ΟΣΤΕΟΜΑΛΑΚΙΑ
ΡΑΧΙΤΙΣΜΟΣ

Γ.ΤΡΟΒΑΣ
ΕΝΔΟΚΡΙΝΟΛΟΓΟΣ

ΔΙΑΤΑΡΑΧΗ ΤΗΣ ΕΠΙΜΕΤΑΛΛΩΣΗΣ ΤΟΥ ΟΣΤΕΟΕΙΔΟΥΣ ΣΕ ΕΝΗΛΙΚΑ ΣΚΕΛΕΤΟ

ΟΣΤΕΟΜΑΛΑΚΙΑ

ΑΥΞΗΜΕΝΟ ΟΣΤΕΟΕΙΔΕΣ

ΕΛΑΤΤΩΜΕΝΗ ΜΕΤΑΛΛΩΣΗ
Η απόσταση μεταξύ των ζωνών εναπόθεσης
Της τετρακυκλίνης είναι ελαττωμένη

ΑΙΤΙΑ ΟΣΤΕΟΜΑΛΑΚΙΑΣ

ΔΙΑΤΑΡΑΧΕΣ ΒΙΤ D ΚΑΙ ΑΣΒΕΣΤΙΟΥ

ΔΙΑΤΑΡΑΧΕΣ ΦΩΣΦΟΡΟΥ

ΣΥΣΤΗΜΑΤΙΚΗ ΟΞΕΩΣΗ
ΥΠΟΦΩΣΦΑΤΑΣΙΑ
ΦΑΡΜΑΚΑ(Αργιλιο,φθοριο,
Α γενιας διφωσφονικα)

ΕΛΛΕΙΨΗ ΒΙΤ D ΚΑΙ ΑΣΒΕΣΤΙΟΥ
-Διατροφικη
Χαμηλη εκθεση στον Ηλιο

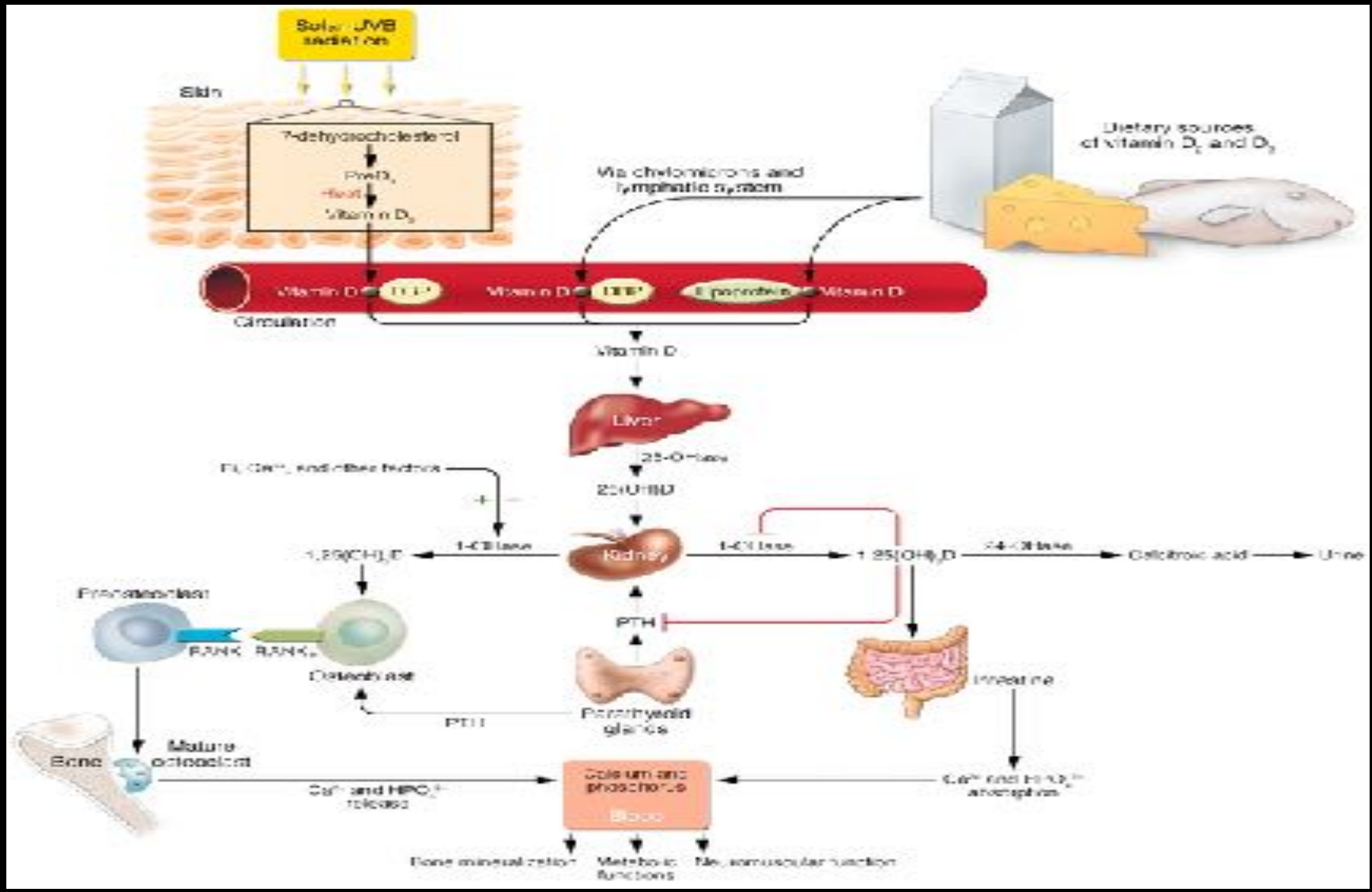
ΦΥΛΟΣΥΝΔΕΤΗ ΥΠΟΦΩΣΦΑΤΑΙΜΙΑ
ΑΥΤΟΣΩΜΑΤΙΚΗ ΚΥΡΙΑΡΧΗ
ΥΠΟΦΩΣΦΑΤΑΙΜΙΑ
ΝΕΦΡΙΚΗ ΣΩΛΗΝΑΡΙΑΚΗ ΟΞΕΩΣΗ
ΟΓΚΟΓΕΝΗΣ ΟΣΤΕΟΜΑΛΑΚΙΑ

