

Impact of different initial systemic staging imaging strategies
on metastasis detection in uveal melanoma patients:
The Melanoma of the Uvea Staging Imaging Consortium (MUSIC) Study

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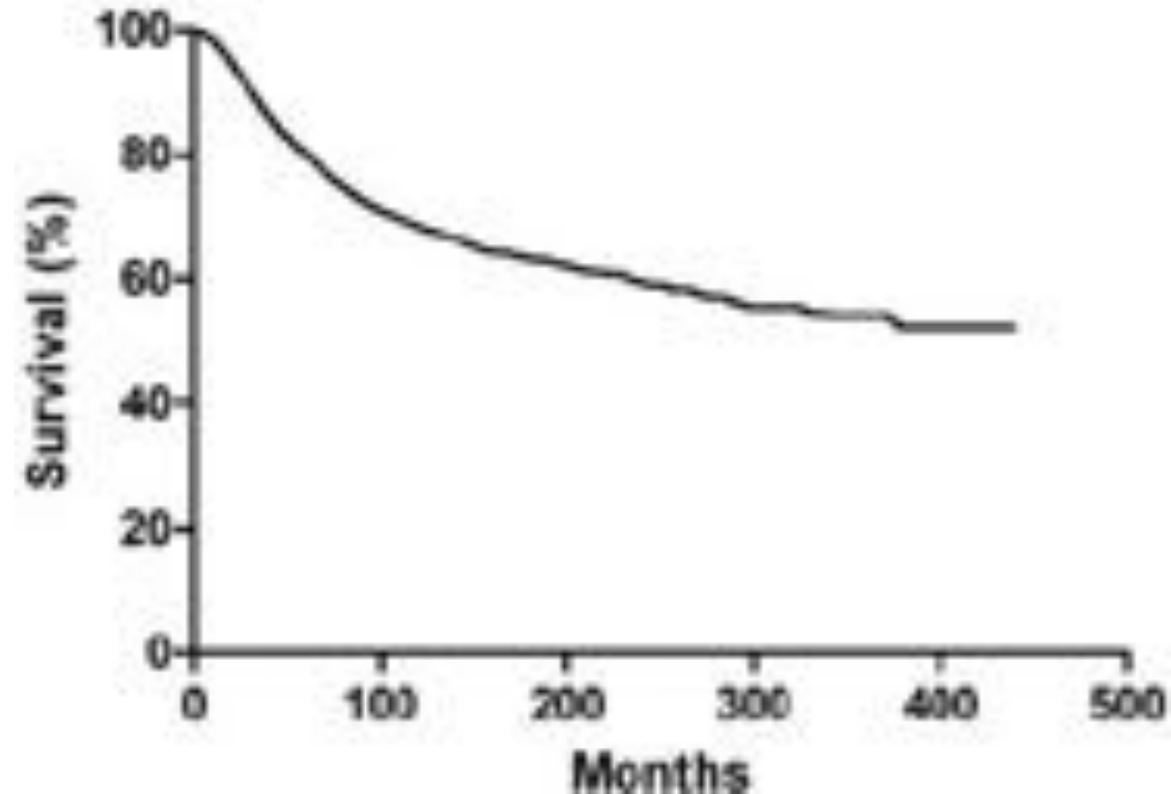
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Summary

- Multi-institution study, including 1000 newly-diagnosed UM patients
- Evaluated modalities for initial staging imaging, fields imaged, findings
- Many more incidental findings than true metastases identified
 - Especially true in pelvis, where there were never any true mets found
 - Pulmonary metastases were almost always in conjunction with liver mets
 - Only a single patient (out of 1000) had pulmonary mets without liver mets
- CT had more false negative and false positive radiology reads in liver than MRI or PET
- Study suggests that the pelvis should not be included in initial systemic staging imaging, and it is unclear if there is utility to imaging the chest
- MRI (or PET, US) imaging of the abdomen should be considered over CT

UM Metastases

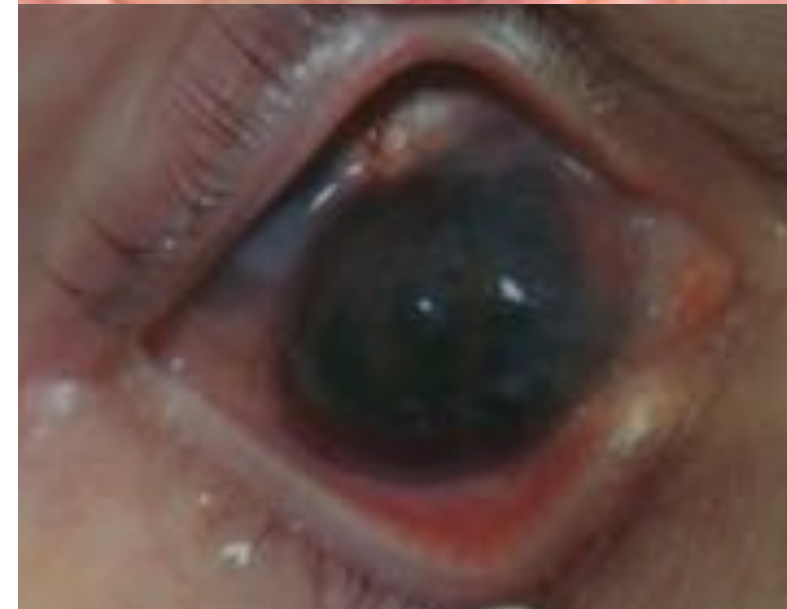
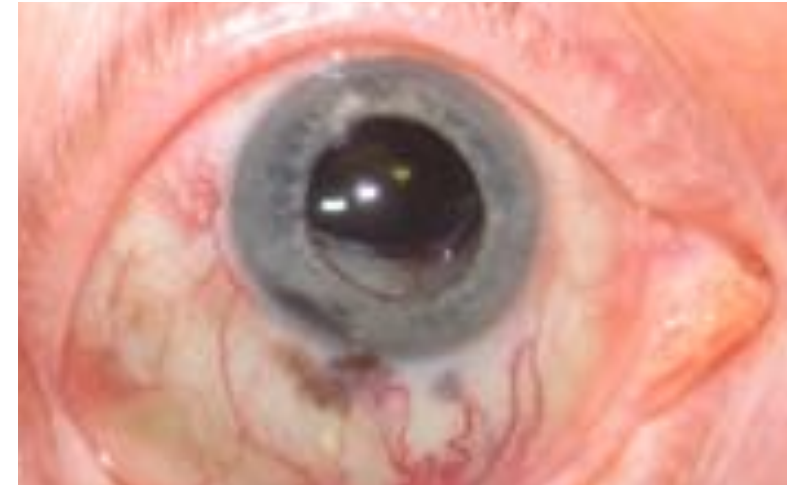
- ~50% of patients develop metastases
- Extremely high mortality
 - Nearly 100%
- Average survival ~6 months



From Andreoli MT, et al., 2015.

UM Metastases

- Rare to have radiographically-evident or clinically-evident metastases at time of Dx
 - ~3% of patients
- Systemic staging imaging
 - NCCN guidelines



Study Purpose

- To describe current practice patterns for staging
- To evaluate the impact of field of imaging
- To evaluate the impact of imaging modality

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- **INITIAL STAGING IMAGING, not subsequent surveillance**

Study Purpose

- MUSIC Study
 - Melanoma of the Uvea Staging Imaging Consortium
 - Vanderbilt
 - University of Michigan
 - Oregon Health Sciences University
 - Retina Consultants of Houston
 - University of Virginia



Methods

- Retrospective review
 - 5 sites
 - 5 years
 - No specific number of patients specified
- RedCap survey

“There’s a method
to my madness,
and a madness
to my method.”

- Salvador Dali

Methods

- RedCap survey
 - Initial imaging modality and field
 - Imaging findings and radiologist's diagnosis
 - By organ
 - Any subsequent imaging
 - Modalities and findings
 - Biopsy confirmation of mets?
 - Final diagnosis of biopsy
 - Incidental findings

