

Diagnosis and Management of Vitamin D Deficiency in Adults in Primary Care

Who is considered as high risk of Vitamin D deficiency?

Age/Groups	Poor exposure to UVB light	Reduced dietary intake/absorption	Metabolic risk
≥75 years Pregnancy Breastfeeding	Pigmented skin Occlusive garments Housebound/Care Care Home residents Use of sun blocking creams	Vegetarian/fish-free diet Malabsorption (including bariatric surgery) Cholestatic liver disease	Elderly (reduced synthesis) Liver disease (reduced stores) Renal disease (reduced activation) Obesity (excess storage in fat) Drugs: rifampicin, antiretrovirals, antiepileptics, cholestyramine, glucocorticoids

Whom to test?

- Rickets, osteomalacia or symptomatic hypocalcaemia
- **High risk patients** (as defined above) with **suggestive symptoms**, such as proximal muscle weakness or musculoskeletal aches and pains that are gradual in onset and persistent.

Yes

No

Investigations

- Serum 25-OHD
- Bone profile (Ca²⁺, PO₄)
- U&Es
- LFTs

Do NOT check vitamin D levels in asymptomatic patients whether high risk or not

Vit D (25OHD) <30 nmol/L¹: Deficiency

Vit D (25OHD) 30–50 nmol/L¹: Insufficiency

Vit D (25OHD) >50 nmol/L¹: Adequate

Note 1: NNUH lab Vitamin D reports now reflect 25OHD levels, in line with [NOS guidance](#). Always check the reported reference ranges.

Treat Deficiency

(Referral needed? – see Note 2)

- Loading regimen* up to a total of approx 300,000 IU colecalciferol**:
- 20,000 unit capsules (or equivalent), two given weekly for 7 weeks
 - 25,000 unit tablets (or equivalent), two given weekly for 6 weeks
 - 50,000 unit capsules (or equivalent), one given weekly for 6 weeks
- (*See **Appendix 1** for available products)

Provide Advice

- Regular, safe, sun exposure (see **Appendix 4**)
- Dietary Vitamin D sources (e.g. oily fish, cod liver oil/fish oils, egg yolks, fortified foods e.g. (some breakfast cereals, milk powder, fat spreads).
- OTC vitamin D supplements 400–1000 IU daily (see **Appendix 2**). DO NOT PRESCRIBE ON FP10.

Patient information Links:

- [National Osteoporosis Society \(Healthy Living for Strong Bone\)](#)
- [National Osteoporosis Society \(Health bones – facts about food\)](#)
- [NHS Choices British Dietetic Association](#)

Maintenance Supplements

- Colecalciferol 800 – 2000 IU daily (occasionally up to 4000 IU daily) – see **Appendix 3**.
- OTC supplements - see **Appendix 2**. DO NOT ROUTINELY PRESCRIBE ON FP10. However patients with medical conditions requiring specialist input (e.g. malabsorption) may require on-going maintenance treatment via FP10.
- May need to be lifelong or during winter months. Provide dietary/sun exposure advice – see **Appendix 4**.
- Supplemental calcium is not required for most patients, but where indicated (e.g. elderly Care Home residents, bisphosphonate therapy) a suitable product may be prescribed (e.g. [Adcal D3](#), [theiCal-D3](#))
- **Routine retesting of Vitamin D levels is NOT recommended.**

Note 2: Indications for secondary care referral

- Renal failure – CKD stage 4&5
- Malabsorption
- Atypical biochemistry (including hypercalcaemia)
- Skeletal deformity
- Focal bone pain
- Unexplained severe deficiency
- Pregnancy

** **Colecalciferol is drug of choice.** It has been reported to raise serum vitamin D concentrations more effectively than ergocalciferol. Ergocalciferol is an alternative if colecalciferol is unavailable.

