

Index

A

- Abiraterone acetate, 441
- AD. *See* Androstenedione
- Adaptive immunity, escape by cancer cells, 438
- Adenocarcinoma, prostate
 - advanced or metastatic histopathology, 101
 - diagnostic criteria, 88–92
 - ductal adenocarcinoma, 97
 - histopathological features, 92–93
 - immunohistochemistry, 93–95
 - variants, 95–96
- ADXS-PSA, 442
- African Americans. *See* Race/ethnic disparities in prostate cancer
- AKRIC3, 222
- AKT, 192, 200
 - coclinical trial project targeting, 369–370
 - historical perspective in prostate cancer, 186–187
- AMPK, therapeutic targeting, 384
- Androgen receptor (AR)
 - abnormalities in prostate cancer, 2–3
 - castration resistance mechanisms
 - gene amplification, 239
 - gene mutations, 239
 - overview, 238–239
 - splice variants, 239–240
 - coregulators, 225–226
 - DNA repair cross talk, 279–280, 288
 - history of study in prostate cancer, 184–186, 217
 - ligand-independent activation, 227–228
 - maturation and folding, 238
 - prostate development, 17–19, 25
 - signaling
 - action, 226–227
 - cross talk, 227–228
 - modeling in mouse, 330
 - prereceptor modulation, 219–220
 - structure, 222–225, 236–237
 - therapeutic targeting
 - chaperones, 241, 243
 - combination strategies, 245–246
 - coregulators, 240–242
 - genomic interplay with other receptors, 244–245
 - non-ligand-binding domain targeting, 243–244
 - transcriptional activation, 222–225, 236–237
 - transcriptional maintenance of normal prostate identity, 147–148
- Androgen-independent prostate cancer.
 - See* Castration-resistant prostate cancer

- Androstenedione (AD), synthesis, 218–219
- APC, 166, 169–170, 199, 399
- AR. *See* Androgen receptor
- ARN-509, 239
- ASTX-727, 173
- Atezolizumab, 441
- ATM, 277, 281–282
 - mouse models of prostate cancer, 330
 - mutations in prostate cancer, 65
- ATRX, 164
- AURKA, 268
- AUY922, 245
- Axl, 306

B

- Basal cell carcinoma, prostate, 97–98
- Base excision repair (BER), 276–277
- BCL-2, 316
- BCL-XL, 316
- BER. *See* Base excision repair
- β -catenin, prostate development, 20–22
- Biomarkers, prostate cancer
 - diagnosis and screening, 169–170, 398–399
 - disease burden and treatment response, 171
 - early detection, 394–397
 - metabolomics for discovery, 384–385
 - overview, 168–169
 - prognosis, 399–401
 - prospects for study, 305
 - risk stratification and surveillance, 170–171
 - targeted therapeutics, 402–405
- BMP. *See* Bone morphogenetic protein
- Bone metastasis. *See* Metastasis, prostate cancer
- Bone morphogenetic protein (BMP),
 - prostate development role, 23–24
- Bone scintigraphy, prostate cancer metastasis, 423–424
- BRAF
 - mouse models of prostate cancer, 339–340
- BRCA1, 62–63, 65, 277–278, 281, 283, 288, 397
- BRCA2, 62–63, 65, 277–279, 281–283, 288, 330, 397
- BRD4, 173
- BRIP1, 277
- BRN2, 257–258

C

- CAF. *See* Cancer-associated fibroblast
- Calcium intake, prostate cancer risk studies