ΔΥΣΑΠΟΡΡΟΦΗΣΗ ΑΣΒΕΣΤΙΟΥ ΚΑΙ D
Γ/Σ επεμβασεις
Χρ.παγκρεατιτιδα
Κοιλιοκακη
Στεατορροια
Χολοκυστοπαθεια

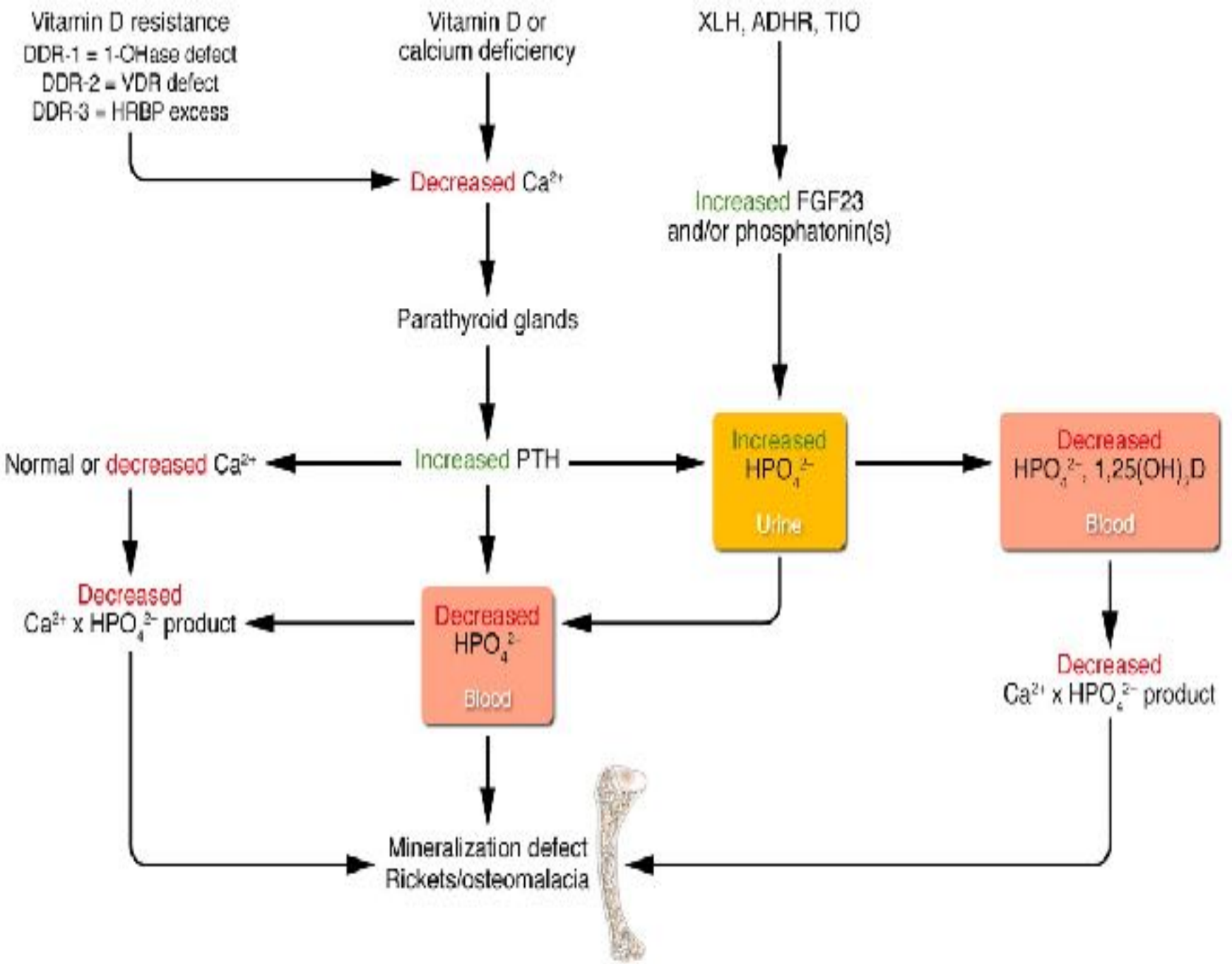
ΔΙΑΤΑΡΑΧΗ ΤΟΥ ΜΕΤΑΒΟΛΙΣΜΟΥ ΤΗΣ D
-Νεφρικη ανεπαρκεια
-Ηπατικη Νοσος
Φαρμακα (Αντιεπηλιπτικα)

