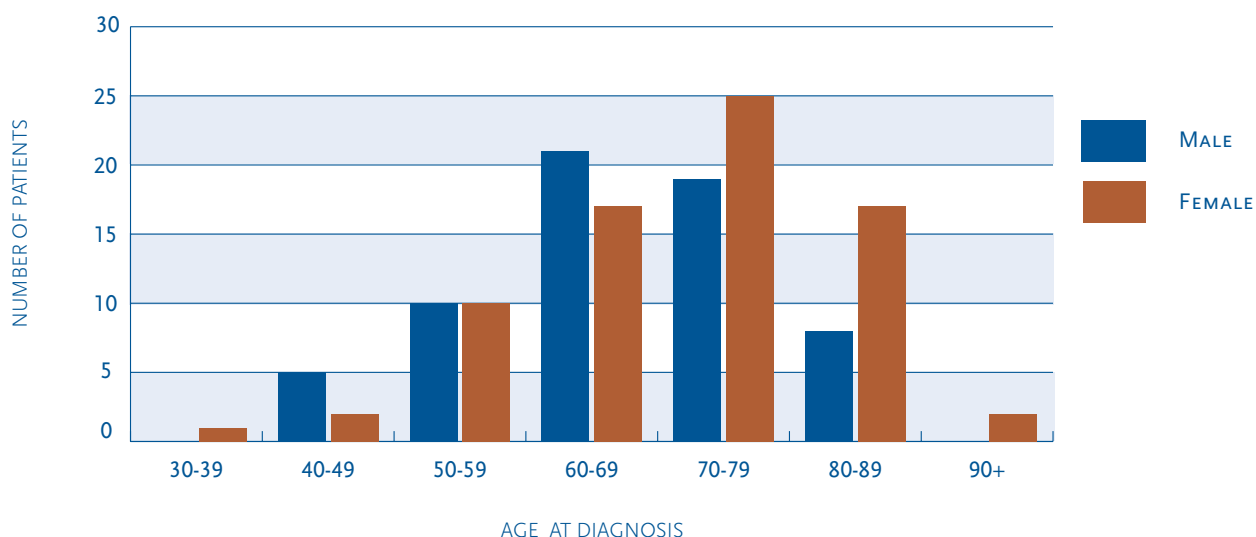
form of lung cancer.) Non-small cell lung cancers are classified into Stages I-IV. Staging procedures include bronchoscopy, needle-guided biopsy, mediastinoscopy, and video-assisted thorascopic surgery. Radiologic studies used to further classify the stage include CT scans, PET scans, and MRI.

To treat patients with non-small cell lung cancer, surgery, radiation therapy, and chemotherapy are the modalities commonly used. In general, surgery provides the best chance for a cure for patients with localized disease. Chemotherapy given after surgery for Stage II cancers has become accepted as standard of care,

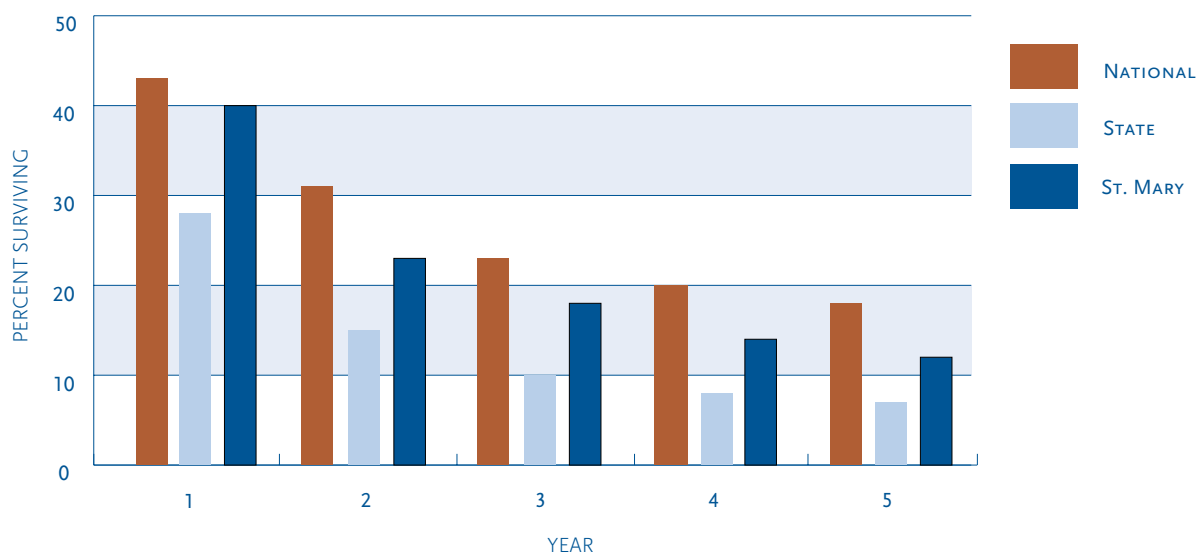
but it remains controversial for Stage I cancers. More advanced cancers, such as Stage III cancers, are usually treated with a combination of chemotherapy and radiation either concurrently or sequentially. For Stage IV tumors, which by definition are metastatic, chemotherapy is the primary treatment modality. Local therapy, such as radiation, is used to palliate specific sites of disease.

