OSTEOSCAN PARTNERS IN OSTEOPOROSIS MANAGEMENT

Osteoscan welcomes you to another exciting year of BMD testing. In this newsletter we discuss the refinement of fracture risk with Vertebral Fracture Assessment and discuss the importance of considering femoral neck BMD in addition to total hip BMD. Which is better…..calcium supplement or dairy? Read on! And as CKD becomes more prevalent in an ageing population we present some basic facts to help you deal with bone health in this group of patients. We thank you for your support of Osteoscan and for the opportunity in 2019 to discuss by telephone many challenging bone cases. We hope that it is self-evident that there is so much more to bone health than ordering a BMD.

Estimating Fracture Risk involves more than just measuring Bone Mineral Density

Peggy is 88. Her GP has referred her for follow-up bone densitometry, with a clinical note: "losing height".

Her lumbar BMD T-score is 0.4; and her total hip T-score is -1.6 (moderate osteopenia).

What is her risk of a fragility fracture in the future?

At Osteoscan we use the Garvan calculator which was developed from 35 years of continuous study of the population of Dubbo. Not only are the data Australian and therefore relevant, but the prospective nature of that study makes analyses more valid than cross-sectional or retrospective studies. Unlike FRAX, the Garvan calculator includes the number of falls in the last 12 months and the number of fragility fractures since the age of 50.

Both Garvan and FRAX base their predictions on the BMD of the neck of femur. **Peggy's femoral neck has a T-score of -2.9.** Note that many of the services that perform BMD testing only quote the total femur. They usually quote FRAX estimates (performed within the densitometer's software) but it is difficult to use their data to perform a Garvan estimate if the T-score of the neck of femur is not supplied.

Peggy does not recall any falls or fractures. Therefore the Garvan estimate of fracture risk, mainly influenced by her age and low femoral neck T-score, would be a 10% risk of hip fracture over 5 years and a 21% risk of any fragility fracture over 5 years. These risks clearly fall into a range in which it is cost-effective to treat with anti-resorptive medications. However, some patients in Peggy's age group may regard a 1-in-10 risk of hip fracture as acceptable.

But…

Not only did the referring GP make note of her loss of height, **he also requested a vertebral fracture analysis (VFA). This revealed three fractures, of T12, L1 and L5**.

Incorporating these otherwise unrecognised vertebral fractures, **Garvan now calculates Peggy's 5-year risk of a hip fracture as 69% and her risk of any fragility fracture as 72%.**

At these levels of risk it is much more likely that the patient and her family will grasp the need for maximum intervention. As well as antiresorptive treatment this might also include **falls prevention exercises** such as Tai Chi and a discussion of the benefits of **hip protectors**.

Take Home Messages:

1. Fracture risk estimations provide useful information for clinical actions.
2. Fracture risk calculators – especially FRAX – tend to ***under***estimate the risk of fracture.
3. Femoral neck T-scores are essential for accurate estimates of fracture risk.
4. Adding a request for VFA substantially alters the risk estimate in one in every six women over 60
   - 1 in 4 shows at least one vertebral fracture; two out of 3 are unaware that their previous episode of back pain represented a fracture.
5. A vertebral fracture assessment delivers 1 µSv of derived radiation dose compared with the 2000 µSv for a lateral X-ray of thoracolumbar spine.
6. If fracture risk estimates are very high then doctors and patients are more likely to be concordant in their views; the cost-effectiveness of intervention is much higher; additional measures may be recommended; patient adherence may be improved.
7. When ordering BMD, consider adding a request for VFA in:
   a) Women over 60.
   b) Patients who are already known to have advanced osteopenia or osteoporosis of the lumbar spine.
   c) Patients who have experienced loss of height, new back deformities, or unexplained back pain.
   d) Patients who have used oral or parenteral glucocorticoids for a month or more.
   e) Unusual disorders, such as Cushing's syndrome, adrenal incidentalomas, hyperparathyroidism, prolonged hyperthyroidism, premature ovarian failure of 10 years duration, coeliac disease, or severe inflammatory bowel disease.

KURRALTA PARK
Level 1, Tennyson Centre
520 South Road
KURRALTA PARK 5037

NORTH EAST
Suite 3
1240 North East Rd
ST AGNES 5097

MARION
Marion Medical Centre
Suite 9, 199 Sturt Road
SEACOMBE GARDENS 5047

Phone (08) 8293 8349
Fax 08 8490 9733
admin@osteoscan.com.au

Dairy or Calcium supplement?

