Our Mission

*To share **God's love** with our **community** by promoting **healing** and **wellness** for the **whole person.***

HEALTHCARE *at a Higher Level*

Glendale Adventist Medical Center
Cancer Services
Adventist Health

CANCER SERVICES ANNUAL REPORT 2013

CARING FOR YOUR LUNGS FOR LIFE

GAMC EARNS THE OUTSTANDING ACHIEVEMENT AWARD

Glendale Adventist Medical Center
Cancer Services
Adventist Health

2013 Cancer Services Annual Report

Including 2011 Cancer Registry Data

GAMC Earns the Outstanding Achievement Award

One of the Finest in Southern California

Kevin A. Roberts, RN, President & CEO, Glendale Adventist Medical Center

My pride in Glendale Adventist Medical Center is showing. The year 2012 brought a significant national honor to our hospital and the Cancer Services Program. The Outstanding Achievement Award from the American College of Surgeons (ACOS) recognizes comprehensive programs that provide the highest quality care to cancer patients.

We applaud Dr. Boris Bagdasarian, Chairman of our Cancer Committee, and Melina Thorpe, Director of Cancer Services, whose leadership truly exemplifies Performance at a Higher Level. An exemplary team of physicians, specialists and support staff makes our Cancer Services program one of the finest in Southern California. In fact, Glendale Adventist was the only Comprehensive Community Cancer Program in Los Angeles County to earn the Outstanding Achievement Award in 2012. Cedars-Sinai Medical Center, classified by ACOS as an Academic Comprehensive Cancer Program, received the award in a separate category.

Compliance with all standards

The award is granted to facilities that demonstrate a commendation level of compliance with seven standards that represent six areas of cancer program management. Glendale Adventist Medical Center exceeded the criteria by receiving commendation with eight standards!

Among upgrades at the Cancer Center are its systems of record and verification and treatment planning, which enable patients to be treated more efficiently and safely.

Cancer patients at Glendale Adventist have the benefit of selecting surgery that utilizes single incision laparoscopic surgery (SILS) developed by Sam Carvajal, MD, a nationally-recognized pioneer in minimally-invasive procedures. Dr. Carvajal also is our physician liaison to the ACOS and is often called on to interpret data and outcomes for the Cancer Services program.

Community outreach is a continuing goal of the entire hospital and is especially evident in Cancer Services. Last year's outreach activities included Valentine's Day Luncheon, Cancer Survivors' Day, Beauty Bus, Daffodil Days, Skin Cancer Awareness, and Prostate Cancer Screening. We were honored to host the young ladies of the Tournament of Roses Royal Court, who visited our hospital and met with our cancer patients.

> "Reflecting on all programs at Glendale Adventist, our people make the difference."
>
> **– Kevin A. Roberts,** RN, President & CEO, GAMC

Tracey Sanders, new as our Ingeborg's Place Apart Coordinator, supports image enhancement, which includes "Look Good/Feel Better" through the American Cancer Society.

The Cancer Services team supports Glendale Adventist physicians in the annual prostate cancer screening.

One of the Finest in Southern California

Cynthia Klinger, MFT, who is widely respected in this area, coordinates a Cancer Support Group and Brain Tumor Support Group. She also offers patients and family individual support and counseling. Nurse Navigator Sharon Feinberg, RN, OCN, guides our patients through their oncology care.

Cancer Services has recently developed the beginnings of a formal survivorship program. This includes survivorship care plans and distress monitoring tools that fulfill the requirements of standards 3.2 and 3.3 required by the ACOS.

A host of patient support programs, including yoga, dance, strength training, journal writing, jewelry-making, and lymph-edema management are offered free of charge — all made possible by funds raised by the Dr. Norick Bogossian Cancer Care Guild.

"To share God's love with our community by promoting healing and wellness for the whole person." This mission continues at the core of our hospital's existence. As a faith-based organization, we recognize that although a patient's diagnosis relates to a physical state, it impacts the whole person. The entire life's experience is shaped by a cancer diagnosis. Our cancer services team considers it a sacred trust and privilege to be a part of the lives of those who come to Glendale Adventist seeking help, and stands in awe of the courage, faith, and authenticity of the incredible people it is privileged to serve. Our team is dedicated to ever-expanding our capabilities for finding, treating, supporting and healing.

I am privileged to serve as a colleague in providing the best possible health care experience at a higher level.

Kevin A. Roberts

Kevin A. Roberts, RN, President/CEO

Adventist Health President/CEO Bob Carmen (left) joins Linh Chen, MD (center) and GAMC radiology staff at the unveiling of the hospital's new Toshiba Aquilion Premium CT Scanner.

The Cancer Center offers the latest technology in radiation treatment. Patient safety and comfort are a priority.

GAMC Earns the Outstanding Achievement Award

GAMC is the only Comprehensive Community Cancer Program in Los Angeles County to earn the prestigious Outstanding Achievement Award from the Commission on Cancer in 2012. The other facility to receive the award in Los Angeles County was Cedars-Sinai Medical Center, classified as an Academic Comprehensive Cancer Program.

The award is designed to recognize cancer programs that strive for excellence in patient care. A facility receives the award following an on-site evaluation by a physician surveyor. The facility must demonstrate a level of compliance with seven primary standards that represent the full scope of the cancer program, while also earning a compliance rating for the remaining 29 standards.

The seven standards that form the basis of the Outstanding Achievement Award criteria are drawn from the following six areas of program activity:

- Cancer Committee Leadership
- Cancer Data Management
- Clinical Management
- Research
- Community Outreach
- Quality Improvement

GAMC demonstrated a level of compliance with eight standards exceeding the seven standards required by the Commission on Cancer. These standards include outcomes analysis, abstracting timeframe, NCDB quality criteria, CAP guidelines, clinical trial accrual, prevention and early detection, cancer education for cancer registry, and cancer related quality improvements.

Boris Bagdasarian, DO, Chairman of the Cancer Committee at GAMC, said the honor was yet "another external endorsement of our commitment to improve the health care of our patients through quality care based on the best medical evidence available." GAMC congratulates our physicians and employees of Cancer Services for earning such an honor to help share God's love with our community by promoting healing and wellness.

Celebrating the Outstanding Achievement Award, from left, Melina Thorpe, Director, Cancer Services; Mark Schlesinger, MD; Sara Kim, MD; Kevin A. Roberts, RN, GAMC President/CEO; Boris Bagdasarian, DO; Denise Cleveland, Cancer Data Manager.

Cancer Committee Chairman's Message

Boris Bagdasarian, DO, Hematology and Oncology, Chairman, Cancer Committee

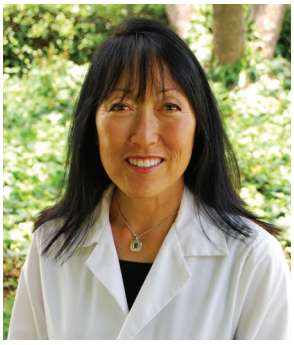
The mission of the Glendale Adventist Medical Center (GAMC) Cancer Center program is to provide the highest quality, comprehensive cancer care by combining innovative, cutting edge technology in diagnostic and therapeutic management with the compassion and caring spirit of our dedicated team. Our exemplary care was acknowledged with the highly prestigious Outstanding Achievement Award by the Commission on Cancer, established by the American College of Surgeons. GAMC's Comprehensive Community Cancer Center and only one other hospital received the award in all of Los Angeles County in 2012. We measure our success against the highest standards set by elite cancer centers throughout the nation and are pleased to report that we have not only met, but exceeded our goals.

Cancer is not one illness. There are a vast variety of different types of malignancies and associated co-morbidities, each requiring knowledge and experience to manage. The multidisciplinary team of physicians, nurses, nurse navigators, nutritionists, pharmacists, psychologists, social workers and tumor registry staff at GAMC are all highly trained and motivated individuals dedicated to the mission and values of our cancer program.

The Cancer Committee continues to seek ways to improve the care of our cancer patients. The committee membership is diverse and includes a committed team of physicians and non-physician health care professionals. The committee oversees a number of important activities within the GAMC Cancer Program, including planning of physician education, cancer screening, compiling and reporting cancer statistics, and developing and monitoring various quality improvement initiatives.

We thank GAMC's Cancer Committee, medical staff, program director, oncology service-line staff, hospital administration and the tumor registry staff. We look forward to great achievements in the years to come.

Back Row (left to right): Denise Cleveland, RHIT, CTR; Susanna Tamazyan, RN; Sara Kim, M.D.; Tracey Sanders, Kerry Nelson, Kelly Turner, Sr. VP; Boris Bagdasarian, D.O., Chairman of Cancer Committee; Sam Carvajal, M.D. Physician Liaison of ACOS; Mark Schlesinger, M.D.; Cynthia Klinger, MFT; Chrissy Kim, American Cancer Society; Arlene Matsuda, LCSW; Emillie Battig, RN; Kathleen Morgan, CTR.
Front Row (left to right): Hilda Bogossian; Allen Molina, RN; Alina DerSarkissian; Anita Theis; Sharon Feinberg, RN; Melina Thorpe, RN, Director of Cancer Services; Michele Cosgrove, M.D.; Marion Watson; Julie Ji, RD; Marion Shannon, RN; Linh Chen, M.D.
Not pictured: Wende Brookshire; Kami Ebrahimi, M.D.; Val Emery; Al Garciliazo, Sze-Ching Lee, M.D.; Ramella Markarian.



Patient Health Care Team Collaboration

Sharon Feinberg, RN, Nurse Navigator

Cancer survivorship begins at the time of diagnosis and extends throughout the individual's lifetime. According to the latest reports, the number of cancer survivors has grown to 13 million in the United States and 28 million worldwide.

"Patient needs are unique at every stage of their journey, from active treatment to surveillance."

– Sharon Feinberg, RN

As a result, the Institute of Medicine (IOM) recommends that principal providers prepare a Survivorship Care Plan (SCP) for patients at the completion of their treatment. The American College of Surgeons Commission on Cancer will require survivorship care plans for program accreditation beginning in 2015. Recognizing the benefits for cancer patients, GAMC's Cancer Services initiated a care plan in January 2013.

The objective of the survivorship care plan is to facilitate effective transitioning from active treatment to surveillance and enhance collaboration between the cancer survivor and the health care team. In alignment with GAMC's mission, "To share God's love with our community by promoting healing and wellness for the whole person," the survivorship care plan will assist our patients to reach beyond survival. Ultimately, it will allow patients to thrive.

How will SCP benefit survivors?

SCP is a cancer patient's personal and portable record of information from diagnosis to the present. It is intended to:

- Aid millions of survivors to transition to primary care physicians for post-treatment cancer care and enhance coordination of care;
- Empower survivors to take ownership of this part of their life;
- Facilitate communication among health care providers and between providers and survivors.

The Cancer Center nurse will complete a written SCP after completion of the patient's treatment program. The document will be reviewed by the treating physician and presented at the first follow-up visit with the survivor. It will include:

- Diagnostic information;
- Cancer treatment history, including surgery, chemo/biotherapy, hormone therapy, targeted therapies and radiation therapy;
- Clinical trial information if applicable;
- Significant events that occurred during treatment;
- Active health problems;
- Recent disease evaluation;
- Genetic testing;
- Distress screening tool, completed at first visit and as clinically indicated;
- Contact information of providers;
- Recommendations for continuation of care, including surveillance, follow-up visit schedule and management of late/long-term side effects;
- Cancer screening/wellness education, including smoking cessation, nutrition, physical activity, safe sex and sun-protective principles.

The Institute of Medicine recommends use of SCP for all cancer survivors based on the IOM and National Research Council 2005 Report *From Cancer Patient to Cancer Survivor: Lost in Transition.*

Enhancing Healing of Mind, Body and Spirit

GAMC's Cancer Center patient support programs enhance healing of the mind, body and spirit for cancer survivors and their families, as well as reducing distress related to cancer diagnosis and treatment. All cancer support services are free of charge to any cancer survivor and cancer patient in the community, regardless of where they received treatment.

The Cancer Center's support programs include:

Nurse Navigator – The oncology nurse navigator helps patients with physician referrals and appointments, provides guidance and anticipates patient and family needs to improve services received throughout the entire cancer treatment process. The nurse navigator may be contacted by calling (818) 863-HOPE.

Ingeborg's Place Apart – A non-clinical place to help facilitate healing of the mind, body and spirit, which is continually changing during cancer treatment. Patients and survivors have access to free wigs, head coverings and beauty care to help them feel better and more beautiful.

Focus on Healing – Free access is provided to individual counseling, support groups for patients, cancer survivors and their loved ones. Classes and support groups are offered in creative writing/ journaling, knitting, jewelry making, cancer support, brain tumor support, and grief and loss support. Support groups are coordinated by a skilled therapist to help cancer patients and survivors.

Fitness Program – The fitness program utilizes the skills of physical therapists and certified athletic trainers to offer classes in strength training, dance and yoga for survivors and cancer patients following surgery, radiation or chemotherapy. The program helps patients recapture lost strength, increase muscle mass, enhance joint range of motion, improve balance, and regain inspiration and personal power to take an active role in treatment and recovery. Classes are conveniently located at The Therapy & Wellness Center, one mile from the GAMC Cancer Center.

Patient Education and Education Center – We want our patients and families to know they are not alone and that their search for the best treatment is located at GAMC – close to home. A special hotline staffed by GAMC oncology professionals and dedicated staff is available to help patients who face a cancer diagnosis and treatment. Call (818) 863 – HOPE for more information.

Cancer patients applaud musicians Ryder Buck (in cap), also a cancer survivor, and a colleague during one of the Cancer Center's monthly luncheons.

Where Life, Love and Hope Connect

Karine Bagdasarian, Cancer Care Guild President, 2012

The Dr. Norick Bogossian Cancer Care Guild was established in May 2011 to benefit and expand services at GAMC's Cancer Center, which provides free support services to anyone with a diagnosis of cancer. Support services include personal and family counseling, support groups, fitness programs such as yoga, classes in jewelry making, knitting, creative writing, and a positive image center that provides free wigs, hats, and scarves to patients.

