This is a free sample of content from Immune Memory and Vaccines: Great Debates.
Click here for more information on how to buy the book.

Index

A

ACT. *See* Adoptive cellular therapy
Activation-induced cytidine deaminase (AID), 38, 48, 56–57, 214, 218
Acute myeloid leukemia (AML), 392
ADCC. *See* Antibody-dependent cell-mediated cytotoxicity
ADCP. *See* Antibody-dependent cellular phagocytosis
ADE. *See* Antibody-dependent enhancement
Adoptive cellular therapy (ACT), 122
Affinity maturation
  antibody affinity reversion/antibody redemption, 56–57
  antibody feedback
    affinity maturation effects, 31–32
    B-cell receptor–antigen interactions, 30–31
    Epitope-spreading role, 32–34
  antigenic seniority, 41
  diminishing returns, 38–40
  founder effect as limitation, 40–41
  human immunodeficiency virus response. *See* Human immunodeficiency virus
  immunoglobulin gene mutability, 41–42
  overview, 30, 38, 54
  pertussis booster vaccination, 342–343
  somatic hypermutation in germinal center B cells, 54–55
  vaccine driven V(D)J hypermutation and selection, 55–56
AID. *See* Activation-induced cytidine deaminase
AML. *See* Acute myeloid leukemia
Animal models. *See also specific animals*
  biomarker development, 294
  coinfection effect on immune response, 293–294
  controlled variability, 294
  discrepancies with human infection
    improvements, 292–293
    natural infection nonexistence, 291
    overview, 290
    pathophysiology differences, 291–292
  preconditioning effect on immune response, 293–294
  proof-of-concept studies, 260
  selection of model, 292
  vaccine effectiveness evaluation
    anthrax, 261–262
    ebola vaccine studies
      bridging animal protection data to humans, 263–264
      overview, 262
      pathogen considerations, 262–263
      surrogate markers, 263
    human immunodeficiency virus studies in nonhuman primates
      immune response measurement, 265
      overview, 264–265
      SHIV challenge models, 265–266
      SIV challenge models, 265
      vaccine design, 265
    human papillomavirus, 261
    overview of challenge models, 260–261
Animal Rule, 261, 267
Anthrax, vaccine studies in animals, 261–262
Antibody affinity maturation. *See* Affinity maturation
Antibody-dependent cell-mediated cytotoxicity (ADCC), 265
Antibody-dependent cellular phagocytosis (ADCP), 265
Antibody-dependent enhancement (ADE), 76, 87, 92, 104, 110
AP-1, 2
APRIL, 233
ATAC-seq, 5

B

Bacille Calmette–Guérin (BCG), 227
B-cell affinity maturation. *See* Affinity maturation
BCG. *See* Bacille Calmette–Guérin
Bcl6, 19, 24

C

Cancer vaccine
  historical perspective, 128
  neoantigens
    cancer vaccine development, 115
    checkpoint inhibitor therapy combination, 132
    delivery, 125
    ideal properties of vaccine, 129–130
    overview, 114
    prophylactic cancer vaccines, 117–118
    rationale for vaccines, 128–129
    selection for vaccine, 117, 123–124

© 2018 by Cold Spring Harbor Laboratory Press. All rights reserved.

This is a free sample of content from Immune Memory and Vaccines: Great Debates.
Click here for more information on how to buy the book.

