
Methods for Serum-Free Culture of Epithelial and Fibroblastic Cells

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Contents of Volumes 1, 2, and 4

Volume 1: Methods for Preparation of Media, Supplements, and Substrata for Serum-Free Animal Cell Culture

METHODS FOR PREPARATION OF BASAL NUTRIENT MEDIA

- 1 Formulation of Basal Nutrient Media**
Richard G. Ham
- 2 Preparation and Use of Serum-Free Culture Media**
Charity Waymouth
- 3 Preparations and Uses of Lipoproteins to Culture Normal Diploid and Tumor Cells Under Serum-Free Conditions**
Denis Gospodarowicz

METHODS FOR PREPARATION OF MITOGENIC PEPTIDES

- 4 Preparation of Human Platelet-Derived Growth Factor**
Elaine W. Raines and Russell Ross
- 5 Purification of Multiplication-Stimulating Activity**
Lawrence A. Greenstein, S. Peter Nissley, Alan C. Moses,
Patricia A. Short, Yvonne W.-H. Yang, Lilly Lee, and
Matthew M. Rechler
- 6 Preparation of Guinea Pig Prostate Epidermal Growth Factor**
Jeffrey S. Rubin and Ralph A. Bradshaw
- 7 Purification of Human Epidermal Growth Factor From Urine**
C. Richard Savage, Jr. and Robert A. Harper

- 8 **Isolation of Growth Factors From Human Milk**
Yuen W. Shing and Michael Klagsbrun
- 9 **Purification of Type β Transforming Growth Factors From Non-neoplastic Tissues**
Anita B. Roberts, Charles A. Frolik, Mario A. Anzano,
Richard K. Assoian, and Michael B. Sporn
- 10 **Preparation of Endothelial Cell Growth Factor**
Thomas Maciag and Robert Weinstein

METHODS FOR PREPARATION OF SUBSTRATA

- 11 **Use of Basic Polymers as Synthetic Substrata for Cell Culture**
Wallace L. McKeehan
- 12 **Preparation of Cellular Fibronectin**
Kenneth M. Yamada and Steven K. Akiyama
- 13 **Isolation of Laminin**
Steven R. Ledbetter, Hynda K. Kleinman, John R. Hassell,
and George R. Martin
- 14 **Isolation of Chondronectin**
Hugh H. Varner, A. Tyl Hewitt, and George R. Martin
- 15 **Human Serum Spreading Factor (SF): Assay, Preparation, and Use in Serum-Free Cell Culture**
Janet Silnutzer and David W. Barnes
- 16 **Purification of Epibolin From Human Plasma**
K.S. Stenn
- 17 **Preparation of Extracellular Matrices Produced by Cultured Bovine Corneal Endothelial Cells and PF-HR-9 Endodermal Cells: Their Use in Cell Culture**
Denis Gospodarowicz
- 18 **Analysis of Basement Membrane Synthesis and Turnover in Mouse Embryonal and Human A431 Epidermoid Carcinoma Cells in Serum-Free Medium**
David S. Salomon, Lance A. Liotta, Mounanandham Panneerselvam,
Victor P. Terranova, Atul Sahai, and Paula Fehnel
- 19 **Cell Attachment and Spreading on Extracellular Matrix-Coated Beads**
Shing Mai and Albert E. Chung

Volume 2: Methods for Serum-Free Culture of Cells of the Endocrine System

- 1 **Growth of GH₃, a Rat Pituitary Cell Line, in Serum-Free, Hormone-Supplemented Medium**
Izumi Hayashi
- 2 **Growth of Adrenocortical Cell Cultures in Serum-Free Medium**
Michael H. Simonian and Mark L. White
- 3 **Primary Culture of Testicular Somatic Cells**
J.P. Mather and D.M. Phillips
- 4 **Isolation and Growth of Adult Human Prostatic Epithelium in Serum-Free, Defined Medium**
Mukta M. Webber, Donna M. Chaproniere-Rickenberg, and Robert E. Donohue
- 5 **Growth of Functional Primary and Established Rat Ovary Cell Cultures in Serum-Free Medium**
Joseph Orly
- 6 **Growth of Rat Mammary Tumor Cells in Serum-Free, Hormone-Supplemented Medium**
Tamiko Kano-Sueoka
- 7 **Growth of Normal Mammary Epithelium on Collagen in Serum-Free Medium**
William R. Kidwell, Mozeena Bano, and David S. Salomon
- 8 **Isolation and Serum-Free Cultivation of Mammary Epithelial Cells Within a Collagen Gel Matrix**
Walter Imagawa, Yasuhiro Tomooka, Jason Yang, Raphael Guzman, James Richards, and Satyabrata Nandi
- 9 **Serum-Free Culture of the Isolated Whole Mammary Organ of the Mouse: A Model for the Study of Differentiation and Carcinogenesis**
Mihir R. Banerjee and Michael Antoniou
- 10 **Growth of Human Mammary Epithelial Cells in Monolayer Culture**
Martha Stampfer
- 11 **Definition of Hormones and Growth Factors Required for Optimal Proliferation and Expression of Phenotypic Responses in Human Breast Cancer Cells**
Marc E. Lippman

