

## **BONE DENSITY & OSTEOPOROSIS:** An Update for Manitoba Physicians

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## Trabecular Bone Score (TBS) and Fracture Risk

What is <u>TBS</u> ?	Trabecular bone score (TBS) is a texture index obtained from the lumbar spine dual-energy X-ray absorptiometry (DXA) image performed when bone density is measured (1). TBS is computed using software that works on the regular spine DXA scan, and does not involve any additional patient scans or radiation. TBS reflects bone structure and can be used to provide information about bone strength and fracture risk independent of bone mineral density (BMD). <u>Manitoba recently acquired the software needed for TBS calculation and is</u> <u>now including this in reports.</u>
How is TBS used to enhance fracture risk assessment?	<ul> <li>The fracture risk assessment tool, called "FRAX", estimates a patient's 10-year Fracture Risk from several risk factors: age, sex, body mass index, prolonged glucocorticoid use, current smoking, high alcohol intake, parental hip fracture, rheumatoid arthritis, prior fragility fracture and femoral neck BMD. The Canadian FRAX tool (http://www.sheffield.ac.uk/FRAX/tool.jsp?country=19) has been used in Manitoba since 2012 and reports the following Fracture Risk categories:</li> <li>"Low risk" = &lt;10% chance of an osteoporotic fracture</li> <li>"Moderate risk" = 10 - 19% chance of an osteoporotic fracture</li> <li>"High risk" = ≥20% chance of an osteoporotic fracture</li> <li>"Not applicable" = premenopausal women, men &lt; 50 years, children, or when there are fractures considered "osteoporosis equivalent" (hip, vertebral, or multiple fracture events).</li> <li>TBS is now included as an additional risk factor that modifies the fracture risk category (2).</li> </ul>
Will this affect how I order and interpret bone density tests?	No, there are no changes in how BMD testing is requested, performed or interpreted by the requesting clinician. TBS will be calculated automatically from the spine scans and included in the reported fracture risk when appropriate. When TBS is included in the risk calculation then you will see "TBS" with the list of risk factors at the top of the report. The actual TBS value will appear in the footnotes at the bottom of the report. TBS measurements are unitless and continuous. There are no specific cutoffs that indicate low or high risk, but lower values are associated with higher fracture risk while higher values are associated with lower fracture risk.

Can TBS be used to diagnose osteoporosis?	TBS is a measure of bone texture and does not measure bone density – TBS and bone density actually show very low correlation which is why TBS can be used as an independent predictor of fracture risk. Therefore, TBS cannot be equated with a bone density T-score or used to diagnose osteoporosis.
Can TBS be monitored in patients receiving treatment for osteoporosis?	TBS measures bone texture and this is not expected to change with standard treatments for osteoporosis. Therefore, TBS is not a good index of treatment response or reduction in fracture risk from effective treatment (3). In addition, TBS cannot be accurately calculated from scans obtained before the software was acquired, and may be affected by technical factors (e.g., weight change) which further limit its use for monitoring.
When will TBS <u>not</u> be reported?	TBS requires a valid spine DXA scan and cannot be accurately calculated if there are severe structural artifacts (e.g., fusion). TBS may not be reliable in those with extremes of body mass index (below 15 or above 37 kg/m <sup>2</sup> ), or extremes of body thickness that require non-standard scan modes. TBS has not been validated to predict fracture risk in children or younger adults (e.g., premenopausal women or men prior to age 50 years). Therefore, TBS will not appear on these reports.

**REFERENCES**:

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2. McCloskey EV, Oden A, Harvey NC, Leslie WD, Hans D, Johansson H, et al. Adjusting fracture probability by trabecular bone score. Calcif Tissue Int. 2015;96(6):500-9.

3. Leslie WD, Majumdar SR, Morin SN, Hans D, Lix LM. Change in Trabecular Bone Score (TBS) With Antiresorptive Therapy Does Not Predict Fracture in Women: The Manitoba BMD Cohort. J Bone Miner Res. 2017;32(3):618-23.