Cancer vaccine (*Continued*)
T-cell response to vaccines
magnitude, 129–130
quality, 130–131
specificity, 131–132
patient selection, 124–125
tumor peptides, mutated versus nonmutated, 115–116
Candida albicans, T-cell response, 10–11, 13
CAR T cell. *See* Chimeric antigen receptor T cell
CCR5, 233, 280–281
CCR6, 23, 184
CD27, 219
CD4 T cell
cell fate
determination, 2–3
fixation, 2–3
human studies, 12–13
lineage tracing, 5
cytokines, 10
Dengvaxia response, 84
follicular helper T cell, 200, 202–203
gut microbiota cross talk, 180, 191
heterogeneity, 10–12
pertussis immune response
infection, 332
vaccination
acellular boosting, 344–345
primary vaccination, 344–345
plasticity
definition, 18
human studies, 12–13
intraclonal diversification, 13–15
phenotype heterogeneity and stability during resting memory, 22–23
recall and plasticity during, 23–24
regulation, 3–5
single-cell studies, 5
stability during
primary response, 18–19
transition from effector to memory cell, 19–22
subtypes, 18
CD8 T cell
activating receptors, 409
cytokine stimulation, 408–409
functional overview, 298
memory cell protection against reinfection, 298, 410
subsets, 314–315
vaccine
delivery, 300
human immunodeficiency virus vaccine
cytomegalovirus-vectored vaccine, 306–309
prospects, 308–309
rationale, 304
vaccination studies, 304–306
manufacturing, 300
prospects, 300–301
rationale, 298–299
safety, 299
Salmonella typhi vaccines, 315–316
CD40L, 237
CD73, 210–211
CD80, 210–211, 219
CD95, 390
CDR3, 40
Chimeric antigen receptor (CAR) T cell, 131
Chronic lymphocytic leukemia (CLL), 115
CLL. *See* Chronic lymphocytic leukemia
Clostridium difficile, 181–182, 190
CMV. *See* Cytomegalovirus
c-Myc, 3
CRISPR-Cas9, 5, 255
CTLA-4, 122, 386
CXCL13, 18
CXCR3, 18, 20, 24, 184
CXCR5, 18–20, 22–24
CXCR6, 384–385
Cytomegalovirus (CMV), 246, 292
immunogen design, 372
natural killer cell memory, 381–383, 390–391, 393, 399–400
vector for human immunodeficiency virus CD8 T-cell vaccine, 306–309

D

Dengue virus
antibody response
primary infection, 71–72
secondary infection, 72–73, 75, 95
conformational quaternary epitopes, 107–109
epidemiology, 62, 70
fusion loop epitope, 107
immune response overview, 62–63, 71, 82–83
prM cleavage, 106–107
secondary infection, 62, 71, 104
serotype heterogeneity, 70–71
vaccines
challenges, 106
Dengvaxia, 64–65, 74, 82, 84–85, 92–97, 104–106
enhanced disease after vaccination, 85–87, 92–97
historical perspective, 104
immune response, 82, 84
live attenuated vaccine, 64, 70, 73–74
naïve individual vaccination, 74, 76
National Institutes of Health LATV enhancement, 98

© 2018 by Cold Spring Harbor Laboratory Press. All rights reserved.

This is a free sample of content from Immune Memory and Vaccines: Great Debates.
Click here for more information on how to buy the book.

primed individual vaccination, 76
prospects, 77
safety, 64, 76–77, 105–106
serotypes, 64–65, 85, 94, 96
TDV, 97–98
virus breathing, 70–71, 107
zika infection interactions, 108, 110

E

Ebola, vaccine studies in animals
bridging animal protection data to humans, 263–264
overview, 262
pathogen considerations, 262–263
surrogate markers, 263
Enterotoxigenic *Escherichia coli*, 315
ERB-B2, 131–132

F

FDC. *See* Follicular dendritic cell
Fecal microbiome transfer (FMT), 181
FMT. *See* Fecal microbiome transfer
Follicular dendritic cell (FDC), 31, 48, 255
Follicular helper T cell, 200, 202–203
Foxp3, 24

