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SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Bone Health and Osteoporosis

Overview

- A bone density based aging model may facilitate and support the development of precision medicine strategies in osteoporosis prevention and management [1].
- Optimizing teriparatide administration timing may guide personalized dosing strategies to enhance bone formation and reduce fracture risk in osteoporosis [2].
- Natural traditional Chinese medicine products provide a theoretical and experimental basis for the development of new drugs and the improvement of osteoporosis management [3].
- Sequential anabolic-to-anti-resorptive therapy may inform treatment guidelines for high-risk postmenopausal populations [4].
- Acupuncture shows encouraging efficacy in improving symptoms of primary osteoporosis as a physical intervention in clinical practice [5].
- Machine learning application to hand radiographs represents a possible step toward more accessible, cost-effective, automated diagnosis and earlier treatment of osteoporosis/osteopenia [6].
- Low rates of osteoporotic pharmacotherapy were seen in patients who had femoral neck fractures despite established guidelines [7].
- Patients with osteoporosis may experience a higher incidence of medical complications within the 90-day global period than nonosteoporotic patients following rotator cuff repair [8].
- Patients with decreased bone mineral density can still achieve excellent 2-year outcomes after arthroscopic rotator cuff repair [9].
- Osteoporosis is a risk factor for complications and reoperations at 1 and 3 years after arthroscopic rotator cuff repair [11].
- Osteoporosis should not be considered a contraindication to arthroscopic rotator cuff repair given overall low complication rates [11].
- Continuous bone cement and standardized treatment for osteoporosis were guarantees of good clinical outcomes for percutaneous vertebroplasty [12].
- Injected bone cement >5.5 ml might be a guarantee of good clinical outcomes for percutaneous vertebroplasty [12].

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How It Works

- Bone density-based aging models can facilitate and support the development of precision medicine strategies in osteoporosis prevention and management [1].
- Optimizing teriparatide administration timing may guide personalized dosing strategies to enhance bone formation and reduce fracture risk in osteoporosis [2].
- Natural traditional Chinese medicine products provide a theoretical and experimental basis for the development of new drugs and the improvement of osteoporosis management [3].
- Sequential anabolic-to-anti-resorptive therapy may inform treatment guidelines for high-risk postmenopausal populations [4].
- Acupuncture shows encouraging efficacy in improving symptoms of primary osteoporosis, supporting its use as a physical intervention in clinical practice [5].
- Machine learning applied to hand radiographs represents a possible step toward more accessible, cost-effective, automated diagnosis and earlier treatment of osteoporosis/osteopenia [6].
- Low rates of osteoporotic pharmacotherapy are observed in patients who have sustained femoral neck fractures despite established guidelines [7].
- Patients with osteoporosis may experience a higher incidence of medical complications within the 90-day global period following rotator cuff repair than nonosteoporotic patients [8].
- Patients with decreased bone mineral density can still achieve excellent 2-year outcomes following arthroscopic rotator cuff repair [9].
- Current machine learning-based prediction models for postmenopausal osteoporosis without fractures demonstrate good discriminative ability but are generally characterized by a high risk of bias, a notable lack of calibration performance evaluation, and insufficient validation of clinical utility [10].
- Genetically modified stem cell therapy is a safe and effective method that can significantly improve bone mineral density and bone volume/total volume in animal models of osteoporosis [13].
- The prevalence of osteoporosis among postmenopausal women hospitalized for fractures in China is 76.9%, with prolonged menopause, vertebral fractures, and recent fracture history identified as key risk profiles [14].
- Obesity-associated dyslipidemia drives bone mineral density loss partly through inflammation-mediated pathways, with key inflammatory cytokines significantly mediating lipid metabolism's impact on bone health [16].
- Bone mineral density alone cannot predict early migration of tibial baseplates in cementless total knee arthroplasty [17].

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What the Evidence Shows

RISK PREDICTION AND SCREENING

- A bone density-based aging model may facilitate precision medicine strategies in osteoporosis prevention and management [1].
- Machine learning applied to hand radiographs represents a possible step toward more accessible, cost-effective, automated diagnosis and earlier treatment of osteoporosis/osteopenia [6].
- Current machine learning-based prediction models for postmenopausal osteoporosis without fractures demonstrate good discriminative ability but are generally characterized by a high risk of bias, a notable lack of calibration performance evaluation, and insufficient validation of clinical utility [10].

