WHAT'S NEW IN CANCER CARE

FCDS Annual Meeting
July 26, 2013
Sunrise, Florida

Steven Peace, CTR
FCDS Data Quality Staff

Prevention  Detection  Treatment  Recovery  Palliation
WHAT’S NEW IN CANCER CARE?

- Targeting At Risk and High Risk Populations
  - Cancer Screening Guidelines
  - New Screening Methods
- Profiling Individual and Tumor Characteristics
  - Prognostic Indicators
  - Molecular Testing
  - Genetic Testing
  - Staging Factors
- Targeting Treatment
  - Patient/Tumor Profile
  - Treatment Guidelines
  - Quality of Life and End of Life Care
- New Methods for Drug Delivery

Source: hetdex.com
Population Characteristics

- Clearly Define the Population
- Family History of Cancer
- Geographic Location
- Education Level
- Employment
- Lifestyle
- Income
- Race
- Sex
- Age
- Performance Status
IDENTIFYING HIGH RISK POPULATIONS

- Population Characteristics
  - Workplace/Occupation/Industry
    - Painters
    - Construction
    - Ship building
  - Exposure to Cancer Causing Agent(s)
    - Agent Orange
    - Solvents
    - Ionizing Radiation
  - Genetic Predisposition(s) to Cancer(s)
    - BRCA1 and BRCA2
    - Lynch Syndrome
    - Li-Fraumeni Syndrome
    - Von Hippel-Lindau Disease
  - Viral or Bacterial Infection – HIV1, HIV3, EBV, HPV, HHV, Merkel
TARGETING HIGH RISK POPULATIONS

- Current/Former Smokers Age 55-74 with 30+ pack-year
- Broward County Women Age 50+ Without Colonoscopy
- Women Age 40-85 with Triple Negative Breast Cancer
- Patients with Neoplasm Never Seen in Hospital
- Women with BRCA1/BRCA2 Gene Expression
- Vietnam Veterans exposed to Agent Orange
- Children with BCR/ABL1+ CML
- Black Men Age 55-75
- Children Age 0-15
- Migrant Farmer
- Other
TARGETING HIGH RISK POPULATIONS

- HIPAA Privacy and Outreach to High Risk Populations
- HIPAA Security and Outreach to High Risk Populations
- 1st HIPAA Breach Settlement
- Other HIPAA News
Cancer Death Rates* Among Men, US, 1930-2009

*Age-adjusted to the 2000 US standard population.
Cancer Death Rates* Among Women, US, 1930-2009

*Age-adjusted to the 2000 US standard population.

Trends in Tobacco Use and Lung Cancer Death Rates* in the US

*Age-adjusted to 2000 US standard population.

August 2011 - National Lung Screening Trial (NLST) Results

Screening with low-dose spiral CT compared to CXR reduced lung cancer deaths among older heavy smokers by 20%.

Improved detection of lung cancer at earlier stages is key to increased survival and improved mortality due to lung cancer.

Weigh Benefits/Risk of lung cancer screening using CT scan

Recommend Screening in High Risk Population:
- Current/Former Smoker
- Age 55-74 Years
- Smoking History of at least 20-30 pack-years (varies by organization)
- No personal history of lung cancer

Frequency of Screening not included in All Recommendations
- Annual
- Once Every 3 Years
- Other
CANCER SCREENING GUIDELINES - LUNG

- Endorsement/Adoption of Guideline
  - American Cancer Society (ACS)
  - American Lung Association (ALA)
  - American College of Chest Physicians (ACCP)
  - American Association for Thoracic Surgery (AATS)
  - ASCO/NCCN Clinical Practice Guidelines (ASCO/NCCN)

- Pending Endorsement
  - United States Preventative Services Task Force
    - 2004 - Last update to USPS TF Lung Cancer Screening
American Lung Association Recommendations

- The best way to prevent lung cancer caused by tobacco use is to never start smoking or to quit smoking.
- Low-dose CT screening should be recommended for those people who meet NLST criteria:
  - Current or former smokers aged 55 to 74 years
  - A smoking history of at least 30 pack-years
  - No history of lung cancer
- Individuals should not receive a chest X-ray for lung cancer screening
- Low-dose CT screening should NOT be recommended for everyone
- Patients should be referred to a facility that uses “best practices” for CT screening