G

GATA3, 24
GC. *See* Germinal center
GCN2, 233, 245
Germinal center (GC). *See also* Affinity maturation
antigen-specific B-cell memory, 198
follicular helper T cell, 200, 202–203
memory B cell
antibody suppression of cell fate, 211
formation, 208–209
functions, 209, 210
prospects for study, 211–212, 218–219
secondary germinal center formation
history of study, 214
human studies, 217–218
mouse studies, 214–217
pathogen studies, 217
somatic hypermutation, 218
memory-response germinal cell
reaction, 198–199
single-cell level programs, 199–201
vaccine significance, 203
GN2, 245
gp100, 128
gp120, 282, 362
Guillain–Barré syndrome, 142
Gut microbiota
adaptive immunity against pathogens, 182–184
adjuvant applications, 175
immune system and infection response influence, 172, 180–182, 192
overview, 172, 180
points test for different microbial taxa, 190–193
political modeling
agitation across federal borders, 190–193
federalism versus sovereignty, 188–189
immigration control, 189–190
sampling, 188–189
systems vaccinology studies, 245
vaccine efficacy impact
dysregulation in failure, 174–175
microbiotal stratification to predict efficacy, 173–174
prospects for study, 176

H

HA. *See* Hemagglutinin
HBV. *See* Hepatitis B virus
HCV. *See* Hepatitis C virus
Hemagglutinin (HA), 48, 138–139, 146–147, 151, 156–160, 164–169, 292
Hepatitis B virus (HBV), 130, 244
Hepatitis C virus (HCV), 130
HIV. *See* Human immunodeficiency virus
HPV. *See* Human papillomavirus
hTERT, 115
Human immunodeficiency virus (HIV)
antigenic variation and somatic hypermutation, 47–48
CD8 T-cell vaccine
cytomegalovirus-vectored vaccine, 306–309
prospects, 308–309
rationale, 304
vaccination studies, 304–306
epitope loss, 131
immune perturbations, 56
immunogen design, 362–364, 372–374
natural killer cell memory, 382–383
somatic hypermutation and broadly neutralizing antibody development, 46, 56, 183
vaccination
history, 222
nonhuman primate studies
immune response measurement, 265
overview, 264–265
SHIV challenge models, 265–266
SIV challenge models, 265
vaccine design, 265
somatic hypermutation load, 48–51
Human papillomavirus (HPV), 261

© 2018 by Cold Spring Harbor Laboratory Press. All rights reserved.

This is a free sample of content from Immune Memory and Vaccines: Great Debates.
Click here for more information on how to buy the book.

I

IFN-α. *See* Interferon α
IFN-γ. *See* Interferon γ
IL-1. *See* Interleukin 1
IL-2. *See* Interleukin 2
IL-4. *See* Interleukin 4
IL-5. *See* Interleukin 5
IL-6. *See* Interleukin 6
IL-7. *See* Interleukin 7
IL-8. *See* Interleukin 8
IL-9. *See* Interleukin 9
IL-10. *See* Interleukin 10
IL-12. *See* Interleukin 12
IL-13. *See* Interleukin 13
IL-15. *See* Interleukin 15
IL-17. *See* Interleukin 17
IL-18. *See* Interleukin 18
IL-21. *See* Interleukin 21
IL-22. *See* Interleukin 22
ILC. *See* Innate lymphoid cell
Immunogen design
  cytomegalovirus, 372
  design
    immunization strategy, 373–374
    shape selection, 371–373
  human immunodeficiency virus, 362–364, 372–374
  influenza virus, 361–362
  overview, 370–371
  prospects, 364–366
  respiratory syncytial virus, 360–361, 372
Immunological memory, overview, 398–399
Influenza virus
  epidemiology, 138
  hemagglutinin stem
    antibody response, 156–158, 164
    epitope vaccine design from antibodies of vaccinated individuals, 158
    monoclonal antibody therapy
      clinical trials, 165–166
      enhanced disease risks, 167–168
      immunogenicity in natural infection, 166–167
      prospects, 168–169
    multidonor class antibody induction by universal vaccine, 158–160
    neutralization mechanisms, 164–165
    next-generation universal vaccine design, 160
  immunodominance
    antigenic drift driving, 148–149
    outflanking strategies, 149–150
    overview of virus humoral immunity, 147–148
  immunogen design, 361–362
  memory B-cell studies in mice, 217
  memory natural killer cells, 382–383
  neutralizing antibodies, 146
  original antigenic sin, 146–147, 150
  strains, 156, 164
  systems vaccinology studies, 224–227
  vaccination
    challenges, 146, 150–151
    conserved antigens as targets, 138–139
    gut microbiota and efficacy, 174
    universal vaccine development
      costs, 142–143
      factors to consider, 140–143
      prospects, 151
      rationale, 139–140
      safety, 142
Innate lymphoid cell (ILC)
  immune memory role, 394–395
  origins, 390–391
  prospects for study, 395
  vaccination role, 394–395
Interferon α (IFN-α), 390
Interferon γ (IFN-γ), 10–12, 18, 82, 182, 315–316, 390–391, 406, 408
Interleukin 1 (IL-1), 10
Interleukin 2 (IL-2), 391
Interleukin 4 (IL-4), 10, 12, 18, 20, 237
Interleukin 5 (IL-5), 10, 18, 22, 394
Interleukin 6 (IL-6), 82, 233
Interleukin 7 (IL-7), 174
Interleukin 8 (IL-8), 82
Interleukin 9 (IL-9), 11
Interleukin 10 (IL-10), 18
Interleukin 12 (IL-12), 12–13, 379, 391–394, 408
Interleukin 13 (IL-13), 18, 22, 394
Interleukin 15 (IL-15), 174, 379, 391–394
Interleukin 17 (IL-17), 10, 22, 394
Interleukin 18 (IL-18), 379, 390–394
Interleukin 21 (IL-21), 18, 237
Interleukin 22 (IL-22), 10, 394
IRF4, 2
IRF7, 232

