## Contents

*Foreword I by Timothy Tellinghuisen* .............................................................. v
*Foreword II by Brett Lindenbach* ............................................................... ix
*Preface to the Second Edition* ...................................................................... xi
*Contributors* ................................................................................................ xvii

**PART I. DETECTION AND QUANTIFICATION OF HCV**

1. Detection and Quantification of Serum or Plasma HCV RNA: Mini Review of Commercially Available Assays  
   *Helene Le Guillou-Guillemette and Francoise Lunel-Fabiani* .......................... 3

2. Simultaneous Detection of Anti-HCV Antibody and HCV Core Antigen  
   *Filippo Ansaldi and Giancarlo Icardi* ......................................................... 15

3. Immunohistochemical Detection of HCV Proteins in Liver Tissue  
   *Oivier Galy, Isabelle Vincent, Philippe Chevallier, Nicole Lyandrat, and Isabelle Chemin* ................................................................. 25

**PART II. HCV NOMENCLATURE, GENOTYPING, AND QUASISPECIES**

4. Nomenclature and Numbering of the Hepatitis C Virus  
   *Carla Kuiken and Peter Simmonds* .............................................................. 33

5. A Real-Time Taqman® Method for Hepatitis C Virus Genotyping and Methods for Further Subtyping of Isolates  
   *Kathryn J. Rolfe, Tim G. Wreghitt, Graeme J. M. Alexander, and Martin D. Curran* ................................................................. 55

6. Characterization of HCV Quasispecies in the Hypervariable Region 1 (HVR 1) by In Vitro Translation and Mass Spectrometry  
   *Carmen Yea, Melissa Ayers, and Raymond Tellier* ........................................ 73

**PART III. HCV REPLICATION IN VITRO**

7. Purification and Crystallization of NS5A Domain I of Hepatitis C Virus  
   *Joseph Marcotrigiano and Timothy Tellinghuisen* ........................................ 85

8. NS5A Phosphorylation and Hyperphosphorylation  
   *Petra Neddermann* ......................................................................................... 95

9. Preparation and Handling of Hepatitis C Viral Proteins NS3 and NS5B for Structural Studies  
   *Stefania Di Marco and Andrea Carfi* ............................................................ 111
10 Structural and Functional Analysis of the HCV p7 Protein
   Nathalie Saint, Roland Montserret, Christophe Chipot, and François Penin ... 125

11 HCV Replicons: Overview and Basic Protocols
   Volker Lobmann .............................................................. 145

12 Reverse Transcription PCR-Based Sequence Analysis of Hepatitis C Virus Replicon RNA
   Timothy L. Tellinghuisen and Brett D. Lindenbach ...................................... 165

13 Studying HCV RNA Synthesis In Vitro with Replication Complexes
   Wengang Yang and Mingjun Huang ......................................................... 177

14 Proteomics Study of the Hepatitis C Virus Replication Complex
   Kyungsoo Chang, Tianyi Wang, and Guangxiang Luo .......................................... 185

15 Investigation of the Hepatitis C Virus Replication Complex
   Volker Brass, Rainer Gosert, and Darius Moradpour ........................................ 195

16 Regulation of Interferon Regulatory Factor 3-Dependent Innate Immunity by the HCV NS3/4A Protease
   Kui Li ......................................................... 211

17 Selection and Characterization of Drug-Resistant HCV Replicons In Vitro
   with a Flow Cytometry-Based Assay
   Jason M. Robotham, Heather B. Nelson, and Hengli Tang .......................... 227

18 High-Throughput Screening of HCV RNA Replication Inhibitors
   by Means of a Reporter Replicon System
   Weidong Hao and Rohit Duggal .............................................................. 243

19 Inhibition of HCV Replication by Small Interfering RNA
   Ratna B. Ray and Tatsuo Kanda ......................................................... 251

PART IV. HCV ENTRY AND INFECTION

20 Cellular Receptors and HCV Entry
   Mike Flint and Donna M. Tscherne ......................................................... 265

21 Studying HCV Cell Entry with HCV Pseudoparticles (HCVpp)
   Birke Bartosch and François-Loïc Cosset .................................................. 279

22 Screening of Small-Molecule Compounds as Inhibitors of HCV Entry
   Jian-Ping Yang, Demin Zhou, and Flossie Wong-Staal .................................. 295

23 Isolation of JFH-1 Strain and Development of an HCV Infection System
   Takaji Wakita .............................................................. 305

24 Measuring HCV Infectivity Produced in Cell Culture and In Vivo
   Brett D. Lindenbach .............................................................. 329

25 Genotype 1a HCV (H77S) Infection System
   MinKyung Yi and Stanley M. Lemon ......................................................... 337
26 Full-Length Infectious HCV Chimeras
Thomas Pietschmann ......................................................... 347

27 Adaptation of the Hepatitis C Virus to Cell Culture
Artur Kaul, Ilka Wörz, and Ralf Bartenschlager ...................... 361

28 Primary Human Hepatocyte Culture for HCV Study
Haizhen Zhu, John Elyar, Robin Foss, Alan Hemming, Eric Hall,
Edward L. LeCluyse, and Chen Liu ..................................... 373

29 In Vivo Study of HCV in Mice with Chimeric Human Livers
Norman M. Kneteman and Christian Toso ................................ 383

PART V. IMMUNITY AND MODELING
30 Determination of HCV-Specific T-Cell Activity
Joo Chun Yoon and Barbara Rehermann .................................. 403

31 Analysis of HCV-Specific T Cells by Flow Cytometry
Masaaki Shiina and Barbara Rehermann .................................. 415

32 Detection of Neutralizing Antibodies with HCV Pseudoparticles
(HCVpp)
Marlène Dreux and François-Loïc Cosset .................................. 427

33 Mathematical Modeling of HCV Infection and Treatment
Harel Dahari, Emi Shudo, Ruy M. Ribeiro, and Alan S. Perelson ...... 439

Index ....................................................................................... 455