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# Cell and Tissue Engineering

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## **Cell and Tissue Engineering**

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## PREFACE

Cell and tissue engineering are multidisciplinary fields with two primary goals: understanding fundamental principles of cell and tissue structure and function, and development of new therapeutic options to address the clinical problem of tissue failure. Over the past two decades there was a tremendous progress in these fields based on advances in molecular biology, biochemistry, medicine and pharmacy as well as in material science and engineering disciplines. Due to the large volume of literature published in these fields, there is a need for apt organization of acquired knowledge to provide resources and assistance for different audiences.

The book *Cell and Tissue Engineering* was inspired by the talks presented at the International Summer School in Cell and Tissue Engineering held at the Faculty of Technology and Metallurgy, University of Belgrade, July 1-8, 2006. Graduate students of engineering and life sciences from many different countries were introduced to the principals and new approaches in cell and tissue engineering. The book contains selected lectures presented at the School, adapted to include both the fundamentals and the current trends in cell and tissue engineering, in a way useful both to a novice and an expert in the field. We expect that it will also be used as a textbook or complementary reading in biomedical engineering courses.

The book is composed of 13 chapters all of which are written by the leading experts. It is organized to gradually assemble an insight in cell and tissue function starting form a molecular (nano) level, extending to a cellular (micro) level and finishing at the tissue (macro) level. In specific, biological, physiological, biophysical, biochemical, medical, and engineering aspects are covered from the standpoint of the development of functional substitutes of biological tissues for potential clinical use. Topics in the area of cell engineering include cell membrane biophysics, structure and function of the cytoskeleton, cell-extracellular matrix interactions, and mechanotransduction. In the area of tissue engineering the focus is on the *in vitro* cultivation of functional tissue equivalents based on the integrated use of isolated cells, biomaterials, and bioreactors. The book also reviews novel techniques for cell and tissue imaging and characterization, some of which are described in detail such as atomic force microscopy.

Mathematical modeling methods are also presented as valuable and indispensable tools in cell and tissue engineering. Numerous illustrations enhance the quality and ease of use of the presented material.

We hope that the book Cell and Tissue Engineering will be valuable for academic and scientific communities especially in the Western Balkan region as one of the few books in these fields providing a resource and stimulus for biomedical engineering research and education.

Bojana Obradovic

# CONTENTS

<b>1. CREATION OF LIVING TISSUE: AN ENGINEERING FEAT .....</b>	<b>1</b>
1.1. OPTIONS ON THE TABLE .....	1
1.2. COMPLEXITY OF BIOLOGICAL ORGANS .....	2
1.3. SIZING UP THE CHALLENGE.....	4
1.4. TISSUE ENGINEERING .....	6
<b>2. CLASSICAL AND QUANTUM INFORMATION PROCESSING IN DNA-PROTEIN CODING.....</b>	<b>9</b>
2.1. INTRODUCTION .....	9
2.2 BASIC FACTS .....	11
2.3. DNA-PROTEIN SYSTEM MODELING.....	13
2.3.1. Energy approach.....	13
2.3.2. Information approach .....	14
2.3.3. Synergy approach.....	16
2.4 HOW DOES THE DNA-PROTEIN INFORMATION SYSTEM WORK?.....	17
2.4.1. New considerations in mechanisms of DNA action.....	17
2.4.2. Hydrogen bonds as a central enigma of life .....	18
2.4.3. Synergy of classical and quantum information .....	19
2.4.4. Violation of the synergetic DNA-protein information channel.....	21
2.5. SUMMARY .....	23
<b>3. UNRAVELING THE MEMBRANE FUSION IN SECRETORY CELLS AT THE NM-LEVEL: A NANOBIOENGINEERING APPROACH.....</b>	<b>27</b>
3.1. INTRODUCTION .....	27
3.2. POROSOME: A NEW CELLULAR STRUCTURE.....	30
3.3. POROSOME: ISOLATION AND RECONSTITUTION.....	34
3.4. SNARE-INDUCED MEMBRANE FUSION.....	37
3.5. REGULATION OF SECRETORY VESICLE SWELLING: INVOLVEMENT IN EXPULSION OF VESICULAR CONTENTS .....	39
3.6. MOLECULAR UNDERSTANDING OF CELL SECRETION .....	40
<b>4. BIOPHYSICAL AND BIOCHEMICAL DETERMINANTS OF CONTRACTILE FORCE GENERATION, REGULATION, AND FUNCTION.....</b>	<b>44</b>
4.1. THE FUNDAMENTAL PROBLEM OF MUSCLE CONTRACTION .....	44
4.1.1 Structure of skeletal muscle .....	44
4.1.2. What makes muscles shorten?.....	46
4.1.3. The cross-bridge cycle.....	47
4.1.4. Swinging lever arm and power stroke .....	49
4.1.5. Atomic structures of actin and myosin.....	50
4.2. BUILDING A COMPREHENSIVE MODEL OF MUSCLE CONTRACTION .....	51
4.2.1. What is the appropriate model to start with?.....	52
4.2.2 Energy landscape of myosin binding to actin.....	53
4.2.3. Extensibility of actin and myosin filaments .....	54
4.2.4. Calcium regulation .....	55
4.3 MATHEMATICAL FOUNDATIONS OF SLIDING FILA-MENT THEORY AND COMPUTATIONAL METHODS THEORETICAL MODELS OF MUSCLE CONTRACTION.....	57
4.3.1. Basic concepts and definitions .....	57