J

JUNB, 2

K

KLF2, 381
Klf4, 3
KLRC2, 400

L

LCMV. *See* Lymphocytic choriomeningitis virus
Listeria monocytogenes, 276
Lymphocytic choriomeningitis virus (LCMV), 19, 129, 131, 408

© 2018 by Cold Spring Harbor Laboratory Press. All rights reserved.

This is a free sample of content from Immune Memory and Vaccines: Great Debates.
Click here for more information on how to buy the book.

M

Malaria, memory B-cell studies in mice, 217
Marburg virus, 262–263
MART-1, 132
Memory. *See* Immunological memory; *specific cells*
Memory B cell. *See* Germinal center
Meningitis B vaccine, 371
Microbiota. *See* Gut microbiota
MMRN. *See* Multiscale multifactorial response network
Mouse models
  dirty versus clean mouse studies, 275–276
  human immune system comparison, 272–273
  memory B-cell studies, 214–217
  previous microbial exposure impact on immune response, 273–274
  specific pathogen-free mice, 275–276
mTOR, 245
MUC1, 115, 117
Multiscale multifactorial response network (MMRN), 237

N

NA. *See* Neuraminidase
Narcolepsy, 142
Natural killer (NK) cell
  activation states and cell maintenance, 409
  cytokine stimulation, 408–409
  functional overview, 378
  memory
    antigen-nonspecific memory-like natural killer cells, 379, 381–382
    antigen-specific memory of highly diverse antigens, 382–383
    bystander responses, 401
    cancer targeting, 401
    cytomegalovirus, 381–382, 390–391, 393, 399–400
    experimental evidence, 380–381
    forms of memory, 390–392
    human immunodeficiency virus, 382–383
    immunological memory, 378–379, 399–400
    prospects for study, 384–386, 395, 409–411
    subset expansion and functional memory, 407–408
    vaccination role, 392–394, 400
    vaccine utilization, 383–384
  origins, 390–391
  receptors in activation, 406–407
  subsets, 378, 407–408
Neoantigen. *See* Cancer vaccine
Neuraminidase (NA), 138–139, 146, 151, 164
NF-κB. *See* Nuclear factor κB
NK cell. *See* Natural killer cell
NKG2C, 378, 390–391, 400, 407
NLRP3, 382
Nuclear factor κB (NF-κB), 2

