

Clinical Cancer Advances 2009: Major Research Advances in Cancer Treatment, Prevention, and Screening—A Report From the American Society of Clinical Oncology

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A MESSAGE FROM ASCO'S PRESIDENT

As this report demonstrates—and as history shows—investment in clinical cancer research pays off. Since 1990, cancer mortality rates have declined by 15%. Today, two thirds of patients survive at least 5 years after diagnosis, compared with just half of patients 40 years ago. Patient quality of life has improved dramatically. In addition, thanks to basic research advances, we are entering an era of personalized cancer medicine, in which treatment is tailored to the unique genetics of the individual.

Clinical cancer research is finally receiving an urgently needed boost in investment. For the first time in 5 years, federal funding for research has increased. The economic stimulus package infused billions into short-term biomedical research projects, and President Obama has pledged to invest in “a cure for cancer in our time.”

However, despite this progress, cancer remains the number-two killer of Americans. Incidence is projected to nearly double by 2020 as the population grows and ages. Scientifically, cancer is highly complex; it is not one disease, but many, and is increasingly defined by thousands of genetic variations, epigenetic changes, post-transcriptional modifications, and combinations of these mechanisms, rather than by site of origin. Unraveling these complexities begins to explain why some cancers are especially resistant to treatment, a fact we have known for some time. Other cancers are fatal because they are typically diagnosed late in the course of disease, when treatment is less effective.

To achieve new breakthroughs, the scale of the national response must match the scale of the problem. Years of flat federal research funding have resulted in abandoned or stalled clinical research projects, a deteriorating research infrastructure, and the loss of talented physicians to other fields. In this report, the American Society of Clinical Oncology (ASCO) commends the recent increases in funding and calls on Congress to make a multiyear commitment to sustained increases in clinical cancer research at the National Institutes of Health and National Cancer Institute. Major advances in cancer treatment cannot be expected to emerge without consistent and predictable investment at the federal level.

Although a robust clinical research enterprise is essential to improving patient care, advances mean little if they do not reach people in need. For people with cancer, lack of health insurance can be the difference between life and death. It is estimated that 32% of patients with cancer in the United States are uninsured at some point during their treatment, and more than a quarter opt not to seek treatment as a result.

We must end the inequality in health care access. ASCO believes that health care reform must ensure that everyone diagnosed with cancer has the coverage necessary to receive high-quality treatment. To that end, we have made access to cancer care a top priority in our advocacy agenda.

I believe the advances described in this report should give all of us cause for hope. Although there is a long road ahead, by investing in a robust national clinical research program and by improving access to high-quality care, we can give every patient the best chance of survival.

Douglas Blayney, MD
President
American Society of Clinical Oncology

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EXECUTIVE SUMMARY

Each year, the American Society of Clinical Oncology (ASCO) independently reviews advances in clinical cancer research and identifies those that have had the greatest impact on patient care. This year's *Clinical Cancer Advances* report highlights 51 of the most significant studies, including 15 that the editors consider major advances that have the potential to lead to a reduction in mortality from cancer.

These advances would not be possible without the nation's investment in cancer research. However, cancer still claims the lives of more than 560,000 Americans each year. In this report, ASCO also makes recommendations for accelerating the pace of progress against cancer by dramatically increasing cancer research funding, strengthening the nation's clinical research system, and ensuring people with cancer receive high-quality care.

Summary of Findings

Advances in personalized medicine and targeted therapies. Oncology is no longer one-size-fits-all medicine. Growing scientific understanding of the biology of cancer is enabling researchers to develop highly targeted treatment approaches based on the genetic makeup of the individual or the tumor. Major advances in the field of personalized medicine and targeted therapies over the past year include:

- First targeted treatment for gastric cancer: For the first time, trastuzumab (Herceptin; Genentech, South San Francisco, CA), which is widely used to treat human epidermal growth factor receptor (HER2)-positive breast cancer, has been proven effective in another cancer type. A large clinical trial found that adding trastuzumab to standard chemotherapy for advanced gastric (stomach) cancer increased survival by 26% in patients whose tumors expressed high levels of the HER2 protein, compared with chemotherapy alone.
- First effective immunotherapy for neuroblastoma: An antibody-based immunotherapy (called chimeric anti-GD2 antibody ch.14.18), which targets a cancer cell-specific glycolipid and provokes the body's immune system to attack tumor cells, was found to reduce risk of relapse and improve survival by 20% for high-risk neuroblastoma, a disease of the peripheral nervous system that is most commonly found among young children.
- Cetuximab improves survival for advanced head and neck cancer: In the first randomized clinical trial in more than 30 years to demonstrate an improvement in overall survival for advanced head and neck cancers, researchers found that adding the epidermal growth factor receptor (EGFR)-targeted drug cetuximab (Erbix; ImClone Systems, New York, NY) to initial chemotherapy for metastatic head and neck cancer increased overall survival by 20% and increased progression-free survival by 46%, compared with chemotherapy alone.
- Benefit of gefitinib for lung cancer depends on EGFR status: In a study that provides new insight into the most effective use of the targeted therapy gefitinib (Iressa; AstraZeneca, Wilmington, DE), a large clinical trial found that first-line gefitinib treatment slows progression of non-small-cell lung cancer (NSCLC) in Asian nonsmokers or light smokers whose tumors have EGFR gene mutations but not in those without mutations. Researchers also found that patients without EGFR mutations responded better to standard chemotherapy.
- Targeted therapies approved for kidney cancer and glioblastoma: Advanced renal cancer and glioblastoma are among the most challenging, deadly forms of cancer. In 2009, the US Food and Drug Administration (FDA) approved drugs to treat both diseases. The FDA approved bevacizumab (Avastin; Genentech), which targets tumor blood vessel growth and development, as a single agent for previously treated glioblastoma. It is the first drug in a decade to be approved to treat the disease. Bevacizumab was also approved to treat metastatic renal cell carcinoma (RCC) in combination with interferon, based on research demonstrating that this regimen increased progression-free survival and overall survival. The FDA approved everolimus (Afinitor; Novartis, East Hanover, NJ) for patients with RCC whose disease has progressed despite treatment with other targeted drugs. Everolimus targets the mTOR protein, which fuels cancer cell growth and division.
- *New standards of care.* This year, the results of several long-awaited clinical trials established new standards of care or confirmed the superiority of certain treatment regimens for biliary, lung, and prostate cancer. Major advances include:
 - First standard of care for biliary cancer: Results from the largest-ever trial of advanced biliary cancer (cancer of the gallbladder and bile ducts) confirmed that combination treatment with gemcitabine (Gemzar; Eli Lilly, Indianapolis, IN) and cisplatin is the most effective treatment approach, both increasing survival and reducing disease progression by nearly one third, compared with gemcitabine treatment alone.
 - Maintenance therapy with pemetrexed improves survival for advanced lung cancer: Results from a large, international trial established maintenance therapy with pemetrexed (Alimta; Eli Lilly) as a new standard of care for patients with advanced nonsquamous NSCLC. Researchers found that pemetrexed increased overall survival after standard chemotherapy by 50%, compared with patients who received placebo, and that the risk of adverse effects was low.
 - Radiation after surgery improves survival for early-stage prostate cancer: Administering radiation treatment after prostatectomy reduces the risk of prostate cancer spread and improves survival by nearly 30% in men with early-stage prostate cancer, according to results from a large trial that observed patients for a median of 13 years. This finding establishes a new standard of care for men who choose to undergo surgery for early-stage prostate cancer, which is the most common form of cancer among men.
- *Cancer prevention and screening.* Studies reported over the past year shed new light on the use and limitations of common tools for cancer detection, monitoring, and prevention. The most significant studies include:
 - Prostate-specific antigen (PSA) testing has minimal effect on reducing prostate cancer mortality: Researchers have debated the value of routine PSA testing for reducing prostate cancer mortality since it was introduced more than 20 years ago. This year, initial results from two large, closely watched screening trials suggest that routine PSA testing has little, if any, effect on reducing the risk of dying from prostate cancer and has likely led to overdiagnosis and treatment of disease that is slow

growing and nonlethal. These findings will influence doctor-patient communication about the risks and benefits of PSA testing.

- Ovarian cancer treatment based on increasing CA-125 blood levels does not improve outcomes: CA-125 is a marker for the growth of ovarian cancer, as well as other cancers. Blood testing for increasing CA-125 levels has been routinely used to monitor women for recurrence of ovarian cancer after initial treatment. Data reported this year from a large, randomized clinical trial showed that starting treatment for relapsed ovarian cancer based on increasing CA-125 levels does not improve survival compared with delaying treatment until symptoms of ovarian cancer relapse arise. This finding could spare women the anxiety and costs associated with frequent blood testing, as well as the expense and toxicity of earlier treatment.
- Human papillomavirus (HPV) vaccine is effective in older women: Researchers reported that the HPV vaccine Gardasil (Merck, Whitehouse Station, NJ) reduces the risk of HPV infection, cervical cancer, and other HPV-related disease among women age 25 to 45 years who have not been previously infected with the HPV strains targeted by the vaccine. The vaccine is currently approved to prevent infection from four types of HPV, two of which are linked to cervical cancer, in girls and young women age 9 to 26 years. These findings suggest that vaccination may be beneficial for a larger population of women than previously thought.

Large trials settle key debates in colon and breast cancer care. The results of two closely watched studies of new treatment approaches for colon and breast cancer were reported this year, settling key debates in clinical oncology:

- Adjuvant treatment with bevacizumab does not prevent recurrences of colon cancer in individuals who have undergone surgery for colon cancer: Many studies have found that the antiangiogenic drug bevacizumab improves outcomes for patients with advanced-stage colon and other cancers. This year, researchers presented highly anticipated data examining the use of bevacizumab as a treatment after surgery in patients with earlier stage colon cancer. They found that adding bevacizumab to standard adjuvant chemotherapy did not prevent recurrences.
- Standard three-drug chemotherapy is superior to single-drug therapy in older women with breast cancer: In women age 65 years and older with early-stage breast cancer, researchers have speculated that single-drug adjuvant therapy with capecitabine (Xeloda; Hoffman-La Roche, Nutley, NJ) may be as effective as and more tolerable than standard three-drug combination chemotherapy. This year, a major study comparing the two approaches found that the three-drug combination regimen is considerably more effective for these patients and is associated with fewer adverse effects than single-drug therapy.

