Incidental Findings in Neuroimaging Research

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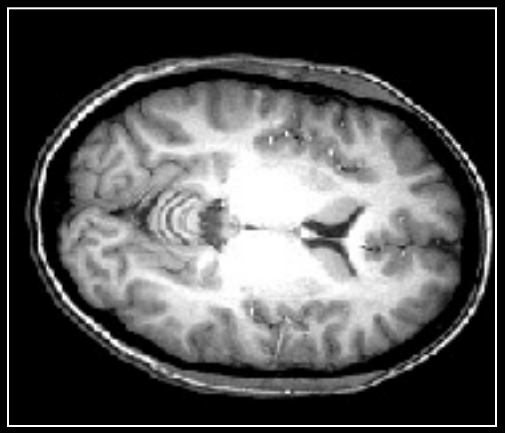
Basic fMRI Study Steps at the NIH

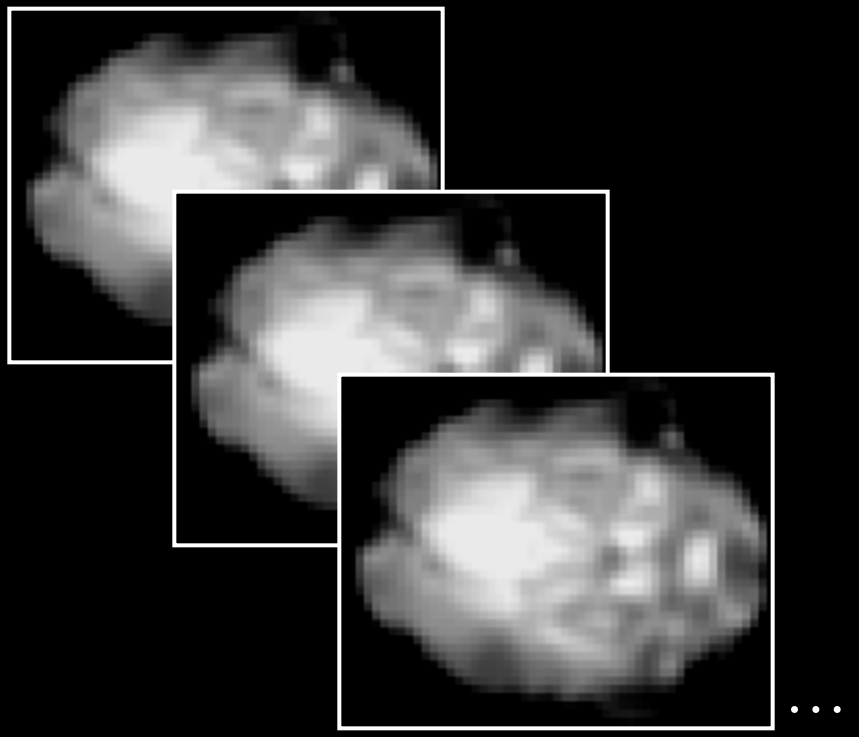
1. responsible physician puts in order for IRB-approved protocol.
2. Every new subject admitted to NIH as a patient – undergoes a basic neurological exam.
3. Subject signs consent forms. (preg. test)
4. clinical screening scan.
5. clinical scan review by radiologist.
6. results sent to responsible clinician on protocol.
7. If IF exists, responsible clinician informs patient.

MRI vs. fMRI

MRI



fMRI



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Clinical Screening Scans

-performed once a year
-takes about 20 minutes
-good but still not optimal for detection of many pathologies

3D FSPGR Series

Fast, IrPrep, TE=MinFull, TI (prep time) =300, FA=17, BW=31.25,

FOV=24, Slice Thickness=5 skip 0, Matrix =256x192, NEX =2,

Freq= A/P, Phase FOV = .80

FSE PDW Series

Fast Spin Echo, Tailored RF, TE =17, TR =3800,

Interleave, FOV =24, Phase FOV=.75, ETL=8, Matrix = 256x192, NEX =1

FSE T2W Series

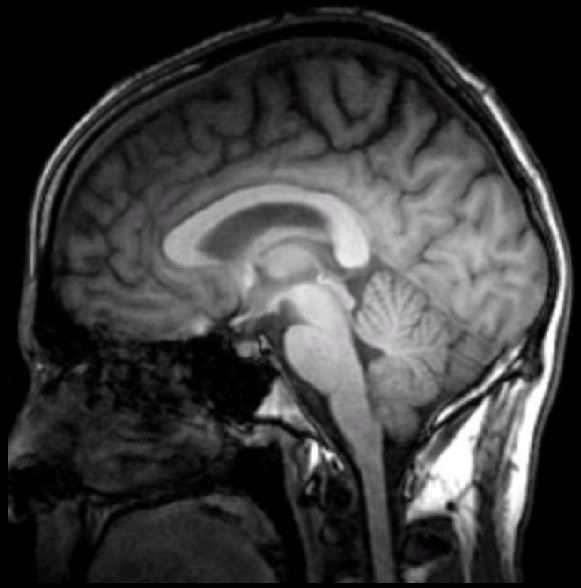
Fast Spin Echo, Tailored RF, TE =107, TR =3800, Slice Thickness =5/

