A	Covalently closed circular DNA (cccDNA)
Acute liver failure (ALF), viral hepatitis, 7	animal model studies, 35–36, 38
Adalimab, hepatitis B management in	deamination, 38, 86
immunosuppression patients, 279	eradication, 1, 9
Alemtuzumab, hepatitis B management in	formation, 75–77
immunosuppression patients, 280	functions, 91
ALF. See Acute liver failure	HBx interactions, 117–118
Antisense RNA	host evasion, 142
hepatitis D management, 350	mouse hepatitis B virus infection, 231
hepatitis viruses, 267	persistence, 9, 142
APOBEC	therapeutic targeting, 85–86, 266–267
covalently closed circular DNA deamination, 38, 86	Cyclin-dependent kinases
recruitment, 92	HBx effects, 120
therapeutic targeting, 266–267 woodchuck, 196	hepatitis B virus assembly role, 93
Apoptosis, HBx effects, 119–120	D
AuAg. See Australian antigen	
Australian antigen (AuAg), discovery, 4-5, 14	Dane particle, 97
	DDB1, HBx interactions, 120–121, 267
В	Delta antigen. See Hepatitis D virus
	Delta hepatitis. See Hepatitis D virus
Bat hepatitis virus (BtHV), zoonotic infection, 47, 53	DNA methyltransferase, upregulation by HBx, 117
B-cell, hepatitis B virus immune response, 146	Duck hepatitis B virus. See Hepatitis B virus
BtHV. See Bat hepatitis virus	
	С
С	Endosomal sorting complex (ESCRT), hepatitis B virus
Calcium flux, HBx effects, 119	particle transport and release, 95–97
cccDNA. See Covalently closed circular DNA	ESCRT. See Endosomal sorting complex
Cell cycle, HBx effects, 120	Etanercept, hepatitis B management in immunosup-
Chimpanzee model, hepatitis B virus infection	pression patients, 279
blood test development, 211-212	
chronic infection, 211	
historical perspective, 209–212	F
immune response	Fas, HBx effects, 119
clearance mechanisms, 214-220	
innate immunity, 213	
persistence mechanisms, 215, 218	G
prospects for study, 220	Glomerulonephritis, hepatitis B association, 22
inoculum size and outcomes, 218	Gorilla hepatitis B virus, phylogeny with other hepatitis
vaccine development, 212–213	viruses, 49
Cirrhosis	Ground squirrel hepatitis virus. See Hepatitis B virus
hepatitis B association, 18–19	Guillain-Barré syndrome, hepatitis B association, 23
hepatitis D management in decompensated cirrhosis patients, 348	
Core proteins, hepatitis B virus	Н
capsid assembly, 92–93, 98–99, 101–102	HBIG. See Hepatitis B immunoglobulin
properties, 97	HBV. See Hepatitis B virus

