

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, and this four-year-project is now being carried out by fourteen prominent Japanese researchers. The project consists of four fields of research, which are equivalent to 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 is to understand dynamic phenomena at cellular and biopolymer-organelle levels on the basis of mechanics. An attempt will then be 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.

We are planning to publish a series of books related to this project, this book being the second in the series. The trend and level of research in this area in Japan can be understood by reading this book.

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