The Cancer Care Guild was named in memory of the late Dr. Norick Bogossian, a renowned plastic surgeon specializing in cancer-related reconstructive surgery. The Cancer Care Guild raises funds through a variety of events throughout the year. The first event was dedicated to Dr. Bogossian and established the beginning of a successful Guild event, which raised over $54,000. In March 2012, the Guild sponsored the first annual comedy show, "Laugh for A Cause," a sold-out event that featured prominent comedians and raised approximately $24,000.

The Cancer Guild also established the "Courage Award," which was presented in the Garden of Hope to GAMC patient Julie Burroughs Shermer in recognition of her courageous battle against cancer. The next event was Marching to the Power of Pink, a kick-off for the hospital's Army of Pink campaign, which raises cancer awareness throughout the community during breast cancer awareness month in October. To date the Cancer Care Guild has raised over $110,000 for the free support programs at GAMC's Cancer Center.

Our phenomenal group of volunteers is comprised of dedicated, caring and compassionate individuals, who truly go above and beyond to make all of our events successful.

The free support services provided by the award-winning Cancer Center are made possible through the generous support of our donors and dedicated volunteers. We are looking forward to many more years of service and successful events. We also encourage the support of the community and anyone who would like to join us in our worthy endeavors!

Cancer Guild members at the Marching to the Power of Pink event. *Back row from left,* Tina Parsegian, Hilda Bogossian, Melina Thorpe, Cynthia Norman-Bey, Christeil Gota, Ramella Markarian, Karine Bagdasarian and Aimee Ayvazian. *Front row from left,* Donna Wammack, Anet Agazaryan, Liz Mirzaian and Sandy Doughty.
Not pictured: Arpi Andonian, Stella Bagdassarian, Nava Ben-Isaac, Debbie Bright, Marianna Clarizio, Denise Cleveland, Stella Derrostomian, Armineh Djanece, Sharon Feinberg, Sara Kim, MD, Cynthia Klinger, Karineh Minassian, Teryl MacDougall, Anita McCain, Tracey Sanders, Susanna Tamazyan and Natalya Topuriya.

Cancer Services Busy with Activities

Tracey Sanders, Positive Image Coordinator

GAMC's Cancer Services program reaches out to our community by hosting and participating in a number of health-related activities.

Highlights included:

Daffodils Day, March 20, 2012 – Sponsored by the American Cancer Society, 250 patients received vases or bouquets of daffodils to symbolize hope and renewal. These patients were seen in the hospital's oncology unit, radiation therapy department, infusion center, and oncology offices.

Bras for a Cause, April 28, 2012 – This annual Soroptimist of Glendale-sponsored event raises money and awareness for breast cancer. Supported by Cancer Services, a group of cancer survivors submitted an entry for Bras for a Cause "Celebrates Holidays" and attended the fundraiser dinner where they received the People's Choice Award for their Veterans Day-inspired bra.

Cancer Survivors' Day, June 8, 2012 – Fiesta themed celebration attended by over 200 cancer survivors and their caregivers. This free luncheon was highlighted with keynote speaker and three-time breast cancer survivor Mayte Prida. The Flame of Hope awards were also presented to Cancer Center art class teacher Tom Shannon, GAMC Guest Relations Manager Teryl McDougall, Physician Development Manager Kerry Nelson, and cancer survivor Mary Wang. A special feature of this event also included a performance by members of the cancer survivors' dance class named Can-Dancers and a live mariachi performance. Mayte Prida also autographed books given to the survivors at the luncheon.

Skin Cancer Education, June 4, 2012 – Cancer Services Director Melina Thorpe and Positive Image Coordinator Tracey Sanders spoke with over 50 students at Hoover High School's health education classes. The discussion was to educate young people on protecting their skin from sun damage that can lead to cancer. A quiz was given at the end of the discussion and prizes were awarded.

Mayte Prida, author and breast cancer survivor, signs one of her books for a GAMC patient at Cancer Survivors' Day. Mayte was also guest speaker at the luncheon.

Melina Thorpe, left, Cancer Services Director, and Kevin A. Roberts, RN, right, President/CEO, join Flame of Hope Awardees at Cancer Survivors' Day.

Skin Cancer Education, June 15, 2012 – Positive Image Coordinator Tracey Sanders spoke to Girl Scout Troop 7142 about sun damage and taking care of their skin at a young age. The troop donated over 25 blankets to the Cancer Center. Sunscreen was given to the girls to promote skin cancer awareness.

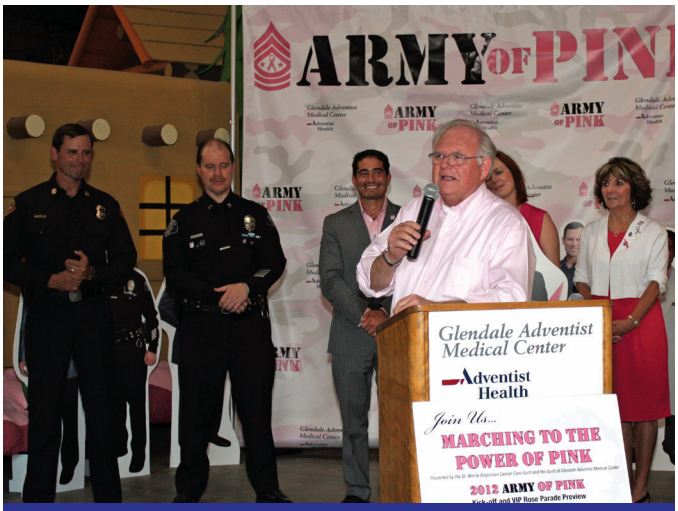
Prostate Screening, September 20, 2012 – A prostate cancer screening was held at the Cancer Center with over 70 participants. Participating physicians were Sze-Ching Lee, MD; Sara Kim, MD; Ben Shenassa, MD; Kamyar Ebrahimi, MD; and Armen Kassabian, MD.

Beauty Bus Event, October 15, 2012 – A day of pampering and beauty was offered free of charge to cancer patients receiving cancer treatment. The Beauty Bus Foundation sponsored the event with pop–up salon services such as manicures, facials, blow-dry, hair styling and makeup application.

Army of Pink, October 2012 – The Army of Pink campaign, held every two years, helps raise awareness about breast cancer and local resources at GAMC. The Cancer Care Guild kicked off the campaign with the Marching to the Power of Pink event, where attendees also got a sneak peek at the 2013 Tournament of Roses parade floats. More than 80,000 votes were cast online for the campaign by community members to support their favorite candidate. In addition to the campaign winner, Glendale Police Captain Carl Povilaitis, the brave soldiers included Deputy Fire Chief Bob Doyle; Glendale Mayor Frank Quintero; Armenian American Medical Society President Vicken Sepilian, MD; Glendale Unified School District Superintendent Richard Sheehan, Ed.D; and Southern California Conference of Seventh-day Adventists President Larry Caviness. They were led by honorary captain Paula Devine, Commissioner on the Status of Women. The campaign winner was announced at an Army of Pink celebration in November. As the winner of the campaign, Carl Povilaitis won the opportunity to ride on the City of Glendale 2013 Rose Parade float, supported this year by GAMC, and has the Cancer Center waiting room named after him for two years.

Celebrating the conclusion of the 2012 Army of Pink campaign are, from left, Vicken Sepilian, MD, Larry Caviness (cutout), Paula Devine, Kevin A. Roberts, RN, GAMC President/CEO, Dr. Richard Sheehan, Carl Povilaitis, Bob Doyle, Melina Thorpe, and Frank Quintero (cutout).

Cancer Services Busy with Activities



Larry Caviness, President, Southern California Conference of Seventh-day Adventists, speaks at the Marching to the Power of Pink kick-off.

The 2013 Tournament of Roses Court, along with GAMC representatives on the City of Glendale's float and hospital executives.

Julie Burroughs Shermer, second from left, receives the Courage Award presented by the Dr. Norick Bogossian Cancer Care Guild.

Four girls ages 12 to 16 receive awards from the hospital for raising over $2,000 at a lemonade stand to support Cancer Services.

Third Annual Glendale Heath Festival, November 3, 2012 – A prostate cancer screening was held at the Pacific Community Center in Glendale. Thirty-four participants were screened for prostate cancer. Volunteering physician was Armen Kassabian, MD.

Christmas Party, December 7, 2012 – An annual Christmas Party at the Cancer Center featured wonderful music, food and the opportunity to celebrate the season with staff and fellow patients and survivors. Santa Claus was there to pose with guests for fun pictures. The Cancer Center staff hosted this event, always mindful of the joy of giving and helping our patients at Christmas and throughout the year.

Allen Molina, RN, OCN, Infusion Nurse

Providing 'a Feeling of Caring and Safety'

Allen Molina is a certified oncology nurse at GAMC's Cancer Center Infusion Center. "The Infusion Center provides any service that can be done through a needle," she explains. Along with infusion nurse Marion Shannon, also a certified oncology nurse, Allen works closely with patients to ensure that treatments are carried out with accuracy and utmost respect.

Experienced nurses surround patients at the Cancer Center, which provides a feeling of caring and safety for everyone. The camaraderie among the staff gives a warm feeling of belonging to those who enter the department. "We treat all of our patients as family," Allen continues. "Our patients are very important to us."

Born in the Philippines, Allen earned her bachelor's degree in biology prior to coming to the United States. She completed her nursing degree at Glendale Community College in 1991. Allen worked at GAMC for 10 years under the mentorship of Agnes Pagdilao, RN, OCN, head nurse, who helped develop the outpatient infusion program. The Infusion Center moved to the Cancer Center building 10 years ago. As an experienced infusion nurse, Allen describes her one-to-one relationship with patients as customized – "every one is different." One of her biggest roles is to educate patients and their loved ones to be diligent in observing symptoms that need to be communicated with their doctor.

> "Every day spent with my cancer patients is a celebration"
>
> **– Allen Molina,** RN, OCN

Years of experience also come with life's lessons. "I have learned to be humble and more attentive to people's needs," she reflects. "Not only do I listen with my ears, but I listen more with my heart. Patients thank us for what we do, and we thank them for the trust they have in us for their care."

Members of the Can-Dancers, a special troup of cancer survivors who are part of the Cancer Center's fitness program, perform at the hospital's annual Cancer Survivors' Luncheon.

'In Pursuit of More Birthdays'

Chrissy Kim, Director, Healthcare Corporate Initiatives

The American Cancer Society combines nearly a century of experience saving lives with an unyielding passion to end suffering from cancer. As a global grassroots force of more than three million volunteers, we fight for every birthday threatened by cancer in every community.

We save lives by helping people stay well, by preventing cancer and detecting it early; helping people get well; being there for them during and after a cancer diagnosis; finding cures through investment in groundbreaking discovery; by fighting back; by rallying lawmakers to pass laws to defeat cancer; and by rallying communities worldwide to join the fight.

Cancer is a relentless enemy, but we are just as relentless in our pursuit of more birthdays, at home and around the world. Here in California between 1988 and 2009, we have seen a 23 percent decrease in cancer deaths and an 11 percent decrease in cancer incidence. In fiscal year 2011, we provided 57,740 Californians with patient related information and/or services, a six percent increase from the previous year. There were also 129 active research grants in our fair state, totaling more than $60.4 million.

Everyone knows how special a simple celebration such as a birthday can be. It's a celebration of life and a marker of progress. Health professionals, caregivers, family members, friends and co-workers who are cancer survivors often rely upon us to get through their journey. They are all part of a larger movement to create a world with less cancer and more birthdays.

Armed with knowledge and tools to reduce cancer incidence and mortality, the American Cancer Society believes we can make a tremendous difference in the lives of countless people. The Society couldn't accomplish its lifesaving mission without the dedication of committed partners like GAMC.

The evolving role of our partnership is an important one as we help create ways we can all stay well, get well, find cures, and fight cancer. Together, our organizations provide a framework for progress in the movement to end cancer by fostering interaction between the community and health systems.

The Society has aggressive goals to measurably reduce the impact of cancer, decrease the cancer mortality percentage, reduce cancer incidence rates and improve quality of life for people with the disease. Globally, nationally, across California and right here in the Glendale area, we have made significant progress toward those goals. However, we know we can do even better.

Enjoying a preview of 2013 Tournament of Roses floats are Melina Thorpe, second from right, Cancer Center Director, and cancer survivors.

The Cancer Prevention Study (CPS-3) is a new research study conducted by the American Cancer Society and has been actively recruiting participants nationwide to help us understand how to prevent cancer, save lives and create a world with more birthdays. The American Cancer Society's Epidemiology Research program is recruiting men and women between the ages of 30 and 65 across the United States and Puerto Rico who want to see an end to cancer.

Today, there are more than 13 million people in America who have survived cancer and countless more who have avoided it – who will be celebrating birthdays this year.

– American Cancer Society

In Spring 2013, we are hosting CPS-3 enrollment locations in communities throughout Los Angeles County, with enrollment hosted at selected local Society offices, corporate partner worksites, hospitals, and other community locations (e.g. churches, YMCA, libraries). We will also continue to enroll participants through selected American Cancer Society Relay For Life and Making Strides Against Breast Cancer events. This is a unique opportunity for our community partners to work with the Society's research program to create one of the largest and most important studies for cancer causes and prevention worldwide. To learn more about CPS-3, visit www.cancer.org

Putting the knock-out punch to cancer following the 2012 Army of Pink campaign are Glendale Police Capt. Carl Povilaitis, who received the most votes, and Boris Bagdasarian, DO, Hematology and Oncology, and Chairman of GAMC's Cancer Committee.

The Society is embracing a bold vision to save even more lives from this disease. We currently help avert 350 cancer deaths each day. We want to change that to save 1,000 lives per day. Yes, 1,000 in the US and thousands more per day worldwide – because our mission and those who support it deserve relentless action. Thank you for your support and partnership!

Together we will save more lives. Together we will eliminate cancer as a major health concern.

