

# Index

Note: Page numbers of article titles are in **boldface** type.

## A

Acid phosphatase, tartrate-resistant, assays for, 371

Alendronate

complications from, 381

discontinuation of

bone mineral density effects of, 324–325

bone turnover marker effects of, 324–325

fracture risk after, 327–332

esophageal cancer due to, 394–395

for glucocorticoid-induced osteoporosis, 419–421

for men, 407

response to, bone turnover markers for, 377–378

selection of, bone turnover markers for, 374–375

teriparatide after, 474

transitioning to denosumab, 445

versus denosumab, 445–447

Alendronate Phase III Treatment Group, 324–325, 327–328

Alkaline phosphatase, bone-specific. *See* BSAP (bone-specific alkaline phosphatase).

American Academy of Oral and Maxillofacial Surgeons, osteonecrosis of jaw

definition of, 388–389

American College of Physicians, osteoporosis screening guidelines of, 404

American College of Rheumatologists, recommendations, 422–427

American Society for Bone and Mineral Research task force, osteonecrosis of jaw

definition of, 389

Amino-terminal crosslinking telopeptide of type I collagen. *See* NTX

(amino-terminal crosslinking telopeptide of type I collagen).

Anabolic agents, 342–348

Androgen deprivation therapy

denosumab with, 447

osteoporosis in, 403–404

Antiresorptive agents. *See also specific agents, eg.* Bisphosphonates.

complications of, **387–400**

new, 339–342

safety of, **387–400**

Aromatase inhibitors, denosumab with, 447–448

Atherosclerosis, vitamin D and calcium supplementation and, 356–357

Autoimmune disease, vitamin D and, 358–360

## B

Bisphosphonates

complications of

esophageal cancer, 394–395

Rheum Dis Clin N Am 37 (2011) 479–488

doi:10.1016/S0889-857X(11)00053-6

rheumatic.theclinics.com

0889-857X/11/\$ – see front matter © 2011 Elsevier Inc. All rights reserved.

Bisphosphonates (*continued*)

- fractures, 391–394
  - osteonecrosis of jaw, 387–391
- discontinuation of, **323–336**
  - bone mineral density effects of, 324–327
  - bone turnover marker effects of, 324–327
  - decisions concerning, 329–332
  - fracture risk after, 327–332
- drug holiday for, 331, 396
- for glucocorticoid-induced osteoporosis, 419–420
- for men, 407
- mechanism of action of, 339
- risks versus benefits of, 395–396
- switching to teriparatide from, 331
- teriparatide after, 474

## Bone mineral density

- for fracture prediction, 366
- glucocorticoid effects on, 417–418
- in men, 403–405
- treatment discontinuation effects on, 324–327

## Bone remodeling, physiology of, 337–338

Bone turnover markers, **365–386**

- assays for, 370–371
  - characteristics of, 367–368
  - diagnostic use of, 368
  - for complication prevention, 381
  - for fracture risk assessment, 369, 373
  - for prediction of bone loss, 373–374
  - for therapeutic response prediction, 375–381
  - for therapy choice, 374–375
  - persistence of therapy and, 381
  - physiology of, 365–367
  - treatment discontinuation effects on, 324–327
- Bone-specific alkaline phosphatase (BSAP). See BSAP (bone-specific alkaline phosphatase).

## Breast cancer

- aromatase inhibitors for, denosumab with, 447–448
- vitamin D and, 357–358

## BSAP (bone-specific alkaline phosphatase)

- assays for, 372
- denosumab effects on, 438–439
- diagnostic use of, 368
- for fracture risk assessment, 369
- for prediction of bone loss, 373–374
- for therapeutic response prediction, 375, 379–380
- for therapy choice, 374–375

## C

Calcitonin, 422

Calcium

- cardiovascular risk with, 356–357
  - dosing of, 351–356
  - for men, 407
  - recommendations for, 360
  - toxicity of, 353–354
  - with glucocorticoid therapy, 418
- Calcium-sensing receptor, 346–347
- Canadian Multicenter Osteoporosis Study (CaMOS), 342
- Cancer
- esophageal, bisphosphonate-induced, 394–395
  - vitamin D and, 357–358
- Carboxy-terminal crosslinking telopeptide of type I collagen generated by matrixmetalloproteinases (CTP), assays for, 370
- Cardiovascular disease, vitamin D and calcium supplementation and, 356–357
- Cathepsin K inhibitors, 339–341
- Colon cancer, vitamin D and, 358
- Continuing Outcomes Relevant to Evista (CORE), 328
- CORE (Continuing Outcomes Relevant to Evista), 328
- Coronary artery disease, vitamin D and calcium supplementation and, 356–357
- Corticosteroids. *See* Glucocorticoid-induced osteoporosis.
- CTP (carboxy-terminal crosslinking telopeptide of type I collagen generated by matrixmetalloproteinases), assays for, 370
- CTX (carboxy-terminal crosslinking telopeptide of type 1 collagen)
- assays for, 370
  - denosumab effects on, 435–445
  - diagnostic use of, 368
  - for fracture risk assessment, 369, 373
  - for prediction of bone loss, 373–374
  - for therapeutic response prediction, 375, 379–380
  - for therapy choice, 374–375
- CTX-MMP (carboxy-terminal crosslinking telopeptide of type I collagen generated by matrixmetalloproteinases), assays for, 370
- Cyclic teriparatide, 475