O

Oct4, 3
Original antigenic sin, 40–41, 146–147, 150, 353

P

p53, 117
PAP. *See* Prostatic acid phosphatase
Parkinson's disease (PD), 124
PD. *See* Parkinson's disease
PD-1, 386
PD-L2, 210–211, 219
Pertussis
  Bordetella pertussis evolution, 332–333
  protection by natural infection, 324–325
  vaccines
    acellular versus whole vaccine, 327, 342
    animal models, 329, 332
    antigen composition of acellular vaccine, 342
    booster vaccination and affinity maturation, 342–343
    herd immunity, 332
    historical perspective, 325
    IgG4 response, 343–344
    immune memory skewing by primary and booster vaccination, 345–346
    immune responses, 327–331, 342–344
    immunoglobulin class switching, 343–344
    improvement of acellular vaccine, 333–335
    overview, 324
    priming failure by acellular vaccines
      original antigenic sin, 353
      overview, 350–353
      postexposure immune memory reactivation failure, 353–354
    prospects, 354–355
    T-cell responses
      acellular boosting, 344–345
      primary vaccination, 344–345
    waning immunity, 325–327
Plaque-reduction neutralization test (PRNT), 84, 87
Polio vaccine, gut microbiota and efficacy, 174
PRNT. *See* Plaque-reduction neutralization test
Proof-of-concept studies, 260
Prostatic acid phosphatase (PAP), 128

R

RAG, 378, 392, 399
Rel, 2

© 2018 by Cold Spring Harbor Laboratory Press. All rights reserved.

This is a free sample of content from Immune Memory and Vaccines: Great Debates.
Click here for more information on how to buy the book.

Relb, 2
Respiratory syncytial virus (RSV), immunogen design, 360–361, 372
RSV. *See* Respiratory syncytial virus

S

Salmonella typhi, CD8 T-cell vaccine, 315–316
SHIV. *See* Human immunodeficiency virus; Simian immunodeficiency virus
SHM. *See* Somatic hypermutation
Simian immunodeficiency virus (SIV)
  CD8 T-cell vaccine, 304–305, 307–308
  human immunodeficiency virus studies in nonhuman primates
    SHIV challenge models, 265–266
    SIV challenge models, 265
  humoral immunity, 32
  natural killer cell memory, 400
  rhesus macaque challenge studies, 280–286
  T-cell response, 19
SIV. *See* Simian immunodeficiency virus
SLE. *See* Systemic lupus erythematosus
Somatic hypermutation (SHM), 46–51, 54–56, 183, 214, 216, 218
Sox2, 3
Specific pathogen-free (SPF) mice, 275–276
SPF mice. *See* Specific pathogen-free mice
SREBP-1, 237
STAT1, 232
STAT4, 408
Systemic lupus erythematosus (SLE), 56
Systems vaccinology
  adjuvant profiling in animals, 242–243
  age effects, 243–244
  cell phenotyping, 226
  challenges, 255–256
  chronic infection studies, 246
  correlates of infection, 246–247
  cytokine studies, 222, 225–226
  examples, 227
  functional assays, 226
  gut microbiota effect studies, 245
  history of human studies, 243–244
  immune response predictors
    identification, 234, 236–237
    robustness, 237–238
  influenza studies, 224–227
  lymphocyte repertoire analysis, 226
  metabolomics, 245
  misunderstandings, 252–255
  overview, 222–223, 232, 242, 252–253
  prospects, 227–228, 238
  techniques, 222–226
  transcriptomics, 222, 237
  vaccine efficacy signatures, 232–234

T

T helper cell. *See* CD4 T cell
TLR4, 243
TLR5, 233, 245
TLR9, 243
TNF-α. *See* Tumor necrosis factor α
Tuberculosis, T-cell response, 11
Tumor necrosis factor α (TNF-α), 82, 316

V

Vesicular stomatitis virus (VSV), natural killer cell memory, 382–383, 392
VSV. *See* Vesicular stomatitis virus

Z

Zika virus
  dengue infection interactions, 108, 110
  nonhuman primate challenge studies, 285

© 2018 by Cold Spring Harbor Laboratory Press. All rights reserved.