SUMMARY OF RECOMMENDATIONS

This year's *Clinical Cancer Advances* report highlights significant advances that have been made in cancer research in 2009. Un-

fortunately, cancer is still the leading cause of death for Americans under age 85 and the second-leading cause of death overall (Figs 1 and 2).

ASCO makes the following recommendations to accelerate progress in clinical cancer research and ensure that all people with cancer have access to high-quality care:

- Increase federal investment in cancer research funding: Breakthroughs in cancer treatment cannot emerge without consistent federal investment in cancer research. Although Congress and the Obama Administration increased cancer research funding for the first time in 5 years in the 2009 stimulus package and the fiscal year 2010 budget, sustained and reliable funding is needed to achieve major advances. ASCO calls on Congress and the presidential administration to build on recent investments by increasing federal funding for the National Institutes of Health (NIH) and the National Cancer Institute (NCI) in fiscal year 2011.
- Strengthen the nation's clinical research system: Clinical trials are the engine driving cancer research, but today, few patients participate. In addition, physicians are not reimbursed for the full cost of trial participation, and current regulatory requirements for clinical trials can be confusing, burdensome, and contradictory. ASCO urges policymakers to support the nation's clinical research system by requiring insurance providers to cover clinical trial participation, increasing funding to cover the cost of patient participation, and reducing regulatory burdens to conducting clinical trials.
- Ensure patients receive high-quality care: ASCO has become a leading innovator in developing and encouraging the adoption of high-quality standards for cancer care. In this report, ASCO calls on health care systems and providers to implement quality programs that ensure all patients receive high-quality care and calls on policymakers to support legislation that fairly covers the cost of providing high-quality, comprehensive cancer care to patients.

ABOUT THIS REPORT

ASCO—the leading medical society representing more than 27,000 oncologists and other professionals worldwide who care for people with cancer—has developed this report to document the important progress made each year in clinical cancer research and to highlight emerging trends in the field.

The report is also intended to fill a gap in cancer literature. It is the only published report to highlight the major advances in clinical cancer research and care each year, and it is written for anyone with an interest in cancer care, including the general public, patients with cancer, cancer organizations, policymakers, oncologists, and other medical professionals.

This report, now in its fifth year, was developed under the guidance of a 18-person editorial board made up of leading oncologists and other cancer specialists, including specialty editors for each of the disease-specific and issue-specific sections. The editors reviewed research published in peer-reviewed scientific journals and the results of research presented at major scientific meetings over a 1-year period (October 2008 to September 2009). Only studies that significantly

Cancer Incidence and Mortality: 2009			Five-Year Survival Rates: 1975-2004 (select cancers)			
Cancer Type	Estimated Deaths	Estimated New Cases	Cancer Type	1975-1977 (%)	1984-1986 (%)	1996-2004 (%)
All sites*	562,340	1,479,350	All cancers	50	54	66
Lung and bronchus	159,390	219,440	Prostate	69	76	99
Colon	49,920	106,100	Thyroid	93	94	97
Breast	40,610	194,440	Testis	83	93	96
Pancreas	35,240	42,470	Melanoma†	82	87	92
Prostate	27,360	192,280	Breast	75	79	89
Non-Hodgkin's lymphoma	19,500	65,980	Hodgkin's lymphoma	74	79	86
Liver and intrahepatic bile duct	18,160	22,650	Endometrial	88	84	84
Ovary	14,600	21,550	Bladder	74	78	81
Esophagus	14,530	16,470	Cervical	70	68	73
Bladder	14,330	70,980	Kidney	51	56	67
Kidney and renal pelvis	12,980	57,760	Rectum	49	57	67
Brain	12,920	22,070	Colon	52	59	65
Stomach	10,620	21,130	Non-Hodgkin's lymphoma	48	53	65
Multiple myeloma	10,580	20,580	Larynx	67	66	64
Acute myeloid leukemia	9,000	12,810	Oral‡	53	55	60
Melanoma	8,650	68,720	Leukemia	35	42	51
Chronic lymphocytic leukemia	4,390	15,490	Ovary	37	40	46
Cervical	4,070	11,270	Brain	24	29	35
Soft tissue	3,820	10,660	Multiple myeloma	26	29	35
Larynx	3,660	12,290	Stomach	16	18	25
Gallbladder	3,370	9,760	Esophagus	5	10	17
Endocrine system	2,470	39,330	Lung	13	13	16
Pharynx	2,230	12,610	Liver	4	6	11
Tongue	1,910	10,530	Pancreas	2	3	5
Mouth	1,810	10,750				
Other oral cavity	1,650	1,830				
Thyroid	1,630	37,200				
Bones and joints	1,470	2,570				
Acute lymphocytic leukemia	1,400	5,760				
Childhood cancer†	1,380	10,730				
Hodgkin's lymphoma	1,290	8,510				
Small intestine	1,110	6,230				
Vulva	900	3,580				
Ureter	790	2,270				
Vagina/other genital (female)	770	2,160				
Anus/anal canal	710	5,290				
Chronic myeloid leukemia	470	5,050				
Testis	380	8,400				
Penis	300	1,290				
Eye	230	2,350				

* Incidence and mortality figures for all sites include cancers not listed in table, including nonepithelial skin cancers; other digestive, respiratory, oral, and endocrine cancers; other types of leukemia; and unspecified primary sites.

† Oral cancers include those of the nose, mouth, tongue, throat, and pharynx. Childhood cancers include leukemia, brain and nervous system, neuroblastoma, Wilms tumor, Hodgkin's lymphoma, rhabdomyosarcoma, retinoblastoma, osteosarcoma, and Ewing sarcoma in children ages 0-14.

‡ Other skin cancers—including squamous cell and basal cell skin cancers—occur in more than 1 million people in the United States each year, and are not included in this table.

§ Oral cancers include those of the nose, mouth, tongue, throat, and pharynx.

Fig 1. Cancer statistics: cancer incidence and mortality in 2009 and 5-year survival rates from 1975 to 2004. Source: American Cancer Society: *Cancer Facts and Figures 2009*. Atlanta, GA, American Cancer Society, 2009.

altered the way a cancer is understood or had an important impact on patient care were included. Research in each section is divided into “major advances” and “notable advances,” depending on the impact of the advance on patient care and survival.

Although important research is underway in all cancer types, advances that met the above criteria were not demonstrated in all types of cancer over the past year. Studies included in this year’s report are grouped as follows:

- Blood and lymphatic cancers
- Breast cancer
- GI cancers
- Genitourinary cancers
- Gynecologic cancers
- Head and neck cancers
- Lung cancer
- Melanoma

- Nervous system cancers
- Cancer disparities
- Quality of life and care
- Cancer prevention

The research considered for this report covers the full range of clinical cancer issues:

- Epidemiology (populations at greatest or increasing risk and new approaches for reaching those in need)
- Prevention (chemopreventive agents and vaccinations)
- Screening, early detection, and monitoring for cancer relapse
- Treatment with traditional therapies (surgery, chemotherapy, and radiation therapy), newer targeted drugs, and immunotherapies
- Genetic research and gene profiling tools
- Personalized cancer medicine
- Access to high-quality care
- End-of-life care