HBx. See Hepatitis B virus X	acute hepatitis D, 329–331
HCC. See Hepatocellular carcinoma	chronic disease, 332–333
HCV. See Hepatitis C virus	helper-independent infection, 331-332
HDV. See Hepatitis D virus	hepatocellular carcinoma studies, 332–333
Hepatic decompensation, hepatitis B association, 19	overview, 135–136
Hepatitis B immunoglobulin (HBIG)	human immunodeficiency virus, 23, 134–135
liver transplant patient use, 281	discovery, 27
	envelopment and release
passive immunization efficacy, 242–243	
Hepatitis B virus (HBV)	envelope proteins, 94–95
animal models	maturation signal, 93
antiviral therapy, 38–39	subviral particles, 95
chimpanzee. See Chimpanzee model, hepatitis B	viral particle transport and release, 95–97
virus infection	epidemiology
duck hepatitis B virus, 29–31, 34–35, 37,	acute disease, 14
81-84	chronic disease, 14
ground squirrel hepatitis virus, 29, 31	genotype distributions, 161–162
hepatocellular carcinoma, 39, 184-185	genotype influences, 134
heron hepatitis B virus, 29	global prevalence, 130, 132-133
historical perspective, 29–31	hepatocellular carcinoma, 136
life cycle of virus, 35	high-prevalence populations, 130-131
molecular biology studies	indigenous peoples, 131-132
reverse transcription and priming, 31-35	low-prevalence populations, 131
second-strand DNA synthesis, 34	mortality, 132
mouse. See Mouse model, hepatitis B virus	overview, 129-130, 159-161
infection	genome
protein function elucidation, 36–38	intergenotypic recombination, 162
transient infection, 37–38	structure, 28–29, 77, 109, 160
woodchuck. See Woodchuck hepatitis virus	geographic distribution of genotypes and
woolly monkey hepatitis B virus, 29	subgenotypes, 46
capsid assembly	history of study, 13–14
allosteric regulation, 101	host susceptibility studies, 70
biochemistry, 98–100	immune response overview, 133–134
core protein determinants, 92–93, 98–99	immune response. See Immune response
kinetics, 100–101	origins and evolution
nucleic acid synergy, 101–102 overview, 92	genomic fossils, 46–47
	genotype and subgenotype roles, 49–50
capsid structure, 97–98	human family tree, 54–55
cell entry	indigenous population implications for origins,
multistep process, 67–68	55–58
overview, 65–66	mixed infections and recombination, 50–51
prospects for study, 71–72	most recent common ancestor, 45–46
sodium taurocholate cotransporting polypeptide	mutation rate, 50, 84
role, 65, 67–70	prospects for study, 59–60
clinical manifestations of infection	theories of origins
acute disease, 15–16	bat origin, 53
chronic disease, 16–18	coevolution, 53
extrahepatic manifestations, 22-23	cospeciation, 53
genotype influences on chronic disease course,	cross-species transmission, 53
162-165	New World origin, 52
HbeAg-negative disease, 17–18	outcomes by age, 242
HbeAg-positive disease, 17	prevention strategies, 242-243
occult infection, 22	sequelae of chronic disease. See also Cirrhosis;
overview, 7–8	Hepatocellular carcinoma
coinfection	cirrhosis, 18–19
hepatitis C virus, 135	hepatic decompensation, 19
hepatitis D virus	hepatocellular carcinoma, 19–20, 165–167

species specificity, 70–71	variant effects on antiviral therapy, 171
surface antigen	vaccination. See Vaccination
discovery, 5	virion structure, 97–98
genotype and variant clinical significance,	Hepatitis B virus X (HBx)
167-168	animal model studies of function, 36-37
prognostic value, 20-21	apoptosis effects, 119–120
seroclearance, 21-22	calcium signaling effects, 119
structure, 94–95	cancer studies, 121
vaccine development, 5-6, 28	cell cycle effects, 120
surface protein domains in infection, 66-67	covalently closed circular DNA interactions,
tissue tropism, 71	117-118
transmission, 14-15, 129-130, 242	DDB1 interactions, 120-121, 267
treatment	enhancer and promoter interactions, 115-117
cure definitions, 264–265	functional diversity, 121–122
early intervention rationale, 263-264	hepatocellular carcinoma role, 121, 166, 186
failure	innate immunity, 143
management, 261-263	overview, 109–111
resistance, 259–261	prospects for study, 123
genotype effects on antiviral therapy	replication role, 111–112
interferon therapy, 169–170	structure, 111–115
nucleoside/nucleotide analogs, 170–171	Hepatitis C virus (HCV)
overview, 168–169	discovery, 7
goals and treatment end points, 254	epidemiology, 2
HBeAg-negative patients	hepatitis B virus coinfection
duration of therapy, 258–259	management, 283–284
on-treatment factors in treatment response	overview, 135
prediction, 258	management, 1
outcomes, 256–257	milestones in research and treatment, 2–3
pretreatment factors in treatment response	Hepatitis D virus (HDV)
prediction, 258	assembly, 323–324
HBeAg-positive patients	cell entry
on-treatment factors in treatment response	multistep process, 67–68
prediction, 257–258	overview, 65–66
outcomes, 256	prospects for study, 71–72
	sodium taurocholate cotransporting polypeptide
prediction 257	role, 65, 67–70
prediction, 257	clinical manifestations, 8
hepatitis C virus coinfection patients, 283–284	
human immunodeficiency virus coinfection	delta antigen forms, 317, 320–321
patients, 282–283	diagnosis, 306 discovery, 6–7, 305
immunosuppression patients	**
anti-CD20 therapy effects, 280	epidemiology
anti-CD52 therapy effects, 280	prevalence, 306–307
anti-TNF- $\alpha$ therapy effects, 279	studies
exacerbation of chronic disease, 278–279	1980s-1990s, 307-308
immunosuppressants in reactivation, 279	Europe, 308–311)
prevention and management of reactivation,	genome
280-281	circular conformation and uniqueness,
indications, 254–256	317–318
liver transplant patients, 281–282	genotypes, 317
novel drug target identification, 265–269	types of RNA, 316–317
pregnant patients	hepatitis B virus coinfection
efficacy of antiviral drugs, 277–278	acute hepatitis D, 329–331
infant transmission prevention, 276–277	chronic disease, 332–333
pregnancy effects on virus course, 276	helper-independent infection, 331–332
safety of antiviral drugs, 277	hepatocellular carcinoma studies, 332-333
therapeutic targets, 253-254	overview, 135–136

