Approaching the Nanomedicine field from Biomedical Informatics

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Abstract

The new discipline of Nanoinformatics represent a solution to manage the new information arising from the fields of nanotechnology and nanomedicine. It aims at integrating it with existing biomedical informatics data, tools and methods. We present here an overview of several activities which have been carried out by our group to approach this new domain. For this purpose we have initiated the analysis of existing information resources in nanomedicine and developed a general framework and a catalogue to organise them. We have also adapted a knowledge management system to integrate nanomedicine available through the Web 2.0. Finally we are participating in several research projects (ActionGrid, NanoSost, Ibero-NBIC) and in standardization initiatives in this field (ISO Technical Committee 229 – Nanotechnologies. Joint Working Group1: Terminology and Nomenclature).

Keywords:

Biomedical informatics, Nanoinformatics, Nanomedicine, Nanotechnology.

Introduction

As Clinical Informatics addresses information processing issues at the level of the individual, Imaging Informatics works with tissues and organs data and Bioinformatics deals with molecular and cellular information, Nanoinformatics involves the development of effective tools and technologies relevant to the application of nanoscale science into medicine. Nanoinformatics could reuse methods, tools and systems already developed under the realm of biomedical informatics (BMI) to facilitate collaborative research and development in nanomedicine.

Methods

To approach this new domain of nanoinformatics, and to contribute to consolidate a new research topic, the Medical Bioinformatics Department of the Institute of Health Carlos III undertook four complementary strategies: (1) Review and analysis of the existing information resources and main collaborative research initiatives about nanomedicine. (2) Adapting a Web 2.0 knowledge management system for the nanomedicine field. (3) Participation in national and international research projects directly related to nanoinformatics[1] and (4) Collaborating with standardisation initiatives in nanotechnology.

Results

(1) We have presented in several international nanomedicine conferences a framework for classifying existing databases of nanoparticles linked with other important representation, simulation, visualization and data mining tools. We have also developed a catalogue which includes sources of news, conferences, standardization initiatives, articles, education resources and software tools related to nanomedicine.

(2) BIKMAS 2.0 is a knowledge management portal that collects the relevant information available on the Web 2.0 about nanomedicine. This portal provides us with an efficient distribution of information for specific uses: publications, presentations and grants writing.

(3) ACTION-GRID is a European Commission funded cooperation Project on healthcare information systems based on Grid capabilities and Nano/Bio/Medical Informatics. The main expected result consists of developing a White Paper that suggests a new research agenda for BMI, Grid and the nano areas. Within the NanoSost project we have developed Infonanosec, a nanosafety website which intends to become a reference resource in these matters in Spain. Finally the CYTED funded Ibero-NBIC network aims to contribute to the setting up of a broad community of researchers in IberoAmerica to advance the development of Convergent Technologies in Health.

(4) Participation in the Terminology y Nomenclature Technical Committee (AEN/CTN GET15/GT1) to development of the standardization in the field of nanotechnologies ISO CTN 229.

Conclusion

The presented strategies have allowed us to be knowledgeable about existing nanomedicine resources and to support our own research and education activities, returning this information to the BMI scientific and academic communities.

[1] COMBIOMED, NANOSOST, CYTED Ibero-NBIC and ACTION-GRID projects