

Effectively Using Calcium and Vitamin D Supplementation

**Osteoporosis 2019
A Clinical Update on Current Best Practice**

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Outline

- **Calcium requirements**
- **Optimising Calcium Intake**
- **Role of Vitamin D**
- **ROS Vitamin Guidelines**
 - Who Should Be Tested for Vitamin D Deficiency
 - How Should We Treat Vitamin D Deficiency
 - Monitoring and Toxicity
- **Summary**

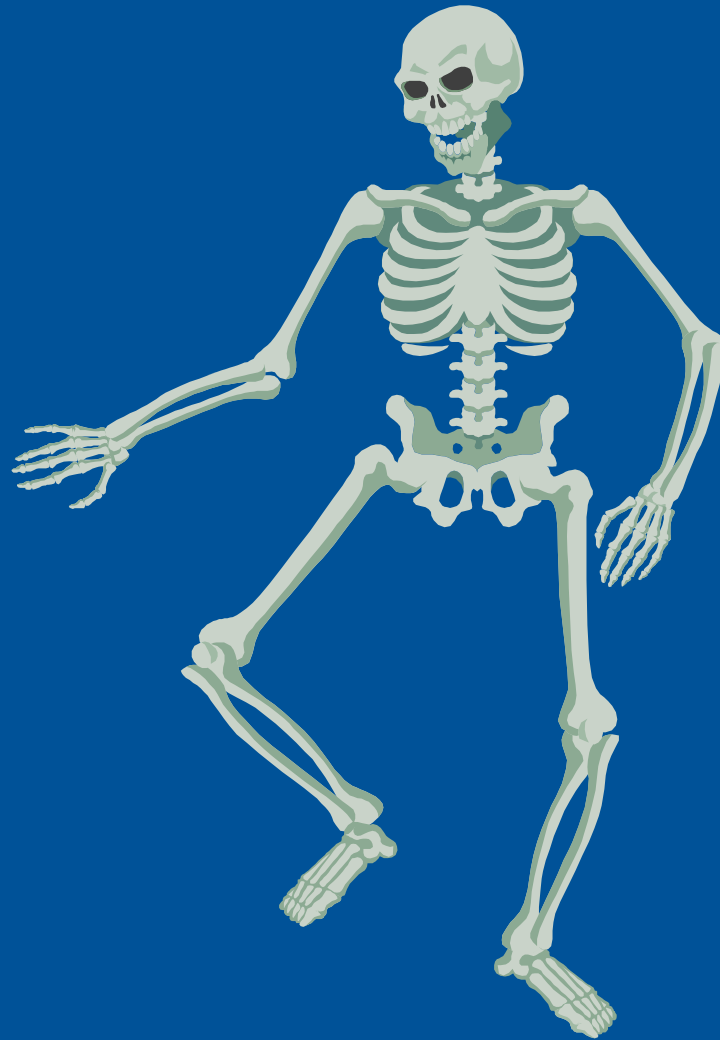
Disclaimer Statement

This presentation reflects my point of view and not necessarily those of the organising committee

Disclosure Statement

I have received honoraria for educational meetings from Eli Lilly and Company, UCB and Consilient Health in the last 12 months

Calcium and Vitamin D



Calcium

Group	Age (years)	Calcium (mg) per day
Infants	Under 1	525
Children	1-3	350
	4-6	450
	7-10	550
Adolescents	11-18	800 (girls) 1000 (boys)
Adults	19+	700
Breastfeeding mums		1250
Women past the menopause		1200
Coeliac Disease	Adults	at least 1000
Osteoporosis	Adults	1000
Inflammatory Bowel disease	Adults	1000
	Post menopausal women and Men over 55 years	1200



