

PREFACE

A project on “Biomechanics at Micro- and Nanoscale Levels,” the title of this book, was approved by the Ministry of Education, Culture, Sports, Science and Technology of Japan in 2003. This four-year-project, carried out by fourteen prominent Japanese researchers, finished in March 2007. The project consisted of four fields of research, which are equivalent to the four chapters of this book, namely, Cell Mechanics, Cell Response to Mechanical Stimulation, Tissue Engineering, and Computational Biomechanics.

Our project can be summarized as follows. The essential diversity of phenomena in living organisms is controlled not by genes but rather by the interaction between the micro- or nanoscale structures in cells and the genetic code, the dynamic interaction between them being especially important. Therefore, if the relationship between the dynamic environment of cells and tissues and their function can be elucidated, it is highly possible to find a method by which the structure and function of such cells and tissues can be regulated. The first goal of this research was to understand dynamic phenomena at cellular and biopolymer-organelle levels on the basis of mechanics. An attempt was then made to apply this understanding to the development of procedures for designing and producing artificial materials and technology for producing or regenerating the structure and function of living organisms.

Volumes I, II and III of a series of books related to this project have already been published, the present volume being the last in this series. The results obtained by individual researchers participating in this project are summarized in this volume.

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