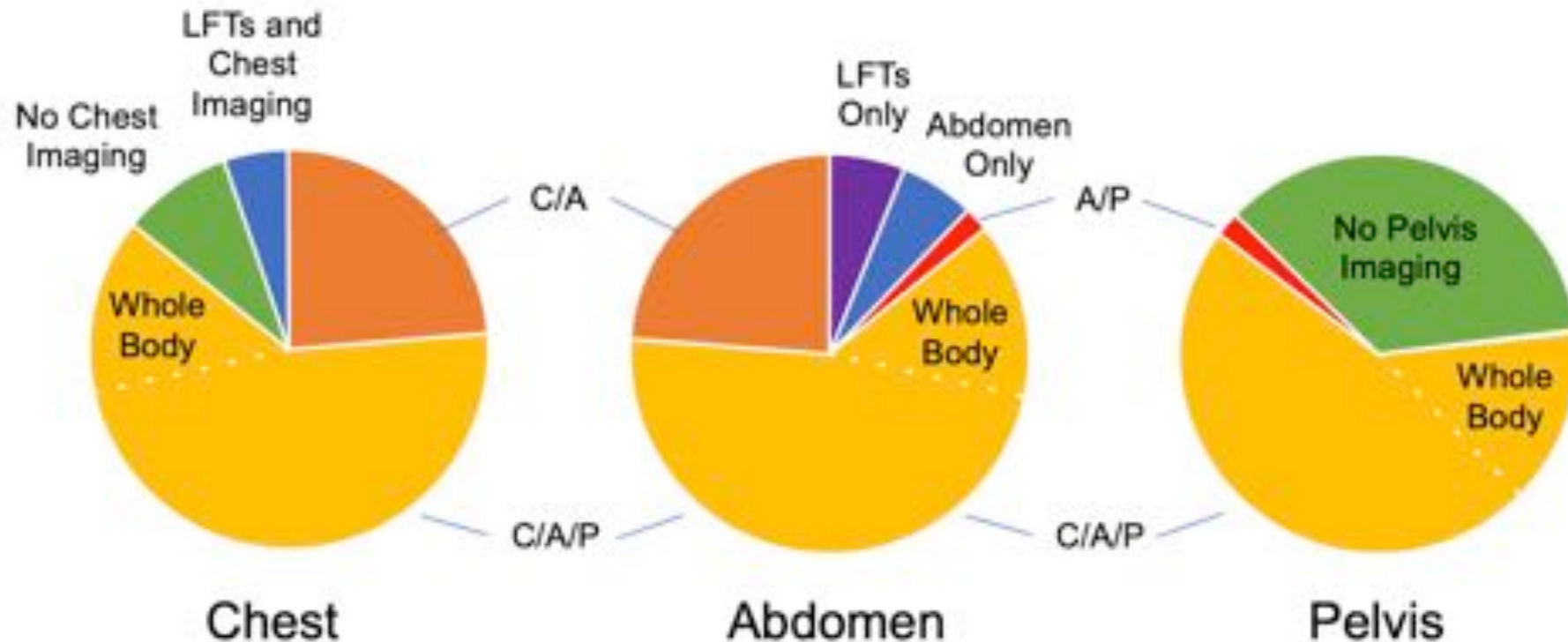
Results

- 1000 total patients were included in the study
- Practice Patterns:
 - Variability in imaging modalities and fields
 - Varied *within* institutions

Field + Modality	Patient Count
CT	694
CT Chest/Abdomen/Pelvis	443
CT Chest/Abdomen	109
CT Abdomen	92
CT Abdomen + CXR	57
CT Abdomen Only [No Chest Imaging]	35
CT Abdomen/Pelvis (A/P)	48
CT A/P + CXR	29
CT A/P Only [No Chest Imaging]	19
CT Whole Body	2
PET-CT Whole Body	138
MRI	75
MRI Abdomen without pelvis	68
MRI Abdomen + CXR	34
MRI Abdomen + CT Chest	18
MRI Abdomen Only [No Chest Imaging]	16
MRI Abdomen/Pelvis	7
MRI A/P + CXR	3
MRI A/P + CT Chest	3
MRI A/P Only [No Chest Imaging]	1
U/S	28
U/S Abdomen + CXR	19
U/S Abdomen + CT Chest	1
U/S Abdomen Only [No Chest Imaging]	8
Liver Function Tests	52
LFTs + XR Chest	47
LFTs + CT Chest	5
LFTs Only [No Chest Imaging]	0
Other imaging	13

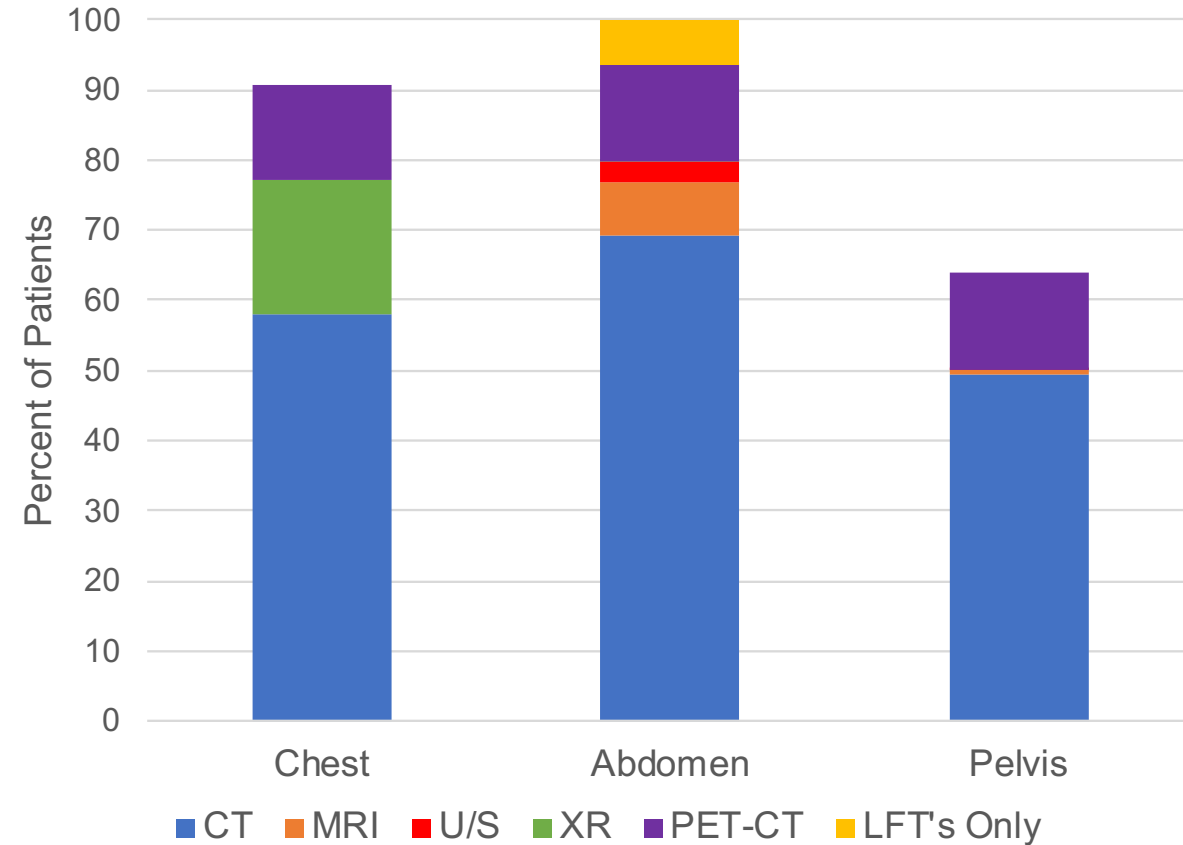
Results – Practice Patterns

- The liver was always evaluated
 - 94% with imaging
 - 6% with LFTs (without imaging)
- The chest was almost always evaluated
 - 91% with imaging
- Pelvis was usually included (64%)



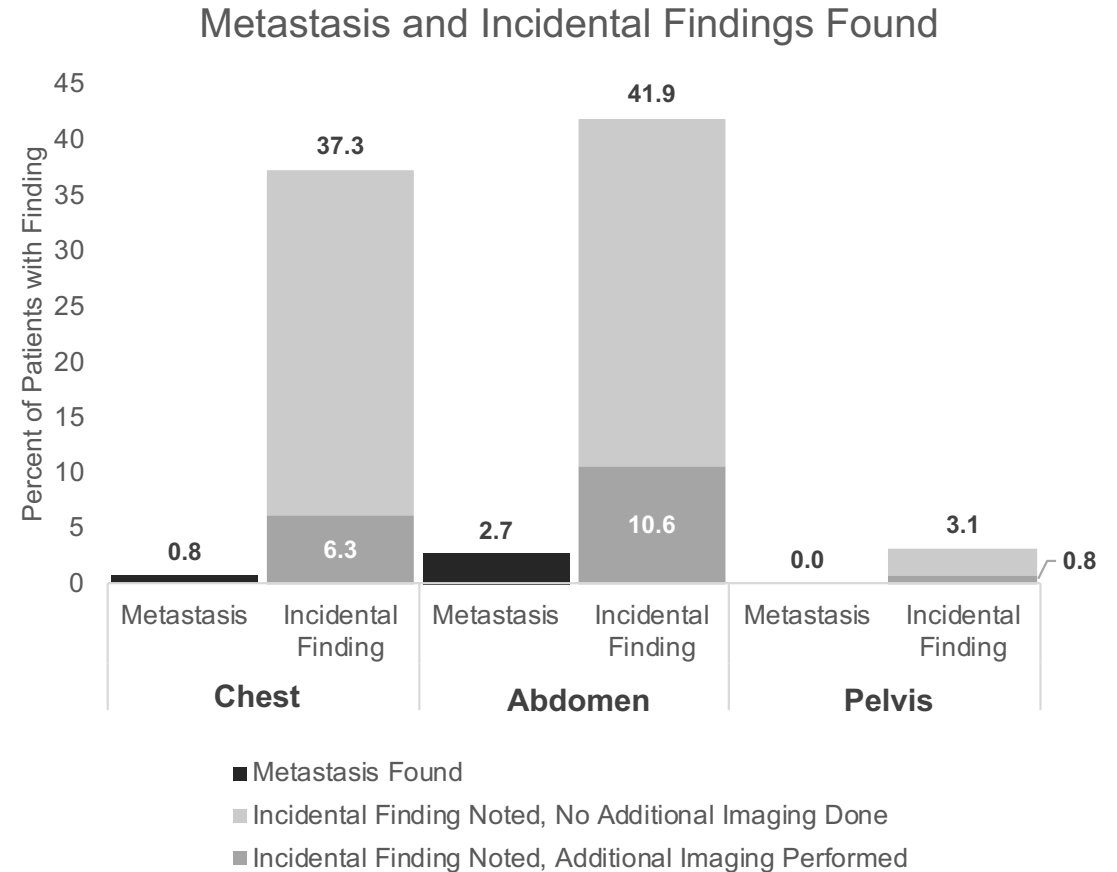
Results – Practice Patterns

- CT was the most common modality for all fields
- MRI, PET-CT, or US were sometimes used for the abdomen
- X-Ray or PET-CT were sometimes used for the chest
- Pelvis was always grouped in with the abdomen's imaging modality