<https://www.bda.uk.com/foodfacts/Calcium.pdf>

Calcium



Milk

Ca / Pint

Full Fat

672

Semi-skimmed

693

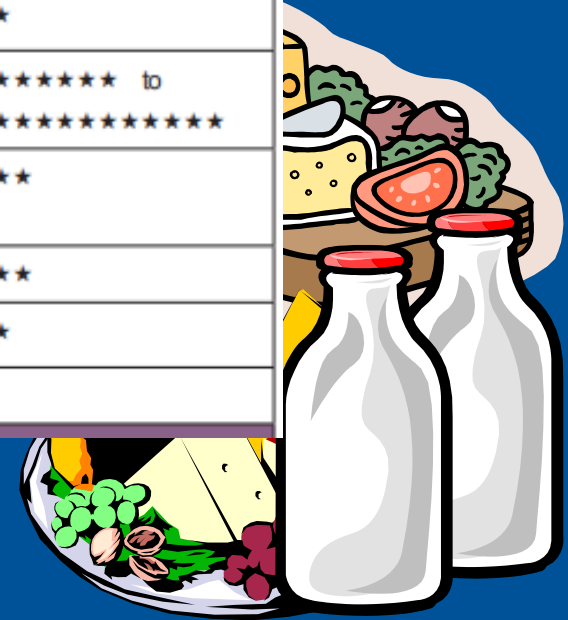
Full-skimmed

705

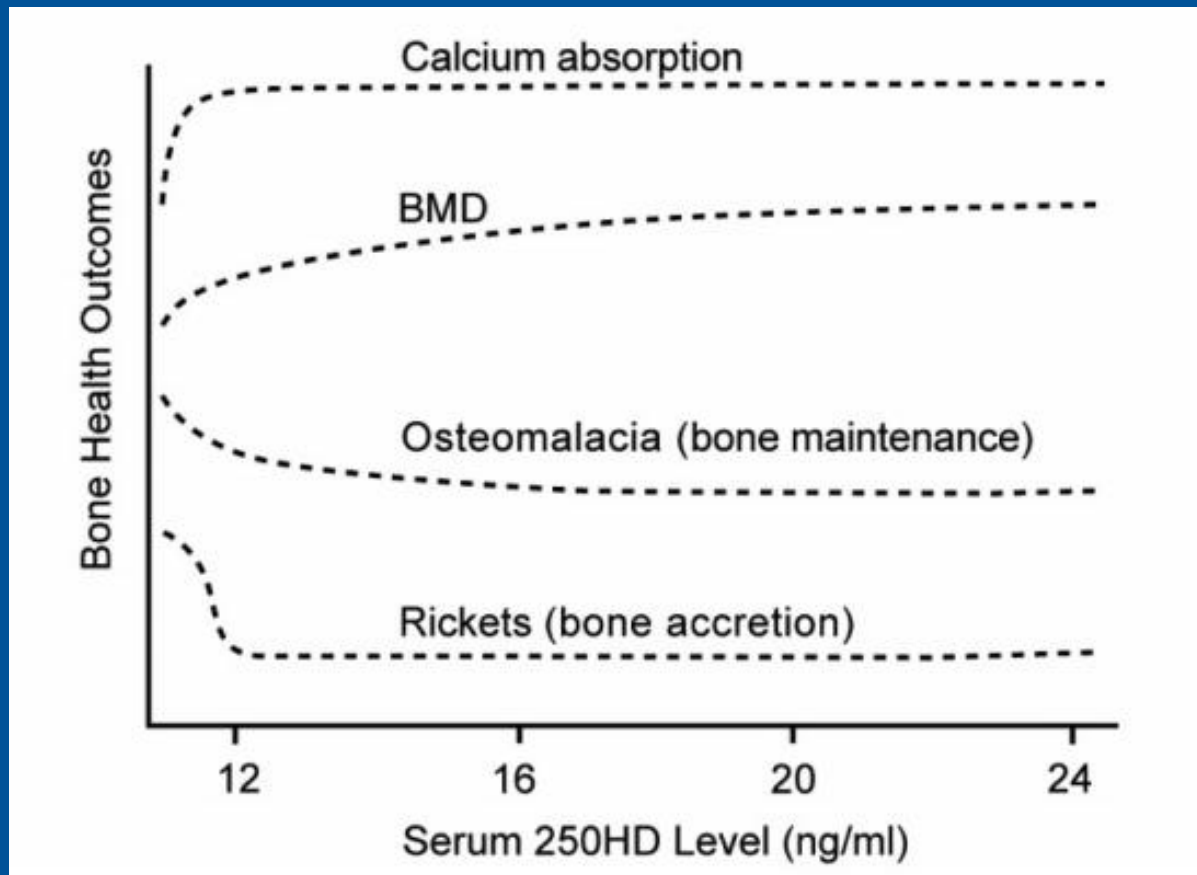
Calcium

Group	Age (years)	Calcium	Calcium	BDA (British Dietetics Assoc)
Calcium in dairy products		Quantity	Calcium (mg)	Stars 1 star = 60mg
Milk, all types		200ml	240	★★★★
Cheese		matchbox-size 30g	220	★★★★
Cheese triangle		1 triangle - 15g	60	★
Yoghurt		120g	200	★★★
Fromage frais		1 pot/pouch - 45-100g	60	★
Calcium-enriched fromage frais		1 pot/pouch - 50-90g	125	★★
Malted milk drink		25g serving in 200ml milk	440-710	★★★★★★ to ★★★★★★★★★★
Hot chocolate (light) 20g (with water)		25g serving in 200ml water	200	★★★
Rice pudding		½ large tin (200g)	176	★★★
Custard		1 serving (120ml)	120	★★
Milk chocolate		30g	66	★

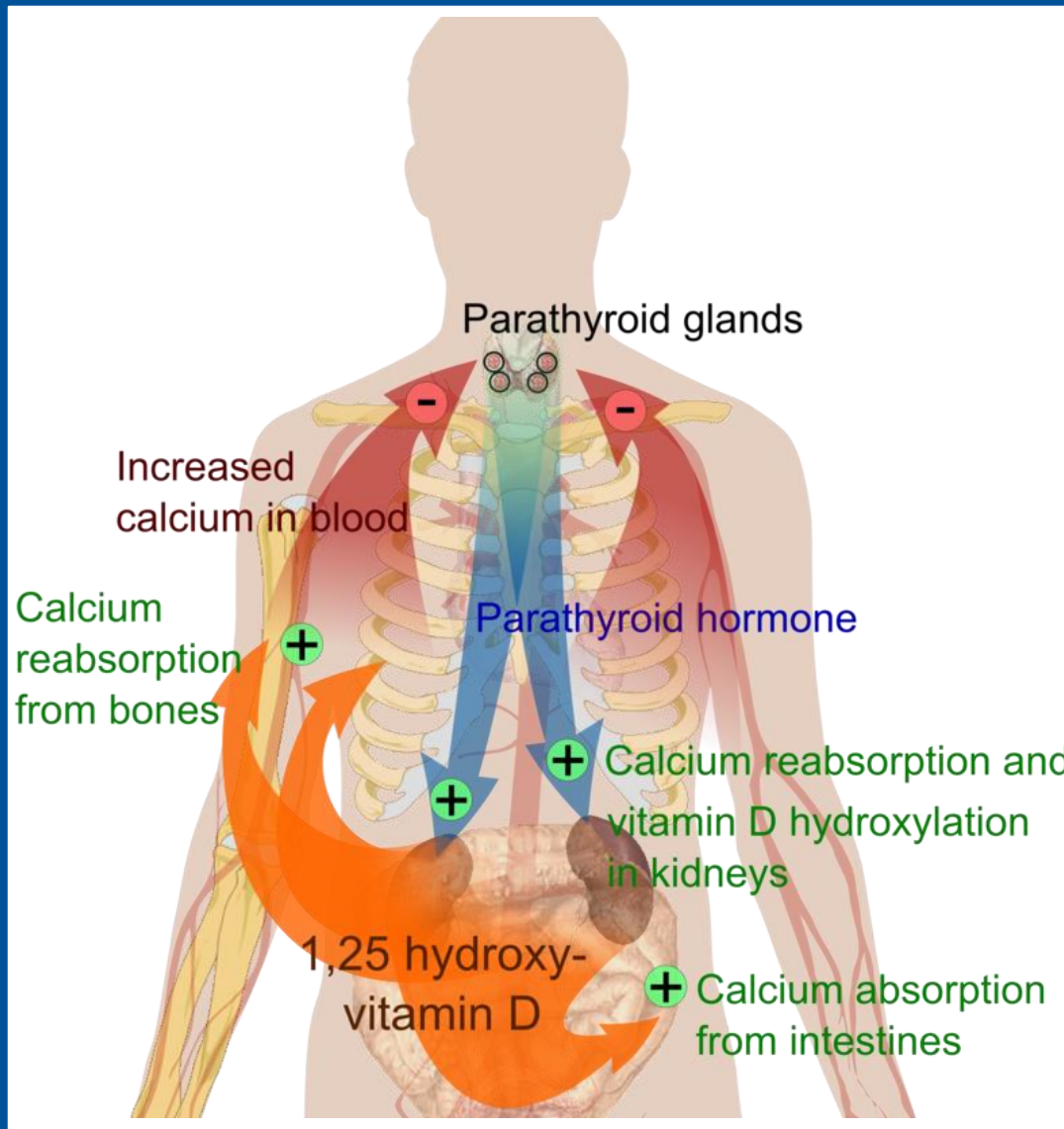
Inflammatory Bowel disease	Adults	1000	17 stars
	Post menopausal women and Men over 55 years	1200	20 stars