Small cell lung cancer is staged as either limited or extensive. Limited stage small cell lung cancer is treated with a combination of chemotherapy and radiation, while extensive stage small cell lung cancer is usually exclusively treated with chemotherapy.

GRAPH 3 St. Mary Male and Female Lung Cancer Patients By Age at Diagnosis – 2008



GRAPH 4 Lung Cancer 5-Year Survival Rates (1998-2001)



18 RISK FACTORS

Smoking is by far the leading risk factor for lung cancer. About 85 to 90 percent of all lung cancer deaths are believed to result from smoking – and this number is even higher for small cell lung cancer. Tobacco smoke contains at least 40 known carcinogens. The development of lung cancer is directly related to the number of cigarettes smoked, the length of smoking history, and the tar and nicotine content of cigarettes. After smoking cessation, the risk of lung cancer declines slowly.

In addition, other risk factors for lung cancer include exposure to:

- Asbestos
- Radon

- Radioactive ores such as uranium
- Inhaled chemicals or minerals such as beryllium, cadmium, silica, vinyl chloride, nickel compounds, chromium compounds, coal products, mustard gas, and chloromethyl ethers
- Diesel exhaust
- Radiation therapy to the lungs
- Arsenic
- Air pollution

SYMPTOMS

The symptoms produced by lung cancer depend on its location. Central tumors produce symptoms of cough, shortness of breath, and bleeding. Peripheral tumors also may cause cough and fluid buildup in the lining

around the lungs called the pleura. Systemic symptoms such as weight loss, anorexia, and pain are also common – especially in metastatic disease.

SURVIVAL RATES

St. Mary's five-year survival rates for lung cancer cases diagnosed between 1998-2001 show favorable survival outcomes compared with those at the state and national levels (*Graph 4*).

ST. MARY THORACIC ONCOLOGY PROGRAM

In April 2005, the Thoracic Oncology Program at St. Mary Medical Center was initiated in response to a community need for state-of-the-art thoracic cancer care. Approximately 450 lung cancer cases are diagnosed annually in Bucks County and approximately 30 percent of those are treated at the St. Mary Regional Cancer Center. Currently, the Thoracic Oncology Team meets about twice a month to present patients with newly diagnosed lung cancer, discuss management of the cases, and update physicians on the latest scientific knowledge and treatment of lung cancer. The meetings are well-attended with physicians from Pathology, Surgery, Radiology, Radiation Oncology, Medical Oncology, Pulmonology, and Internal Medicine. The meetings also are open to all allied health professionals for continuing medical education credits. In 2008, 98 thoracic cases were presented at the meetings for discussion, evaluation, and clinical management.

