INTRODUCTION TO VITAMIN D

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Declaration of Potentially Perceived Conflicts:

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Vitamin D Basics

Serum or Plasma 25(OH)D concentration units

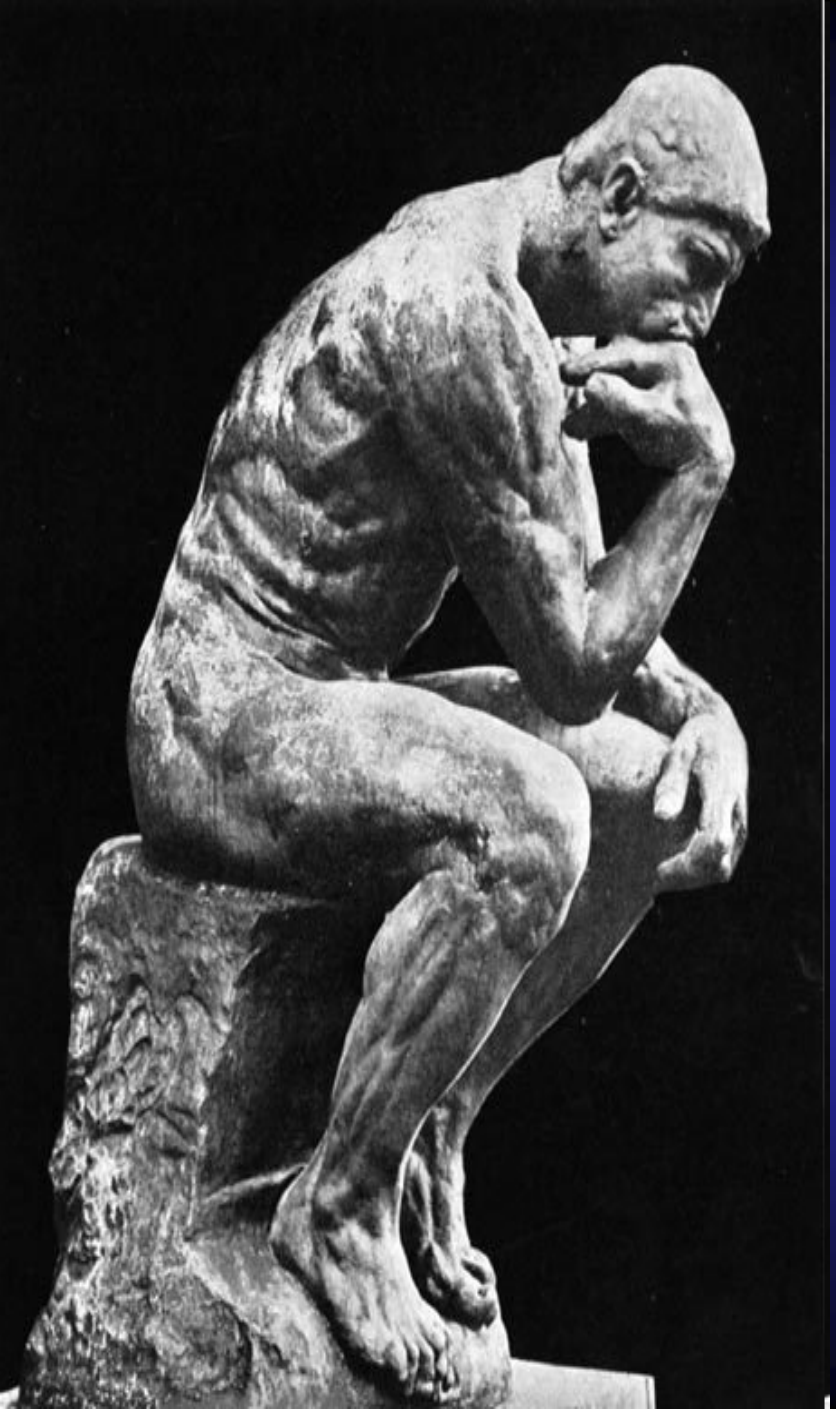
- 1 ng/ml = 2.5 nmol/L
- 30 ng/ml = 75 nmol/L

Oral dosage units

- 400 IU = 10 microgram
- 40,000 IU = 1 milligram

Health Canada and FDA: "Vitamin D is indicated for use in the treatment of hypoparathyroidism, … vitamin D resistant rickets, and familial hypophosphatemia. Any other use would be considered an off-label use."

Vitamin D to target a 25(OH)D level is "off-label" use.