## D

- DAPS (Denosumab Adherence Preference Satisfaction Study), 446–447
- DECIDE (Determining Efficacy: Comparison of Initiating Denosumab vs. Alendronate) trial, 445–446
- DEFEND (Denosumab Fortifies Bone Density) trial, 440–442
- Denosumab, **433–452**
- adverse events with, 439–442
  - clinical studies of, 436–440
    - aromatase inhibitors with, 447–448
    - fracture prevention, 442–444
    - men with androgen deprivation therapy, 447
    - patient satisfaction, 446–447
    - postmenopausal women, 436–442, 445–446
    - single-dose, dose-escalation study of, 435–436
    - transitioning from alendronate, 445
  - discontinuation of

Denosumab (*continued*)

- bone mineral density effects of, 326
  - bone turnover marker effects of, 326
  - fracture risk after, 329
  - response to, bone turnover markers for, 378
  - versus alendronate, 445–447
- Denosumab Adherence Preference Satisfaction Study (DAPS), 446–447
- Denosumab Fortifies Bone Density (DEFEND) trial, 440–442
- Dental Practice-Based Research Network, 390
- Deoxyypyridinoline (DPD)
- assays for, 371
  - for therapy choice, 374
- Department of Veterans Affairs, osteoporosis screening guidelines of, 404–405
- Determining Efficacy: Comparison of Initiating Denosumab vs. Alendronate (DECIDE) trial, 445–446
- Diabetes mellitus
- bone turnover markers in, 373
  - vitamin D and, 359
- Dialysis, teriparatide for, 476
- Diaphyseal fractures, bisphosphonate-induced, 391–394
- Dickkopf-1, 342–345
- DPD (deoxyypyridinoline)
- assays for, 371
  - for therapy choice, 374
- Drug holiday, 331, 396
- Dual-energy X-ray absorptiometry, 366

**E**

- EPIDOS study, 369
- Esophageal cancer, bisphosphonate-induced, 394–395
- Estrogen(s), 422
- discontinuation of
    - bone mineral density effects of, 326
    - bone turnover marker effects of, 325–326
    - fracture risk after, 328
  - selection of, bone turnover markers for, 374
- Etidronate, for glucocorticoid-induced osteoporosis, 419–420
- European Study of Forsteo (EUROFORS), 474

**F**

- Femoral fractures
- bisphosphonate-induced, 391–394
  - teriparatide effects on, 476
- FIT (Fracture Intervention Trial), 374
- FLEX (Fracture Intervention Trial Long Term Extension), 325, 328
- Fracture(s)
- diaphyseal, bisphosphonate-induced, 391–394
  - healing of, teriparatide effects on, 475–476
  - in men, 402–403

- risk of
  - after treatment discontinuation, 327–332
  - bone turnover markers and, 369, 373
  - in glucocorticoid therapy, 417–418
  - subtrochanteric, bisphosphonate-induced, 391–394, 476
- Fracture Intervention Trial (FIT), 374
- Fracture Intervention Trial Long Term Extension (FLEX), 325, 328
- Fracture Prevention Trial (FPT), 328, 374
- Fracture Reduction evaluation of Denosumab in Osteoporosis Every 6 Months (FREEDOM) trial, 380, 442–444
- Fracture Risk Assessment Tool (FRAX), 366–367, 369, 401–402, **453–471**
  - adjustments to, 465–467
  - Canadian, 457–458
  - caveats for, 459–460
  - clinical risk factors in, 454–458, 460–461
  - clinician's guide for, 461–462
  - demographics in, 456
  - development of, 454–455
  - Implementation Guide for, 458–459
  - limitations of, 461–462
  - official positions for, 463–465
  - Position Development Conference for, 463–465
  - strengths of, 461–462
- FRAX. See Fracture Risk Assessment Tool (FRAX).
- FREEDOM trial, 380, 442–444
- FPT (Fracture Prevention Trial), 328

