The Department of Thoracic Oncology at Moffitt Cancer Center invites you, your family and friends to a special program in honor of our patients, families and the lung cancer community.

The Lung and Thoracic Tumor Education (LATTE) Spring Forum

Friday, April 8, 2016
11 a.m.–2 p.m.

Vincent A. Stabile Research Building, Moffitt Cancer Center
12902 USF Magnolia Drive, Tampa, FL 33612
Scott Antonia, MD
Advancements in Lung Cancer

1) Early Detection
2) Molecular Targeted Therapy
3) Immunotherapy
4) Ongoing Translational Research
Early Detection

- Low-Dose CT Scan for High Risk
- National Lung Cancer Screening Trial Results (2012)
- Medicare Coverage (2015)
- Continued Clinical Research
Molecular Targeted Therapy

- **Epidermal Growth Factor Receptor (EGFR)**
  - Erolinib (Tarceva)
  - Afatinib (Gilotrif)
  - Gefitinib (Iressa)

- **EML4-ALK**
  - Crizotinib (Xalkori)
  - Ceritinib (Zykadia)

- **Ongoing Clinical Trials**
Immunotherapy

- **Monoclonal Antibodies**
  - FDA Approval of Opdivo (Nivolumab)
- **Checkpoint Inhibitors**
- **Therapeutic Vaccines**
- **Adoptive T-Cell Transfer**
- **Ongoing Clinical Trials**
Todd Knepper, PharmD
PERSONALIZED MEDICINE IN THE CLINIC

LATTE Forum

Todd Knepper, PharmD
Personalized Cancer Medicine Fellow
April 8, 2016
TARGETING THE TUMOR GENOME

- Genetic alterations in molecular pathways are involved in tumor development, survival, and progression/metastases

- We have the technology! We can profile it!

- Targeted anticancer drugs are available commercially or in clinical trials

- Personalized Medicine Consult Service is helping physicians to target the cancer genome
IMPLEMENTATION IN CLINICAL PRACTICE AT MCC

1. Tumor genetic testing ordered and results returned

2. Personalized Medicine Clinical Service discussion and review
   - Expedited consult communicated to ordering clinician
   - Referral to Clinical Genomics Action Committee

3. Consult report generated and documented in EHR

4. Discussion with oncologist and patient

5. Assistance with acquisition of off-label therapy if needed
MCC CLINICAL GENOMIC ACTION COMMITTEE (CGAC)
Theresa Boyle, MD
PD-L1 Immunohistochemistry
ALK Screening By Immunohistochemistry

NEGATIVE  BORDERLINE  POSITIVE

FISH NEGATIVE ALMOST ALWAYS  FISH POSITIVE
ALK Break Apart FISH

2p23 LSI ALK SpectrumOrange SpectrumGreen

2p23 Region

SHGC-56576

ALK

SHGC-104192

LSI ALK Dual Color, Break Apart Rearrangement Probe

ALK NEGATIVE

ALK POSITIVE
Targeted Next Generation Sequencing For Detection Of Fusions

**FFPE samples**

RNA (10 ng)

**Library Preparation**

- RNA
- Reverse transcription
- cDNA
- Amplification of targets with custom panel of primers
- Ligation of adapters, barcodes
- Library enrichment

**Sequencing**

**Data Analysis**
Custom BI pipeline (alignment, QC, quantification of fusion transcripts)

Integrative Genomic Viewer (IGV)
Sampling of Molecular Tests “In the Works” at Moffitt

• PD-L1 Immunohistochemistry (Drs. Khalil and Altiok)
• ALK, ROS1, TRK and other translocations
  – RNA-based next generation sequencing (Dr. Magliocco)
• “Liquid biopsy”, digital droplet PCR, cfDNA and circulating tumor cell analysis (Dr. Jhanelle Gray)
• MET Amplification and Exon14 splice site mutations
• Proximity ligation assay (PLA) to detect cell signaling (Dr. Eric Haura)
Lary Robinson, MD
<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Infectious Cause</th>
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<tbody>
<tr>
<td>Cancer of the cervix; anal and perianal cancers (&gt;99%)</td>
<td>Various HPV types</td>
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<tr>
<td>Vulvar, penile and vaginal cancers (90%)</td>
<td>Various HPV types</td>
</tr>
<tr>
<td>Head and neck cancers (78%)</td>
<td>Various HPV types</td>
</tr>
<tr>
<td>Specific squamous cell carcinomas of skin</td>
<td>Various HPV types</td>
</tr>
<tr>
<td>Hepatocellular carcinomas</td>
<td>Hepatitis B and C viruses</td>
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<tr>
<td>B-cell lymphomas in immunocompromized patients (50%) and in some T-cell</td>
<td>Ebstein-Barr Virus</td>
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<tr>
<td>lymphomas</td>
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<tr>
<td>Burkitt’s lymphoma</td>
<td>Ebstein-Barr Virus</td>
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<tr>
<td>Nasopharyngeal cancer</td>
<td>Ebstein-Barr Virus</td>
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<tr>
<td>Hodgkin’s lymphoma (30-40%)</td>
<td>Ebstein-Barr Virus</td>
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<tr>
<td>Gastric cancer (10%)</td>
<td>Ebstein-Barr Virus</td>
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<tr>
<td>Merkel cell carcinoma of the skin</td>
<td>Merkel cell polyomavirus</td>
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<tr>
<td>Adult T-cell leukemias</td>
<td>HTLV-1 retrovirus</td>
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<tr>
<td>Seminomas</td>
<td>Endogenous retroviruses</td>
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<tr>
<td>Kaposi’s sarcoma</td>
<td>HHV-8</td>
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<tr>
<td>Gastric cancer and gastric lymphoma</td>
<td><em>Helicobacter pylori</em></td>
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<tr>
<td>Bladder cancer; rectal cancer</td>
<td>Schistosoma species</td>
</tr>
<tr>
<td>Cholangiocarcinoma (gall bladder)</td>
<td>Opisthorchis species; <em>Clonorchis sinensis</em></td>
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</table>
Smoking (80-90% of lung cancer occurs in smokers)
Second-hand (passive) smoking
Family history
Genetic/family susceptibility (polymorphisms)
Radiation exposure (radon, gamma radiation)
Advancing age (declining immune system)
Environmental carcinogens (asbestos, cooking fumes, heavy metals, nitrogen dioxide, etc.)
Chronic inflammation...recurrent pulmonary infections
Chronic obstructive pulmonary disease