1. If we are going to be recommending 1000+ units Vit D to all patients, is screening still needed?

2. In terms of the needs assessment, is universal 25(OH)D screening cost effective?

3. Is there strong evidence that Vitamin D to all our patients is effective beyond bone?

- “All scientific work is incomplete – whether it be observational or experimental... That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time.” – **A.B. Hill.** The Environment and Disease: Association or Causation? ***Proceedings of the Royal Society of Medicine*, 58 (1965), 295-300.**

- “if no randomised trial has been carried out for our patient's predicament, we must follow the trail to the next best external evidence and work from there.” – **D Sackett et al, BMJ 1996 312:72.** **Gairdner Award Oct 29, 2009**


Sunshine:
Full-skin exposure to UVB = 10,000 IU daily oral vitamin D3

If shadow TALLER than you are tall, you CANNOT make vitamin D

Implicit evidence that 10,000 IU/day of vitamin D is safe, because it matches the potential effect of UV light exposure.

Stamp et al. ***Lancet 1977, June:p1341***

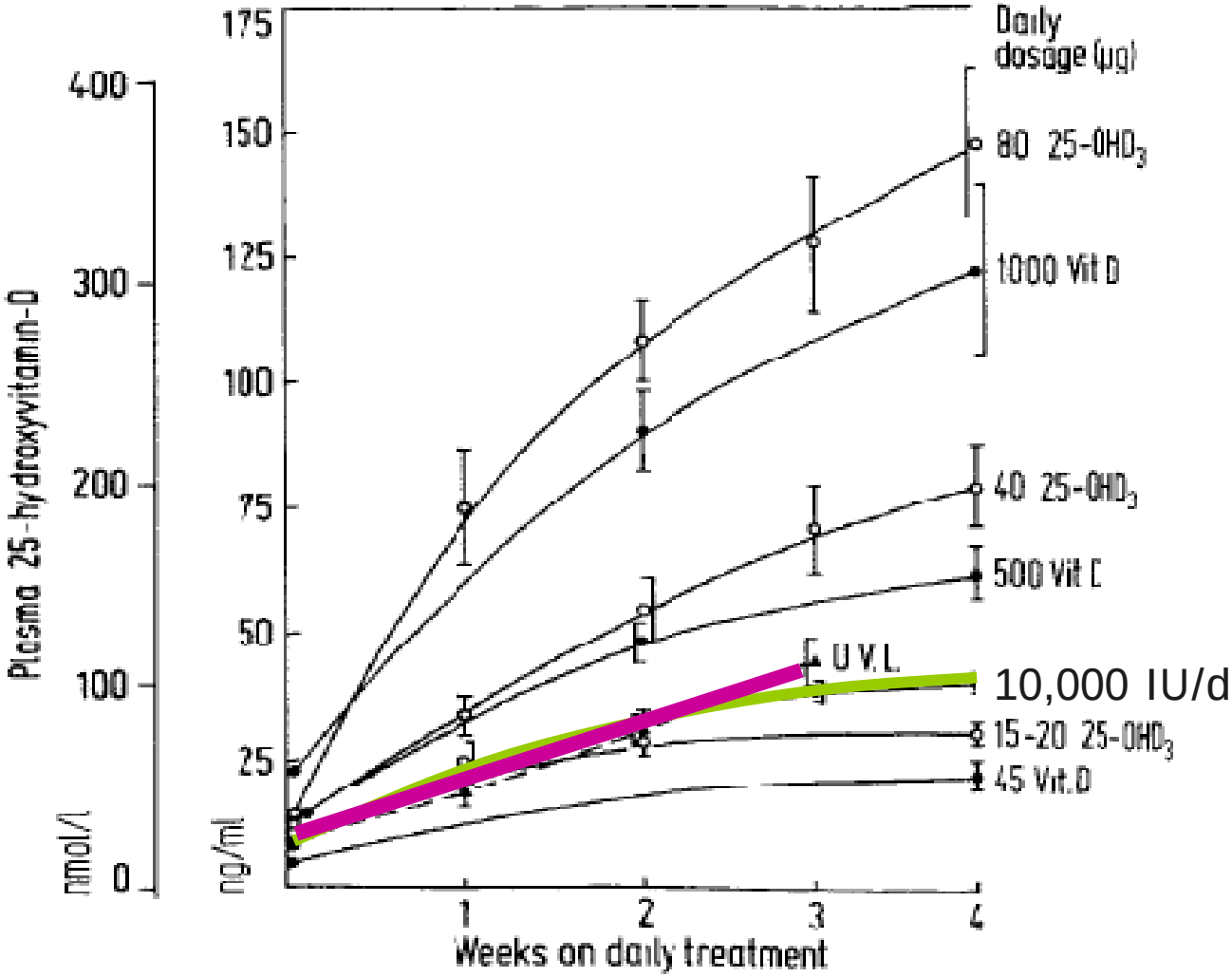
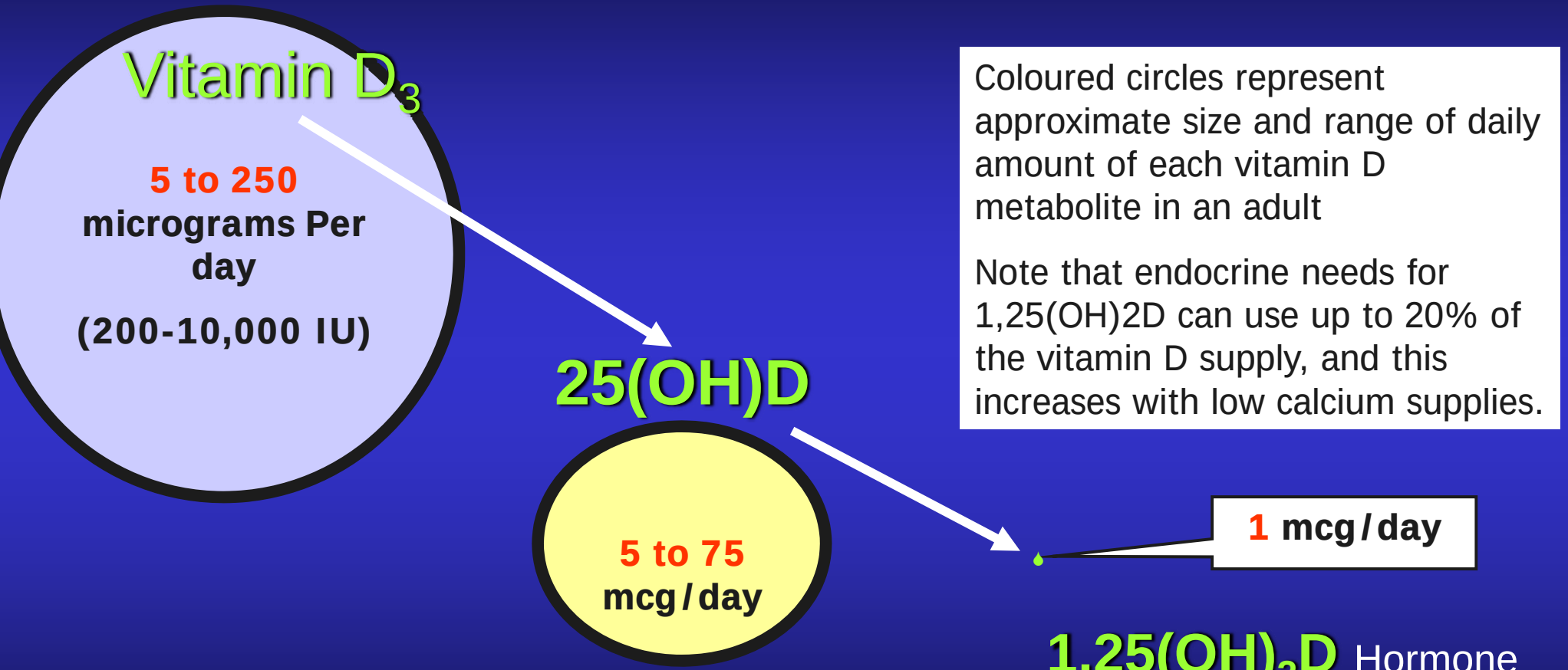


Fig. 2—Mean plasma-25-OHD in 60 subjects during short-term treatment with vitamin D_2 of D_3 (●) or with 25-OHD_3.

(○) in different daily doses (as shown). ▲=mean 25-OHD in 7 subjects receiving daily artificial U.V.L.[12] Bars indicate S.E.M.

Adult Replacement Doses for Vitamin D and Major Metabolites



Coloured circles represent approximate size and range of daily amount of each vitamin D metabolite in an adult

Note that endocrine needs for 1,25(OH)2D can use up to 20% of the vitamin D supply, and this increases with low calcium supplies.