Optimising Calcium Absorption



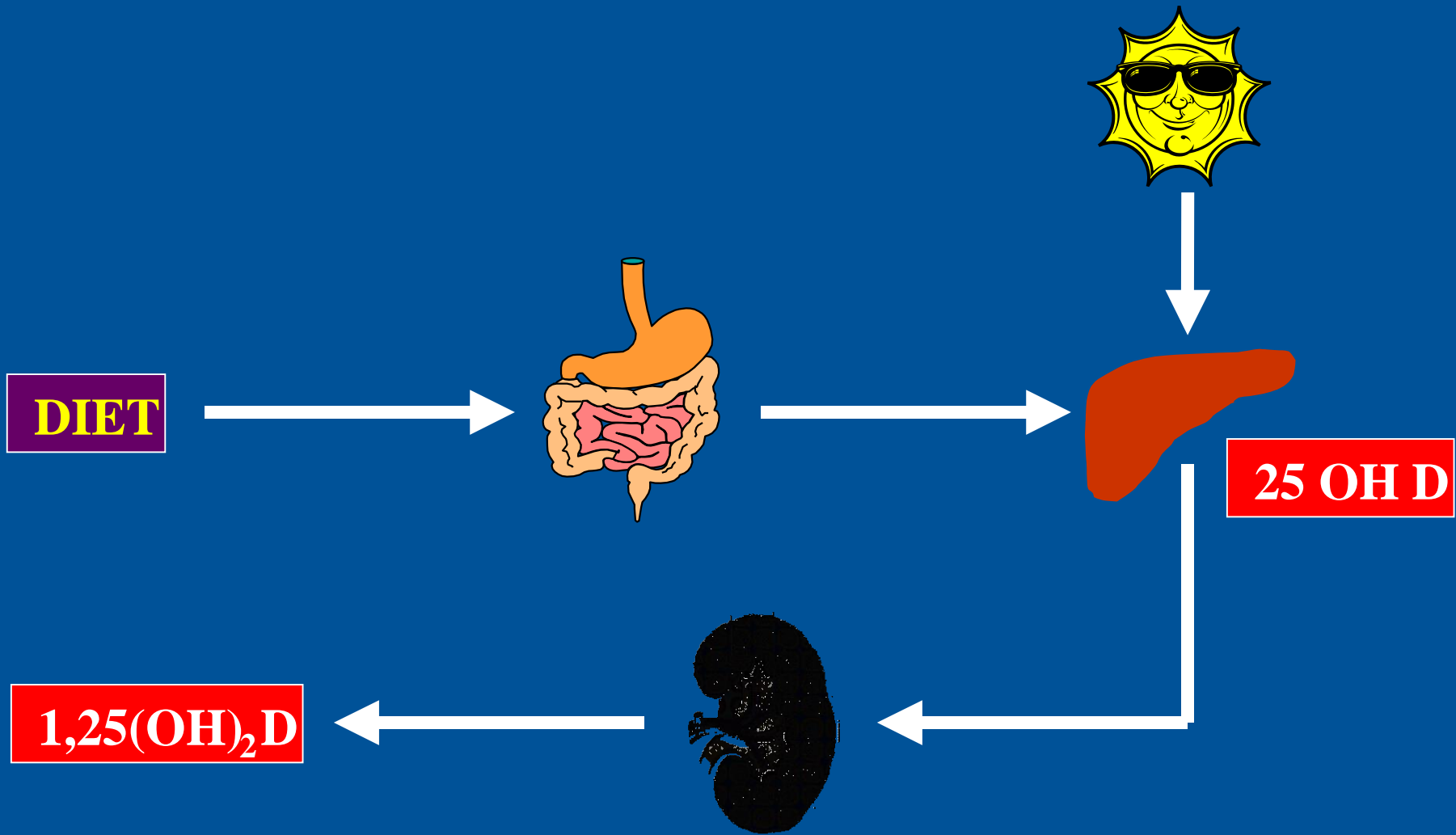
Optimising Calcium Absorption-Vitamin D



Prevalence of Vitamin D Deficiency

- **Part of Health Survey for England (HSE) 2000, on behalf of DoH**
- **Nationally representative sample of people aged 65 and over**
- **Data on vitamin D levels from 1297 patients**
 - 642 in private households (320 female)
 - 655 in institutions (454 female)
- **Proportion with vitamin D level < 30 nmol/L:**
 - **Women in private households: 55%**
 - **Women in institutions: 75%**

Vitamin D Life Cycle



Vitamin D Foods



Vitamin
D

Fortification of Foods

If you like beer You'll Love Schlitz

*No harsh bitterness . . .
Just the kiss of the hops*

This dry and mellow beer . . . this beer of *matchless flavor* . . . is the world's largest seller.

Year after year more bottles and cans of Schlitz are bought—*millions more*—than of any other beer. This popularity is the result of the most conclusive taste test in beer history.



FAMOUS SCHLITZ RAREBIT: Mix together in chafing dish or double-boiler over low fire, 1 tsp. butter, 1/2 tsp. Worcestershire sauce, 1/2 tsp. dry mustard, a few dashes paprika. Add 1/2 to 3/4 bottle or can of Schlitz beer. Crumble 1 lb. sharp cheese; add slowly to mixture, stirring until smooth. Salt to taste. Just before serving add dash of cayenne pepper. Serve piping hot on crisp, dry toast. Serves 4 to 6.



ON TV EVERY WEEK—The popular "SCHLITZ PLAYHOUSE OF STARS." See your newspaper for time and station.

© 1951—Jas. Schlitz Brewing Company, Milwaukee, Wis., Division of Milwaukee, Wis. and Brooklyn, N. Y.

