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100% Online nutrition and functional medicine course for Neuro-mechanical practitioners
Metabolic intervention to allow Neuro-mechanical care to work

https://www.academyofchiropracticnutrition.com/APM
Free weekly insights newsletter
Plus vitamin D symptom & dosing chart
Vitamin D video on mechanisms behind vitamin D symptoms plus pregnancy & breastfeeding

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Vitamin D- A guide for Neuromechanical practitioners

Why vitamin D deficiency is making your patients hypersensitive, fatigued and depressed/anxious

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All practitioner's have two things in common

- We all have patients who get amazing, life changing, results through our care…..**what do we learn from these?**
- We all have patients who get responses that are……quite good,OK, bit disappointing, meh, or just no response at all - **this an opportunity for learning & improvement**

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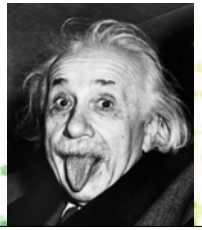
- All patients should benefit from neuromechanical care
- If treatment doesn't sustain or it does and patient still isn't well
  - why ?
  - and what do we do ?
- *"Insanity is doing the same thing over & over again & expecting different results"*



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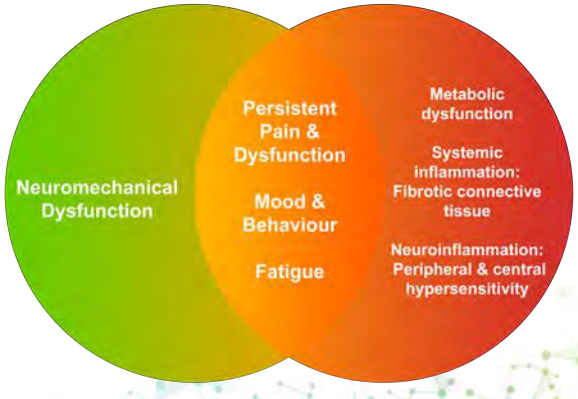
Vitamin D: The Neuromechanical-Metabolic Interface



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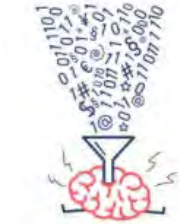
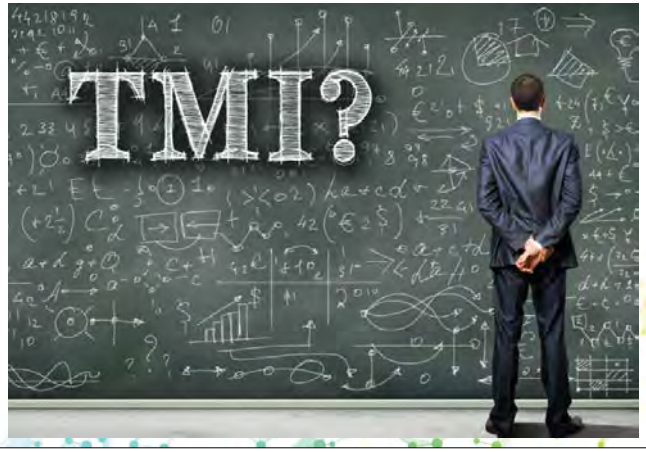
Results not theory

Too many options = overwhelmed

Functional medicine seminar





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Keystone nutrients

- Specific nutrients affecting specific pathways/cycles relevant to neuromechanical practice
- "Bottlenecks"

- "Dominos"

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Factor in

- How common is it low/suboptimal

- Can it be replenished quickly with supplements/foods & maintained

- How fast are the results

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- Vitamin D is in public awareness and you can't get enough from diet- easy sell, good compliance
- Supplements are cheap
- Results within days/weeks
- Great place to start metabolic intervention for practitioners new to nutrition

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Treatment/care goals:

- Neuromechanical intervention to work as expected

  - Sustained ROM increases consistent with remodelling/ healing

  - Sustained drops in pain consistent with remodelling/healing & normal nervous system nociceptive thresholds

- Increase health & wellness

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- Vitamin D deficiency is a common cause of persistent pain & dysfunction mood & behaviour, and fatigue

- Significant % of neuromechanical pain patients are deficient/insufficient in vitamin D - esp **obese, non-caucasian, & elderly**
- 5000iu (125 mcg) daily will correct most adult patients deficiencies, except the obese

NICE National Institute for Health and Care Excellence

Vitamin D deficiency in adults - treatment and prevention

Last revised in September 2018 Next planned review by November 2021

- **Dietary intake of vitamin D.** Advise that:
  - It is important to maintain dietary intake of vitamin D by taking vitamin D supplements, especially during the winter months, as it is difficult to obtain sufficient vitamin D from food sources alone because they are limited.

Test for vitamin D deficiency, by measuring serum 25-hydroxyvitamin D (25[OH]D) levels, if a person presents with the following, especially if they are at higher risk of vitamin D deficiency:

  - Symptoms of osteomalacia, such as:
    - Bone discomfort or pain (often throbbing) in lower back, pelvis, and lower extremities.
    - Impaired physical function.
    - Muscle aches and weakness — this may be marked, is usually most noticeable in the quadriceps and glutei, and can result in difficulty in rising from a seating position, or a waddling gait.
    - Symmetric lower back pain.
  - Chronic widespread pain.

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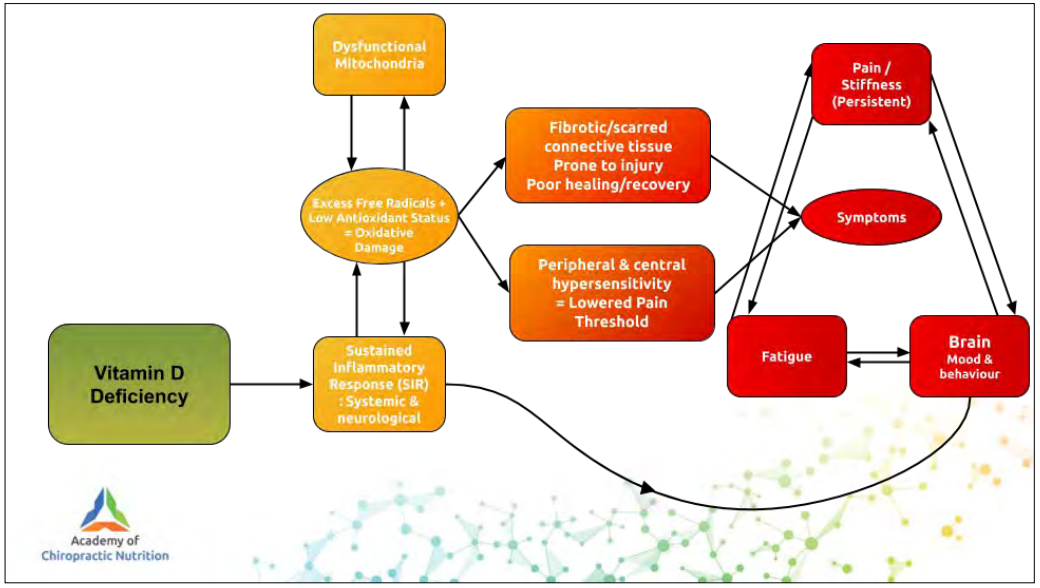

- Immune system & inflammation - 50 % of our ancestors died from infections

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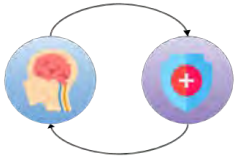
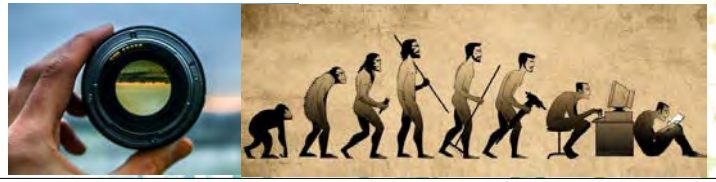
Integrated response between  with a goal of

survival rates.