Smoking-Attributable Lung Cancer

Jodi Gillians, Nurse Educator

Smoking, a main cause of small cell and non-small cell lung cancer, contributes to 80 percent and 90 percent of lung cancer deaths in women and men, respectively. Men who smoke are 23 times more likely to develop lung cancer. Women are 13 times more likely, compared to non-smokers.[1]

Between 2000 and 2004, an average of 125,522 Americans (78,680 men and 46,842 women) died of smoking-attributable lung cancer each year.[2] Exposure to secondhand smoke causes approximately 3,400 lung cancer deaths among non-smokers every year.[3]

GAMC is committed to providing the community with smoking cessation assistance. We provide the American Lung Association's Freedom From Smoking Program in a one-on-one or group counseling setting. It is a seven-week smoking cessation program, which discusses the following topics:

- **Thinking About Quitting -** Examines the three-link chain of addiction (physical, mental, social), benefits of quitting and being honest with excuses for smoking;
- **On the Road to Freedom -** Stress management, discovering triggers and how to cope with cravings, nicotine replacement options and assessing nicotine dependence;
- **Wanting to Quit -** Developing an individualized quit plan, relapse prevention and receiving social support;
- **Quit Day -** Covers the day where an individual officially becomes a non-smoker, recovery symptoms, overcoming cravings and rewards;
- **Winning Strategies -** Covers the grief cycle, what to do if you slip, coping strategies, refining your quit plan and stress management;
- **The New You -** Progress review, lifestyle changes, weight management, staying smoke-free and social situations;
- **Staying Off -** Physical activity, changing your self-image and assertive communication;
- **Celebration -** Rewarding new behaviors, relapse prevention, challenging your thinking and completion ceremony.

There are no "safe" cigarettes and no "safe" amount that you can smoke. With the first puff, your body is impacted. Cigarettes contain over 4,000 chemicals including acetone (nail polish remover), methanol (rocket fuel), arsenic (poison), formaldehyde (embalming fluid), carbon monoxide (car exhaust fumes), naphthalene (mothballs) and nicotine (an addictive and powerful poison; a single concentrated drop is lethal).

To stop smoking or to register for the Freedom From Smoking Program, please contact Jodi Gillians, nurse educator at (818) 409-8305 for more information.

References

1. U.S. Department of Health and Human Services. The Health Consequences of Smoking. A Report of the U.S. Surgeon General. 2004.
2. Centers for Disease Control and Prevention. Annual Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses — United States, 1997–2001. Morbidity and Mortality Weekly Report July 1, 2005; 54(25):625-628.
3. California Environmental Protection Agency. Identification of Environmental Tobacco Smoke as a Toxic Air Contaminant. Executive Summary, June 2005.

State-of-the-Art Services

Denise Cleveland, RHIT, CTR, Cancer Data Manager

Glendale Adventist Medical Center is an American College of Surgeons (ACOS) Commission on Cancer approved program and holds the certificate of approval with commendation as a Comprehensive Community Cancer Program.

During our recent survey with the ACOS, GAMC achieved eight commendations and the coveted Outstanding Achievement Award (awarded to only two hospitals in all of Los Angeles County in 2012). Eight commendations exceed the necessary requirement of seven in specified areas to qualify for the nationally recognized award.

This level of approval ensures that patients will receive quality care, use of state-of-the-art services and equipment, a multidisciplinary team approach to coordinate the best cancer treatment available, information about clinical trials and new treatment options, and access to cancer-related information, education and support.

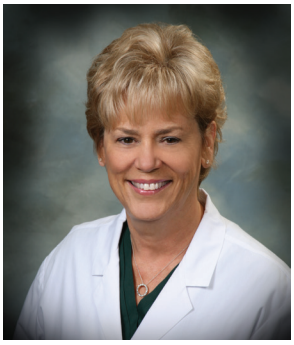
I appreciate the opportunity to be part of an exceptional program supported by our Cancer Center staff and Cancer Committee!

Continuing Medical Education 2012

February 1, 2012
Oral Cancer
Armond Kotikian, MD, DDS, GAMC Medical Staff Member,
Assistant Professor, University of Southern California, Department
of Oral and Maxillofacial Surgery, Medical Advisor, LA Zoo

March 14, 2012
Advances in Radiation
Sara Kim, MD
Medical Director, Department of Radiation
Glendale Adventist Medical Center

October 24, 2012
Lung Cancer in 2012: Are We Making Progress?
Daniel S. Oh, MD
Assistant Professor of Surgery, Division of Thoracic Surgery,
Keck School of Medicine, University of Southern California



Providing Excellence in Patient Care

Kathie Morgan, CTR, Cancer Registry

Tumor Board conferences provide our cancer specialists with a forum to have discussions relating to the treatment of cancer on an individual patient basis in order to provide excellence in patient care.

GAMC Tumor Board Conferences are held weekly at 7:00AM in Committee Rooms A/B. Surgical Tumor Boards are held three times a month, and a dedicated Breast Tumor Board is held once a month.

The cancer registry staff gathers the information required for discussion, including medical history, pertinent pathology and radiology material for review. Multi-disciplinary tumor boards are moderated by a surgeon, medical oncologist or radiation oncologist. Both prospective and retrospective cases are discussed.

Tumor boards provide the presenting physicians with the opportunity to obtain treatment information from the multi-disciplinary perspective. Physicians receive treatment recommendations to advise their patients accordingly of their treatment options.

The American College of Surgeons requires that the number of cases presented annually is proportional to 10 percent of the analytic caseload and represents the institution's case mix. GAMC's 2011 analytic caseload was 627, of which 18 percent of the caseload was presented at the Tumor Board Conferences.

Total cases presented are both analytic and non-analytic. Some of these cases are analytic from neighboring hospitals, which may not have tumor boards.

2011 PRIMARY SITES DISCUSSED	CASES
BILIARY	3
BLADDER	6
BREAST	15
CERVICAL SPINE	1
COLON	9
ESOPHAGUS	3
HEAD & NECK	3
HEMATOPOIETIC	1
KIDNEY	3
LIVER	4
LUNG	5
LYMPHOMA	5
OTHER (may not be cancer)	5
OVARY	3
PANCREAS	5
PLACENTA (HYDATIDFORM MOLE)	1
PROSTATE	10
RECTUM	4
SKIN/(MELANOMA)	9
STOMACH	9
SOFT TISSUE	3
THYROID	5
UNKNOWN PRIMARY	3
TOTAL: This total reflects total cases presented.	**115**

Year-by-Year Statistics

Primary Site	2006	2007	2008	2009	2010	2011
All Sites	541	547	567	578	624	627
Oral Cavity/Pharynx	11	9	12	15	20	17
Esophagus	3	3	5	2	8	5
Stomach	14	19	11	23	18	20
Colon	68	46	51	55	57	56
Rectum & Rectosigmoid	25	21	23	23	21	16
Pancreas	14	15	11	16	21	14
Lung	51	45	53	65	82	62
Leukemia, Myeloma, & Hematopoietic	20	22	24	22	26	27
Soft Tissue	2	4	1	3	4	3
Melanoma of the Skin	12	10	7	6	7	11
Breast	81	88	120	101	91	120
Corpus Uteri	14	17	14	21	15	21
Ovary	9	5	11	8	10	16
Prostate	29	38	30	29	43	40
Bladder	18	30	21	25	32	40
Kidney/Renal	7	8	21	7	10	12
Brain/Nervous System	39	47	49	36	55	47
Endocrine	39	32	26	41	34	39
Lymphatic System	27	28	28	32	27	27
Unknown Primary	7	9	7	8	14	4

Includes analytic cases only (diagnosed at GAMC and received first course treatment).

2011 Primary Site Table

Site Group	Total Cases	Class		Sex	
		Analytic	Non Analytic	Male	Female
ALL SITES	678	627	51	285	393
BREAST	129	120	9	0	129
LUNG/BRONCHUS-NON SM CELL	63	55	8	37	26
COLON	58	56	2	28	30
BLADDER	43	40	3	35	8
PROSTATE	42	40	2	42	0
OTHER NERVOUS SYSTEM	37	34	3	9	28
THYROID	33	32	1	3	30
NON-HODGKIN'S LYMPHOMA	24	21	3	17	7
STOMACH	22	20	2	15	7
CORPUS UTERI	20	20	0	0	20
OVARY	19	16	3	0	19
RECTUM & RECTOSIGMOID	17	16	1	8	9
LEUKEMIA	16	14	2	7	9
PANCREAS	15	14	1	6	9
MELANOMA OF SKIN	13	11	2	6	7
KIDNEY AND RENAL PELVIS	13	12	1	10	3
BRAIN	13	13	0	5	8
LIVER	9	7	2	7	2
LARYNX	9	9	0	9	0
OTHER HEMATOPOIETIC	9	9	0	5	4
LUNG/BRONCHUS-SMALL CELL	7	7	0	4	3
OTHER ENDOCRINE	7	7	0	2	5
HODGKIN'S DISEASE	6	6	0	0	6
ESOPHAGUS	5	5	0	2	3
CERVIX UTERI	5	5	0	0	5
SMALL INTESTINE	4	4	0	2	2
MYELOMA	4	4	0	3	1
UNKNOWN OR ILL-DEFINED	4	4	0	2	2
NASOPHARYNX	3	2	1	2	1
SOFT TISSUE	3	3	0	2	1
TESTIS	3	2	1	3	0
TONGUE	2	1	1	2	0
SALIVARY GLANDS, MAJOR	2	1	1	1	1
MOUTH, OTHER & NOS	2	2	0	0	2
TONSIL	2	2	0	2	0
ANUS,ANAL CANAL, ANORECTUM	2	2	0	1	1
BILE DUCTS	2	2	0	1	1
OTHER DIGESTIVE	2	2	0	2	0
OTHER SKIN CA	2	2	0	2	0
UTERUS NOS	2	1	1	0	2
GALLBLADDER	1	1	0	0	1
PLEURA	1	1	0	1	0
KAPOSIS SARCOMA	1	0	1	1	0
PENIS	1	1	0	1	0
URETER	1	1	0	0	1

Primary Site Table (con't)

Stage						
Stage 0	Stage I	Stage II	Stage III	Stage IV	N/A	Unknown
33	168	91	76	109	89	61
16	45	31	17	6	0	5
0	8	2	16	26	0	3
3	10	12	12	7	0	12
9	22	3	2	3	0	1
0	10	20	2	5	0	3
0	0	0	0	0	34	0
0	22	1	4	2	0	3
0	8	0	2	7	0	4
0	5	1	3	6	0	5
0	8	2	2	0	0	8
0	4	1	5	6	0	0
2	2	0	3	5	0	4
0	0	0	0	0	14	0
0	0	4	0	8	0	2
1	4	2	1	2	0	1
0	5	0	1	6	0	0
0	0	0	0	0	13	0
0	0	0	0	3	1	3
0	4	3	0	1	0	1
0	0	0	0	0	9	0
0	0	0	0	6	0	1
0	0	0	0	0	7	0
0	3	2	0	1	0	0
0	0	0	0	2	0	3
0	1	1	0	3	0	0
0	0	0	3	0	0	1
0	0	0	0	0	4	0
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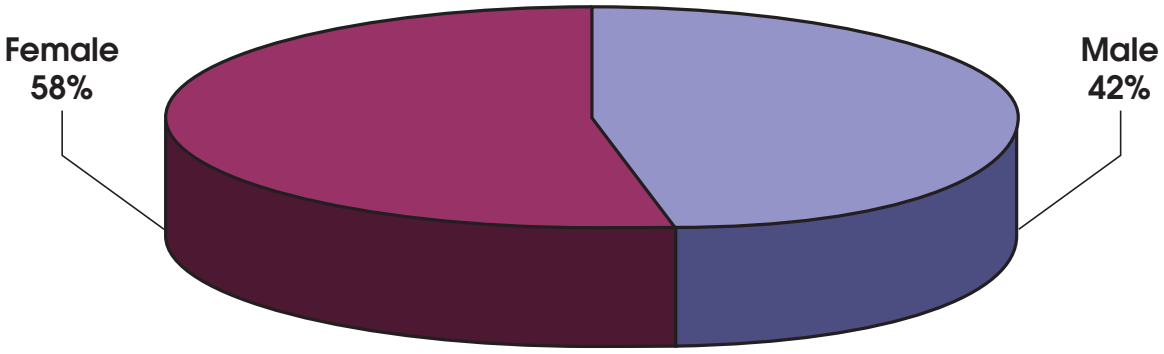
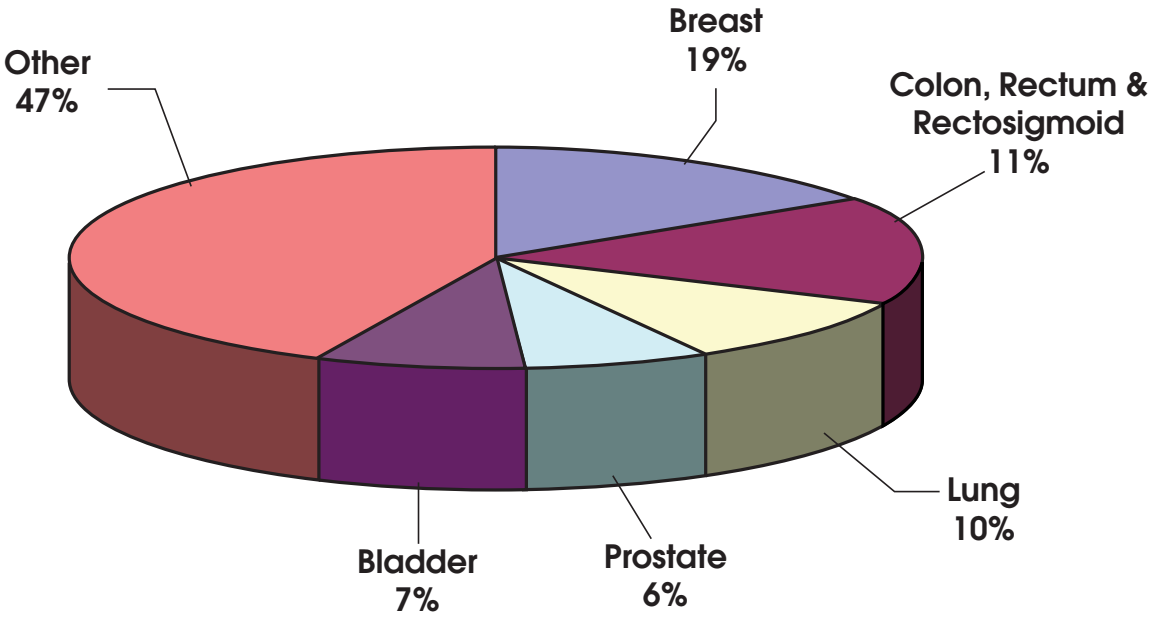
0	0	1	0	0	1	0
0	0	0	0	0	2	0
0	0	1	0	0	0	1
0	1	0	0	0	0	0
0	0	0	0	1	0	0
0	0	0	0	1	0	0
0	0	0	0	0	0	0
0	1	0	0	0	0	0
1	0	0	0	0	0	0

2011 MALE/FEMALE RATIO N=678



2011 TOP FIVE SITES N=678



Behind the Scenes: Research

Clinical research trials at GAMC's Oncology Department support the hospital's mission, "To share God's love with our community by promoting healing and wellness for the whole person."