First in Sales

The Beer that Made Milwaukee Famous

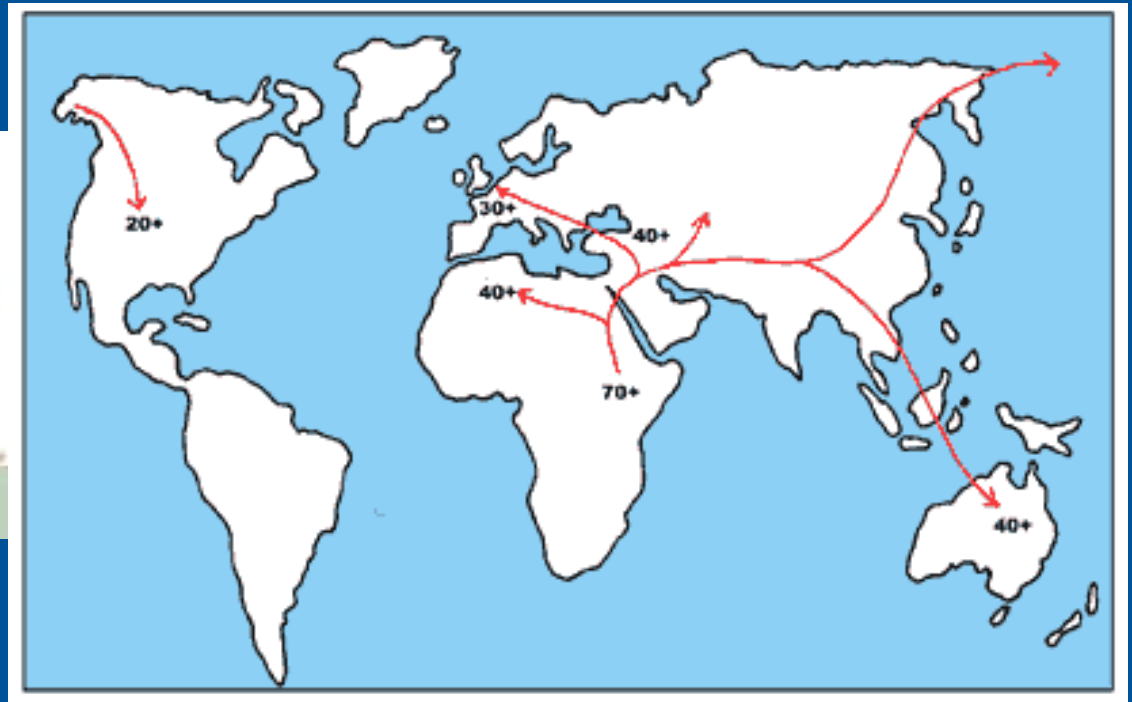
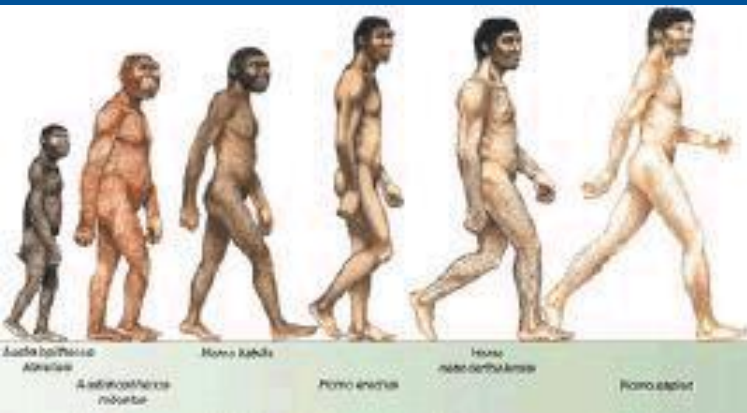