Index

- Cancer stem cell (CSC)
 - assays, 131–133
 - markers and identification in prostate, 137–139
 - prospects for study, 139
 - prostate cancer cell origin identification, 135–136
 - tumor heterogeneity, 130
 - Cancer-associated fibroblast (CAF), prostate stroma, 295–297, 301
 - Castration-resistant neuroendocrine prostate cancer (CRPC-NE)
 - cell lineage plasticity and transdifferentiation, 265
 - epigenomic alterations, 260–261
 - gene mutations and pathways, 259–260, 266
 - genomic alterations, 258, 260
 - neuroendocrine cells in prostate cancer, 256
 - overview, 255–256
 - preclinical models
 - cell lines, 262
 - mouse, 262, 264–265
 - overview, 262–263
 - xenografts and organoids, 265, 267
 - stem cell differentiation and neuronal pathways, 257–258
 - therapeutic targets, 268–269
 - Castration-resistant prostate cancer (CRPC)
 - androgen receptor
 - dependence, 18, 220–221
 - resistance mechanisms
 - gene amplification, 239
 - gene mutations, 198, 239
 - overview, 238–239
 - splice variants, 239–240
 - cell culture, 5
 - multifocality and heterogeneity in tracking, 201
 - overview, 3
 - transcriptional network, 152–153
 - transcriptional rewiring
 - FOXA1, 152
 - transition to androgen-independent androgen receptor signaling, 150–152
 - treatment, 235
 - CB-839, 384
 - CBX2, 268
 - CD9, 193
 - CDK12, 281
 - CDKN1A, 193
 - CGH. *See* Comparative genomic hybridization
 - CHD1, 196, 331
 - CHEK2, variants in prostate cancer, 64–65, 283
 - Chemoprevention
 - dutasteride, 211–212
 - finasteride, 4, 210–211
 - inflammation targeting, 214
 - lycopene, 212–213
 - nonsteroidal anti-inflammatory drugs, 213
 - overview, 209–210
 - selenium, 212
 - soy, 213
 - statins, 213–214
 - toremifene, 213
 - vitamin E, 212
 - CHK2, 277, 283
 - CHKA. *See* Choline kinase A
 - Choline kinase A (CHKA), 241
 - CLU, 243
 - CNV. *See* Copy number variation
 - Coclinical trial project
 - cell cycle control studies, 370
 - cell metabolism targeting, 370–371
 - clinical challenges, 368
 - DNA repair pathway targeting studies, 369–370
 - efficacy of platform in prostate cancer, 367–368
 - mouse models for patient stratification, 365–366
 - mTOR pathway inhibition studies, 368–369
 - overview, 364–365
 - personalized therapies, 368
 - prospects, 371
 - Ras pathway targeting studies, 369
 - requirements, 366–367
 - Wnt signaling pathway targeting studies, 370
 - Coffee, prostate cancer risk studies, 43
 - Comparative genomic hybridization (CGH), historical perspective in prostate cancer, 187–188
 - Computed tomography (CT), prostate cancer, 423
 - Copy number variation (CNV), prostate cancer genetics, 62, 187–189
 - CpG island, 161
 - CPI-1205, 173
 - CPT1, prostate cancer alterations, 377
 - CRPC. *See* Castration-resistant prostate cancer
 - CRPC-NE. *See* Castration-resistant neuroendocrine prostate cancer
 - CSC. *See* Cancer stem cell
 - CT. *See* Computed tomography
 - CTCF, 164
 - CXCL12, 297, 301, 312
 - Cytogenetics, historical perspective in prostate cancer, 183
- ## D
- DDSP. *See* DNA damage secretory program
 - Dehydroepiandrosterone (DHEA)
 - prostate cancer synthesis, 220–221
 - synthesis, 218–219
 - Denosumab, 319
 - DHEA. *See* Dehydroepiandrosterone
 - DHT. *See* Dihydrotestosterone
 - Dihydrotestosterone (DHT)
 - prostate cancer synthesis, 220–221
 - synthesis, 218–219
 - DKK, 316
 - DLL3, 268–269
 - DNA damage secretory program (DDSP), 302
 - DNA methylation. *See* Epigenetics, prostate cancer
 - DNA methyltransferase, isoforms, 161