- 12 **Serum-Free Cell Culture of MCF7 Human Mammary Carcinoma**
David W. Barnes
- 13 **General Methods for Isolation of Acetic Acid- and Heat-Stable Polypeptide Growth Factors for Mammary and Pituitary Tumor Cells**
Tatsuhiko Ikeda, David Dantelpour, Peter R. Galle, and David A. Sirbasku

Volume 4: Methods for Serum-Free Culture of Neuronal and Lymphoid Cells

SERUM-FREE CULTURE OF NEURONAL CELLS

- 1 **Culture Methods for Growth of Neuronal Cell Lines in Defined Media**
Jane E. Botenstein
- 2 **Preparation of a Chemically Defined Medium for Purified Astrocytes**
Richard S. Morrison and Jean de Vellis
- 3 **Growth and Differentiation of Pheochromocytoma Cells in Chemically Defined Medium**
R. Goodman
- 4 **Differentiated Mouse Fetal Hypothalamic Cells in Serum-Free Medium**
A. Faivre-Bauman, J. Puymirat, C. Loudes, and A. Tixier-Vidal
- 5 **Regulation of Pigmentation and Proliferation in Cultured Melanocytes**
John M. Pawelek
- 6 **Neuron-Glia Interaction in Mammalian Brain: Preparation and Quantitative Bioassay of a Neurotrophic Factor (NTF) From Primary Astrocytes**
Wilfried Seifert and Hans Werner Müller
- 7 **Preparation and Assay of Nerve Growth Factor**
Thomas L. Darling and Eric M. Shooter

SERUM-FREE CULTURE OF LYMPHOID CELLS

- 8 **Production and Purification of Interleukin-2 for the Initiation and Maintenance of T-Cell Lines**
Diane Mochizuki and James D. Watson

- 9 **Methods for Production and Purification of Human T-Cell Growth Factor**
M.G. Sarngadharan, R.C. Ting, and R.C. Gallo
- 10 **Preparation of Thymosins**
Teresa L.K. Low and Allan L. Goldstein
- 11 **Culture of Lymphocytes and Hemopoietic Cells in Serum-Free Medium**
N.N. Iscove
- 12 **Growth of Lymphoid Cells in Serum-Free Medium**
Frederick J. Darfler and Paul A. Insel
- 13 **Serum-Free Cultivation of Plasmacytomas and Hybridomas**
Hiroki Murakami
- 14 **Culture of Human Lymphocytes in Serum-Free Medium**
John Mendelsohn, Alendry Caviles, Jr., and Janice Castagnola
- 15 **Studies of Growth and Differentiation of Human Myelomonocytic Leukemia Cell Lines in Serum-Free Medium**
Theodore R. Breitman, Beverly R. Keene, and Hiromichi Hemmi
- 16 **Serum-Free Growth of SP2/0-AG-14 Hybridomas**
Kathelyn Sue Steimer

Preface

In this volume are described methods for preparation of serum-free, hormonally defined media for transformed and untransformed fibroblasts and a number of types of differentiated epithelial cells. Investigations of tissue-specific functional expressions by epithelial cells are one of the most active areas of research in molecular and cell biology, and the development of serum-free, defined media for these cell types has had considerable impact on the field. Striking examples of the new types of studies accomplished by culturing epithelial cells in defined media are those in this volume describing the functional state of cultured kidney tubule epithelium. Different combinations of hormones and other factors can be shown to promote expression of either proximal or distal tubule functions selectively. Serum-free culture methods also are described for organ culture of developing kidney. Studies of hormone-responsive transport mechanisms as well as studies of the factors altering the states of kidney cell differentiation are open to new approaches using the methods outlined.

In addition to kidney, methods for preparing primary cultures of normal, functional hepatocytes are described; these will provide interested workers with a starting point for further investigation of the complex regulation of growth and gene expression in these cells in a defined environment. Also examined in this volume is the serum-free culture of epithelia from the lung; in this case, defined media have been used successfully to grow cell types that are readily lost when cultured in serum-containing medium. Well-defined cultures of lung epithelium from human and other species will facilitate the study of carcinogenesis in this tissue. Chapters describing growth of both human lung and colon carcinoma point out the experimentally-proven potential of the use of serum-free medium in the growth of human tumor cells from biopsy samples for drug screening.