PHARMACOLOGIC AND NON-PHARMACOLOGIC THERAPIES

- Sequential anabolic-to-anti-resorptive therapy may inform treatment guidelines for high-risk postmenopausal populations [4].
- The efficacy of acupuncture in improving the symptoms of primary osteoporosis is encouraging for its use in clinical practice as a physical intervention [5].
- Genetically modified stem cell therapy is a safe and effective method that can significantly improve bone mineral density (BMD) and bone volume/total volume (BV/TV) in animal models of osteoporosis [13].
- Jintiange capsules are a good choice for patients with osteoporosis for relieving pain, improving BMD, improving activity function, and improving gait and preventing fracture [18].
- Natural traditional Chinese medicine products provide a theoretical and experimental basis for the development of new drugs and the improvement of osteoporosis management [3].
- Optimizing teriparatide administration timing may guide personalized dosing strategies to enhance bone formation and reduce fracture risk in osteoporosis [2].

PERIOPERATIVE OUTCOMES AND COMPLICATIONS

- Osteoporosis is a risk factor for complications and reoperations at 1 and 3 years after arthroscopic rotator cuff repair [11].
- Patients with osteoporosis may experience a higher incidence of medical complications within the 90-day global period than nonosteoporotic patients following rotator cuff repair [8].
- Despite established guidelines, low rates of osteoporotic pharmacotherapy were seen in patients who had femoral neck fractures [7].
- In osteopenic and osteoporotic patients undergoing total joint arthroplasty, rates of 2- and 5-year postoperative complications were low and similar among patients who used proton pump inhibitors perioperatively and those who did not [15].
- Bisphosphonate use in patients who have osteoporosis did not decrease the risk of periprosthetic fracture following total knee arthroplasty, but significantly lowered the incidence of all-cause revision at 2 years [20].

SURGICAL EFFICACY AND TECHNICAL FACTORS

- Patients with decreased bone mineral density can still achieve excellent 2-year outcomes after arthroscopic rotator cuff repair [9].
- Osteoporosis should not be considered a contraindication to arthroscopic rotator cuff repair [11].
- Continuous bone cement and standardized treatment for osteoporosis were guarantees of good clinical outcomes for percutaneous vertebroplasty, and injected bone cement >5.5 ml might be a guarantee [12].

Practical Considerations

- Bone density-based aging models may facilitate precision medicine strategies in osteoporosis prevention and management [1].
- Optimizing teriparatide administration timing may guide personalized dosing strategies to enhance bone formation and reduce fracture risk in osteoporosis [2].
- Natural traditional Chinese medicine products provide a theoretical and experimental basis for the development of new drugs and the improvement of osteoporosis management [3].
- Sequential anabolic-to-anti-resorptive therapy may inform treatment guidelines for high-risk postmenopausal populations [4].
- Acupuncture shows encouraging efficacy in improving symptoms of primary osteoporosis as a physical intervention in clinical practice [5].
- Machine learning applied to hand radiographs represents a step toward more accessible, cost-effective, automated diagnosis and earlier treatment of osteoporosis/osteopenia [6].
- Low rates of osteoporotic pharmacotherapy were observed in patients with femoral neck fractures despite established guidelines [7].
- Patients with osteoporosis may experience a higher incidence of medical complications within the 90-day global period following rotator cuff repair compared to nonosteoporotic patients [8].
- Patients with decreased bone mineral density can achieve excellent 2-year outcomes after arthroscopic rotator cuff repair [9].
- Machine learning-based prediction models for postmenopausal osteoporosis without fractures demonstrate good discriminative ability but are characterized by a high risk of bias, a notable lack of calibration performance evaluation, and insufficient validation of clinical utility [10].
- Osteoporosis is a risk factor for complications and reoperations at 1 and 3 years after arthroscopic rotator cuff repair [11].
- Osteoporosis should not be considered a contraindication to arthroscopic rotator cuff repair given overall low complication rates [11].
- Continuous bone cement and standardized treatment for osteoporosis are guarantees of good clinical outcomes for percutaneous vertebroplasty [12].
- Injected bone cement volume greater than 5.5 ml might be a guarantee of good clinical outcomes for percutaneous vertebroplasty [12].

