Osteopenia is not a diagnosis *per se* but a term used in osteodensitometry when the bone mineral density (BMD) is below the normal range but above the cut-off used to define ‘osteoporosis.’ Bone mineral density as measured by dual-energy absorptiometry (DXA) is categorised into ‘normal’, ‘osteopenia’ and ‘osteoporosis’ by thresholds set in the 1980s by a working group of the World Health Organisation (WHO). According to these criteria, ‘osteopenia’ refers to a T-score between 1.0 and 2.5 standard deviations (SD) below that of the young ‘normal’ adult. In contrast, the term ‘osteoporosis’ is used when the T-score is more than 2.5 SD below the young ‘normal’ mean. It should be noted however, that these definitions only apply to postmenopausal women or men aged over 50 years, and only to measurements performed by dual-energy absorptiometry (DXA).1, 2

By definition, therefore, approximately 16% of the young ‘normal’ population (age 20 to 29) will have a BMD in the ‘osteopenic’ range (which again makes the point that such a test result does not represent a diagnosis as such). Due to age-related and, in women, post-menopausal bone loss, the proportion of people with osteopenia continuously increases with age in all populations. The Burden of Disease report (2013) estimated that 3.7 million Australians aged 50 years or over have a BMD in the osteopenic range. While the WHO thresholds are used to categorise the results of BMD tests, it is important to understand that the relationship between BMD and fracture risk is a continuum. In other words as BMD decreases the risk of fracture progressively increases across the various WHO categories. Thus, for every 1 unit of T-score decrease in BMD, fracture risk increases by approximately two-fold.3

Compared to people with a BMD T-score in the ‘osteopenic’ range, the relative and absolute risk of an osteoporotic fracture is clearly higher in patients with T-scores in the ‘osteoporotic’ range (i.e. -2.5SD or less). However, simply due to the greater numbers of people with T-scores in the osteopenic range, the majority of fragility fractures occur in what the WHO defines as ‘osteopenia.’4 Therefore, any fragility fracture is a signal for increased risk of future fragility fractures, irrespective of the BMD measurement.5, 6 Apart from the bone mineral density, other important factors such as age, a history of falls and prior fracture(s) are important determinants of future fracture risk. Therefore, when seeing a patient with a BMD in the ‘osteopenic’ range, the following should be considered:

1. Fracture history;
2. Gender and age;
3. Number of falls in the previous 12 months;
4. Any underlying conditions associated with increased rate of bone loss or increased risk of fragility fractures (e.g. family history; steroid use, inflammatory disorders).

Fracture risk calculators can be used to estimate absolute fracture risk in individual patients and their use may be helpful in reviewing patients with BMD T-scores in the ‘osteopenic’ range.
Osteopenia – Cause for Concern? (Cont.)

Management of people with ‘osteopenia’ can be considered in two separate groups:

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>No prior fragility fracture</td>
<td>Patients falling into this category are a challenging group as there are no clear guidelines on management. The following 3 approaches will aid decision making:</td>
</tr>
<tr>
<td></td>
<td>1 Clinical assessment: In the presence of significant risk factors for bone loss or fracture, anti-resorptive treatment may be indicated to prevent further bone loss and thus reduce fracture risk. However, this indication is NOT covered under the PBS.</td>
</tr>
<tr>
<td></td>
<td>2 Monitoring bone density in 1 to 2 years, and obtaining an estimate of the rate of ongoing bone loss may help to determine whether anti-resorptive treatment could be beneficial. Again, this indication would NOT be covered under the PBS.</td>
</tr>
<tr>
<td></td>
<td>3 Assess absolute fracture risk. If elevated, treatment may be indicated to reduce fracture risk.</td>
</tr>
<tr>
<td>Prior fragility fracture</td>
<td>Treat as per established osteoporosis.</td>
</tr>
</tbody>
</table>

Currently in Australia, the PBS restrictions do not take into account the patient’s absolute fracture risk.

Looking beyond bone density

As the name implies, bone mineral density only measures the density of bone as it relates to the mineral content of the tissue. However, there are many other determinants of bone strength (and hence fracture risk). Recent studies demonstrate that assessment of ‘bone microarchitecture’, although still difficult to obtain in the clinical setting, are useful to better diagnose poor bone health. These techniques will be available in the future and are likely to improve diagnostic accuracy.

A new parameter named ‘Trabecular Bone Score’ (TBS) has been introduced to provide an indirect index of trabecular microarchitecture by evaluating the pixel grey-level variations in the lumbar spine DXA image. In vitro studies have previously demonstrated that the TBS correlates with measurements of bone micro-architecture obtained by high-resolution peripheral quantitative CT (HRpQCT), including cortical thickness, trabecular number (Tb.N) and separation (Tb.S). Clinical studies suggest that combining TBS with BMD significantly improves fracture prediction in postmenopausal women. While still in its infancy, the TBS may be of particular value in people with osteopenia as an additional parameter to determine their absolute fracture risk.

