



**How to integrate biomedical data to support computer-based understanding of cerebral aneurysms, leading to individualised disease management and interventional planning?**

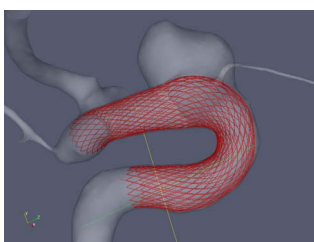
**Clinical challenge**

Modern imaging technology allows today's radiologists to identify 'silent' lesions - aneurysms - within the blood vessels of the head, typically during routine scans after an accident. Aneurysm rupture is often fatal so, with a rupture risk of around 1/10,000 people annually, such lesions require diagnostic and treatment decisions. Today these decisions are made on the interpretation of comparatively simple data, leading to significant and costly overtreatment.

**Aneurysm management would benefit greatly from an integrated approach to clinical decision-making, personalised risk-assessment and interventional planning.** This would significantly reduce healthcare costs by treating only the patients at risk and avoiding hazardous procedures in those who are not; and where treatment remains necessary, technology could improve individualised minimally-invasive surgery.



A cerebral aneurysm is a bulge on a blood vessel in the head; typically it enlarges over time - Courtesy of the University of Geneva



Interventions to divert flow from the aneurysm can be visualised and evaluated - Courtesy of Universitat Pompeu Fabra, Barcelona

Cerebral aneurysm disease has high prevalence (around 3% of the population), but rupture has low incidence, so data on ruptures is sparse and distributed. **Sharing patients' electronic health records across European regions**

could improve evidence on risk factors and treatment outcomes, and optimise management even in relatively small clinical centres. Still, the legal and ethical implications of such **shared data access need to be addressed effectively, to meet the requirements of data privacy.**

**Achievements**

@neurIST ([www.aneurist.org](http://www.aneurist.org)), a **17 M€ EC-funded integrated project** (Jan-06 to Mar-10) brings together **28 European public and private organisations** to focus on these challenges, with the **goal of developing a novel IT-enabled system for cerebral aneurysm management.** It has four main strands:

- Extracting automatically the key data from publicly-available scientific and genetic data
- Deriving rich quantitative information on each patient, by complex analysis of medical images
- Assessing individual patient data against anonymised summary statistics to estimate prognostic risk
- Planning personalised interventions, including the customisation of medical devices

Supporting these is the development of a unique IT infrastructure that links the clinical databases and controls the automated use of remote high-performance computers. These **concepts are being clinically evaluated at five reference centres across Europe, and prototypes have already received near-90% scores in assessments by clinical specialists.**

***By uniting currently fragmented clinical data and integrating concepts of the Virtual Physiological Human, @neurIST will have a major impact on the management of cerebral aneurysms***

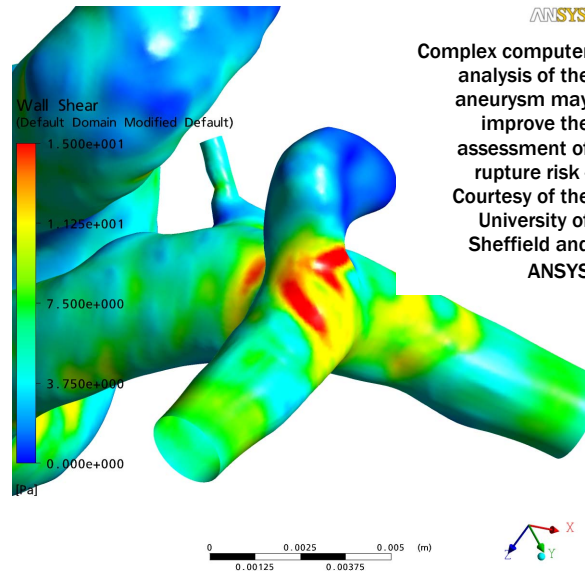
## Benefits and Implementation

The @neurIST system is an example of the vision behind the Virtual Physiological Human initiative ([www.vph-noe.eu](http://www.vph-noe.eu)) and demonstrates the healthcare benefit available to EU citizens from processed information. The @neurIST infrastructure includes the facility for secure access to public and protected health databases located anywhere in the world, meaning that, subject to appropriate consents, it could grow to become a worldwide means of aneurysm patients receiving optimised treatment based on the sum total of past experience in the disease. It also includes mechanisms for researchers to seek answers to clinically-significant questions by querying the anonymised databases for patterns of results.



Similar cases can be retrieved using automatic retrieval techniques. Courtesy of the Fraunhofer Institute

As the project enters its final phase, work is accelerating to find ways of converting the prototype into a system for sustainable use in the clinic. Additionally, many components of @neurIST should be reusable in the study of other diseases, and this technology migration is also being explored. The long-promised integration of disparate medical and research data with complex processed biomedical information may finally be shown to bring benefit to patients, and economy to care costs.



ANSYS  
Complex computer analysis of the aneurysm may improve the assessment of rupture risk - Courtesy of the University of Sheffield and ANSYS

## Partners:

Universitat Pompeu Fabra, Université de Genève, The University of Sheffield, Ecole Polytechnique Fédérale de Lausanne, Fraunhofer Institute, Institut Municipal d'Assistència Sanitària, Super Computing Solutions, Philips Medical Systems, Erasmus Medical Center, Royal Institute of Technology, GridSystems, ANSYS, NEC, University of Oxford, InferMed, Advanced Simulation & Design, William Cook, Institut National de la Santé et la Recherche Médicale, IDAC, Neuroangiografia Terapèutica, Hospital Clínic de Barcelona, University of Bedfordshire, Medical University of Pécs, Universitaet Wien, Universitätsklinikum Freiburg, Durham University, King's College London

**Timetable:** from 01/06 - to 12/09

**Total cost:** € 17.356.730,92

**EC funding:** € 12.605.239

**Instrument:** IP

**Project Identifier:** FP6-IST- IST-2004-027703

## Important Links:

Project website: <http://www.aneurist.org>

Publication: White Paper - An introduction to the @neurIST System Architecture (April 2009)

[http://cilab2.upf.edu/UserFiles/File/PUBLIC\\_DELIVERABLES/Architecture\\_White\\_Paper\\_v2\\_1.pdf](http://cilab2.upf.edu/UserFiles/File/PUBLIC_DELIVERABLES/Architecture_White_Paper_v2_1.pdf)

eHealth Research: [http://ec.europa.eu/information\\_society/activities/health/research](http://ec.europa.eu/information_society/activities/health/research)

eHealth FP6 Projects: [http://ec.europa.eu/information\\_society/activities/health/research/fp6projects](http://ec.europa.eu/information_society/activities/health/research/fp6projects)

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