- DNA repair
androgen receptor cross talk, 279–280, 288
coclinical trial project targeting, 369–370
defects in prostate cancer
 advanced prostate cancer, 282–283
 primary prostate cancer, 280–282
 risk, 277–279
overview of DNA damage and repair, 276–277
therapeutic targeting
 clinical trials, 285–287
 kinases, 293
 PARP, 283, 288
 prospects, 288–289
- Dutasteride, chemoprevention, 211–212
- E**
- EMT. *See* Epithelial-to-mesenchymal transition
- Enzalutamide, 239, 245
- EPI-001, 243–244
- EPI-506, 244
- Epidemiology, prostate cancer. *See also* Race/ethnic disparities in prostate cancer
 incidence, 33–34
 mortality, 34–36
 prospects for study, 4, 44
 risk factors
 calcium, dairy, and vitamin D studies, 42–43
 coffee protection, 43
 fish intake studies, 43
 height, 39–40
 lycopene and tomato product protection, 41–42
 obesity, 39
 overview, 36–37
 physical activity protection, 40
 smoking, 40–41
 statin protection, 43, 44
 total prostate cancer, 37–39
- Epigenetics, prostate cancer
 castration-resistant neuroendocrine prostate cancer, 260–261
 clinical biomarkers for prostate cancer
 diagnosis and screening, 169–170
 disease burden and treatment response, 171
 overview, 168–169
 risk stratification and surveillance, 170–171
 DNA methylation
 detection, 172
 overview, 161–164
 prostate cancer, 166–167
 driver mutations, 165–166
 histone modification
 overview, 164–165
 prostate cancer, 167–168
 metabolic rewiring, 381–383
 mouse models of prostate cancer, 338
 overview of machinery, 159–161
 therapeutic targeting, 172–174
- Epithelial-to-mesenchymal transition (EMT), 296, 300, 311
- ERG, 188, 191–192, 201, 331, 398–399
- Ethnicity. *See* Race/ethnic disparities in prostate cancer
- ETS genes
 fusions in prostate cancer precursor lesions, 113–114
 historical perspective in prostate cancer, 188, 190–194
 mouse models of prostate cancer, 326
- ETV1
 mouse models of prostate cancer, 331
 transcriptional reprogramming of prostate cancer, 148, 188, 191–192
- ETV4, transcriptional reprogramming of prostate cancer, 148, 188
- Exercise. *See* Physical activity
- Extracellular matrix. *See* Stroma, prostate cancer
- EZH2, 164, 168, 173, 200, 260–261, 268, 338
- F**
- FANCA, 282
- FANCD2, 281
- FAO. *See* Fatty acid oxidase
- FASN. *See* Fatty acid synthase
- Fatty acid oxidase (FAO), therapeutic targeting, 384
- Fatty acid synthase (FASN)
 prostate cancer alterations, 377
 therapeutic targeting, 383
- FGF. *See* Fibroblast growth factor
- Fibroblast growth factor (FGF)
 prostate development, 21–25
 tumor microenvironment, 295
- Finasteride, chemoprevention, 4, 210–211
- Fish intake, prostate cancer risk studies, 43
- FKBP51, 238
- FKBP52, 238
- FLI1, transcriptional reprogramming of prostate cancer, 148
- FOXA1, 227
 castration-resistant prostate cancer role, 152
 mouse models of prostate cancer, 332
 mutation in prostate cancer, 194
 prostate cytodifferentiation, 26
- FOXA2, 258
- FRS2 α , prostate development, 23
- G**
- GAS6, 302
- GATA2, 237
- Genome-wide association study (GWAS), prostate cancer genetics, 52–62
- Gleason grade, 99–100
- GLUT1, prostate cancer alterations, 382
- GSTP1, 120, 166, 169, 399
- GWAS. *See* Genome-wide association study
- H**
- HBP. *See* Hexosamine biosynthesis pathway
- Height, prostate cancer risk studies, 39–40