Clinical trials are an important step in discovering new and improved treatments for cancer and other diseases as well as new ways to detect, diagnose, and reduce the risk of disease. Clinical trials show researchers what does and doesn't work in patients. Clinical trials also help researchers and physicians decide if side effects of a new treatment are acceptable when weighed against the benefits offered by the new treatment.

Researchers cannot predict what the outcomes of clinical trials will be. This uncertainty can make it hard to decide if one should participate in a clinical trial. Clinical trial volunteers may experience side effects, by the treatment or procedure being tested. At the same time, hundreds of thousands of people have found a cure for their disease because other people chose to participate in a trial that resulted in a new, more effective treatment. While clinical trials are important, the choice to participate in one is very personal and depends on your unique situation. As with any cancer treatment, you and your doctor need to weigh the benefits against the risks and decide what's best for you.

Clinical trials are just one type of research done before a new treatment becomes available. New drugs must first be discovered, purified, and tested in a preclinical trial before researchers consider starting a clinical trial. According to the American Cancer Society, about 1,000 potential drugs are tested before a single product makes it to the clinical trial phase. On average, a new drug to treat cancer has been studied for six or more years before a clinical trial is started.

The GAMC Oncology Department offers many treatment options, the highest advanced medical care and the opportunity to participate in cutting edge cancer research. Those who participate in clinical trials pave the way to more effective and advanced medical treatments. You also can join in the advancement of medical care by participating in clinical research trials at Glendale Adventist Medical Center.

Lung Cancer Incidence and Mortality

Boris Bagdasarian, DO, Hematology and Oncology, Chairman, Cancer Committee

In 2012 it is estimated that 226,000 new cases of lung cancer (non-small cell and small cell) were diagnosed leading to approximately 160,000 deaths. Lung cancer is the leading cause of cancer-related mortality in the United States. The five-year relative survival rate for patients with lung cancer is approximately 16%. Five-year relative survival rate varies depending on the stage at diagnosis from 49-16% to 2% for patients with local, regional and distant stage disease, respectively.

The major cause of lung cancer is smoking. Numerous epidemiologic and murine studies as well as in vitro data have tied the dramatic pandemic of lung cancer to carcinogenic effects of tobacco smoke. Recent data suggest that women may be more susceptible to cigarette smoke than men, although these data are not conclusive. Hypothesis include differences in rates of carcinogen detoxification in the presence of estrogen receptor beta on lung cancer cells.

> "God ... will not forget your work and the love you have shown him as you have helped his people and continue to help them."
>
> *– Hebrews 6:10*

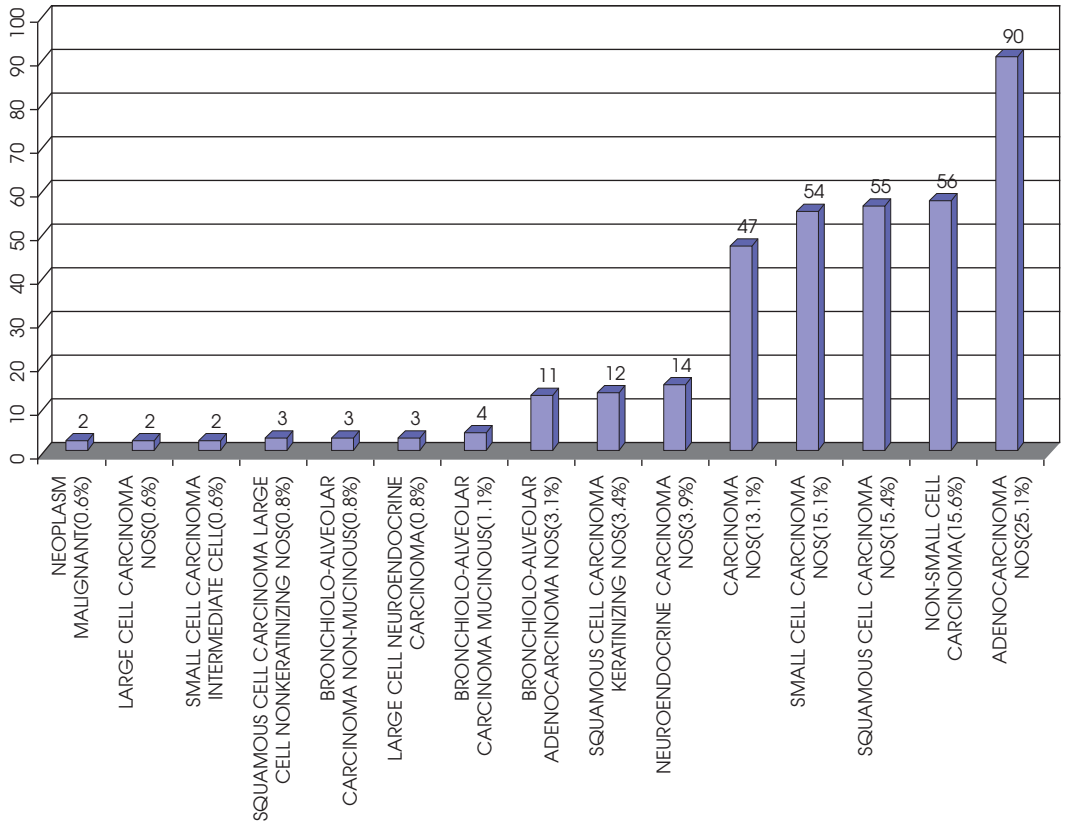
Incidence of lung cancer, although declining for both white and black men, is approximately 50% higher for black men. Race-related variances in lung cancer, however, are complicated by differences in socioeconomic status which are associated with disparities, smoking rates, types of cigarette smoke, and exposure to inhaled agents in the work place.

Prevention

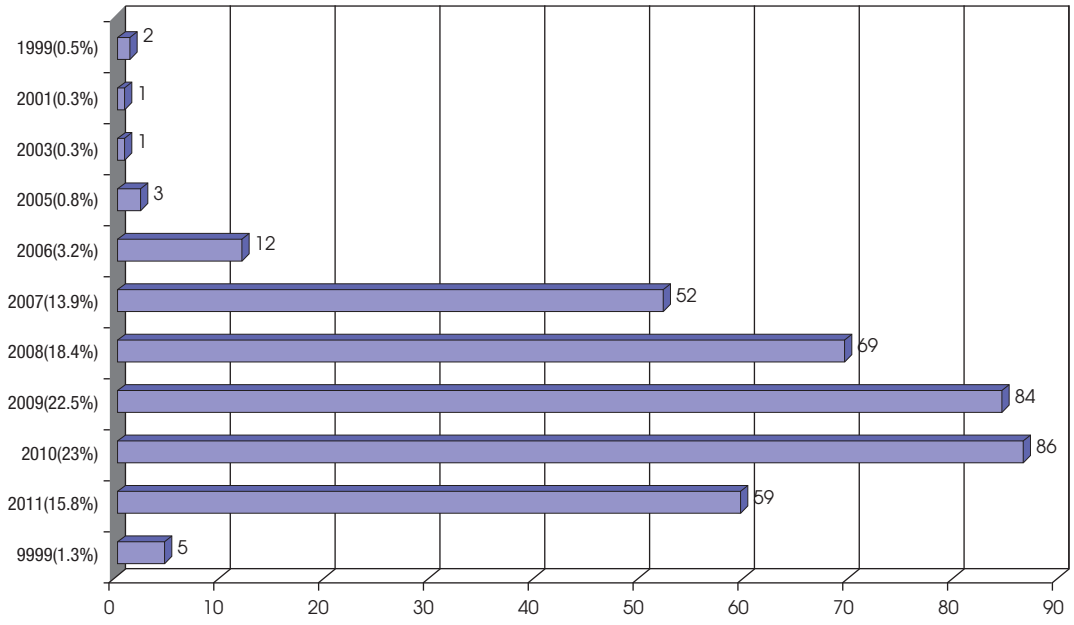
A significant number of patients cured of their smoking-related lung cancer may develop a second malignancy. In the lung cancer study group, LUNGC study group trial of 907 patients with Stage T1, N0 resected tumors, the rate was 1.8% per year for non-pulmonary second cancers and 1.6% per year for new cancers. Other studies have reported even higher risk of second tumors and long term survivors, including rates of 10% for second lung cancers and 20% for second cancers.

Because of the persistent risk of developing second lung cancers in former smokers, various chemo prevention strategies have been evaluated in randomized controlled trials. None of the phase 3 trials with the agents beta carotene, retinol, 13-cys-retinoic acid, alpha-tocopherol, or acetylsalicylic acid has demonstrated beneficial reproducible results. Chemoprevention of second primary cancers of the upper aerodigestive tract is undergoing clinical evaluation in patients with early stage lung cancer.

Lung Cancer 2007-2011
Top 15 Histology



Lung Cancer 2007-2011
Year of Diagnosis



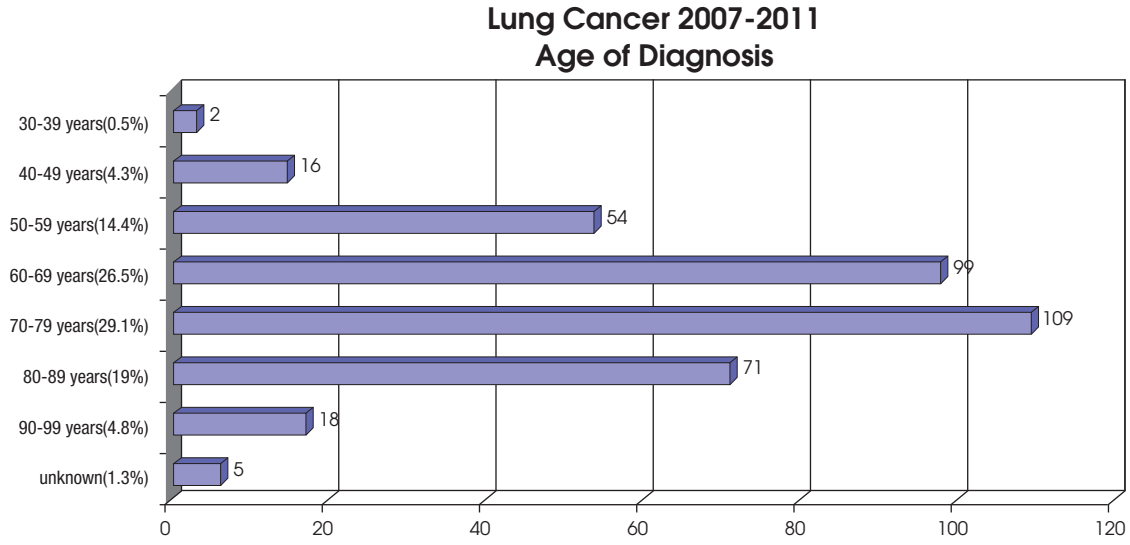
N=374

Patients were diagnosed in 1999-2006 but were seen at GAMC during the study period of 2007-2011.

Lung Cancer Incidence and Mortality

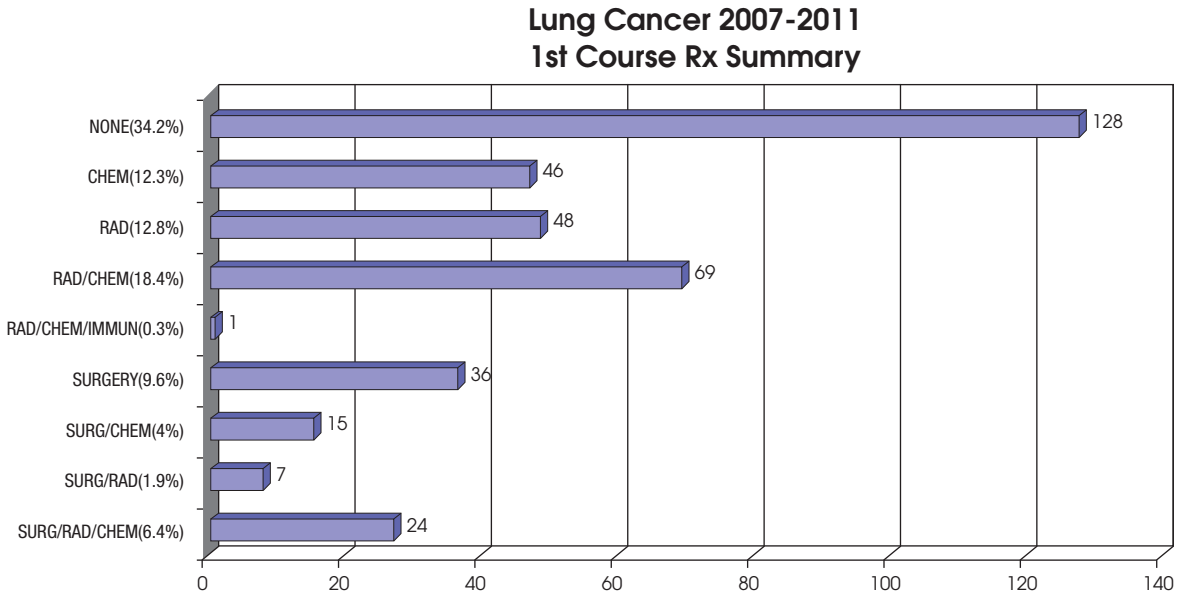
Screening

Most patients with advanced lung cancer raise the question of screening in order to detect these tumors at an early stage when they are theoretically more curable. The three interventions that have been explored include x-ray, cytologic analysis of sputum, and low dose spiral computer tomography. Based on solid evidence, screening with chest x-ray and/or sputum cytology does not reduce mortality from lung cancer. However, there is evidence that screening individuals age 55-74 years who have cigarette smoking histories of 30 or more pack years and, who if they are former smokers, have quit within the last 15 years, reduced lung cancer mortality by 20% and all cause of mortality by 6.2% when screening for lung cancer with low dose helical computed tomography. Studies were positive with a magnitude 20% relative reduction in lung cancer.