Results – Imaging Findings

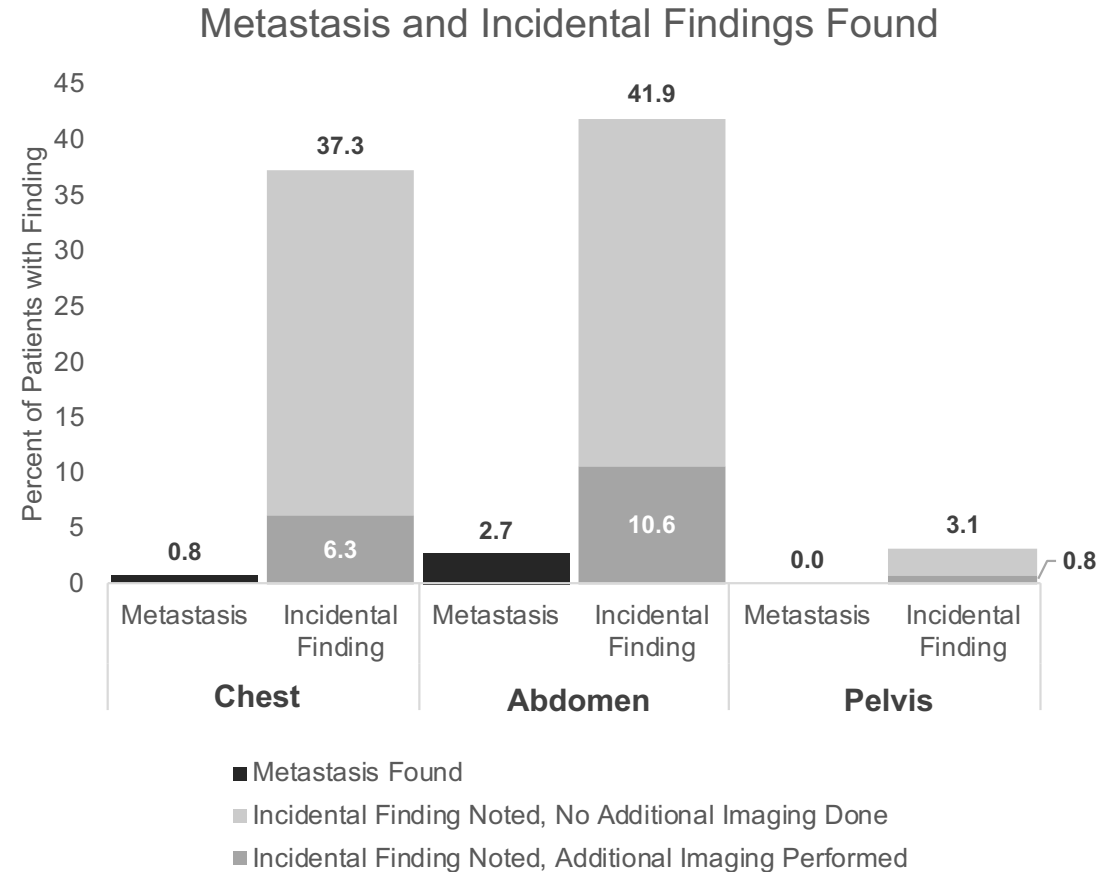
- There were a lot more incidental findings than true metastases found
- Led to additional imaging performed



Imaging Findings - PELVIS

- **Pelvis:**

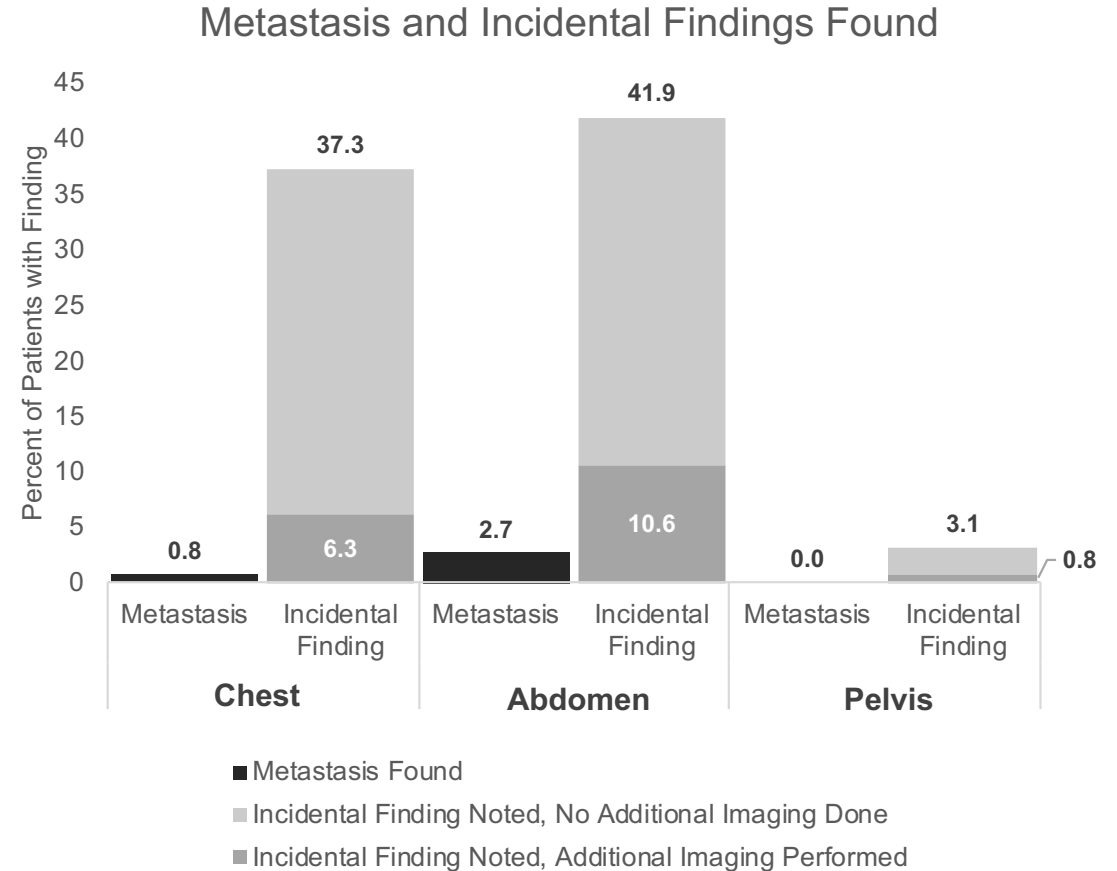
- 640 patients imaged
- 20 patients had a suspicious finding
- 5 necessitated additional imaging
- **NO metastases in the pelvis**