Leading to activation of oncogenes and/or inactivation of tumor suppressor genes
But what about an infectious cause of lung cancer?

“No great discovery was ever made without a bold guess.”

– Sir Isaac Newton 1642-1727
THE "PERFECT STORM" MODEL OF CARCINOGENESIS

MICROORGANISM(S)

Chronic Inflammation

Genetic Predisposition

Acquired Physical Changes (obesity, hormones)

Immune System “Impairment” (HIV, immunosenescence, immunosuppressive drugs, chemotherapy, corticosteroids)

Environmental Factors (tobacco, air pollution, chemicals, carcinogens)

Chronic Infection

CANCER
Advances in Lung Cancer Radiotherapy

Thomas J. Dilling, MD, MS
LATTE Forum
April 8, 2016
Over the Past 10-20 Years….

• Significant advances in TECHNOLOGY
  – Improvements in Treatment Planning
    • More sophisticated
    • More biologically accurate/correct
  – Improvements in Treatment Delivery
    • Safer (less toxicity)
    • Higher doses/better tumor control (SBRT)
    • Respiratory Gating
    • Daily CT scans to adjust treatment
Are We Coming to the End of Possible Technical Advances?

• Possibly!
  – Newer treatment technologies still being developed
  – But mostly with small incremental gain?

• So where do we go from here?...
Future of Radiation Therapy (FORT)

• Active research initiative in Radiation Oncology at Moffitt
  – Number of different research questions
  – Number of different cancer sites/types
  – Concept: Utilize tumor biology, genetics, and/or genomics to personalize radiotherapy treatment
Radiotherapy as Immunotherapy

- Radiation as an Immune Modulator
  - Abscopal Effect
  - Incorporation of Immunotherapy Drugs
Biologically-Defined Radiotherapy Dose

- Radiation Sensitivity is Variable
- Utilize a Genetic Predictor of Sensitivity!
  – Created at Moffitt
Holly Wilson, LCSW
Why Are Social Workers on the Team?

- NCI Designation, Institute of Medicine report (*Cancer Care for the Whole Patient*), and best practice require us to look at each person as a whole.
What Do Social Workers Do?

• “Air Traffic Controller”
• Counseling to Patients and Families to assist in coping with new diagnosis, treatment, recurrence or adjusting once treatment is over.
• Goals of Care
• Advance Directives-Educate and Facilitate
• Coordinating Home Health, Hospice and Medical Equipment Referrals
What Social Workers Do

• Facilitate Problem Solving with Cumbersome Systems
• Link with Internal or External Programs for Possible Financial Assistance
• Support and Educational Groups
• Special Programs (Families First, Caregiver Conference)
Diane Portman, MD
Palliative Care in Lung Cancer Treatment

Palliative Care: The Extra Layer of Support
PALLIATIVE CARE TEAMS MANAGE TOTAL PAIN

**PHYSICAL**
- Pain from disease
- Other symptoms
- Physical decline

**SOCIAL**
- Relationship with family/caregivers
- Role in family
- Work life
- Financial stressors

**TOTAL PAIN**

**PSYCHOLOGICAL**
- Grief, depression
- Anxiety, anger
- Adjustment to condition

**SPIRITUAL**
- Religious faith
- Meaning of life and illness
- Personal value as a human being

DAME CICELY SAUNDERS
KEY OUTCOMES

• Rapid symptom relief
• Fewer visits to ER, hospital and Intensive Care Unit
• Shorter hospital stays
• Greater patient/family satisfaction
• Improved family well-being
• Prolonged survival (outpatient intervention)
Tom and Beverly Burnham
Dawn Owen
Questions?