Hepatitis D virus (HDV) (Continued)	advanced disease
host susceptibility studies, 70	chemotherapy, 293
origins and evolution, 46, 58-59	immunotherapy, 293-294
pathogenesis, 333–334	novel therapies, 295
posttranscriptional RNA editing, 322-323	oncolytic virus therapy, 294–295
replication, 319, 322	standard frontline therapy, 292–293
ribozymes, 318–320	early disease
severity of disease, factors affecting, 333	adjuvant therapy after hepatectomy, 297–298
species specificity, 70–71	liver transplantation, 298
surface protein domains in infection, 66–67	locoregional ablative therapy, 298-299
tissue tropism, 71	surgical resection, 297
transmission, 305–306	transarterial embolization with chemotherapy,
treatment	295-296
acute disease, 340-341	Hepadnaviridae
chronic disease, 341-345	comparison of family members, 46–47
decompensated cirrhosis patients, 348	phylogenetic tree, 48
interferon combination therapy with nucleoside	Heron hepatitis B virus. See Hepatitis B virus
analogs, 345-346	HEV. See Hepatitis E virus
novel therapies	Hippocrates, hepatitis studies, 3
antisense RNA, 350	Historical perspective, viral hepatitis
hepatocyte entry inhibitors, 348-349	Australian antigen discovery, 4–5
immunotherapy, 350	early characterization, 3–4
overview, 348	screening tools, 5
prenylation inhibitors, 350	vaccination and treatment, 5–6
nucleoside analogs, 346–348	HIV. See Human immunodeficiency virus
overview, 339–340	Human immunodeficiency virus (HIV), hepatitis B
prospects, 350	virus coinfection
thymic humoral factor-γ2, 348	management, 282-283
thymosin-α1, 348	overview, 23, 134–135
virion structure, 315–316	
Hepatitis E virus (HEV), discovery, 7	
Hepatocellular carcinoma (HCC)	I
animal models, 39–40	Immune response
hepatitis B	chimpanzee hepatitis B virus infection
association, 19–20	clearance mechanisms, 214-220
DNA integration studies, 182-184	innate immunity, 213
epidemiology, 136	persistence mechanisms, 215, 218
genomic alterations and oncogenic pathways,	prospects for study, 220
181–182	hepatitis B virus
genotypes in risk, 165–166	adaptive immunity
HBx role, 121, 166, 186	B-cells, 146
variants in risk, 166–167	regulatory T cells, 148
hepatitis D virus studies, 332–333	T-cells, 146–148
immunization in prevention, 247	Th17 cells, 148
incidence, 290	Th22 cells, 148
mortality, 179	antigen immunomodulation, 148–149
overview, 289-290	innate immunity, 142–143
risk factors, 180–181	mouse hepatitis B virus infection
staging	acute hepatitis, 231-234
BCLC staging, 291–292	chronic hepatitis, 234-236
CLIP score, 291	natural killer cells, 145–146
Okuda system, 291	natural killer T cells, 145-146
overview, 290–291	overview, 141–142
selection of staging system, 292	replication control, 143-144
TNM staging, 291	therapies, 149–152
treatment	vaccination, 150–151