In conclusion, ‘osteopenia’ is not a diagnosis in itself but an osteodensitometric result seen in many men and women. In the absence of a minimal trauma fracture or other significant risk factors for (accelerated) bone loss, most people with DXA BMD T-scores in the ‘osteopenic’ range do not require specific therapy but should be recommended lifestyle measures such as improvements in their calcium and vitamin D intake, and physical activity. However, where a patient with a BMD T-score in the osteopenic range has sustained a minimal trauma fracture, a full clinical assessment is required and action should be taken to reduce the risk of further fracture.

References available upon request.

“The Burden of Disease report (2013) estimated that 3.7 million Australians aged 50 years or over have a BMD in the osteopenic range”
Controversial Milk Study

Dairy foods are the richest source of calcium in the Western diet, and consumption of milk and other dairy products is encouraged to maintain bone health and reduce the risk of osteoporosis and fractures in later life. However, a recent Swedish study suggests that high milk consumption in adults may increase mortality, also questioning its bone health benefits. Not surprisingly, the study published late last year in the British Medical Journal (BMJ 2014;349:g6015 doi: 10.1136/bmj.g6015) has generated controversy in both the medical and mainstream media.

The observational study followed two large Swedish adult cohorts over an average 20 year period, with milk and dairy consumption assessed via food frequency questionnaire. Higher milk consumption (3 or more glasses a day) was associated with increased mortality in both women and men, although the effects were less pronounced in men. High milk consumption was also linked to increased fracture risk in women, but not in men.

The authors hypothesise that increased oxidative stress and inflammation associated with the high D-galactose content of milk may increase mortality and have a detrimental effect on bone health. The study found lower mortality and fracture rates in women who consumed high levels of fermented dairy products such as yogurt and cheese, which have lower D-galactose levels.

The authors themselves caution that the study’s findings are preliminary and point out its limitations – the possibility of reverse causation (people already predisposed to osteoporosis might increase their milk intake) being the main concern.

Australian bone health experts have responded with some scepticism, emphasising the need to replicate the findings and conduct experimental studies. They also point out that 3 glasses of milk per day greatly exceeds the NHMRC’s recommendation of one glass per day, not associated in this study with significantly increased risk of mortality. Osteoporosis Australia continues to recommend a diet rich in calcium, including daily consumption of a range of lower fat dairy foods to protect and maintain bone health.

Vitamin K2 Supplements

After calcium and vitamin D comes… vitamin K2. This latest addition to the complementary medicines approach to fracture prevention has gained ground in recent months with a number of supplement manufacturers emphasising the bone health benefits of vitamin K2 in their marketing campaigns. But do the research findings match the hype? Bone health experts in Australia are cautiously positive. Research over the past 20 years has revealed a relationship between vitamin K and bone metabolism, with more recent studies demonstrating an association between low dietary vitamin K intake and reduced bone mineral density and increased fracture risk in post-menopausal women. The most potent form of Vitamin K2 in terms of bone health, menaquinone-7 (MK-7), has been the subject of recent randomised controlled trials. A 2013 Netherland- based RCT tested the effects of low dose MK-7 supplementation on the bone mineral density and fracture risk of post-menopausal women over a three year period (Osteoporos Int 2013;24:2499-507). In the trial of 244 women, those randomised to 180ug/day of MK-7 were found to have improved vitamin K status compared to those taking placebo, with an associated decrease in age-related decline of BMD at the lumbar spine and femoral neck. A 2015 meta-analysis of 19 RCTs suggested that vitamin K2 also has a role in the maintenance of bone mineral density and the prevention of fractures in post-menopausal women diagnosed with osteoporosis (Osteoporos Int 2015; 26:1175-86). More research is needed to further understand the bone benefits of vitamin K supplementation.
Coeliac Disease and Osteoporosis

Coeliac disease is a leading cause of secondary osteoporosis, but the risk of declining bone health associated with this condition can be easily overlooked in general practice. Calcium is poorly absorbed in people with coeliac disease. Chronic malabsorption, particularly during the accelerated skeletal growth periods of childhood and adolescence, may have a detrimental effect on peak bone mass attainment in early adulthood, increasing the risk of osteoporosis and fragility fractures in later life. Vitamin D, important for the optimal absorption of calcium from the bowel, may also be reduced in these patients.

Early diagnosis of coeliac disease followed by strict adherence to a gluten-free diet will help to optimise calcium absorption and minimise any additional impact to natural age-related decline in bone density. A patient diagnosed in adulthood following years of bowel symptoms may already have compromised bone health and is at increased risk of fractures if timely action is not taken to halt declining bone density.

Early detection of poor bone health in patients with coeliac disease is essential. Younger people with well-controlled coeliac disease are unlikely to need testing, but older patients, particular those who have experienced bowel symptoms over extended periods, should be investigated. Bone mineral density testing by DXA is recommended; patients with proven coeliac disease are eligible for MBS reimbursement.

