SNM: Advancing Molecular Imaging and Therapy

SNM 2012 Annual Meeting
Press Conference

June 11, 2012
Miami Beach, Fla.
George Segall, MD
SNM 2011-2012 President

Professor of Radiology
Stanford University
Stanford, Calif.
Frederic Fahey, DSc
SNM 2012-2013 President
Associate Professor of Radiology
Harvard Medical School
Boston, Mass.
SNM 2012 Annual Meeting

Scientific Research Highlights
New Skin Patch Treatment Kills Most Common Form of Skin Cancer

P. Gupta, S. Gupta, A. Malhotra, G. Bandopadhyaya, R. Kumar

Special thanks to Dr. Meera Venkatesh, Dr. Usha Pandey, Dr. Sanjay Saxena (BARC, Mumbai, India)

There are two main types of skin cancer: melanoma, which forms deep in the cells that produce pigment in skin, and nonmelanoma cancer, such as basal cell carcinoma and squamous cell carcinoma.

Basal cell carcinoma is the most common type of skin cancer that affects the surface layer of the skin.
Two to three million nonmelanoma skin cancers develop each year around the globe.

One in every three cancers diagnosed worldwide is a skin cancer.

In the United States, it is estimated that one in five Americans will develop nonmelanoma skin cancer at some point in their lives.
New Skin Patch Treatment Kills Most Common Form of Skin Cancer

- 10 patients between the ages of 32 and 74 years with facial basal cell carcinoma were treated Phosphorous-32 patches.

- Each patient was treated in 3 sittings using P-32 skin patches on day 1, day 4 and day 7.

- Each treatment was for 3-hours on an outpatient basis.

- Biopsies taken at 3 months and repeated after 3 years.
New Skin Patch Treatment Kills Most Common Form of Skin Cancer

Research Findings

- 8 out of 10 patients were found to be entirely cured and disease free.

- Clinical and hematological follow-up did not reveal toxicity.

- Minimal scarring of the tumor site gradually healed.
New Skin Patch Treatment Kills Most Common Form of Skin Cancer

Initial lesion of basal cell carcinoma

Lesion site after treatment

Pre-treatment biopsy slide indicating basal cell carcinoma

Post-treatment biopsy slide showing absence of any malignancy
New Skin Patch Treatment Kills Most Common Form of Skin Cancer

Broader Implications of the Study

- Opens a new dimension in the field of therapeutic nuclear medicine and dermatology, especially for the treatment of skin malignancies.

- May become the standard procedure for treating basal cell carcinoma or serve as an alternative when surgery and radiotherapy are not possible.
New Therapy Extends Life For Prostate Cancer Patients

V. Lewington, R. Lamey, K. Staudacher, N. Vogelzang

Scientific Paper 222: “Radium-223 Chloride: Radiation Safety, Tolerability, and Survival Gain in Patients with Castration-Resistant Prostate Cancer”
New Therapy Extends Life For Prostate Cancer Patients

- 241,740 new cases of prostate cancer
- 28,170 deaths each year in United States
- Late stage, castration-resistant prostate cancer characterized by progressive skeletal metastases
New Therapy Extends Life For Prostate Cancer Patients

- Bone metastases increase morbidity, mortality and treatment cost in late stage prostate cancer

- Current bone targeted drugs relieve pain but do not prolong survival
New Therapy Extends Life For Prostate Cancer Patients

ALSYMPCA Trial

- Double-blind, randomized study of 921 patients with castrate-resistant prostate cancer
- Patients treated with Radium-223 dichloride or placebo
- Therapy administered by intravenous injection every 4 weeks for 6 cycles
New Therapy Extends Life For Prostate Cancer Patients

ALSYMPCA Results

Radium-223 therapy:

- Prolongs median survival by 3.6 months
- Delays bone complications by 5.5 months
- Is very well tolerated
New Therapy Extends Life For Prostate Cancer Patients

Broader Implications of the Study

- Radium-223 offers a new standard of care for advanced prostate cancer
- Diagnostic imaging guides patient selection
- PET/CT and other nuclear medicine techniques useful for response assessment
Molecular Imaging Detects Signs of Alzheimer’s in Healthy Patients


Scientific Paper 299: “Imaging and cognitive biomarkers as predictors of progression to Alzheimer’s disease”
Alzheimer’s disease affects an estimated 18 million people worldwide.