Vitamin D

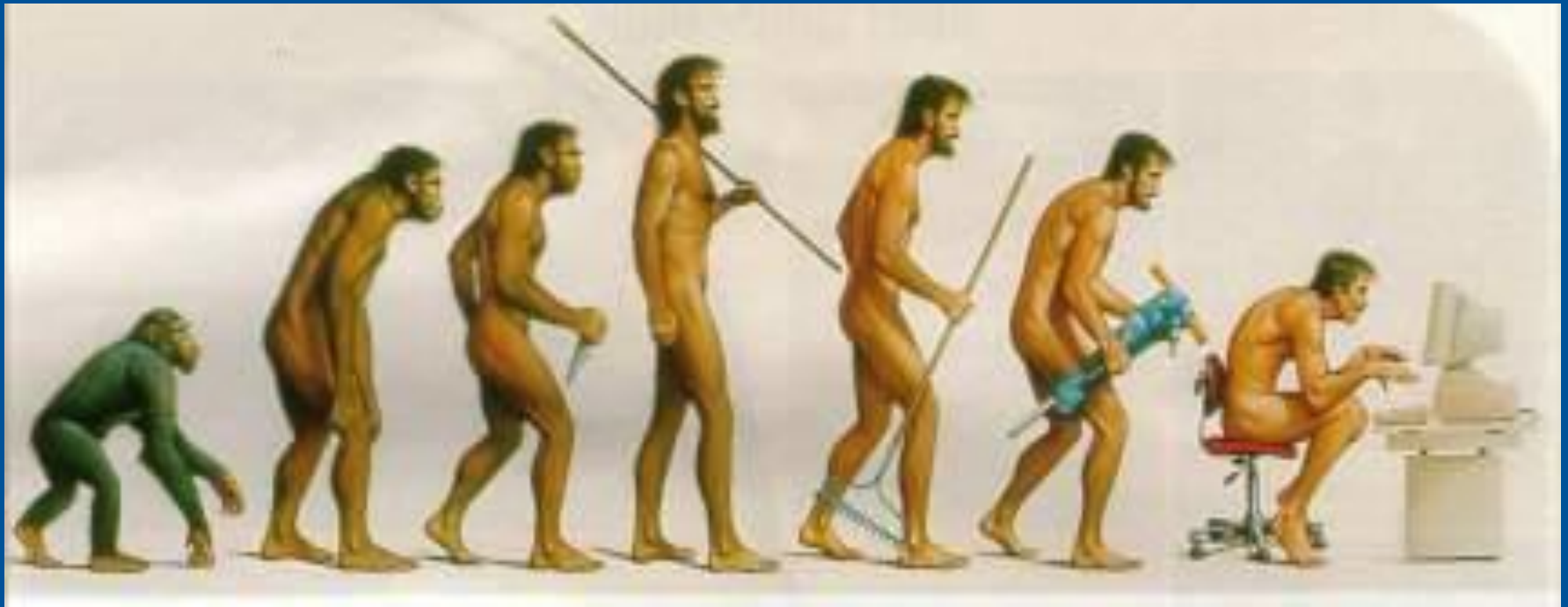


Bathsheba Beach-Barbados

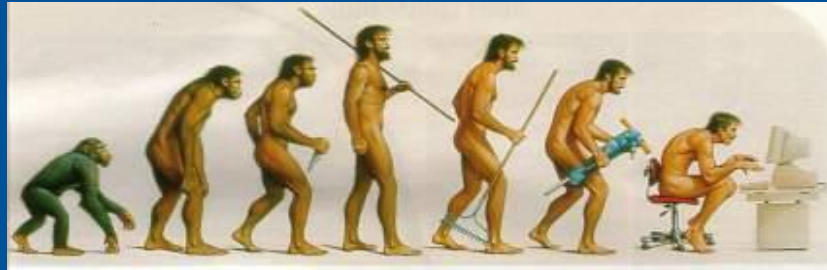
Out of Africa model



Modern Man

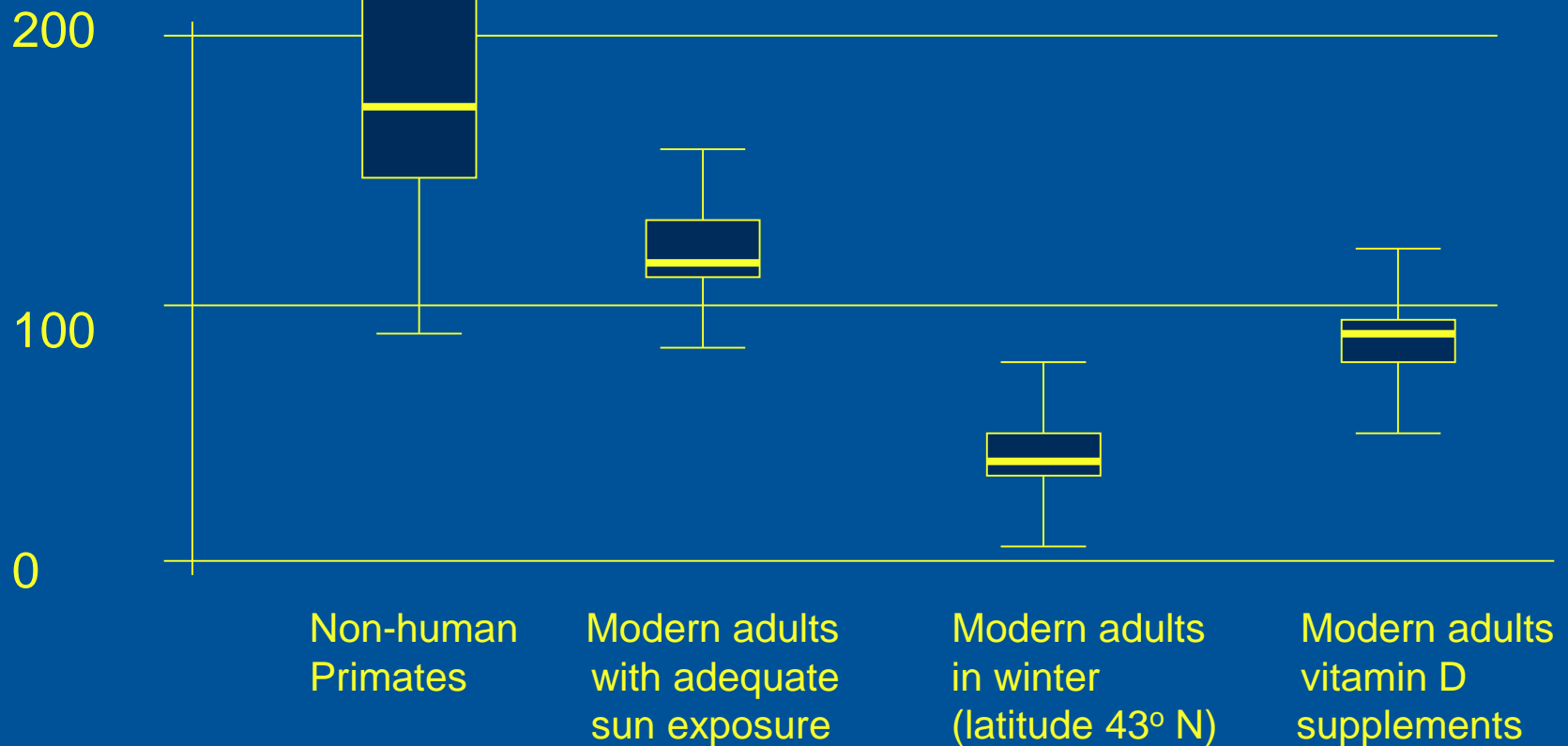


25D in non-human primates and modern humans



Adapted from:
Vieth R J Steroid Biochem & Mol Bio
2004;89-90;575-579

25D
nmol/l



Modern Weather

Thursday

Sunrise 05:32 (BST)

Sunset 20:34 (BST)



18°C

Friday

Sunrise 05:31 (BST)

Sunset 20:31 (BST)



15°C

Saturday

Sunrise 05:29 (BST)

Sunset 20:34 (BST)



14°C

Sunday

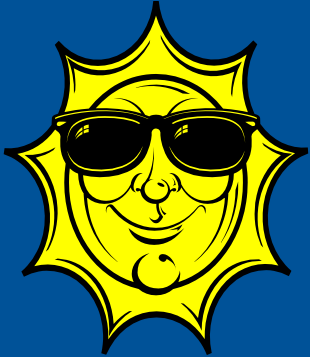
Sunrise 05:34 (BST)

Sunset 20:39 (BST)

