Neuroimaging Working Group Update

University of Utah, Salt Lake City

April 5, 2014

Neuro-Imaging Group Members (to date)

- 15 members (9 institutes)
  - Imperial College of London
  - Medical University of Graz
  - Mass General Hospital
  - University of Edinburgh
  - University of Gothenburg
  - University of Leuven
  - University of Rostock
  - University of Cambridge
  - Institut Hospital del Mar d'Investigacions Mèdiques

Image courtsey of www.infoplease.com

Image courtsey of commons.wikimedia.org

Courtesy of Lisa Cloonan, BA

Overall goals of the group

- Assess the full potential for genetic discovery of the neuroimaging data available through the participating ISGC sites
- Harmonize the neuroimaging phenotypic datasets in relation to the genotypic and clinical data to facilitate future analyses
- Expedite and properly power the ongoing analyses (e.g., WMH GWAS)
- Facilitate future analyses of neuroimaging phenotypes (DWI size, CMBs, angiography)
- Develop neuroimaging phenotype assessment standards for future genetic and genomic studies in stroke
- Foster collaborations for future genetic discovery in stroke
  - facilitate future ISGC publications/ grant applications

Completed projects

- Recommendations to the ISGC Protocols and Standards
  - submitted

- WMH measurements harmonization pilot study
  - volumetric vs. ordinal WMH (LADIS) grading
    - WMH ratings were consistent among the readers (ICC=0.82)
    - Range of κ between any two readers = (0.755 - 0.93)

Ongoing projects

- Preliminary ordinal WMH GWAS (SIFAP)
  - Lead: Anne-Katrin Giese

- GWAS of MRI phenotypes in stroke (lead: Natalia Rost)
  - ➢ MRI-GENIE (MRI-GENetics Interface Exploration) study
    - MRI database QC and annotation (NINDS-SiGN MRI repository)

    - volumetric WMH/DWI analysis pipeline -- MIT-SiGN collaboration
      - permission to share: MIT is approved as the SiGN analysis site

- Genetics of posterior circulation stroke
  - Leads: Petrea Frid, Arne Lindgren, Jesper Petersson (Lund University)

Individual MRI QC and folder annotation

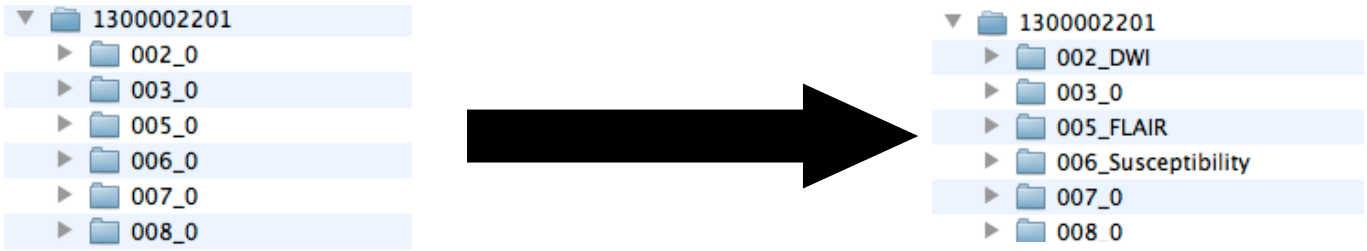
NINDS-SiGN MRI Repository

Study Name	Center	Total # Scans
ISGS/SWISS	Mayo Florida -UVA	425
GCNKSS	U Cincinnati	245
MGH-GASROS	MGH	542
MIAMISR	U Miami	262
GEOS	U Maryland	76
BASICMAR	IMIM-Hospital del Mar	124
BRAINS	Imperial College London	70
GRAZ	Medical University Graz	373
Gothenburg	Sahlgrenska Academy at University of Gothenburg	401
Krakow	Jagiellonian University Medical College	224
Lund	University Hospital, Lund	195
Leuven	University Hospitals, Leuven	448

