PREFACE

We present to you the third volume in our ongoing series, dedicated to the continuous exploration of recent research and practical solutions in the area of computational oncology and personalized medicine, which are the major topics in *Priority Research Area* #1 (POB1) of *the Silesian University of Technology*. Within these pages, you will find the culmination of efforts from a consortium of scientists, students, and collaborative partners from academia or the socio-economic environment. Together, they performed innovative investigations and carefully described their findings to provide valuable insights into medical science. As you read through these chapters, you'll discover that many stories are shaped in response to the practical needs expressed by medical colleagues. We warmly invite you to explore the abundant knowledge and potential that lie within these pages.

Most of the chapters represent topics related to **bioinformatics**, including medical imaging informatics (quantization of H&E stained histopathological images; analysis of bacterial cell viability through confocal microscopy), cancer-related research (expression of cytokines in colorectal cancer; clonal evolution/somatic mutations in cancers), new data processing and analysis tools (dystrophy patients stratification system; DNA sequencing reads simulator; oxford nanopore mapper), supporting the rehabilitation process (accessibility analysis of mobile rehabilitation applications and websites; games supporting rehabilitation) as well as other general applications (proliferation effect of exposure to electromagnetic field). The other group of chapters is focused on **biomodelling** (analysis of the process of heating biological tissue and its thermal damage; musculoskeletal modeling), **biomaterials engineering** (synthesis of a biodegradable and bioresorbable blood vessel scaffold), and **public health**-related problems (epidemiological studies of dengue fever and typhoid fever).

The publication of the book is one of the activities carried out by *the Silesian University of Technology* and it was published 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 program 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. Through this book, we want to propagate the latest achievements in computational methodologies within the scientific community. We strongly believe that the ideas and solutions presented in this series have the power to bring about new and improved tools for diagnosis, ground-breaking treatments, and advanced therapies. These innovations could support healthcare providers, ultimately leading to a better quality of life for their patients.