IRCCS : the Italian Network of Neuroscience and Neurorehabilitation

Structure, Activities and Opportunities

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IRCCS Network of Neuroscience and Neurorehabilitation

- 24 Research Hospitals (IRCCS)
  - CLINICAL ACTIVITIES
    - Neurology (22)
    - Child Neurology (8)
    - Neurosurgery (9)
    - Neurorehabilitation (10)
  - Mission: Translational Research
  - Funding: Italian Ministry of Health & Regional Health System
Network of Neuroscience and Neurorehabilitation
Research Hospital (IRCCS)

- Fondazione Istituto Neurologico Carlo Besta - MI
- Fondazione Ca' Granda Ospedale Maggiore Policlinico - MI
- Ospedale San Raffaele - MI
- Istituto Di Ricerca Farmacologiche Mario Negri -MI
- Fondazione Don Carlo Giocchi Orbassano - MI
- Istituto Alkoologico Italiano - MI
- Istituto Clinico Humanitas - Rozzano (MI)
- Fondazione Policlinico San Matteo - PV
- Istituto Neurologico Casimiro Mondino - PV
- Istituti Clinici Scientifici Maugeri - PV
- Centro San Giovanni Di Dio Fatesibenefratelli - BS
- Eugenio Medea - La Nostra Famiglia - Bosco Parco (LC)
- Fondazione “Opera San Carlo” - VE
- Istituto delle Scienze Neurologiche di Bologna - BO
- Istituto Giannina Gaslini - GE
- Fondazione Stella Maris - Calambrone (PI)
- Fondazione Santa Luca - Roma
- Ospedale Pediatrico Bambini Gesù - Roma
- Istituto San Raffaele Pisana - Roma
- Fondazione “GB Bietti” - Roma
- Istituto Neurologico Mediterraneo Neuromed - Pozzilli (IS)
- Istituto di Ricerca Diagnostica e Nucleare - NA
- Centro Neurolesi Bonino Pulejo - ME
- Oasi Maria SS - Troina (EN)

Global Clinical and Research Capacity of the Network

Neurology, Child Neurology, Neurosurgery, Neurorehabilitation

- In-patients • 7,385 beds
  • ≈ 126,000 admissions/year

- Out-patients • ≈ 1,060,000 visits/year

- Active Clinical Trials • 1,006

- Impact Factor • 14,349 (2016)
Network of Neuroscience and Neurorehabilitation

**Current Programs and Activities**

- Consortium Agreement
- Web Site
- Genomic and Proteomic Platforms
- Teleneurology and Teleneurorehabilitation Platforms
- Harmonization and Research Projects
  - Advanced Neuroimaging Protocols
  - Genomics and Proteomic procedures and protocols (including informed consent for genetics)
  - Teleneurorehabilitation procedures and protocols

Network of Neuroscience and Neurorehabilitation

**Planned Programs and Activities**

- Harmonization
  - Clinical Protocols
  - Neuroimmunology protocols
- Disease Registries
- Database of Biorepositories and Biobanks
- Teleneurology Platforms
- Cell Factory
- Structured interactions with Research Organizations, Research Institutes, Industry, Patients’ Associations
  - Human Brain Project
  - Italian Institute of Technology
  - Human Technopole
IRCCS Network
Advanced Neuroimaging

Harmonization Procedures
MRI protocols across multiple sites and scanners

Research project funded by the Italian Ministry of Health

Sites: 22 IRCCS

March 2017
June 2018

General Objectives

Clinical diagnostic and prognostic power
Increase the diagnostic and prognostic power of quantitative MRI measures

Generalization of results
Harmonization of imaging protocols across projects, vendor platforms (GE, Philips, Siemens) and recruitment sites to minimize intra-scanner and inter-scanner variability

Collaborations
Necessary to maximize efficacy and efficiency dealing with increasingly competitive funding sources