Interleave, FOV=24, Phase FOV =.75, ETL =8, Matrix= 256x192, NEX =1

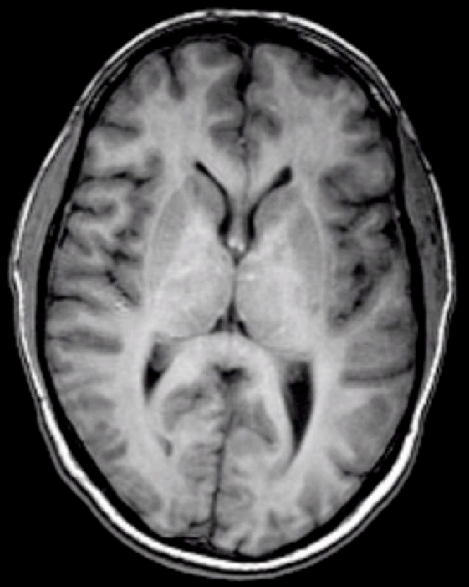
Clinical scans:

1. Sag 3D SPGR
2. Axial 3D SPGR
3. Proton Density
4. T2

1.



2.



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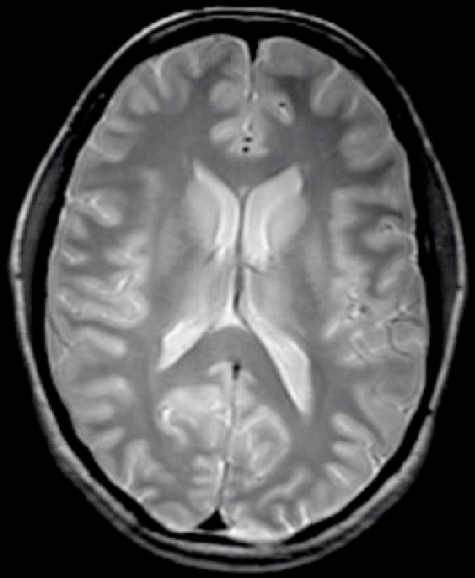

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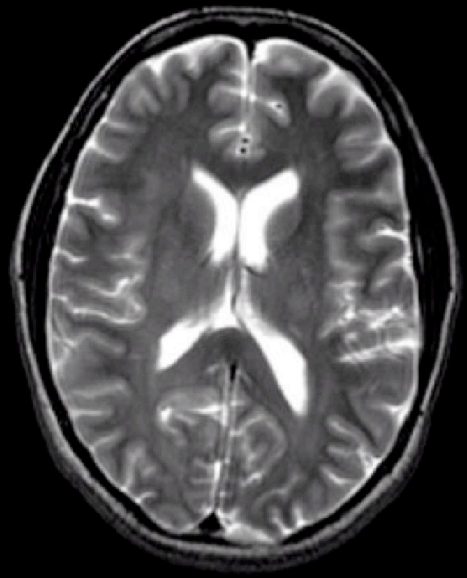
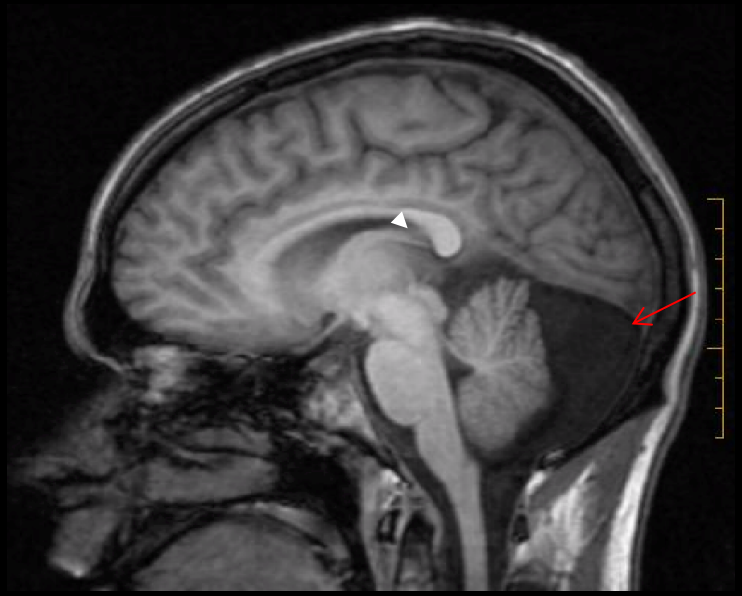


Normal volunteer 22yr old white male with prominent cysterna magna.

