Vitamin D and Tuberculosis

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probably the only remedial agent by which the vital powers may be enabled to struggle successfully against that malady.

**Figure 21**—Heliotherapy ward, Fitzsimons General Hospital, Denver, Colo. (Courtesy of National Library of Medicine.)

- Newham
- Brent
- London

Rate (per 100,000)

Source: Tuberculosis Section, Health Protection Agency Centre for Infections, London

TB incidence in south Asians, 2000:
immunodeficiency of recent migration?

- E/W/NI Born UK
- E/W/NI Born S Asia
- E/W/NI Born S Asia, in UK<5 yr
- Bangladesh
- India
- Pakistan
- Sri Lanka

Rate (per 100,000)


Fig. 7. Serum 25-hydroxy-vitamin D concentrations of 24 recently arrived Pakistani Asians, plotted on a logarithmic scale as a function of the time (in months) since their arrival in the United Kingdom. The solid line is the calculated regression line for the readings during the first year.
Serum 25-hydroxy-vitamin D ≤10 nmol/l:

TB patients: 69/103 (67%)
Controls: 11/42 (26%)
Odds ratio: 2.9 (95% CI: 1.3 – 6.5)

TB contacts

Randomise

Vitamin D

Placebo

Follow-up

Compare TB incidence*

*n=13,866 to demonstrate 20% difference between groups

TB contacts

Randomise

Vitamin D

Placebo

Follow-up

Compare immune response
Measuring immune response

<table>
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<tr>
<th>0 hours</th>
<th>24 hours</th>
<th>Luminescence ratio</th>
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Study participants (n=202)

- 107 male
- Aged 18-100 years (median 34 years)
- Ethnic group:
  - 140 south Asian
  - 29 black African
  - 22 white
  - 11 other/mixed
Baseline vitamin D status

- 89/202 profoundly deficient
- 83/202 insufficient
- 30/202 sufficient

Serum 25(OH)-vitamin D by diet

- 34/59 deficient
- 52/140 deficient

p=0.008, $\chi^2$ test

Martineau et al. Am J Respir Crit Care Med 2007; 176: 208-13
Serum 25(OH)-vitamin D by season

- November-April: 59/114 deficient
- May-October: 29/87 deficient

$p=0.009$, $\chi^2$ test

Martineau et al. Am J Respir Crit Care Med 2007; 176: 208-13

Serum 25(OH)-vitamin D by ethnic group

- Black African: 15/28 deficient
- South Asian: 69/139 deficient
- White: 3/23 deficient

$p=0.003$, $\chi^2$ test

Martineau et al. Am J Respir Crit Care Med 2007; 176: 208-13
Follow-up serum 25(OH)-vitamin D

Martineau et al. Am J Respir Crit Care Med 2007; 176: 208-13

Follow-up luminescence ratios

Martineau et al. Am J Respir Crit Care Med 2007; 176: 208-13
Vitamin D signalling
Vitamin D ‘switches on’ production of cathelicidin LL-37 in white blood cells

Control

Vitamin D


Cathelicidin LL-37 restricts growth of M. tuberculosis in broth

Vitamin D and TB

- Vitamin D deficiency is very common among TB contacts and TB patients in the UK
- A single oral bolus of 2.5 mg vitamin D corrects vitamin D deficiency in TB contacts and boosts immunity to mycobacteria
- Vitamin D supplementation may have a role in the prevention of TB, or as an adjunct to standard antibiotic treatment
REVIEW

Fracture Prevention With Vitamin D Supplementation
A Meta-analysis of Randomized Controlled Trials

http://www.healthresearchforum.org.uk/
Strategies to improve the vitamin D status of the UK population

- Supplementation
- Fortification
- Sunbathing