CONCLUSIONS & RECOMMENDATIONS

Progress in treating lung cancer has been made over the past few years. Better surgical techniques and more precise ways of delivering radiation, such as Stereotactic Body Radiotherapy (SBRT), have improved care at St. Mary Medical Center. Advances in chemotherapy with newer targeted therapies, such as bevacizumab and erlotinib, also have improved patient outcomes. Although these new therapies have made a significant impact on patient prognosis, smoking cessation remains the most important factor in reducing rates of lung cancer.

In addition, the field of oncology has widely accepted multidisciplinary care as an approach to improve the coordination of care and survival outcomes. The goal of the Thoracic Oncology Program is to expand to a multidisciplinary thoracic oncology clinic, elevating the quality of care for the patient with a streamlined, multidisciplinary evaluation process.

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STUDY 2: STEREOTACTIC RADIATION THERAPY

BACKGROUND

Brain metastases are the most common intracranial tumor treated by oncologists and neurosurgeons. In the United States, approximately 200,000 people will present with or develop a brain metastasis from their primary cancer. Brain metastases can cause life-altering symptoms, including neuromuscular weakness, confusion, and speech deficits. Although there is a vast range of active chemotherapeutic and biological agents available to treat a wide range of primary cancers, many of these agents are unable to penetrate into brain tissue. Thus, radiation therapy and surgical resection are key modalities in the treatment of brain metastases.

TREATMENT

Patients with brain metastases can be treated with surgical resection, radiosurgery, radiotherapy, chemotherapy, or any combination of

these. Numerous factors impact the decisions of physicians and patients as to which treatment paradigm is best suited for each individual case. These include the specific type of cancer from which the metastasis originated, the health of the patient, the location of the brain metastases, the number and size of the brain metastases, and the overall prognosis. When treated aggressively, patients may have the potential for prolonged survival. Clinicians must individualize the management of these patients and understand the advantages and disadvantages of each discipline involved: radiation oncology, neurosurgery, and medical oncology.

Radiation therapy is a non-invasive, targeted therapy that can be utilized with or without surgical or medical intervention. As the field of radiation oncology has advanced significantly over the last 25 years through the development of new radiation delivery technologies and planning systems – three-dimensional and Intensity

Modulated Radiation Therapy (IMRT), Image-Guided Radiation Therapy (IGRT), and improvements in anatomical imaging – brain metastases can be treated more accurately with higher doses of radiation. These technological advances correlate with improvements in local control and survival and decreased side effects.

Stereotactic Radiotherapy (SRT) and Stereotactic Radiosurgery (SRS) (radiation delivered in one fraction) are terms used to describe the delivery of radiation to precise targets in the brain (i.e. brain metastases) or body with the use of immobilization and/or tracking devices. SRT and SRS are non-invasive therapies that patients can undergo on an outpatient basis with minimal side effects. Recent Phase III studies have shown improved outcomes when higher doses of radiation are used to treat brain metastases. There are various delivery and planning systems that can provide SRT and SRS treatments. These include TomoTherapy, Gamma Knife, Cyberknife, and standard linear

accelerators equipped with the appropriate upgrades (i.e. Brain Lab). Another advantage of SRT and SRS is the ability to treat brain metastases during or in between cycles of systemic therapy. Thus, unlike surgical resection, with SRT or SRS patients do not have to delay systemic therapy or halt it for an extended period of time.

TREATMENT OUTCOMES

Large national and international Phase III trials have demonstrated the importance of higher doses of radiation in controlling brain metastases and increasing survival in certain patient populations. These studies compared whole brain radiation (WBRT) +/- SRS to WBRT alone and SRS +/- WBRT. Improvements in local control correlate with decreased future neurological symptoms, decreased use of steroids to control brain swelling, and decreased neurological deaths. To date, there have been no studies comparing SRS to more than one high dose fraction with or without WBRT. More data are needed to compare fractionated radiation therapies to SRS. However, it is unlikely that a Phase III trial would be created to compare these radiation therapy regimens. Thus,

the data will likely come from retrospective studies and clinical experience.

Many radiation oncology departments do not offer SRS, and therefore SRT (fractionated, high dose radiation) is used to treat brain metastases. SRT offers patients a seamless transition to be treated expeditiously by the radiation oncologist with whom they have built a rapport. SRT can be delivered without an invasive head frame, thus optimizing patient comfort.