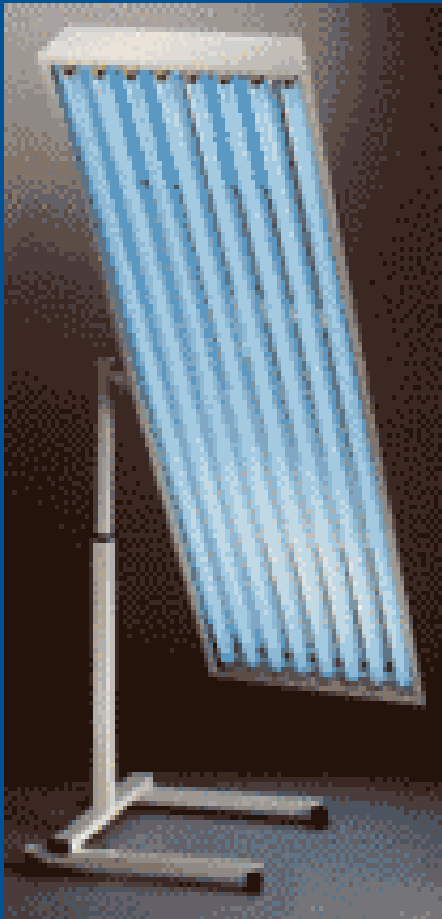


17°C

Vit D : Skin Cancer



Vit D Supplementation : The Alternative Answer



SALSA ALURA SUNLAMP

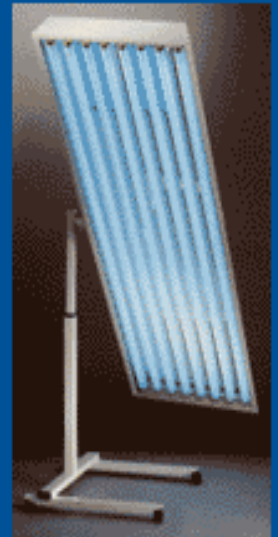
PRICE £ 595

FACIAL TUBES £ 1795

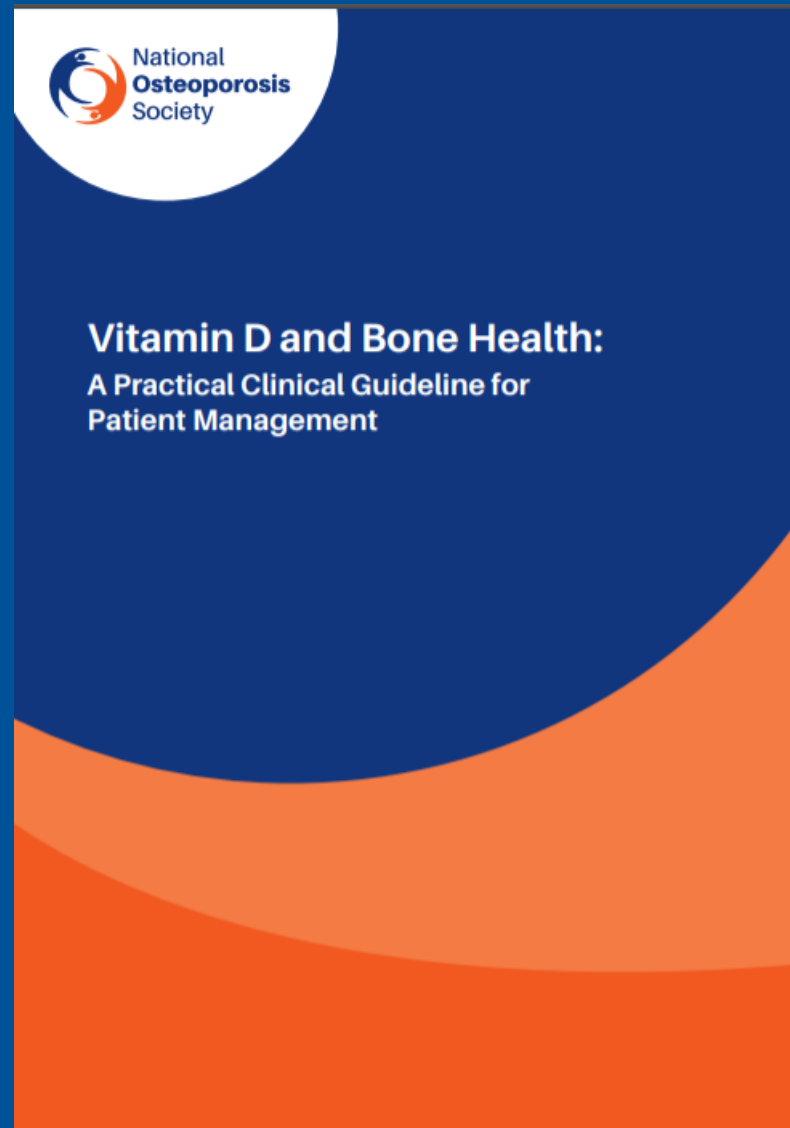
VARIABLE BODY COOLER £ 75

Vit D Supplementation : UV Radiation

- **45 FEMALE PSYCHOGERIATRIC PATIENTS**
MEAN AGE 85 YRS
- **RANDOM ALLOCATION UV-B IRRADIATION**
LOWER BACK [3x/Week, 1/2 Minimal Erythema Dose]
12 Week Study
- **EXCLUSION CRITERIA**
GOING OUTDOORS > 1 / WEEK
ACTINIC / CANCER SKIN LESIONS
- **12 WEEK ENDPOINT**
MEDIAN 25OHD INCREASED FROM
30 TO 60 nmol/l



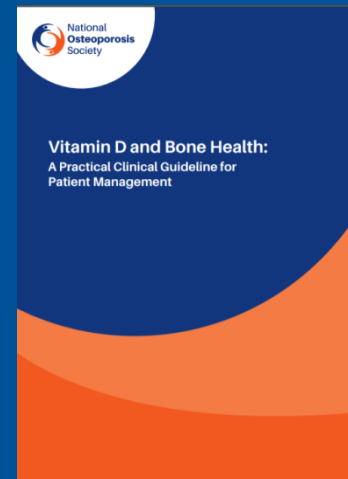
Vit D Guidelines



https://theros.org.uk/media/100231/nos_vitamin_d_and_bone_health_in_adults_web.pdf

Vit D Guidelines

- **Definition of Vitamin D Deficiency**
- **Who Should Be Tested for Vitamin D Deficiency**
- **How Should We Treat Vitamin D Deficiency**
- **Monitoring and Toxicity**