The complete report can be found at www.Lung.org.
CANCER SCREENING GUIDELINES - LUNG

- Low Dose CT Screening
  - Negative: Re-Screen
  - Indeterminate: Watchful Follow Up
- Smoking Cessation
- Suspicious: Further Immediate and Potentially Invasive Procedures
  - Further Imaging
  - Lung Cancer
  - No Lung Cancer

- Multi-disciplinary Approach
  - Treatment Possibilities: Surgery, Palliative Care, Clinical Trials, Other
- Continued Screening

Concerns: Length of Time Intervals
ALA Developing an Educational Portfolio for Patients to Explain:

+ The difference between a screening process and a diagnostic test
  - *Cancer Screening is testing for cancer before there are any symptoms*
+ The benefits, risks and costs (emotional, physical and economic)
+ That not all lung cancers will be detected through use of low dose CT scanning

ALA issued a Call to Action for Hospitals and Screening Centers to:

+ Establish ethical policies for advertising/promoting lung cancer screening svcs
+ Develop educational materials to assist patients in having thoughtful discussions between patients and physicians regarding lung cancer screening
+ Provide lung cancer screening services with access to multidisciplinary teams that can deliver the needed follow-up for evaluation of nodules.
CANCER SCREENING GUIDELINES - LUNG

NCCN Guidelines Version 1.2014
Lung Cancer Screening

RISK ASSESSMENT
- Smoking history
  - Present or past
- Radon exposure
- Occupational exposure
- Cancer history
- Family history of lung cancer
- Disease history (COPD or pulmonary fibrosis)
- Smoking exposure (second-hand smoke)
- Absence of symptoms or signs of lung cancer (if symptoms, see appropriate NCCN Guidelines)

RISK STATUS

High risk:
- Age 55-74 y and
- ≥30 pack year history of smoking and
- Smoking cessation <15 y (category 1) or
- Age ≥50 y and
- ≥20 pack year history of smoking and
- One additional risk factor (other than second-hand smoke) (category 2B)

Moderate risk:
- Age ≥50 y and
- ≥20 pack year history of smoking or second-hand smoke exposure
- No additional risk factors

Low risk:
- Age <50 y and/or
- <20 pack year history of smoking

See Screening and Findings (LCS-2)

Routine lung cancer screening not recommended
CANCER SCREENING GUIDELINES - LUNG

NCCN Guidelines Version 1.2014
Lung Cancer Screening

**SCREENING MODALITY**

- Baseline low-dose CT (LDCT)
- No lung nodule(s) on LDCT

**SCREENING FINDINGS**

- Lung nodule(s) on LDCT
  - Solid or part solid nodule
  - Ground glass opacity (GGO)
  - Ground glass nodule (GGN)
  - Nonsolid nodule (NS)
  - Multiple GGO/GGNs

- Findings requiring follow-up for diseases other than lung cancer (e.g., suspicious for other cancers, COPD, coronary artery calcifications)

- Annual LDCT for 2 years (category 1) and consider annual LDCT until patient no longer eligible for definitive treatment

See Evaluation of Screening Findings (LCS-3)
See Evaluation of Screening Findings (LCS-4)
See Evaluation of Screening Findings (LCS-5)
PSA screening in men under age 40 years is not recommended.

Routine screening in men between ages 40 to 54 years at average risk is not recommended.

For men ages 55 to 69 years, the decision to undergo PSA screening involves weighing the benefits of preventing prostate cancer mortality in 1 man for every 1,000 men screened over a decade against the known potential harms associated with screening and treatment. For this reason, shared decision-making is recommended for men age 55 to 69 years that are considering PSA screening, and proceeding based on patients’ values and preferences.

To reduce the harms of screening, a routine screening interval of two years or more may be preferred over annual screening in those men who have participated in shared decision-making and decided on screening. As compared to annual screening, it is expected that screening intervals of two years preserve the majority of the benefits and reduce over diagnosis and false positives.

Routine PSA screening is not recommended in men over age 70 or any man with less than a 10-15 year life expectancy.
What do the guidelines actually mean?