Calcium and vitamin D are important for bone health and fracture prevention. Dairy products are an efficient way to obtain dietary calcium but there is a widespread community perception that dairy products can be harmful. Apart from those who believe that they are lactose intolerant, many people are also concerned about the perceived effects of dairy intake on weight and metabolic factors, including lipids and diabetes. Unfortunately, this perception does not reflect the reality of high-quality research. Overall, dairy products are probably at worst neutral for weight and metabolic complications, and are likely in the case of fermented dairy products to be beneficial.

Dairy and fracture prevention

The link between dairy intake and fracture risk is still unclear. Some studies show a significant inverse association between dairy intake and bone turnover markers and a positive association with bone mineral content. Fortified dairy products induce more favourable changes in biochemical indexes of bone metabolism than calcium supplementation alone. The association between consumption of dairy and risk of hip fracture is less well established, although yogurt intake shows a weakly positive protective trend for hip fracture.

Dairy and cardiovascular disease

A 2014 metanalysis by Rice et al, comprising 18 observational studies, concluded that total dairy intake does not increase cardiovascular disease incidence or death. A number of studies suggest that fermented dairy products (i.e. cheese and yoghurt) are protective. For example, Koskinen and colleagues found those in the highest intake quartile of fermented dairy had 27% (95% CI, 5-44) lower risk for coronary heart disease than those in the lowest quartile.

Dairy and weight

The effect of dairy consumption on body weight and composition has been investigated extensively, with conflicting results. There may be a weak association between dairy consumption and weight reduction, decrease in fat mass and waist circumference, and increase in lean body mass.

Dairy and diabetes

Recent Australian and Swedish prospective studies have shown that the highest versus the lowest quartile of regular-fat dairy consumption was inversely associated with metabolic syndrome, and a 23% reduction in the incidence of type 2 diabetes.

Dairy and inflammation

The evidence for any role of dairy in inflammation is conflicting and limited to small observational or clinical trials. Although dairy foods have in the past been considered pro-inflammatory, more recent studies of dairy consumption demonstrate that full-fat dairy products have either a neutral or inverse effect on levels of circulating inflammatory biomarkers.

Mechanisms

There is a great deal of speculation but very little hard evidence. Milk is a complex, biological entity with many different components, and trying to reduce it to simply calcium and fat is just too simplistic. It is possible that dairy may cause satiety and so reduce snacking. Fermented dairy products have also been proposed as crossing the blood-brain barrier and affecting central regulation of metabolism, as well as having a beneficial effect on the gut microbiome.

In summary, dairy products provide a package of essential nutrients that are difficult to obtain elsewhere. They represent a useful source of dietary calcium. For many people it is not possible to achieve recommended daily calcium intakes with a dairy-free diet. By consuming 3 servings of dairy products per day, the recommended daily intakes of nutrients essential for good bone health may be readily achieved, and if cheese or yoghurt are chosen there may be additional protective metabolic effects.

Renal disease (CKD), BMD testing and Osteoporosis

GFR < 60 doubles the risk of hip fracture. It has the same effect on overall fracture risk as a recent fragility fracture. As the GFR declines from 60 to 30 the hip fracture risk increases further. However, there is no effect of declining GFR on risk of vertebral fracture. After a hip fracture, perhaps not surprisingly, mortality is higher in patients with reduced GFR.

When to measure BMD?

In patients with **GFR <60** with evidence of metabolic bone disease (abnormalities of calcium, phosphate, PTH or ALP) or risk factors for osteoporosis, then BMD testing is appropriate. There is of course a strong inverse relation between age and GFR, so that many patients with GFR < 60 will have prevalent osteoporosis risk factors.

The nature of renal bone disease and how to treat it

Renal bone disease is potentially complex and includes high bone turnover/ hyperparathyroidism or low bone turnover, either adynamic bone disease or osteomalacia. Sorting this out is beyond most specialists, but a few general comments are applicable. If PTH is increased then an antiresorptive +/- Vitamin D is applicable. For GFR < 30, if the increase in PTH is severe and progressive, then calcitriol may be considered.

Can I measure CrossLaps in patients with renal disease?

CrossLaps refers to the C-terminal telopeptide of bone Type 1 collagen and this is renally excreted. It is not recommended to measure CrossLaps in patients with GFR < 60 and certainly not if GFR is < 30. As an extreme example, patients undergoing hemodialysis may have CrossLaps > 2000.

Antiresorptive treatment in patients with CKD

Risedronate has been shown to decrease fractures in CKD 2 – 4, and denosumab in CKD 2 – 3. Bisphosphonate clearance is decreased in CKD. If using risedronate in patients with GFR < 30, then dosing could be reduced from 35 mg weekly to fortnightly. With GFR < 30 the use of denosumab is associated with increased risk of hypocalcemia. Pre-treatment with Vitamin D is essential in this situation.