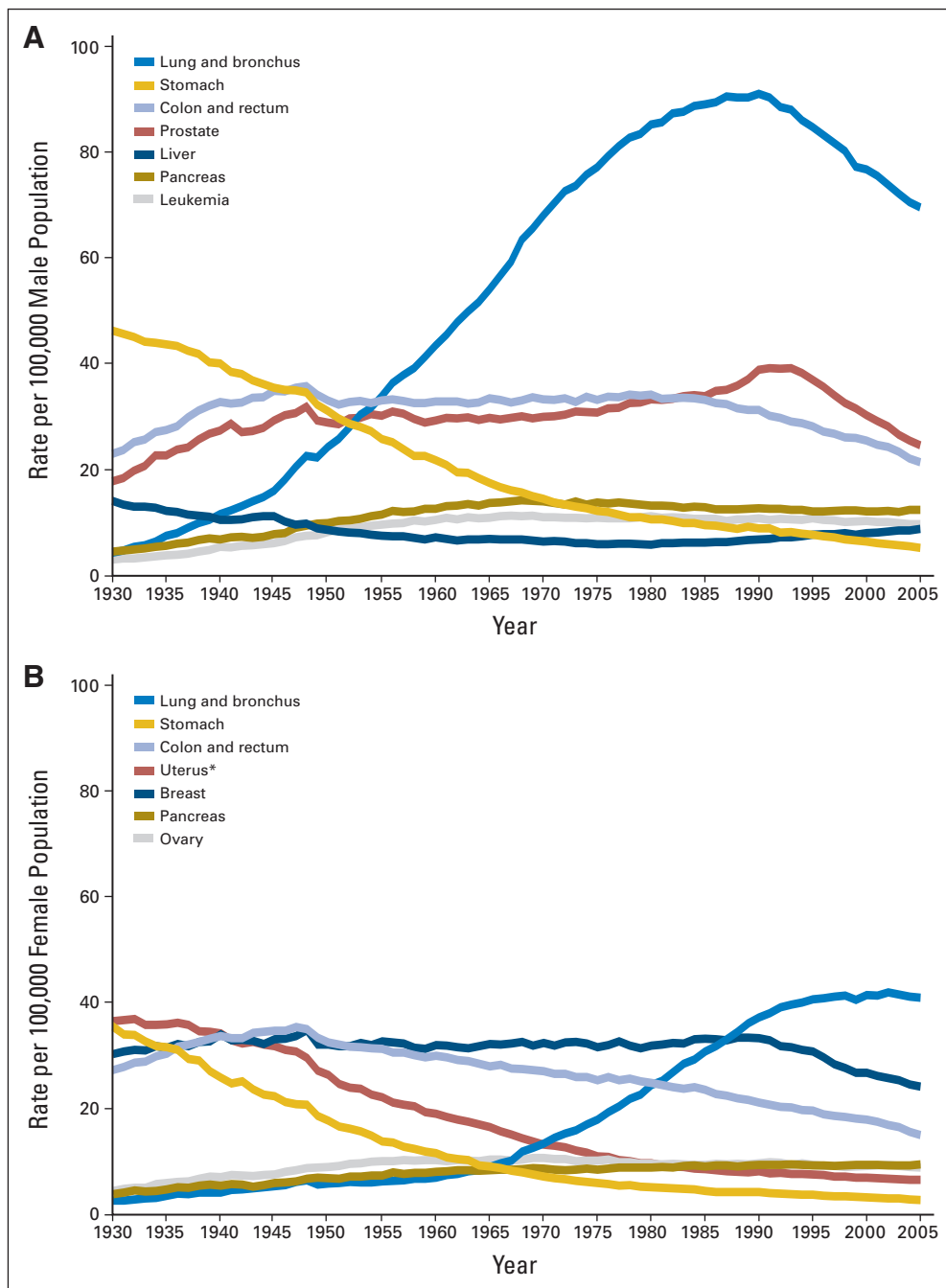


Fig 2. Age-adjusted cancer death rates by site in the United States from 1930 to 2005 for (A) men and (B) women. Source: National Center for Health Statistics, Centers for Disease Control and Prevention: *US Mortality Data, 1960 to 2005*, *US Mortality Volumes, 1930 to 1959*. Atlanta, GA, Centers for Disease Control and Prevention, 2008. (*) Uterus cancer death rates are for uterine cervix and uterine corpus combined.

BREAST CANCER

Breast cancer is the most commonly diagnosed cancer among women in the United States. Although significant progress has been made in the treatment of the disease, especially in its earliest stages, major challenges remain. Certain forms of the disease are especially difficult to treat, some women are unable to tolerate the adverse effects of standard treatments, and progress against metastatic disease has been limited.

Studies in the past year examined new approaches to treating both premenopausal and older women with early-stage disease, novel ways to enhance breast cancer detection, and the use of new targeted drugs for hard-to-treat forms of breast cancer.

Major Advances

Combination chemotherapy is superior to capecitabine alone for older women. Oncologists have debated whether older women with breast cancer might better tolerate a single chemotherapy drug rather

than a conventional combination of three anticancer drugs, which can cause adverse effects such as nausea, hair loss, and heart problems. However, a large randomized Cancer and Leukemia Group B study showed that single-agent therapy with the anticancer drug capecitabine is less effective in women age 65 years and older with early-stage breast cancer than the conventional multidrug chemotherapy regimen.

The study found that the risk of relapse and death among patients who received capecitabine alone was double that of women who received standard treatment of cyclophosphamide plus methotrexate/fluorouracil or cyclophosphamide plus doxorubicin. At 3 years, the rates of relapse-free survival and overall survival for the capecitabine group were 68% and 86%, respectively; the corresponding rates for the combination chemotherapy group were 85% and 91%, respectively.¹

Notable Advances

Computer-aided detection system enhances accuracy of single reading of mammograms. Past research has shown that the interpretation of mammograms by two breast imaging specialists (double reading) increases the rate of breast cancer detection approximately four-fold compared with a reading by a single specialist. Because of shortages of breast imaging specialists in some parts of the country, however, double reading is not always possible.

A British study showed that the proportion of breast cancers detected by a single reader using a computer-aided detection system (ImageChecker DMax computer-aided detection system, version 8.1; Hologic, Bedford, MA) was similar (87.2%) to that detected by two mammography readers (87.7%). These findings suggest that a computer-aided detection system used by a single reader is an effective substitute for double reading.²

PARP inhibitors show promise for hard-to-treat breast cancers. Two studies examined the effectiveness of a new class of targeted therapies called poly(adenosine diphosphate-ribose) polymerase (PARP) enzyme inhibitors for traditionally hard-to-treat, triple-negative breast cancers and *BRCA1/2*-deficient breast cancers.

PARP is used by cancer cells to repair DNA damage, including the damage inflicted by chemotherapy drugs. Drugs that inhibit the PARP enzyme may diminish this self-repair mechanism, make cancer cells more sensitive to treatment, and promote cancer cell death.

One randomized, preliminary, phase II study found that adding the investigational PARP inhibitor BSI-201 to conventional chemotherapy extended both progression-free and overall survival in women with triple-negative breast cancer—a form of the disease in which cancer cells lack receptors for estrogen, progesterone, and HER2, which are targeted effectively by other drugs. Women who received BSI-201 had a median survival time of 9.2 months and a median progression-free survival time of 6.9 months compared with 5.7 months and 3.3 months, respectively, for women who received standard chemotherapy (gemcitabine and carboplatin) alone.³ These findings are currently being confirmed in a larger trial.

A second phase II study found that 40% of women with advanced *BRCA*-deficient breast cancer that persisted despite prior therapy experienced tumor shrinkage after receiving the investigational PARP inhibitor olaparib. Breast cancers associated with *BRCA* mutations have a defect in their ability to repair DNA. Olaparib deprives the tumor cells of another DNA repair mechanism, which seems to promote cancer cell death.⁴

GI cancers include those of the esophagus, stomach, liver, pancreas, biliary tract, colon, rectum, and anus. Colorectal cancers can typically be diagnosed in their early, more curable stages using colonoscopy, but no such screening tests exist for less common digestive cancers, such as those of the stomach and biliary tract.

Important advances over the past year include new, effective treatments for metastatic gastric cancer and biliary tract cancer, new ways to predict risk of colorectal cancer recurrence and response to treatment, and the results of the first study to evaluate bevacizumab as an adjuvant treatment for colon cancer.

Major Advances

Trastuzumab improves survival for patients with HER2-positive gastric cancer. Trastuzumab, which has been used for more than a decade to treat breast cancer that overexpresses the HER2 protein, has now been shown to be effective against HER2-positive advanced stomach cancer. Trastuzumab is a targeted cancer therapy that works by blocking the HER2 receptor, which is associated with cancer cell growth. This is the first time the drug has been proven effective in another type of cancer.

An international, randomized, multicenter, phase III study of trastuzumab in patients with HER2-positive gastric cancer found a 26% reduction in the risk of death among patients who received trastuzumab plus standard chemotherapy (fluorouracil or capecitabine in combination with cisplatin) compared with patients who received standard chemotherapy alone. Median overall survival time was 13.8 months in the trastuzumab group compared with 11.1 months in the standard chemotherapy group.

The rate of symptomatic congestive heart failure, which has been associated with trastuzumab use in patients with breast cancer, was similar between the two groups. The incidence of decreased ventricular ejection fraction (a measure of the heart's pumping ability) was generally low (5.9% in the trastuzumab group v 1.1% in the standard therapy group), and the mean ventricular ejection fraction remained greater than 60% throughout the study among the patients who received trastuzumab.⁵

First standard of care for advanced biliary tract cancer. In a study that establishes the first-ever standard of care for advanced biliary tract cancer (or cholangiocarcinoma), British researchers found that a combination of gemcitabine and cisplatin improved survival and reduced the risk of cancer progression in patients with an inoperable disease of the biliary tract (gallbladder and bile duct) compared with gemcitabine treatment alone.

The study found that progression-free survival time was 30% longer among patients who received gemcitabine plus cisplatin (8.5 months) compared with patients who received gemcitabine alone (6.5 months). Patients who received both drugs also lived 32% longer than patients who received gemcitabine alone (11.7 v 8.2 months, respectively). Gemcitabine plus cisplatin was generally well tolerated.⁶

Bevacizumab does not reduce recurrence risk of early-stage colon cancer. In the first evaluation of bevacizumab for early-stage colon cancer, a randomized phase III trial conducted by the National Surgical Adjuvant Breast and Bowel Project found that adding bevacizumab to standard adjuvant chemotherapy (fluorouracil, leucovorin, and oxaliplatin [FOLFOX]) did not improve disease-free survival in stage II and III colon cancer. Bevacizumab has proven to be effective

against several advanced cancers; this was the first time it was examined as an adjuvant treatment.

Patients were randomly assigned to receive either the standard chemotherapy (6 months of FOLFOX) or the experimental therapy (6 months of FOLFOX and bevacizumab followed by an additional 6 months of bevacizumab alone). After a median follow-up time of 3 years, investigators found that 77.4% of patients in the experimental group were alive and free of disease compared with 75.5% of patients who received standard chemotherapy, a difference that was not statistically significant. During the year that patients were receiving bevacizumab, there was an increase in disease-free survival that subsequently diminished when bevacizumab was discontinued, but the clinical implications of that finding are not clear.⁷

Notable Advances

New gene assay predicts colon cancer recurrence risk. Researchers from the National Surgical Adjuvant Breast and Bowel Project and the Cleveland Clinic developed and validated the first molecular assay that predicts the risk of recurrence among patients with stage II colon cancer. The genomic test, called the Oncotype DX (Genomic Health, Redwood City, CA) assay, generates a recurrence score that physicians can use with other pathologic measures to determine whether a patient's disease is likely to recur. Patients who are at risk for recurrence may benefit from additional chemotherapy after surgery, whereas patients at low recurrence risk can safely forego further treatment and avoid the associated adverse effects and cost. This test is similar in design to a test by the same name that is used for women with breast cancer and is one of a growing number of assays that can be used to guide cancer treatment and predict outcome.