Men of any age should not be routinely screened using PSA until evidence demonstrates mortality benefit of screening.

Men ages 55 to 69 are urged to talk with their doctors about benefits and harms of testing and treatment.

The best available evidence suggests that following these guidelines will lead to an improved benefit-to-harm ratio.

What will this mean for cancer registry programs?

What will this mean for cancer treatment centers?
Endorsement/Adoption of Guideline

- American Cancer Society (ACS)
- American College of Physicians (ACP)
- American Urological Association (AUA)
- American Society for Radiation Oncology (ASTRO)
- ASCO/NCCN Clinical Practice Guidelines (ASCO/NCCN)
- United States Preventative Services Task Force (USPSTF)
Starting at age 50, men and women should follow one of the following examination schedules:

<table>
<thead>
<tr>
<th>Test</th>
<th>Time Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fecal Occult Blood Test</td>
<td>Annual</td>
</tr>
<tr>
<td>Flexible Sigmoidoscopy</td>
<td>5 Years</td>
</tr>
<tr>
<td>Double Contrast Barium Enema</td>
<td>5 Years</td>
</tr>
<tr>
<td>Colonoscopy</td>
<td>10 Years</td>
</tr>
<tr>
<td>CT Colonography</td>
<td>5 Years</td>
</tr>
</tbody>
</table>
NEW CANCER SCREENING METHODS

- Personal Genetic Profile
- Low-Dose Imaging Techniques
- Virus Exposure Testing – HPV (oral)
- MicroRNA-Based Diagnostic Assays
- Immunological Stool Testing for Blood and Antibodies – Colon
  - Significantly Superior to Enzymatic Stool Testing
- Laser-Induced Fluorescence (new imaging technique)
NEW CANCER SCREENING METHODS

- Need to Track Radiation Exposures from Screening
- Need to Track Radiation Exposure from non-screen CTs
- Screening Risk from Radiation Exposure Hypothesis Testing
Common sources of radiation

Where do mobile phones fit?

Source: Science Media Centre
Radiation exposure: How does it compare?

Exposure measured in mSv

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>Fatal within weeks</td>
</tr>
<tr>
<td>6,000</td>
<td>Typical dosage recorded in those Chernobyl workers who died within a month</td>
</tr>
<tr>
<td>5,000</td>
<td>Single dose which would kill half of those exposed to it within a month</td>
</tr>
<tr>
<td>1,000</td>
<td>Single dose which could cause radiation sickness, nausea, but not death</td>
</tr>
<tr>
<td>400</td>
<td>Max radiation levels recorded at Fukushima plant 14 March, per hour</td>
</tr>
<tr>
<td>350</td>
<td>Exposure of Chernobyl residents who were relocated</td>
</tr>
<tr>
<td>100</td>
<td>Recommended limit for radiation workers every five years</td>
</tr>
<tr>
<td>10</td>
<td>Dose in full-body CT scan</td>
</tr>
<tr>
<td>9</td>
<td>Airline crew NYC - Tokyo polar route, annual</td>
</tr>
<tr>
<td>2</td>
<td>Natural radiation we're all exposed to, per year</td>
</tr>
<tr>
<td>1.02</td>
<td>Radiation per hour detected Fukushima site, 12 March</td>
</tr>
<tr>
<td>0.4</td>
<td>Mammogram breast x-ray</td>
</tr>
<tr>
<td>0.1</td>
<td>Chest x-ray</td>
</tr>
<tr>
<td>0.01</td>
<td>Dental x-ray</td>
</tr>
</tbody>
</table>

Source: WNA, Radiologyinfo.org, Reuters
NEW TREATMENT DELIVERY METHODS

- Transition from infusion chemotherapy to oral administration
- New Inhalable chemotherapeutic agents using “nanostructured lipid nanocarriers” can transport antineoplastic agents at full strength directly into lungs or other organs – highly efficient.
- Nanoparticles also carry small interfering RNA (siRNA) molecules which helps control and repress certain genes to eliminate “pump” resistance (when tumor cells actively expel chemo agent(s) before the chemo can work) and “non-pump” resistance, which keeps cancer cell from dying.
- MRI-Guided Focused/Concentrated Ultrasound Therapy
NEW TREATMENT DELIVERY METHODS