Imaging Findings - PELVIS

- **Pelvis:**

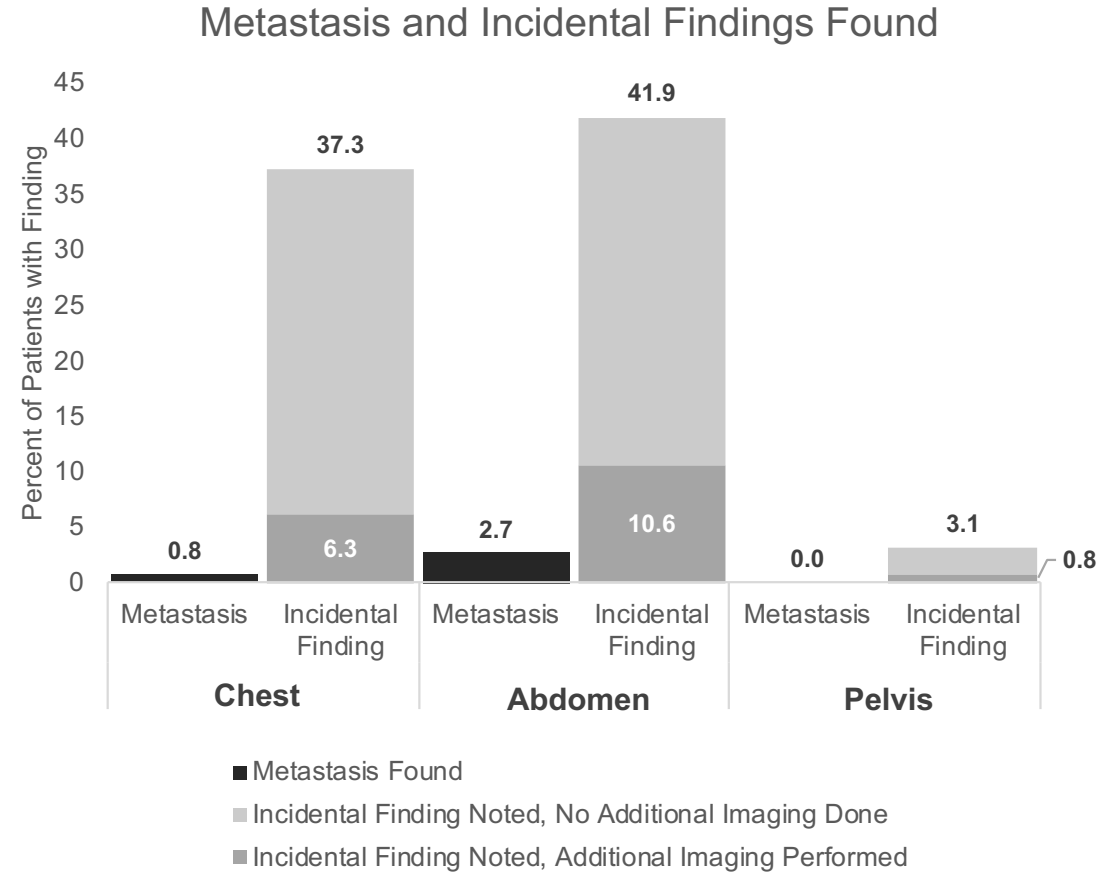
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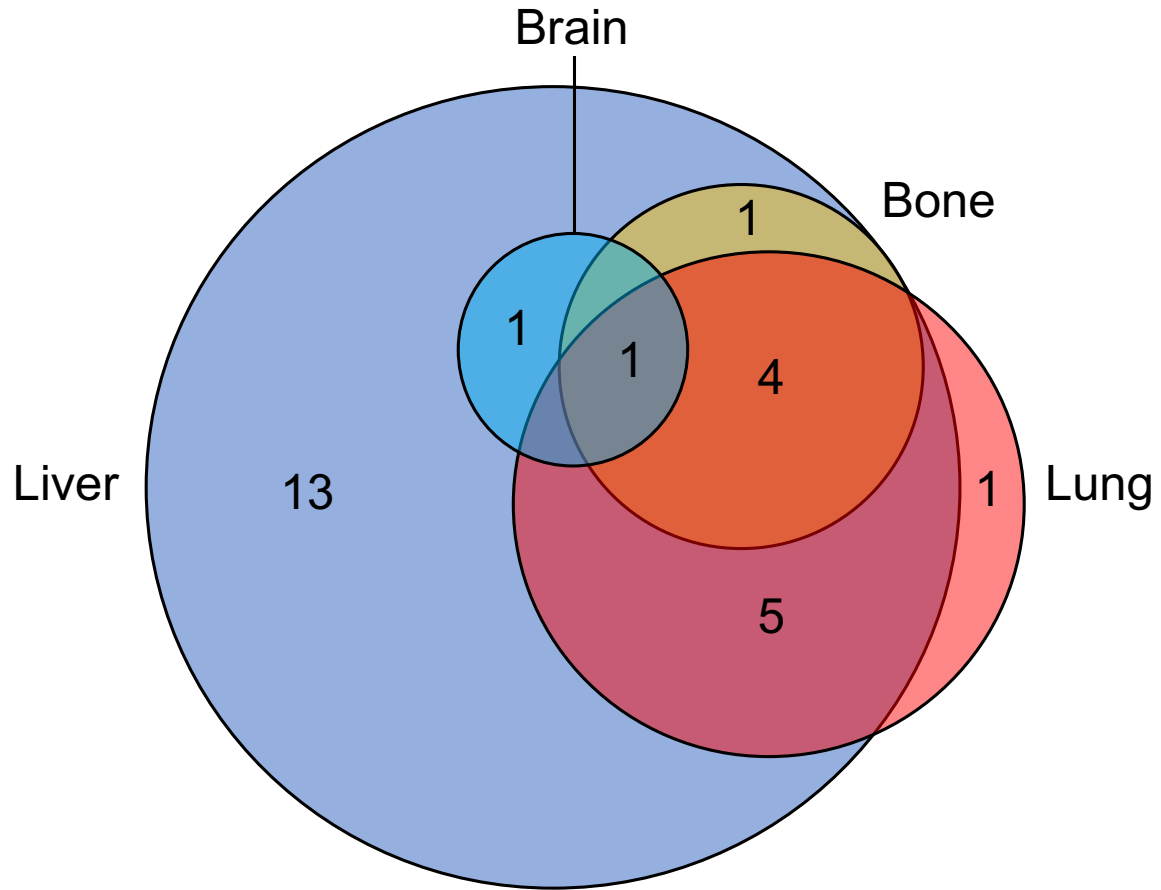
Imaging Findings - CHEST

- **Chest:**

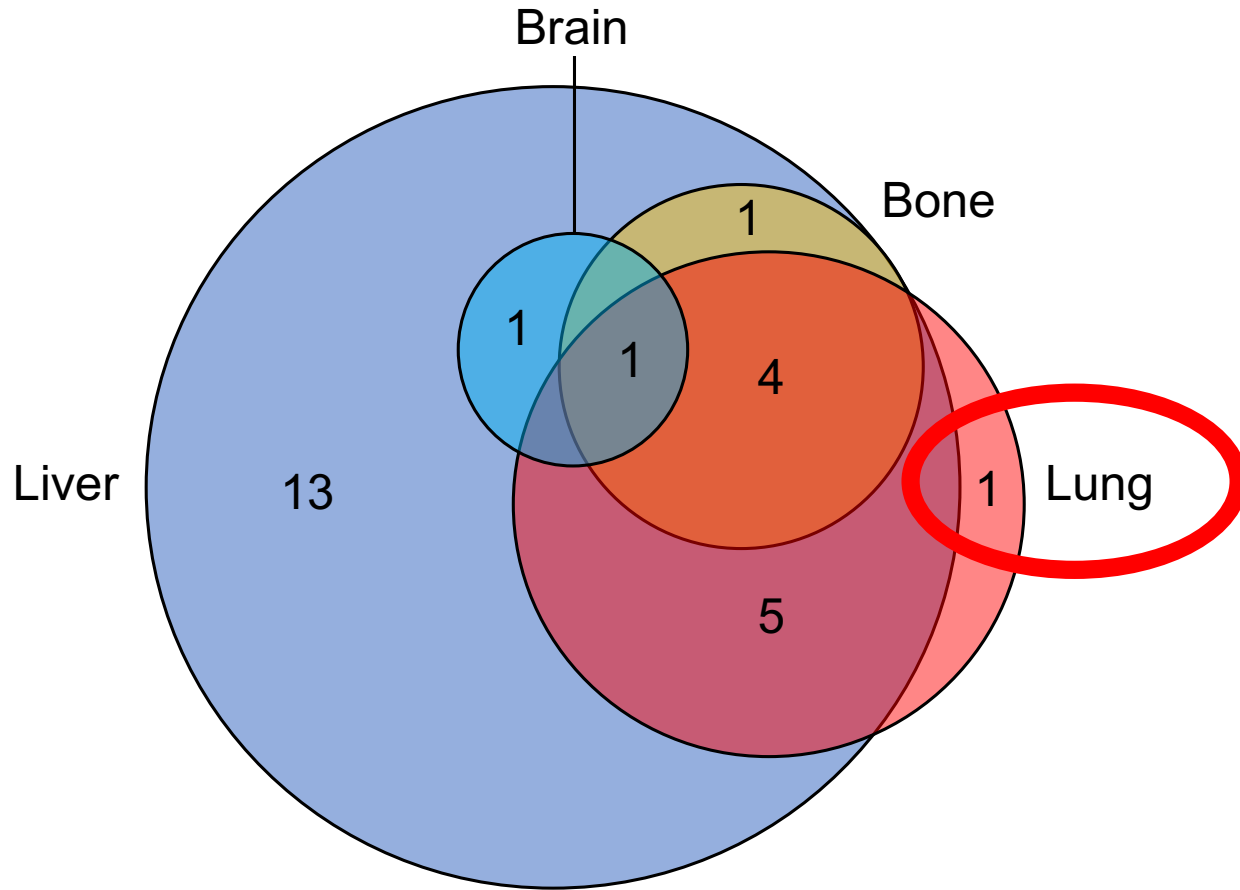
- 908 patients imaged
- 346 patients had a suspicious finding
- 64 necessitated additional imaging
- 10 patients had confirmed mets in the chest