Prioritise removal of  &/or healing by modified behaviour to facilitate recovery & reduce chances of predatory attack



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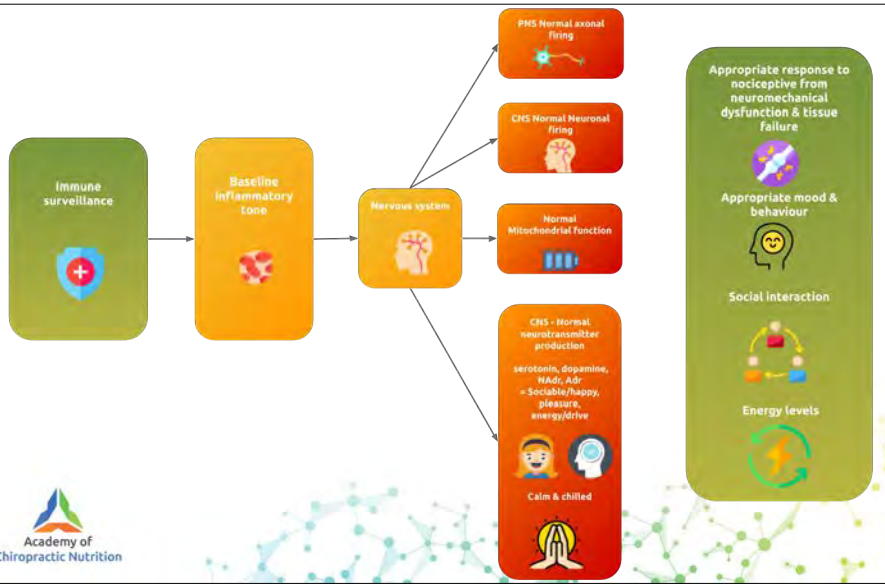

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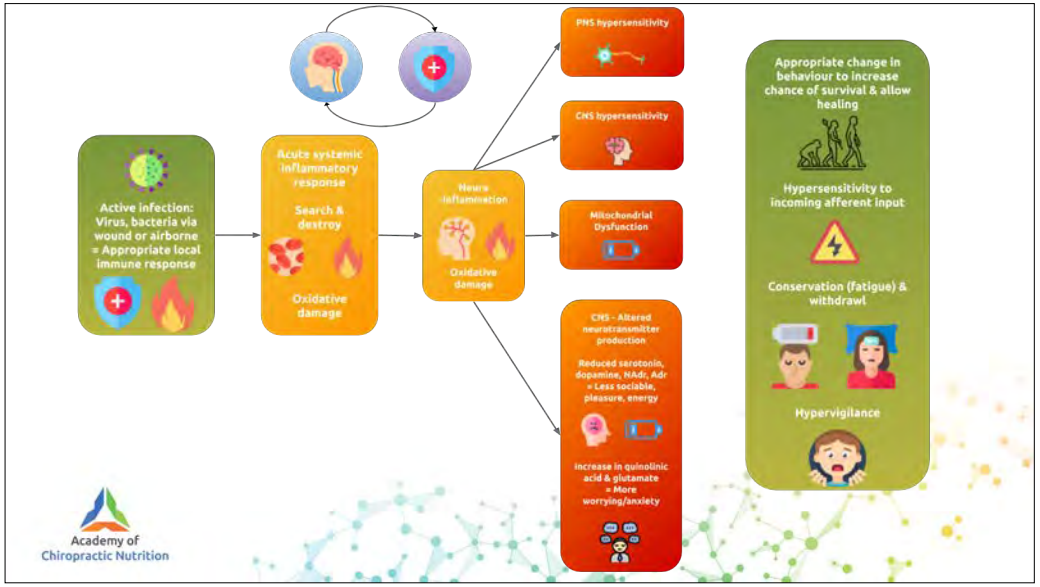

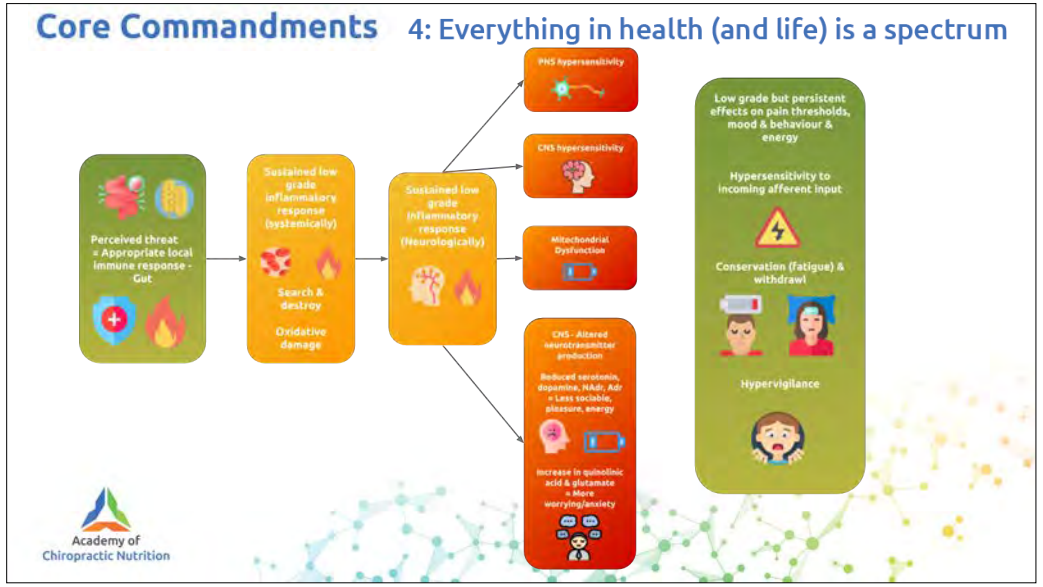

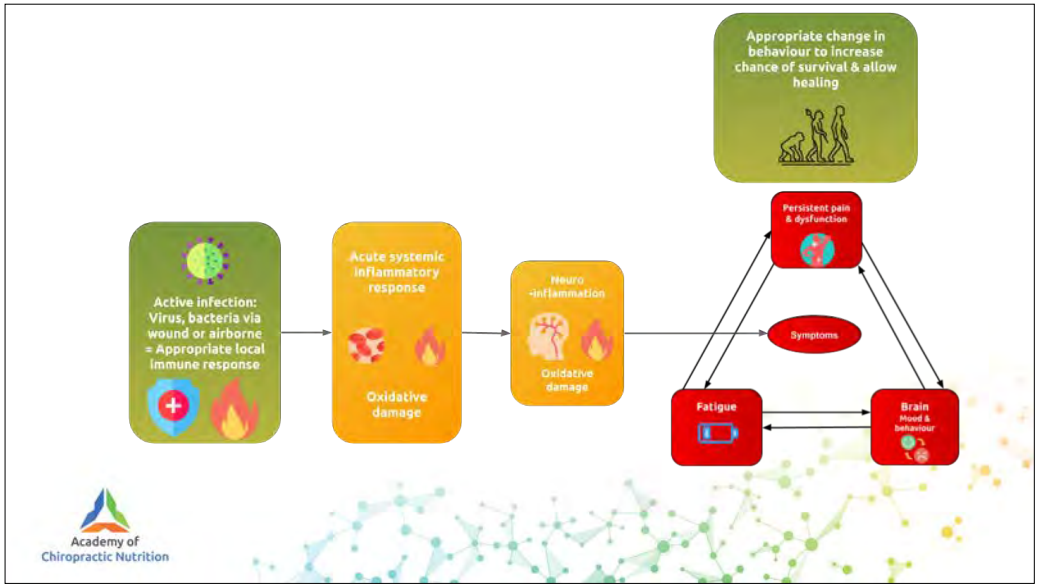

Inflammation-induced hyperalgesia: Effects of timing, dosage, and negative affect on somatic pain sensitivity in human experimental endotoxemia