It is important to consider a patient’s overall osteoporosis risk profile when assessing their bone health. Advancing age, hormonal status in women, co-morbidities, medications, diet and lifestyle can all affect bone density. Osteoporosis is often termed a ‘silent disease’ — neither patient nor doctor is aware of declining bone health until a fracture occurs. The possibility of underlying coeliac disease should be considered in any patient with a low T-score and few or no obvious risk factors for osteoporosis, particularly if a low Z-score (<-2.0) is also reported by the testing centre.

Following a strict gluten free diet and maximising dietary calcium intake (1000mg/day for adults, 1300mg/day for women over 50 and men over 70) is important for the preservation of bone health in patients with malabsorption disorders. A calcium supplement (500-600mg/day elemental calcium) may be required. Patients with untreated coeliac disease are also eligible for vitamin D testing under the MBS, and vitamin D supplementation is recommended if deficiency exists (<50nmol/L in winter).

Osteoporosis medications (oral or intravenous bisphosphonates, denosumab) are recommended to slow bone loss and prevent fracture if bone density testing reveals a T-score of <-2.5, or to reduce the risk of secondary fractures if a fragility fracture has already occurred.
Recognition for service

Professor Peter Ebeling has been awarded an Officer in the General Division of the Order of Australia for distinguished service to medicine. As a Board member and Medical Director of Osteoporosis Australia he has displayed a tireless commitment to ensuring Australians with poor bone health are diagnosed, managed and treated. The Board and staff of Osteoporosis Australia congratulate Professor Ebeling on this well-deserved honour.

Welcome to Pat McCabe

Former Wallaby Pat McCabe has joined Osteoporosis Australia as an ambassador, Pat McCabe said “I’m very pleased to have this opportunity to help raise awareness about bone health in Australia. I know from personal experience that preventing broken bones needs to be a priority.”

Pat McCabe has played 24 tests for the Wallabies, and had a long history with the ACT Brumbies with 66 games.

Pat retired from his professional playing career following a third vertebral fracture sustained during the Bledisloe Cup test against the All Blacks. Pat concedes it was a shock at the time to learn he had fractured again but he felt lucky not to have any more serious or permanent injury to his spine. He understands first hand how fracturing a bone can have a big impact, he said “many people overlook how it can severely restrict movement and many day-to-day tasks during recovery.”

NEW for GPs

A new online video for GPs has been released on the Osteoporosis Australia website. The video introduced by Medical Director Professor Peter Ebeling reviews risk factors for osteoporosis and encourages investigation of patients with a bone density test. It includes latest national statistics, footage of testing and reporting and tips on how to assist diagnosed patients. The project was proudly supported by Hologic.

Update on ownership

Reed Medical Education have recently purchased ThinkGP, the online GP educational portal where Osteoporosis Australia hosts an Active Learning Module for GPs. The website address and free registration remains unchanged www.thinkgp.com.au/oa

Actavis + Allergan has acquired an osteoporosis bisphosphonate treatment in Australia.

ABS releases new finding

New analysis of the Australian Health Survey (AHS) indicates whether Australians are consuming the required amount of a range of nutrients including vitamins, minerals, protein, fat and carbohydrates. In a joint first the Australian Bureau of Statistics (ABS) and Food Standards Australia New Zealand (FSANZ) produced estimates of usual intake of nutrients and calcium was found to be lacking. The results showed only 1 in 4 females and 1 in 3 men receive adequate calcium from food.

1800 242 141
Osteoporosis helpline for your patients
Freecall · Post-diagnosis support · General information

Resources for General Practice
Information and resources for general practice can be accessed online in the GP section of the Osteoporosis Australia website, located under the Healthcare Professionals section.
www.osteoporosis.org.au
According to the latest Australian Dietary Guidelines, women 19–50 years should consume **2.5 serves per day** and women over 50 years **4 serves per day** of milk, cheese, yogurt and/or alternatives.*1

Milk, cheese and yogurt contain a unique package of nutrients. Consumption of the recommended serves may contribute to stronger bones, as well as having numerous other health benefits.1

Make sure your patients are up with the latest.

**All the latest recommendations are provided in the Dairy Information wheel.**

To order one, along with other resources for your practice, go to Legendairy.com.au/must-haves

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*The dairy food group includes alternatives. Those who need to or prefer to avoid dairy products should choose alternative products that have added calcium, such as calcium-enriched soy or rice drinks; these products should contain at least 100 mg of calcium per 100 mL.

1. National Health and Medical Research Council (2013) Australian Dietary Guidelines. Canberra, Australia. © Dairy Australia Limited (ACN 105 227 987), Level 5, IBM Centre, 60 City Rd, Southbank, Victoria, 3006, Australia. All rights reserved. DAA25026 04/15