ΚΛΗΡΟΝΟΜΙΚΕΣ ΔΙΑΤΑΡΑΧΕΣ ΤΟΥ ΥΠΟΔΟΧΕΑ ΤΗΣ D
VDDR-1 (ελαττωματικη1$^{\alpha}$ υδροξυλαση)
VDDR-2(Μεταλλαξεις του VDR)

ΜΕΤΑΒΟΛΙΣΜΟΣ ΤΗΣ ΒΙΤΑΜΙΝΗΣ D



Holick, M. F. J. Clin. Invest. 2006;116:2062-2072



Holick, M. F. J. Clin. Invest. 2006;116:2062-2072

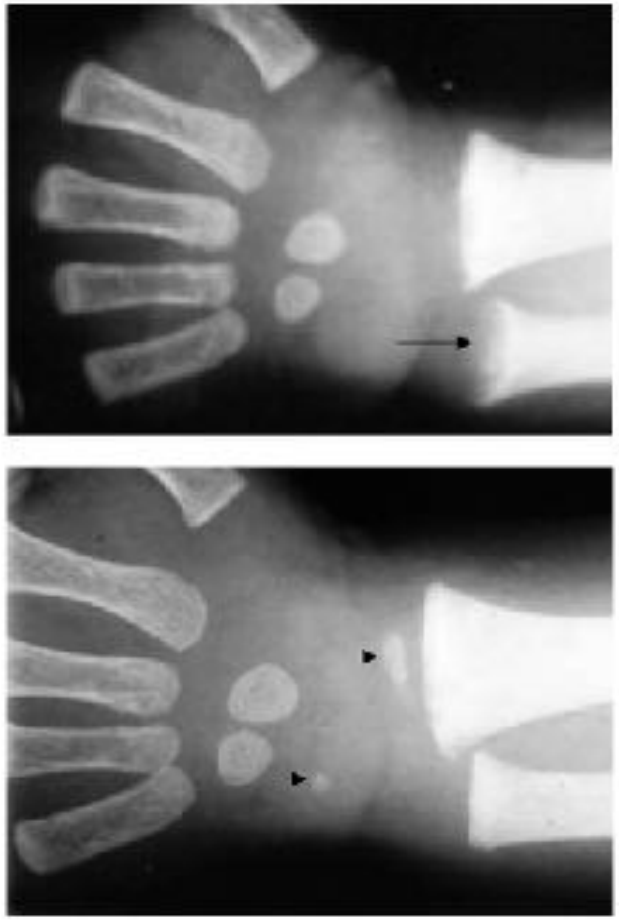
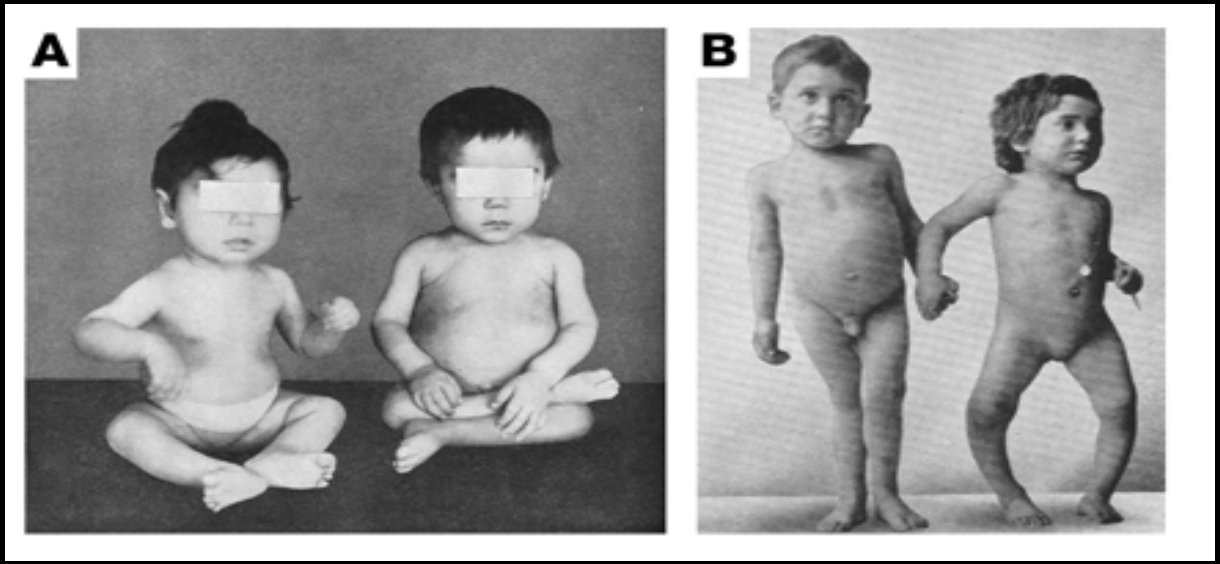


Fig. 75.1. Rickets in a child of 1.5 years. Upper panel shows florid rickets with typical unsharp concave margin of the ulna (arrow). Lower panel shows healing of rickets and appearance of new ossification centers (arrow heads).

Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism, Eighth Edition. Edited by Clifford J. Rosen.