4.3.2. A probabilistic formulation of cross-bridge kinetics .....	58
4.3.3. Rules for strain-dependent cross-bridge transition rates .....	60
4.3.4. Stochastic strain dependent binding in 3D sarcomere lattice .....	62
4.3.5. Probabilistic and stochastic numerical solutions .....	62
<b>4.4. THEORETICAL MODELS OF MUSCLE CONTRACTION .....</b>	<b>63</b>
4.4.1 Huxley’s sliding filament model in extensible filament lattice .....	63
4.4.2. Stochastic strain dependent binding in 3D sarcomere lattice .....	69
4.4.3. Thin filament regulation in skeletal muscle .....	72
4.4.4. The latch regulatory scheme in smooth muscle.....	79
<b>5. CYTOSKELETAL PRESTRESS AS A DETERMINANT OF DEFORMABILITY AND RHEOLOGY OF ADHERENT CELLS .....</b>	<b>92</b>
5.1. INTRODUCTION .....	92
5.2. WHAT IS PRESTRESS?.....	93
5.3. STATICS: PRESTRESS AND CELL DEFORMABILITY .....	94
5.3.1. Measurements of cytoskeletal prestress and stiffness .....	96
5.3.1.1. <i>Traction Microscopy</i> .....	96
5.3.1.2. <i>Magnetic Twisting Cytometry</i> .....	97
5.3.2. Modeling of the steady-state mechanical behavior of the CSK.....	98
5.3.2.2. <i>Prestress induced stiffness of the CSK</i> .....	101
5.4. DYNAMICS: PRESTRESS AND CELL RHEOLOGY .....	103
5.4.1. Mechanisms that link cytoskeletal prestress to rheology .....	106
5.4.1.1. <i>Tensegrity and cytoskeletal rheology</i> .....	106
5.4.1.2. <i>Myosin cross-bridge kinetics</i> .....	108
5.4.1.3. <i>Cytoskeletal remodeling</i> .....	108
5.4.1.4. <i>Activation energy</i> .....	108
5.4.1.5. <i>Actin network dynamics</i> .....	109
5.4.1.6. <i>Dynamics of individual polymer chains under sustained tension</i> .....	110
5.5. CONCLUSIONS.....	113
<b>6. CELL AND TISSUE ORGANIZATION IN SOFT MATERIALS: INSIGHT FROM MATHEMATICAL AND BIOPHYSICAL MODELLING.....</b>	<b>119</b>
6.1. INTRODUCTION .....	119
6.1.1. Overview of cell and tissue organization principles for adherent cells .....	119
6.1.2. Classification of mechanical signals and biological responses .....	120
6.1.3. Effect of substrate mechanics on cell behavior .....	121
6.1.4. Sensing substrate mechanics: Active mechanosensing .....	121
6.2. A PRIMER ON ELASTICITY THEORY .....	123
6.3. TOWARDS A SYSTEM UNDERSTANDING OF THE INFLUENCE OF SUBSTRATE MECHANICS ON CELL AND TISSUE ORGANIZATION .....	125
6.3.1. Modeling cellular scale effects.....	125
6.3.2. Modeling tissue scale effects.....	128
6.3.3. Modeling subcellular scale effects .....	130
6.4. OUTLOOK .....	132
<b>7. SUBSTRATE STRETCHING AND ORIENTATION OF ACTIVE CELLS AS A STABILITY PROBLEM.....</b>	<b>135</b>
7.1. INTRODUCTION .....	135
7.2. MECHANICS PRELIMINARIES .....	139
7.3. THE NONLINEAR HOMOGENEOUS STRAIN FIELD OF A STRESS FIBER .....	142
7.4. THE EQUILIBRIUM PLACEMENTS OF THE STRESS-FIBERS.....	145
7.5. GLOBALLY STABLE EQUILIBRIUM PLACEMENTS.....	148