## G

- Garvan Institute fracture risk calculator, 454, 461
- General Practice Research Database, 327
- Glucagonlike peptide 2, 341–32
- Glucocorticoid-induced osteoporosis, **415–437**
  - bone mineral density in, 417
  - fracture risk in, 417–418
  - in men, 408
  - pathogenesis of, 415–416
  - treatment of
    - bisphosphonates for, 419–420
    - nonpharmacologic, 418–419
    - recommendations for, 422–427
    - teriparatide for, 420–422, 476–477

## H

- Health Outcomes and Reduced Incidence with Zoledronic Acid Once Yearly Pivotal Fracture Trial (HORIZON PFT), 326, 328
- Hip, transient osteoporosis of, 476
- Hip fractures
  - bisphosphonate-induced, 391–394
  - in men, 402–403

Hip (*continued*)

- teriparatide effects on, 476

HORIZON PFT (Health Outcomes and Reduced Incidence with Zoledronic Acid Once Yearly Pivotal Fracture Trial), 326, 328

HORIZON-GIOP, 420

Hormone therapy, 422

- discontinuation of

- bone mineral density effects of, 326

- bone turnover marker effects of, 325–326

- fracture risk after, 328

Hydroxyproline (HYP), assays for, 371

Hyperparathyroidism, in vitamin D deficiency, 352–353

Hypogonadism, 405–406, 416

## I

Ibandronate

- discontinuation of

- bone mineral density effects of, 325

- bone turnover marker effects of, 325

- for glucocorticoid-induced osteoporosis, 420

- response to, bone turnover markers for, 378

- selection of, bone turnover markers for, 375

Inflammatory bowel disease, vitamin D and, 359–360

International Osteoporosis Foundation, 366, 457, 464

International Society of Clinical Densitometry, position statement on testing for men, 404

## J

Jaw, osteonecrosis of, 387–391, 476

## K

Kidney failure, teriparatide for, 476

## M

Macrophage colony-stimulating factor, 416

Mandible, osteonecrosis of, 387–391, 476

Manitoba Bone Density Program, 457

Maxilla, osteonecrosis of, 387–391, 476

Men, osteoporosis in, **401–414**

- bone turnover markers in, 369

- denosumab for, 447

- diagnosis of, 404–406

- epidemiology of, 401–403

- risk factors for, 403–404

- treatment of, 407–408

Multiple Outcomes of Raloxifene Evaluation (MORE), 328

Multiple sclerosis, vitamin D and, 359–360

Myocardial infarction, vitamin D and calcium supplementation and, 356–357

## N

## National Osteoporosis Foundation

- FRAX validation by, 457–459
- on epidemiology, 402

## Nitrates, 342

## Nitroglycerine as an Option: Value in Early Bone Loss (NOVEL) trial, 342

## Nordic Research on Ageing (NORA) study, 367

## NOVEL (Nitroglycerine as an Option: Value in Early Bone Loss) trial, 342

## NTX (amino-terminal crosslinking telopeptide of type I collagen)

- assays for, 370
- denosumab effects on, 435–439
- diagnostic use of, 368
- for prediction of bone loss, 373–374
- for therapeutic response prediction, 375, 379
- for therapy choice, 374

## O

## OC. See Osteocalcin (OC).

## Odanacatib, 339–341

## OFELY study, 369

## Osteoblasts, function of, 337–338

## Osteocalcin (OC)

- assays for, 372
- diagnostic use of, 368
- for prediction of bone loss, 373–374
- for therapeutic response prediction, 375
- for therapy choice, 374

## Osteoclasts, function of, 337–338

## Osteocytes, function of, 337–338

## Osteonecrosis, of jaw, 387–391, 476

## Osteopenia, definition of, 369

## Osteoporosis

- assessment of
  - bone turnover markers for, **365–386**
  - for fracture risk, **453–471**
  - teriparatide in, **473–479**
- diagnosis of
  - bone turnover markers for, 368
  - in men, 404–406
- epidemiology of, in men, 401–403
- glucocorticoid-induced, 408, **415–437**
- in men, **404–414**
- RANKL pathway in, **433–452**
- risk factors for, in men, 403–404
- secondary, 405–407
- treatment of
  - calcium and vitamin D for, **351–365**
  - denosumab for, **433–452**
  - duration of, **323–336**

Osteoporosis (*continued*)emerging, **337–350**evaluation of, bone turnover markers for, **365–386**

in men, 407–408

safety of, **387–400**

Osteoporosis pseudoglioma, 344–345

Osteoprotegerin, 373, 434

**P**

Pain, in osteoporosis, teriparatide for, 476

## Pamidronate

for glucocorticoid-induced osteoporosis, 419–420

selection of, bone turnover markers for, 374

## Parathyroid hormone

calcium-sensing receptor and, 346–347

for therapy. *See* Teriparatide.

