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Computers in Biology and Medicine 33 (2003) 183–184

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Computers in Biology  
and Medicine

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## Editorial

# Human heart in the focus of computer power

The average human being in the Northern Hemisphere is probably not aware of the fact how much the computers are already influencing our society. Not just influencing but making the humanity vulnerable to them, dependent to such an extent that was unimaginable even in the fast development in the mid-20th century. Medicine, whether a pure or applicative science, is far more than being an exception; furthermore, some of its parts are practically impossible without the use of computers of computing science—computerized tomography, nuclear magnetic resonance imaging, digital subtraction angiography, contemporal electromiography. Everything in the medicine is becoming digitized and also the data, still in analogue form, are being transferred into digital formats of different kinds. It is true that this is giving us the opportunity to communicate to an extent unthinkable for our ancestors (GSM, Internet) and one is starting to think how much has still to come to digitize our brain information in a similar way as today the human genome is mapped. On the other hand, numerous people (perhaps even the majority of the world's population) do not have the computers as a situation per se, they still live in the “old ways”. Their information are stored in an analogue way on paper, sometimes even just by handwriting and nevertheless, we have to admit that this way of storing is perhaps far more long lasting than the digital one. It may be wise to store at least part of the information, representing the use of computers in biology and medicine, presented on these pages in an “old-fashioned” way, on paper, and this issue is the result.

Quoting late William of Ockham (1285–1349): “One should never increase, beyond what is necessary, the number of entities required to explain anything”, we would like to show a small part of the present computer applications in the real medicine, either as a simulation study or definitive solution.

This special issue presents a narrow look on the actual activities connected with the application of computers focusing on the human heart activity. There are many other important fields of investigation where high-performance computers are becoming essential tool for the medical doctors and scientists.

Our contributors show how to simulate the structure and functions of the left ventricle of the human heart. Some parts of the cardiac surgery like topical cooling can also be mimic reliably. There is no real obstacle to simulate and personalize the complete surgery procedure regarding the patient history, input diagnoses and actual personnel and medical equipment. Some potential hazards can be simulated in order to make the surgeon aware of eventual consequences and needed actions for preserving the patient's vital functions.

Next group of papers is dealing with the measurements of cardiac activity by multichannel devices in order to improve spatial resolution of the well-known ECG signals. New tools are available for the analysis of cardiac activity like multichannel simultaneous long-term recordings, body surface

maps, etc. The vast amount of data has to be processed in order to get an improved and personalized diagnosis. Computers may assist by signal processing. For example, small variability in signals can be detected using algorithms already applied and tested on other areas of sciences.

Medical imaging is becoming reality because image data can be digitalized and processed by computers. Medical data has to retain privacy, computers can serve even on this area in order to guarantee the confidential processing, transmission and manipulation with medical data. We showed how computers may effectively assist in the educational process of the future doctors.

It is expected that the impact of computers in medicine will be even stronger in the future. A new generation of doctors has grown up in the information era, with a positive reflection to the computer assistance. This generation will be able to improve medical results that are already approaching perfection, so continuous improvement is becoming harder. Computers are becoming a new tool that could enable personalized medical treating and are expected to eventually produce improved medical diagnostic and treatment results.

We are grateful to the authors of the articles for their valuable contributions and to many reviewers for their timely evaluations and constructive comments.

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