

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, 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.

At the 5th World Congress of Biomechanics held in Munich, Germany from 29th July to 4th August, 2006, we organized the following sessions:

Thread 3: Biomechanics at micro- and nanoscale levels

1. Cell mechanics
2. Molecular biomechanics
3. Mechanobiology at micro- and nanoscale levels
4. Computational biomechanics

We are planning to publish a series of books related to this project, the present volume being proceedings covering topics related to the sessions we organized. I would like to express my sincere gratitude to Professor Dieter Liepsch, the President of the 5th World Congress of Biomechanics, who granted us permission to publish these proceedings, as well as to the ten researchers who contributed to these proceedings.

Hiroshi Wada, PhD,
Project Leader,
Tohoku University,
Sendai,
December, 2006