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Animal Cell Bioreactors

Chester S. Ho
Daniel I.C. Wang

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Animal Cell Bioreactors

Edited by

Chester S. Ho

Daniel J. C. Wang

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Animal Cell Bioreactors

1.1	Introduction	1
1.2	History of Animal Cell Bioreactors	2
1.3	Classification of Animal Cell Bioreactors	3
1.4	Design and Construction of Animal Cell Bioreactors	4
1.5	Operation and Control of Animal Cell Bioreactors	5
1.6	Applications of Animal Cell Bioreactors	6
1.7	Future Trends in Animal Cell Bioreactors	7
1.8	References	8
1.9	Index	9
1.10	Appendix	10

2.1	Animal Cell Culture	11
2.2	Media and Supplements	12
2.3	Cell Isolation and Primary Culture	13
2.4	Cell Subculture and Passage	14
2.5	Cell Characterization and Identification	15
2.6	Cell Viability and Growth	16
2.7	Cell Differentiation and Product Formation	17
2.8	Cell Death and Apoptosis	18
2.9	Cell Transfection and Gene Expression	19
2.10	Cell Cryopreservation and Storage	20

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PREFACE

Biotechnology is entering a new era. To date, many new biopharmaceutical products developed with this new technology are being sold commercially and approximately 100 are in clinical trials. According to industrial sources, over 250 more are in the research or preclinical development stage. Animal cell culture, in particular, is responsible for a wide range of medically important products, such as vaccines, antibodies, hormones, cytokines, growth factors, and enzymes. As these products advance toward commercialization, the biotechnology industry must rapidly increase the capacity requirement for large-scale in vitro production of animal cell products.

This book addresses the underlying principles and strategies in the in vitro cell culture biotechnology. It addresses the engineering aspects such as mass transfer, instrumentation, and control ensuring successful design and operation of animal cell bioreactors. The purpose of the book is to provide a comprehensive analysis and review in the advancement of the bioreactor systems for large-scale animal cell cultures.

Animal cell culture is here to stay. A broad spectrum of subjects regarding animal cell bioreactors will be useful to researchers and practitioners with different scientific backgrounds. Progress in this area will depend, to a great extent, on a concerted and continued effort by all. It is fair to state

that much work remains to be done and that it certainly will tax the ingenuity of researchers in the years to come. Indeed, the future of animal cell culture is a bright one, and we certainly hope *Animal Cell Bioreactors* will play a role in this exciting march into the future.

We thank the contributing authors for their enthusiasm, encouragement, and efforts in making this project possible. To the staff at Butterworth-Heinemann, we are grateful for their patience and assistance during the preparation and publication of this book.

Chester S. Ho
Daniel I.C. Wang

CONTENTS

Preface

xv

PART I. HISTORICAL DEVELOPMENT OF ANIMAL CELL BIOREACTORS

1. An Overview of Animal Cell Biotechnology: The Conjoint Application of Science, Art, and Engineering	3
<i>R.E. Spier</i>	
1.1 Shear and Bubbles	6
1.2 High Cell Concentration Systems	10
1.3 Modern Bioprocess Engineering for Animal-Cell Containing Systems	14
1.4 Conclusions	17
References	17

PART II. IMPLICATIONS OF CELL BIOLOGY ON BIOREACTOR OPERATION

2. Implications of Cell Biology in Animal Cell Biotechnology	21
<i>Aleš Prokop</i>	
2.1 Cell Status	21
2.2 Status of Extracellular Environment	42

X Contents

2.3	Cell-Environment Interaction	47
2.4	Dynamics of Interaction of Cell and Environment	51
	References	53
3.	Protein Glycosylation: Function and Factors that Regulate Oligosaccharide Structure	59
	<i>Joseph K. Welply</i>	
3.1	Structure and Heterogeneity of the Protein-Bound Oligosaccharides	61
3.2	Factors that Influence the Structure of Protein-Bound Oligosaccharides	65
3.3	Conclusion	70
	References	70
4.	Serum-Free Media	73
	<i>Kazuaki Kitano</i>	
4.1	Chemically Defined Serum-Free Media	74
4.2	Serum-Free Media-Containing Serum-Substitutes	87
4.3	Production of Biologically Active Substances by Serum-Free Cultures	92
4.4	Conclusion	97
	References	98
5.	Nuclear Magnetic Resonance Spectroscopy of Dense Cell Populations for Metabolic Studies and Bioreactor Engineering: A Synergistic Partnership	107
	<i>Bruce E. Dale and Robert J. Gillies</i>	
5.1	Phenomena that Can and Cannot be Measured by NMR	107
5.2	Some Representative NMR Spectra	109
5.3	Current Limitations on Whole Cell NMR: Sensitivity and the Need for Well-Defined Bioreactors	110
5.4	Bioreactor Engineering Considerations	112
5.5	Quantitative Measures of Diffusion and Reaction	112
5.6	Design Procedures Involving Weisz's Modulus	113
5.7	Experimental Confirmations of Reaction Rate Control: Toward Gradientless Bioreactors	115
5.8	Uses of NMR in Bioreactor Analysis and Design	116
5.9	Summary	117
	References	117
6.	Regulation of Animal Cell Metabolism in Bioreactors	119
	<i>William M. Miller and Harvey W. Blanch</i>	
6.1	Metabolism of Cultured Cells	120
6.2	Methods for Obtaining Metabolic Information in Bioreactors	129

