785.1 VITAMIN D TESTING AND TREATMENT IN ADULTS

Criteria for Testing Vitamin D Levels in Adults

Vitamin D testing is ONLY clinically justified in the patient groups defined below:
Based on current evidence widespread testing is NOT justified. The test is expensive. It should be used very selectively.

For groups 1 and 2, a vitamin D level is needed BEFORE treatment because the result directs the product choice and dose. This is not the case for any other patient group.

1. Confirmed osteoporosis AND one of the following:
   - Risk factor(s) for vitamin D deficiency (see box below).
   - Fracture(s) after one year of treatment with bone specific therapy or a reduced T score at treatment review (despite treatment compliance).
   - Prior to starting one of the following treatments: Parenteral bisphosphonates, denosumab, teriparatide or parathyroid hormone.

2. Suspected osteomalacia with at least one classic sign or symptom (as defined below) AND a risk factor(s) for vitamin D deficiency.
   Classic signs and symptoms of osteomalacia include:
   - Myalgia with proximal myopathy, waddling gait.
   - Bone pain predominantly affecting pelvis, spine, ribs, lower extremities.
   - Pain on bone palpation (spine, ribs, pubic ramus, tibia).
   - Looser's zones on X ray (pelvis, ribs, scapulae).
   - Have suffered fragility fractures.

For group 3, treat first*, review after three months and if no response, test.

3. All three of the following:
   - Suspected vitamin D deficiency AND
   - Generalised myalgia and arthralgia (after all other causes have been excluded) with no classic signs and symptoms of osteomalacia AND
   - Risk factor(s) for vitamin D deficiency.

*Daily dose of vitamin D 800 units either alone or with calcium, dependent upon Ca intake.

Risk factors for vitamin D deficiency

- Pigmented skin
- Limited sun exposure/skin concealing garments, strict sunscreen use (factor 15 or more)
- Vegan (non fish-eating) diet
- Malabsorption, short bowel, untreated coeliac disease, cholestatic liver disease
- Use of anti-epileptics, rifampicin, glucocorticoids, aromatase inhibitors, highly active antiretroviral treatments (HAART), cholestyramine
- Multiple short interval pregnancies

For all patients, check dietary calcium intake and provide advice on calcium and vitamin D requirements (see Appendix 1 and 2).

Does the patient meet vitamin D testing criteria defined on page 1?

- No → See below
- Yes
  - **Vitamin D >50 nanomol/L** → See page 3
  - **Vitamin D 25 - 50 nanomol/L INSUFFICIENCY** → See page 3
  - **Vitamin D <25 nanomol/L DEFICIENCY** → See page 4

Refer to secondary care if:

Vitamin D level <50 nanomol/L **with**

- persistent hypercalcaemia, **or**
- eGFR <30 ml/min, **or**
- Renal stones containing Ca, **or**
- Sarcoidosis

Groups requiring supplementation without vitamin D testing

If considering vitamin D supplements where testing is not required

- CMO recommended supplementation groups CMO advice:
  - pregnant and breastfeeding women
  - aged under 5 years
  - aged over 65 years
  - People who have low or no exposure to the sun
  - People who have darker skin

