PREFACE

The second book in the series continues to report recent research and applied solutions in the area of computational oncology and personalized medicine, being the topic of the *Priority Research Area #1* (POB1) of the *Silesian University of Technology*. The chapters are the result of the research conducted by the staff of SUT and by the partners from both the academic world and socio-economic environment. It aims to present research results and interests and to exchange information on scientific activities related to the scope of POB1.

The idea behind the monograph is to spread among the scientific community the recent advances in computational methods in medical applications. We believe that the new ideas and applications presented within the series would lead to the implementation of new diagnostic tools, drugs or therapies to assist clinicians in their practice and eventually would lead to an increase in life quality.

The chapters of this monograph cover mostly the topics that are the response of the scientific community to the needs raised by clinical partners.

The largest number of chapters represent topics related to **bioinformatics**, including: **medical image processing and analysis** (X-ray microtomography in histopathology; the algorithm for keratin 10 determining in organotypic cell cultures images; and still relevant and important issues sourced in COVID-19: chest X-ray images preprocessing for COVID-19 patients AI-driven classification; denoising autoencoder model for chest X-ray images preprocessing), **classification systems** (feature extraction and dimensionality reduction as the first step of the full hands-free machine learning analysis; neural network for mixed types big data visualization) as well as **cancer--related research** (clonal evolution/somatic mutations in cancers; unsupervised algorithms in the gene expression data of different human cancers) and **general applications** (recurrence and cross-recurrence quantification analyses of the time series in pharmacology and physiology).

The second largest group of chapters is focused on **(bio)materials engineering** (incl. biofunctionalization of surfaces; polycaprolactone in tissue engineering; polyhydroxybutyrate accumulation in bioplastic) and **tissue properties** (subcutaneous adipose tissue).

The third group is related to **numerical modelling in biomedical applications** (incl. skin tumour freezing; cardiovascular biofluid mechanics).

Finally, one chapter covers the up-to-date problem, especially during the pandemic time, of **e-learning course evaluation methodology**.

The publication of the book is one of the activities carried out by the *Silesian University of Technology* and it was published, among others, as a result of *the Excellence Initiative – Research University* programme. As one of ten Polish universities, *the Silesian University of Technology* obtained the status of a research university and commenced the implementation of the programme aimed at increasing its scientific excellence and international significance.

Editors would like to express their gratitude to the authors who have submitted their original research chapters as well as to all the reviewers for their valuable comments. Your effort has contributed to the high quality of the book that we pass on to the readers. We also hope that this second volume in the series would not only ignite a new, joint, interdisciplinary and challenging research but could also result in new methods and diagnostic tools. Such solutions, in future, could also support both clinicians and health agencies in better distribution/usage of available health budgets.

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