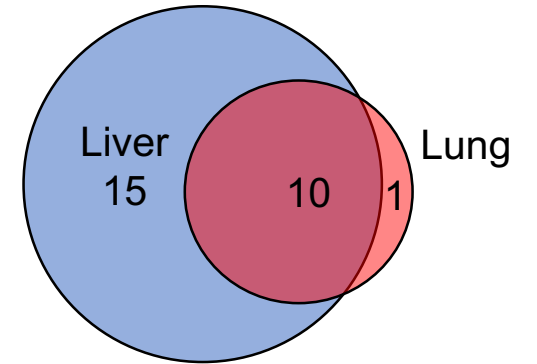
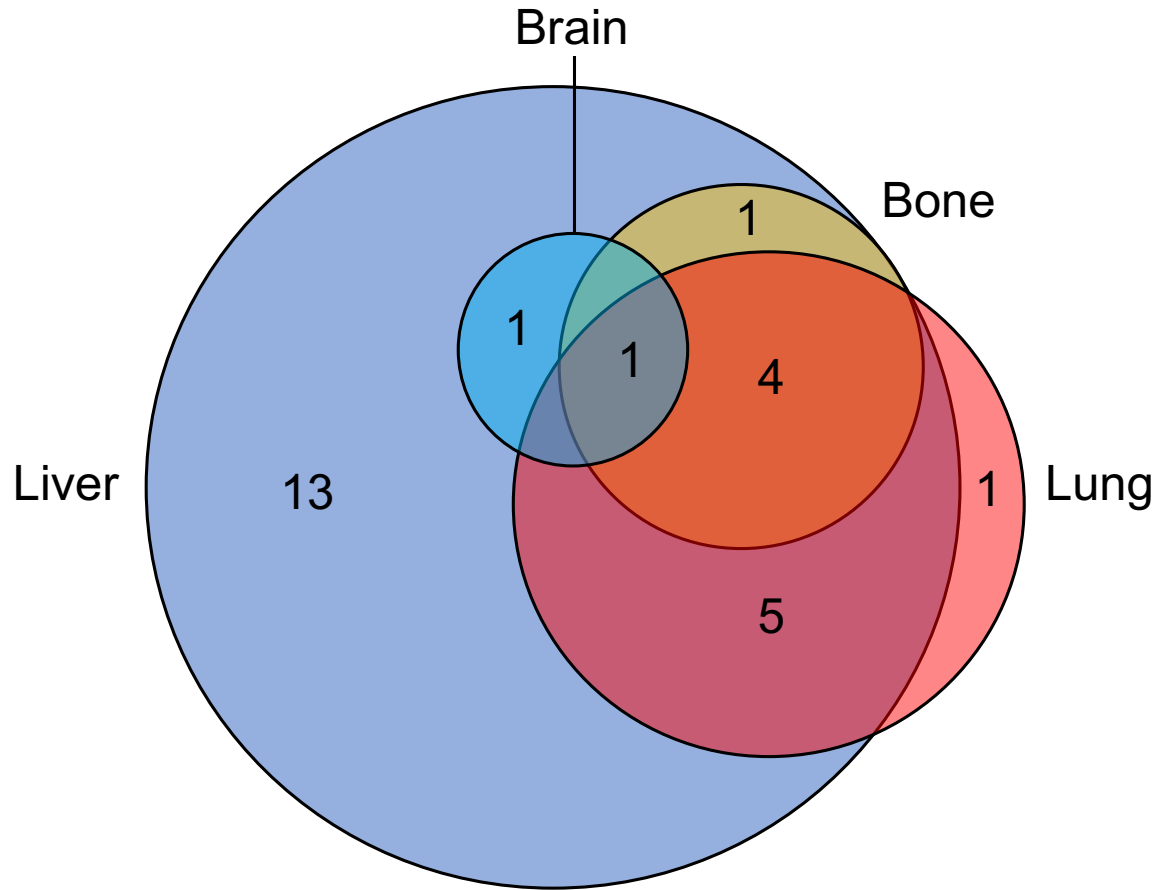
Imaging Findings - CHEST



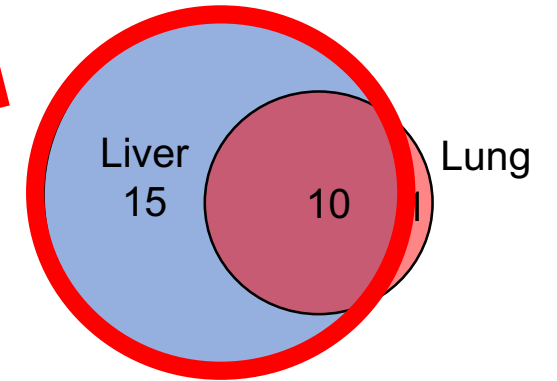
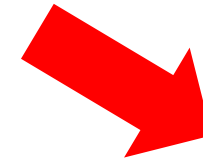
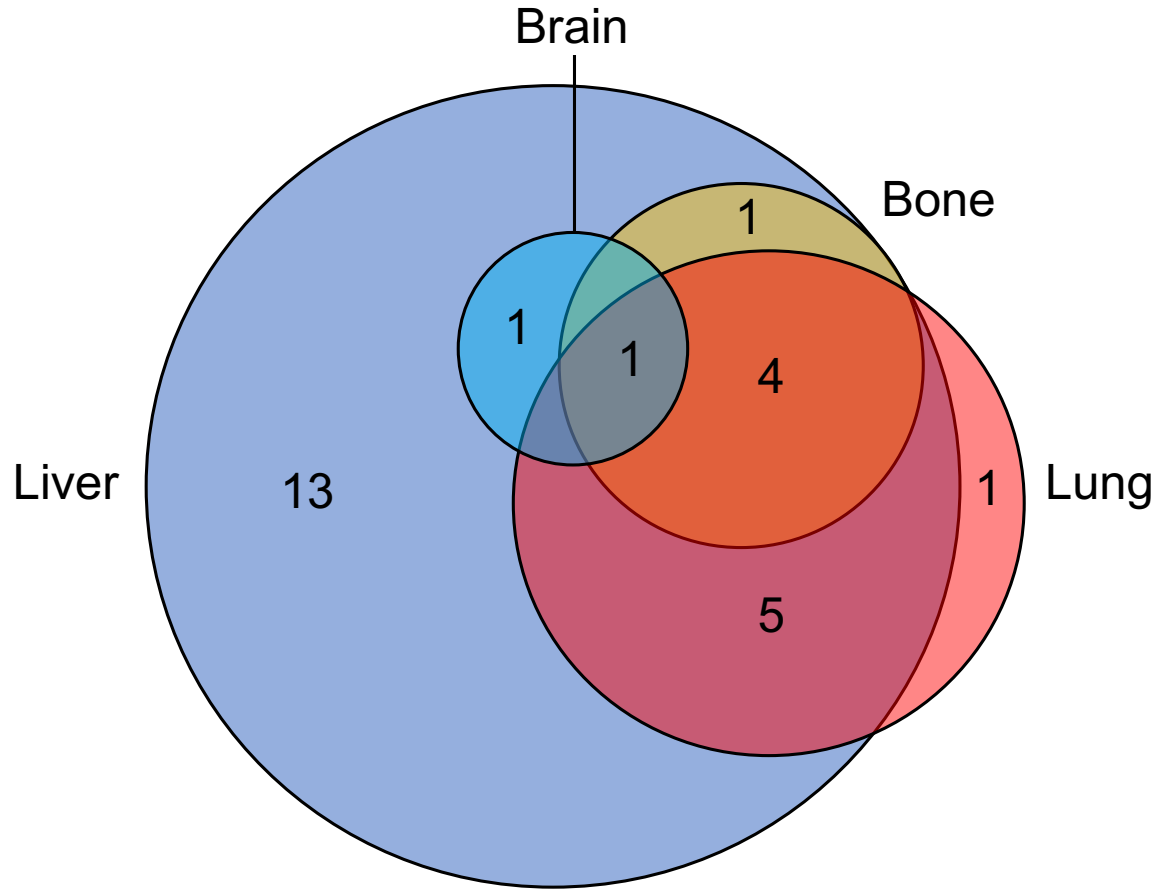
Imaging Findings - CHEST