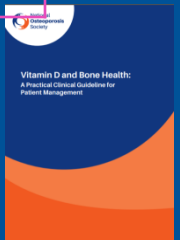


Vit D Guidelines

Definition of Vitamin D Deficiency

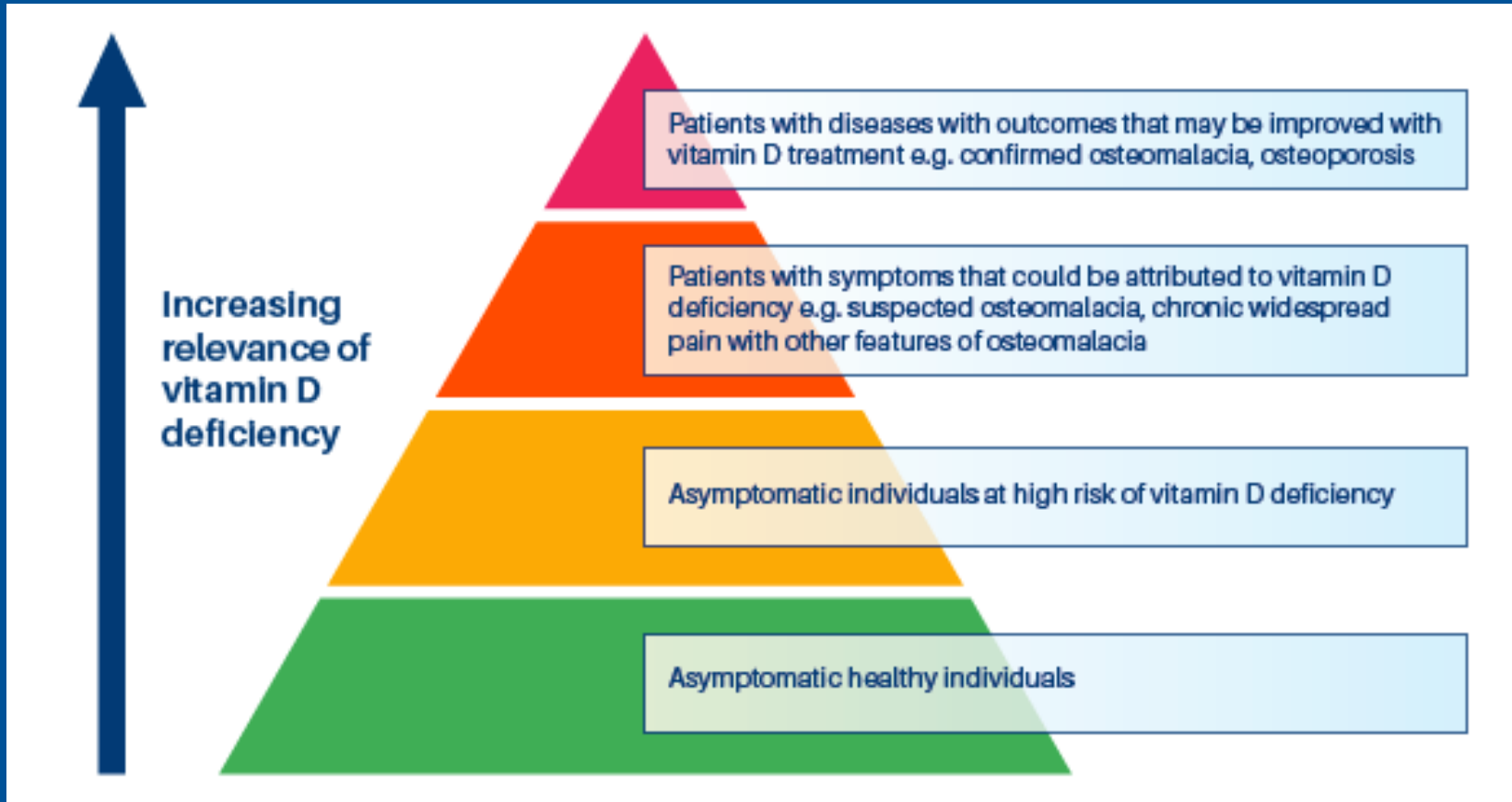
In agreement with the Institute of Medicine, the ROS propose that the following vitamin D thresholds are adopted by UK practitioners in respect to bone health in adults:

Definition	Serum 25(OH)D
Deficient	<30 nmol/L
Inadequate (In some people)	30–50 nmol/L
Sufficient (For almost the whole population)	>50 nmol/L



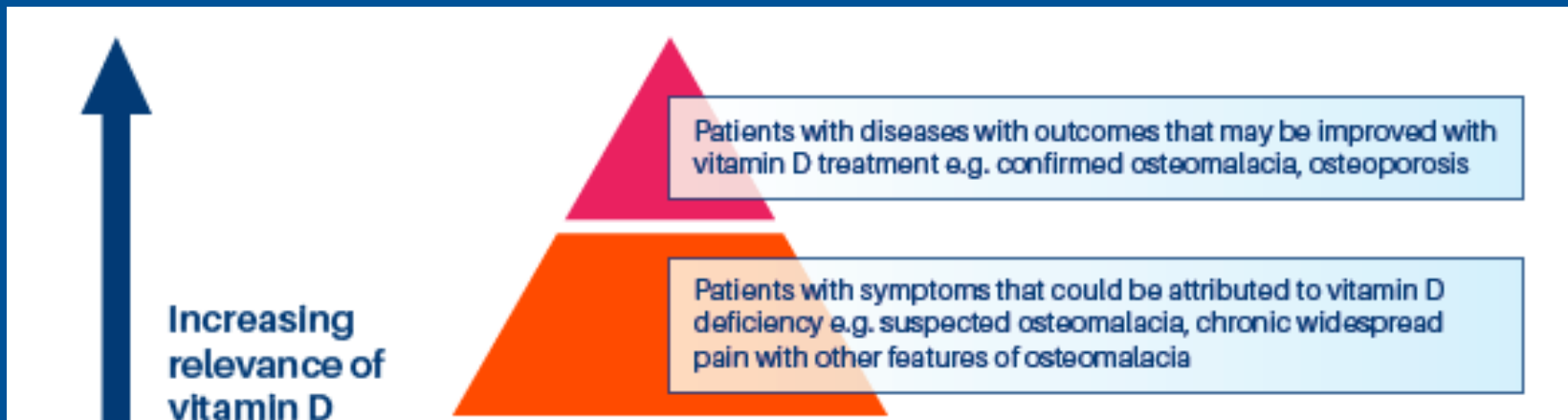
Vit D Guidelines

Who Should be Assessed



Vit D Guidelines

Who Should be Assessed



Vit D Guidelines

Who Should be Assessed

Department of Health and Social Care Guidance⁵³

Adult groups at risk of vitamin D deficiency:

- older people, aged 65 years and over
- people who have low or no exposure to the sun, for example those who cover their skin for cultural reasons, who are housebound or who are confined indoors for long periods
- people who have darker skin, for example people of African, African-Caribbean or South Asian origin, because their bodies are not able to make as much vitamin D.