Brain, Behavior, and Immunity
Volume 41, October 2014, Pages 46-54

Alexander Wegner [a], Sigrid Elsenbruch [b], Janina Maluck [b], Jan-Sebastian Gröpland [b], Harald Engler [b], Marcus Jäger [a], Ingo Spreitzer [a], Manfred Schedlowski [b], Sven Benson [b, c, *]

mediated processes in human pain. In this study, we aimed to analyze dose- and time-dependent effects of lipopolysaccharide (LPS) on clinically-relevant pain models for musculoskeletal and neuropathic pain as well as the interaction among LPS-induced changes in inflammatory markers, pain sensitivity and negative affect.

In this randomized, double-blind, placebo-controlled study, healthy male subjects received an intravenous injection of either a moderate dose of LPS (0.8 ng/kg *Escherichia coli*), low-dose LPS (0.4 ng/kg), or saline (placebo control group). Pressure pain thresholds (PPT), mechanical pain sensitivity (MPS), and cold pain sensitivity (CP) were assessed before and 1, 3, and 6 h post injection to assess time-dependent LPS effects on pain sensitivity. Plasma cytokines (TNF-α, IL-6, IL-8, IL-10) and state anxiety were repeatedly measured before, and 1, 2, 3, 4, and 6 h after injection of LPS or placebo.

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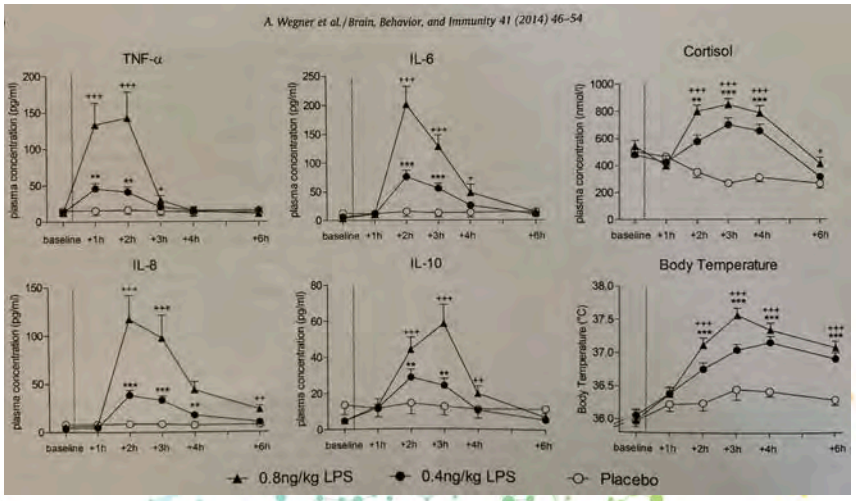

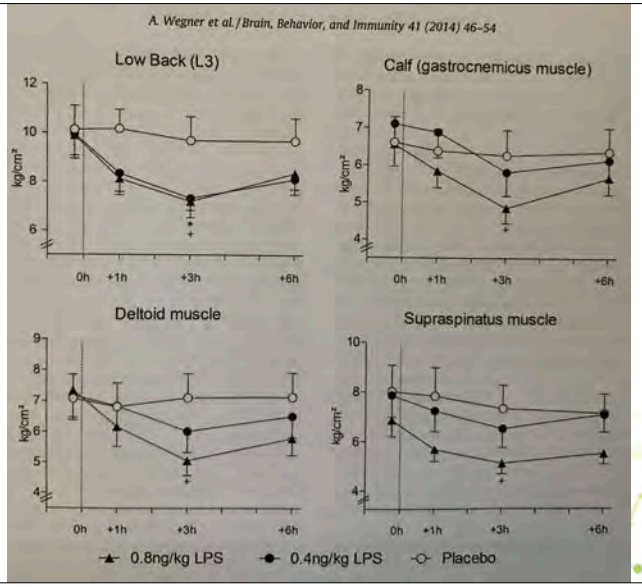

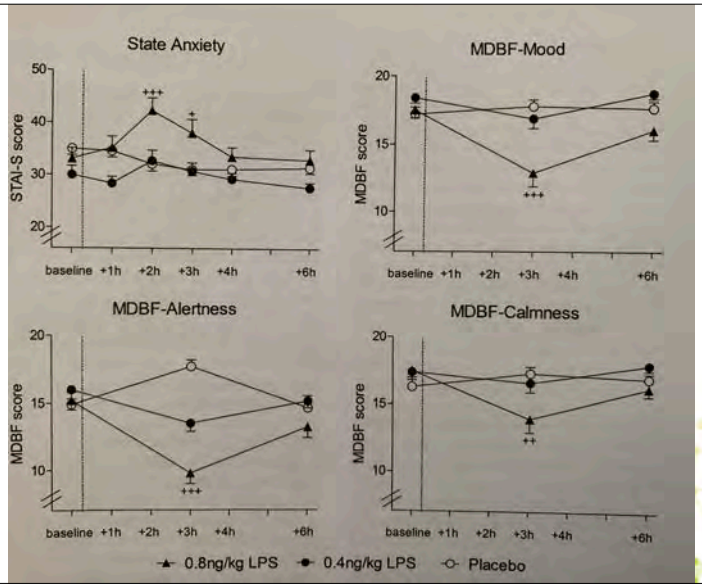

Essential clinical questions

- Is my patient likely to be vitamin D deficient or insufficient ?
- If yes…..
- Is my patients vitamin D deficiency or insufficiency
- directly causing the chief complaint(s) - allodynia

- Is my patients vitamin D deficiency or insufficiency
- - contributing to a dysfunctional metabolic system which is creating a sustained inflammatory response & hypersensitivity within the PNS/CNS (lowered pain threshold)
- - effectively **highlighting/exaggerating *latent neuromechanical dysfunction &/or connective tissue failure***

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Vitamin D - NHS / Standard Medical Model nmol/L

0 - 25	25 - 50	50 - 250	> 250
Gross / Severely Deficient	Deficient	Adequate / Normal	Toxic

Vitamin D Functional Ranges nmol/L

0 - 25	25 - 50	50 - 85	100 - 225	225	> 250
Gross / Severely Deficient	Deficient	Insufficient	Optimal		Excessive

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Common Symptoms /Signs
< 25 nmol/L - Gross deficiency

- Always Symptomatic – severity varies
- Muscle pain and stiffness – Broad areas
- Pain: dull ache – local lumbar spine or generalised spine and bilateral extremities
- Fatigued – often very severely
- Very weak (Muscle testing – globally weak)
- Low mood/Depression, behaviour issues
- Previous non-response to other Rx





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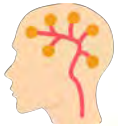
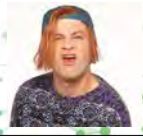
<25 nmol/L – Common Dx

- Fibromyalgia
- CFS
- “Depression” “anxiety”
- *“all in my head”* aka central hypersensitivity
- Growing pains in children
- Failure to thrive, developmental delay
- Grumpy teenager

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International Journal of Rheumatic Diseases
International Journal of Rheumatic Diseases 2016; 19: 1255–1262

Efficacy of vitamin D replacement therapy on patients with chronic nonspecific widespread musculoskeletal pain with vitamin D deficiency

Ramazan YILMAZ,[1] Ali SALLI,[2] Havva Turac CINGOZ,[3] Sami KUCUKSEN[2] and Hatice UGURLU[2]

Abstract

Aim: The objective of this study is the evaluation of the effect of vitamin D replacement treatment on musculoskeletal symptoms and quality of life in patients with chronic widespread musculoskeletal pain (CWP) including fibromyalgia (FM) and vitamin D deficiency.