hepatitis D virus, 334	NF-κB. See Nuclear factor-κB
woodchuck hepatitis virus	Nivolumab, hepatocellular carcinoma management, 293
cloning and characterization of components in	NK cell. See Natural killer cell
woodchuck, 192–196	NKT cell. See Natural killer T cell
T-cell response, 196	NTCP. See Sodium taurocholate cotransporting
Immunization. See Vaccination	polypeptide
Immunosuppression patients with hepatitis B	Nuclear factor-κB (NF-κB), HBx effects, 119–120
anti-CD20 therapy effects, 280	
anti-CD52 therapy effects, 280 anti-TNF-α therapy effects, 279	0
exacerbation of chronic disease, 278–279	
immunosuppressants in reactivation, 279	Ofatumumab, hepatitis B management in immunosuppression patients, 280
prevention and management of reactivation,	minutiosuppression patients, 200
280–281	
Infliximab, hepatitis B management in	Р
immunosuppression patients, 279	PAN. See Polyarteritis nodosa
Interferon	PD-1, therapeutic targeting in hepatocellular
chimpanzee hepatitis B virus infection immune	carcinoma, 293
response, 215, 220	Pembrolizumab, hepatocellular carcinoma
hepatitis B virus	management, 293
genotype effect on therapy, 169–170	Pexa-Vec, hepatocellular carcinoma management,
immune response, 142–144	294–295
treatment outcomes, 256-257	pgRNA. See Pregenomic RNA
hepatitis C virus management, 1	Pidilizumab, hepatocellular carcinoma management,
hepatitis D management	293
acute disease, 340-341	PKA. See Protein kinase A
chronic disease, 341–345	PKC. See Protein kinase C
combination therapy with nucleoside analogs,	Plus-strand. See Second-strand DNA synthesis
345-346	Polyarteritis nodosa (PAN), hepatitis B association, 22
history of hepatitis management, 6	PreCore, animal model studies of function, 36–37
hepatitis D virus, 324	Pregenomic RNA (pgRNA)
hepatocellular carcinoma role, 39	digestion, 91
	εRNA requirement in packaging and protein
L	priming, 82
	packaging, 78–79
Lamivudine, liver transplant patient use, 281 – 282	Pregnancy, hepatitis B
Liver cancer. See Hepatocellular carcinoma	efficacy of antiviral drugs, 277–278
Liver transplantation	infant transmission prevention, 276–277 pregnancy effects on virus course, 276
hepatitis B management in recipients, 281–282 hepatocellular carcinoma treatment, 298	safety of antiviral drugs, 277
Lonafarnib, hepatitis D management, 350	Pre-S, hepatocellular carcinoma mutations, 167, 181
Lonatarino, nepatros D management, 550	Protein kinase A (PKA), hepatitis B virus assembly
	role, 93
M	Protein kinase C (PKC), hepatitis B virus assembly
Minus-strand, synthesis, 79	role, 93
Mouse model, hepatitis B virus infection	
acute hepatitis, 231–234	_
chronic hepatitis, 234–236	R
historical perspective and types, 229–231	Replication complex, assembly, 78-79
	Reverse transcription
N	animal studies
N	model, 34–35
Natural killer (NK) cell, hepatitis B virus immune	overview, 31
response, 145–146	priming, 32–34
Natural killer T (NKT) cell, hepatitis B virus immune	εRNA requirement in packaging and protein
response, 145–146	priming, 82