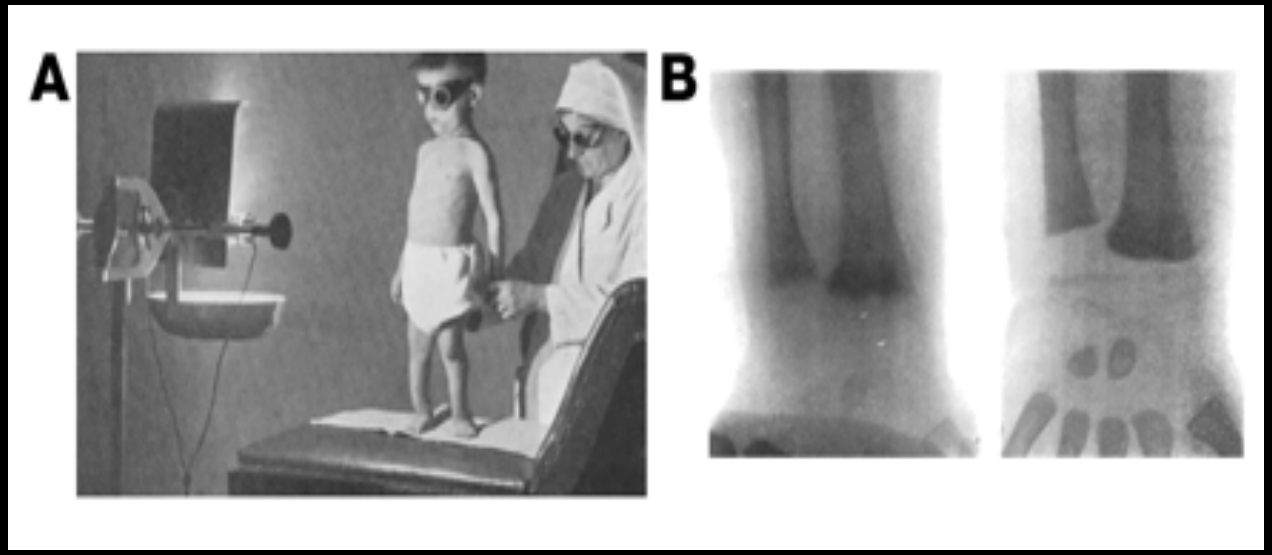
WILEY Blackwell

Αναβίωση της έλλειψης Βιταμίνης D και Ραχιτισμού



M Holick JCI 2006

Αναβίωση της έλλειψης Βιταμίνης D και Ραχιτισμού



M Holick JCI 2006

Υπάρχει ή όχι ανεπάρκεια βιταμίνης D σε μητέρες και τα νεογνά τους στην Ελλάδα;

Άννα Χάλλα[1], Αγαθή Ντουρνταύφη[2], Β. Χολέβας[2], Ιωάννα Βλάχου[3], Στυλιανή Ανδρονίκου[2]

[1] Εργαστήριο Υγείας του Παιδιού

[2] Νεογνολογική Κλινική, Τομέας Υγείας του Παιδιού, Ιατρική Σχολή Παν/μίου Ιωαννίνων

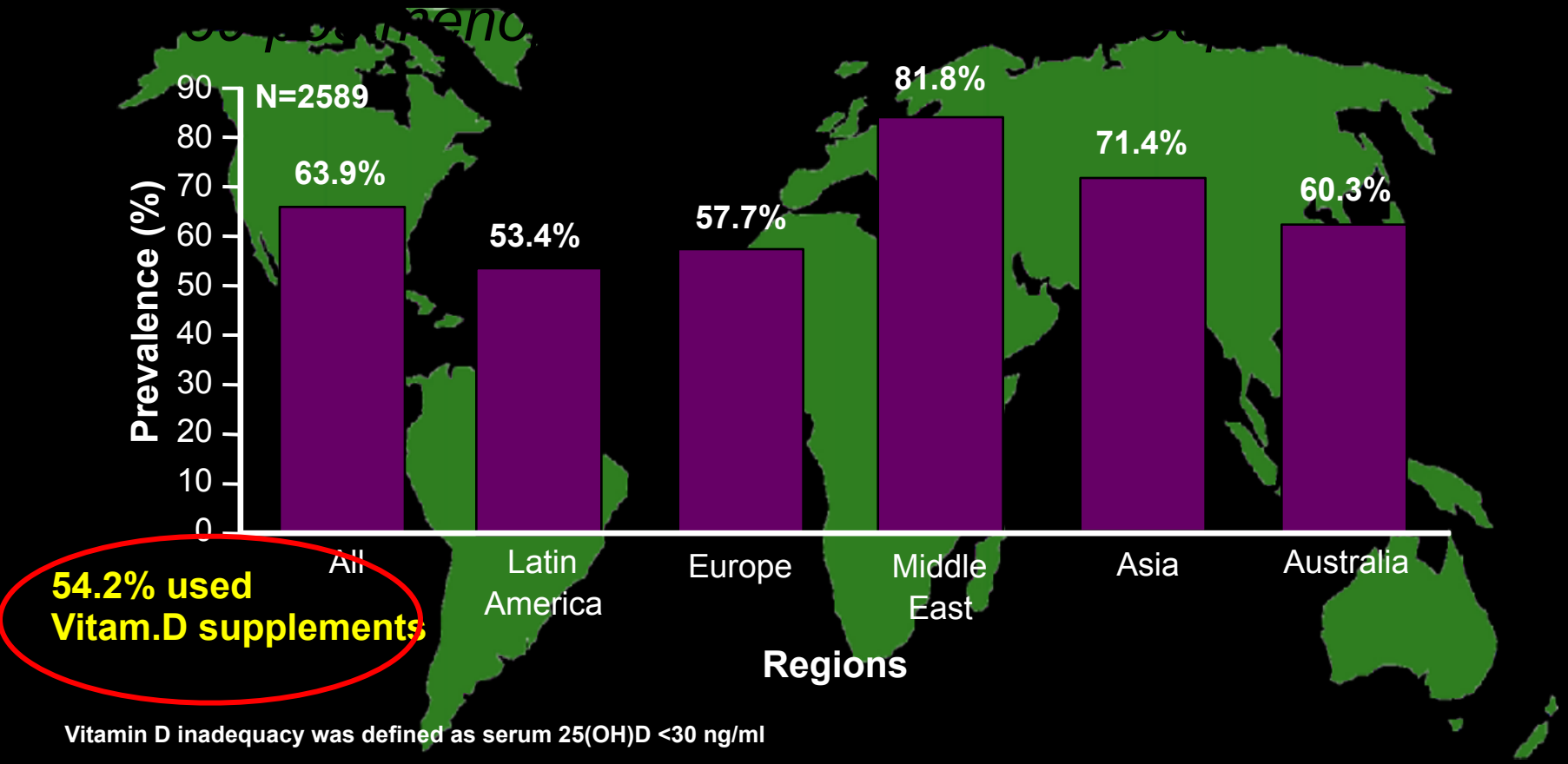
[3] Βιοχημικό Εργαστήριο Παν/κού Νοσοκομείου Ιωαννίνων