- **Photo-Dynamic Therapy (PDT)**
  - Approved for airway malignancy, Barrett’s esophagus with high grade dysplasia and non-melanoma skin cancers
  - Investigational for high-grade glioma, oral and laryngeal neoplasms, inoperable cholangiocarcinoma, and mesothelioma

- **New Embolization Techniques**
  - Code as Chemo or Radiation plus Other Therapy
  - Trans-Arterial Chemo Embolization (TACE) – direct administration of chemo into liver or other organ then embolization of artery
  - Drug Eluting Bead Therapy – administration of beads impregnated with chemo agent(s) through catheter with timed release of agent(s)
  - Ytrium-90 Microsphere Therapy – administration of spheres with low levels of radio-isotope Ytrium-90 attached – direct radiation to liver
    - Code as brachytherapy not radio-isotope per CoC
NEW TREATMENT DELIVERY METHODS

- HIPEC Chemotherapy – Heated Intra-peritoneal Chemotherapy
  + Chemotherapy solution heated to 107.6 degrees before administration
  + Chemotherapy solution kept at 107.6 degrees and recirculated throughout peritoneal cavity for at least two hours by going through a heating chamber

- Proton Therapy Increases Precision and Reduces Side Effects

- Focusing not only on direct treatment to tumor burden but also reducing side effects from treatment and collateral tissue damage

- Also focusing on long-term /secondary effects from treatment(s)
TREATMENT RECONSIDERED

- Knowing When No Treatment is the Best Treatment

- Risk Stratification for Treatment of Solid Tumors
  - Neo-adjuvant therapy
  - Primary treatment
  - Adjuvant and Consolidation therapy
  - Maintenance therapy
  - Therapy for recurrent/progressive disease
  - Salvage therapy

- IMRT – Intensity-Modulated Radiotherapy is more expensive and not as effective or at least equally effective to conventional CRT – Conformal Radiotherapy for treatment of prostate cancer
FOCUS AREAS IN CANCER RESEARCH

- Cancer Screening Risks and Benefits
- No Two Tumors Are Alike
- Precision Medicine – Personalized Medicine
- Targeting Molecular Pathways
- Targeting Genetic Alterations
- FDA and New Drug Approvals
- Management of Clinical Trials
- Overcoming Treatment Resistance
- Quality of Life and Survivorship Issues
- End of Life Care
# FDA Approvals of Anticancer Agents

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Trade Name</th>
<th>Indications</th>
<th>Date of Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axitinib</td>
<td>Inlyta</td>
<td>For treatment patients with advanced kidney cancer (renal cell carcinoma) who have not responded to other treatments for this type of cancer.</td>
<td>January 27, 2012</td>
</tr>
<tr>
<td>Vismodegib</td>
<td>Erivedge</td>
<td>For use in patients with locally advanced basal cell cancer who are not candidates for surgery or radiation and for patients whose cancer has metastasized.</td>
<td>January 30, 2012</td>
</tr>
<tr>
<td>Pertuzumab</td>
<td>Perjeta</td>
<td>For use in combination with trastuzumab and docetaxel as a first-line treatment for patients with HER2-positive metastatic breast cancer.</td>
<td>June 8, 2012</td>
</tr>
<tr>
<td>Carfilzomib</td>
<td>Kyprolis</td>
<td>For treatment of patients with multiple myeloma whose disease progressed despite at least two prior therapies, including bortezomib and an immunomodulatory agent.</td>
<td>July 20, 2012</td>
</tr>
<tr>
<td>Ziv-Aflibercept</td>
<td>Zaltrap</td>
<td>For use in combination with 5-fluorouracil, leucovorin, irinotecan (FOLFIRI) for the treatment of patients with metastatic colorectal cancer that is resistant to or has progressed following an oxaliplatin containing regimen.</td>
<td>August 3, 2012</td>
</tr>
<tr>
<td>Enzalutamide</td>
<td>Xtandi</td>
<td>For treatment of patients with metastatic castration-resistant prostate cancer who have previously received docetaxel.</td>
<td>August 31, 2012</td>
</tr>
<tr>
<td>Regorafenib</td>
<td>Stivarga</td>
<td>For treatment of patients with metastatic colorectal cancer that has progressed despite standard treatments.</td>
<td>September 27, 2012</td>
</tr>
</tbody>
</table>
# FDA Approvals of Anticancer Agents