Recommendations:

- people aged 65 years and over and people who are not exposed to much sun should also take a daily supplement containing 10 µg (400 IU) of vitamin D.

Vit D Guidelines

How Should We Treat Vitamin D Deficiency

- **Less urgent**

Co-prescribing with an oral antiresorptive agent, maintenance therapy may be started without the use of loading doses

- **Rapid correction**

Patients with symptomatic disease or about to start treatment with a potent antiresorptive agent (zoledronate or denosumab or teriparatide), the recommended treatment regimen is based on fixed loading doses followed by regular maintenance therapy

Vit D Guidelines

How Should We Treat Vitamin D Deficiency

Loading dose

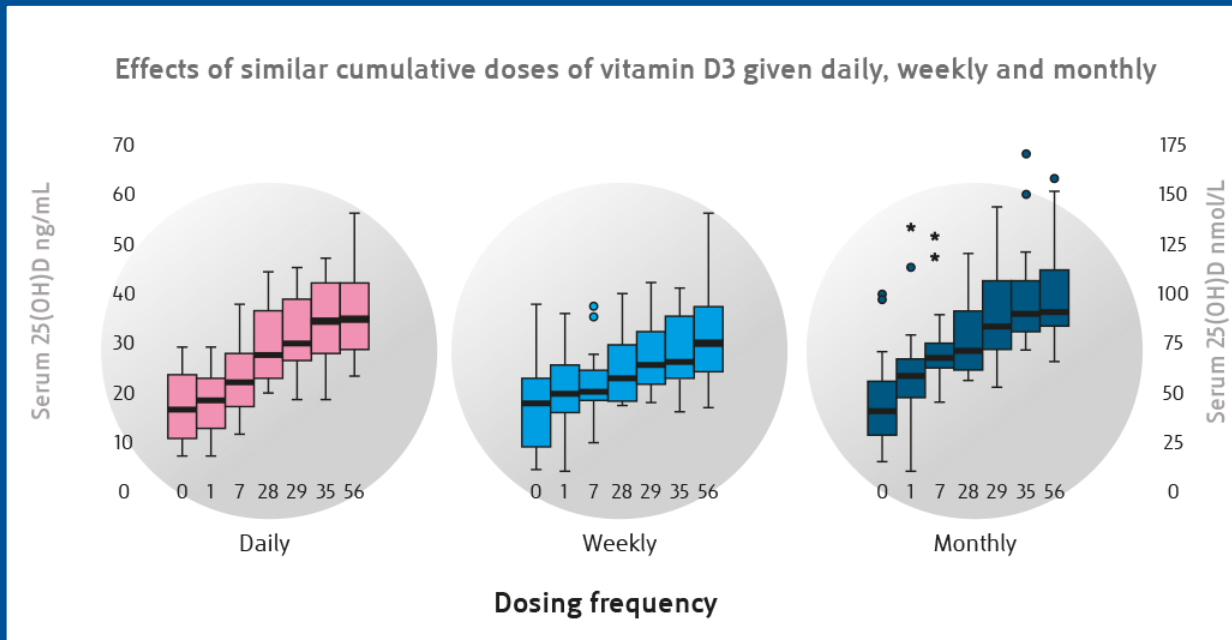
- A loading regimen to provide a total of approximately 300,000 IU vitamin D.
- Given either as separate weekly or daily doses over 6 to 10 weeks.
- e.g. 50,000 IU/week for six weeks.

Maintenance dose

- Maintenance therapy comprising of vitamin D in doses equivalent to 800–2000 IU daily.
- Occasionally up to 4,000 IU daily.
- Given either daily or intermittently at a higher equivalently dose.

Vit D Guidelines

How Should We Treat Vitamin D Deficiency Maintenance



Ish Shalom S et al. J Clin Endocrinol Metab 2008;93:3430–3435.

Vit D Guidelines

Monitoring

Routine monitoring of 25(OH)D is unnecessary but may be appropriate in patients with

- Symptomatic vitamin D deficiency
- Situations where malabsorption or poor compliance with medication is suspected
- Patients taking antiresorptive therapy who have extremely low levels at baseline assessment
- Repeat testing may be indicated prior to sequential doses of potent antiresorptives

Adjusted plasma calcium is recommended to be checked one month after completing the loading regimen or after starting lower dose vitamin D supplementation in case primary hyperparathyroidism has been unmasked.

Vit D Guidelines

Vitamin D Toxicity

The Food and Nutrition Board of the IOM concluded

Vitamin D below 10,000 IU per day is not usually associated with toxicity, whereas doses equal to or above 50,000 IU per day for several weeks or months are frequently associated with toxicity.

The IOM set the Upper limit (UL) for long-term intake at 4,000 IU (100 µg) per day.

Similarly, the European Food Safety Authority (EFSA) and the UK Scientific Advisory Committee on Nutrition (SACN) reviewed the evidence and concluded that an upper limit of 4,000 IU (100 µg) per day is safe for adults

1. IOM (Institute of Medicine). Dietary reference intakes for calcium and vitamin D. Washington DC; The National Academies Press 2011;
2. EFSA Panel on Dietetic Products NaAN. Scientific opinion on the tolerable upper intake level of vitamin D. EFSA Journal 2012; 10(7):2813;

Vit D Guidelines

Vit D Toxicity

Hypercalcaemia

Patients with granulomatous disease are at risk of hypercalcaemia because of increased 1α -hydroxylase activity (converts 25(OH)D to active 1,25(OH) $_2$ D).¹

Toxicity has been reported during vitamin D treatment of tuberculosis and in patients with active sarcoidosis.²

Hypercalciuria and renal stones

No strong evidence that correcting vitamin D deficiency with vitamin D alone will increase the risk of renal stones.¹

Patients with active nephrolithiasis should be managed on a case by case basis.¹

¹ https://theros.org.uk/media/100231/nos_vitamin_d_and_bone_health_in_adults_web.pdf

² Sharma OP. *Chest* 1996;109:535–539.

Calcium and Vitamin D Summary

- **Optimise dietary intake (calcium)**
- **Consider OTC preparations**
- **Appropriate Use of Vitamin D Testing**
- **Vitamin D loading / Maintenance**
- **Vitamin D Toxicity**
- **Combination calcium and vitamin D supplements**