N=374

Age at diagnosis is very similar to that of national data.



N=374

NON-SMALL CELL LUNG CANCER TREATMENT STAGES Ia AND Ib

Surgery

Surgery is the treatment of choice for patients with Stage I non-small cell lung cancer. A lobectomy or segmental, wedge or sleeve resection may be performed as appropriate. Patients with impaired pulmonary function are candidates for segmental or wedge resection of the primary tumor. The immediate postoperative mortality is age related; about a 3-5% mortality rate with lobectomy can be expected.

Adjuvant Therapy

Many patients treated surgically subsequently develop regional or distant metastases. Such patients are candidates for entry into clinical trials evaluating postoperative treatment with chemotherapy or radiation followed by surgery. At present, neither chemotherapy nor radiation has been found to improve the outcome of patients with Stage I non-small cell lung cancer that has been completely resected.

Stage II Non-Small Cell Lung Cancer Treatment

Surgery

Surgery is the treatment of choice for patients with Stage II non-small cell lung cancer (NSCLC). A lobectomy, pneumonectomy or segmental resection may be performed as appropriate. Despite the immediate and age related postoperative mortality rate, 5-8% mortality rate with pneumonectomy or 3-5% mortality rate with lobectomy can be expected. The Cochrane Collaboration Group reviewed 11 randomized trials with a total of 1,910 patients who underwent surgical intervention for early stage (I-IIIa) lung cancer. A pooled analysis of three trials demonstrated superior results for patients who underwent resection and complete ipsilateral mediastinal lymph node dissection compared to those who underwent resection and lymph node sampling. There was a significant reduction in any cancer recurrence (local or distant) in the complete mediastinal lymph node dissection group.

Neoadjuvant Chemotherapy

The role of chemotherapy prior to surgery was tested in clinical trials. The proposed benefits of preoperative chemotherapy include the following:

1. A reduction in tumor size that may facilitate surgical resection.
2. Early eradication of micrometastases.
3. Better tolerability.

Lung Cancer Incidence and Mortality

Preoperative chemotherapy may, however, delay potentially curative surgery.

Adjuvant Chemotherapy

The preponderance of evidence indicates that postoperative cisplatinum combination chemotherapy provides a significant survival advantage to patients with resected Stage II non-small cell lung cancer. Preoperative chemotherapy may also provide survival benefit. The optimal sequence of surgery and chemotherapy and the benefits and risks of postoperative radiation therapy in patients with resectable NSCLC remain to be determined. After surgery many patients develop regional or distant metastases. Several randomized controlled trials and meta-analyses have evaluated the use of postoperative chemotherapy in patients with Stage I, II and IIIa NSCLC. Data on individual patient outcomes were collected and pooled into a meta-analysis from the five largest trials that were conducted after 1995 of cisplatinum-based chemotherapy in patients with completely resected NSCLC. Meta-analysis as well as the individual studies support the administration of postoperative cisplatinum-based chemotherapy in combination with vinorelbine. In a retrospective analysis of a phase 3 trial of postoperative cisplatinum and vinorelbine, patients older than 65 years were found to benefit from treatment as well. The chemotherapy significantly prolonged overall survival for elderly patients. There were no significant differences in toxic effects, hospitalization or treatment related death by age group, although elderly patients received less treatment. Based on this data, patients with completely resected Stage II lung cancer may benefit from postoperative cisplatinum-based chemotherapy.

Radiation Therapy

Patients with potential operative tumors with medical contraindications to surgery or those with inoperable Stage II disease and with sufficient pulmonary resolve are candidates for radiation therapy with curative intent. In the largest retrospective series reported to date, 152 patients with medically inoperable NSCLC were treated with definitive radiation therapy. Study reported a five-year overall survival of 10%, 44 patients with T1 tumors achieved an actuarial disease free survival rate of 60%.

Stage III Non-Small Cell Lung Cancer Treatment

Patients with Stage IIIa NSCLC are a heterogenous group. Patients may have metastases to ipsilateral mediastinal nodes, potentially resectable T3 tumors, or mediastinal involvement with metastases to para-bronchial or hilar lymph nodes (N1).

Patients with clinical Stage IIIa-N2 disease have a five-year overall survival rate of 10% to 15%. However, patients with bulky mediastinal involvement have a five year survival rate of 2-5%.

Neoadjuvant Chemotherapy

The role of chemotherapy prior to surgery in patients with Stage III-N2 non-small cell lung cancer has been extensively tested in clinical trials. The proposed benefits of preoperative chemotherapy include a reduction in size of the tumor that may facilitate surgical resection, early eradication of micrometastases and better tolerability.

The Cochrane Collaboration Group provided a systematic review and meta-analysis of seven randomized controlled trials that included 988 patients and evaluated the addition of preoperative chemotherapy to surgery versus surgery alone. These trials evaluated patients with Stage I, II and IIIa non-small cell lung cancer. Preoperative chemotherapy provided an absolute benefit in survival of 6% across all stages of disease, from 14-20% at five years (HR, 0.82; 95% CI, 0.69; P=0.22).

In the largest trial reported to date, 519 patients were randomly assigned to receive either surgery alone or three cycles of platinum-based chemotherapy followed by surgery. Most patients (61%) had clinical

Stage I disease; 31% had Stage II disease; and 3% had Stage III disease. Postoperative complications were similar between groups and, no impairment of quality of life was observed. Systematic review in the present results suggest a 12% relative survival benefit with the addition of preoperative chemotherapy equivalent to an absolute improvement in survival of 5% at five years.

Adjuvant Chemotherapy

Patients with completely resected Stage IIIa NSCLC may benefit from postoperative cisplatinum chemotherapy. Two trials (FRE-IALT and ANITA) reported significant overall survival benefits associated with postoperative chemotherapy in Stage IIIa disease.

Standard treatment options for patients with unresectable Stage IIIa-N2 NSCLC include radiation alone versus radiation and chemotherapy.

Chemoradiation Therapy

The addition of sequential and concurrent chemotherapy to radiation therapy has been evaluated in prospective randomized trials and meta-analysis. Overall concurrent treatment may provide the greatest benefit in survival, however, with an increase in toxic effects.

Concomitant platinum based radiation chemotherapy may improve survival of patients with locally advanced non-small cell lung cancer, however, the available data are insufficient to accurately define the size of such potential treatment benefit and the optimal schedule of chemotherapy. A meta-analysis of patient data from 11 randomized clinical trials showed that cisplatinum-based combinations plus radiation therapy resulted in a 10% reduction in the risk of death compared to radiation therapy alone. A separate meta-analysis of 13 trials show that the addition of concurrent chemotherapy to radiation therapy reduced the risk of death at 2 years (relative risk, 0.93; 95% CI, confidence index, 0.88 0.98; P=0.01).

The results from two randomized trials (including RTOG-9410) and a meta-analysis indicate that concurrent chemotherapy and radiation may provide greater survival benefit compared to sequential chemotherapy and radiation therapy. Additionally, a meta-analysis of three trials evaluated concurrent versus sequential treatment, the analysis indicated a significant benefit of concurrent over sequential treatment (RR, 0.86; 95% CI, 0.95; P=0.003). All studies used cisplatinum-based regimens and once daily radiation.

Stage IV Non-Small Cell Lung Cancer Treatment

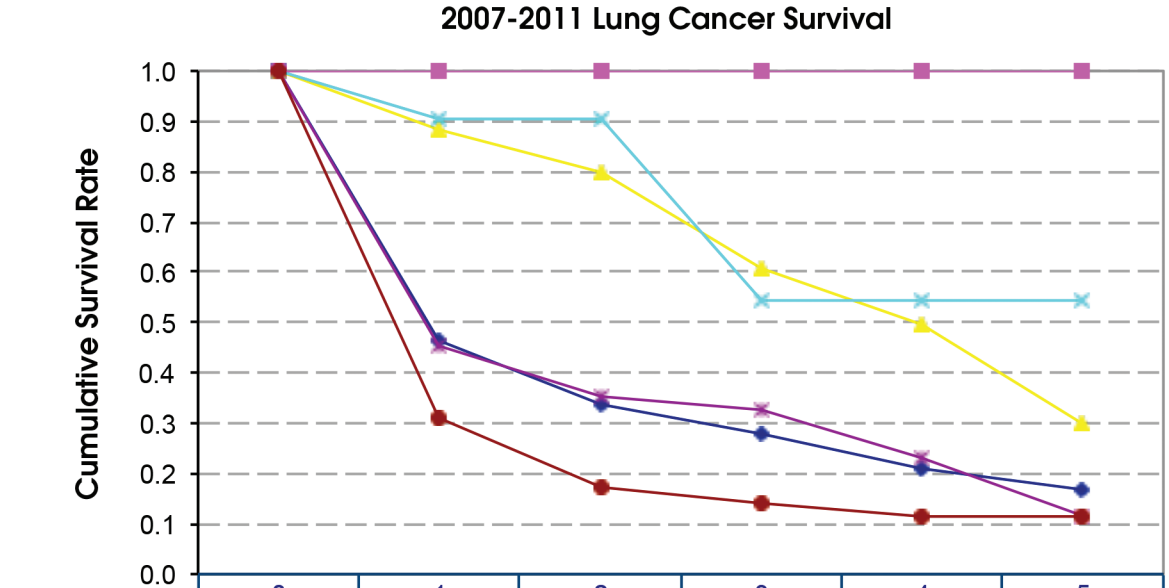
40% of patients with newly diagnosed non-small cell lung cancer have Stage IV disease. Treatment goals are to prolong survival and control disease related symptoms. Treatment options include chemotherapy and targeted agents. Radiation therapy and surgery are generally utilized for palliative purposes.

Lung Cancer Incidence and Mortality

Chemotherapy

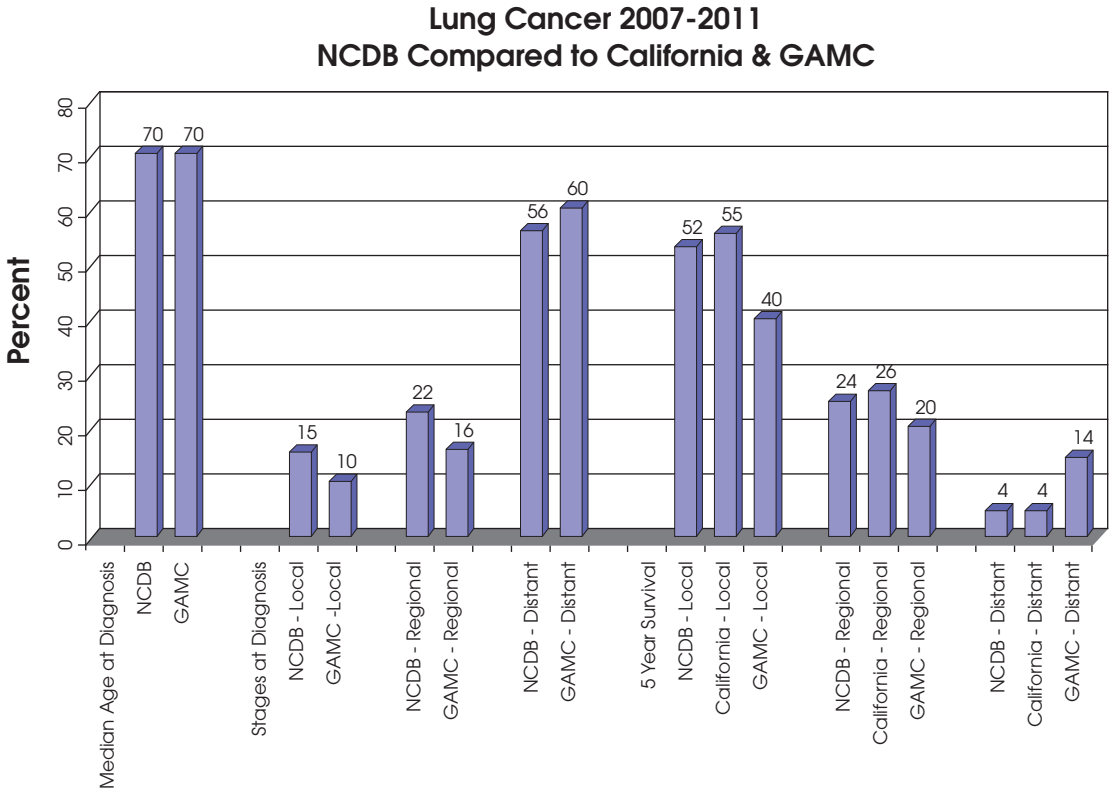
The type and number of chemotherapy drugs to be used for the patients with advanced non-small cell lung cancer have been extensively evaluated in randomized controlled trials and meta-analyses. Platinum combinations with vinorelbine, paclitaxel, docetaxel, gemcitabine, and pemetrexed yield similar improvements in survival. Types and frequencies of toxicities defer, and these may determine the preferred regimen for an individual patient. Patients with adenocarcinoma may benefit from pemetrexed. Non-platinum combinations offer no advantage to platinum-based chemotherapy, and some studies demonstrate inferiority.

The local, regional and distant data are close to being similar to the databases of California and NCDB. GAMC has a population and ethnic diversification with high-risk features (i.e. heavy tobacco use) and seeks medical attention late (see NCDB Compared to California and GAMC graph on page 29).