7100 iu daily

62 nmol/L

Method: Patients with nonspecific CWP and vitamin D deficiency (25-OH D3 < 25 ng/mL) were included into the study. Replacement treatments of 50 000 IU/week oral vitamin D3 for 3 months were given to the patients. Patients were assessed pre- and post-treatment in terms of serum levels of Ca, P, alkaline phosphatase, 25-OH D3, severity of pain (visual analogue scale [VAS]-pain), severity of asthenia (VAS-asthenia), Beck Depression Inventory (BDI), quality of life scale (Short Form [SF]-36), tender point count (TPC), severity of waking unrefreshed, headache, tenderness on tibia, meeting the criteria of FM, and level of patient satisfaction.

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Table 2 Pre- and post-treatment comparison of assessment parameters ($n = 58$)

	Pre-treatment	Post-treatment	P
Ca (8.4–10.2 mg/dL)†	9.3 ± 0.4	9.4 ± 0.3	0.78
P (2.3–4.7 mg/dL)†	3.6 ± 0.6	3.6 ± 0.6	0.89
ALP (40–150 U/L)†	59.1 ± 16.3	54.0 ± 14.4	< 0.001*
25-OH D3 (ng/mL)	10.6 ± 5.1	46.5 ± 24.0	< 0.001*
VAS-pain	7.4 ± 1.4	3.9 ± 2.3	< 0.001*
VAS-asthenia	7.3 ± 1.6	4.2 ± 2.6	< 0.001*
Tender point count	10.4 ± 5.2	7.5 ± 5.4	< 0.001*
Severity of waking unrefreshed	2.3 ± 0.8	1.2 ± 1.1	< 0.001*
Beck Depression Inventory	19.7 ± 8.8	12.7 ± 7.5	< 0.001*
SF-36 Physical function	51.6 ± 22.8	66.0 ± 23.6	< 0.001*
SF-36 Limitation of physical role	21.6 ± 34.0	53.5 ± 39.7	< 0.001*
SF-36 Bodily pain	30.0 ± 13.3	51.2 ± 19.7	< 0.001*
SF-36 Perception of general health	41.5 ± 23.4	52.1 ± 23.1	< 0.001*
SF-36 Vitality	26.4 ± 15.4	46.8 ± 21.6	< 0.001*
SF-36 Social function	47.6 ± 23.4	64.2 ± 22.1	< 0.001*
SF-36 Limitation of emotional role	25.9 ± 36.4	51.5 ± 39.0	< 0.001*
SF-36 Mental health	43.3 ± 16.8	57.4 ± 19.1	< 0.001*

ALP, alkaline phosphatase; VAS, visual analogue scale. †Normal reference range. *Statistically significant.

47% in pain in 3 months

35% reduction in depression

77% increase in vitality

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Common symptoms 25-50 nmol/L -Deficient

- Usually symptomatic but on a more subtle level - awareness varies
- Low grade aches and pain – broad, non-specific
- Low pain threshold highlights/exaggerates local neuromechanical issues, thus presenting as regional mechanical pain (beware treatment results plateauing….)
- Fatigue and mood issues: Mild-moderate
- Previous partial response to rx - plateaued and effects easily lost

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Case Study: Persistent low back pain

- Russell 47 yo male Aug 2008, 3 yr hx CLBP, neck pain p-n bilateral hands (4-5th digits) EXAM: S scoliosis, neuro NAD, X-rays: Mod DDD/DJD Lower Lx, C6-7
- 8 Rx, good improvement of function noted, mild symptom changes (5/10 Av pain, p-n in hands 20% better)
- Advised pilates/home rehab, continue care, less frequent intervals, 8 treatments over 4 months
- Significant improvement in function, but symptoms remain static

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Case Study: CLBP

- Relies on NSAID's/tramadol every 4 hours
- Referred back to GP for CRP, B12 (vegetarian) and vitamin D, Inflammatory arthropathy ?
- Jan 2009 vitamin D = 35.5 nmol/L
- Corrected calcium 2.29 nmol/L (2.15-2.60)
- CRP <1
- B12 140 ng/L (NHS <130 deficient, 130-160 indeterminate value), >160 normal

- GP Rx: 800iu vit d with calcium carbonate
- B12 injections 1000mcg hydroxocobalamin

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Case study: CLBP

- Patient agreed to take 5000iu daily
- Aug 2009- Pain free (still having monthly B12 injections)
- Oct 2009, B12 now only every 3 months low grade LBP returned
- Recommended 1000mcg daily B12 sublingual Methylcobalamin
- Dec 2009 Pain free (starts sublingual B12 one month after injection)
- Follow up blood tests: Vit D 232 nmol/L
- B12 140 > 646ng/L

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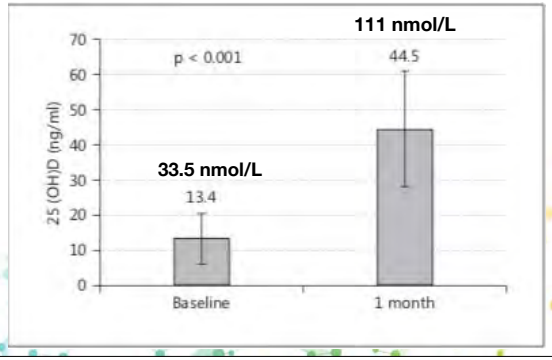
Original Paper

Med Princ Pract 2015;24:332–338
DOI: 10.1159/000431035

Aysel Vehapoglu[a] Ozden Turel[a] Serdar Turkmen[b] Berrin Belcik Inal[c]
Turgut Aksoy[c] Gamze Ozgurhan[d] Murat Ersoy[c]

Are Growing Pains Related to Vitamin D Deficiency? Efficacy of Vitamin D Therapy for Resolution of Symptoms

<6 yo 150,000 iu
>6 yo 300,000 iu



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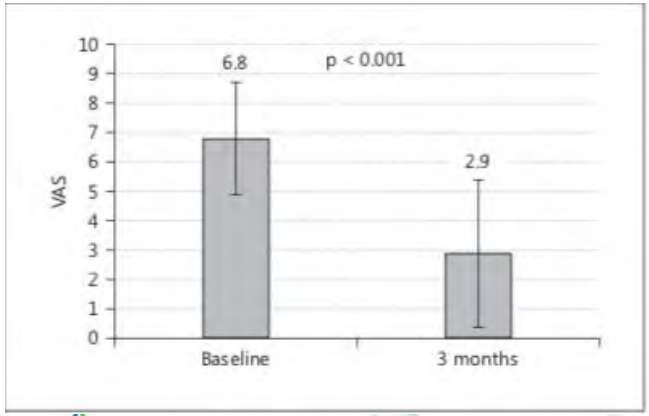

57% reduction

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Case Study: Diffuse pain/fatigue

- Ben 12 yo boy, Feb 2013 ,generalised muscle and joint pain (knees, feet/ ankle, LBP, neck), very fatigued
- Fractured ankle March 2011, 6 weeks cast, didn't heal
- Splint 4 weeks, US showed signs of healing
- Jan 2012: Paeds consultant ref on-going pain, bloods NAD
- Dx: Flat feet
- Rx with a DC and DO