Index

- Hematopoietic stem cell (HSC), prostate cancer stroma, 298
- Hexosamine biosynthesis pathway (HBP), prostate cancer alterations, 381
- HGPIN. *See* High-grade prostatic intraepithelial neoplasia
- High-grade prostatic intraepithelial neoplasia (HGPIN) biopsy, 111
chemoprevention studies, 116, 118–119
inflammation in development, 119
molecular pathways in development, 119–121
mouse models, 330–332
MYC role, 121–123
next-generation sequencing findings, 116
overview, 109–111
precursor of prostate cancer
 molecular pathology evidence, 114–115
 postinvasive intraepithelial carcinoma as cancer precursor comparison, 111–114
- Histone modification. *See* Epigenetics, prostate cancer
- Histopathology, prostate cancer
- Adenocarcinoma
 advanced or metastatic histopathology, 101
 diagnostic criteria, 88–92
 ductal adenocarcinoma, 97
 histopathological features, 92–93
 immunohistochemistry, 93–95
 variants, 95–96
 basal cell carcinoma, 97–98
 grading, 99–101
 intraductal carcinoma, 87–88
 neuroendocrine carcinoma, 98
 squamous carcinoma, 97
 treatment response, 98–99
 urothelial carcinoma, 97
- Homologous recombination (HR), 277, 283, 288
- HOP, 238
- HOX*, prostate development role, 19–20
- HOXB13*
 castration-resistant prostate cancer role, 152
 prostate cancer mutations, 52, 63–64, 227
- HR. *See* Homologous recombination
- HSC. *See* Hematopoietic stem cell
- HSP27, 243
- HSP70, 238, 243
- HSP90, 238, 245
- I**
- IDH1, 174, 403
- IDH2, 174
- IGF-1. *See* Insulin-like growth factor-1
- IKBKB, 193
- Imaging. *See specific techniques*
- Immunogenic cell death, 444
- Immunotherapy. *See specific targets*
- Inflammation
 chemoprevention targeting, 214
 high-grade prostatic intraepithelial neoplasia role, 119
- Insulin-like growth factor-1 (IGF-1), 315
- Intraductal carcinoma, histopathology, 87–88
ITGB4, 279
- K**
- KDM6A*, prostate cancer mutations, 116
- KLF4, 163
- KMT2C*, 165
- KMT2D*, prostate cancer mutations, 116
- KRAS*, mouse models of prostate cancer, 339–340
- L**
- Linkage analysis, prostate cancer mutations, 52
- Low-density lipoprotein receptors, prostate cancer alterations, 378
- LRP5, 316
- Lycopene
 chemoprevention, 212–213
 prostate cancer risk studies, 41–42
- Lynch syndrome, prostate cancer risk, 63
- M**
- MAGL. *See* Monoacylglycerol lipase
- Magnetic resonance imaging (MRI), prostate cancer
 diagnosis, 418
 diffusion-weighted imaging, 415, 417
 dynamic contrast-enhanced imaging, 417
 endorectal coil, 417–418
 guided biopsy
 cognitive fusion prostate biopsy, 419–420
 in-bore guided biopsy, 420
 software-based fusion biopsy devices, 420
 reporting systems, 418
 T2-weighted imaging, 415
 3.0T MRI, 417–418
 treatment management
 active surveillance, 421–422
 staging, 422–423
 ultrasound fusion biopsy, 420–421
- Magnetic resonance spectroscopy imaging (MRSI),
 metabolic imaging, 385, 417
- Matrix metalloproteinases (MMPs), tumor microenvironment, 295, 298
- MBD proteins, 163, 165, 174
- MCL-1, 316
- MECP2*, 163
- Metabolism, prostate cancer
 biomarker discovery, 384–385
 coclinical trial project targeting, 370–371
 derangements
 amino acid metabolism, 378
 glucose metabolism, 376
 hexosamine pathway, 381
 lipid metabolism, 376–379
 one-carbon metabolism, 378, 380–381
 diet and systemic metabolism effects on metabolome, 381