Reverse transcription (Continued)	TLRs. See Toll-like receptors
genome variability role, 84	TNF-α. See Tumor necrosis factor-α
host factors in replication, 82-83	Toll-like receptors (TLRs)
reverse transcriptase	therapeutic targeting
human and duck hepatitis B virus comparison,	hepatitis B, 268
83–84 structure and function, 81–82	hepatitis D, 350 woodchucks, 194
Ribavirin	hepatocellular carcinoma management,
hepatitis C management, 1	295–296
hepatitis D management, 346–347	Transforming growth factor-β (TGF-β),
Ribonuclease H, pregenomic RNA digestion, 91	hepatitis B virus immune response,
Rituximab, hepatitis B management	144–145
in immunosuppression patients, 280	Tumor necrosis factor- $\alpha$ (TNF- $\alpha$ ), HBx effects, 119
RNA interference. See Antisense RNA	rumor necrosis nector a (1141 a), 115x enecus, 117
	V
S	Vaccination
Second-strand DNA synthesis	hepatitis B virus
animal studies, 34	barriers
priming, 80	compliance, 247–248
Small interfering RNA. See Antisense RNA	infant protection duration, 248–249
Sodium taurocholate cotransporting polypeptide	resources, 247
(NTCP)	vaccine failure, 249
hepatitis B/D cell entry role, 65, 67–70	chimpanzee hepatitis B virus infection immune
therapeutic targeting, 265–266, 268–269, 349	response, 212–213
SRPK, hepatitis B virus assembly role, 93	combination of passive and active immunization
511 15, 11 panalo 2 11 as accounts, 1016, 20	244-245
Т	development, 243
	global view, 245–246
TACE. See Transarterial embolization with	immune response, 150–151
chemotherapy	passive immunization with HBIG, 242–243
T-cell	prevention efficacy
chimpanzee hepatitis B virus infection immune	active immunization, 243–244
response, 215, 217–220	hepatocellular carcinoma, 247
hepatitis B virus immune response	passive immunization with recombinant
CD4 and CD8 T-cells, 146–148	vaccine, 245
regulatory T cells, 148	universal immunization, 246–247
Th17 cells, 148	surface antigen, 5–6, 28
Th22 cells, 148	universal mass immunization program, 245
hepatitis D virus response, 334	woodchuck hepatitis virus
mouse hepatitis B virus response, 233–235	combination therapy studies, 199
therapeutic targeting, 268	recombinant viral vector immunization,
woodchuck hepatitis virus	197–199
immune response, 196	T-cell vaccines, 197
vaccines, 197	
Telomelysin, hepatocellular carcinoma	W
management, 295	
Telomerase reverse transcriptase (TERT),	WHO. See World Health Organization
hepatocellular carcinoma mutations,	WHV. See Woodchuck hepatitis virus
181-182	Woodchuck hepatitis virus (WHV)
TERT. See Telomerase reverse transcriptase	hepatocellular carcinoma studies, 184-185
TGF-β. See Transforming growth factor-β	history of study, 29-30, 191
Thymic humoral factor-γ2, hepatitis D	immune response
management, 348	cloning and characterization of components in
Thymosin-α1, hepatitis D management, 348	woodchuck, 192-196

T-cell response, 196
persistence, 85
replication studies, 34
species specificity, 192
therapy studies
 combination therapy studies, 199
 overview, 196–197
 prospects for study, 199–202
 recombinant viral vector immunization, 197–199

T-cell vaccines, 197 X role, 37 Woolly monkey hepatitis B virus. *See* Hepatitis B virus World Health Organization (WHO), Global Hepatitis Programme, 136–138

X
X. See Hepatitis B virus X

This is a free sample of content from The Hepatitis B and Delta Viruses.

Click here for more information on how to buy the book.