ΟΣΤΟΥΝ 17(1) 2006

35-80% ΠΑΙΔΙΩΝ ΕΧΟΥΝ ΧΑΜΗΛΑ ΕΠΙΠΕΔΑ ΒΙΤΑΜΙΝΗΣ D

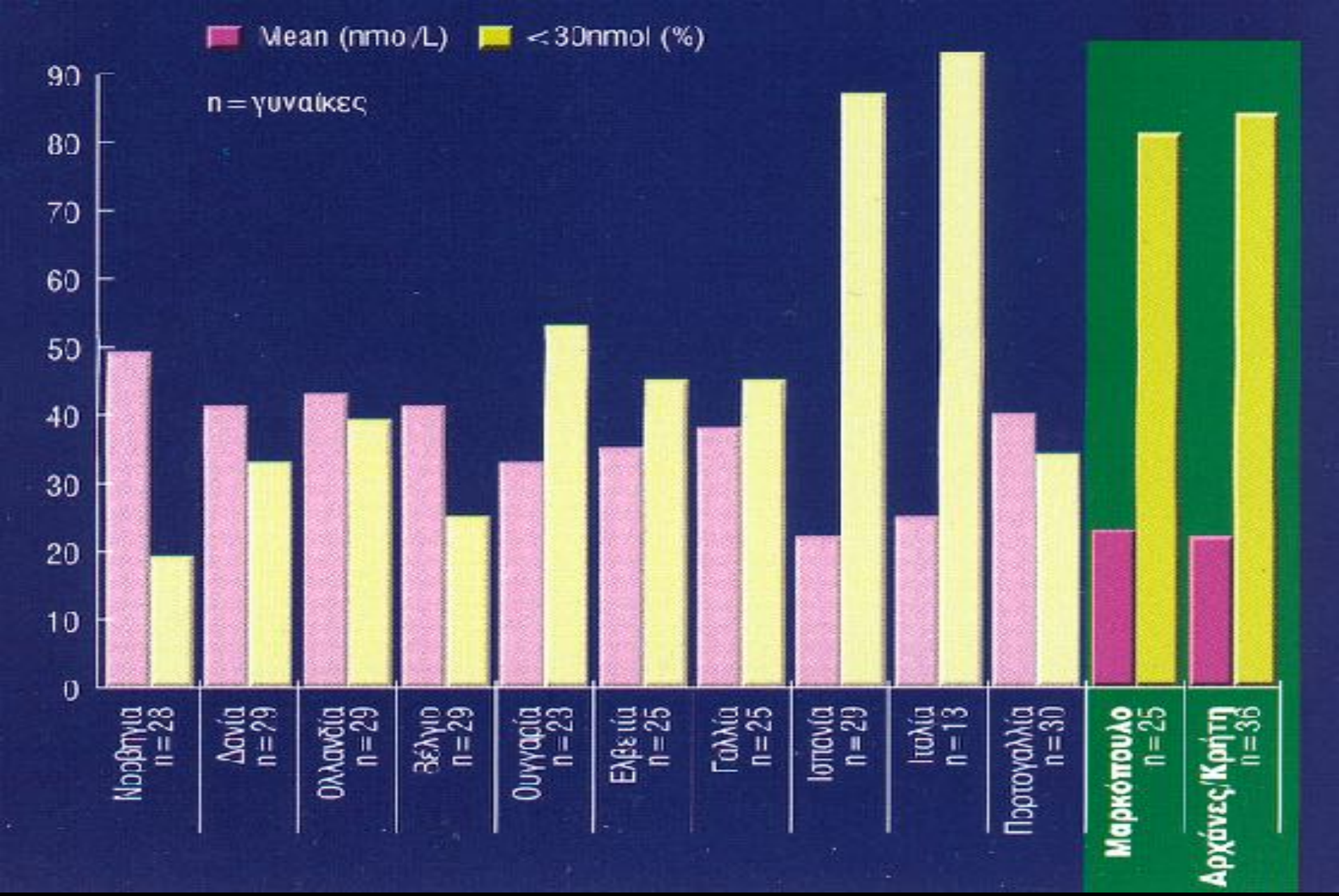
- Σαουδική Αραβία
- Ινδία
- Τουρκία
- Νέα Ζηλανδία
- Ισραήλ
- Αίγυπτος
- Λίβανος
- Χονγκ-Κονγκ
- Κίνα
- Λιβύη
- Ισπανία
- Αυστραλία
- Σαν Ντιέγκο
- Βορειοανατολική Αμερική