7.6. APPLICATIONS .....	151
7.7. DISCUSSION .....	152
<b>8. ROLES OF MECHANICAL FORCES AND EXTRACELLULAR MATRIX PROPERTIES IN CELLULAR SIGNALING IN THE LUNG.....</b>	<b>158</b>
8.1. INTRODUCTION .....	158
8.2. MAIN CONSTITUENTS OF THE LUNG CONNECTIVE TISSUE.....	160
8.2.1. Properties of collagens .....	160
8.2.2. Properties of elastic fibers .....	161
8.2.3. Properties of proteoglycans .....	161
8.2.4. Interstitial cells .....	162
8.2.5. Air-liquid interface and surface tension .....	163
8.2.6. Interaction among the tissue components.....	163
8.3. MECHANICAL PROPERTIES OF THE NORMAL LUNG.....	164
8.3.1. Molecular, fibril and fiber elasticity .....	164
8.3.2. Elasticity of lung collagen, alveolar wall, tissue strip and whole lung .....	166
8.4. EFFECTS OF MECHANICAL FORCES ON THE LUNG PARENCHYMA .....	168
8.4.1. Mechanical forces, cell signaling and biomechanical properties of the ECM....	168
8.4.2. Mechanical forces in the diseased lung .....	170
8.5. SUMMARY .....	172
<b>9. ENZYME SIGNALING: IMPLICATIONS FOR TISSUE ENGINEERING.....</b>	<b>179</b>
9.1. INTRODUCTION .....	180
9.2. GENERAL PROPERTIES OF ENZYMES.....	181
9.3. METALLOPROTEINASES IN SIGNALING .....	183
9.3.1. MMPs in diseases.....	183
9.3.2. Types and Structure of MMPs.....	184
9.3.3. Activation and inhibition of MMPs.....	187
9.3.4. Pharmacological manipulations of MMPs .....	188
9.4. GENERAL CONSIDERATIONS FOR TISSUE ENGINEERING .....	190
<b>10. HYDROGELS IN TISSUE ENGINEERING .....</b>	<b>197</b>
10.1. INTRODUCTION .....	197
10.2. WHAT IS A HYDROGEL?.....	199
10.3. METHODS OF PREPARATION .....	200
10.3.1. Chemical hydrogel preparation .....	200
10.3.2. Physical hydrogel preparation .....	201
10.3.2.1. Hydrogels obtained by ionic interactions.....	202
10.3.2.2. Hydrogels obtained by crystallization.....	202
10.3.2.3. Hydrogels obtained from amphiphilic block and graft co-polymers .....	203
10.3.2.4. Hydrogels obtained by hydrogen bond interactions.....	204
10.3.2.5. Hydrogels obtained by protein interactions .....	204
10.4. HYDROGEL PROPERTIES .....	205
10.4.1. Swelling.....	205
10.4.2. Responsive hydrogels.....	206
10.4.3. Surface properties.....	207
10.4.4. Degradability .....	208
10.5. METHODS OF CHARACTERIZATION .....	208
10.6. BIOMEDICAL / TISSUE ENGINEERING APPLICATIONS .....	209
<b>11. BIOREACTORS IN TISSUE ENGINEERING .....</b>	<b>217</b>
11.1. INTRODUCTION: WHAT ARE TISSUE-ENGINEERING BIOREACTORS?..	217
11.2. MASS TRANSPORT CONSIDERATIONS .....	218



11.3. BIOPHYSICAL REGULATION.....	219
11.3.1. Engineered Bone .....	219
11.3.2. Engineered Cartilage .....	221
11.3.3. Engineered Myocardium .....	223
11.4. SUMMARY .....	223
<b>12. APPROACHES TO MATHEMATICAL MODELING OF TISSUE ENGINEERING SYSTEMS .....</b>	<b>228</b>
12.1. INTRODUCTION .....	228
12.2. CHARACTERIZATION OF IN VITRO CULTIVATING CONDITIONS .....	231
12.2.1. Hydrodynamic environment.....	232
12.2.2. Modeling of mass transfer .....	234
12.2.2.1. <i>Mass transport through the tissue by diffusion.....</i>	<i>234</i>
12.2.2.2. <i>Enhancement of mass transport through the tissue by convection .....</i>	<i>239</i>
12.3. CORRELATIONS OF CULTIVATING CONDITIONS WITH THE CELL RESPONSE AND TISSUE PROPERTIES .....	242
12.3.1. Correlations of hydrodynamic conditions with the tissue growth .....	242
12.3.2. Mathematical model of GAG accumulation in engineered cartilage constructs.....	244
12.4. CONCLUSION.....	247
13. COMPUTATIONAL MODELING OF TISSUE SELF-ASSEMBLY .....	251
13.1. THE MODELING APPROACH TO MORPHOGENESIS.....	251
13.2. IN SILICO TISSUE ENGINEERING .....	253
13.3. A LATTICE MODEL OF LIVING TISSUES.....	254
13.4. MONTE CARLO SIMULATIONS OF THE SELF -ASSEMBLY OF LIVING CELLS .....	258
<b>Index.....</b>	<b>275</b>