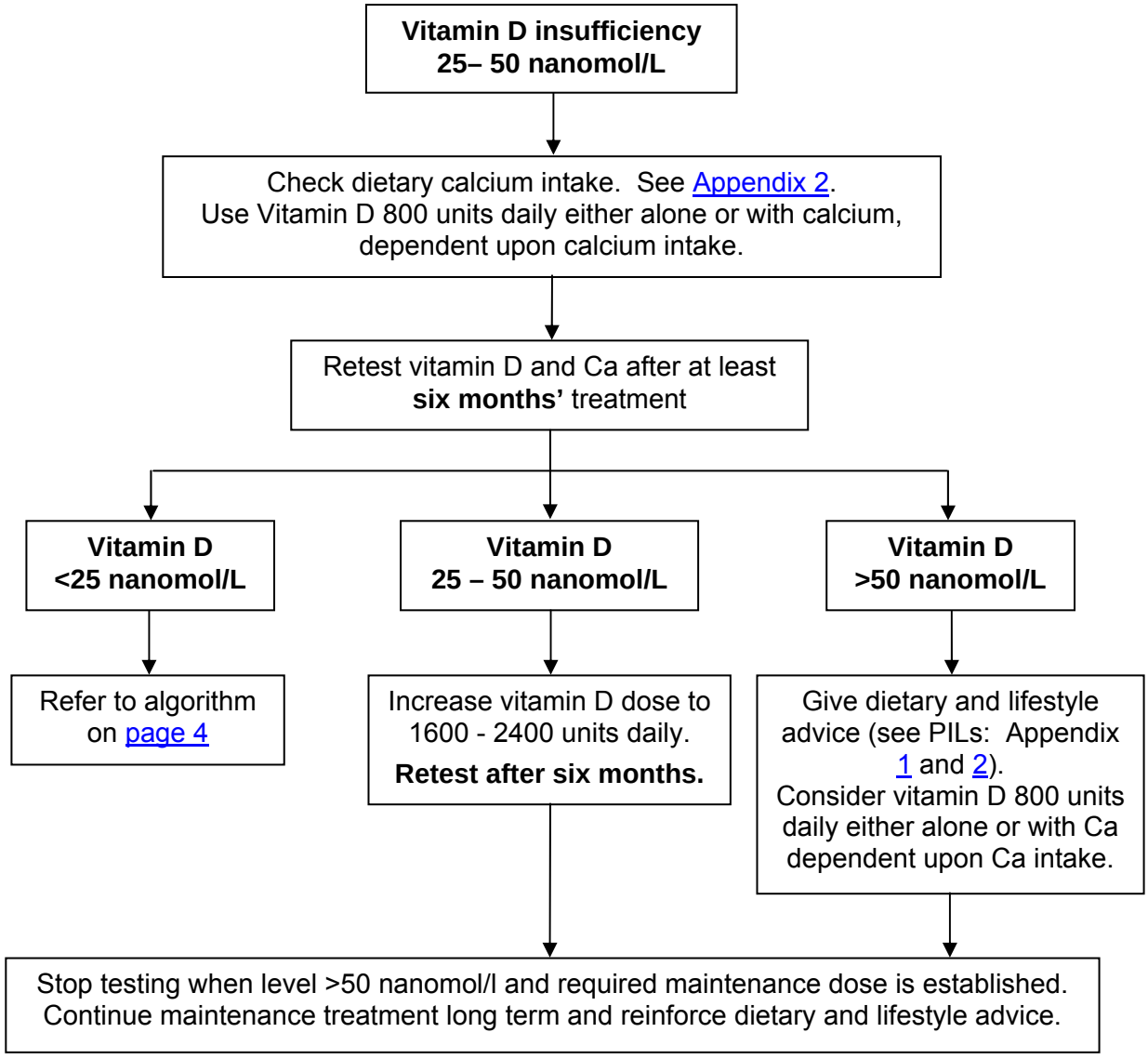
  → Purchase vitamin D 400 units daily. Some patients may be eligible for Healthy Start vitamins.
- Housebound patients → Vitamin D 800 units daily either alone or with calcium depending upon calcium intake
- Patients with osteoporosis. See guidelines 402 and 403 → Vitamin D 800 units daily either alone or with calcium depending upon calcium intake

Patients with 25-hydroxy-vitamin D level >50 nanomol/L

1) **If vitamin D level is >50 nanomol/L (with no known diagnosis of osteoporosis):** Vitamin D deficiency is not likely to be responsible for symptoms. Patient may be advised to purchase vitamin D as a lifestyle choice but it is not necessary for it to be prescribed. Suggest a maintenance **dose of vitamin D 400 units daily.**