TomoTherapy is a novel radiation delivery technology in that it is a linear accelerator mounted to a computed tomography (CT) scanner, allowing the patient to be treated under image guidance. IGRT can improve the set-up and treatment accuracy. Fractionated low and high dose radiation plans can be created to treat any site of the body, including the brain. Extremely conformal radiation plans are delivered painlessly to brain metastases without the use of an invasive frame. This report will describe the approach and experience at the St. Mary Regional Cancer Center in treating patients with brain metastases with TomoTherapy.

BRAIN METASTASES: PATIENT EVALUATION, TREATMENT PLANNING, AND RADIATION DELIVERY

PATIENT EVALUATION

Each patient consultation includes an extensive conversation with a physician and nurse and close review of the medical records, physical exam, and imaging (e.g. MRI, CT, PET/CT). Each case is discussed with the neurosurgeons, neurologists, and/or medical oncologists involved. The risks and benefits of the different treatment options are explained to the patient. At the conclusion of this consult, patients are given recommendations regarding the various treatment options for their brain metastases: WBRT, SRS, SRT, surgical resection, systemic therapy, or observation.

TREATMENT PLANNING

When SRT is opted for, a rigorous process takes place. Unless there are contraindications, each patient has an MRI done with gadolinium. The patient will undergo a CT simulation in St. Mary's radiation oncology department with an individually made Aquaplast mask. Aquaplast creates a

mask that precisely conforms to the shape of the patient's head and face. This mask decreases patient motion and improves radiation accuracy in a non-invasive manner. To further enhance accuracy, the CT images are acquired with the Aquaplast mask in place.

Through the use of treatment planning software, these CT images are fused with the recently done MRI. This allows the physician to identify the brain metastases using both MRI and CT images. The CT images also delineate the normal structures of the brain. Once the target or targets and normal structures are contoured, the planning process can occur. During planning, the physician, dosimetrist, and physicist determine the optimal way to deliver radiation to the lesions while minimizing dosage to the normal brain and head structures. Then, the physician chooses the amount of radiation and number of treatments the patient will receive. Because of its unique properties, which allow one or more brain

metastases to be treated during a single course of radiation, TomoTherapy has its own planning system.

RADIATION DELIVERY

After the radiation plan has been optimized, patient treatment commences. The patient is placed on the flat table of the TomoTherapy machine wearing his or her Aquaplast mask made during the CT simulation. Before each treatment session and before any radiation is delivered, CT images are acquired with the patient in the appropriate position. If the patient does not align correctly based on the immediate CT images, the patient is repositioned. Once the patient is properly aligned, the treatment is given. This application of IGRT minimizes set-up error and patient movement, thus optimizing the delivery of the radiation. The entire process occurs over 10 to 30 minutes. Patients usually are treated in three to five sessions spread over one to two weeks.



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Appointments	
<i>Infusion/Chemotherapy</i>	215.710.5325
<i>Radiation Oncology</i>	215.710.5300
Bereavement Support Group	215.710.5902
Breast Center	215.710.5393
Clinical Research/Protocol	215.710.5328
Community Cancer Screenings and Cancer Education Program.....	215.710.5962
Family Risk Evaluation Program.....	215.710.4511
Health Sciences Library.....	215.710.2012
Holistic Services	215.710.6948
Home Care/Hospice	267.569.0760
Inpatient Oncology Unit	215.710.7002
Mammography (to schedule)	215.710.2208
Nutritional Counseling	215.710.2361
Palliative Care/Supportive Care	215.710.4616
Radiology/Imaging Services (to schedule).....	215.710.2208
Rehabilitative Services	
<i>Physical medicine and rehabilitation</i>	215.710.2223
<i>Pulmonary rehabilitation</i>	215.710.2522
<i>Cardiac rehabilitation</i>	215.710.2191
Smoking Cessation Program	215.710.2264
Social Services.....	215.710.2542
Spiritual Care.....	215.710.5902
Tumor Registry.....	215.710.5314



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