Incidence of the disease is expected to double by the year 2025 to 34 million.

The U.S. National Institute on Aging estimates that as many as 50 percent of Americans aged 85 or older are affected.
Beta amyloid is a naturally occurring protein in the brain that can form a neurotoxic plaque linked to the development of Alzheimer’s disease.

Beta-amyloid plaque may lead to extensive damage of neural tissues controlling mental functioning including memory, language and behavior.
Molecular Imaging Detects Signs of Alzheimer’s in Healthy Patients

- Study included
  - 194 healthy elderly participants.
  - 92 people with mild cognitive impairment.
  - 70 subjects with Alzheimer’s disease.

- C-11 PiB (Pittsburgh compound B) PET brain scans were used to gauge amyloid burden in the brain.

- Clinical follow-up at 20 and 36 months.
Molecular Imaging Detects Signs of Alzheimer’s in Healthy Patients

Research Findings

- Widespread amyloid plaque build-up preceded cognitive impairment.

- Those with extensive amyloid burden were at high risk of cognitive decline.
  - Sixty-six percent of MCI group with high amyloid burden progressed to Alzheimer’s disease over 3 years.
  - Only 7 percent of MCI group with a negative amyloid scan progressed to Alzheimer’s disease.
Molecular Imaging Detects Signs of Alzheimer’s in Healthy Patients

Amyloid plaque is shown by the red and yellow areas in this PiB PET brain scan.
Molecular Imaging Detects Signs of Alzheimer’s in Healthy Patients

Broader Implications of the Study

- Molecular imaging can help lead to a diagnosis of Alzheimer’s disease when the patient first presents with symptoms and still has largely preserved mental function.

- Amyloid imaging may be a stepping stone for developing a treatment for Alzheimer’s disease.
PET Imaging Could Lead to Better Care for Neuroendocrine Cancer


and N. Schaefer

PET Imaging Could Lead to Better Care for Neuroendocrine Cancer

- Neuroendocrine neoplasm (NET) are defined as epithelial neoplasms with predominant neuroendocrine differentiation originating from cells of the neural crest.

- NETs have different behavior, prognosis and therapy according to their origin, staging and grading.

- Clinical decision-making is challenging when determining the most appropriate treatment for patients with these tumors.
61 patients with low- to intermediate-grade NETs were prospectively included in the study; about half were considered eligible for surgery to remove their cancer.

Patients imaged with Gallium-68 DOTATATE PET/CT.

Clinical decisions before and after Gallium-68 DOTATATE PET/CT imaging were compared.
PET Imaging Could Lead to Better Care for Neuroendocrine Cancer

Research Findings

- Gallium-68 DOTATATE PET/CT led to change in management in 36.1% of the patients.

- 14 of 32 (43.8%) patients sent for Gallium-68 DOTATATE PET/CT by the surgical department for preoperative exclusion of metastatic disease were reclassified as non-operable.

- 8 of 29 (27.6%) of the patients with clinically evident NETs or elevated Chromogranin A were reclassified as potentially resectable cases (p = 0.037).
PET Imaging Could Lead to Better Care for Neuroendocrine Cancer

Hindgut Carcinoid

Endoscopic resection of the tumor
PET Imaging Could Lead to Better Care for Neuroendocrine Cancer

- Pancreatic neuroendocrine tumor (G1) scheduled for liver transplantation after resection of the primary tumor in the pancreas.

- Patient showed disseminated osseous metastases in the Gallium-68 DOTATATE PET/CT not seen in the contrast enhanced CT scan.