Sagittal



Axial

Figure 1

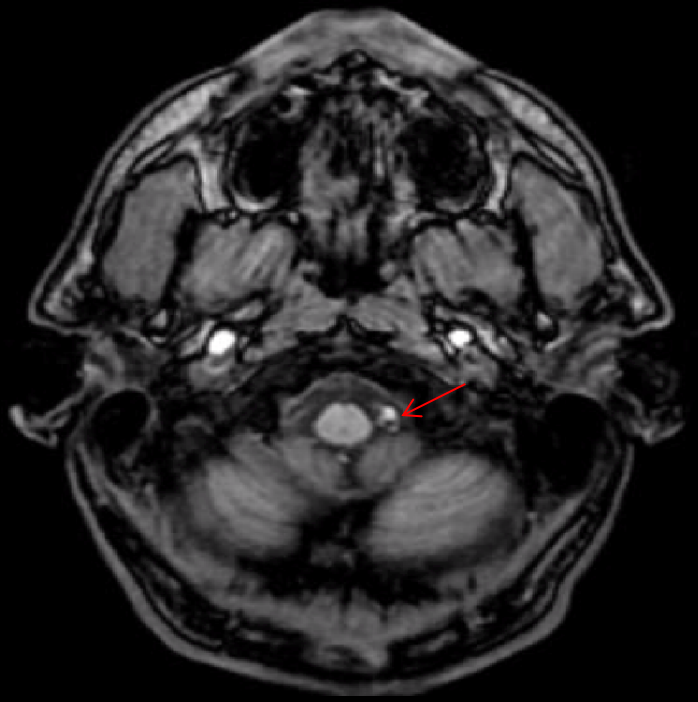
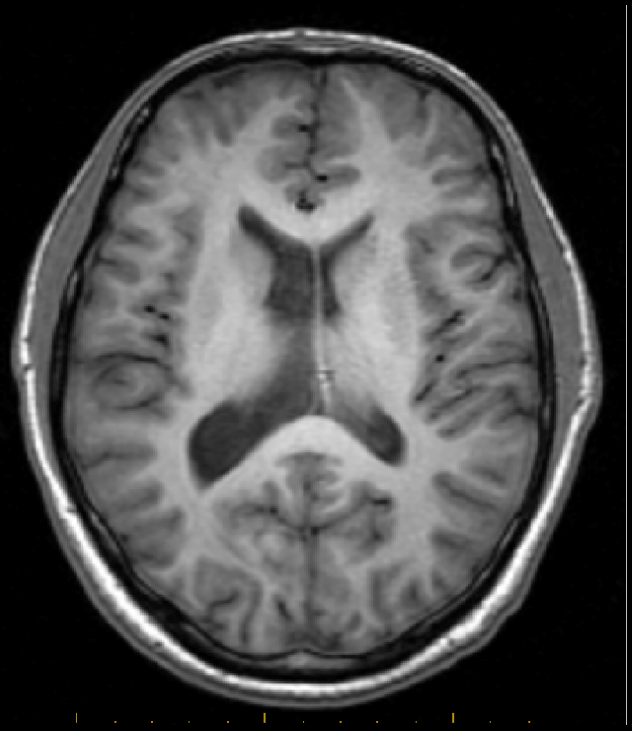


Figure 2

Normal volunteer 33yr white male with abnormal ventricle size.



Normal volunteer 26yr old female with a 1.5cm pineal cyst.

- About 2500 research scans performed on each scanner per year on each scanner.
- Many repeat volunteers, therefore about 1000 clinical scans performed a year.
  - Roughly 5 incidental findings per 1000.
- A considerable amount of non-research effort is applied
  - responsible physician entering in order (within 24 hours of scan)
  - pregnancy test (within 24 hours of scan)
  - consent forms (on day of scan)
  - radiologist viewing clinical scans (once a year for each repeat volunteer)
  - neurological exam (on obtaining patient ID)
  - Basic record keeping

Some Issues:

1) Two extremes: a) no clinical responsibility in research (no obligation to do clinical screening scans), and b) great clinical responsibility (should even do more: I.e. better clinical scans, etc..).

We need a reasonable balance between a) and b). By what criteria do we decide this? On one hand even radiologists will miss pathologies given non-optimal clinical scans. On the other hand, some pathologies are obvious to the non-radiologist even with echo planar images.

2) Having a standard: It appears that NIH approach is more conservative than academia approach. A universal protocol should be adopted. How would this be done most effectively? How would it be enforced?

Many more....