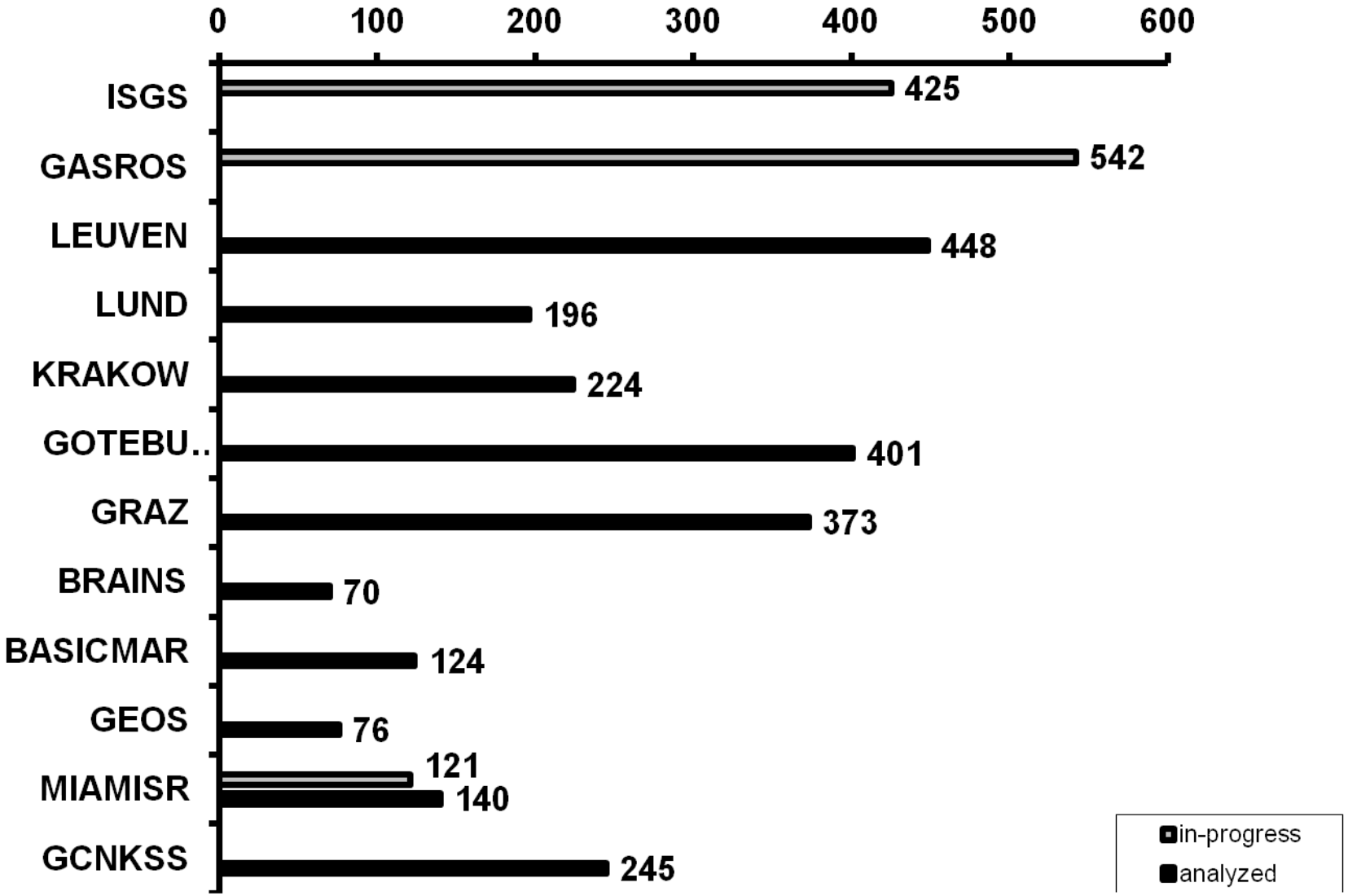
Total =3,385

Individual MRI QC and annotation

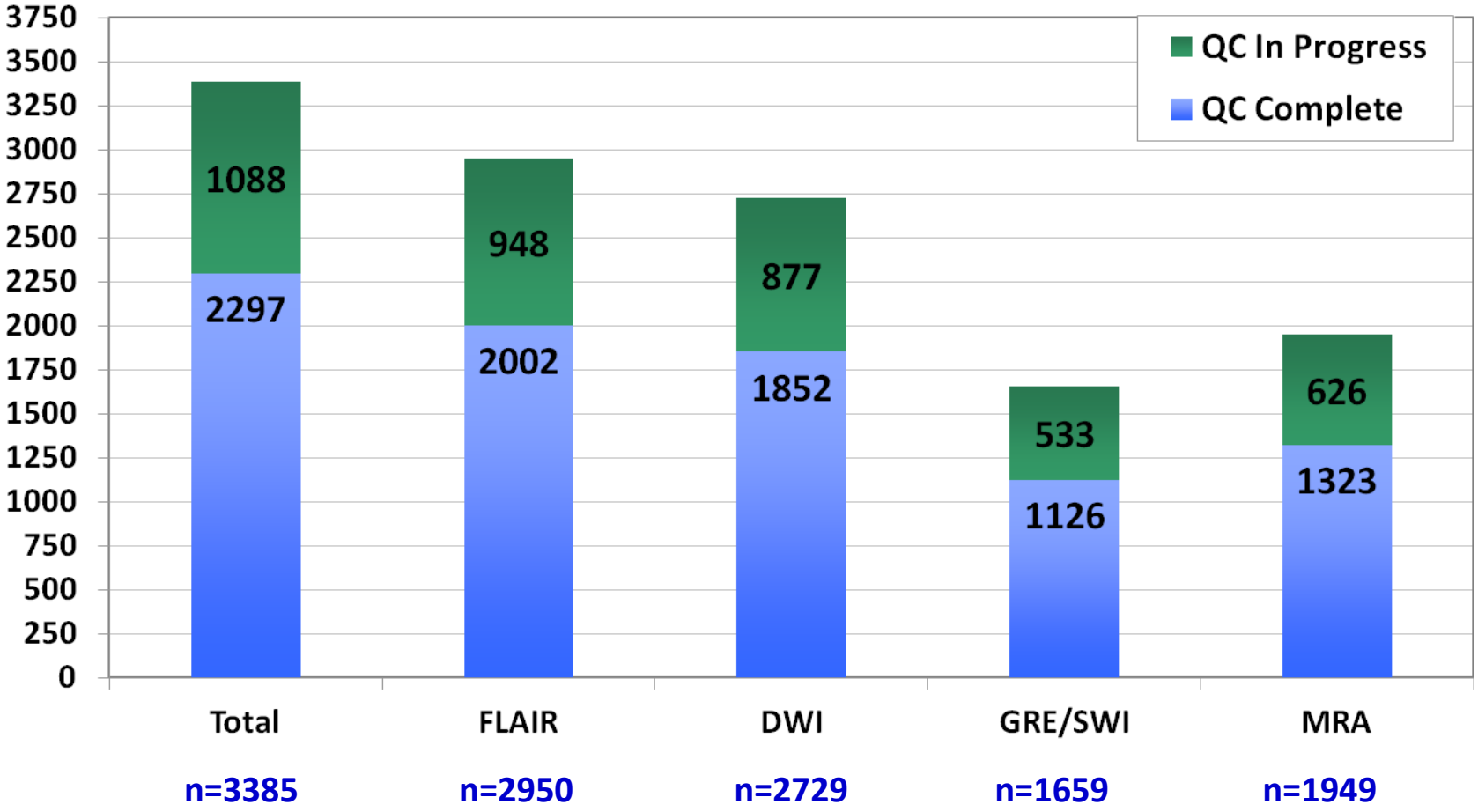
Patient name	Study Description	Modality	ID
▼ 1300002201 (7 series)	U01_13	MR	0
unnamed		MR	2
unnamed		MR	3
unnamed		MR	5
unnamed		MR	6
unnamed		MR	7
unnamed		MR	7
unnamed		MR	8
▶ 1300002218 (8 series)	U01_13	MR	0
▶ 1300002294 (7 series)	U01_13	MR	0
▶ 1300002410 (5 series)	U01_13	MR	0
▶ 1300002413 (5 series)	U01_13	MR	0



SiGN MRI repository QC



Current and projected QC data: SiGN MRI sequences



Next steps

- Individual MRI QC and annotation
  - April 2014
- Compile a complete database of ISGC MRIs
  - Clinical characteristics
  - GWAS data
- Volumetric MRI analysis pipeline project
  - proceed with all available FLAIR and DWI volumetric analysis using the existing pipeline
  - Conduct GWAS of neuroimaging outcomes (WMHv & DWIv)
- Plan for future proposals (?process)
  - MRI phenotype spin-off projects/validation etc.