Sharing knowledge and experience
Exchange of knowledge and experience of clinicians and technicians in this field to increase scientific competitiveness at international level

Integration
Infrastructure to connect and share data

National & International Research Organizations and Programs
Specific Aims & Methodology

1. WP 1 Clinical protocols
   Identifying standard and advanced MRI protocols for different Central Nervous System (CNS) pathologies

2. WP 2 Clinical Scanners
   Developing methods and guidelines for the acquisition, processing and sharing of neuroimaging data in multi-site studies in clinical setting

3. WP 3 Pre-clinical scanners
   Developing methods and guidelines for the acquisition, processing and sharing of neuroimaging data in multi-site studies in pre-clinical setting

4. WP 4 Infrastructure
   Implementation of an infrastructure for the sharing of data among sites (big data)

5. WP 5 Ethics and Privacy
   Ethical and privacy implications in sharing data in multi-site study

IRCCS and Human Brain Project

MIP (Medical Informatics Platform)
- Establish a framework for Evidence Based Medicine based on Multiscale Disease Signature
- Develop federated e-infrastructure
- Develop machine learning algorithms
- Derive biological signatures of brain disease through a data-driven approach
HBP-MIP validation in 3 IRCCS of the Neuroscience Network

Show-Case on Dementias

Expected Outcome
1. Assessment of the added value
2. Classification performance assessments
3. Assessment of agreement between data-driven classification and clinical diagnosis. Disagreement will be formally discussed among clinical experts
4. Validation of MIP as second opinion tools

IRCCS Telerehabilitation Network

14 Centres Involved
- 9 with the same technology
- 5 with different ICT devices
- 4 additional centres will join the net

- Implementation of National Cloud Server
- Each IRCCS shares the Server, with its own private account
- No restriction concerning additional IRCCS interested in joining the net
IRCCS
Telerehabilitation Network

AIMS

• Harmonization of Procedures and Protocols

• Clinical trials on Stroke, Parkinson Disease, Multiple Sclerosis, Dementia and other neuropsychiatric disorders to compare the results of telerehabilitation on motor and cognitive function and independence in self-care and domestic life, with those of traditional in-home rehabilitation

• Feasibility, safety and user satisfaction (patients living at home and their caregivers)

• Evaluation of TR-related cost-effectiveness

IRCCS contribution to Human Technopole

Neurogenomics

Clinical Research Centers Outstation

5 IRCCS
### Activities

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<thead>
<tr>
<th>Human Technopole - Neurogenomics</th>
<th>Clinical Research Centers Oncation</th>
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<tbody>
<tr>
<td>• <strong>Cohorts of extensively characterized patients</strong></td>
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<tr>
<td>• Clinical data</td>
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<tr>
<td>• Imaging and neurophysiology</td>
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<tr>
<td>• Molecular profile (gene-panel and proteomic approaches, other)</td>
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<td>• Other biomarkers</td>
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<td><strong>Initial patient stratification</strong></td>
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<tr>
<td>• Sample collection and storage (SOPs)</td>
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<tr>
<td>blood, plasma, serum, CSF, urine, feces, skin, other</td>
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<tr>
<td>• Brain Bank</td>
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<tr>
<td>• Molecular-based multicenter clinical trials</td>
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<td>• Innovative genomic analysis</td>
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<td>• Genomic screening for personalized medicine</td>
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<td>• Large scale data resources of genomic information</td>
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<td>• Drug discovery tailored to genomic background</td>
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### Conclusions

- **Network of 24 IRCCS of Neuroscience and Neurorehabilitation**
  *Support: Italian Ministry of Health, Regional Health Systems*
  *National and International funding agencies*

- **Centres of Excellence**
  - Diagnosis, treatment, rehabilitation and long-term management of neurological disorders of children and adults
  - Translational Research in Neuroscience

- ✓ Large cohorts of extensively characterized patients
- ✓ Large database and biorepositories
- ✓ Critical mass for national and international collaborative studies and advanced education programs