	0	1	2	3	4	5
All Stages	1.0000	0.4624	0.3347	0.2770	0.2102	0.1681
Stage 0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Stage I	1.0000	0.8824	0.8003	0.6082	0.4976	0.2986
Stage II	1.0000	0.9048	0.9048	0.5429	0.5429	0.5429
Stage III	1.0000	0.4545	0.3535	0.3263	0.2331	0.1166
Stage IV	1.0000	0.3093	0.1718	0.1432	0.1146	0.1146

Years



NCDB – Cancer Treatment Survivorship – Facts Figures 2012-2013 California Cancer Facts/Figures 2012

Factors Influencing Treatments

Histology

Patients with adenocarcinoma may benefit from pemetrexed, EGFR inhibitors and bevacizumab.

Age Versus Comorbidity

Evidence supports that elderly patients with good performance status and limited co-morbidity may benefit from combination chemotherapy. Age alone should not dictate treatment related decisions in patients with advanced non-small cell lung cancer. Elderly patients with a good performance status enjoy a longer survival and better quality of life when treated with chemotherapy compared with supportive care alone.

Retrospective data analyzing and comparing younger (age less than 70 years) patients with older (age greater than 70 years) patients who participated in large randomized trials of doublet combinations also showed that elderly patients may derive the same survival benefit, although with a higher risk of toxic effects in the bone marrow.

Performance Status

Performance status is the most important prognostic factors for survival of patients with non-small cell lung cancer. The benefit of therapy for this group of patients has been evaluated through retrospective analyses as well as through prospective clinical trials. The results support further evaluation of chemotherapeutic approaches for both metastatic and locally advanced non-small cell lung cancer; however, the efficacy of current platinum-based chemotherapy combinations is such that no specific regimen can be regarded as standard therapy. Chemotherapy should be given only to patients with good performance status and patients who desire such treatment after being fully informed of its anticipated risks and limited benefits.

Lung Cancer Incidence and Mortality

Combination Chemotherapy With Bevacizumab or Cetuximab (First Line)

Two randomized trials have evaluated the addition of bevacizumab, an antibody targeting vascular endothelial growth factor, to first line combination chemotherapy. The median survival was 12.3 months in the group assigned to chemotherapy plus bevacizumab as compared to 10.3 months in the chemotherapy alone group. Another randomized phase 3 trial investigated the efficacy and safety of cisplatinum/gemcitabine plus bevacizumab versus the two drugs alone. Progression free survival was significantly prolonged, these results support the addition of bevacizumab to platinum containing chemotherapy.

Two trials have evaluated the addition of cetuximab to first line chemotherapy. The overall survival was longer for patients treated with cetuximab and chemotherapy (median 11.3 months versus 10.1 months; HR for death 0.871; 95% CI, 0.62; P=0.44). A median survival benefit was seen in all histologic subgroups; however, survival benefit was not seen in non-white or Asian patients.

EGFR Tyrosine Kinase Inhibitors (First Line)

Selected patients may benefit from single agent EGFR tyrosine kinase inhibitors. Randomized control trials of patients with chemotherapy naive non-small cell lung cancer and EGFR mutations have shown that EGFR inhibitors improved progression free survival but not overall survival and have favorable toxicity profiles compared with combination chemotherapy.

Maintenance Therapy Following First Line Chemotherapy

One treatment strategy has been investigated extensively in non-small cell lung cancer is maintenance therapy following initial response to chemotherapy. Options for maintenance therapy that have been investigated include continuing the initial combination chemotherapy, continuing only single agent chemotherapy, and introducing a new agent as maintenance. It was concluded that data suggests that progression free survival, but not overall survival may be improved either by continuing an effective chemotherapy beyond four cycles or by immediate initiation of alternative chemotherapy. Improvement and progression free survival, however, are tempered by an increase in adverse events from additional cytotoxic chemotherapy and no consistent improvement in quality of life. For patients who have stable disease or who respond to first line therapy, evidence does not support the continuation of cytotoxic chemotherapy until disease progression or the initiation of a different chemotherapy prior to disease progression. Collectively, these trials suggest that first line cytotoxic combination chemotherapy should be stopped at disease progression or at four cycles in patients whose disease is not responding to treatment.

The findings of two randomized trials have shown outcomes with the addition of pemetrexed following standard first line platinum based combination chemotherapy. Both the primary end point of progression free survival and secondary end point of overall survival were statistically significantly prolonged with the addition of the maintenance pemetrexed (median progression free survival 4.3 months versus 2.6; median survival 13.4 months versus 10.6 months). Benefit was not seen in patients with squamous histology.

One trial has reported favorable outcomes with maintenance erlotinib after four cycles of platinum-based doublet chemotherapy in patients with stable disease. In the overall population, patients whose tumors had activating EGFR mutations derived the greatest progression free survival benefit from maintenance erlotinib treatment. Patients whose tumors with wild type EGFR also obtained significant progression free survival and overall survival improvements.

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Lung Cancer

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Lung cancer is the leading cause of cancer-related deaths in the United States, with a 5-year survival rate of only 15%.[1] Lung cancer is classified as either non–small cell or small cell lung cancer, with the former accounting for 87% of all lung cancers.[1]

The most important prognostic indicator in lung cancer is the extent of disease. The internationally used TNM staging system takes into account the degree of spread of the primary tumor, represented by T; the extent of regional lymph node involvement, represented by N; and the presence or absence of distant metastases, represented by M. The TNM system is used for all lung carcinomas except small cell lung cancers (SCLCs), which are generally staged differently.

Staging of Primary Tumors

Conventional chest radiograph (CXR) has limited staging accuracy. It usually demonstrates the size of the lung tumor. Central tumors may cause atelectasis or obstructive pneumonitis by obstruction of central airway. CXR may also show a pleural effusion, direct extension into the chest wall with destruction of the ribs or vertebrae, or mediastinal widening secondary to lymphadenopathy. In the absence of these signs, CXR are unreliable in detecting invasion of the chest wall, diaphragm, or mediastinum, and CT or MRI is required to assess these conditions.

Contrast-enhanced helical CT scan of the chest is routinely used for staging lung cancers. The primary tumor is measured in two dimensions using lung window settings. CT scan can predict mediastinal invasion if the tumor surrounds the major mediastinal vessels or bronchi. However, a tumor that simply abuts the mediastinum cannot be considered invasive, even if the fat plane between the mediastinum and mass is obliterated. Neither CT scanning nor MRI can be used to distinguish tumor invasion of mediastinal fat from inflammatory changes.

CT scan criteria for resectability include the following:

- Contact between mass and mediastinum of less than three cm;
- Circumferential contact between the mass and aorta of less than 90°;
- Presence of a fat plane between the mass and mediastinum.

CT scan criteria for non-resectability are suggested by the following:

- Involvement of the carina;
- Tumor surrounding, encasing the aorta;
- Tumor involvement of main or proximal portions of the right or left pulmonary arteries, or esophagus by more than 180°.

MRI is superior to CT in the assessment of tumor invasion of the pericardium, heart, and great vessels. Multiplanar coronal and sagittal images are useful in delineating the extent of tumor in the heart and mediastinum. However, it has less spatial resolution compared with that of CT, and is more susceptible to cardiac and respiratory motion artifacts. MRI may be used instead of CT in patients who have contrast allergies and in patients with significant renal insufficiency. The overall difference in accuracy between MRI and CT is similar. The sensitivity of CT is 63%, and that of MRI is 56%.[2]

Positron emission tomography (PET) scanning is indicated in the assessment of indeterminate pulmonary nodules and staging. Fluorodeoxyglucose (FDG)-PET is superior to CT in differentiating between malignant and benign tumors because it is a metabolic imaging technique that relies on a biochemical difference between normal and neoplastic cells. Tumors generally have increased uptake of FDG, a glucose analogue labeled with fluorine-18 (18 F), a positron emitter. The preoperative use of PET reduces unnecessary thoracotomies in patients considered operable on the basis of CT alone. The combination of CT and PET also improves accuracy of radiotherapy.[3,4,5,6,7]

Staging of Mediastinal Lymph Nodes

Nodal disease can be staged concurrently with the primary tumor at the time of diagnosis. On all imaging modalities, lymph node enlargement suggests possible nodal involvement. However, normal-sized nodes may contain metastases, and adenopathy may be caused by inflammatory etiologies without metastatic involvement. The short-axis diameter is the most reliable measurement of lymph node size on CT scans. A short-axis diameter greater than 10 mm is abnormal regardless of the nodal location.

Chest radiography is inferior to CT scanning in the detection of mediastinal lymph node metastases. It has a sensitivity of only 10-30%, although its specificity (90%) is higher than that of CT. The sensitivity and specificity of CT scan in the detection of mediastinal nodes vary considerably, with ranges of 40-85% and 50-80%, respectively. This likely reflects interobserver variability and differences in the size criteria for abnormal lymph nodes and patient populations. The negative predictive value of CT scanning is approximately 85%. Therefore, patients with normal-appearing mediastinum should undergo thoracotomy. If there is nodal enlargement, lymph node biopsy by mediastinoscopy or thoracoscopy is usually required before surgery is ruled out. Like CT scan, MRI can be used to identify nodal involvement based on size criteria, with comparable sensitivity and specificity. However, because MRI has multiplanar capability and better inherent tissue contrast, it is superior to CT in differentiating lymph nodes from vessels without IV contrast enhancement.

PET scan, unlike CT and MRI, does not rely on size criteria to differentiate between normal and neoplastic lymph nodes. Abnormal nodes containing tumor have an increased uptake of FDG. PET imaging has higher sensitivity, specificity, and accuracy than does CT scanning in staging mediastinal disease. Published studies have demonstrated a sensitivity of 80%, an overall specificity of 92%, and an accuracy of 92%, with a positive predictive value of 90% and a negative predictive value of 93%. In those patients with abnormal hilar nodes, PET has 73% sensitivity and 76% specificity, compared with 18% sensitivity and 86% specificity with CT. The sensitivity of PET combined with CT was 93%, and the specificity was 97%. A negative PET scan in these patients suggests that mediastinoscopy is unnecessary and that thoracotomy may be performed. In about 35% of cases first staged with CT, the disease is upstaged after subsequent PET, with resultant changes in management.

Nevertheless, PET can produce some false-negative results. This has been documented in patients with carcinoid syndrome, bronchoalveolar carcinomas, and bronchogenic carcinoma measuring less than 10 mm. False-positive findings are known to occur in infectious or inflammatory disorders such as granulomatous disease. For patients with lymph nodes measuring 16 mm or more on CT and a negative FDG-PET result, the probability for N2 disease was 20%. These patients should be scheduled for mediastinoscopy before possible thoracotomy. However, for patients with lymph nodes measuring 10-15 mm on CT and a negative FDG-PET result, the probability for N2 disease was only 5%. These patients generally do not require medisatinoscopy because yield will be extremely low. PET is also useful because it allows for concurrent staging of distant metastases, in the neck and below the diaphragm.[3,4,5,6,7,8]

Staging of Distant Metastases

The detection of distant metastases indicates that curative surgical resection of the primary tumor is contraindicated. Metastases occur in about 50% of patients with NSCLC. In patients with clinical or PET evidence of disease elsewhere, targeted imaging of those sites is indicated. These sites include the brain, which can be examined with contrast enhanced CT or MRI, and the skeleton, which can be evaluated with scintigraphic bone scan or MRI.

The probability of metastases is highest for SCLC, which is 60-80% on presentation, and lowest for

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squamous cell cancers; the incidence increases with advancing stage. Adenocarcinoma tends to have early metastasis to brain and adrenal glands. Contrast enhanced CT and MRI have sensitivity of about 85% in the detection of liver metastases.

Staging of Small Cell Lung Cancer (SCLC)

Small cell lung cancer is classified as either limited stage or extensive stage. Limited stage: the tumor is found in one lung and in nearby lymph nodes, an area that can be encompassed by one radiation port. Extensive: the tumor has spread beyond one lung or to other organs. TNM is not generally used for staging SCLC, mainly because treatment options don't vary much between these detailed stages. About 60% of SCLC patients present with extensive disease. They are rarely surgical candidates, and are usually treated with irradiation and/or chemotherapy. Systemic chemotherapy is the main treatment, with response rates of 70% but cure rates of less than 5%.

Staging is routinely performed using CT, MRI, and PET. Contrast enhanced CT can evaluate central lung lesions and mediastinal disease. MRI may provide information regarding mediastinal invasion, but more commonly is used to evaluate brain lesions and indeterminate adrenal masses. PET can be used for staging of nodal involvement and distant metastasis in patients who are potential candidates for additional thoracic radiotherapy to chemotherapy. PET can useful for evaluating cases in which recurrent disease is questionable.[8] Bone scan is routinely used to evaluate bony metastatic disease.

Lung Cancer Screening

Screening for lung cancer has the potential of identifying the disease in the earlier stages of development and to reduce the risk of death and morbidity. A systematic review of the role of low-dose computed tomography (LDCT) lung cancer screening for individuals at high risk due to smoking was undertaken. The review was a collaborative initiative of the American Cancer Society (ACS), the American College of Chest Physicians (ACCP), American Society of Medical Oncology (ASCO), and the National Comprehensive Cancer Network (NCCN). The review forms the basis of clinical practice guidelines developed by the ACCP and ASCO, with input from the American Thoracic Society (ATS).[9] The following guidelines have been developed to screen for lung cancer for people who currently smoke or who have quit smoking:

- Yearly screening with a low-dose CT scan is recommended instead of screening with a chest x-ray or no screening for people age 55 to 74 who have smoked for 30 pack years or more or who have quit within the past 15 years.
- CT screening is not recommended for people who have smoked for less than 30 pack years, are younger than 55 or older than 74, have quit smoking more than 15 years ago, or have a serious comorbidity that could affect cancer treatment or limit life expectancy.

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Morphologic & Genomic Considerations

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Pathologic classification and terminology for lung cancer has continually evolved along with our understanding of the biology of this important disease. Classification is now informed by molecular and immunohistochemical techniques in addition to light microscopic morphologic features.