2) **If the patient has a vitamin D level of 50 – 80 nanomol/L with osteoporosis:** It is recommended that the maintenance **dose is 800 units vitamin D daily.** However, if the patient has already been taking vitamin D 800 units daily for at least three months then it is recommended that the maintenance **dose is doubled to 1600 units daily.**

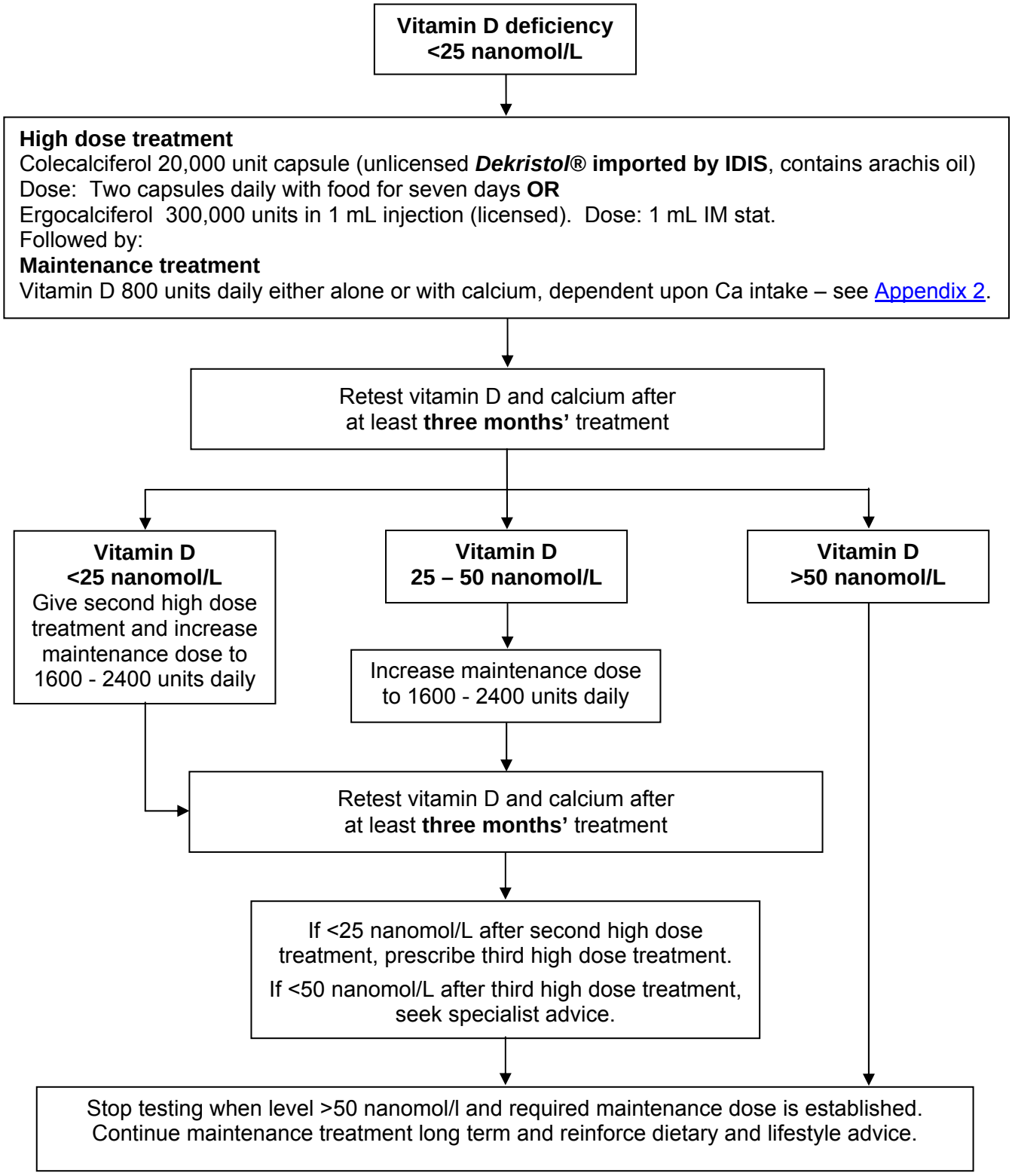
Treatment of vitamin D INSUFFICIENCY: 25-hydroxy-vitamin D level 25 – 50 nanomol/L



