

Simulations in Biomedicine V

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FIFTH INTERNATIONAL CONFERENCE ON SIMULATIONS IN BIOMEDICINE

BIOMEDICINE 2003

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Preface

This book contains the papers presented at the Fifth International Conference on Computer Simulations in Biomedicine (Biomedicine 2003) held at the University Medical Centre of Ljubljana in Slovenia in April 2003. The conference was organised jointly by the University Medical Centre Ljubljana, the Faculty of Computer and Information Science, University of Ljubljana, and the Wessex Institute of Technology, Southampton, UK.

Computer models have been increasingly successful in simulating biological phenomena. The advantages of this approach are numerous, particularly in the area of biomedicine where it has led to a better understanding of the mechanics of physiological processes. The use of computational models has also spread to many applications in medicine, as demonstrated by the contents of this book. Another major contribution brought to the medical community by the wide availability of computational facilities and the development of numerical techniques, is the ability to acquire, analyse, manage and visualize massive amounts of data.

Current medical and biological technology has advanced very rapidly in recent years. As these advances continue, enormous progress in health care and the consequent improvements in people's lives will be available in the very near future. It can be expected that a number of illnesses and diseases as well as age-old handicaps will benefit from the development of computational biomedicine. This progress is related to the application of computational fluid dynamics, computer vision, better artificial limbs and prostheses, neural implants, biosensors, tissue engineering, artificial organs and others. Computers are also providing virtual environments, minimising surgical procedures, developing intelligent environments for the disabled, better telemedicine communications, etc.

The papers included in the book cover a broad spectrum of topics on the application of computers to simulate biological phenomena. They nevertheless represent a small portion of the efforts which are leading to a much better future for mankind.

There are now two challenges faced by medical professionals and biomedical engineers. Firstly, the challenge of using state-of-the-art computer technology and secondly, working with living systems. In an attempt to bring the contents of this book closer to the medical professionals, we arranged the papers in sections according to their medical and biological perspective. The book is divided into eleven sections covering:

Simulation of Physiological Processes; Cardiovascular System (Vascular System, Lung, Cardiac System & Applications); Artificial Limbs & Joints (Orthopaedics & Biomechanics); Electrical Stimulation (Functional Electrical Simulation & Cellular Engineering); Data Acquisition & Computer Vision: Analysis & Diagnostics; Applications of Artificial Intelligence in Medicine; Virtual & Intelligent Environments.

The Editors are grateful to all the authors for their excellent contributions and in particular to the members of the International and Local Scientific Advisory Committees for their help. They hope that this volume will increase the awareness of the potential of computer simulations amongst medical professionals, engineers and scientists working in this exciting new field.

The Editors

April 2003

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