Although researchers were able to develop a score that accurately predicts colon cancer recurrence risk, they did not meet their secondary goal of validating a separate score that would predict a patient's response to treatment with standard chemotherapy (fluorouracil and leucovorin) after surgery.⁸

BRAF mutations predict worse outcome in patients with metastatic colorectal cancer. New research indicates that the *BRAF* gene may eventually prove as useful as the *KRAS* gene for predicting which patients are most likely to respond to EGFR inhibitors such as cetuximab and panitumumab (Vectibix; Amgen, Thousand Oaks, CA). One study found that patients with metastatic colorectal cancer with mutations in the *BRAF* gene who had normal copies of the *KRAS* gene did not respond to treatment with these EGFR inhibitors. After approximately 6 months of treatment, patients with *BRAF* mutations, compared with patients with normal *BRAF*, were more likely to experience cancer progression (82% v 59%, respectively) and had lower overall survival (30% v 85%, respectively). Separate laboratory studies also showed that treatment with the *BRAF* inhibitor sorafenib (Nexavar; Bayer HealthCare Pharmaceuticals, Pittsburgh, PA; Onyx Pharmaceuticals, Emeryville, CA) restored the sensitivity of *BRAF*-mutated colorectal cancer cells to EGFR inhibitors.⁹

GENITOURINARY CANCERS

Cancers of the genitourinary system include those arising in the kidneys, bladder, prostate, testes, ureters, and urethra. In recent years, several new treatments have been developed for RCC, a serious form of kidney cancer. Progress against the disease continued this year, with

two FDA drug approvals—one for patients with metastatic disease and another for patients whose cancer has progressed despite other therapies (Fig 3). For men with prostate cancer, studies over the past year identified important new treatment advances for early-stage disease and a new test to predict outcomes.

Major Advances

Radiation reduces risk of metastasis and increases survival after prostatectomy. Approximately one third of men with early-stage prostate cancer develop metastases outside the prostate after surgery. In a practice-changing study, researchers reported that radiation therapy after radical prostatectomy (surgical removal of the prostate) reduces the risk of prostate cancer metastasis by 29% and improves survival by 28% in men with early-stage prostate cancer.

These findings are the result of a long-term study that began in 1988, with a median follow-up time of nearly 13 years. Investigators found that among men with early-stage prostate cancer who had radiation therapy after radical prostatectomy, median metastasis-free survival was 14.7 years compared with 12.9 years among men who did not have radiation; median overall survival for the two groups was 15.2 years and 13.3 years, respectively.¹⁰

Everolimus approved for treating RCC. The FDA approved everolimus for the treatment of RCC in March 2009. The drug, which inhibits mammalian target of rapamycin (mTOR), a protein that cancer cells need to grow and divide, was approved for patients whose disease has returned or progressed despite prior therapy with sunitinib (Sutent; Pfizer, New York, NY) and/or sorafenib.¹¹

The FDA approval was based on results from a randomized phase III clinical trial that showed that patients with metastatic RCC that progressed despite sunitinib and/or sorafenib treatment and who were then given everolimus experienced better progression-free survival than patients who received a placebo (4.0 v 1.9 months, respectively).¹²

Bevacizumab slows disease progression and is approved by FDA for metastatic RCC. Bevacizumab, which is approved for treating advanced colorectal, lung, and breast cancers, was approved by the FDA to treat metastatic RCC when combined with interferon. The approval was based on findings from two phase III studies presented at ASCO's 2009 Annual Meeting.

The Avastin in Renal (AVOREN) study found that patients who received bevacizumab plus interferon alfa-2a had a median progression-free survival time of 10.4 months compared with 5.5 months for patients who received interferon alone. Overall survival was also slightly higher among patients who received bevacizumab plus interferon versus interferon alone (23.3 v 21.3 months, respectively).¹³

A similar Cancer and Leukemia Group B trial showed that patients who received the bevacizumab/interferon regimen had a median progression-free survival time of 8.4 months compared with 4.9 months for patients receiving interferon alone; overall survival was slightly greater in the bevacizumab group, but the difference was not statistically significant (18.3 v 17.4 months, respectively).¹⁴

Notable Advances

FDA approves test for predicting prostate cancer outcomes. In 2008, the FDA approved a test called CellSearch (Veridex, North Raritan, NJ) for use in predicting survival and monitoring treatment in men with advanced prostate cancer. Physicians can use the test to

FDA Approvals of Anti-Cancer Agents, October 2008–September 2009

Newly Approved Agents

Generic Name	Trade Name	Indications	Date of Approval
Eltrombopag	Promacta	Thrombocytopenia (condition that affects some patients with leukemia and a potential side effect of chemotherapy)*	11/20/2008
Plerixafor	Mozobil	Non-Hodgkin's lymphoma and multiple myeloma†	12/15/2008
Degarelix	Firmagon	Advanced prostate cancer	12/24/2008
Everolimus	Afinitor	Advanced renal cell carcinoma‡	3/30/2009

Expanded Indications For Existing Agents

Generic Name	Trade Name	Indications	Date of Approval
Bendamustine hydrochloride	Treanda	Indolent B-cell non-Hodgkin's lymphoma that has progressed during or within 6 months of treatment with rituximab or a rituximab-containing agent§	10/31/2008
Imatinib mesylate	Gleevec	Adjuvant treatment of adult patients after complete gross resection of Kit (CD117) -positive GI stromal tumor	12/19/2008
Bevacizumab	Avastin	Glioblastoma, as a single agent for patients with progressive disease after prior therapy¶	5/5/2009
Pemetrexed	Alimta	Maintenance treatment of patients with locally advanced or metastatic nonsquamous non-small cell lung cancer whose disease has not progressed after four cycles of platinum-based first-line chemotherapy	7/2/2009
Bevacizumab	Avastin	Treatment of patients with metastatic renal cell carcinoma (in combination with interferon alfa)	7/31/2009

*Approved for the treatment of thrombocytopenia in patients with chronic immune (idiopathic) thrombocytopenic purpura who have had an insufficient response to corticosteroids, immunoglobulins, or splenectomy.

†Approved in combination with granulocyte-colony stimulating factor to mobilize hematopoietic stem cells to the peripheral blood for collection and subsequent autologous transplantation.

‡Approved for treatment of patients with advanced renal cell carcinoma after failure of treatment with sunitinib or sorafenib.

§The FDA approved bendamustine hydrochloride in 2008 for the treatment of chronic lymphocytic leukemia.

||The FDA approved imatinib mesylate in 2001 for the treatment of adult Ph+ chronic myelogenous leukemia; in 2002 for Kit+ unresectable and/or metastatic GI stromal tumors; in 2003 for pediatric Ph+ chronic myelogenous leukemia in 2003; and in 2006 for Ph+ acute lymphoblastic leukemia, myelodysplastic/myeloproliferative diseases, hypereosinophilic syndrome, aggressive systemic mastocytosis, and dermatofibrosarcoma protuberans.

¶The FDA approved bevacizumab in 2004 for the treatment of metastatic colorectal cancer, with intravenous fluorouracil-based chemotherapy for first- or second-line treatment.

Fig 3. US Food and Drug Administration (FDA) approvals of anticancer agents: October 2008 to September 2009. Ph, Philadelphia chromosome.

make more informed clinical decisions, such as treatment selection and aggressiveness.

The FDA approval was based on findings demonstrating that the test was useful for detecting circulating tumor cells (CTCs) before treatment (to predict survival) and after treatment (providing additional information on response to treatment). For example, men who had an unfavorable CTC score (five or more CTCs per 7.5 mL) before treatment had a median overall survival time of 11.5 months compared with 21.7 months among men with a favorable CTC score (less than five CTCs per 7.5 mL). Moreover, CTC counts predicted overall survival more accurately than PSA testing.¹⁵

GYNECOLOGIC CANCERS

Gynecologic cancers include cancers of the cervix, uterus, ovaries, fallopian tubes, vulva, and vagina. Ovarian cancers are the most common of these cancer types and are often diagnosed in their later stages.

A novel and important study reported this year will have far-reaching implications for how women are monitored for ovarian cancer recurrence. Another study confirms the efficacy of oophorectomy for preventing breast and ovarian cancer in women at high risk. A third study demonstrates that the HPV vaccine is also effective at preventing cervical cancer in women age 24 to 45 years.

Major Research

Frequent CA-125 testing to monitor for recurrence of ovarian cancer is unnecessary. Women who have completed ovarian cancer treatment may not need quarterly CA-125 blood tests, which are performed to monitor for early signs of disease recurrence. In the first study of its kind, European researchers reported that starting treatment early for an ovarian cancer relapse based on CA-125 blood levels alone did not improve overall survival compared with delaying treatment until physical symptoms arose, a finding that could spare many women the anxiety associated with frequent testing. The findings have the potential to change how women are monitored once they have achieved remission after ovarian cancer treatment and suggest that

second-line treatment can be safely delayed until symptoms of relapse develop.

This study compared overall survival between women with ovarian cancer in remission after initial chemotherapy who began second-line chemotherapy based on an increase in CA-125 levels and women whose second-line treatment was not initiated until they experienced physical symptoms of relapse (such as pelvic pain and bloating). Researchers found that even though the former group started second-line chemotherapy an average of 5 months before the latter group, overall survival was the same (41 months since the completion of initial therapy).¹⁶

HPV vaccine is effective in older women. A large, multicenter, randomized study reported that an HPV vaccine was 90.5% effective in preventing HPV infection and the development of benign and malignant cervical and genital disease associated with HPV in women age 24 to 45 years who received all three doses of the vaccine and were observed for more than 2 years. The vaccine is currently approved for use in females age 9 to 26 years; this new study shows that older women who have not been infected with HPV may also benefit from the same protection.

The vaccine evaluated in this study, Gardasil, is a quadrivalent formula designed to prevent infection with the most common forms of HPV (strains 6, 11, 16, and 18). Studies are ongoing to determine how long the vaccine offers protection against cervical cancer, a finding that may help determine the cost effectiveness of the vaccine in women older than age 26.¹⁷

Notable Research

Prophylactic surgery confirmed to reduce breast and ovarian cancer risk among women with BRCA gene mutations. A pooled analysis of 10 studies originally published between 1999 and 2007 confirmed that surgical removal of the ovaries and fallopian tubes reduces the risk of breast cancer by 51% and the risk of ovarian and fallopian tube cancers by 79% in women who have mutations in the *BRCA* genes.

The investigators concluded that their findings should guide risk reduction strategies for women at increased genetic risk of these cancers. Women with inherited mutations in the *BRCA1* and *BRCA2* genes have up to an 84% lifetime risk of breast cancer and up to a 46% risk of ovarian and fallopian tube cancers.¹⁸

CANCERS OF THE BLOOD AND LYMPHATIC SYSTEM

Cancers of the blood and lymphatic system—called hematologic cancers—include leukemia, lymphoma, and multiple myeloma. Over the past year, clinical researchers reported the results of several notable studies, including one study that identified a personalized therapeutic vaccine for patients with follicular lymphoma, and two early-stage studies that reported data on investigational targeted agents for certain types of lymphoma and leukemia.