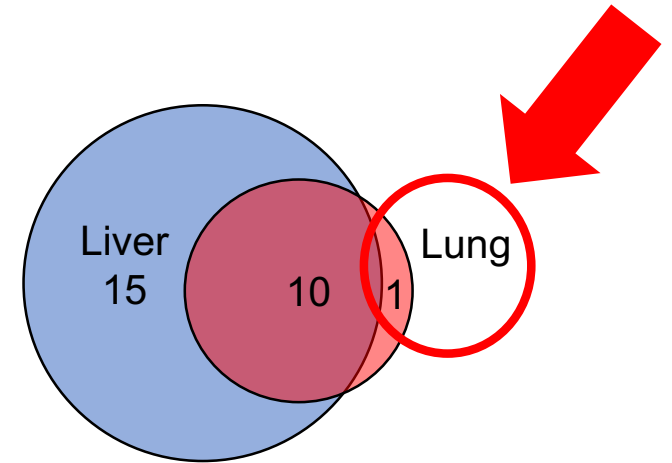
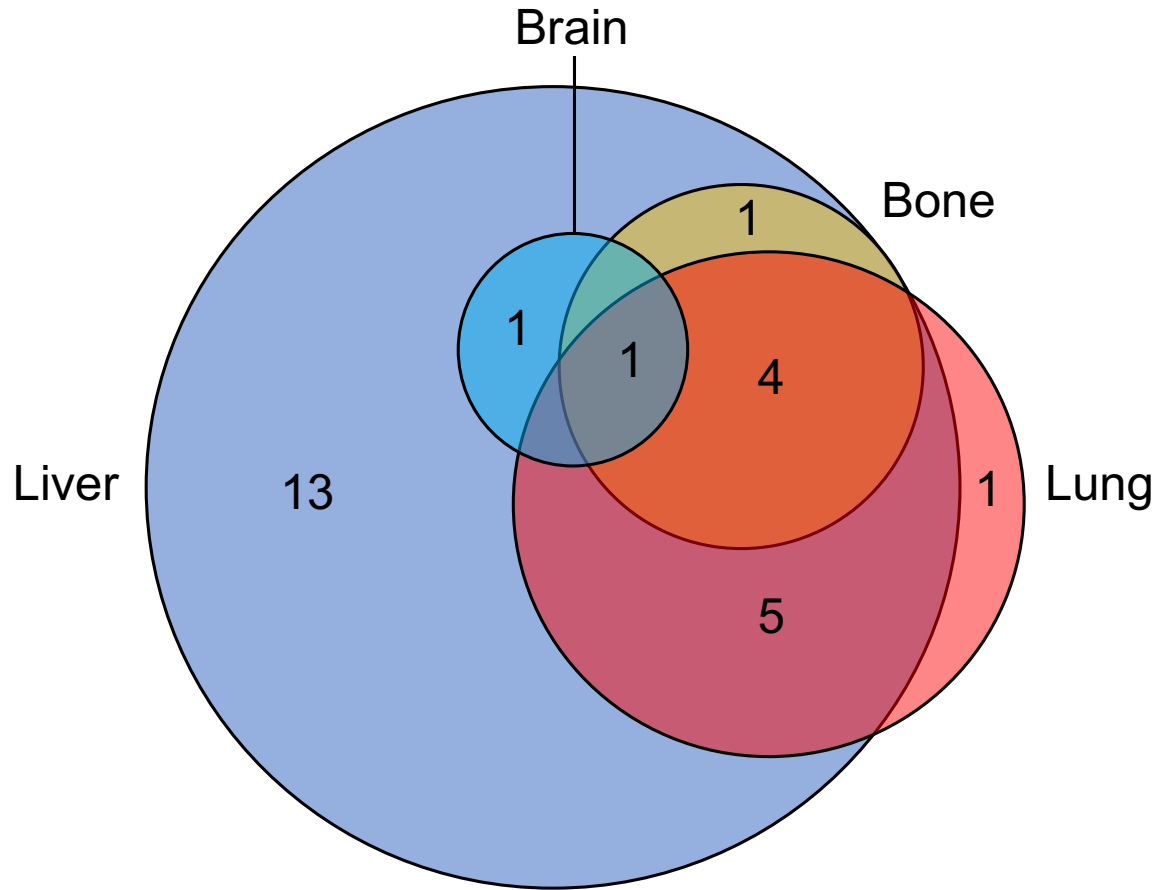
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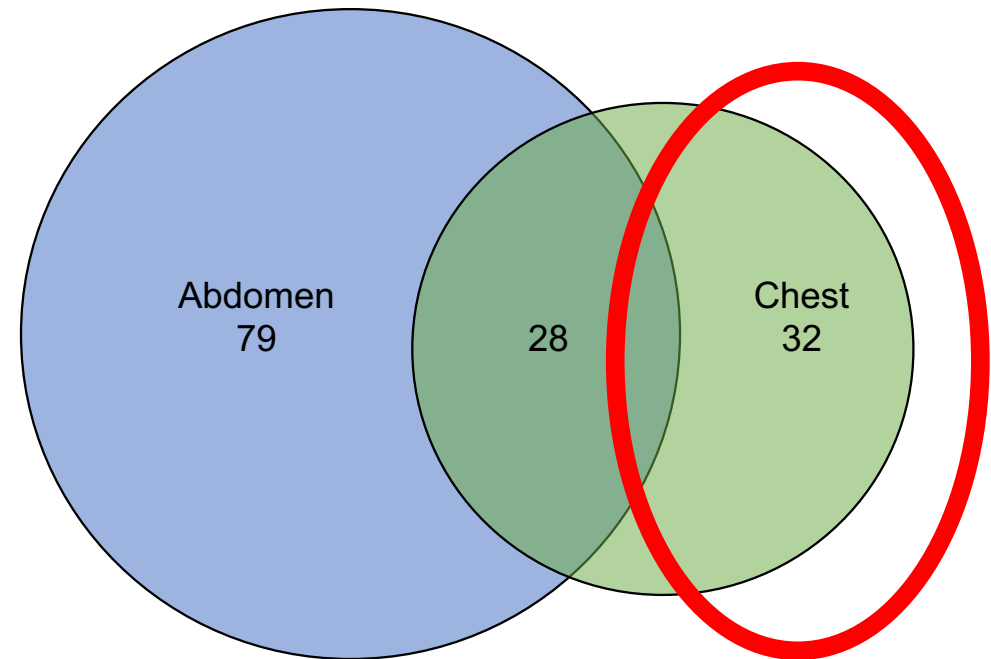
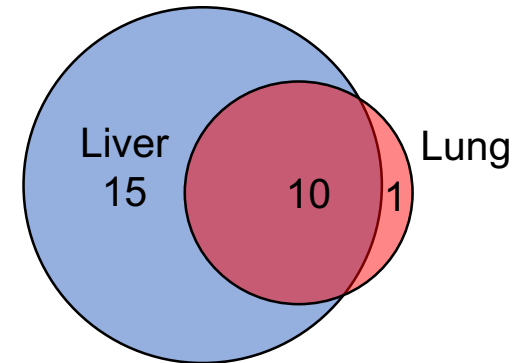
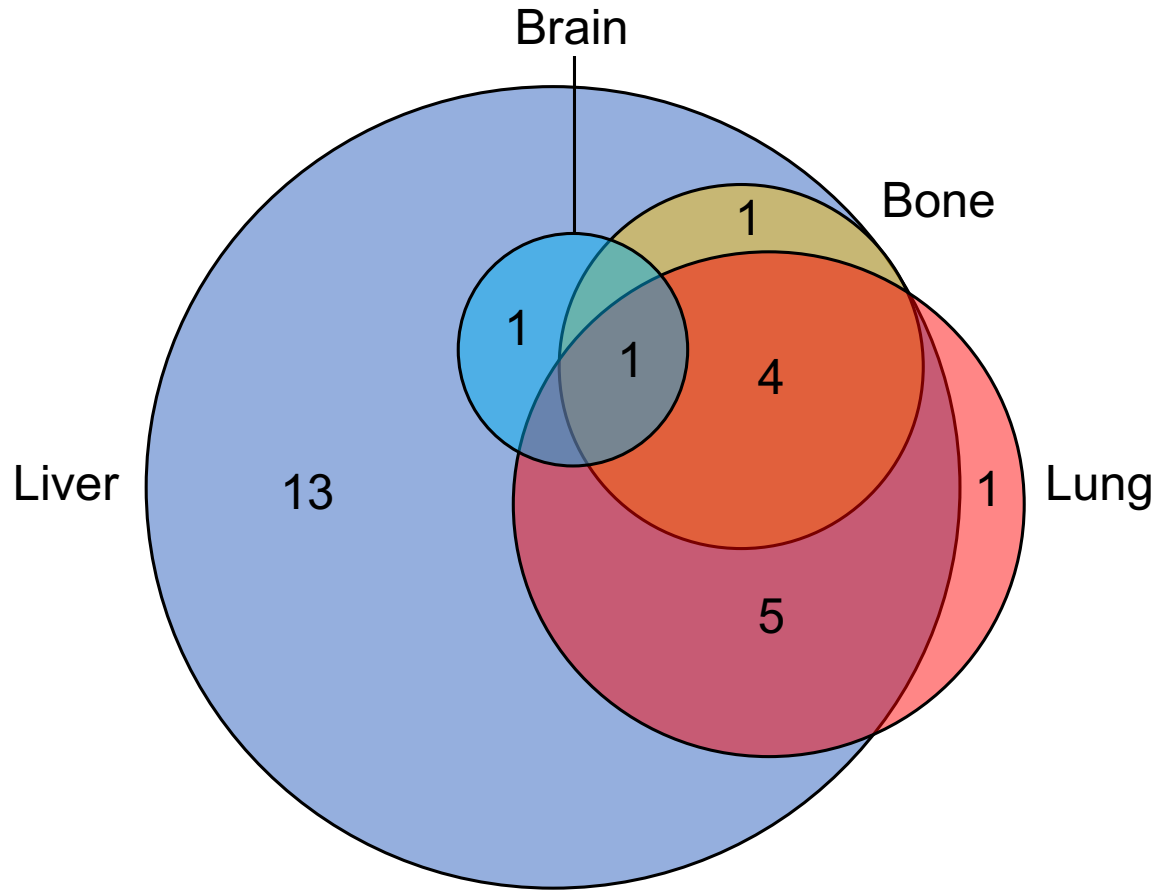