A High Prevalence of Vitamin D Inadequacy* Was Seen Across All Geographic Regions

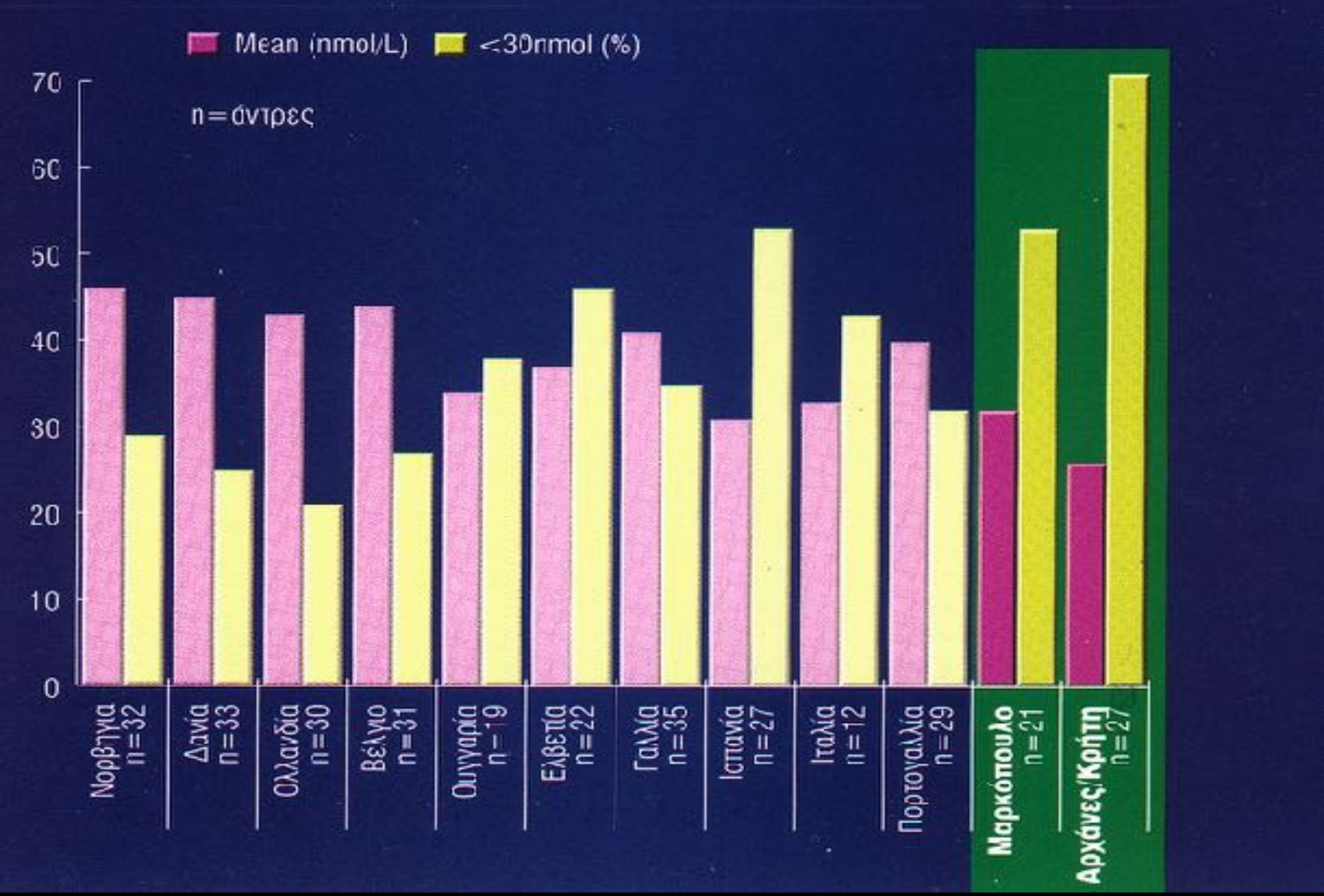


Vitamin D inadequacy was defined as serum 25(OH)D <30 ng/ml

Lips P et al. Poster presented at ASBMR, Nashville, TN, USA, September 23–27, 2005



Lancet 346:207-10,1995



Lancet 346:207-10,1995

HYPOVITAMINOSIS D OSTEOPATHY

A.M. PARFITT

TABLE 11–2 Criteria for Different Morphological Forms of Osteomalacia and Different Stages of the Evolution of Hypovitaminosis D Osteopathy (HVO)

Form	Stage	O.Th[a] (μm)	Mlt (d)	OV/BV[b] (%)
Preosteomalacia	HVOi	<12.5[c]	<100	>5
Osteomalacia: generalized	HVOii	>12.5	>100	>10
Generalized	HVOiii	>12.5	∞[d]	>10
Focal	—	>12.5	>100	<5[e]
Atypical	—	<12.5	>50	>5[f]

[a]Corrected for regression on adjusted apposition rate in borderline cases.
[b]Corrected for trabecular thickness in borderline cases.
[c]Upper limit higher in renal osteodystrophy.
[d]No double label, so apposition rate zero.
[e]Cases with OV/BV between 5% and 10% are transitional between focal and generalized.
[f]In cases with OV/BV between 5% and 10% or with Mlt between 50 and 100, will need BFR to discriminate from HVOi or other forms of high-turnover osteoporosis.