In 2011, an international, multidisciplinary lung cancer classification system was proposed, sponsored by the International Association for the Study of Lung Cancer, American Thoracic Society and the European Respiratory Society. This resulted in a published, evidence-based document to guide in standardization of the classification of lung tumors.[1] The new system can be applied not only to resection specimens but also small biopsies and cytology specimens. This is important because 70% of all lung cancers are diagnosed on small biopsies or cytology specimens.

Morphologic Classification

Classification of the lung cancer specimen still begins with morphologic examination of a hematoxylin and eosin stained section of tumor under the light microscope. If it is determined that carcinoma is present, the carcinoma is then placed into one of two categories: Small Cell Lung Carcinoma (SCLC) or Non Small Cell Lung Carcinoma (NSCLC) based on cell size and nuclear characteristics seen under the microscope.

Small Cell Lung Carcinoma

Accounting for 20% of all lung carcinomas, these tumors are characterized by relatively small cell size and distinctive nuclear features, often showing necrosis and crush artifact. Small cell pulmonary carcinomas are derived from neuroendocrine cells and as such, demonstrate expression of neuroendocrine markers such as synaptophysin by immunohistochemical (IHC) staining. They also show TTF-1 and cytokeratin expression by IHC. Small cell carcinoma is associated with cigarette smoking and has a relatively poor prognosis with about a 5% five-year survival.

Non Small Cell Lung Carcinoma (NSCLC)

The remaining 80% of lung carcinomas are NSCLC. These are further divided into Adenocarcinoma and Squamous Cell Carcinoma.

Adenocarcinoma

This is the most common type of NSCLC and standardization of criteria for diagnosis and subclassification of pulmonary adenocarcinoma is the major emphasis of the new classification system. All adenocarcinomas show differentiation along the lines of glandular epithelium. Some of these begin as preinvasive glandular proliferations in the lung. These include atypical adenomatous hyperplasia (AAH) and adenocarcinoma in situ (AIS), which can be of nonmucinous, mucinous or mixed type.

Invasive adenocarcinoma is divided into multiple categories in the new system:

- Adenocarcinoma (with description of architectural patterns present i.e. acinar, papillary, solid, micropapillary)
- Adenocarcinoma with lepidic pattern (formerly non-mucinous bronchoalveolar carcinoma)
- Invasive mucinous adenocarcinoma (formerly mucinous bronchoalveolar carcinoma)
- Adenocarcinoma with colloid pattern
- Fetal adenocarcinoma
- Adenocarcinoma with enteric features
- NSCLC, favor Adenocarcinoma.

Recognition of glandular differentiation in small biopsy samples of poorly differentiated tumors is a particular and important challenge for the surgical pathologist. Recognition of glandular features will determine eligibility for molecular testing and targeted therapy. IHC is very useful in such cases. Adenocarcinoma often shows nuclear expression

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of TTF-1 and is more likely to show cytoplasmic CK7 expression. Markers of squamous differentiation (see below) are typically absent.

The new system includes specific recommendations for reporting small biopsy samples harboring adenocarcinoma. For example, in a small biopsy or cytology sample, adenocarcinoma with lepidic pattern and no evidence of invasion is reported with a note that "an invasive component cannot be excluded," acknowledging that invasion cannot be completely evaluated on a non-resection specimen. Guidelines regarding tissue handling for small samples are also given, recognizing the challenge of performing classification on tiny samples which often require IHC tissue preservation for relevant molecular studies.

Adenocarcinomas are variably associated with smoking history, with some variants occurring most often in nonsmokers.

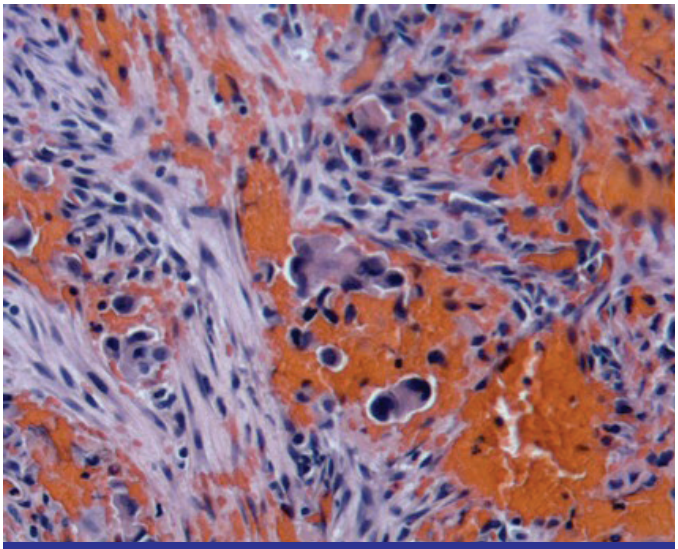

Figure 1. NSCLC, Core biopsy 400x

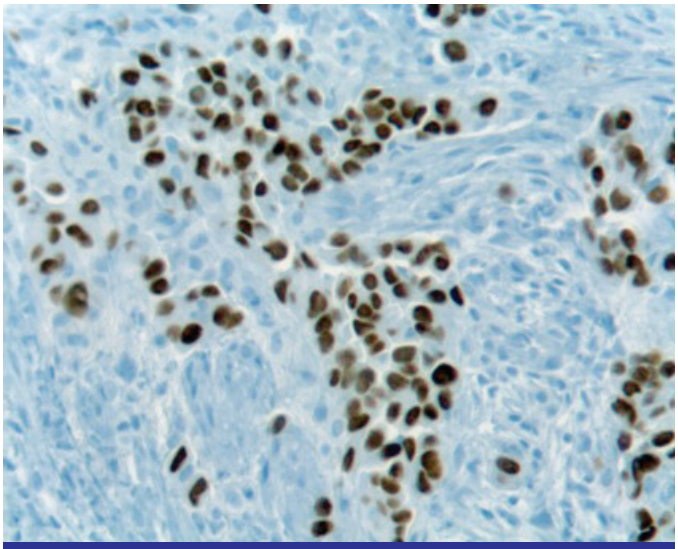

Figure 2. NSCLC , Adenocarcinoma, TTF-1 Nuclear staining, 400x

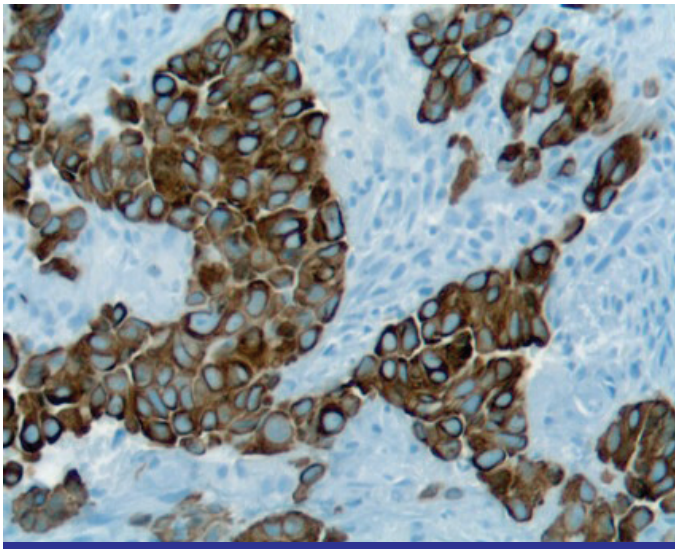

Figure 3. NSCLC , Adenocarcinoma , CK7 cytoplasmic staining, 400x

Squamous Cell Carcinoma

These tumors show differentiation along the lines of squamous epithelial cells. This may be recognized morphologically using light microscopy or in less differentiated tumors by use of IHC staining, which reveals that squamous cell carcinomas often express the markers p63 and CK 5/6. It is important to distinguish NSCLC with squamous differentiation from adenocarcinoma and "NSCLC –NOS (not otherwise specified)" to determine if there is need for molecular testing and to select appropriate chemotherapeutic options to improve efficacy and avoid toxicity. Squamous cell carcinoma is associated with cigarette smoking.

Genomic Classification

The treatment of advanced NSCLC has been rapidly evolving towards a personalized approach, especially for adenocarcinoma. It is now recognized that these tumors can be divided into subsets based on unique genetic alterations, detected by a variety of laboratory techniques including immunohistochemistry, fluorescent in-situ hybridization (FISH), polymerase chain reaction (PCR) and gene sequencing. Specific therapeutic regimens now exist for several subsets, with the hope that future research will allow for targeted therapy for all variants.

EGFR

Patients with a diagnosis of advanced adenocarcinoma, NSCLC favor adenocarcinoma or NSCLC,NOS are all considered candidates for EGFR mutation testing. From 10-30% of pulmonary adenocarcinoma will show mutated EGFR, with the highest frequencies seen in never smokers, Asians and individuals with nonmucinous tumors. EGFR mutation is a validated predictive marker for response to a class of chemotherapeutic agents known as EGFR tyrosine kinase inhibitors, such as gefitinib and erlotinib.

ALK Translocation

About 3-5% of lung adenocarcinomas have a small inversion in chromosome 2p which gives rise to a transforming fusion gene EML4-ALK. This finding seems to be associated with younger age, male gender and never or light smoking. Tumors with ALK translocation typically lack EGFR and KRAS mutation. Clinical trials are currently underway comparing crizotinib to combination chemotherapy in patients with advanced, ALK rearranged NSCLC.

KRAS

KRAS mutation is present in 10-30% of lung adenocarcinomas, but its role as a predictor of prognosis or response to chemotherapeutic agents has not been established. KRAS mutated adenocarcinoma is more frequent in smokers, non-Asians and invasive mucinous adenocarcinoma.

ROS1

Genomic alterations in ROS1 have recently been described in 1.7% of NSCLC.[2] ROS1 rearranged tumors are usually adenocarcinoma and associated with Asian ethnicity, younger age and never smokers. Preliminary data suggests patients with this rearrangement may respond to crizitinib, but further study is needed to better understand the significance of this mutation.

Considering that lung cancer is the most frequent cause of major cancer incidence and mortality wordwide, the current and future advances in pathologic classification will benefit an enormous number of cancer patients in the form of personalized targeted cancer therapy.

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Surgical Treatment of Lung Cancer

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Lung cancer continues to be a major public health problem in the United States and rest of the world. In terms of the lung cancer estimates in the United States for 2012, the American Cancer Society projected 226,160 new cases of lung cancer will be diagnosed, and 160,340 deaths from lung cancer, accounting for about 28% of all cancer deaths.[1]

Although lung cancer is the second most common cancer in the United States, it is by far the leading cause of cancer death among both men and women. Each year, more people die of lung cancer than of colon, breast and prostate cancer combined.[1] The high mortality data of lung cancer parallels the incidence of advanced stage lung cancer at the time of diagnosis. As such, early detection of lung cancer represents the most promising approach to improve lung cancer survival. In patients with early stage lung cancer, surgical resection remains the best treatment option. Advances in the surgical treatment of lung cancer have been made over the years, including improved technology for diagnosis and staging, less invasive surgical techniques, and refined perioperative care that focuses on decreasing complications and improving survival and quality of life.

A New Era in Lung Cancer Diagnosis & Staging

Replacing the need for high-risk invasive procedures such as transthoracic needle biopsies or surgical biopsies for lung nodules, the endoscopic navigational bronchoscopy (superDimensionTM) sets the stage for earlier lung cancer diagnosis, boosting survival rates and eliminating the need for the lengthy and stressful "wait and see" approach after detecting a suspicious growth on a chest CT scan. The endoscopic navigation bronchoscopy (ENB) is an innovative and far less invasive bronchoscopy technique for detecting and diagnosing lung diseases and lung cancer at earlier stages. It uses electromagnetic navigation technology similar to GPS (global positioning system) to guide the physician much more deeply into a patient's airways to take tissue samples in areas previously inaccessible via traditional techniques. Electromagnetic sensors guide a catheter to the exact location where suspicious tissue resides and where a frozen section sample is taken and sent to a lab for cancer diagnosis. This minimally invasive technology also can be used for earlier detection of benign or malignant lesions in patients with poor lung function. Dale et al reported that the use of ENB resulted in fewer pneumothoraces, hemorrhage episodes and respiratory embarrassment compared to a CT-guided biopsy strategy.[2] The ability of this emerging technology to detect lung disease and lung cancer earlier, even before symptoms are evident, and minimize the need for more invasive procedures to access lung lesions, greatly enhances the efficiency of care and improves patient outcome through early detection.

As with most cancers, staging is an important determinant of treatment and prognosis. Lung cancer staging is the assessment of the extent to which a lung cancer has spread from its original source. Mediastinoscopy is an operation that is commonly performed to stage lung cancer. During this procedure, a small midline incision is made just above the clavicles. The mediastinoscope is then placed through the incision and positioned above the trachea where the lymph nodes surrounding the trachea are biopsied. Microscopic analyses of these lymph nodes will assess for the presence of lung cancer cells and determine the staging of the disease. This surgical procedure remains as the gold standard technique for the evaluation of mediastinal metastasis in lung cancer.

Recent advances with the various types of endoscopic ultrasound and biopsy are emerging as a sensitive tool for minimally-invasive mediastinal

staging in patients with suspected lung cancer. Endoscopic ultrasound (EUS) is an endoscopic technique where a miniaturized ultrasound probe is passed though the mouth into the upper gastrointestinal tract, and a fine needle is advanced through the esophagus into adjacent lymph nodes to obtain biopsy samples. EUS fine needle aspiration (EUS-FNA) can reliably reach the lymph node stations 5, 7, 8 and 9. The feasibility of EUS-FNA of aorto-pulmonary window lymph nodes (station 5) is a major advantage of EUS since evaluation of this station has traditionally required a paramedianmediastinotomy (Chamberlain procedure). In the superior mediastinum, the trachea is somewhat to the right of the esophagus which makes it often possible to reach left-sided station 2 and 4 (paratracheal) lymph nodes and, less often, right-sided paratracheal lymph nodes with EUS-FNA. As such, a hybrid employing ultrasound guidance with a bronchoscope, enabling real-time transbronchial needle aspiration (TBNA) is used to assess the superior anterior mediastinum. This technology is termed the endobronchial ultrasound (EBUS). Wallace et al compared the diagnostic accuracy of transbronchial needle aspiration, EBUS-TBNA, EUS-FNA, and their combinations.[3] They reported a sensitivity of 93% (95% CI, 81–99%), and a negative predicted value of 97% (95% CI, 91–99%) for the combination of EUS-FNA and EBUS-TBNA in a population with a prevalence of mediastinal metastases of 30%. In addition, they reported that the combination of EUS-FNA and EBUS-TBNA was better than either alone, even when evaluating scenarios that favored one technology over the other. Both technologies far outperformed blind TBNA in assessing mediastinal lymph nodes. Together, EBUS and EUS cover the entire mediastinum and the combination may allow complete access to all mediastinal lymph node stations, constituting a more appropriate initial sampling method that may ultimately replace mediastinoscopy.