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Case study

- Exam :
- Beighton 7/9
- Very flat feet
- Very weak on muscle testing
- Vitamin D test ordered

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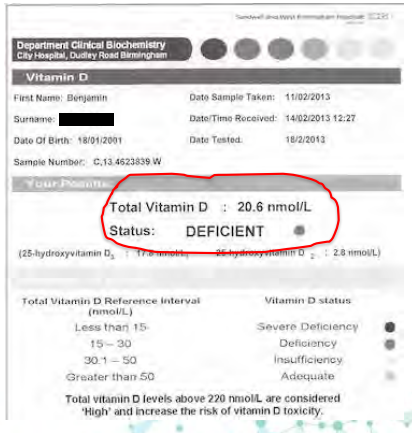
Department Clinical Biochemistry
City Hospital, Dudley Road Birmingham

Vitamin D

First Name: Benjamin
Surname: [redacted]
Date Of Birth: 18/01/2001
Sample Number: C,13.4623839.W
Date Sample Taken: 11/02/2013
Date/Time Received: 14/02/2013 12:27
Date Tested: 18/2/2013

Total Vitamin D : 20.6 nmol/L
Status: DEFICIENT

(25-hydroxyvitamin D_3 : 17.6 nmol/L 25-hydroxyvitamin D_2 : 2.8 nmol/L)

Total Vitamin D Reference Interval (nmol/L)	Vitamin D status
Less than 15	Severe Deficiency
15 – 30	Deficiency
30.1 – 50	Insufficiency
Greater than 50	Adequate

Total vitamin D levels above 220 nmol/L are considered 'High' and increase the risk of vitamin D toxicity.

50,000 iu loading dose,
5,000 iu daily thereafter

Subsequently added 450mg Mg citrate

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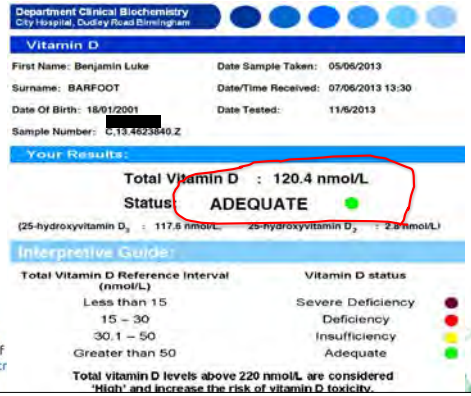
- Rx: SMT, SOT/Cranial, IASTM, home rehab, orthotics,
- June 2013: Excellent clinical changes


Department Clinical Biochemistry
City Hospital, Dudley Road Birmingham

Vitamin D

First Name: Benjamin Luke
Surname: BARFOOT
Date Of Birth: 18/01/2001
Sample Number: [redacted]
Date Sample Taken: 05/06/2013
Date/Time Received: 07/06/2013 13:30
Date Tested: 11/6/2013

Your Results:

Total Vitamin D : 120.4 nmol/L
Status: ADEQUATE

(25-hydroxyvitamin D_3 : 117.6 nmol/L 25-hydroxyvitamin D_2 : 2.8 nmol/L)

Interpretive Guide:

Total Vitamin D Reference Interval (nmol/L)	Vitamin D status
Less than 15	Severe Deficiency
15 – 30	Deficiency
30.1 – 50	Insufficiency
Greater than 50	Adequate

Total vitamin D levels above 220 nmol/L are considered 'High' and increase the risk of vitamin D toxicity.

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- December 2013: Achy LB, knees, poor sleep
- Stopped vitamin D in Oct 2013……..

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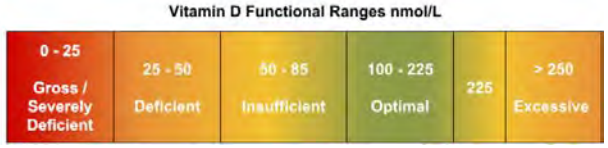
Blood levels >50 nmol/L



50-85 nmol/L – Reported as adequate, aka "*normal*"

- Always get patient to obtain copies of GP notes

Functionally: 50-85 nmol/L = **Insufficient** - not recognised by most mainstream labs

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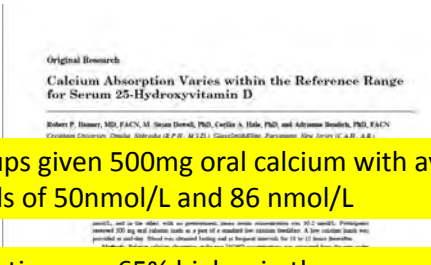
Original Research

Calcium Absorption Varies within the Reference Range for Serum 25-Hydroxyvitamin D

2 Groups given 500mg oral calcium with average vitamin D levels of 50nmol/L and 86 nmol/L

Absorption was 65% higher in the group averaging 86.5nmol/L

Conclusions: Patients with "normal" vitamin D levels are not getting the full benefit from their calcium intake

"We conclude that the reference range is set too low"

Heaney RP et al JACN Vol 22, No 2, 142-146 (2003)

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Blood levels 50-85 nmol/L

- Not usually symptomatic unless they have a defect in the vitamin D receptor (VDR) – thus need higher doses for the normal physiological response

VDR	Taq1	+/-
VDR	Bsm1	+/-

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Pain, depression

- David 67 yo, 3 year Hx of severe muscle & joint pain, severe fatigue & weakness, came on after radiotherapy prostate cancer
- Unable to do normal ADL's, cant walk up stairs, effectively disabled
- GP Dx: OA
- 1300 iu vitamin D (325 % above RDA-400iu)
- Vitamin D levels 55 nmol/L

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- Rx: 5000 iu daily vitamin D
- Within 3 days walking up stairs
- 2 months later, walking up to 4 miles
- Via blood testing now takes 7000iu daily
- 209 nmol/L

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Optimal levels ?

- 100-200 nmol/L
- Mimics natural endogenous production with sun
- Epidemiological & some RCT's to suggest 100 -200 nmol/L significantly reduces cancer, MI, stroke, MS and mortality in general

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Vitamin D supplementation, 25-hydroxyvitamin D concentrations, and safety[1,2]

Reinhold Vieth

ABSTRACT

Vitamin D levels whilst living in sun-rich conditions

TABLE 1
25-Hydroxyvitamin [25(OH)D] concentrations under sun-rich living conditions

Reference, year, and subjects	Location	25(OH)D
		nmol/L
Haddock et al (23), 1982	Puerto Rico	
Hospital personnel (n = 26)		105
Farmers (n = 18)		135
Haddad and Kyung (24), 1971	St Louis	
Lifeguards (n = 9)		163
Better et al (25), 1980	Israel	
Lifeguards (n = 34)		148

INTRODUCTION

Vieth R AJCN 1999;69:842-56

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Measuring Vitamin D

- Always measure the inactive form 25(OH)D3

Home finger prick test
www.vitamindtest.org.uk
£29
NOTE: Labs reference ranges are set far too low, advice patient to bring in results, use ACN functional range chart

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Vitamin D personalised dosing

Recommended Range: 125-175 nmol/L

Average intake observed to produce noted serum levels in adults of 68kg average weight.