For vitamin D levels <50 nanomol/L:

- **Despite treatment - RE-ASSESS ADHERENCE and presence of other risk factors, e.g. malabsorption.**
- **With persistent hypercalcaemia, eGFR <30 ml/min, renal stones containing Ca or sarcoidosis – REFER TO SECONDARY CARE.**

Treatment of vitamin D DEFICIENCY: 25-hydroxy-vitamin D level <25 nanomol/L



For vitamin D levels <50 nanomol/L:

- **Despite treatment - RE-ASSESS ADHERENCE and presence of other risk factors, e.g. malabsorption.**
- **With persistent hypercalcaemia, eGFR <30 ml/min, renal stones containing Ca or sarcoidosis – REFER TO SECONDARY CARE.**

See also:

Guideline 222 Injectables Policy and Guide (Adult)

Guideline 402 Osteoporosis: Primary Fracture Prevention Guidelines in Men and Women over the Age of 50 with Risk Factors

Guideline 403 Osteoporosis: Secondary Fracture Prevention Guidelines in Men and Women over the Age of 50 who Sustain a Fragility Fracture

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Appendix 1

Supplementary Information to be Communicated to Patients
Vitamin D and Bone Health in Adults

Vitamin D plays an important role in keeping your bones healthy. Lack of vitamin D can lead to bone deformities, such as rickets in children and bone pain and tenderness as a result of osteomalacia in adults. Vitamin D deficiency is also associated with increased risk of fractures and falls in older people.

Sources of Vitamin D

There are **THREE** sources of vitamin D: Exposure to sunlight, food and supplements:

1. Exposure to sunlight

Vitamin D is made in the skin from ultra-violet light (UVB) in sunlight. The amount of UVB in sunlight in the UK is highest between 11am and 2pm in the summer months (April to October). People with fair skin require ten to fifteen minutes of sunlight exposure each day to make enough vitamin D. People with darker skin need longer sun exposure.

Ten minutes of midday summer sun generates 3000 units of vitamin D (without sun block). You do not need to sunbathe to make enough vitamin D. Spending some time outside on most days in the summer with some bare skin such as face, arms and legs is sufficient for most people.

2. Foods containing vitamin D

Vitamin D is found in only a few foods. Only 10% of vitamin D body stores are produced from food intake. Foods containing vitamin D include:

- oily fish such as salmon, sardines, pilchards, trout, kippers, eel
- eggs and meat
- some breakfast cereals have added vitamin D

3. Vitamin D supplements

Vitamin D is present in cod liver oil capsules and some multivitamin products. It can also be bought as capsules containing vitamin D alone (not in combination with other vitamins). Vitamin D3 (colecalciferol) is derived from animals whereas vitamin D2 (ergocalciferol) is derived from plants.

Women and children from families eligible for the Government Healthy Start scheme may receive free vitamins (www.healthystart.nhs.uk/). If not eligible, people are advised to purchase supplements from a pharmacy or health food shop. **If you need help choosing a vitamin D supplement ask your pharmacist for advice.**

Doctors may prescribe preparations which contain both vitamin D and calcium, e.g. Calceos®, Adcal D_3® or Calcichew D3 Forte®, for people with osteoporosis or osteomalacia.

Who needs vitamin D supplements?