Minimally-Invasive Thoracic Surgical Techniques

In traditional open-chest surgery, or thoracotomy, the surgeon makes a longer incision—usually about 6 to 10 inches long — often from the patient's back around to his or her side. Then, in order to assess the intrathoracic cavity, the surgeon must move the ribs out of the way by cutting or spreading them. This method, while sometimes necessary, is more traumatic to the body and the recovery process can be painful and take many weeks. A minimally invasive approach to lung surgery, video-assisted thoracoscopic surgery (VATS), is now becoming the standard practice by which lung cancer surgery is performed. VATS involves inserting a television camera into the chest through a small incision. Additional small incisions are made to accommodate surgical instruments into the chest cavity. Not only can intrathoracic pathology be visualized by minimally invasive means, but a wide variety of procedures can be carried out. With improved equipment and experience over the years, virtually any thoracic procedure can now be performed with VATS. McKenna et al reported low morbidity and mortality rates with VATS lobectomy with anatomic dissection.[4] Compared to traditional open chest surgery for early stage lung cancer, VATS offers numerous benefits including less postoperative pain, faster recovery, better immune system response and better quality of life.

A new minimally invasive approach to the treatment of lung diseases, robotic-assisted chest surgery, has emerged as safe and feasible technique for the treatment of early stage lung cancer. During the robotic operation, a unit containing the robot is placed at the side of the operating table, and the surgeon sits a few feet away at a control console. The surgeon makes four to six dime-sized incisions, called operating ports, along the side of the chest to allow for the passage of the video camera and surgical instruments. Using foot pedals and hand controls, the surgeon manipulates the robot's arms

Surgical Treatment of Lung Cancer

and controls the surgical instruments to twist, turn, and rotate in order to cut tissue, and remove tumors and lymph nodes. A monitor displays in real time a highly magnified, full-color, high-definition, three-dimensional view of the patient's lungs and chest cavity. While both VATS and robotic chest surgery are minimally invasive, robotic surgery offers certain advantages over the VATS approach for lung cancer surgery: its exceptional precision and highly maneuverable "wrists" are capable of rotating 540 degrees mimicking the complex movement of the hand and wrist inside the chest cavity rather than at the ribs. Another advantage is the robot's high-definition, three-dimensional camera, which provides a superior view of the tissues being operated on, especially in a closed confined space. Patients tend to be discharged somewhat sooner following robotic surgery — typically in two to three days, compared to four days for the typical VATS procedure. Park et al reported that robotic lobectomy for early-stage lung cancer can be performed with low morbidity and mortality.[5] Long-term stage-specific survival is also acceptable and consistent with prior results for VATS and thoracotomy. Preliminary data in the literature suggest that robotic lung surgery, like VATS, is a feasible alternative to open surgery for early-stage lung cancer. What remains to be seen, however, is whether robotic surgery is poised to replace VATS in the future.

Perioperative Management of Thoracic Surgical Patients

Over the last two decades, numerous surgical advances were made in the care of thoracic surgical patients. Preoperative prophylaxis for atrial fibrillation, deep venous thrombosis, infection and stress ulceration were addressed. Strategies in the postoperative phase focusing on fluid management, analgesic control, nutritional support and physical therapy were refined. Avoidance of postoperative respiratory complications and the management of chest drainage tubes continue to present challenges to the thoracic surgeons.

Intraoperative modifications include novel surgical techniques to reduce lung parenchymal air leaks and intrathoracic space after lung resection as well as to improve the efficacy of oncologic operations. An example of such intraoperative refinement is the emerging role of sublobar resection for early stage, small-sized lung cancer. The standard surgical treatment of lung cancer is lobectomy (or pneumonectomy)[6]. Lesser non-anatomical pulmonary resections are associated with higher rates of locoregional recurrence and decreased long-term survival. Lobectomy, on the other hand, is sometimes prohibitive in patients with borderline pulmonary function. In addition, new primary lung cancers can arise over time, requiring further lung resection. Pulmonary segmentectomy is a feasible surgical option for patients with compromised pulmonary reserve. Experience reported in the literature increasingly supports the notion that segmentectomy is comparable with lobectomy for small tumors (≤2 cm), provided that the lesion is located centrally and affords a 2-cm parenchymal surgical margin.[7-8] In a recent retrospective study that compared VATS lobectomy to VATS segmentectomy, the authors concluded that segmentectomy yields excellent oncological results with comparable morbidity, mortality, locoregional recurrence, and 3-year survival.[9] Moreover, patients in both surgical groups were discharged after similar length hospital stays, although patients undergoing VATS segmentectomy had worse pulmonary function before surgery. Currently, this surgical technique for small peripheral non-small cell lung cancers is being evaluated in a large North American randomized study, CALGB-140503 (Cancer and Leukemia Group B-140503).[10] The role of segmentectomy as the preferred surgical technique for limited resection of patient with stage IA non-small cell lung cancer remains to be seen.

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Radiation Treatment in Lung Cancer Patients

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External beam radiation is used for different stages of both small cell and non-small cell lung cancers. The treatment is often combined with chemotherapy in patients with more advanced disease. Chemotherapy is either given before the radiation or concurrently with the radiation. It has been shown in several prospective randomized studies that chemo-radiation produced superior survival than either modality alone for patients with locally advanced disease. This was true particularly if the patients had good performance status and minimal weight loss. Radiation can also be used for patients with metastases for palliation. It is effective in reducing painful symptoms in bony metastasis, controlling symptoms from brain metastases and bleeding from endo-bronchial tumors.

Conformal Radiation

It is important to localize the tumor and involved lymphatics when radiation planning is done. CT scan is done and images are transferred electronically to the treatment-planning computer. The physician contours the tumors and normal structures, and a treatment plan, together with beam-eye view of the treatment and dose-volume histogram, is generated. The patient is treated with multiple fields of radiation converging on the center of the lesion. The treatment is given for a few minutes daily for about seven weeks. Palliative radiation is usually completed in three weeks.

To better define the area of active disease, PET/CT scan is being used to enhance the radiation planning process. Patients get a combined PET/CT scan in treatment position. A PET scan shows where the tumor is active, while the CT scan defines the anatomy of the patient. This technology helps deliver a definitive dose of radiation to the location where the tumor is most aggressive, thus yielding better loco-regional control.

Brachytherapy

Radiation can be given directly to endo-bronchial lesions with high dose rate (HDR) Iridium radioactive source. The pulmonary specialist places an endobronchial catheter under bronchoscopic guidance to where the lesion is located. The catheter is then connected to the HDR machine, which in turn, delivers a "hot" Iridium source to the target. The treatment usually takes 10-15 minutes and is done as an out-patient procedure. The indication for treatment includes nearly obstructing endo-bronchial tumor or bleeding lesions. The treatment can be combined with external beam radiation and given as a boost.

Intensity Modulated Radiation Therapy (IMRT)

This is state-of-the-art radiation therapy. With the help of a multi-leaf collimator and a sophisticated computer program (PEACOCK), the intensity of the radiation beam can be modulated. The end result is the ability to shape the dose of radiation in order to avoid certain critical structures and deposit the bulk of radiation on the target lesions. This treatment modality has been employed in prostate, head and neck, and brain cancers. It is being actively investigated in the treatment of lung cancer.

The specific challenge for lung cancer treatment is tumor and organ localization due to the patient's normal breathing movement. The lung tumor moves during the cycles of inspiration and expiration. Tightly targeting the lesion may not be advantageous since tumor can move in and out of the field. Research is being done to synchronize the time that the radiation beam moves with the respiratory movements. We are working toward the goal of improving the benefit-risk ratio, which hopefully will translate to better cure rate.

Radiation Treatment for Non-Small Cell Lung Carcinoma

Patients with inoperable Stage I disease with sufficient pulmonary reserve may be considered

for radiation therapy with curative intent using CyberKnife Radiation. Supported by compelling scientific evidence, hypo-fractionated high-dose radiosurgery is emerging as a ground-breaking treatment modality — showing evidence of improved tumor control and patient survival when compared to conventional radiation therapy. Scientific evidence has demonstrated a direct relationship between survival and efficacy with radiosurgical close escalations of greater than 100 Gy BED. However, dose escalation for treating lung tumors has historically been limited by the destruction of normal tissue resulting from the large treatment margins commonplace with conventional radiation treatment.

Primary radiation therapy should consist of approximately 6,000 cGy delivered to the midplane of the known tumor volume using conventional fractionation. A boost to the cone-down field of the primary tumor is frequently used to further enhance local control. Conformal-treatment planning with precise definition of target volume and avoidance of critical normal structures to the extent possible is needed for optimal results.

Patients with inoperable Stage II disease and with sufficient pulmonary reserve may be considered for radiation therapy with curative intent.[1] Among patients with excellent performance status, up to a 20 percent 3-year survival rate may be expected if a course of radiation therapy can be completed. In the largest retrospective series reported to date, 152 patients with medically inoperable NSCLC treated with definitive radiation therapy achieved a 5-year overall survival rate of ten percent; however, the 44 patients with T1 tumors achieved an actuarial disease-free survival rate of 60 percent. This retrospective study also suggested that improved disease-free survival was obtained with radiation therapy doses greater than 6,000 cGy.[2]

Patients with clinical Stage IIIA N2 disease have a 5-year survival rate of 10-15 percent overall. However, patients with bulky mediastinal involvement (visible on chest radiograph) have a 5-year survival rate of 2-5 percent. Depending on clinical circumstances, the principal forms of treatment that are considered for patients with Stage IIIA non-small cell lung cancer (NSCLC) are radiation therapy, chemotherapy, surgery, and combinations of these modalities. Although the majority of these patients do not achieve a complete response to radiation therapy, there is a reproducible long-term survival benefit in 5-10 percent of patients treated with standard fractionation to 6,000 cGy; significant palliation often results. Patients with excellent performance status and those who are found to have N2 disease by a thoracotomy are most likely to benefit from radiation therapy.[4]

The addition of chemotherapy to radiation therapy has been reported to improve survival in prospective clinical studies that have used modern cisplatin-based chemotherapy regimens.[5-8] A meta-analysis of patient data from 11 randomized clinical trials showed that cisplatin-based combinations plus radiation therapy resulted in a ten percent reduction in the risk of death compared with radiation therapy alone.[9] The optimal sequencing of modalities and schedule of drug administration remains to be determined and is under study in ongoing clinical trials.

Treatment for Small Cell Lung Carcinoma

Results of prospective randomized trials suggest that combined modality therapy produces a modest but significant improvement in survival compared with chemotherapy alone. Two meta-analyses showed an improvement in 3-year survival rates of about five percent for those receiving chemotherapy and radiation therapy compared to those receiving chemotherapy alone.[1-2] Most of the benefit occurred in patients less than 65 years of age.

Radiation Treatment in Lung Cancer Patients

Combined modality treatment is associated with increased morbidity and, in some trials, increased treatment-related mortality from pulmonary and hematologic toxic effects; proper administration requires close collaboration between medical and radiation oncologists.[3] In general, those studies show a positive effect for combined modality therapy and thoracic irradiation early in the course of treatment, concurrently with chemotherapy.[3-6]

The combination of etoposide and cisplatin chemotherapy with concurrent chest radiation therapy has now been used in multiple single institutional studies and in cooperative group studies. These studies have consistently achieved median survivals of 18-24 months and 40-50 percent 2-year survival with less than three percent treatment-related mortality.[3-7] Once daily and twice daily chest radiation schedules have been used in regimens with etoposide and cisplatin.

One randomized study showed a modest survival advantage in favor of twice daily radiation therapy given over three weeks, compared to once daily radiation therapy given over five weeks (26% versus 16% at five years, p=0.04). However, esophagitis was increased with twice daily treatment.[8] The current standard treatment of patients with limited-stage small cell lung cancer should be a combination containing etoposide and cisplatin plus chest radiation therapy administered during the first or second cycle of chemotherapy administration.

Majority of patients with small cell lung cancer develop brain metastasis. Therefore, trials were done to examine the role of prophylactic cranial irradiation (PCI) in patients with small cell lung cancer. A meta- analysis of all randomized trials of PCI in patients with small cell lung cancer who achieved a complete or near complete response to induction chemotherapy (alone or combined with lung radiation) showed a statistically significant improvement in survival in patients treated with PCI (20.7% at three years versus 15.3% in those not given PCI). The survival improvement with PCI was seen in all patient subgroups, regardless of age, stage of disease, type of induction treatment, or performance status. Approximately 85 percent of the patients included in the meta-analysis had limited disease, and recommendations for use of PCI have been applied generally to this subgroup. One randomized trial, however, suggests benefit for PCI in patients with responding extensive disease as well.

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Class Of Case/Collaboration

Class of Case

Analytic: Cases that are first diagnosed and/or receive all or part of their first course of treatment at Glendale Adventist Medical Center.

Non-Analytic: Cases that have been diagnosed and have received their entire first course of treatment elsewhere and are first seen at Glendale Adventist Medical Center for subsequent care.

Collaboration

In order to accomplish the wide-ranging and ambitious goals involved in designing and supporting a community hospital comprehensive cancer program, many, many people have contributed—and continue to give their energy and expertise.

The contributions and support of the medical staff, nursing staff and many other professionals who have offered their expertise for the implementation of our cancer program throughout the year are greatly appreciated.

Special appreciation is given to all members of the Cancer Committee and the Cancer Registry for their involvement in preparing this annual report.

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