$1,25(OH)_2D$ Hormone control to increase calcium absorption and bone development (via Calcium)

Pharmacokinetic Features of Vitamin D Metabolites

The Nutrient: Serum vitamin D rises and falls sharply after a dose.

Within **2-3 days**, all of a given dose of vitamin D3 is either stored in tissues, or converted to 25(OH)D.

Vitamin D_3

25(OH)D

Serum 25(OH)D rises gradually over time, and if supplies of vitamin D are removed

Half-life = about **2 months**.

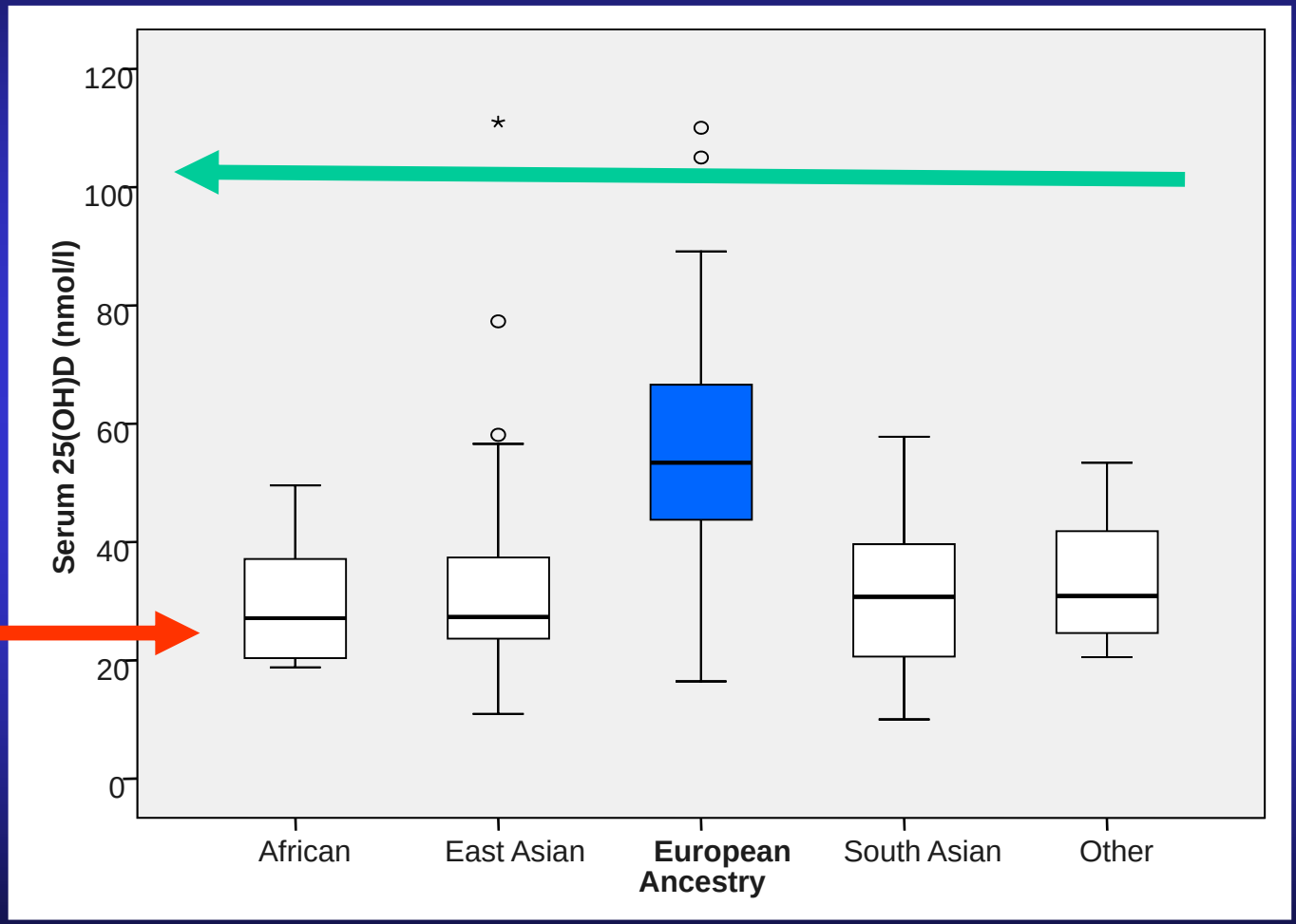
$1,25(OH)_2D$ ***Hormone*** control to increase calcium absorption and bone development (via Calcium)

Serum $1,25(OH)_2D$ is **<u>not affected</u> by a vitamin D dose**, since its production is stimulated by PTH, and the need for Calcium.