## Expanded Indications for Existing Agents

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Trade Name</th>
<th>Indications</th>
<th>Date of Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imatinib mesylate</td>
<td>Gleevec</td>
<td>For the adjuvant treatment of adult patients following complete gross resection of Kit (CD117) positive gastrointestinal stromal tumors (GIST)</td>
<td>January 31, 2012</td>
</tr>
<tr>
<td>Pazopanib</td>
<td>Votrient</td>
<td>For treatment of patients with advanced soft tissue sarcoma who have received prior chemotherapy.</td>
<td>April 26, 2012</td>
</tr>
<tr>
<td>Cetuximab</td>
<td>Erbitux</td>
<td>For use in combination with FOLFIRI (irinotecan, 5-fluorouracil, leucovorin) chemotherapy for first-line treatment of patients with KRAS mutation-negative, epidermal growth factor receptor (EGFR)-expressing metastatic colorectal cancer</td>
<td>July 6, 2012</td>
</tr>
<tr>
<td>Everolimus</td>
<td>Afinitor</td>
<td>For use in combination with exemestane to treat certain postmenopausal women with advanced hormone-receptor positive, HER2-negative breast cancer</td>
<td>July 20, 2012</td>
</tr>
<tr>
<td>Vincristine sulfate liposome</td>
<td>Marquibo</td>
<td>For treatment of adult patients with Ph- acute lymphocytic leukemia in second or greater relapse or whose disease has progressed following two or more anti-leukemia therapies</td>
<td>August 9, 2012</td>
</tr>
</tbody>
</table>
“An increasing number of targeted therapies are being evaluated in clinical trials and are becoming available for our patients. Clinicians will need to select therapeutic approaches using these novel agents, standard chemotherapeutic regimens, and combinations of the two based on their knowledge of their patients and the specific features of their diseases.”

– HARRY P. ERBA, MD, PhD
Fig 8. Targeted therapies for HER2+ breast cancer: Trastuzumab, Lapatinib, and TDM-1

“Advances in breast cancer research over the past year were especially exciting. They provided evidence that several new targeted therapies benefit patients with metastatic breast cancer. The studies also allowed a glimpse into the future, in which the power of genomic technologies is used to define the molecular underpinnings of breast cancer, opening avenues for better understanding of drug resistance and the discovery of new therapeutic targets.”

– SYLVIA ADAMS, MD
MAJOR CLINICAL ADVANCES IN YEAR 2012

- **Breast Cancer**
  - Chemo - Everolimus (Afinitor) for hormone-receptor + breast
  - Chemo - Trastuzumab-DM1 for HER2-positive metastatic breast
  - BRM - Pertuzumab (Perjeta) for HER2-positive metastatic breast

- **Lung Cancer**
  - Combination Chemo - Carboplatin and Pemetrexed for non-small cell lung cancer

Prevention  Detection  Treatment  Recovery  Palliation
MAJOR CLINICAL ADVANCES IN YEAR 2012

- **Prostate Cancer**
  - Hormone - Enzalutamide (Xtandi) for late stage prostate cancer

- **Esophageal Cancer**
  - Neoadjuvant chemo plus XRT then surgery for esophagus and gastroesophageal junction tumors
MAJOR CLINICAL ADVANCES IN YEAR 2012

- **Multiple Myeloma**
  - BRM - Lenalidomide (Revlimid) maintenance delays relapse after stem cell transplant
  - BRM Agents for MM – Thalidomide, Velcade, Kyprolis, Pomalyst

- **Soft Tissue Sarcoma**
  - Chemo - Pazopanib (Votrient) for soft tissue sarcoma – 1\textsuperscript{st} new drug in decades for soft tissue sarcoma
MAJOR CLINICAL ADVANCES IN YEAR 2012