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- The prevalence of osteoporosis among postmenopausal women hospitalized for fractures in China is 76.9% [14].
- Prolonged menopause, vertebral fractures, and recent fracture history are key risk profiles for osteoporosis in postmenopausal women hospitalized for fractures [14].
- Rates of 2- and 5-year postoperative complications in osteopenic and osteoporotic patients undergoing total joint arthroplasty were low and similar among those who used perioperative proton pump inhibitors and those who did not [15].

Key Evidence

- [L3] This approach may facilitate and support the development of precision medicine strategies in osteoporosis prevention and management. [1] (10.1186/s12891-025-09298-0)
- [L2] This trial is expected to provide crucial insights into optimizing teriparatide administration timing, potentially guiding personalized dosing strategies to enhance bone formation and reduce fracture risk in osteoporosis. [2] (10.1186/s13018-025-06083-6)
- [L4] This paper summarises recent research progress on natural TCM products in preventing and treating osteoporosis and provides a theoretical and experimental basis for the development of new drugs and the improvement of osteoporosis management. [3] (10.1186/s13018-025-05879-w)
- [L1] This sequential anabolic-to-anti-resorptive therapy may inform treatment guidelines for high-risk postmenopausal populations. [4] (10.1186/s13018-025-06040-3)
- [L1] The current evidence suggests that the efficacy of acupuncture in improving the symptoms of primary osteoporosis is encouraging for its use in clinical practice as a physical intervention. [5] (10.1186/s13018-025-05513-9)
- [L2] The findings represent a possible step toward more accessible, cost-effective, automated diagnosis and therefore earlier treatment of osteoporosis/osteopenia. [6] (10.1016/j.jhsa.2024.09.008)
- [L3] Despite established guidelines, low rates of osteoporotic pharmacotherapy were seen in patients who had femoral neck fractures. [7] (10.1016/j.arth.2025.07.028)
- [L3] In addition, patients with osteoporosis may experience a higher incidence of medical complications within the 90-day global period than nonosteoporotic patient. [8] (10.1016/j.xrrt.2026.100723)
- [L3] Patients with decreased bone mineral density can still achieve excellent 2-year outcomes. [9] (10.1016/j.jse.2025.02.011)
- [L1] Current machine learning-based prediction models for postmenopausal osteoporosis without fractures demonstrate good discriminative ability but are generally characterized by a high risk of bias, a notable lack of calibration performance evaluation, and insufficient validation of clinical utility. [10] (10.1186/s12891-025-09385-2)
- [L3] Overall rates of complication were low and osteoporosis should not be considered a contraindication to arthroscopic RCR. [11] (10.1016/j.jseint.2026.101678)

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- [L3] Continuous bone cement and standardized treatment for osteoporosis were guarantees of good clinical outcomes for PVP, and injected bone cement >5.5 ml might be a guarantee. [12] (10.1186/s12891-024-08153-y)
- [L1] Genetically modified stem cell therapy is a safe and effective method that can significantly improve the BMD and BV/TV in animal models of osteoporosis. [13] (10.1186/s12891-025-08507-0)
- [L4] This study reveals an alarmingly high prevalence (76.9%) of osteoporosis among postmenopausal women hospitalized for fractures in China, identifying prolonged menopause, vertebral fractures, and recent fracture history as key risk profiles. [14] (10.1186/s12891-026-09517-2)
- [L3] In osteopenic and osteoporotic patients undergoing TJA, rates of 2- and 5-year postoperative complications were low and similar among patients who used PPIs perioperatively and those who did not. [15] (10.1016/j.arth.2025.07.067)
- [L4] Obesity-associated dyslipidemia drives BMD loss partly through inflammation-mediated pathways, with key inflammatory cytokines significantly mediating lipid metabolism's impact on bone health. [16] (10.1186/s12891-026-09576-5)
- [L4] Our results suggest that BMD alone cannot predict early migration of tibial baseplates. [17] (10.1016/j.arth.2026.03.014)
- [L1] In terms of relieving pain, improving BMD, improving activity function, and improving gait and preventing fracture, JTG is a good choice for patients with osteoporosis (OP). [18] (10.1186/s12891-025-08694-w)
- [L3] While bisphosphonate use in patients who have osteoporosis did not decrease the risk of periprosthetic fracture, it did significantly lower the incidence of all-cause revision at 2 years. [20] (10.1016/j.arth.2024.11.004)

