

# NEUROWEB

## Integration and sharing of information and knowledge in neurology and neurosciences

**NEUROWEB project improves healthcare delivery achieving knowledge-based, personalised diagnosis and therapy through vertical integration of existing clinical and genetic databases. NEUROWEB stimulates the sharing of knowledge on cerebrovascular diseases using an on-line web platform.**

### Objectives of the project

The amount of biomedical information that can be accessed through the Internet has reached a level no one could have dreamt of just ten years ago. The success of the genome sequencing projects has created an enormous amount of data that cannot be manually analysed. Since disease phenotypes arise from complex interaction between genetic factors and environment, the value of high-throughput genomic research would be dramatically enhanced by associations with key patient data. These data are generally available but of disparate quality and sources. The development of a data management system which integrates genomic databanks, clinical databases, and data mining tools embedded into a common resource accessible to health care professionals would be extremely advantageous.

Ischemic stroke is a major health problem in the developed countries. It is a complex, multigenic disorder, since there are several subtypes and risk factors, and most of the cases have non-mendelian inheritance. The integration and the analysis of a large number of well-defined clinical, radiological and molecular data will improve the evidence on the different roles played by genetic and environmental risk factors in stroke pathophysiology.

Within the framework of cerebrovascular disease, the objectives of the **NEUROWEB** project are:

- To integrate clinical and genetic databases of the participating centres, different for structure and language, into a single virtual database;
- To query the genetic databanks containing human genetic profiles present on the web;
- To generate new knowledge on single patients with cerebrovascular disease, in order to achieve personalised prevention, diagnosis and therapy;
- To promote collaborative research practices among the research communities involved in the project in order to share and enhance knowledge in the neurological domain.

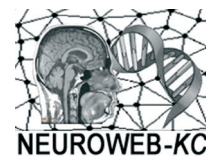
The final aim of the **NEUROWEB** project is to foster vertical integration between clinical and genetic data in other common and complex diseases (i.e. cardiovascular diseases and tumours), in order to improve and personalise healthcare delivery in EC.

### Project Description

**NEUROWEB** knowledge will be initially based on four existing databases referring to patients affected by cerebrovascular diseases. The four **NEUROWEB** hospitals will make available their genetic, biological, clinical, and imaging data, according to each partner's specialization. The genetic database will be based on innovative technologies such as cDNA-microarray for

### Scenario

The exploitation of genomic information into the daily clinical practice requires a data management system which integrates genomic databanks, clinical databases, and data mining tools. **NEUROWEB** purpose is to create an innovative system based on integrated biomedical data from heterogeneous and various sources, aimed at obtaining enhanced knowledge on the single patient for individualized prevention, diagnosis and treatment.



**“The final aim of NEUROWEB is to foster vertical integration between clinical and genetic data, in order to achieve knowledge-based and personalised healthcare”**

single nucleotide polymorphisms (SNPs) genotyping. These data will constitute the kernel of the project and will be used also to validate currently used protocols in the participating centres.

From a technological point of view, **NEUROWEB** is aimed at integrating this information using metadata profiling with the support of ontologies to improve user access and distribution of information in a

standard web environment. In particular, specific support systems will be developed to interconnect Clinical Information Systems (CIS) and static HTML web sites in a common dynamic environment. Web service technology will support such integration. The intelligent navigation tool will be supported by a knowledge base, flexible and easy to update system, containing the logic paths and the search templates offered to the final user.

The success of the **NEUROWEB** will be measured in terms of genetic discoveries enabled and improved knowledge of cerebrovascular diseases' etiology. Specifically, identifying which genes and pathways are causal in has the potential to provide a new and solid foundation for biomedical research. **NEUROWEB** will also allow continuous updating and verification of clinical protocols adopted in participating clinical institutions.

### Expected Results & Impacts

**NEUROWEB** will verify finalized vertical integration of patient's data. The model will improve clinical practice and biomedical research, and could be easily extended to other common and complex diseases.

**NEUROWEB** will allow health care managers to verify the appropriateness of the different clinical protocols (aimed to direct all the steps of the diagnostic and therapeutic process) applied by their care-givers, both in terms of success and costs.

**NEUROWEB** will promote the potential diffusion of advanced technologies as gene-chips in advanced medical practice and consequent cost-effective “genomic medicine”.

The exploitation of **NEUROWEB** results envisages the enlarging of such knowledge with the adhesion of other institutions, both enhancing the quality of their own offered services and improving the **NEUROWEB** itself with their data (**NEUROWEB** Knowledge Club).

(the project is expected to start 1st July 2006)

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### Partners:

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- University of Milan – BICOCCA (IT)
- Regione Lombardia (IT);
- Erasmus University of Rotterdam (NL);
- Medical School of Patras University (GR);
- Orszagos Pszichiatrai es Neurologiai Intezet (HU);
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**Instrument:** STREP

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non-mendelian diseases.