- Obtain blood level - via GP or private test
- Choose optimal level
- Take corresponding dose for 3 months
- Re-test

***Note:** For obese individuals, 4-5 stones overweight double the stated dose*

Average change in serum levels based on intake (IU/day)

Expected level nmol/L

Current level nmol/L	50	75	100	125	150	175
25	1000	2200	3600	5300	7400	10100
37	500	1700	3200	4900	7000	9700
50		1200	2600	4300	6400	9100
62		600	2000	3700	5800	8600
75			1400	3100	5200	7900
87			800	2500	4600	7300
100				1700	3800	6500
112				900	3000	5700
125					2100	4800
150						2700

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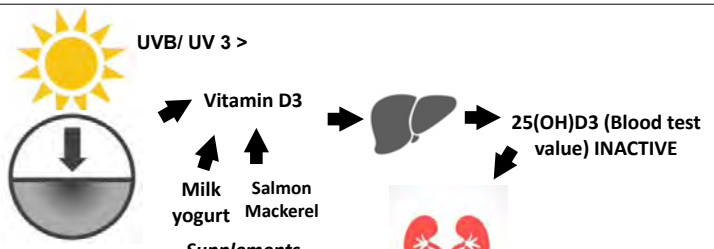

Calcium, Muscle
And Bone Health
Regulation PTH production

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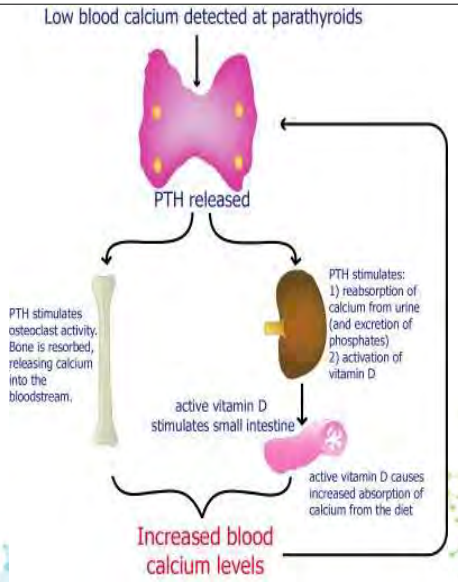

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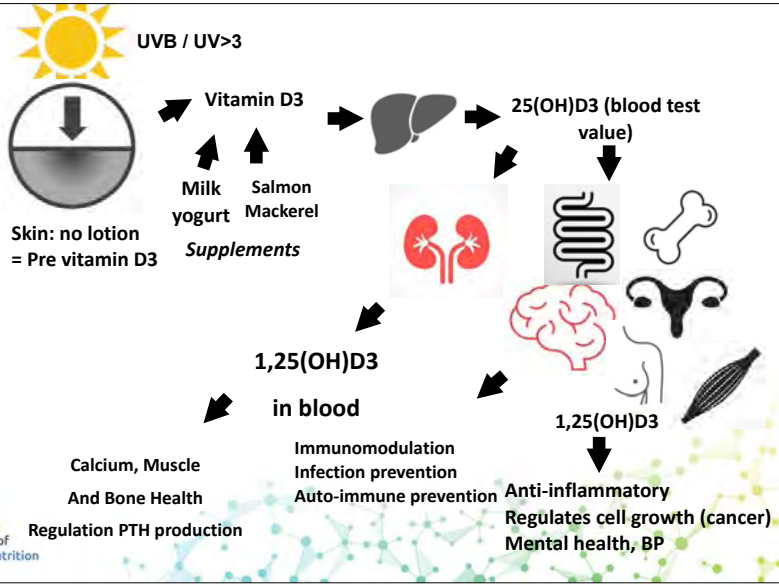

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thebmj

Research

Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data

BMJ 2017 ; 356 doi: https://doi.org/10.1136/bmj.i6583 (Published 15 February 2017)
Cite this as: *BMJ* 2017;356:i6583

Results 25 eligible randomised controlled trials (total 11 321 participants, aged 0 to 95 years) were identified. IPD were obtained for 10 933 (96.6%) participants. Vitamin D supplementation reduced the risk of acute respiratory tract infection among all participants (adjusted odds ratio 0.88, 95% confidence

Conclusions Vitamin D supplementation was safe and it protected against acute respiratory tract infection overall. Patients who were very vitamin D deficient and those not receiving bolus doses experienced the most benefit.

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Review

Open Access **Virology Journal**

On the epidemiology of influenza

John J Cannell*[1], Michael Zasloff[2], Cedric F Garland[3], Robert Scragg[4] and Edward Giovannucci[5]

Abstract

The epidemiology of influenza swarms with incongruities, incongruities exhaustively detailed by the late British epidemiologist, Edgar Hope-Simpson. He was the first to propose a parsimonious theory explaining why influenza is, as Gregg said, "seemingly unmindful of traditional infectious disease behavioral patterns." Recent discoveries indicate vitamin D upregulates the endogenous antibiotics of innate immunity and suggest that the incongruities explored by Hope-Simpson may be secondary to the epidemiology of vitamin D deficiency. We identify – and attempt to explain – nine influenza conundrums: (1) Why is influenza both seasonal and ubiquitous and where is the virus between epidemics? (2) Why are the epidemics so explosive? (3) Why do they end so abruptly? (4) What explains the frequent coincidental timing of epidemics in countries of similar latitude? (5) Why is the serial interval obscure? (6) Why is the secondary attack rate so low? (7) Why did epidemics in previous ages spread so rapidly, despite the lack of modern transport? (8) Why does experimental inoculation of seronegative humans fail to cause illness in all the volunteers? (9) Why has influenza mortality of the aged not declined as their vaccination rates increased? We review recent discoveries about vitamin D's effects on innate immunity, human studies attempting sick-to-well transmission, naturalistic reports of human transmission, studies of serial interval, secondary attack rates, and relevant animal studies. We hypothesize that two factors explain the nine conundrums: vitamin D's seasonal and population effects on innate immunity, and the presence of a subpopulation of "good infectors." If true, our revision of Edgar Hope-Simpson's theory has profound implications for the prevention of influenza.

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Skin production

- UVB - UV3 and above – No lotion: April to Sept, 11am-3pm potential production
- Rule of thumb
  - Shadow shorter than you = Vitamin D
  - Shadow longer than you = No vitamin D production

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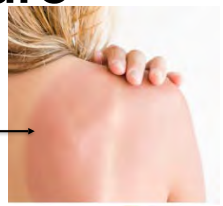
Sun exposure



- 1 MED

(Minimal Erythermal Dose)

up to 20,000 iu produced within 30 minutes

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Aim for 1/3 -1/2 MED – Must not burn !!

Minimum 25% body skin on show, usually face, arms and legs

10-30 minutes
(varies with skin tone)

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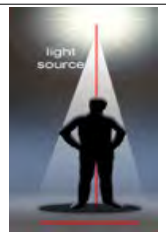

March/April – Sept/Oct
11am – 3pm

No lotion:
- SPF 30 and above blocks 99% of all vitamin D production

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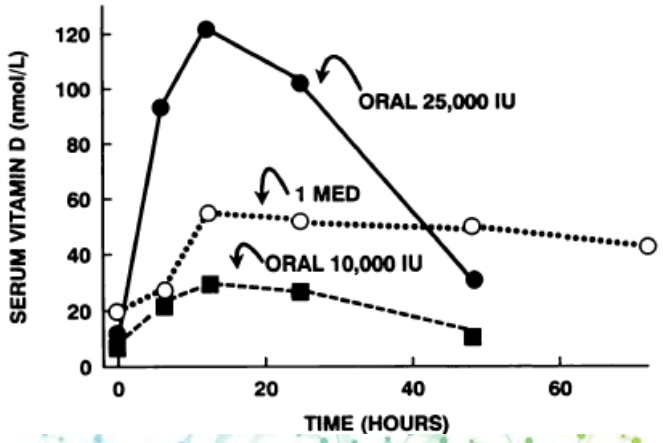
RDA/NRV 200 IU