Half-life = **12 hrs**.

"NORMAL?"

University of Toronto students of various ancestries



Below this is Diagnostic of vitamin D deficiency rickets in infants

The box demarks:

75th percentile

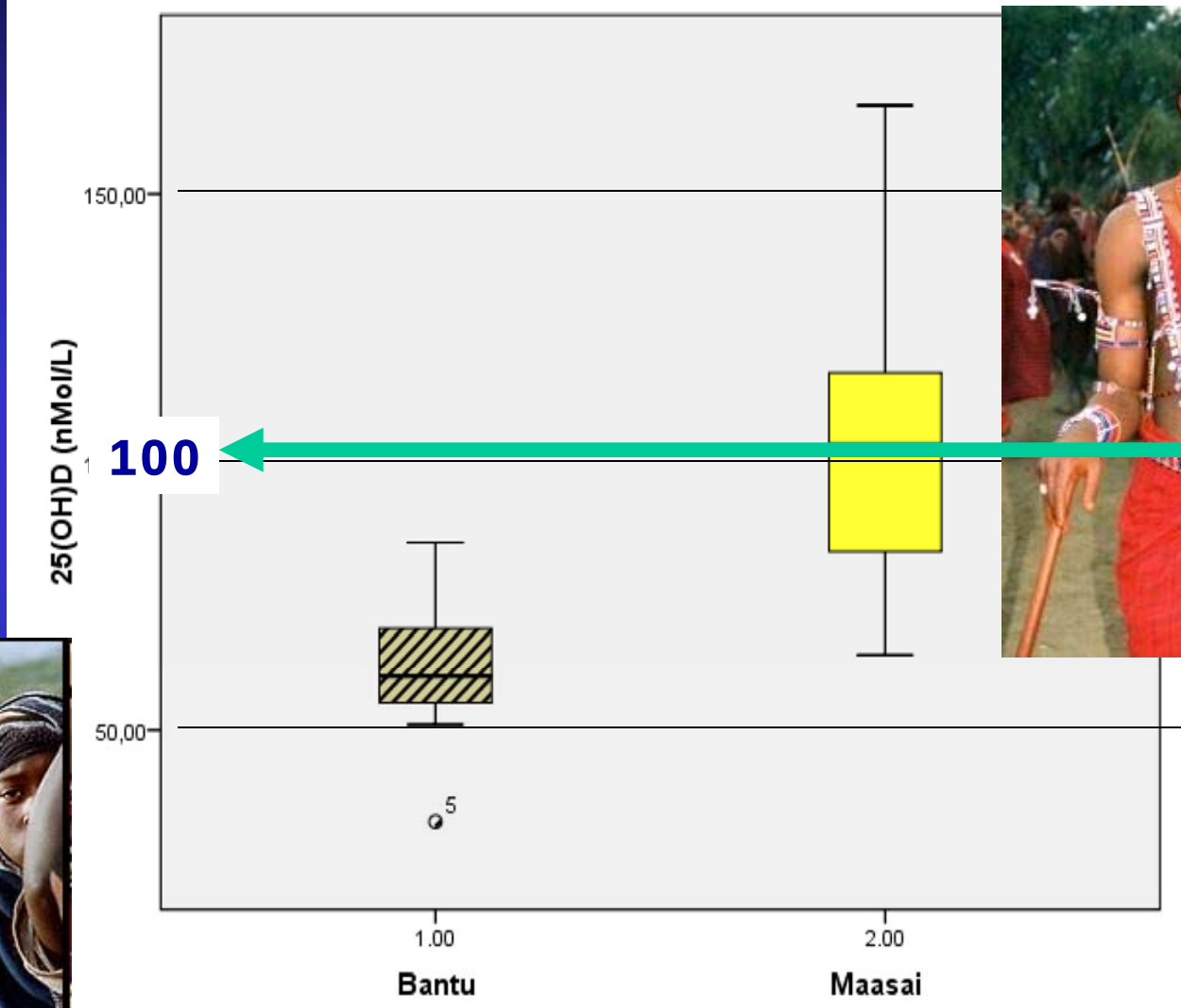
50th %ile
25th %ile

For the group
Indicated below the box

Gozdzik A, et al. *BMC Public Health*. 2008 Sep 26;8:336.

"NORMAL?"

Maasai median 25(OH)D = 104 nmol/L = 41 ng/mL



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