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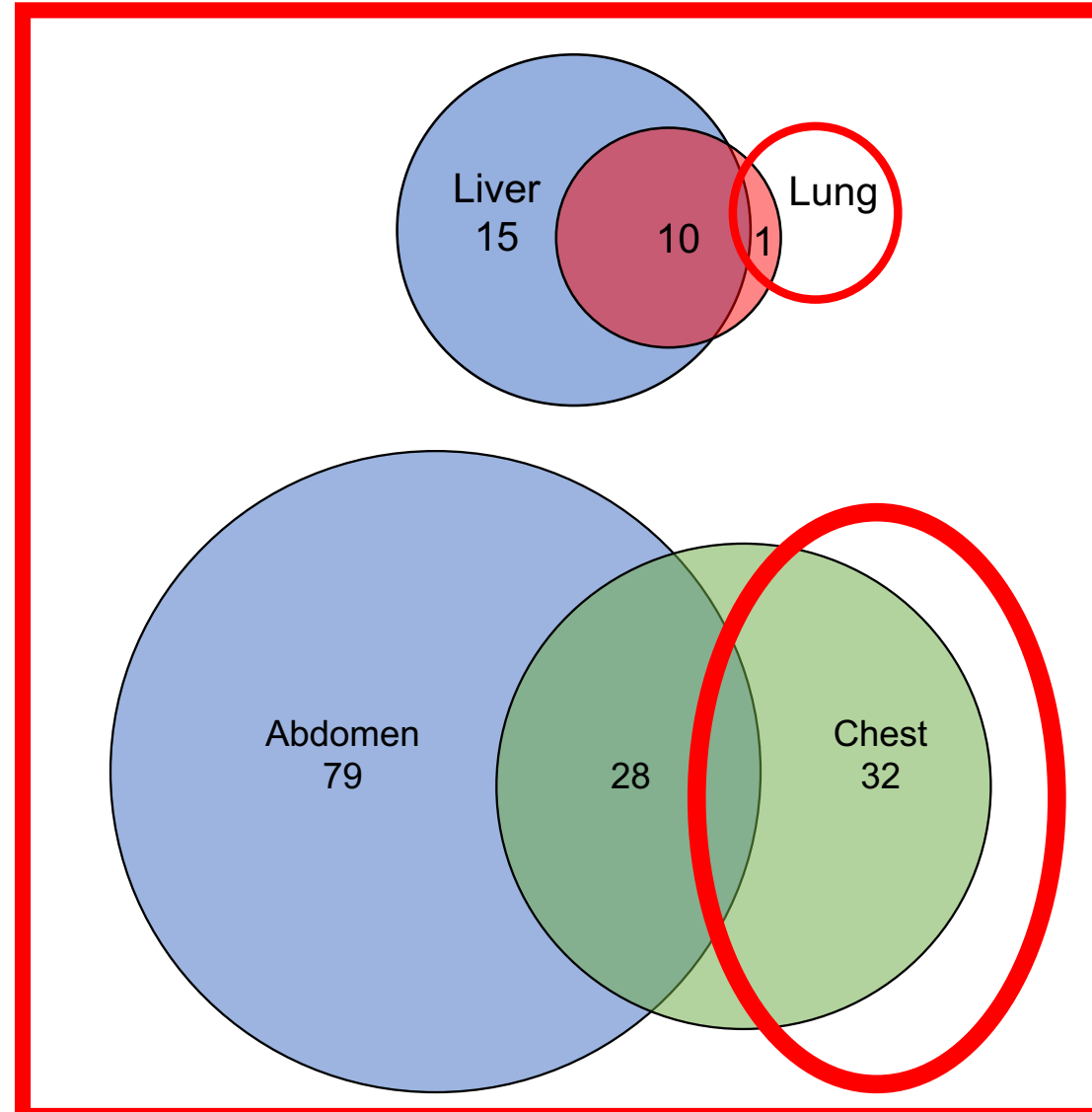
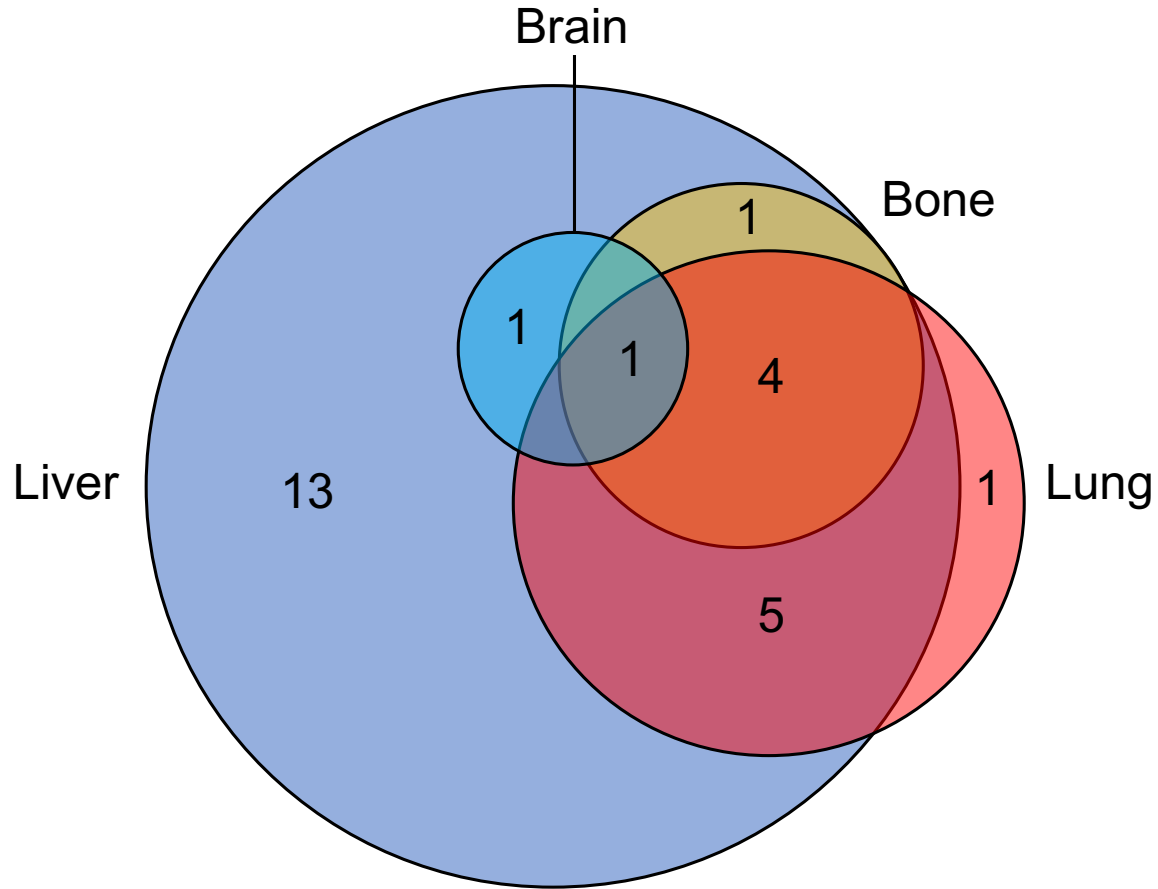
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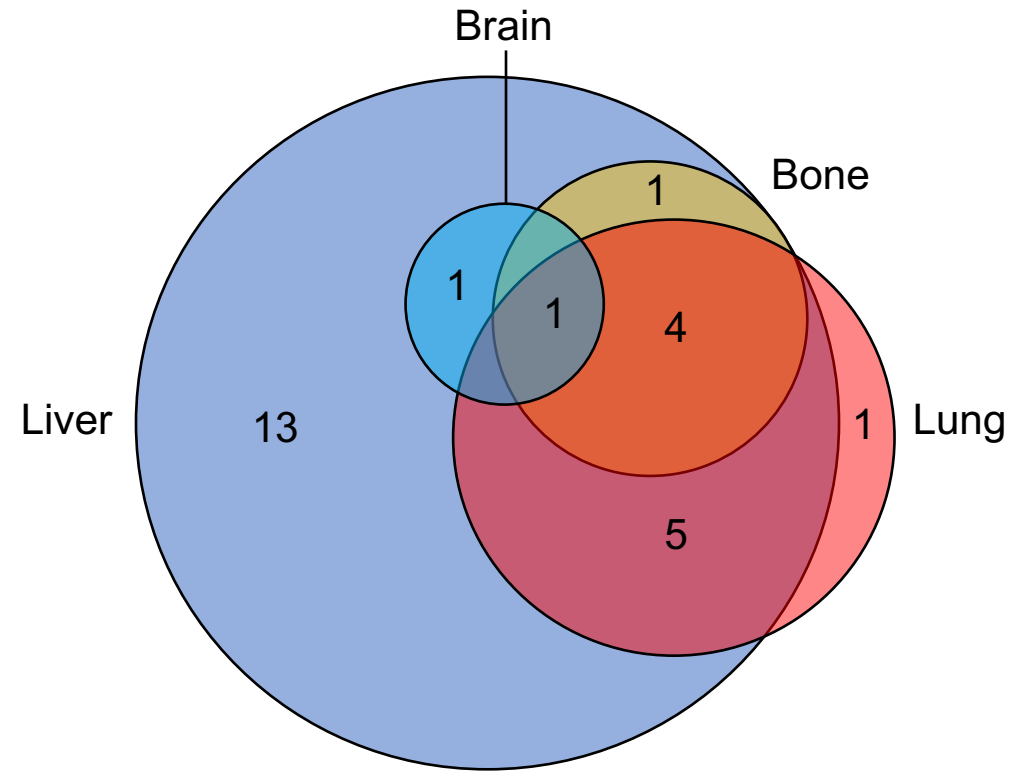