- imaging, 385–387
 - rewiring as integrator of genetic and epigenetic alterations, 381–383
 - therapeutic targeting, 383–384
 - Metastasis, prostate cancer
 - bone
 - experimental models, 317–318
 - management, 318
 - mechanisms, 314–316
 - epidemiology, 310
 - models, 311–312
 - mouse models, 338–340
 - residual disease and dormancy, 312–314
 - seed and soil hypothesis, 311
 - sites, 309–310
 - soft tissue, 316–317
 - steps, 310–311
 - MicroRNA, osteoclastogenesis role, 316
 - MLH1*, 282
 - MMP7*, genome-wide association study, 53
 - MMPs. *See* Matrix metalloproteinases
 - Monoacylglycerol lipase (MAGL), prostate cancer alterations, 377, 381
 - Mortality, prostate cancer, 1, 34–36
 - Mouse models, prostate cancer. *See also* Coclinical trial project
 - androgen receptor signaling modeling, 330
 - castration-resistant neuroendocrine prostate cancer, 262, 264–265
 - epigenetic regulators, 338
 - gene expression targeting in prostate, 329
 - gene targets, 326–327, 330
 - metastasis, 338–340
 - MYC activation, 332–333
 - overview, 325–326
 - pre-malignant and early-stage cancer, 330–332
 - prospects, 340–342
 - prostate comparison with humans, 328–329
 - PTEN loss of function, 333–337
 - TP53* defects, 337–338
 - WNT defects, 338
 - MRI. *See* Magnetic resonance imaging
 - MRSI. *See* Magnetic resonance spectroscopy imaging
 - MSH2*, 63, 282, 404
 - MSH6*, 404
 - MSMB*, genome-wide association study, 54
 - mTOR
 - coclinical trial project targeting, 368–369
 - glutamine control of mTORC1 signaling, 378
 - MYC
 - castration-resistant neuroendocrine prostate cancer role, 257
 - castration-resistant prostate cancer role, 153
 - high-grade prostatic intraepithelial neoplasia and prostate cancer role, 117, 119, 121–123
 - historical perspective in prostate cancer, 186–187
 - metabolic rewiring, 382–383
 - mouse models of prostate cancer, 330, 332–333, 339
 - neuroendocrine prostate cancer role, 200
 - therapeutic targeting, 268
 - transcriptional reprogramming of prostate cancer, 149–150
- ## N
- NBS1*, 64, 277
 - NER. *See* Nucleotide excision repair
 - Neuroendocrine prostate cancer, 98, 199–200
 - castration-resistant prostate cancer. *See* Castration-resistant neuroendocrine prostate cancer
 - inducers, 256–257
 - neuroendocrine cells in prostate cancer, 256
 - Neuron specific enolase (NSE), 256
 - NHEJ. *See* Nonhomologous end joining
 - Nkx3.1*
 - history of study in prostate cancer, 184
 - mouse models of prostate cancer, 326, 331, 340
 - prostate development, 21, 25
 - transcriptional maintenance of normal prostate identity, 146–147
 - Noggin, prostate development, 24
 - Nonhomologous end joining (NHEJ), 277
 - Nonsteroidal anti-inflammatory drugs (NSAIDs), chemoprevention, 213
 - NSAIDs. *See* Nonsteroidal anti-inflammatory drugs
 - NSD2*, 338
 - NSE. *See* Neuron specific enolase
 - Nucleotide excision repair (NER), 277
- ## O
- Obesity, prostate cancer risk studies, 39
 - Oct1, 237
 - OGX-427, 243
 - Olaparib, 443
 - Organogenesis. *See* Prostate
 - Organoid
 - castration-resistant neuroendocrine prostate cancer, 265, 267
 - culture model of prostate cancer, 131–132, 355–357
- ## P
- p53. *See* *TP53*
 - p63
 - prostate development, 22
 - transcriptional maintenance of normal prostate identity, 147
 - PI160, 226
 - PARP
 - inhibitors, 280, 282–283, 288, 341, 403, 443–444
 - prostate cancer studies, 279–280
 - Patient-derived explant (PDE)
 - generation, 354–355
 - overview, 354
 - proliferation index, 355