- Thyroid Cancer
  - Chemo - Cabozantinib (Cometriq) in medullary thyroid cancer

- Colorectal Cancer
  - Chemo - Regorafenib (Stivarga) in metastatic colorectal cancer

- Ovarian Cancer
  - BRM - Bevacizumab (Avastin) in recurrent ovarian cancer
Colorectal Cancer Screening

- Flexible sigmoidoscopy reduces colorectal cancer incidence and deaths – where does it fit into screening paradigm?
- Flexible sigmoidoscopy results are comparable to colonoscopy
Factors increase risk of death in elderly chemo population
- Geriatric assessment for patients > 70 yrs of age
- Advanced disease
- Low nutritional assessment score
- Poor mobility

Chemo-induced Nausea and Vomiting
- Ancillary - Olanzapine (Zyprexa) for breakthrough nausea/vomiting
Predicting risk for adverse effects of chemo in elderly

- New model introduced scoring system and risk-stratification
- Low-Risk / Intermediate-Risk / High-Risk

Chemo-induced Peripheral Neuropathy

- Ancillary - Duloxetine (Cymbalta) for alleviating pain from chemo-induced neuropathy
WHY CLINICAL GUIDELINES?

GUIDELINES

SPECIALTY EDITOR: ANN H. PARTRIDGE, MD, MPH

Advancing Quality Care through Clinical Guidelines

Clinical practice guidelines are a cornerstone of high-quality cancer care, helping doctors to provide the most effective and efficient care possible for each patient. Over the past two decades, ASCO has published close to 40 guidelines, with a goal of providing timely and relevant clinical advice to practicing oncologists in areas where clinical science has evolved quickly or where there are urgent clinical questions that need to be addressed.

Development of ASCO guidelines has typically relied on a systematic, objective review of medical literature conducted by a panel of experts. Over the past year, ASCO has issued guidance on several key topics, including:

- **Integration of Palliative Care into Standard Oncology Care: This** PCO recommends that all patients with metastatic non-small cell lung cancer be offered palliative care along with standard cancer therapy, beginning at the time of diagnosis. The guidance is based on evidence that this approach not only improves patients’ quality of life but also, in some cases, can extend their lives. While available evidence is strongest for metastatic lung cancer, the guidance recommends that palliative care be considered early in the course.

- **CT screening for lung cancer in clinical practice:** A joint guideline developed by ASCO and the American College of Chest Physicians recommends yearly screening with a low-dose CT scan for individuals aged 55 to 74 who have smoked for 30 pack years or more or who have quit within the past 15 years. Such screening is not recommended for other populations including those who have smoked for less than 30 pack years or who quit smoking more than 15 years ago.

- **Sentinel lymph node biopsy for melanoma:** A joint guideline from ASCO and the Society of Surgical Oncology provides the first evidence-based guidance on the use of sentinel lymph node biopsy.
Risk Stratification TX Early Stage Bladder Cancer (example):

- Low-Risk Group: Ta Low Grade/Low Volume Non-Muscle Invasive Bladder Cancer – single dose Intravesical Chemotherapy using Epirubicin or Mitomycin

- High-Risk Group: Ta High Grade/High Volume Non-Muscle Invasive and T1 Bladder Cancer – Intravesical BCG (Bacillus Calmette-Guerin – Tuberculosis)
REFERENCES

- Clinical Cancer Advances 2012 – ASCO’s Annual Report – American Society of Clinical Oncology
- Journal of National Comprehensive Cancer Network (JNCCN)
- European Journal of Cancer University of Florida Proton Therapy Institute
- The Histologic Reclassification of Adenocarcinoma of the Lung: Implications for Diagnosis and Therapy, E. Brambilla
- Inhalable Drug Deliver Provides New Approach to Lung Cancer Treatment, D. Quick
- IMRT Benefits in Prostate Cancer Questioned
- FUSIMO - http://www.fusimo.eu
- The CoC Brief
- American Cancer Society
- American Urological Society
- American Society of Clinical Oncology
- American Society for Radiation Oncology
- American College of Chest Physicians
- BioPIC 2013 Royal College of Surgeons in Ireland
- The Wall Street Journal Reuter’s Health
- MD Anderson Cancer Center – Clinical Cancer Genetics
QUESTIONS