Notable Advances

BiovaxID (Biovest, Tampa, FL) personalized vaccine prolongs disease-free survival in follicular lymphoma. An 8-year, randomized, phase III clinical trial reported that BiovaxID, a patient-specific therapeutic vaccine, prolonged disease-free survival in previously untreated patients with follicular non-Hodgkin's lymphoma. Patients who received BiovaxID experienced a disease-free survival time of 44.2

months compared with 30.6 months for patients who received a control vaccine, which is an increase of 47%.

BiovaxID is individually manufactured from a tissue biopsy obtained from each patient's tumor. The vaccine targets a protein unique to each patient, called an idotype, expressed by cancerous B cells in follicular lymphoma, while sparing normal, healthy B cells that do not express the tumor protein. Additional studies will need to be conducted to determine the efficacy of BiovaxID in patients who have had rituximab therapy (a common lymphoma treatment that was not part of the treatment received by patients in this study) and to determine whether the vaccine may also be useful in the treatment of other B-cell lymphomas.¹⁹

Pralatrexate shown to shrink T-cell lymphoma. The phase II PROPEL study reported that the investigational drug pralatrexate shrank tumors in 29% of patients with peripheral T-cell lymphoma that persisted or returned despite conventional therapy and that tumors regressed completely in 11% of patients. Pralatrexate works by inhibiting a protein called RFC-1, which is overexpressed in T-cell lymphoma cells.

This is the largest prospective study to date of a single agent in patients with relapsed or refractory peripheral T-cell lymphoma. The drug is currently being considered for approval by the FDA.²⁰

Promising early-stage study shows activity of fostamatinib in lymphoma and chronic leukemia. The investigational drug fostamatinib belongs to a promising new class of oral targeted therapies for lymphoma and chronic leukemia that work by inhibiting the enzyme Syk kinase, which is involved in inflammation and regulation of the immune system. A phase I trial demonstrated that fostamatinib significantly shrank tumors in 54% of patients with chronic lymphocytic leukemia, 21% of patients with diffuse large B-cell lymphoma, 11% of patients with mantle-cell lymphoma, and 10% of patients with follicular lymphoma. Median progression-free survival time was 4.5 months for patients in the study, and the drug was generally well tolerated. Fostamatinib is one of the first targeted oral agents to show preliminary activity in lymphomas; other anticancer drugs for lymphoma are given intravenously.²¹

HEAD AND NECK CANCERS

Cancers of the head and neck include those of the mouth, throat, larynx, pharynx, and sinus-nasal tract. Most of these cancers have been linked to tobacco use and alcohol abuse, and researchers have more recently found a strong association between cancers of the oropharynx (upper throat) and prior infection with HPV.

Studies over the past year evaluated new targeted therapies and novel combinations of treatments for head and neck cancers. Other research demonstrated that a simple oral test could be used to detect oral HPV infection in people with head and neck cancers.

Major Advance

Addition of cetuximab to initial chemotherapy extends survival for advanced head and neck cancer. Cetuximab is currently approved as a single agent for treatment of recurrent or metastatic head and neck cancer that does not respond to platinum therapy. A phase III clinical trial involving 442 patients, known as the Erbitux in First-Line Treatment of Recurrent or Metastatic Head and Neck Cancer (EXTREME) study, found that patients with untreated recurrent or metastatic head

and neck cancers who received cetuximab in addition to cisplatin or carboplatin plus fluorouracil chemotherapy, compared with patients who received chemotherapy alone, lived 20% longer (10.1 v 7.4 months, respectively) and experienced a 46% increase in progression-free survival (5.6 v 3.3 months, respectively).²² Adverse effects such as hypomagnesemia (electrolyte imbalance associated with low levels of magnesium), grade 3 skin reactions, infusion reactions, and sepsis were more common in the cetuximab group, but treatment-related deaths were more common among patients who received chemotherapy alone.

The ability to improve overall survival with chemotherapy has proven elusive over the last 30 years in several randomized trials comparing different chemotherapy regimens in this setting. Thus, the results of this trial are particularly noteworthy and are changing clinical practice.

Notable Advances

Study shows that oral HPV test offers promise as a screening tool for certain head and neck cancers. The findings of a new study suggest that a simple oral rinse test may be used in the future to detect oral HPV infection and potentially identify people at higher risk for certain head and neck cancers. Knowledge of HPV status is becoming an important consideration in the evaluation of therapies for patients with head and neck cancers. Past studies have shown that HPV-positive tumors respond better to treatment, and researchers are now beginning to stratify patients with head and neck cancer by HPV status in clinical trials.

Researchers showed this year that patients with head and neck tumors who test positive for HPV16 are more likely to have detectable levels of the virus in their saliva compared with HPV16-negative patients. Using a DNA amplification strategy to analyze oral rinse samples obtained via a saline wash that captured naturally shed oral mucosal cells, investigators found that patients whose head and neck tumors were positive for HPV16 were 8.6 times more likely to have detectable HPV in their saliva before treatment and 2.9 times more likely to have detectable HPV in their saliva after treatment compared with patients with HPV16-negative tumors. Patients with HPV16-positive tumors were also more likely to have other high-risk HPV strains. Although follow-up was only 21 months, the risk of second cancers was lower in the HPV16-positive group compared with the HPV16-negative group.²³

Gefitinib is not superior to methotrexate for improving survival for recurrent squamous cell carcinoma. Although many head and neck cancers overproduce EGFR, a new study found that EGFR-targeted therapy with gefitinib did not improve survival compared with the historic standard therapy, methotrexate, in patients with recurrent head and neck cancer. A phase III study involving 486 patients found that survival among patients who received gefitinib was 5.6 to 6.0 months, depending on the dose, compared with 6.7 months for patients who received methotrexate. Outcomes also seemed unrelated to EGFR gene copy number. Measured quality of life was not significantly different between the arms, and observed adverse effects were those expected for the agents used, although tumor hemorrhage was more common among patients who received gefitinib.²⁴

Two studies provide additional insights regarding the role of induction chemotherapy in larynx preservation treatment approach. To preserve the larynx during larynx and hypopharynx (lower throat) cancer treatment, concurrent chemotherapy and radiation is widely used and is associated with the highest larynx preservation rates. However, there

is concern that this strategy adversely affects swallowing function, particularly for hypopharynx tumors, and that it may be suboptimal for patients at higher risk of micrometastatic distant disease.

An induction chemotherapy strategy followed by radiation alone has previously been proven effective in this setting and potentially addresses these two concerns. Two studies reported this year provide additional insight on induction chemotherapy options.

First, a phase III study conducted by the European Organization for Research and Treatment of Cancer randomly assigned 450 patients with advanced larynx or hypopharynx cancers to either induction chemotherapy (using cisplatin and fluorouracil) followed by definitive radiation therapy or concurrent chemoradiotherapy, in which lower doses of chemotherapy were alternated with radiation therapy. Surgery and postoperative radiation therapy were used in both groups for patients who did not respond.

Investigators found no significant difference between the arms in terms of the study's primary end point, which was survival with a functional larynx, or in median progression-free survival. Overall survival was also similar among the two groups.

Of note, the incidence of locoregional adverse effects was slightly, although not significantly, lower in the alternating therapy group compared with the induction therapy group (21% v 32% for grade 3 or 4 mouth inflammation and 11% v 16% for severe edema and/or fibrosis, respectively). These findings suggest that the alternating approach may be less toxic than the induction option; however, the efficacy was not proven to be clearly superior.²⁵ More efficacious and less toxic options are clearly needed.

Second, for patients who undergo induction therapy, data from the French Head and Neck Oncology Radiotherapy Group confirmed prior studies demonstrating that a chemotherapy regimen with cisplatin, fluorouracil, and a taxane (in this case, docetaxel) is superior to standard chemotherapy with cisplatin and fluorouracil.

Investigators randomly assigned 213 patients with advanced larynx or hypopharynx cancer to either of these two induction regimens followed by the same locoregional radiation treatment approach. Patients who received the three-drug combination, compared with patients who received the two-drug combination, had a higher 3-year larynx preservation rate (70.3% v 57.5%, respectively) and a higher major response rate to chemotherapy (80.0% v 59.2%, respectively).²⁶

Reirradiation reduces local recurrence risk but does not improve survival. After primary surgery for head and neck cancer, adjuvant chemotherapy and radiation improve disease control when certain poor prognostic factors (such as remaining cancer cells at the margins of the surgical area or disease outside the lymph nodes) are present compared with radiation therapy alone. Newer radiation techniques make additional radiation, or reirradiation, feasible. Researchers are exploring the role of adjuvant chemo-reirradiation after surgery for either recurrent disease or a second primary cancer in an area that had been previously irradiated. New research finds that administering additional radiation along with chemotherapy under these circumstances improves locoregional control and disease-free survival but not overall survival.

In a phase III clinical trial with 130 participants, patients who received reirradiation and chemotherapy after salvage surgery had lower rates of local or regional recurrence after 2 years (approximately 40% v 80% in the standard care group) and more of the patients remained free of disease (40% v 18% in the standard care group), compared with patients who were observed (a wait and see approach)

after surgery. However, the addition of chemo-reirradiation after surgery did not extend overall survival significantly (approximately 30% of patients in each group were alive at 3 years) and was associated with an approximate four-fold increase in the rate of grade 3 or 4 late toxicity.²⁷

LUNG CANCER

Lung cancer remains the leading cause of cancer death among men and women in the United States. People with early stages of the disease rarely have symptoms, and the survival benefit of routine lung cancer screening has not yet been proven. As a result, lung cancer is often diagnosed at an advanced stage, when it is difficult to cure.

Over the past year, several studies identified specific genetic mutations that can help guide treatment for people with lung cancer, and a large clinical trial identified the first maintenance therapy to significantly improve lung cancer survival.