Imaging Findings - CHEST



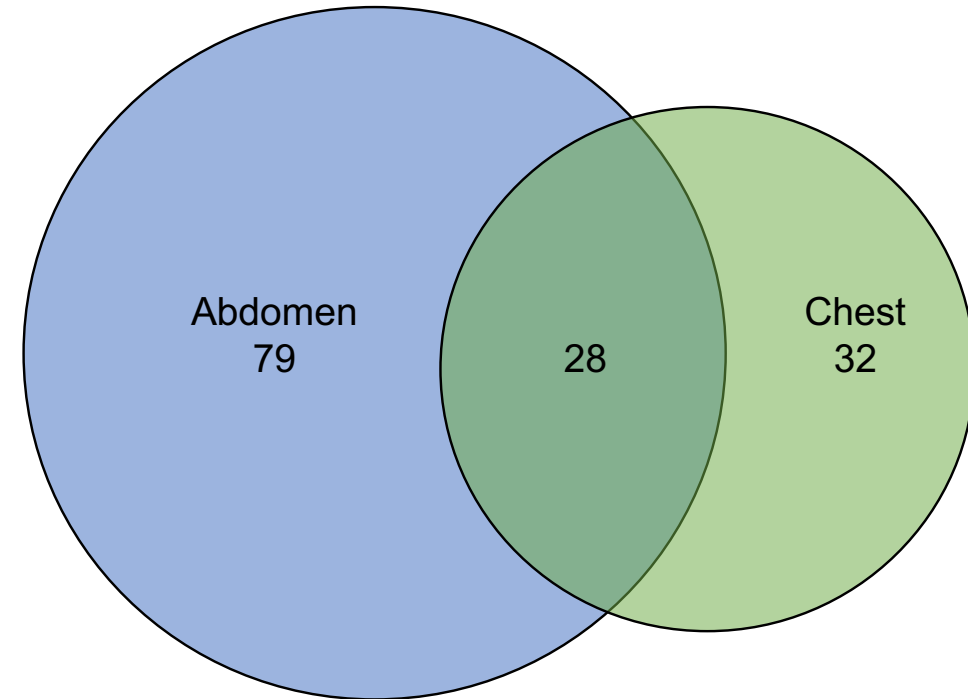
Imaging Findings - ABDOMEN

- Liver is the most common site (25/26)



Imaging Findings - ABDOMEN

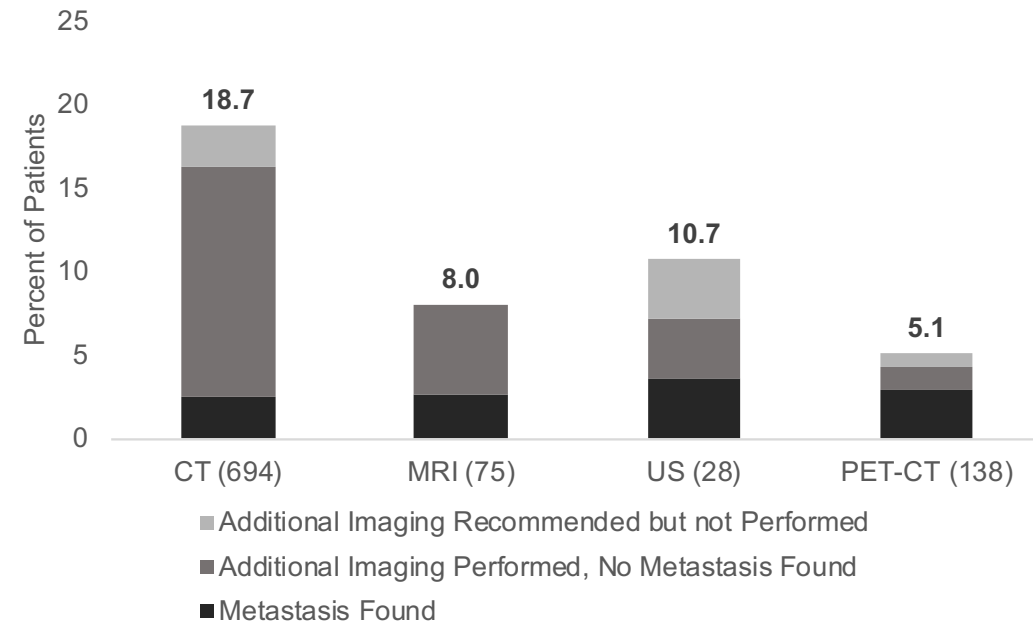
- Liver had the greatest number of NON-UM metastasis / incidental findings



Imaging Findings - ABDOMEN

- Rates varied by imaging modality
 - Non-randomized
- CT had the highest number of additional studies required for “false positives”
- Overall numbers of US, MRI, and PET studies were much lower, so hard to assess that data in a granular fashion

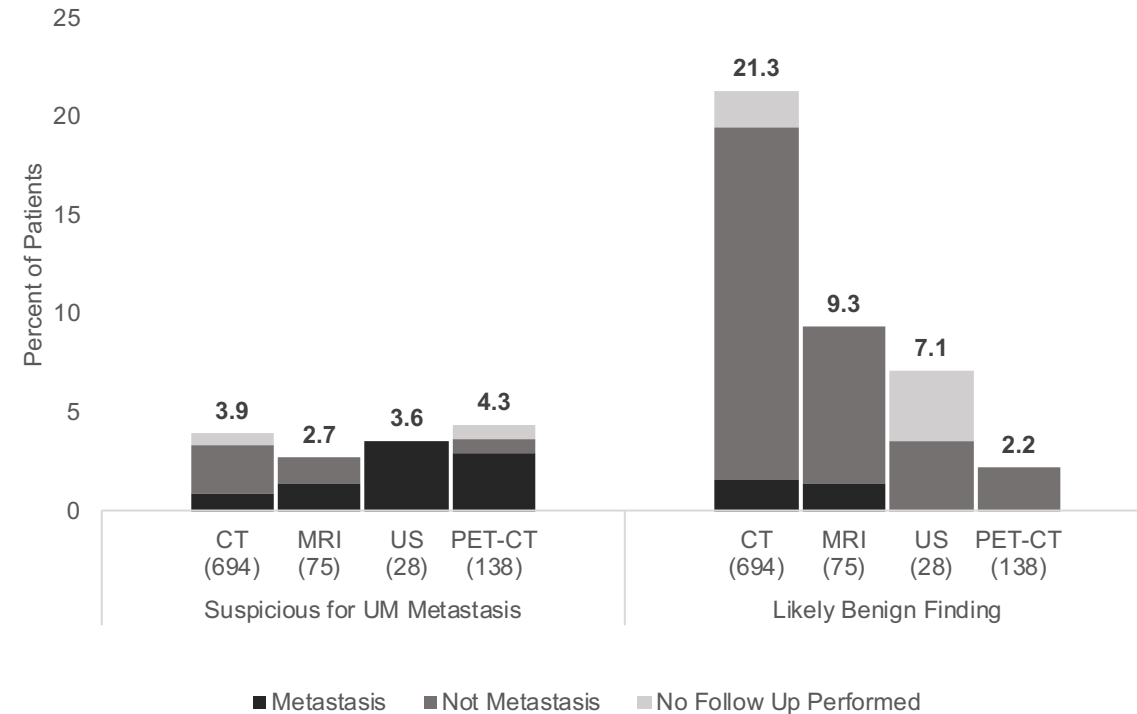
Percent of patients who were recommended additional liver imaging, by initial imaging modality.



Imaging Modalities for the Liver

- 2.5% with CT or MRI had liver lesions initially called benign that were actually found to be malignant
- 3 patients with presumed UM liver met on CT, actually had met from 2nd primary
- Radiologists were often incorrect in calling a met a met, or in calling a benign lesion benign.
- This was especially true for abdominal CT

Radiologist's interpretation of liver lesions, by imaging modality.



CONCLUSIONS

- Practice patterns varied between institutions, and within institutions
- FIELD:
 - PELVIS:
 - NO additional true mets, but additional testing for ultimately benign findings
 - CHEST:
 - Lung mets almost always accompanied by liver mets on abd. Imaging
 - Only 1/1000 patients found to have isolated lung mets
 - This approaches the additional risk of cancer from 1 additional CT scan (+ follow-up)
- MODALITY (for the abdomen):
 - Many “over-calls” and “under-calls” across all modalities
 - CT appears to pick up a very great number of benign findings relative to true findings, and these CT findings lead to a very large number of additional tests

Thank you!

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