Appendix 1: Available Vitamin D Products for the Treatment of Vitamin D deficiency in Adults

Preparation (Drug, Strength, Form, Quantity)	Manufacturer / Distributor	Costs of preparations / pack sizes – based on information available at the time of writing	Dosing and Cost of an approximate 300,000 IU treatment course for Vitamin D deficiency	Licensing and risk considerations
Aviticol Capsules 20,000 IU (colecalfiferol)	Available from Colonis Pharma Ltd via normal wholesalers	20,000 IU - £29.00 – 30 capsules	Two 20,000 IU capsules taken weekly for 7 weeks (total dose 280,000 IU) – cost £13.53	Licensed UK medicine / Patient Info Leaflet Hard gelatin capsules. Arachis oil free / Sesame oil free Halal and Kosher appropriate
Fultium-D3 Capsules & Drops 20,000 IU capsules (colecalfiferol) Fultium[®]-D₃ Drops : 1ml (41 drops) contains 2740 IU colecalciferol - 3 drops = 200 IU.	Available from Internis Pharmaceuticals Ltd via normal wholesalers	Capsules : 20,000 IU - £17.04 - 15 20,000 IU - £29.00 – 30 Oral Solution (Drops): 25ml £10.70	Two 20,000 IU capsules taken weekly for 7 weeks (total dose 280,000 IU) – cost £15.90 60 drops (4000 IU) taken daily for 10 weeks (total dose 280,000 IU) - cost £53.50 (5 bottles – remainder 22.5 ml / 922 drops)	Licensed UK medicine / Patient Info Leaflet Soft-gel capsules - contain gelatin Manufacturer's Info: http://www.internisvitd3.com/medical-professionals/fultiumsupsup-dsub3sub-20000iu/
InVita D3 Oral Solution 25,000 IU / mL (colecalfiferol)	Available from Consilient Health Ltd via normal wholesalers	Oral solution (S/F) 3 x 1mL ampoule - £4.45	50,000 IU (two oral ampoules) each week for 6 weeks – cost £17.80	Licensed UK medicine / Patient Info Leaflet Sugar-free liquid Contains Olive oil (refined), and Sweet orange peel oil.
Plenachol Capsules: 20,000 IU capsules 40,000 IU capsules	Available from D3 Pharma Auden Mckenzie (Pharma Division) Ltd via normal wholesalers	20,000 IU - £9.00 - 10 40,000 IU - £15.00 - 10.	40,000 IU taken weekly for 7 weeks (total dose 280,000 IU) – cost £10.50	Licensed UK medicine Hard white capsules that must be swallowed whole with water, preferably with food. Halal and Kosher certificated.
Stexerol D₃ tablets 25,000 IU (colecalfiferol)	Available from ProStrakan via normal wholesalers	25,000 IU - £17.00 – 12 tablets	Two 25,000 IU tablets taken weekly for 6 weeks – cost £17.00	Licensed UK medicine / Patient Info Leaflet Film-coated capsule-shaped tablets (14 mm size) which can be swallowed whole or crushed, and taken with food.
THORENS oral solution : 25,000 I.U. /2.5 ml (2.5ml single dose bottle)	Available from Galen Limited via normal wholesalers	25,000 IU/2.5 ml (2.5ml single dose bottle) oral solution £1.55 per single-dose bottle £5.85 per 4-bottle pack.	Two 25,000 IU/2.5 ml single dose bottles (50,000 IU) taken weekly for 6 weeks – cost £17.55	Licensed UK medicine / Patient Info Leaflet Licensed for the treatment and prevention of vitamin D deficiency in all ages from newborn infants to adults (NB <i>High dose cholecalciferol products such as THORENS 25,000 I.U./2.5ml oral solution are not recommended for use in pregnant and</i>

Preparation (Drug, Strength, Form, Quantity)	Manufacturer / Distributor	Costs of preparations / pack sizes – based on information available at the time of writing	Dosing and Cost of an approximate 300,000 IU treatment course for Vitamin D deficiency	Licensing and risk considerations
				<i>breastfeeding women)</i> <ul style="list-style-type: none"> • Olive oil based solution • Halal- and Kosher-certified • Suitable for vegetarians • Gluten, lactose and nut-free

Appendix 2: Available Vitamin D Products for Purchase by Patients (OTC) (Maintenance Supplements)

