

INFOBIOMED

Structuring European Biomedical Informatics to Support Individualised Healthcare

INFOBIOMED aims at enforcing European Biomedical Informatics as an integrative discipline with a view on supporting individualised healthcare. Biomedical Informatics aims to take advantage of synergies derived from a joint consideration of both Bioinformatics (BI) and Medical Informatics (MI), facilitating the discovery of novel diagnostic and therapeutic methods.

Objectives of the project

The discovery of the human genome sequence has evidenced the need for a strong collaborative effort between Bioinformatics (BI) and Medical Informatics (MI). Biomedical Informatics (BMI) is the emerging discipline that aims to combine these fields and facilitate the discovery of novel prognostic, diagnostic and therapeutic methods. Unfortunately, the development of BMI is currently hampered by the traditional independence of both BI and MI, so a collaborative effort is needed to stimulate the crossing of boundaries, practices and languages for mutual benefit.

“The aim of Bio-medical informatics is to promote individualised healthcare”

The **INFOBIOMED** network aims to set a durable structure for such a collaborative approach at a European level, and its specific objectives are:

- To enable systematic progress in clinical and genetic data interoperability and integration.
- To advance the development, exchange and interfacing of methods, tools and technologies used in both MI and BI.
- To enable pilot applications in particular fields that demonstrate the benefits of a synergetic approach in BMI.
- To create a European BMI community that extends

beyond the proposed core network to serve as an open forum for dialogue between the actors involved.

- To widely spread the knowledge acquired and developed in the framework of the network to the scientific community, healthcare professionals, citizens, industry, authorities and other stakeholders.
- To enable a robust framework for education in BMI, as well as training and mobility of involved researchers that allows for the creation of a solid European BMI research capacity.
- To create a long-lasting, self-sustainable structure in the European BMI field.

Project Description

The Joint Programme of Activities in **INFOBIOMED** has been designed to cover all the significant aspects that are relevant to Medical Informatics and Bioinformatics and that have the potential to provide a space for synergy between them. These aspects are included in two separate blocks of activities, one for data interoperability and management and the other for methods, technologies and tools. These two blocks are divided in several activities that reflect the main different areas that require specific effort towards synergy:

Scenario

There is a great need to gain more insight in the complexity of periodontitis, to design new treatment strategies and devise preventive measures. Periodontitis is an excellent model to study complex chronic inflammatory diseases because of its multifactorial etiology (genetics, infection and environment), relative high prevalence and broad and easy access to diseased patients and control cases, as well as tissue samples. **INFOBIOMED** aims to build a biomedical informatics platform to assist with understanding and managing the disease. Existing data banks need integration, further genotyping support and modern informatics approaches for data analysis, such as clinical data image analysis tools (including radiological images). Biomedical informatics methods and tools can contribute to the study of the etiology of periodontitis and the development of gene based disease classification schema that may be relevant to differential treatments.

- Data interoperability and management: Data characteristics and ontologies; Integrative approaches; Ethics and confidentiality issues;
- Methods technologies and tools: Data analysis and information retrieval; Image visualisation and analysis; Information systems and decision support tools.

The knowledge gathered in the framework of these activities will be then tested into some 'vertical' pilot applications that aim to cover the whole range of information levels from molecule to population, from a practical perspective that works as test-bed for the integrative approach pursued. Four pilot applications are envisaged within **INFOBIOMED**:

- **Pharmainformatics**, aimed at investigating the impact of BMI at the different stages of the drug discovery process, from the target identification to lead optimisation.
- **Genomics and infection**, focused on the study of host and pathogen genetic polymorphisms, protein interactions and transcriptional/ translational control and how these impact on microbial virulence and host immune responses to infection.
- **Genomics and chronic inflammation**, which deals with the clinical management of a complex disease such as adult periodontitis.
- **Genomics and colon cancer**, targeted at the information management of screening programmes in families with high-risk of developing colon cancer.

Expected Results & Impacts

The **INFOBIOMED** Network of Excellence addresses the interaction between Medical Informatics and Bioinformatics, which has a great potential for synergetic development. Indeed, the new genetic and proteomic data has brought forth the possibility of developing new targets and therapies based on these findings, of implementing newly developed preventive measures and also of discovering new research approaches to old problems. To carry out these tasks, we must be able to deal with the vast amounts of data generated in the laboratory by functional genomics and proteomics and integrate it into electronic health records. Therefore, if we couple Bioinformatics with the tools and techniques that deal with clinical information (e.g. electronic health records, clinical decision systems, image- and signal-processing), we have the means to correlate essentially genotypic information with expressed phenotypic information.

New discoveries can increase the success rate against some diseases. Most diseases have both a genetic component and an environmental component; patients' lifestyle and where they live might have a great influence on the development of certain diseases.

To fully enhance our understanding of disease processes, to develop more and better therapies to combat and cure diseases and to develop strategies to prevent them, there is a need for synergy of the disciplines involved, which include, among others, Medicine, Biology, Computer Sciences, Medical Informatics, Bioinformatics, Pharmacology and Epidemiology.

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- Other Participants
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- Università degli studi di Siena (IT)

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