
Contents

Foreword	vii
Marylène MOUGEL	
Preface	xi
Chapter 1. General Information on Retroviruses	1
1.1. Common characteristics of retroviruses	1
1.1.1. Untranslated regions	2
1.1.2. Translated regions	3
1.2. Architecture of the virion	5
1.3. Replication cycle of retroviruses	6
1.3.1. Early phase	7
1.3.2. Late phase	9
Chapter 2. Effects of the Structure of Retroviral RNA on Reverse Transcription	11
2.1. Reverse transcription of genomic RNA	11
2.2. RNA structures involved in the initiation of reverse transcription	14
2.2.1. A cellular tRNA as RT primer	14
2.2.2. Formation of the template–primer duplex	16
2.2.3. Role of the structure of the template–primer duplex upon initiation	19
2.3. RNA structures involved in the first strand transfer	21
2.3.1. Actors involved in the first strand transfer	21
2.3.2. Molecular basis of R–r pairing	22
2.4. RNA structures promoting genetic recombination	26
2.4.1. Internal strand transfer	26
2.4.2. RNA structures triggering internal strand transfer	28

Chapter 3. RNA Structures Regulating the Expression of the Retroviral Genome	31
3.1. Regulatory RNA structures of proviral DNA transcription	31
3.1.1. The transcriptional activator Tat	31
3.1.2. TAR structures with one stem-loop	33
3.1.3. TAR structures with two stem-loops	37
3.2. RNA structures regulating genomic RNA maturation	38
3.2.1. The negative regulator of splicing of RSV	39
3.2.2. Structural diversity and alternative splicing in HIV-1	41
3.3. RNA structures regulating the export of retroviral RNAs	44
3.3.1. Export of unspliced RNA in simple retroviruses	44
3.3.2. Unspliced RNA export in complex retroviruses	53
3.4. RNA structures regulating the translation of retroviral RNAs	60
3.4.1. IRESs of simple retroviruses	61
3.4.2. Translation initiation in complex retroviruses	63
Chapter 4. Encapsidation of Genomic RNA in the Retroviral Particle	73
4.1. RNA structures and mechanisms governing gRNA dimerization	73
4.1.1. Structures and mechanisms in alpharetroviruses	74
4.1.2. Structures and mechanisms in betaretroviruses	77
4.1.3. Structures and mechanisms in deltaretroviruses	79
4.1.4. Structures and mechanisms in gammaretroviruses	81
4.1.5. Structures and mechanisms in lentiviruses	85
4.2. RNA structures and mechanisms regulating gRNA encapsidation	96
4.2.1. Structures and mechanisms in alpharetroviruses	96
4.2.2. Structures and mechanisms in betaretroviruses	99
4.2.3. Structures and mechanisms in deltaretroviruses	104
4.2.4. Structures and mechanisms in gammaretroviruses	106
4.2.5. Structures and mechanisms in lentiviruses	108
Conclusion	115
Glossary	117
List of Acronyms	121
References	127
Index	159