Major Advances

Maintenance pemetrexed therapy improves survival for certain subtypes of advanced NSCLC. A large, multicenter, randomized phase III study conducted in the United States showed that patients with stage IIIB or IV nonsquamous NSCLC (including adenocarcinoma and large-cell carcinoma) who received maintenance therapy with pemetrexed until their cancer began growing again lived a median of 15.5 months, compared with 10.3 months for patients who received a placebo. Maintenance therapy is given after initial chemotherapy is completed and when the patient is still in remission, rather than waiting to treat the disease based on tumor growth. Maintenance therapy is becoming increasingly possible as a result of the advent of anticancer drugs that can be taken for longer periods of time with fewer adverse effects.

These results have changed the standard of care for patients with advanced NSCLC.²⁸ Researchers also analyzed patients with the squamous form of NSCLC and found that pemetrexed maintenance therapy did not improve survival in this group (9.9 months for the pemetrexed group v 10.8 months for patients receiving a placebo).

Tumor mutation status predicts response to therapy. Data from the prospective Iressa Pan-Asia (IPASS) study showed for the first time that Asian patients with NSCLC with mutations in the *EGFR* gene who were nonsmokers or light smokers experienced significantly slower cancer progression when treated with gefitinib as initial treatment than patients without this mutation and fared better with gefitinib than with conventional chemotherapy (carboplatin/paclitaxel). Among patients with *EGFR* mutations, median progression-free survival time was 9.5 months with gefitinib versus 6.3 months with conventional chemotherapy. Conversely, patients without *EGFR* mutations fared better with conventional chemotherapy; in these patients, median progression-free survival time was 5.5 months with carboplatin/paclitaxel versus 1.5 months with gefitinib.²⁹

Notable Advances

Translocations of the EML4-ALK gene predict treatment response to an oral receptor kinase inhibitor targeting ALK. A phase I study found that patients with a somatic genetic change, a translocation of the *EML4* and *ALK* genes, had a significant response to treatment with PF-02341066, a targeted oral drug that inhibits ALK receptor kinase,

which is associated with the growth of some lung cancers. Among 19 patients with NSCLC tumors that contained the *EML4-ALK* translocation, 10 patients (53%) had a partial response. Larger trials will determine whether these benefits can be confirmed and whether there is any effect on survival.³⁰ None of these patients had *EGFR* mutations and thus represent a new group of patients with lung cancer who have quick and substantial improvements after taking an oral kinase inhibitor.

MELANOMA

Melanoma is the most deadly form of skin cancer. Research is focused on improving our understanding of the biology of the disease so that new molecular targets for therapy can be identified.

Research over the past year found that melanoma cases have increased sharply in the United States over the past 15 years, particularly among older men. Other notable studies reported promising results from new treatments, including a therapeutic vaccine and a novel oral agent.

Notable Advances

Melanoma incidence is increasing in the United States. The incidence of melanoma has increased sharply, a trend that cannot be attributed to increased screening alone. A review of Surveillance, Epidemiology, and End Results data showed that the incidence of melanoma among non-Hispanic whites increased 45% between 1992 (18.2 new cases per 100,000 people) and 2004 (26.3 new cases per 100,000 people), increasing by 3.1% per year. The greatest increase was observed among men age 65 years and older, with incidence climbing from 73.2 new cases per 100,000 people in 1992 to 126.1 new cases per 100,000 people in 2004, an increase of 4.5% per year. The overall death rate from melanoma increased by 0.4% per year in this same time period.

The cause of these increases remains unclear and is widely debated. Researchers noted that some but not all increases can be attributed to rapid increases in environmental risk factors and sun exposure, as well as increased screening and reporting. The data also showed that increases in incidence were observed for all histologic subtypes and tumor thicknesses, including larger tumors more than 4 mm deep. If the increases were a result of more screening alone, one might expect to see cases increase primarily in thinner cancers, which are generally associated with earlier-stage disease.³¹

Therapeutic vaccine improves response rate and slows melanoma growth. A new therapeutic vaccine that boosts the immune system's ability to fight melanoma holds promise for slowing the progression of metastatic disease. Preliminary findings from a phase III multicenter study showed that adding the gp100:209-217(210M) peptide vaccine to standard therapy with interleukin-2 (IL-2) more than doubled the response rate (from 9.7% to 22.1%) compared with IL-2 alone. Progression-free survival and overall survival were also longer in the vaccine group (2.9 and 17.6 months, respectively) compared with the IL-2 group (1.6 and 12.8 months, respectively).

The vaccine is made from a peptide that is part of the gp100 protein, an antigen present on melanoma cells but not on healthy cells. The vaccine stimulates T cells to seek and attack melanoma cells by locating the gp100 antigen on their surfaces. Investigators are continuing to assess the vaccine's long-term effectiveness and are evaluating it in various subgroups of patients.³²

Novel drug PLX4032 is most effective in patients with BRAF mutations. A novel oral agent that targets an enzyme called *BRAF* kinase causes tumor shrinkage in patients with melanoma tumors that contain mutations in the *BRAF* gene, according to a phase I study. Researchers reported that five of seven patients whose melanomas contained the V600E mutation in the *BRAF* gene experienced tumor shrinkage (up to 83% tumor regression for as long as 14 months) after taking the investigational drug PLX4032; patients without these mutations did not benefit from the drug.

BRAF is the most common mutation in melanoma, occurring in 60% of tumors. However, another drug that targets *BRAF*, called sorafenib, has not been shown in clinical studies to slow tumor growth in patients with melanoma—even those with *BRAF* mutations. This study of PLX4032 is the first to demonstrate the clinical benefit of a drug that targets *BRAF* in patients with melanoma.³³

NERVOUS SYSTEM CANCERS

Cancers of the nervous system comprise those of the CNS, including the brain and the spine, and those of the peripheral nervous system, such as neuroblastoma. Over the past year, a number of important studies advanced the understanding and treatment of glioblastoma, the most aggressive form of brain cancer; the FDA approved a new treatment, a study found that a therapeutic vaccine was effective at slowing its growth, and an ongoing effort to map the genomes of several cancers identified key genetic characteristics of the disease. Important progress was also made against neuroblastoma, with researchers reporting the first effective immunotherapy for the disease.

Major Advances

FDA approves bevacizumab for glioblastoma. The FDA approved bevacizumab as a single agent for previously treated glioblastoma in May 2009, providing the first new drug for the disease in a decade. Bevacizumab works by restricting the blood supply that tumors need to grow and spread.

The approval was based on two studies that demonstrated the anticancer activity of bevacizumab in patients with advanced glioblastoma, including a phase II study showing that patients who had received prior treatment with temozolomide (Temodar Schering-Plough, Kenilworth, NJ) and radiation had a median progression-free survival time of 16 weeks and median overall survival time of 31 weeks after receiving bevacizumab, significantly longer than with other available treatments.³⁴ Data from phase III studies have not yet been reported.

First effective immunotherapy for neuroblastoma. A novel immunotherapy was found to reduce the risk of recurrence and extend survival for patients with high-risk neuroblastoma, a difficult-to-treat cancer of the peripheral nervous system that primarily afflicts young children. A phase III Children's Oncology Group clinical trial found that an antibody-based immunotherapy, the chimeric anti-GD2 antibody ch14.18, reduced the risk of relapse and improved overall survival.

The ch14.18 antibody targets a specific glycolipid (sugar and fat molecule) on neuroblastoma cells called GD2. After this antibody binds to GD2, it is thought to provoke the immune system to attack the cancer. After 2 years, 86% of patients in the immunotherapy group were still alive compared with 75% of patients in the standard treat-

ment group. Sixty-six percent of patients who received the immunotherapy were free of relapse compared with 46% of patients who received standard treatment.³⁵

Notable Advances

The Cancer Genome Atlas research characterizes genetics of glioblastomas. The Cancer Genome Atlas has identified several genetic mutations that characterize glioblastoma, which is critical information that could potentially be used to develop and target therapy based on each tumor's biology.

In an analysis of 206 glioblastoma tumor samples, 91 had mutations in certain genetic sequences. The analysis identified mutations in the *ERBB2*, *NF1*, and *TP53* genes in glioblastoma tumors and discovered frequent mutations in a subunit of the *PIK3R1* gene.³⁶ Glioblastoma is the first of several cancers to be genetically mapped by The Cancer Genome Atlas researchers.

Therapeutic vaccine slows cancer growth and extends survival for patients with glioblastoma. Treatment with a novel therapeutic vaccine that targets an abnormal protein in glioblastoma tumors resulted in significantly longer progression-free survival and overall survival times compared with historical controls. A phase II study showed that patients who received temozolomide, radiation therapy, and a vaccine that targets a protein called EGFR variant III (EGFRvIII) had a median progression-free survival time of 14.2 months and lived a median of 26 months. By contrast, a historical comparison group of glioblastoma patients treated with only temozolomide and radiation therapy had a progression-free survival time of 6.3 months and lived 15 months.

EGFRvIII is expressed in approximately half of all glioblastomas but is not present in normal tissues. The authors recommended that the vaccine, called PEPvIII-KLH, be evaluated in a phase III randomized clinical trial.³⁷

CANCER DISPARITIES

Decades of investment in cancer research have led to sophisticated screening and treatment methods that have contributed to substantial improvements in survival rates. Yet not all Americans have access to these advances, and many studies have shown that minority patients have significantly worse outcomes than non-Hispanic whites with cancer.

This year, ASCO published recommendations for reducing inequalities in cancer care in the United States. Other studies over the past year shed new light on disparities in access to care and on the molecular characteristics of cancers in African Americans—information that will help guide future clinical research and that could potentially reduce gaps in cancer outcomes.

Notable Advances

ASCO issues policy statement for addressing cancer disparities in the United States. ASCO's "Disparities in Cancer Care" policy statement, issued in April 2009, recommended strategies for reducing cancer care disparities in the United States, including³⁸:

- Increasing research on the differences in quality of care provided to minority populations compared with white patients and the factors contributing to poorer quality of care.