Index

- Patient-derived xenograft (PDX)
bone metastasis model, 317–318
castration-resistant neuroendocrine prostate cancer, 265, 267
disease stage-specific models, 352–354
limitations, 354
overview, 351–352
tissue sources, 353
transplant, 352–353
- PCA3, early detection of prostate cancer, 397
- PD-1
immune escape in cancer, 438–440
therapeutic targeting, 403, 405, 440–445
- PDE. *See* Patient-derived explant
- PD-L1
expression in prostate cancer, 440
immune escape in cancer, 438–440
therapeutic targeting, 403, 405, 440–445
- PDX. *See* Patient-derived xenograft
- Pembrolizumab, 441–442
- Pentose phosphate pathway, prostate cancer alterations, 376
- PET. *See* Positron emission tomography
- Physical activity, prostate cancer risk studies, 40
- PIC. *See* Postinvasive intraepithelial carcinoma
- Positron emission tomography (PET)
metabolic imaging of prostate cancer, 385–387, 425–427
prostate-specific membrane antigen, 427–430
- Postinvasive intraepithelial carcinoma (PIC), prostate cancer precursor, 111–114
- PPIase, 238
- PREX1, 279
- Prostate
Anatomy
human, 9–10
mouse, 12
gene expression targeting in mouse, 329
histology
human, 10–12
mouse, 12–14
prostate epithelium, 131
oncogenic transformation susceptibility, 1–2
organogenesis
budding and branching morphogenesis, 22–25
cancer significance, 26–27
cytodifferentiation, 25–26, 133
initiation and identity, 17–22
overview, 16–17
Prostate-specific antigen (PSA)
early detection of prostate cancer, 394–397
limitations as biomarker, 4
Prostate-specific membrane antigen (PSMA), positron emission tomography, 427–430
- Prostate stem cell
adult progenitor cells
basal progenitor cells, 134
localization, 134
luminal progenitor cells, 134–135
overview, 133
markers, 137
prostate cancer cell origin identification, 135–136
- Prostatic intraepithelial neoplasia. *See* High-grade prostatic intraepithelial neoplasia
- PROSTVAC-V/F, 442
- Protasphere, culture model of prostate cancer, 355–357
- PSA. *See* Prostate-specific antigen
- PSMA. *See* Prostate-specific membrane antigen
- PTEN, 256
castration-resistant neuroendocrine prostate cancer genomic alterations, 258
diagnostic biomarker, 399
historical perspective in prostate cancer, 186, 192, 194
loss in prostate cancer precursor lesions, 113–114
mouse models of prostate cancer, 330, 333–337
prognostic biomarker, 399–401
prostate cytodifferentiation, 26
targeted therapeutics, 402–403
- PTGS2, 169
- ## R
- Race/ethnic disparities in prostate cancer
ancestral genome role, 75
biomarker considerations, 78–79
elimination, 80–81
genetic studies, 75–78
health care and health status, 79–80
metrics, 71–74
residential factors, 79
risk factors, 79
- RAD51B, genome-wide association study, 53
- RAD51C, 279, 281–282
- RAD54B, 279, 282
- RANKL, 315–316
- Ranolazine, 384
- RARB, 169
- RASSF1A, 166, 169–170
- RB
castration-resistant neuroendocrine prostate cancer genomic alterations, 258
castration-resistant prostate cancer role, 152–153
historical perspective in prostate cancer, 184
mouse models of prostate cancer, 330, 338–339
- REST, 256
- Restriction fragment length polymorphism (RFLP), historical perspective in prostate cancer, 183–184
- RFLP. *See* Restriction fragment length polymorphism
- ROCK2, 279
- ## S
- S-Adenosylmethionine (SAM), prostate cancer alterations, 380
- SAM. *See* S-Adenosylmethionine
- Sarcosine dehydrogenase (SARDH), prostate cancer alterations, 380–381
- SARDH. *See* Sarcosine dehydrogenase