replacement of, 347–348

response to, bone turnover markers for, 379–380

Parathyroid Hormone and Alendronate for Osteoporosis trial, 473–474

Parathyroid-related protein, 347–348

## PICP (procollagen type I carboxy-terminal propeptide)

assays for, 372

for therapeutic response prediction, 375–376, 379

for therapy choice, 374–375

## PINP (procollagen type I amino-terminal propeptide)

assays for, 372

for therapeutic response prediction, 375–376, 380

for therapy choice, 374–375

## Prednisone

fracture risk from, 460–461, 466

osteoporosis prevention with, 418–419

Procollagen type I amino-terminal propeptide. *See* PINP (procollagen type I amino-terminal propeptide).Procollagen type I carboxy-terminal propeptide. *See* PICP (procollagen type I carboxy-terminal propeptide).

Pseudoglioma, osteoporosis, 344–345

Pycnodysostosis, 339

Pyridinoline (PYD), assays for, 371

**Q**

QFractureScores, 454, 461

**R**

## Raloxifene

discontinuation of

bone mineral density effects of, 326

bone turnover marker effects of, 325–326

fracture risk after, 329



- response to, bone turnover markers for, 378, 380
- RANK and RANKL pathway, 416, **433–452**
  - action of, 434
  - denosumab and, **433–452**
  - treatment implications of, 434–435
- Receptor activator of nuclear factor  $\kappa$ B (RANK). See RANK and RANKL pathway.
- Rheumatoid arthritis, vitamin D and, 359
- Risedronate
  - discontinuation of
    - bone mineral density effects of, 325
    - bone turnover marker effects of, 325
    - fracture risk after, 328–332
  - for glucocorticoid-induced osteoporosis, 419–420
  - for men, 407
  - response to, bone turnover markers for, 378
  - selection of, bone turnover markers for, 374–375
- Ronacaleret (SB-751689), 347

## S

- Sclerosteosis, 343–344
- Sclerostin, 342–345
- Serotonin, 345–346
- SOF (Study of Osteoporotic Fractures), 342, 454
- STAND trial, 445
- Strontium ranelate, 378–380
- Study of Osteoporotic Fractures (SOF), 342, 454
- Subtrochanteric fractures
  - atypical, bisphosphonate-induced, 391–394, 476
  - teriparatide effects on, 476
- Systemic lupus erythematosus, vitamin D and, 359

## T

- Tartrate-resistant acid phosphatase (TRACP), assays for, 371
- Teriparatide
  - adherence to, 477
  - after bisphosphonates, 474
  - cyclic, 475
  - discontinuation of
    - bone mineral density effects of, 326–327
    - bone turnover marker effects of, 326–327
    - fracture risk after, 329
  - follow-up for, 474–475
  - for glucocorticoid-induced osteoporosis, 420–422, 476–477
  - for kidney disease, 476
  - for men, 407
  - for osteonecrosis of jaw, 476
  - for pain management, 476
  - fracture healing with, 475–476
  - response to, bone turnover markers for, 375–379

Teriparatide (*continued*)

- switching from bisphosphonates to, 331
- zoledronate with, 473–474

## Testosterone

- for men, 407–408
- low levels of, 406–407

TRACP (tartrate-resistant acid phosphatase), assays for, 371

Transient osteoporosis, of hip, 476

T-score, in FRAX, 467

**U**

United Kingdom General Proteic Database study, of glucocorticoid-induced osteoporosis, 417

**V**

Vertebral Efficacy with Risedronate Therapy–North American (VERT-NA) trial, 325, 328

## Vitamin D

- autoimmune disease development and, 358–360
- cancer development and, 357–358
- cardiovascular risk with, 356–357
- dosing of, 351–356
- for men, 407
- recommendations for, 360
- screening for, 360
- toxicity of, 353–354
- with glucocorticoid therapy, 418

**W**

Wnt signaling, 342–345

## Women's Health Initiative studies

- calcium with vitamin D supplementation, 357
- estrogen therapy, 327

## World Health Organization

- osteoporosis definition of, 453
- osteoporosis intervention recommendations of, 366

**Z**

## Zoledronate

- discontinuation of
  - bone mineral density effects of, 325–326
  - bone turnover marker effects of, 325–326
  - fracture risk after, 328–332
- for glucocorticoid-induced osteoporosis, 420
- for men, 407
- response to, bone turnover markers for, 378, 380
- teriparatide with, 473–474