Daily dose	Preparation (Drug, Strength, Form, Quantity)	Price (based on information available at the time of writing)	Available from
1000 IU	Boots Pharmaceuticals Vitamin D tablets 25ig (1000 IU) (colecalfiferol)	£5.10 – 90 tablets £8.99 – 180 tablets £16.18 – 360 tablets	Boots www.boots.com
400 IU	Boots Pharmaceuticals Vitamin D tablets 10ig (400 IU) (colecalfiferol)	£2.19 – 90 tablets	Boots www.boots.com
400 IU	Holland & Barrett Vitamin D tablets 10ig (400 IU) (colecalfiferol)	£3.55 – 100 tablets £7.99 – 250 tablets	Holland & Barrett www.hollandandbarrett.com
400 IU	Holland & Barrett Vitamin D vegetarian capsules 10ig (400 IU) (colecalfiferol)	£4.99 – 100 capsules	Holland & Barrett www.hollandandbarrett.com
1000 IU	Holland & Barrett Vitamin D tablets 25ig (1000 IU) (colecalfiferol)	£7.99 – 100 £8.99 – 250	Holland & Barrett www.hollandandbarrett.com
400 IU	Nature's Best Vitamin D3 tablets 400 IU (colecalfiferol)	£5.50 – 180 tablets (plus deliver)	Online at www.naturesbest.co.uk
1000 IU	Nature's Best Vitamin D3 capsules 1000 IU (colecalfiferol)	£8.95 – 180 capsules £14.90 – 360 capsules (plus delivery)	Online at www.naturesbest.co.uk
1000 IU	SunVit D3 tablets 1000 IU (colecalfiferol)	£4.79 – 28 tablets (plus P&P)	Online at www.sunvitd3.co.uk
500 IU	Tesco Vitamin D tablets 12.5ig (500 IU) (colecalfiferol)	£2.75 for 90 tablets	Tesco www.tesco.com
1000 IU	Tesco Vitamin D tablets 25ig (1000 IU) (colecalfiferol)	£4.00 for 90 tablets	Tesco www.tesco.com
400 - 800 IU	DLux 400 oral spray 400 IU per spray (colecalfiferol)	£6.25 for 15mL (100 sprays)	Online at www.betteryou.uk.com (Larger Boots and Holland & Barrett stores may also stock)
1000 IU	DLux 1000 oral spray (1000 IU per spray) (colecalfiferol)	£6.95 for 15mL (100 sprays)	Online at www.betteryou.uk.com (Boots and Holland & Barrett stores may also stock)
400 IU	Pregnacare (multivitamins & minerals) Suitable for pregnant women	Prices vary (Approx. £4 to £5 for 30 tablets)	Various outlets including pharmacies and supermarkets

NB: All products are marketed as nutritional supplements (i.e. are not licensed medicines). Please note that other community pharmacies may also stock suitable vitamin D preparations. Patients should be advised to ask for available products.

Appendix 3: Vitamin D Products available for Maintenance Supplements on Prescription

Preparation (Drug, Form, Strength)	Manufacturer / Distributor	Cost (Drug Tariff price or from manufacturer) – based on information available at the time of writing	Licensing and risk considerations
Adcal D3 Chewable Tablets (Calcium Carbonate 1500mg , Colecalciferol 400 IU per tablet)	Available via normal wholesaler routes	£3.65 – 56 tablets	Licensed UK medicine Contains soya oil. Contraindicated in those with peanut or soya allergy.
Adcal-D3 Caplets (Calcium Carbonate 750mg , Colecalciferol 200 IU per caplet)	Available via normal wholesaler routes	£2.95 – 112 tablets	Licensed UK medicine. Does not contain soya or peanut based excipients
Desunin Tablets 800 IU (colecalfiferol)	Available from Meda Pharmaceuticals via normal wholesalers routes	£ 3.60 – 30 tablets £10.17 – 90 tablets	Licensed UK medicine / Patient Info Leaflet Suitable for vegetarians / Gelatin free Soya and peanut oil free.
Fultium-D3 Capsules & Drops 800 IU capsules Fultium® D3 Drops: 1ml (41 drops) contains 2740 IU colecalciferol 3 drops = 200 IU. (colecalfiferol)	Available from Internis Pharmaceuticals Ltd via normal wholesalers	Capsules: £ 3.60 – 30 capsules £10.80 – 90 capsules Oral Solution (Drops): 25ml £10.70 - equivalent to 85 doses (~12 weeks) of 800 IU daily	Licensed UK medicine - capsules licensed for adults and children aged 12 years and older Soft-gel capsules - contain gelatin
Stexerol D₃ tablets 1000 IU (colecalfiferol)	Available from ProStrakan via normal wholesalers	£2.95 – 28 tablet pack	Licensed UK medicine / Patient Info Leaflet Film-coated orange, oval tablets (8.5 mm size) which can be swallowed whole or crushed, and taken with food.
THORENS oral drops, solution: 10 000 IU /ml (10ml bottle) 1ml = 50 drops 800 – 1000 IU = 4 to 5 drops	Available from Galen Limited via normal wholesalers	£5.85 for 10,000 IU/ml oral drops, solution (per 10ml bottle) One 10ml bottle provides 100 to 125 doses of 800-1000 IU (14 to 17 weeks).	Licensed UK medicine / Patient Info Leaflet <ul style="list-style-type: none"> • Licensed for the prevention of vitamin D deficiency in newborn infants up to and including adults (including pregnant and breastfeeding women) • Licensed for the treatment of vitamin D deficiency in newborn infants, children and adolescents up to 18 years • Olive oil based solution • Halal- and Kosher-certified • Suitable for vegetarians • Gluten, lactose and nut-free

NB. When prescribing a calcium and vitamin D combination product avoid prescribing Calcium and Ergocalciferol tablets as these contain insufficient calcium and are not cost effective.