- People with darker skin
- People who wear whole body covering, avoid sun exposure or who always use sun block when outside
- The housebound, especially frail older people
- People who are obese or very overweight
- Vegans
- Pregnant or breastfeeding women
- People taking anti-epileptic drugs, those with kidney or liver disease or conditions that reduce the absorption of food

What is the recommended daily dose of vitamin D supplements?

The Department of Health recommends that all pregnant or breastfeeding women, people aged 65 years and over and people who are not exposed to much sun, should take 400 international units (IU) (10 micrograms) of vitamin D each day. In certain circumstances a higher dose may be recommended by your doctor.

Useful links

- The Sunlight Campaign on National Osteoporosis website: http://www.nos.org.uk/page.aspx?pid=535
- Healthy Living for Strong Bones leaflet: http://www.nos.org.uk/~/document.doc?id=981

Appendix 2

Supplementary Information to be Communicated to Patients
Calcium and Bone Health in Adults

Calcium plays an important role in keeping our bones and teeth healthy. It gives them strength and rigidity. If we don't have enough calcium in our body, we may have low bone mass and an increased risk of fractures. Calcium is also essential for other body functions such as blood clotting, nerve and muscle function.

Our body loses calcium every day through the skin, sweat, kidneys and gut. It is therefore important to replace what is lost by eating food which contains calcium.

Sources of Calcium

There are TWO sources of calcium: Food and supplements.

1. Food

Food is the best source of calcium. Those with a high content include dairy products (e.g. milk, yoghurt and cheese), bread, "bony fish" (e.g. sardines and pilchards), pulses, dried fruit, nuts, tofu and dark green leafy vegetables.

Calculate calcium intake:

Milk (include milk with cereals, fortified soya, etc) per day								**Calcium (mg)**
Milk	None	<⅓ pint (<200 ml)	⅓ pint (~200 ml)	½ pint (~300 ml)	⅔ pint (~400 ml)	1 pint (~600 ml)	1½ pint (~900 ml)	
Calcium (mg)	0	100	200	300	400	600	900	
Servings of dairy (not including milk) per day								
Serving	0	1	2	3	4+			
Calcium (mg)	0	200	400	600	800			
Other sources: See list below or details from food labels								
Calcium (mg)	From:							
Add totals from milk, servings of dairy and other sources to give: Total calcium intake (mg)								

Calcium intake assessment result (tick to indicate)	Replete (1000 mg)		Intermediate (500 – 1000 mg)		Low (500 mg)	

Food (calcium content (mg) in brackets)

Dairy products		
Milk soya	100 ml	(89)
Cheese Cheddar	3½ oz/100 g	(739)
Cheese cottage	3½ oz/100 g	(127)
Yoghurt fruit low fat	3½ oz/100 g	(140)
Yoghurt fruit	3½ oz/100 g	(122)
Fromage frais fruit	3½ oz/100 g	(86)
Ice cream dairy	3½ oz/100 g	(100)
Custard from powder	3½ oz/100 g	(140)
Rice pudding	3½ oz/100 g	(88)
Fish		
Pilchards in tomato sauce	3½ oz/100 g	(250)
Sardines in tomato sauce	3½ oz/100 g	(430)
Sardines in oil	3½ oz/100 g	(500)
Salmon tinned	3½ oz/100 g	(91)
Tuna in oil tinned	3½ oz/100 g	(12)
Vegetables		
Curly kale boiled	3½ oz/100 g	(150)
Okra stir fried	3½ oz/100 g	(220)
Spring greens boiled	3½ oz/100 g	(75)
Watercress	3½ oz/100 g	(170)
Pulses, beans and seeds		
Red kidney beans canned	3½ oz/100 g	(71)
Tofu steamed	3½ oz/100 g	(510)
Green/French beans	3½ oz/100 g	(56)
Baked beans	3½ oz/100 g	(53)
Sesame seeds	3½ oz/100 g	(670)
Cereal products (may be calcium enriched)		
White bread	3½ oz/100 g	(177)
Wholemeal bread	3½ oz/100 g	(106)
Muesli Swiss style	3½ oz/100 g	(110)
Fortified instant cereals	3½ oz/100 g	(up to 1333)
Fruit		
Apricots dried	3½ oz/100 g	(73)
Figs dried	3½ oz/100 g	(250)
Currants	3½ oz/100 g	(93)
Mixed peel	3½ oz/100 g	(130)
Olives in brine	3½ oz/100 g	(61)
Orange	3½ oz/100 g	(47)
Convenience foods		
Lasagne frozen	3½ oz/100 g	(80)
Sausage low fat grilled	3½ oz/100 g	(130)
Cornish pasty	3½ oz/100 g	(60)
Omelette cheese	3½ oz/100 g	(287)
Quiche cheese & egg	3½ oz/100 g	(262)
Macaroni cheese	3½ oz/100 g	(170)
Pizza cheese & tomato	3½ oz/100 g	(210)