- Increasing minority enrollment onto clinical trials so that critical questions can be answered about differences in cancer progression and treatment in minority populations.
- Developing policies to guarantee equal access to quality health care, with emphasis on reducing insurance and economic barriers to cancer care.
- Stimulating diversity in the oncology workforce to provide more culturally appropriate care to minority patients and increase the number of oncologists who practice in underserved areas.
- Highlighting disparities in cancer care at ASCO scientific meetings and educational sessions and in member communications.

Minority patients have lower access to cancer specialists. Higher rates of cancer incidence and mortality observed among minorities may be a result of more limited access to specialists who diagnose and treat cancer. A study examining the demographics and distribution of cancer specialists in US counties found that with each percentage point increase in the African American population within a county, there was a decrease in the number of specialists offering cancer screening and treatment. The trend was most pronounced for radiation oncologists and for gastroenterologists, the physicians who most often perform colonoscopies. It was observed to a lesser extent for colorectal surgeons, who most often perform surgery for colorectal cancer. By contrast, the number of specialists rose, with increasing percentages of Asian Americans within a county.³⁹

Studies examine similarities and differences in breast cancer outcomes between white and African American women. Although breast cancer is more common among white women, mortality from the disease is higher among African American women. Two studies assessed the potential factors that contribute to breast cancer outcomes in these two groups.

Researchers at The University of Texas M. D. Anderson Cancer Center showed that for one form of difficult-to-treat breast cancer, disease progression and overall survival are similar in both black and white women who receive the same treatment. They found that African American women with triple-negative breast cancer (a breast cancer subtype in which cancer cells lack receptors for progesterone, estrogen, and HER2) fared just as well as white women when they received the same chemotherapy regimen. At 3 years, 68% of African American women and 62% of white women were free of cancer progression, and 71% of women in both groups were still alive.⁴⁰

In another report, an analysis of two Southwest Oncology Group studies assessed a larger, more general breast cancer population and found that African American women with breast cancer had worse survival rates than white women, even after controlling for prognostic factors such as baseline WBC count, early discontinuation of treatment, and treatment delays. The estimate of 10-year progression-free survival was 78% for white patients and 71% for African American patients. For overall survival, the 10-year estimates were 86% for white patients and 76% for African American patients. The researchers concluded that no known factor related to treatment quality or delivery can explain the racial differences in survival and disease progression and that more research on potential biologic differences of breast cancer between African American and white women is needed.⁴¹

Study pinpoints molecular features of colon cancer in African Americans. Colorectal cancer incidence and mortality are significantly higher among African Americans than in other racial groups. One study provided new insight into genetic characteristics of colorectal

tumors that could explain disparities between racial groups and help doctors select the most effective treatments.

An analysis of colorectal cancer tumors from African American patients found that 19.8% of samples contained high levels of a form of genetic instability called microsatellite instability—a figure nearly twice as high as that observed in the general US population. The study also found that high microsatellite instability was associated with mutations in the *BRAF* gene and in DNA mismatch repair proteins but was not associated with *KRAS* mutations. Both *KRAS* and *BRAF* gene mutations are associated with a variety of aggressive cancers, including colorectal cancer. These results may help guide the treatment of African American patients with colorectal cancer because certain anticancer drugs target *BRAF* mutations, whereas others have been shown to be most effective in patients with normal (not mutated) *KRAS* genes.⁴²

Lower HPV prevalence in head and neck cancers among African Americans may explain worse outcomes. Previous research has demonstrated that head and neck cancer mortality is significantly higher among African Americans compared with whites and that head and neck tumors that contain HPV respond better to treatment.

A retrospective analysis of the TAX 324 trial of chemotherapy followed by chemoradiation for head and neck cancer reported that the HPV status of tumors is likely a key cause of racial differences in outcomes. The study found that white patients were nine times more likely to have HPV-positive tumors compared with African American patients and that HPV positivity was associated with significantly improved outcomes. By contrast, median overall survival was similar between African American and white patients who had HPV-negative tumors. This study illustrates that factors other than race alone may explain disparities in treatment outcomes and suggests that it may be important to consider a broad range of etiologic and genetic factors when examining the outcomes of clinical trials.⁴³

QUALITY OF LIFE AND QUALITY OF CANCER CARE

Improving patient quality of life and ensuring access to the highest quality care are just as important as breakthroughs in clinical cancer science for improving patient outcomes. Notable studies over the past year provide important new data on adherence to screening guidelines in the general population and among cancer survivors, offer a new tool for the management of chemotherapy-related nausea, and expand understanding of patient decisions and desires at the end of life.

Notable Advances

US cancer screening rates are low or declining. Despite efforts to raise awareness of the benefits, too few Americans are getting cancer screening tests. A report published by the American Cancer Society in January 2009 showed that too few Americans are seeking recommended screening tests for cancers of the breast, cervix, and colon. This report noted results from the Centers for Disease Control and Prevention's 2005 National Health Interview Survey, which showed that 79.6% of women for whom cervical cancer screening is recommended said they had a Pap test in the prior 3 years, a 1.7% decline since 2000. Only 50.6% of people age 50 to 64 years and 57.6% of people \geq age 65 years—ages when all people should be having screening colonoscopy—reported in 2005 that they had had a colonoscopy. Among women who were candidates for screening mammography, the percentage of women who received a mammogram declined by 3.4% from 2000 to 2005; in 2005, 60.7% of

women age 50 to 64 years and 59.8% of women \geq age 65 years said they had this breast cancer screening test.

The American Cancer Society concluded that these rates are “lower than what is both feasible and optimal” and suggested ways to raise screening rates, including increasing public awareness and incentives for health care professionals to refer patients to screening, implementing reminder systems, and expanding access for medically underserved populations.⁴⁴

Some survivors of childhood cancer are not receiving recommended cancer screening tests. Too few childhood cancer survivors are being screened for cancers for which they may be at increased risk. Many survivors of childhood cancer are at increased risk for a second cancer because of their prior treatment (particularly radiation therapy) and should follow Children’s Oncology Group guidelines, which vary by treatment exposure, but may recommend increased surveillance for breast, colon, and skin cancers.

A report from the ongoing Childhood Cancer Survivors Study showed that only 11.5% of survivors for whom a colonoscopy was recommended had one within the last 5 years, only 46.3% had a mammogram within the last 2 years, and only 26.7% had ever had a complete examination for skin cancer, the most common radiation-associated second cancer in survivors. To increase adherence to screening guidelines, the investigators recommended that survivors and their physicians discuss their past cancer, the therapy that was given, the risk of second cancers, and the screening tests patients should be receiving.⁴⁵

To help patients and their physicians keep track of information about their cancer, cancer treatment, and follow-up care, ASCO has developed a Cancer Treatment Plan and Summary tool, as well as specialized survivorship plans for breast and colorectal cancer survivors and a generic template that can be customized for survivors of all types of cancer. Additional treatment plans and summaries for other cancer types are being developed. These resources are available to download on ASCO’s patient Web site, [www.Cancer.Net](http://www.cancer.net) at <http://www.cancer.net/patient/Survivorship/ASCO+Cancer+Treatment+Summaries>.

Ginger supplements reduce chemotherapy-related nausea. In the largest randomized study to date evaluating the benefits of ginger for reducing nausea in patients with cancer undergoing chemotherapy, researchers reported that patients who received two doses of ginger in capsule form each day for 6 days, starting 3 days before the first day of a chemotherapy cycle, experienced significantly less chemotherapy-related nausea than patients who received a placebo. Patients in both groups also received traditional drugs used to manage nausea associated with chemotherapy. All three doses of ginger in the study (0.5, 1.0, and 1.5 g) significantly reduced nausea more than placebo, with the 0.5- and 1.0-g doses having the greatest effect.

Ginger is well absorbed by the body and may have anti-inflammatory properties in the digestive tract. The researchers cautioned that patients should speak with their doctors first before taking any supplement, including ginger.⁴⁶

Studies identify determinants and effects of end-of-life care. Two studies published in the last year explored patients’ end-of-life care choices and the factors that may influence the intensity of treatment they receive.

One study demonstrated that patients with advanced cancer who had end-of-life discussions with their physicians (such as their expected survival and the effectiveness of additional treatments), com-

pared with patients who did not have these discussions, opted for less aggressive medical care in the last week of life and had lower rates of ventilation (1.6% v 11%, respectively), resuscitation (0.8% v 6.7%, respectively), and intensive care unit admission (4.1% v 12.4%, respectively) and a higher rate of earlier hospice enrollment (65.6% v 44.5%, respectively). More aggressive medical care was associated with worse patient quality of life and depression among caregivers, whereas longer hospice stays were related to better quality of life for patients, as well as for their caregivers.⁴⁷

The degree to which patients and their families seek religious support to cope with cancer and its treatment varies greatly, and one study found that it can significantly influence a patient’s choice of end-of-life care. The study examined treatment received by patients who relied on religion to cope with advanced cancer, finding that they were more likely to receive mechanical ventilation (11.3% v 3.6% of nonreligious patients) and intensive life-prolonging care (13.6% v 4.2% of nonreligious patients) during the last week of life. The authors cautioned that more research is needed to determine the reasons for this association.⁴⁸

CANCER PREVENTION AND SCREENING

The goal of cancer screening is to decrease risk of death from the cancer targeted by the screening test. With the exception of a few cancer types, such as colon cancer, cervical cancer, and breast cancer, routine cancer screening has not been proven to lower the risk of cancer mortality in the general population.

This year, studies offered new insight into the value of PSA testing for prostate cancer and the risk of false-positive results associated with multiple cancer screenings. Additional research examined the effectiveness of vitamin and mineral supplements for preventing cancer. In addition, ASCO and the American Urological Association (AUA) jointly issued new guidance on the use of 5- α -reductase inhibitors (5-ARIs) for reducing prostate cancer risk.

Major Advances

Two large trials find that routine PSA testing has a small effect, if any, on reducing prostate cancer mortality. The initial results from two large, randomized trials of PSA testing for prostate cancer found only a minimal benefit, if any, in reducing mortality among men who received routine screening. Both trials confirm that PSA screening can lead to the diagnosis of slow-growing, nonlethal cancers and can therefore trigger unnecessary therapy. These findings suggest that men should fully understand the potential benefits and harm of screening before they decide to be screened.