6.3	Metabolic Results Obtained in Continuous Suspension Bioreactors	135
6.4	Models of Cell Metabolism	150
	References	157

PART III. ANCHORAGE-DEPENDENT CELL SUPPORTS

7.	Fixed Immobilized Beds for the Cultivation of Animal Cells	165
	<i>Bryan Griffiths and Denis Looby</i>	
7.1	General Principles	166
7.2	Historical Developments in Animal Cell Immobilization	171
7.3	Fixed Beds in a Production Process	172
7.4	Optimization of Glass Sphere Reactors	177
7.5	Porous Packing Materials for High Cell Density Culture	183
7.6	Conclusion	188
	References	188
8.	Microcarriers for Animal Cell Biotechnology: An Unfulfilled Potential	191
	<i>R.E. Spier and N. Maroudas</i>	
8.1	Times Past	191
8.2	Three-Dimensional Microcarriers	193
8.3	The Problems Expounded	195
8.4	Current Manifestations of Three-Dimensional Microcarriers	204
8.5	Conclusions	209
	References	210
9.	Hydrodynamic Effects on Animal Cells in Microcarrier Bioreactors	213
	<i>Matthew S. Croughan and Daniel I.C. Wang</i>	
9.1	Methods of Investigation	214
9.2	Hydrodynamic Effects on Cell Growth	217
9.3	Hydrodynamic Effects on Cell Metabolism	222
9.4	Fluid-Lift, Airlift, and Stirred-Tank Bioreactors	223
9.5	Mechanisms of Hydrodynamic Cell Death	224
9.6	Cell Damage from Direct Sparging	239
9.7	Protective Polymers	241
9.8	Recommendations for Future Research	243
9.9	Nomenclature	245
	References	247

PART IV. ANIMAL CELL BIOREACTOR DESIGN, OPERATION, AND CONTROL

10. Scaleup of Animal Cell Suspension Culture	253
<i>Malcolm Rhodes, Simon Gardiner, and David Broad</i>	
10.1 Scaleup Principles	255
10.2 Bioreactor Scaleup	257
10.3 Process Scaleup	262
10.4 Conclusions	266
10.5 Nomenclature	266
References	267
11. Continuous Cell Culture	269
<i>Mary L. Nicholson, Brian S. Hampson, Gordon G. Pugh, and Chester S. Ho</i>	
11.1 Methods of Continuous Cell Culture	270
11.2 Automation	275
11.3 Assessing Cell Yield and Productivity in an Immobilized System	279
11.4 Maintaining Steady-State Conditions	284
11.5 Maintenance Media	287
11.6 Cell Density in Perfusion Systems	290
11.7 Rapid Product Isolation and Nutrient Manipulation	293
11.8 Scalability	294
References	302
12. Optimization of the Microenvironment for Mammalian Cell Culture in Flexible Collagen Microspheres in a Fluidized-Bed Bioreactor	305
<i>John N. Vournakis and Peter W. Runstadler, Jr.</i>	
12.1 Verax Microspheres and Cell Viability	308
12.2 The Verax Fluidized Bed Reactor	311
12.3 Cell-Cell and Cell-Matrix Interactions	314
12.4 The Microenvironment	317
12.5 Bioreactor Productivity and Product Quality	322
12.6 Summary	323
References	325
13. High Density Cell Culture	327
<i>Michiyuki Tokashiki</i>	
13.1 Development of a New Perfusion Culture Process	329
13.2 Perfusion Culture with Recycling of High Molecular Weight Components	339

13.3	High Density Culture Using Fluorocarbon to Supply Oxygen	351
	References	355
14.	Diffusion and Convection in Membrane Bioreactors	357
	<i>Carole A. Heath and Georges Belfort</i>	
14.1	Diffusive Mass Transfer	359
14.2	Convective Mass Transfer	365
14.3	Simultaneous Diffusive and Convective Mass Transfer	368
14.4	Conclusions	370
	References	370
15.	Bioreactor Control and Optimization	373
	<i>Michael W. Glacken</i>	
15.1	Process Goals	374
15.2	Process Control: Direct Control of Measured Variables	378
15.3	Process Control from Inferred Measurements	382
15.4	Feed-Forward Control Using Empirically Derived Mathematical Relations	385
15.5	Speculative Strategies for Manipulating Cellular Metabolism to Improve Bioreactor Performance	396
15.6	Nomenclature	401
	References	402
16.	Instrumentation of Animal Cell Culture Reactors	405
	<i>Winfried Scheirer and Otto-W. Merten</i>	
16.1	Theoretical Approaches	406
16.2	State of the Art	412
16.3	Future Developments	437
16.4	Conclusions	438
	References	439
17.	Large-Scale Process Purification of Clinical Product from Animal Cell Cultures	445
	<i>Christopher P. Prior</i>	
17.1	Potential Product Contaminants Derived from Animal Cell Culture Processes	447
17.2	Discussion of a cGMP Ion Exchange Process Purification Scheme for a Monoclonal IgG	450
17.3	Use of Protein A Affinity Chromatography for Monoclonal IgG Purification	462
17.4	The Impact of Cell Culture Techniques on Product Integrity	465
17.5	Summary of Key Points	474
	References	477

PART

I

Historical Development of Animal Cell Bioreactors

Application of Science, Art, and
Engineering