2. Calcium supplements

These are available either as calcium alone or as calcium and vitamin D tablets. For dosing requirements see below.

What is the recommended daily intake of calcium?
In the UK, the recommended daily calcium intake for an adult is 700 mg. This is the same for pregnant women.

Most people can achieve this with an appropriate diet. Some people such as those on restricted diets, the elderly and housebound may require calcium supplements.

A daily intake of 500 mg or less requires increased dietary intake or calcium supplements.

Some people need a higher intake of calcium. They include:

- Breastfeeding women who need 1250 mg of calcium per day.
- People with osteoporosis or osteomalacia who need 1000 – 1200 mg of calcium per day. Calcium intake may vary from day to day and it therefore needs to be assessed on a weekly basis. People with osteoporosis or osteomalacia need a calcium supplement if their calcium intake is less than 500 mg per day.

What dose of calcium supplement should I take?
The amount of calcium needed depends upon the amount of calcium in your diet. Taking more calcium than necessary does not have added benefits and can even have some risks.

For people with osteoporosis or osteomalacia, an assessment of dietary calcium intake is made before a supplement is prescribed. This ensures that people do not take too much calcium.

Most people with osteoporosis or osteomalacia are prescribed supplements containing both calcium and vitamin D, e.g. Calceos®, Adcal D_3® or Calcichew D3 Forte® which contain 600 mg of calcium. This is because vitamin D is essential for calcium absorption and vitamin D deficiency can lead to low calcium levels in the blood and calcium loss from the bones.

Other supplements containing calcium alone may be purchased from your Pharmacy. If you need help choosing a calcium supplement, ask your pharmacist for advice.

What if I am also taking other tablets for osteoporosis?
Do not take your calcium supplements at the same time of the day as your bisphosphonate tablet, or strontium ranelate, because the calcium will prevent the absorption of these drugs and they will therefore be less effective.

How should I ensure that calcium is absorbed most effectively from food or supplements?
It is best to eat calcium containing foods in smaller amounts several times a day or take supplements twice a day to maximise your body's absorption of calcium. If in doubt ask a pharmacist for advice on how to take your supplement.

Side effects
Some people experience nausea, bloating or constipation from calcium supplements and if this is the case you need to try another type of supplement.

You may have come across publicity regarding possible links between calcium and heart attacks/stroke. Current advice is that there is insufficient evidence to support these concerns and it is safe to take calcium supplements but it is important to ensure that the correct dose is taken.

Useful links
- Healthy Living for Strong Bones leaflet
  http://www.nos.org.uk/~/document.doc?id=981
- Healthy bones – facts about bones
  http://www.nos.org.uk/~/document.doc?id=395&DeliveryChannelID=23b562ascr s – facts about food leaflet:
- MHRA Drug Safety Update October 2011
  http://www.mhra.gov.uk/Safetyinformation/DrugSafetyUpdate/CON131932