- Palliative treatment with Everolimus was started.
PET Imaging Could Lead to Better Care for Neuroendocrine Cancer

Broader Implications of the Study

- Molecular imaging can have significant impact in patient management, sparing patients from futile surgery or in finding symptomatic patients which might be curable with surgery.

- PET imaging with Gallium-68 DOTATATE can serve as a model for further cost-effective decision making using molecular imaging.
Molecular Imaging “Sees” Inside Coronary Arteries To Measure Disease

V. Murthy, M. Naya, R. Hachamovitch, C. Foster, M. Gaber, J. Hainer, S. Dorbala, R. Blankstein, M. Di Carli

Scientific Paper 22: “Coronary vascular dysfunction and prognosis in patients age 75 and older”
Cardiovascular disease the number one cause of death and disability across the globe.

Coronary artery disease can cause serious problems, including heart attack, if left untreated.
When an active heart needs more oxygen, blood vessels dilate so greater amounts of blood can flow.

Maximum dilation possible is the coronary flow reserve, or CFR.

Diseased coronary arteries are unable to dilate as fully as healthy blood vessels, potentially limiting oxygen supply to the heart muscle.
Molecular Imaging “Sees” Inside Coronary Arteries To Measure Disease

- 704 patients over the age of 75 referred for stress test with Rb-82 PET.
- Abnormalities assessed by semi-quantitative visual analysis.
- Rest and stress myocardial blood flows used to compute CFR.
Research Findings

- Many older patients have preserved coronary vascular function.

- Aging does not always imply decline in vascular function
  - 1 in 3 older adults has excellent vascular health

- Those who have abnormal coronary vascular function are approximately twice as likely to die from cardiac causes, even after accounting for other risk factors and stress test results.
Molecular Imaging “Sees” Inside Coronary Arteries To Measure Disease

Cardiac Mortality Among Age ≥75 by Stress Defect Size and CFR

<table>
<thead>
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<th>Stress Defect Size</th>
<th>CFR &gt; 1.5</th>
<th>CFR ≤ 1.5</th>
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<tr>
<td>0%</td>
<td>1.8%</td>
<td>6.5%</td>
</tr>
<tr>
<td>1-10%</td>
<td>4.3%</td>
<td>7.6%</td>
</tr>
<tr>
<td>≥10%</td>
<td>7.0%</td>
<td>13.9%</td>
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</tbody>
</table>
Molecular Imaging “Sees” Inside Coronary Arteries To Measure Disease

Annualized Cardiac Mortality by Age and CFR ≥1.9

*Summed Stress Score ≤3
PET imaging with Rb-82 can better identify high risk patients who may need more aggressive medical therapy or, in some cases, invasive coronary angiography.

This can be accomplished with less radiation than stress SPECT and no additional cost beyond PET stress testing.
SNM 2012 Image of the Year

Peter Herscovitch, MD
2012-2013 SNM Vice President-Elect
Abstract #455: Synthesis of $^{213}$Bi-DOTATOC for peptide receptor alpha-therapy of GEP-NET patients refractory to beta therapy

Morgenstern$^1$, F. Bruchertseifer$^1$, C. Apostolidis$^1$, F. L. Giesel$^2$, W. Mier$^2$, U. Haberkorn$^2$, C. Kratochwil$^2$

$^1$European Commission, Joint Research Centre, Institute for Transuranium Elements, Karlsruhe, Germany

$^2$University Hospital Heidelberg, Department of Nuclear Medicine, Heidelberg, Germany
Remarkable responses to Bi-213-DOTATOC observed in tumors resistant to previous therapy with Y-90/Lu-177-DOTATOC

Case I: Shrinkage of liver lesions and bone metastases after i.a. therapy with 11 GBq Bi-213-DOTATOC

Case II: Response of multiple liver lesions after i.a. therapy with 14 GBq Bi-213-DOTATOC
Thank You

Questions?