Incidental Findings in Neuroimaging

*a Neuroradiologist’s View*

So, is my brain OK?

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Factors Influencing Incidental Findings

- Body part scanned
- Age of patients
- Whether they have any pre-disposing conditions
  - Hypertension, etc.
- Type of scan performed (i.e., amount of anatomy included)
  - Often most of the study is fMRI or other sequences not typically used for diagnosis
- Operator’s experience
  - Technologists > Students, etc.
Consent Forms

• The investigators for this project are not trained to perform radiological diagnosis, and the scans performed in this study are not optimized to find abnormalities. The investigators and Stanford are not responsible for failure to find existing abnormalities in your MRI scans.

• However, on occasion the investigator may notice a finding on a MRI scan that seems abnormal. When this occurs, a radiologist will be consulted as to whether the finding merits further investigation, in which case the principal investigator of the research study being conducted will contact you and your primary care physician and inform you of the finding.

• The decision as to whether to proceed with further examination on treatment lies solely with you and your physician.

Available at http://cafn.stanford.edu/index.php/Documents
Workflow

• Someone sees something.
  – Do not alarm subject (!)
  – (Maybe) mechanism for immediate rad consultation
  – (Maybe) screening by a more senior non-MD on site
• If deemed significant at this level, PI made aware.
• Referred to radiologist for a full report
  – Often limited, because non-clinical imaging protocol is used
• Report given to PI (maybe) with recommendations for follow-up
• Follow-up is responsibility of patient
  – Including any incurred expenses

*Consensus of workflows from Stanford Lucas Center, Stanford CNI, UCSF, and MGH
Possible Sequelae

- No action necessary (most common)
- Need for routine referral
  - Anatomic sequences not adequate for diagnosis
  - Contrast needed but not given
- Need for urgent referral
  - Chronic subdural hematoma without neurological symptoms
- Need for immediate referral or clinical evaluation
  - This in theory cannot wait for specialist read
  - Least common (fortunately!)

Issues with Referrals

- Stressful for patient
- May lead to more tests
- Financial costs
- False positives

[Diagram of a balance scale with 'Potential treatable causes' on one side and 'Stressful for patient, May lead to more tests, Financial costs, False positives' on the other side]
Incidental Findings

- Research MRI setting
  - 2 3T, 1 7T, 1 3T PET/MRI
  - Circa 1000 human scans per year
- Primarily neuro brain scans (>70%)
  - A lot of EPI
- Scans performed primarily by students & technologists (non-MD’s and non-radiologists)
Incidental Findings

• Review of 2.5 year period (2013-2015)
  – 49 cases referred, 80% Brain
  – About 2% of total

• 11 cases required contacting subject
  – 0.4%

• 2 cases leading to possible action
  – 0.1%
Cases Not Requiring Follow-up

- Perivascular spaces, VR spaces (n=9)
- Nothing (n=4)
- Arachnoid cyst (n=2)
- Arachnoid granulation (n=2)
- Sinus disease (n=2)
- White matter hyperintensities (n=2)
- Pineal cystic lesion (n=2)
- Normal pituitary (n=2)
Perivascular Spaces

*a.k.a. Virchow-Robin Spaces*
Perivascular Spaces
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Perivascular Spaces

*a.k.a. Virchow-Robin Spaces*

- CSF signal intensity
- Surrounding small vessels
- Usually bilateral
- Most common locations
  - Basal ganglia, esp putamen
  - Supratentorial WM
  - Midbrain
Arachnoid Cyst

- Located CSF collections
- CSF signal intensity
- Can be large and have mass effect
- May thin adjacent skull
- No underlying brain tissue changes
- Common locations
  - Anterior temporal tip (esp L)
  - Retrocerebellar
  - Over frontal convexities
- Almost never intervened upon
Urgent Case 1

- Small subacute subdural hematoma
  - Observation only, no intervention performed
Urgent Case 2

- Pituitary adenoma/Rathke’s cleft cyst
  - Discussion with neurosurgeon re: possible surgery
Conclusions

• If you scan, you will see abnormalities
• Be prepared
  – Inform patients via consent process
  – Know the procedure in your lab
  – Work on your poker face
• Most will be normal variants or artifacts
• Not your job to figure this out
  – Low index of suspicion for referral
• You may save a life.
• Good luck!

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This talk available @ http://cafn.stanford.edu/index.php/Lectures

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