- Selenium, chemoprevention, 212
- Serotonin, neuroendocrine cells in prostate cancer, 256
- Shh*, prostate development, 25
- Single nucleotide polymorphism (SNP), prostate cancer genetics, 52–62, 188
- Single-photon emission computed tomography (SPECT), prostate cancer, 424
- SMAD4*, mouse models of prostate cancer, 340
- Smoking, prostate cancer risk studies, 40–41
- Snail2*, 256
- SNP. *See* Single nucleotide polymorphism
- SOST, 316
- SOX2, 265
- Sox9, prostate development, 24–25
- SOX11, 265
- Soy, chemoprevention, 213
- SPDEF, 260
- SPECT. *See* Single-photon emission computed tomography
- Spheroid, culture model of prostate cancer, 355–357
- SPOP, 226
- SPOP*, 3
- mouse models of prostate cancer, 326, 331–332
 - prostate cancer mutations, 116, 194, 196, 198
- Squamous carcinoma, prostate, 97
- SRC1, 226
- SRC2, 226
- SRC3, 226
- SREBP-2, prostate cancer alterations, 378
- Statins
- chemoprevention, 213–214
 - prostate cancer risk studies, 43, 44
- Stem cell. *See* Cancer stem cell; Hematopoietic stem cell; Prostate stem cell
- Stroma, prostate cancer
- cell types
 - cancer-associated fibroblasts, 295–297
 - vascular cells, 297–298
 - drug delivery and efficacy barriers, 300
 - prospects for study, 303
 - protumorigenic damage responses, 302
 - tumor microenvironment, 294–295
 - tumor microenvironment protective niches, 301–302
- T**
- Telomere, high-grade prostatic intraepithelial neoplasia findings, 120–121
- Testosterone, synthesis, 218–219
- TET, 163
- Tfm*, 19
- TGF- β . *See* Transforming growth factor- β
- TMPRSS2:ERG translocation, 3, 78–79, 98
- androgen receptor signaling, 226–227
 - castration-resistant neuroendocrine prostate cancer
 - genomic alterations, 258, 260
 - early detection of prostate cancer, 397
 - heterogeneity of prostate cancer, 192–193
 - high-grade prostatic intraepithelial neoplasia, 113–116, 118–119
- historical perspective in prostate cancer, 188, 190–193
 - mouse models of prostate cancer, 326, 331
 - transcriptional reprogramming of prostate cancer, 148–149
- TNF- α . *See* Tumor necrosis factor- α
- TOP2B, 193
- Toremifene, chemoprevention, 213
- TP53*, 3, 152–153, 184, 194
- castration-resistant neuroendocrine prostate cancer
 - genomic alterations, 258
 - mouse models of prostate cancer, 330, 337–338
- Transforming growth factor- β (TGF- β), 23–24, 315–316, 339
- Transrectal ultrasound (TRUS), prostate cancer, 414–415
- Trimetazidine, 384
- TRUS. *See* Transrectal ultrasound
- Tumor microenvironment. *See also* Stroma, prostate cancer
- prospects for study, 303
 - prostate cancer, 294–295
 - protective niches, 301–302
 - protumorigenic damage responses, 302
- Tumor necrosis factor- α (TNF- α), 315
- TV-2640, 383
- Twist1, 256
- Tyro3, 306
- U**
- Ultrasound. *See* Transrectal ultrasound
- Urothelial carcinoma, prostate, 97
- V**
- Vascular endothelial growth factor (VEGF), prostate cancer stroma, 297
- VAV3, 280
- VCAM-1, 315
- VEGF. *See* Vascular endothelial growth factor
- Vimentin, 256
- Vitamin D, prostate cancer risk studies, 42–43
- Vitamin E, chemoprevention, 212
- W**
- WNT
- castration-resistant prostate cancer, 316
 - coclinical trial project targeting, 370
 - mouse models of prostate cancer, 338
 - prostate development, 20–22
- X**
- Xenograft. *See* Patient-derived xenograft
- XRCC2*, 279
- XRCC3*, 279
- Z**
- Zeb1, 256