References

[1] Unveiling risk factors and predicting osteoporosis through bone density based aging model: a community-based cohort in Guangdong, China. *BMC Musculoskeletal Disorders*. 2025. DOI: 10.1186/s12891-025-09298-0 [2] Timing optimization of teriparatide dosing for postmenopausal osteoporosis: a randomized controlled trial. *Journal of Orthopaedic Surgery and Research*. 2025. DOI: 10.1186/s13018-025-06083-6 [3] Natural traditional Chinese medicine products: emerging therapeutic targets for the treatment of osteoporosis. *Journal of Orthopaedic Surgery and Research*. 2025. DOI: 10.1186/s13018-025-05879-w [4] Effectiveness of anabolic and anti-resorptive agents for preventing postmenopausal osteoporosis fractures: a systematic review and network meta-analysis. *Journal of Orthopaedic Surgery and Research*. 2025. DOI: 10.1186/s13018-025-06040-3 [5] Efficacy of acupuncture for primary osteoporosis: a systematic review and meta-analysis of randomized controlled trials. *Journal of Orthopaedic Surgery and Research*. 2025. DOI: 10.1186/s13018-025-05513-9 [6] Application of Machine Learning to Osteoporosis and Osteopenia Screening Using Hand Radiographs. *The Journal of Hand Surgery*. 2025. DOI: 10.1016/j.jhsa.2024.09.008 [7] A Missed Opportunity? Osteoporosis Treatment Following Femoral Neck Fractures: Reducing the Risk of Secondary Hip Fracture. *The Journal of Arthroplasty*. 2026. DOI: 10.1016/j.arth.2025.07.028 [8] Impact of osteoporosis on post-operative outcomes following rotator cuff repair. *JSES Reviews, Reports, and Techniques*. 2026. DOI: 10.1016/j.xrrt.2026.100723

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[9] No difference in 2-year outcomes of arthroscopic rotator cuff repair in patients with osteoporosis. *Journal of Shoulder and Elbow Surgery*. 2025. DOI: 10.1016/j.jse.2025.02.011 [10] Risk prediction models for postmenopausal osteoporosis: a systematic review and meta-analysis study. *BMC Musculoskeletal Disorders*. 2026. DOI: 10.1186/s12891-025-09385-2 [11] Osteoporosis is a risk factor for complications and reoperations at 1 and 3 years after arthroscopic rotator cuff repair. *JSES International*. 2026. DOI: 10.1016/j.jseint.2026.101678 [12] Continuity and volume of bone cement and anti osteoporosis treatment were guarantee of good clinical outcomes for percutaneous vertebroplasty: a multicenter study. *BMC Musculoskeletal Disorders*. 2025. DOI: 10.1186/s12891-024-08153-y [13] Genetically modified stem cells for osteoporosis: a systematic review and meta-analysis of preclinical studies. *BMC Musculoskeletal Disorders*. 2025. DOI: 10.1186/s12891-025-08507-0 [14] How prevalent is osteoporosis in a high-risk subgroup? A multicenter study of postmenopausal women hospitalized for fractures in China. *BMC Musculoskeletal Disorders*. 2026. DOI: 10.1186/s12891-026-09517-2 [15] Effects of Perioperative Proton Pump Inhibitor Use on Outcomes of Total Joint Arthroplasty Patients Who Have Osteoporosis and Osteopenia. *The Journal of Arthroplasty*. 2026. DOI: 10.1016/j.arth.2025.07.067 [16] Perioperative inflammatory cytokines nursing screening test indicate the link between dysregulated lipid metabolism and reduced bone mineral density in obese osteoporosis patients: a retrospective study. *BMC Musculoskeletal Disorders*. 2026. DOI: 10.1186/s12891-026-09576-5 [17] Stable Fixation in Cementless Total Knee Arthroplasty Even for Low Local Bone Mineral Density. *The Journal of Arthroplasty*. 2026. DOI: 10.1016/j.arth.2026.03.014 [18] The effect of Jintiange capsules on pain in patients with primary osteoporosis: a systematic review and meta-analysis. *BMC Musculoskeletal Disorders*. 2025. DOI: 10.1186/s12891-025-08694-w [20] Bisphosphonate Use in Patients Who Have Osteoporosis Does Not Increase the Risk of Periprosthetic Fracture Following Total Knee Arthroplasty. *The Journal of Arthroplasty*. 2025. DOI: 10.1016/j.arth.2024.11.004

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