

## The solution

It is now 15 years since a randomised controlled trial on more than 3,000 women in residential care showed that 800 units of vitamin D<sub>3</sub> daily with 1200 mg of calcium reduced the hip fracture rate by 43% in 18 months [7]. This important finding has not yet been systematically applied in any western country but SA Health is implementing it in South Australia.

Our policy is that everyone in residential care should receive 800–1000 units of vitamin D<sub>3</sub> daily with 1000–1200 mg of calcium as the carbonate or about 600 mg as the citrate. The same regimen should be applied to community-dwellers with serum 25-hydroxyvitamin D levels below 60 nmol/L, particularly women. These dosages can be given as combination tablets or as an effervescent drink. If calcium is contra-indicated for any reason, 1,000 units of vitamin D<sub>3</sub> can safely be given indefinitely, but there is no evidence that Vitamin D alone can prevent hip fractures – it is the combination with calcium that is so effective [8].

We hope that all parties involved in the care of the elderly in South Australia will actively implement this program.

## Selected references

1. Morris HA, Morrison GW, Burr M, Thomas DW, Nordin BEC. Vitamin D and femoral neck fractures in elderly South Australian women. *Med J Aust* 1984;41:144-145.
2. Need AG, Morris HA, Horowitz M, Nordin BEC. Effects of skin thickness, age, body fat, and sunlight on serum 25-hydroxyvitamin D. *Am J Clin Nutr* 1993;58:882-885.
3. Bischoff-Ferrari HA, Dawson-Hughes B, Willett WC, et al. Effect of vitamin D on falls: a meta-analysis. *JAMA* 2004;291:1999-2006.
4. Jesudason D, Need AG, Horowitz M, O'Loughlin PD, Morris HA, Nordin BEC. Relationship between serum 25-hydroxyvitamin D and bone resorption markers in vitamin D insufficiency. *Bone* 2002;31:626-630.
5. Heaney RP. Is the paradigm shifting? *Bone* 2003;33:457-464.
6. Parfitt AM. Vitamin D and the pathogenesis of rickets and osteomalacia. In: Feldman D, Pike JW, Glorieux FH, eds. *Vitamin D*. Second edition, volume II. Burlington MA, Elsevier Academic Press, 2005:1029-1048.
7. Chapuy MC, Arlot ME, Duboeuf F, et al. Vitamin D<sub>3</sub> and calcium to prevent hip fractures in elderly women. *N Engl J Med* 1992;327:1637-42.
8. Boonen S, Lips P, Bouillon R, Bischoff-Ferrari HA, Vanderschueren D, Haentjens P. Need for additional calcium to reduce the risk of hip fracture with vitamin D supplementation: evidence from a comparative meta-analysis of randomized controlled trials. *J Clin Endocrinol Metab* 2007;92:1415-23.

## Members of the Working Party

Penelope Coates MD, FRACP, FRCPA    PC Joseph AM, MBBS,  
Christy Pirone RN, MClSci, BSN    RJ Prowse MBBS, MRCP  
Debra Rowett BPharm    P Slobodian BPharm, MClSciPharm  
Michele Sutherland MAppSci    BEC Nordin AO, FRACP, DSc (Chair)  
HA Morris PhD, FAACB, (Deputy Chair)

Further documentation is available on application to the Chairman at:

Institute of Medical and Veterinary Science,  
Frome Road, Adelaide 5000 (Tel: 8222 3653)  
e-mail: [christopher.nordin@imvs.sa.gov.au](mailto:christopher.nordin@imvs.sa.gov.au)

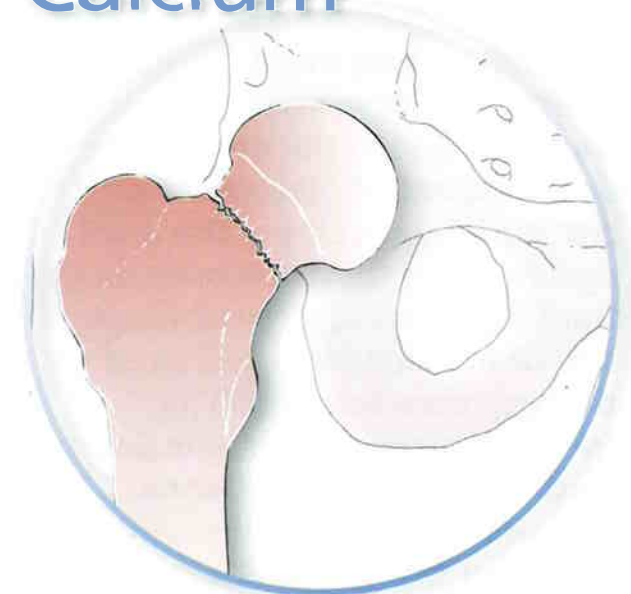
Web: [www.safetyandquality.sa.gov.au](http://www.safetyandquality.sa.gov.au)



Government of South Australia

Department of Health

# Preventing Hip Fractures with Vitamin D & Calcium



Recommendations of a South Australian  
Department of Health Working Party

ISBN 0 7308 9578 5

# Preventing Hip Fractures with Vitamin D & Calcium

## The problem

It is well-known that fracture rates rise with age in western countries due to the progressive development of osteoporosis, particularly in women. The most significant of these fractures, both from the point of view of society and of the individual, is that of the hip; more than 2,000 hip fractures occur each year in South Australia and the number has been increasing annually with the ageing of the population.

## The background

It has been known for over 20 years that vitamin D deficiency is common in patients with hip fracture in South Australia and that a high proportion of these hip fracture cases come from residential care facilities. It has also been known for the same length of time that hypovitaminosis D is almost universal in aged care facilities <sup>[1]</sup>.

There is also a general decline in vitamin D status with age in virtually all western countries, including Australia, where such measurements have been made. This is due to decreasing exposure to the sun with advancing age and to the declining capacity of the ageing skin to synthesise vitamin D in response to sunlight <sup>[2]</sup>. All the evidence now tells us that it is the elderly subjects with the lowest serum vitamin D levels who are at greatest risk of hip fracture.

## The explanation

There are at least four reasons why vitamin D deficiency is a risk factor for fractures in general and hip fractures in particular.

- 1 The loss of the action of vitamin D on muscle increases body sway and so increases the risk of falling <sup>[3]</sup>.
- 2 Secondary hyperparathyroidism, due to loss of the bone-resorbing action of vitamin D, increases the rate of bone turnover <sup>[4]</sup>, which is itself an independent risk factor for fracture <sup>[5]</sup>.
- 3 This same secondary hyperparathyroidism destroys bone and so aggravates osteoporosis and increases the need for Calcium.
- 4 The decline in the calcium and phosphate levels in the blood and tissue fluid leads to a progressive failure of bone mineralisation (osteomalacia) <sup>[6]</sup> and consequent weakening of the bony tissue itself.