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Some patients just can't accept it

Most important thing is not to burn
Simply supplement all year round

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Essential clinical questions

- Is my patient vitamin D deficient or insufficient ?
- Consider:

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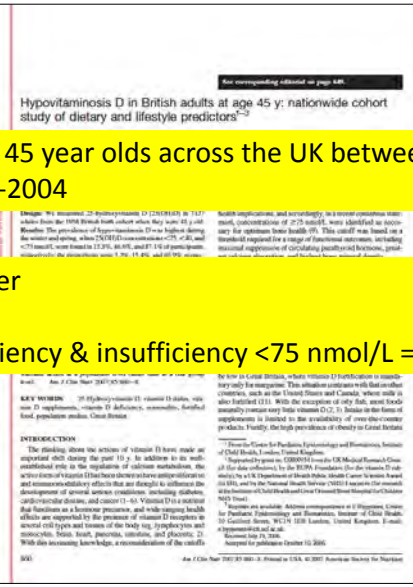

Hypovitaminosis D in British adults at age 45 y: nationwide cohort study of dietary and lifestyle predictors

7437 45 year olds across the UK between 2002-2004

Winter

Deficiency & insufficiency <75 nmol/L = 87 %

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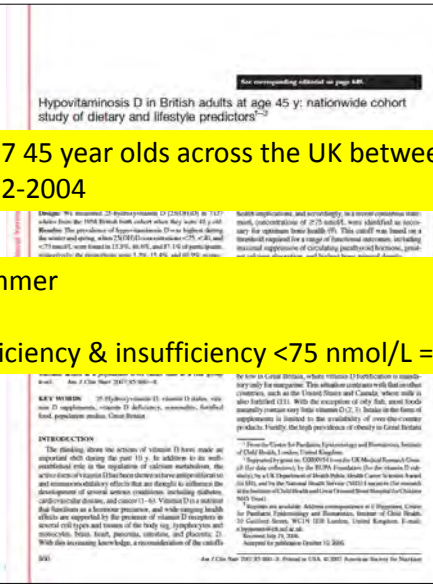

Hypovitaminosis D in British adults at age 45 y: nationwide cohort study of dietary and lifestyle predictors

7437 45 year olds across the UK between 2002-2004

Summer

Deficiency & insufficiency <75 nmol/L = 60 %

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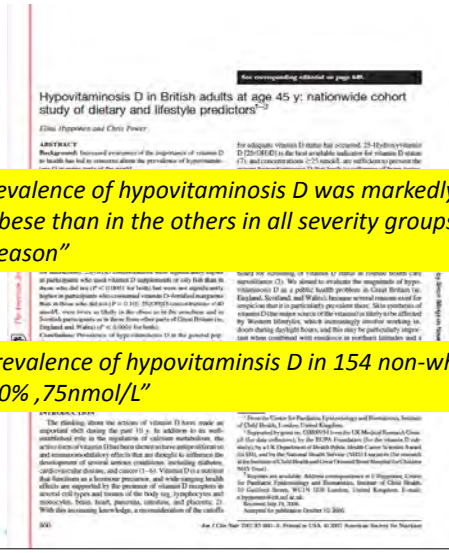

Hypovitaminosis D in British adults at age 45 y: nationwide cohort study of dietary and lifestyle predictors[1–3]

"The prevalence of hypovitaminosis D was markedly higher in the obese than in the others in all severity groups and regardless of the season"

"The prevalence of hypovitaminsis D in 154 non-whites in the cohort was 100% ,75nmol/L"

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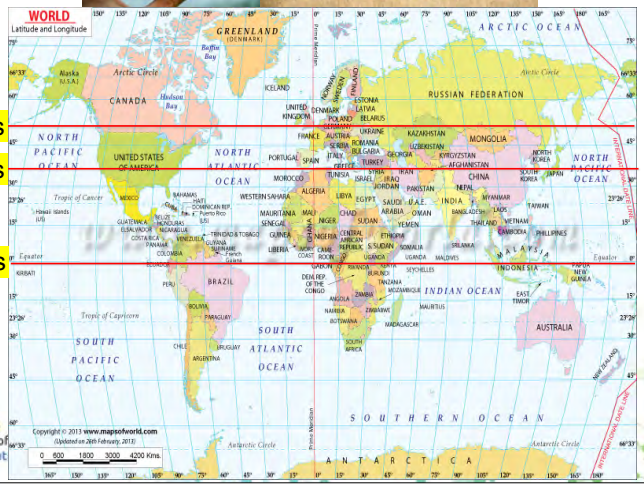

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- Less skin production ability (& less sun time/exposure)

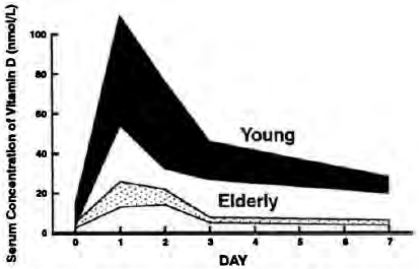

FIGURE 3. Circulating concentrations of vitamin D in response to a whole-body exposure to one minimal erythemal dose in healthy young and elderly subjects. Reproduced with permission (11).

- vitamin D is fat soluble and so is stored in adipose tissue

Essential Clinical Question

- Is my patients vitamin D deficiency or insufficiency
  - directly causing the chief complaint(s)

- **Restore vitamin D levels and assess response**

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Essential Clinical Question

- Is my patients vitamin D deficiency or insufficiency contributing to a dysfunctional metabolic system which is creating an **Sustained Inflammatory Response (SIR)** and **nerve hypersensitivity (lower pain threshold)**, effectively **highlighting/exaggerating neuromechanical dysfunction &/ or connective tissue failure**

- **Restore vitamin D levels and assess response**

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Empirical dosing – No blood test

- **DO IT ON FIRST VISIT**: Days/Weeks for Sx change
- Majority 5000 iu (125mcg) daily for adult patients
- NRV(RDA) = 200 iu (5 mcg)

- Severe Symptoms
- Consider loading dose 100,000 iu
- 10,000iu daily for 1 month, then reduce to 5000iu

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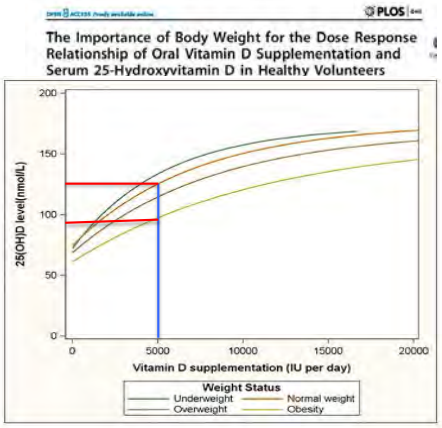

Obesity and dosing

vitamin D supplementation. We recommend vitamin D supplementation be 2 to 3 times higher for obese subjects and 1.5 times higher for overweight subjects relative to normal weight subjects. This observational study provides body weight specific recommendations to achieve 25(OH)D targets.

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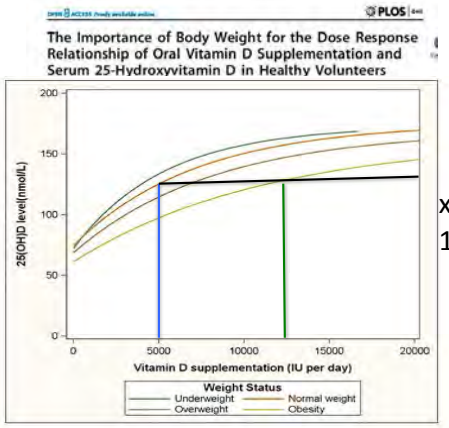
Ekwaru JP et al PLOS ONE Nov 2014 Vol 9 issue 11 FREE DOWNLOAD



x2.5 higher dose to achieve 125 nmol/L

vitamin D supplementation. We recommend vitamin D supplementation be 2 to 3 times higher for obese subjects and 1.5 times higher for overweight subjects relative to normal weight subjects. This observational study provides body weight specific recommendations to achieve 25(OH)D targets.