Seven- to 10-year follow-up data were reported from the Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial, which randomly assigned more than 76,000 men to annual PSA testing and digital rectal examination or to usual care. Twenty-two percent more cancers were found among men who were offered annual screening, compared with men who had usual care (which could include opportunistic screening based on their personal decision or the routine practice of their physician). However, prostate cancer mortality was not statistically significantly different between the two groups, with 92 deaths in the screening group and 82 deaths in the usual care group at 10 years.⁴⁹

The European Randomized Study of Screening for Prostate Cancer, which observed 182,000 men for a median of 9 years, found that

the incidence of prostate cancer among men who were offered PSA screening an average of once every 4 years was 8.2%, compared with 4.8% among men who did not receive PSA screening. The risk of prostate cancer death was 20% lower (0.35 per 1,000 person-years) in the screening group compared with the control group (0.41 per 1,000 person-years).⁵⁰ In other words, approximately 1,410 men would need to be screened to prevent one prostate cancer death after approximately 9 years. In addition, it was estimated that for every reduction of one prostate cancer death attributable to screening, 48 additional men would have to be treated. Follow-up in both trials is continuing.

Notable Advances

Guidelines recommend discussion on use of 5-ARIs to reduce prostate cancer risk. ASCO and the AUA released joint guidelines on the use of 5-ARIs, a family of drugs that includes finasteride (Proscar, Propecia; Merck), for reducing prostate cancer risk. These evidence-based guidelines recommended that healthy men who are screened regularly for prostate cancer, have an initial PSA level of 3.0 ng/mL or less, and show no symptoms of the disease talk with their doctors about using a 5-ARI to prevent prostate cancer. The guidelines recommend that men who are already taking one of these drugs (which are indicated for male-pattern baldness and for treating enlarged prostate) speak with their doctors about continuing to take a 5-ARI to reduce prostate cancer risk.

5-ARIs lower the level of dihydrotestosterone, a hormone that can promote prostate cancer growth. The large randomized Prostate Cancer Prevention Trial showed that finasteride can reduce the overall relative risk of developing prostate cancer by approximately 25%.⁵¹ Although that study also raised concerns that 5-ARIs could induce or promote more aggressive high-grade tumors, the ASCO/AUA panel examined additional, subsequent studies and concluded that 5-ARIs were not the likely cause. However, because the evidence is not definitive, men should be made aware of the remaining uncertainty. They should also be aware that 5-ARIs have only been tested for prostate cancer prevention in men who are actively being screened for prostate cancer and that the effectiveness of 5-ARIs is unknown in men who choose not to be screened.

Supplements are ineffective at reducing cancer risk. Two clinical trials found no evidence that certain vitamin and mineral supplements reduce cancer risk.

The randomized Selenium and Vitamin E Cancer Prevention Trial (SELECT), which observed more than 35,000 men in the United States, Canada, and Puerto Rico, found that neither selenium nor vitamin E supplements, taken together or individually, reduced prostate cancer risk after 5.5 years of follow-up.⁵²

The Women's Health Initiative reported that women who took multivitamins did not reduce their risk of developing breast, colorectal, endometrial, lung, or ovarian cancers. This study observed more than 160,000 participants for 8 years.⁵³

False-positive results increase with number of cancer screening tests. An analysis from the Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial found high cumulative false-positive rates after multiple common cancer screening tests, including CA-125 testing and transvaginal sonograms for ovarian cancer, chest x-ray for lung cancer, flexible sigmoidoscopies for colorectal cancer, and PSA testing plus digital rectal examination for prostate cancer.

The study found that the risk of a positive or suspicious screening test in people ultimately shown not to have cancer—the false-positive

rate—after four tests is approximately 37% for men and 26% for women. By the completion of the 14th test (ie, 3 years of testing), the risk increased to 60% for men and 49% for women, and the risk of having an invasive diagnostic procedure after 14 tests among those who had a false-positive test was 29% for men and 22% for women. The authors concluded that because the benefit of multiple cancer screening tests in reducing mortality is not yet known, physicians and patients should balance the known risks of these tests against their potential benefits to determine which tests are most appropriate for each individual.⁵⁴

POLICY RECOMMENDATIONS

Introduction

This year's *Clinical Cancer Advances* report highlights important advances in cancer research and access to care in 2009.

Over the past year, Congress increased federal biomedical research funding for the first time in 5 years, and the nation began serious and important debates about health care reform to expand access to care for everyone in need. But cancer is still the leading cause of death for Americans under age 85 and the second-leading cause of death overall. Much more must be done to find new cures and improve patient access to care.

This year, ASCO makes public policy recommendations in key areas, including sustaining funding for cancer research, strengthening the nation's clinical trial system, and improving patient access to high-quality care.

Invest in Federally Funded Cancer Research

For the first time in 5 years, Congress and the Administration increased the investment in cancer research at the NIH and the NCI through the economic stimulus legislation passed early this year. In addition, President Obama publicly committed to doubling cancer research funding.

ASCO applauds the President and Congress for taking steps to enhance funding for biomedical research. However, the 2009 stimulus package only allocated funding to the NIH for 2009 and 2010, specifically devoted to 2-year research projects. Breakthroughs in cancer treatment cannot emerge without consistent and predictable investment at the federal level, especially in today's economic climate.

ASCO calls on Congress and the Administration to support a funding increase in fiscal year 2011 that builds on this critical investment in the NIH and NCI. Major critical advances in cancer treatment will not occur if NIH and NCI funding remains flat, as it did from 2003 to 2008.

Strengthen the Nation's Clinical Research System

Clinical trials are the engine that drives cancer research, but today, few patients participate. To strengthen the clinical research program in the United States and increase patient participation in cancer clinical trials, ASCO recommends policies that will:

- Improve investigator support and training. The NIH provides critical funding to institutions to recruit and train the next generation of investigators. In this economic climate, the financial pressure on academic institutions is compromising the ability of training programs to preserve dedicated time for investigator training. ASCO calls for the NIH to continue to make investigator training a priority for the Institutes, and

Congress should provide increased NIH funding to achieve these important goals.

- Increase funding to adequately cover the cost of conducting research. Low accrual to clinical trials is a national crisis. A key factor in whether sites are able to offer clinical trials to patients is whether they receive appropriate funding to cover their research costs. The NCI currently provides \$2,000 for each patient that a site enrolls onto an NCI-funded clinical trial. This amount was set 9 years ago, but today, the real per-case cost of conducting research is closer to \$6,000 per enrollee. Federally funded clinical trials are critical because they answer important clinical questions that the pharmaceutical industry is not likely to investigate. Clinician investigators and institutions prefer to enroll patients onto these clinically relevant and scientifically rigorous studies, but inadequate funding is causing sites to reconsider or limit their participation. The NCI must boost its funding to clinical research sites to enable increased participation in clinical trials.
- Provide support and funding for comparative effectiveness research. Congress has provided increased funding for comparative effectiveness research through the economic stimulus legislation. The NCI's Cooperative Group trials play a central role in enriching our understanding of how treatments can be used most effectively and which patient populations most benefit from treatments—the essence of comparative effectiveness research. The NCI should increase its investment in Cooperative Group trials, and Congress should give the NIH a key role in overseeing the federal comparative effectiveness program.
- Require that insurers provide equitable coverage for patients with cancer, regardless of whether they participate in clinical trials. All health plans, whether regulated at the state or federal level, should follow Medicare's policy of providing coverage for routine services required as part of clinical trials. This includes the routine services that a patient would receive as a part of standard cancer treatment, regardless of whether or not the patient is participating in a clinical trial, including any treatment of complications that may arise. Congress should accomplish this by including the Access to Cancer Clinical Trials Act (S. 488 and H.R. 716) in health care reform legislation.
- Reduce regulatory barriers to conducting clinical research. Federal regulatory requirements for conducting patient research are complex, overlapping, duplicative, and at times contradictory. A 2009 Institute of Medicine study revealed different regulatory standards for privacy of health information used in research. To address this issue, the Secretary of the Department of Health and Human Services should convene a task force made up of representatives of the research community to develop recommendations to harmonize and clarify federal regulatory requirements for conducting clinical and translational research. These recommendations, which should be given priority attention by the NIH, FDA, Office for Human Research Protections, Office for Civil Rights, and Centers for Medicare and Medicaid Services, could help improve research protections, streamline how research is conducted, and allow for better use of research funds.

Ensure All Patients With Cancer Receive High-Quality Care

As the organization representing physicians who care for patients with cancer, ASCO believes that all people with cancer should have access to high-quality care, health care reform should not exclude patients with pre-existing conditions or include caps on the amount of care that can be prescribed, physicians should be appropriately compensated for the care they provide to patients, and quality standards for cancer care should be developed by oncology professionals. To that end, ASCO recommends policies that will:

- Encourage implementation of cancer care quality measures and recognition programs. ASCO has become a leading innovator in developing and encouraging the adoption of high-quality standards for cancer care. ASCO's Quality Oncology Practice Initiative (QOPI) program helps oncologists assess the quality of care provided in their practices, using a secure database and established quality measures. ASCO's new QOPI Certification Program will recognize oncology practices that meet scoring requirements on QOPI measures and demonstrate compliance with structural standards related to safe chemotherapy administration. Measures aimed at improving the quality of cancer care should be implemented by health systems, provider groups, and payers.
- Enhance coordination of care for patients with cancer, including end-of-life care. ASCO is committed to improving patient-physician communication about cancer care, including end-of-life care. ASCO has taken the lead in developing and disseminating both disease-specific and general treatment plans and summaries to improve communication and information sharing with patients and among medical oncologists, surgeons, radiologists, primary care physicians, and other specialists involved in treatment or follow-up care of patients with cancer. The time that physicians spend counseling patients and families about follow-up care and care at the end of life plays a major role in both quality of care and outcomes. Congress should pass legislation such as the Comprehensive Cancer Care Improvement Act of 2009 (H.R. 1844) to establish a new Medicare service for care planning, including a written care plan, treatment summary, and survivor care plan that are communicated to cancer survivors.

For more information about ASCO's policy priorities, visit <http://www.asco.org/policypriorities>.

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