Appendix 4: Advice on Sun exposure

The amount of UVB in sunlight changes substantially with season, latitude and time of day. These factors greatly affect vitamin D production, which is greatest around two hours either side of solar noon, and during summer months.

Physical characteristics can also affect vitamin D production; with darker skin requiring longer UV exposures to produce the same amount of vitamin D. Older people have a reduced ability to make vitamin D through their skin.

Exposure to ultraviolet B (UVB) radiation in sunlight is the most efficient way to boost vitamin D supply but it is still unclear how much sunlight is required to produce a given level of 25 (OH) D. However, best estimates suggest that for most people, everyday casual exposure to sunlight is enough to produce vitamin D in the summer months.

In a recent study, Caucasian British people were given a simulated dose of summer exposure to sunlight. These controlled conditions (equivalent to 13 minutes of midday exposure to the summer sun, three times a week for six weeks) raised 25 (OH) D levels to greater than, 50 nmol/l in 90% of people and greater than 70nmol/l in 26 % of these.

It has been consistently shown that vitamin D can be efficiently and sufficiently produced at doses of UV below those which cause sunburn (i.e. reddening of the skin). Additional UV exposure provides no additional vitamin D but increases the levels of DNA damage and increases the risk of skin cancer.

Some unprotected exposure in the hours closest to solar noon may be necessary but people should *not* be advised to deliberately sunbathe or expose themselves to the sun for long periods of time without protecting themselves with a sunscreen or covering up.

For vitamin D synthesis little and often is best i.e. two or three short sunlight exposures per week are sufficient to achieve vitamin D levels between April and September in the UK. During winter months there is not enough UVB for vitamin D synthesis and the body relies on tissue stores. For those who achieve a sufficient supply of vitamin D in summer they will normally keep levels greater than 25nmol/l in winter even without supplements.¹

The National Osteoporosis Society suggests **trying to get ten minutes of sun exposure to bare skin (face and arms), once or twice a day, without sunscreen and taking care not to burn**^{2,3}

Appendix 4 Reference Sources:

- Greater Manchester Medicines Management Group Interface Prescribing & New Therapies Subgroup Vitamin D Deficiency / Insufficiency Management flowchart for Adults, April 2011
Statement abridged from consensus Vitamin D position statement December 2010 – based on the unified views of the British Association of Dermatologists, Cancer Research UK, Diabetes UK, the Multiple Sclerosis Society, the National Heart Forum, the National Osteoporosis Society and the Primary Care Dermatology Society - <http://www.bad.org.uk/desktopDefault.aspx?TabId=1221>
- National Osteoporosis Society. Healthy Living for Strong Bones. December 2011. <http://www.nos.org.uk/~document.doc?id=981>
- National Osteoporosis Society. Healthy bones – facts about food. June 2011. <http://www.nos.org.uk/~document.doc?id=395>

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- National Osteoporosis Society. Vitamin D and Bone Health: A Practical Clinical Guideline for Patient Management. April 2013. Available at <https://www.nos.org.uk/>
- East and South East England Specialist Pharmacy Services. Vitamin D deficiency and insufficiency - using appropriate available products. August 2014. Accessed via <http://www.medicinesresources.nhs.uk/en/Communities/NHS/SPS-E-and-SE-England/Medicines-Information/North-London-Regional-MI-Network/Vitamin-D-deficiency-and-insufficiency-using-appropriate-available-products/> on 17/02/2015
- UKMi Q&A 387.4 Which vitamin D preparations are suitable for a vegetarian or vegan diet? May 2015 Accessed at <http://www.evidence.nhs.uk/search?q=%22Which%20Vitamin%20D%20preparations%20are%20suitable%22&syn=False&om=%5B%7B%22sm%22%3A%5B%22%20ukmi%20%22%5D%7D%5D>