Additional detailed methods are given in the first section for the serum-free culture of two cell types that may be of interest to a broad audience: The A431 human epidermoid carcinoma line, widely used recently in studies of epidermal growth factor effects and growth factor-receptor interactions, is finding use in other types of studies, including those dealing with extracellular matrix production (See Volume 1). Methods for growth of several lines of differentiating embryonal carcinoma, an obvious choice for a model system in the study of control of cell differentiation, are also reviewed. For those investigators requiring formulations for differentiated epithelial cell types not described in these volumes, application of the methods presented with lung, colon, and kidney tissue will provide a useful starting point. Information provided in Volume 1 of this series will provide methods of preparation of some of the basic components of the defined media used with the epithelial cells.

In the second part of this volume, methods for serum-free culture of fibroblasts are detailed, with an emphasis on those systems and techniques applicable to studies of growth control and malignancy in vitro. Included is an introductory chapter (reprinted from *Prog. Clin. Biol. Res.*, Vol. 66) that provides an overview of the use of serum-free cell culture in the study of proliferation in vitro, as well as detailing serum-free culture conditions for lines of transformed and untransformed fibroblasts. With methods described in this section, a variety of applications are possible. Several approaches are described for the use of serum-free cell culture as a selection process for isolating cell variants. Also presented in this volume are methods for isolation and purification of brain- and pituitary-derived fibroblast growth factors. Methods for preparation of both the acidic and basic forms of these polypeptide factors are described in detail, and provide the interested investigator not only with access to those preparations, but also with outlines of how one goes about attempting the successful isolation of new factors that may be required for cell growth.

Applications of the methods described here are direct for several of the major cell types of the body. With some thought and experimentation, these formulations, and the methods of approach that they represent, should be applicable to other cell types as well.

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Gordon H. Sato

Contents

Contributors	ix
Contents of Volumes 1, 2, and 4.	xiii
Preface	xix

SERUM-FREE CULTURE OF EPITHELIAL CELLS

1	Growth of Primary and Established Kidney Cell Cultures in Serum-Free Media Mary Taub	3
2	Hormonally Defined, Serum-Free Medium for a Proximal Tubular Kidney Epithelial Cell Line, LLC-PK ₁ Milton H. Saier, Jr.	25
3	Serum-Free Organ Culture of Embryonic Mouse Metanephros Ellis D. Avner, William E. Sweeney, Jr., and Demetrius Ellis	33
4	Primary Culture of Hepatocytes H.L. Leffert, K.S. Koch, and H. Skelly	43
5	Selective Growth of Human Small Cell Lung Cancer Cell Lines and Clinical Specimens in Serum-Free Medium Desmond N. Carney, Martin Brower, Virginia Bertness, and Herbert K. Oie	57

6	Primary Tissue Cultures of Human Colon Carcinomas in Serum-Free Medium: An In Vitro System for Tumor Analysis and Therapy Experiments Jürgen van der Bosch	73
7	Growth and Differentiation of Human Bronchogenic Epidermoid Carcinoma Cells in Serum-Free Media Kaoru Miyazaki, Hideo Masui, and Gordon H. Sato	83
8	Serum-Free Cell Culture of A431 Human Epidermoid Carcinoma David W. Barnes	95
9	Growth and Differentiation of Embryonal Carcinoma Cells in Defined and Serum-Free Media Angie Rizzino	107
10	α_2-Macroglobulin, a Contaminant of Commercially Prepared Pedersen Fetus: Isolation, Characterization, and Biological Activity David S. Salomon, Kathryn B. Smith, Ilona Losonczy, Mozeena Bano, William R. Kidwell, Giulio Alessandri, and Pietro M. Gullino	125

SERUM-FREE CULTURE OF FIBROBLASTIC CELLS

11	On Deciding Which Factors Regulate Cell Growth Arthur B. Pardee, Paul V. Cherington, and Estela E. Medrano	157
12	Purification of Pituitary and Brain Fibroblast Growth Factors and Their Use in Cell Culture Denis Gospodarowicz	167
13	Preparation of Bovine Pituitary Fibroblast Growth Factor Sandra K. Lemmon and Ralph A. Bradshaw	199
14	Preparation of Pituitary Acidic FGF Angelo A. Gambarini, Mari C.S. Armelin, and Hugo A. Armelin	209
15	Growth of SV40 Balb/c-3T3 Cells in Serum-Free Culture Medium G.A. Rockwell	221
16	Use of Hormone-Toxin Conjugates and Serum-Free Media for the Isolation and Study of Cell Variants in Hormone Responses Nobuyoshi Shimizu	233

17	Growth of Human Fibroblast Cultures in Serum-Free Media Richard G. Ham	249
18	Serum-Free Cell Culture for Growth of NIH 3T3 and 10T1/2 Mouse Embryo Fibroblast Cell Lines, SV40 Virus Propagation, and Selection of SV40-Transformed Cells Lin-Chang Chiang, Janet Silnutzer, James M. Pipas, and David W. Barnes	265
	Index	277

Serum-Free Culture of Epithelial Cells
