Agenda for Presentation

- Brief overview of disease & preferred sites of metastasis
- Discussion of different imaging modalities for metastatic melanoma
- Patient presentation

Melanoma, back
Color irregularity
Asymmetry
Border irregularity

Image from J. L. Melton, MD, Loyola Univ. Chicago
Epidemiology

1999
- 47,000 new primary melanomas
- 7300 deaths
- ~1 in 90 Americans will develop
- 3% of all USA cancers
- 3rd most common cause of brain metastases (mets)

Affects all ages
- Men 30-49: 2nd most common CA
## Risk factors

<table>
<thead>
<tr>
<th>RISK FACTOR</th>
<th>RELATIVE RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;15</td>
<td>88</td>
</tr>
<tr>
<td>Pigmented lesion</td>
<td>7-64;148</td>
</tr>
<tr>
<td>Caucasian</td>
<td>12</td>
</tr>
<tr>
<td>Previous cutaneous Melanoma</td>
<td>5-9</td>
</tr>
<tr>
<td>Melanoma in 1(^{st}) degree relative</td>
<td>2-8</td>
</tr>
<tr>
<td>Immunosuppression</td>
<td>2-8</td>
</tr>
<tr>
<td>Excessive sun (UVB)</td>
<td>3-5</td>
</tr>
<tr>
<td>Sun sensitivity</td>
<td>2-3</td>
</tr>
</tbody>
</table>
Numerous classifications

- **Cutaneous melanoma**
  - Malignant melanocytes
  - Subtypes exist

- **Noncutaneous**
  - Mucosal epithelia
  - Retina
  - Leptomeninges
Skin: fundamentals

Image: Edward Buckingham, MD, Combined Plastics Conference, 2000
5-yr Survival and Tumor Depth

- Newer staging system
- I, II- localized
  - IA= <0.75 mm
  - IB= 0.76-1.50 mm
  - IIA= 1.50-4.00 mm
  - IIB= >4.00 mm
- III- limited nodal met, 30-35%
- IV- advanced met, ~6months

Image: Edward Buckingham, MD, Combined Plastics Conference, 2000
Clinical symptoms & signs

- **Early**: ↑ size, change in shape or color, pruritis
- **ABCDEF’s** (asymmetry, irregular border, color variation, diameter >5mm, elevation, enlarging, Family History)
- **Late**: tenderness, bleeding, ulceration
Unfavorable Prognosis

✦ Histologic features
  – Ulceration
  – High mitotic activity
  – Tumor micro-satellites
  – Vertical growth

✦ Consider metastatic potential!

Image: Edward Buckingham, MD, Combined Plastics Conference, 2000
Common sites for metastasis

- Skin
- Lungs (70%)
- Lymph nodes (23-75%)
- Liver (58%)
- Central nervous (50%)
- Kidney (35%)
- Bone (11-17%)
- Bowel & mesentary (8%)
- Spleen (1-5%)

Diagnostic dilemma:
How to detect?
1. Before known mets
2. With known mets
3. While monitoring treatment of mets

Average latent period of mets: 2-5 years
Before known metastasis

- Patients who are asymptomatic
- Initial screen with PA chest x-ray
  - Other imaging studies rarely reveal mets when patients are symptom-free
- Sentinel lymph node (SLN) biopsy
  - First node to receive tumor drainage
- Other screening:
  - Palpate regional nodes, liver, spleen
  - Neuro exam
  - Bone pain?
  - Liver function tests
Screening chest x-ray

- Hematogenous spread: favors bases
- Rounded opacities
- Bilateral
- No cavitation
- No gas-fluid levels
- +/- hilar adenopathy
- +/- pleural effusions

Image: Robert Dunn, MD, Canberra Hospital
PA chest x-ray: looking for lung, bone mets

Image: Robert Dunn, MD, Canberra Hospital
Lymph nodes

Diagram from Melanoma.net
Lymphoscintigraphy

- Tumors >1mm thick
- Technetium-99 injected in or around tumor
- Drainage patterns visualized with gamma probe - mark site
- Inject blue dye to identify lymphatic tracks & sentinel node
Lymphoscintigraphy

Technetium-99 gamma probe blue dye identification

Diagram from Melanoma.net
Beth Israel Deaconess Patient

- 33 year old man with known metastatic melanoma, multiple risk factors

- Metastases to:
  - Brain
  - Kidneys
  - Lungs
CNS mets: MRI

- Often symptomatic
- Magnetic resonance imaging (MRI) best
  - Gadolinium-enhanced MRI - most sensitive
  - Most mets are T2 bright and enhance
  - Edema common
  - CT+ may miss small mets & leptomeningeal spread
- Ddx of primary tumor:
  - Bronchogenic carcinoma (ca) (50%)
  - Breast ca (20%)
  - Colon, rectal ca (15%)
  - Melanoma, Renal ca (10%)
Large right frontal met: heterogeneous hyperintensity

Generalized edema with slight shift of septum

CSF bright (T2)

Large left occipital met: heterogeneous hyperintensity

BIDMC PACS system, courtesy of Dr. M. Spencer
T1-weighted MRI after gadolinium

Large right frontal met: hypointense with ring enhancement

Enhancement of choroid plexus

CSF dark (T1)

Large left occipital met: hypointense with ring enhancement

BIDMC PACS system, courtesy of Dr. M. Spencer
Computed Tomography (CT)

- Best for abdominal viscera and peritoneum
- **Liver**: mets will enhance with contrast, best during portal-venous phase
- **Kidneys**: may see hemorrhage, parenchyma will enhance- can follow ureters to bladder
- **Abdominal cavity**: +/- malignant ascites, hemoperitoneum
- **Stomach**: see “target lesion” with oral contrast
- **Bowel**: see irregularities of lumen
CT with oral contrast, without IV contrast

Bilateral renal mets with massive hemorrhage

Low density lesion with hemorrhage
CT with oral contrast, without IV contrast

Left iliopsoas muscle

Extravasation of left renal hemorrhage

BIDMC PACS system, courtesy of Dr. M. Spencer
CT with oral contrast, + IV contrast

- Lower attenuation lesion, compressing the renal (enhancing) parenchyma
- Enhancing renal parenchyma
CT with oral contrast, with IV contrast
CT with oral contrast, without IV contrast

Stomach with mets projecting into lumen

Courtesy of Dr. M. Spencer
CT with oral contrast, without IV contrast

Duodenum with mets projecting into lumen

Courtesy of Dr. M. Spencer
Positron Emission Tomography (PET)

- Future of imaging metastatic melanoma?
- Use of glucose analog (FDG-glucose)
  - Advantages:
    - melanoma has high FDG uptake = high sensitivity in detecting mets early
    - Able to distinguish between recurrent disease & radiation necrosis
    - Single test for entire body
  - Limitations:
    - CT is better for small pulmonary lesions

Image from Kiran Mehta, MD
Positron Emission Tomography (PET)

- Malignant melanoma of the right shoulder (bright white spots near crossed yellow lines)
- Mets involving the right upper lobe peripherally as well as the right hilum and mediastinum

Image from Lyndon Gritters, Univ. of Iowa
References

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