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Ekwaru JP et al PLOS ONE Nov 2014 Vol 9 issue 11 FREE DOWNLOAD

Obese 3 stones overweight: Add 50%

7-8000iu / 175mcg

More than 5 stones overweight

10,000iu / 250 mcg

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Poor compliance



Do weekly doses

i.e. 5000 iu x7 = 35,000 iu once a week for adults

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Malabsorption issues



- gastric surgery, PPI's, IBD (crohns disease etc), "IBS"
- Sublingual tablets available – dissolve between cheek and gum

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Easy mistake to make

- "I already take vitamin D" - assumption of therapeutic dose
- On its own?
- part of multi ?
- Where did they buy it ?

Tesco Multiplus Men X 30

5.0µg (100%NRV)

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Vitamin D personalised dosing

Recommended Range: 125-175 nmol/L

Average intake observed to produce noted serum levels in adults of 68kg average weight.

- Obtain blood level - via GP or private test
- Choose optimal level
- Take corresponding dose for 3 months
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***Note:** For obese individuals, 4-5 stones overweight double the stated dose*

Average change in serum levels based on intake (IU/day)

Expected level nmol/L

Current level nmol/L	50	75	100	125	150	175
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87			800	2500	4600	7300
100				1700	3800	6500
112				900	3000	5700
125					2100	4800
150						2700

Vitamin D Safety: Medical hysteria

Fat soluble so can build up in the body

Vitamin D is none toxic, but can lead to HYPERCALCEMIA

No link with kidney stones

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Vieth R AJCN 1999;69:842-56

Hypercalcemia, hypercalciuria, and kidney stones in long-term studies of vitamin D supplementation: a systematic review and meta-analysis[1,2]

*Zarintaj Malihi, Zhenqiang Wu, Alistair W Stewart, Carlene MM Lawes, and Robert Scragg**

School of Population Health, University of Auckland, Auckland, New Zealand

ABSTRACT

Background: Vitamin D supplementation is increasingly being used in higher doses in randomized controlled trials (RCTs). However, adverse events from very large annual doses of vitamin D have been shown in 2 RCTs, whereas in a third RCT, low-dose vitamin D, with calcium supplements, was shown to increase kidney stone risk.

Objective: We analyzed the side effects related to calcium metabolism in RCTs, specifically hypercalcemia, hypercalciuria, and kidney stones, in participants who were given vitamin D supplements for [illegible]

Design: [illegible] reviewed 30 studies [illegible]

Results: A total of 48 studies with 19,833 participants were identified, which reported ≥1 of the following side effects: hypercalcemia, hypercalciuria, or kidney stones. Of these studies, kidney stones were reported in only 9 trials with a tendency for fewer subjects reporting stones in the vitamin D arm than in the placebo arm (RR: 0.66; 95% CI: 0.41, 1.09; $P = 0.10$). In 37 studies, hypercalcemia was shown with increased risk shown for the vitamin D group (RR: 1.54; 95% CI: 1.09, 2.18; $P = 0.01$). Similar increased risk of hypercalciuria was shown in 14 studies for the vitamin D group (RR: 1.64; 95% CI: 1.06, 2.53; $P = 0.03$). In subgroup analyses, it was shown that the effect of vitamin D supplementation on risk of hypercalcemia, hypercalciuria, or kidney stones was not [illegible]

Keywords: hypercalcemia, hypercalciuria, kidney stones, randomized controlled trials, vitamin D supplements

INTRODUCTION

The 2 sources of vitamin D are from the diet (either from food or supplements) or sun exposure (1). Humans have developed a homeostatic mechanism that prevents vitamin D intoxication from sun exposure through the conversion of pre–vitamin D to non–vitamin D photoproducts such as lumisterol or tachysterol (2). However, this protective mechanism does not apply to dietary vitamin D as has been evidenced by side effects that result from the ingestion of very large pharmacologic doses (3). Thus, safety is an issue that is related to vitamin D supplementation, which has been made more relevant by several recent, large randomized controlled trials (RCTs) of vitamin D supplementation (4, 5).

The safety of vitamin D supplements has been examined in [illegible] reviewed 30 studies [illegible] and can improve the serum vitamin D status in the short term (10). In contrast, 2 recent Cochrane meta-analyses of RCTs of vitamin D supplementation (including active analogs) showed that vitamin D supplementation increased risk of hypercalcemia and, when combined with calcium supplements, also increased risk of nephrolithiasis or renal insufficiency (7, 8). An additional Cochrane review of RCTs of vitamin D supplementation in relation to cancer prevention did not find increased risk for hypercalcemia, but there was increased risk for kidney stones (9).

These meta-analyses were restricted to studies that reported outcomes either of mortality (8), fractures (7), or cancer (9) and did not select studies on the basis of the outcomes that are related

[illegible] Supported the University of Auckland (doctoral scholarship; to ZM) and by the China Scholarship Council (state scholarship fund; to ZW).

[illegible] Supplemental Table 1 and Supplemental Figures 1–5 are available from the "Online Supporting Material" link in the online posting of the article and from the same link in the online table of contents at http://ajcn.nutrition.org.

* To whom correspondence should be addressed. E-mail: r.scragg@auckland.ac.nz.

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First published online September 7, 2016; doi: 10.3945/ajcn.116.134981.

48 studies with 19,833 patients

...vitamin D supplementation did not increase risk of kidney stones

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Vitamin D safety

Published reports for which the dose is known all involve intakes of over 40,000 iu daily

No toxicity reported with blood levels under 500 nmol/L

10,000 iu long term shown safe

Vitamin D supplementation, 25-hydroxyvitamin D concentrations, and safety[1,2]

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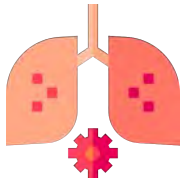
Vieth R AJCN 1999;69:842-56

Contraindications



Sarcoidosis

Associated with elevated blood calcium levels

Leave management to GP or test and refer

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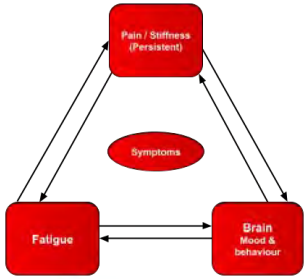
Clinical Implementation

symptoms, response to previous treatment
+ risk factors



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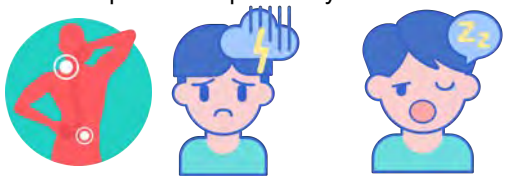
- Vitamin D deficiency is a common cause of persistent pain & dysfunction mood & behaviour, and fatigue



- Significant % of neuromechanical pain patients are deficient/insufficient in vitamin D - esp **obese, non-caucasian, & elderly**
- 5000iu (125 mcg) daily will correct most adult patients deficiencies, except the obese

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https://www.academyofchiropracticnutrition.com/APM
Free weekly insights newsletter
Plus vitamin D symptom & dosing chart
Vitamin D video on mechanisms behind vitamin D symptoms
plus pregnancy & breastfeeding

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