O.Th, mean osteoid thickness (corrected for section obliquity); Mlt, mineralization lag time; OV/BV, osteoid volume per unit of bone volume.

A.M. Parfitt

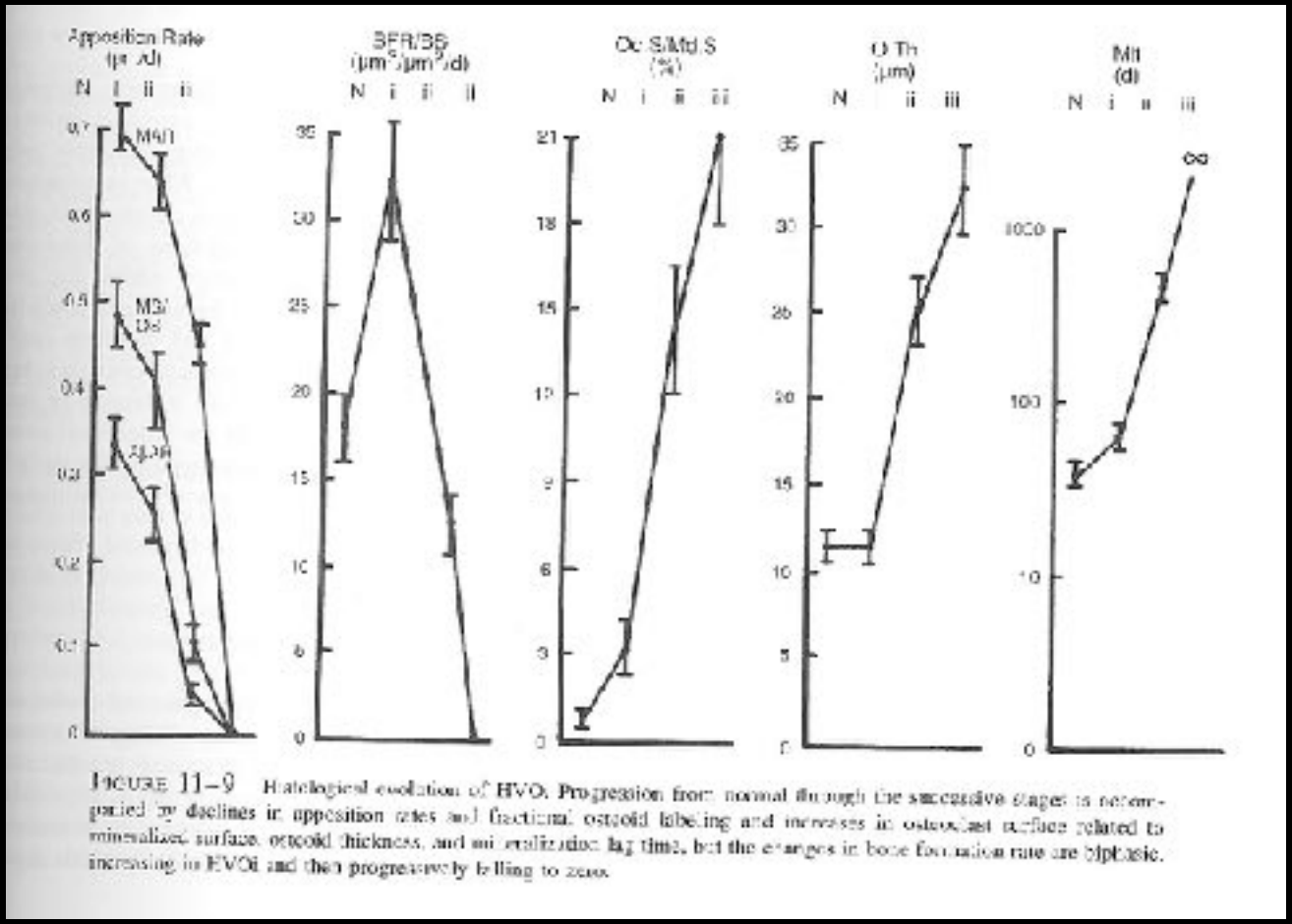
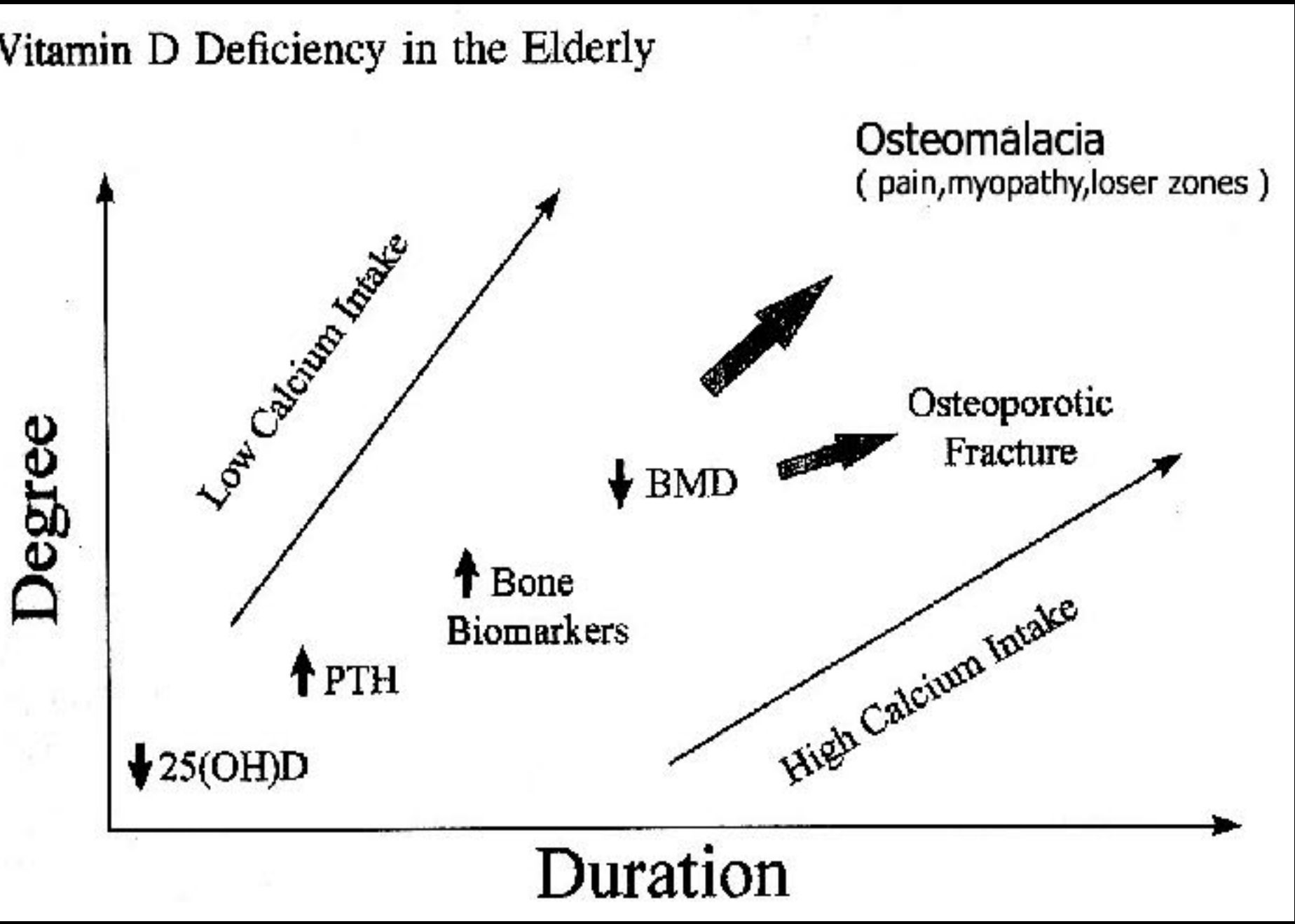
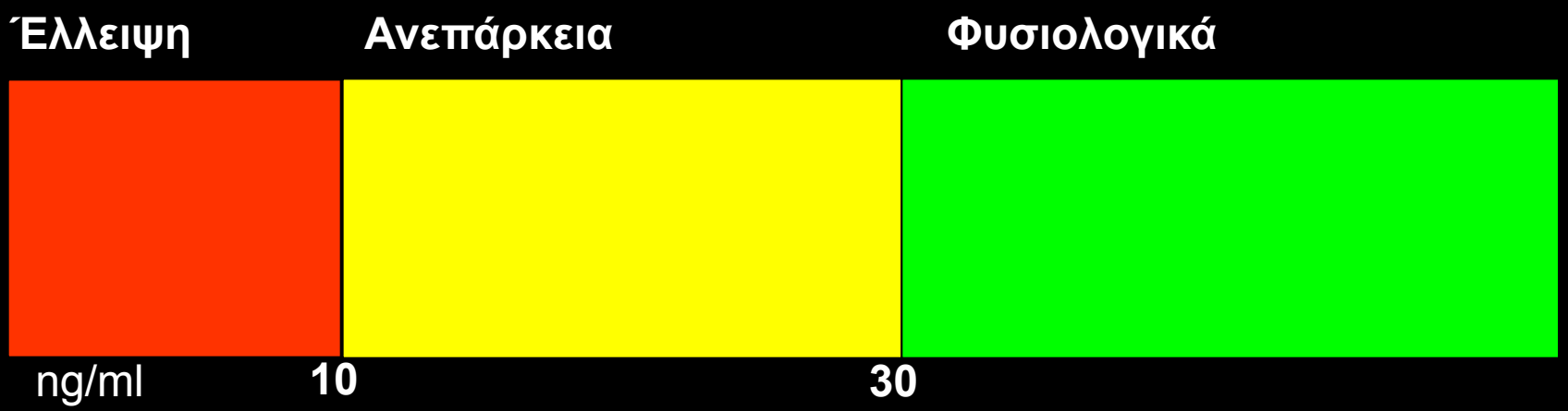


FIGURE 11–9 Histological evolution of HVO. Progression from normal through the successive stages is accompanied by declines in apposition rates and fractional osteoid labeling and increases in osteoclast surfaces related to mineralized surface, osteoid thickness, and mineralization lag time, but the changes in bone formation rate are biphasic, increasing in HVOi and then progressively falling to zero.

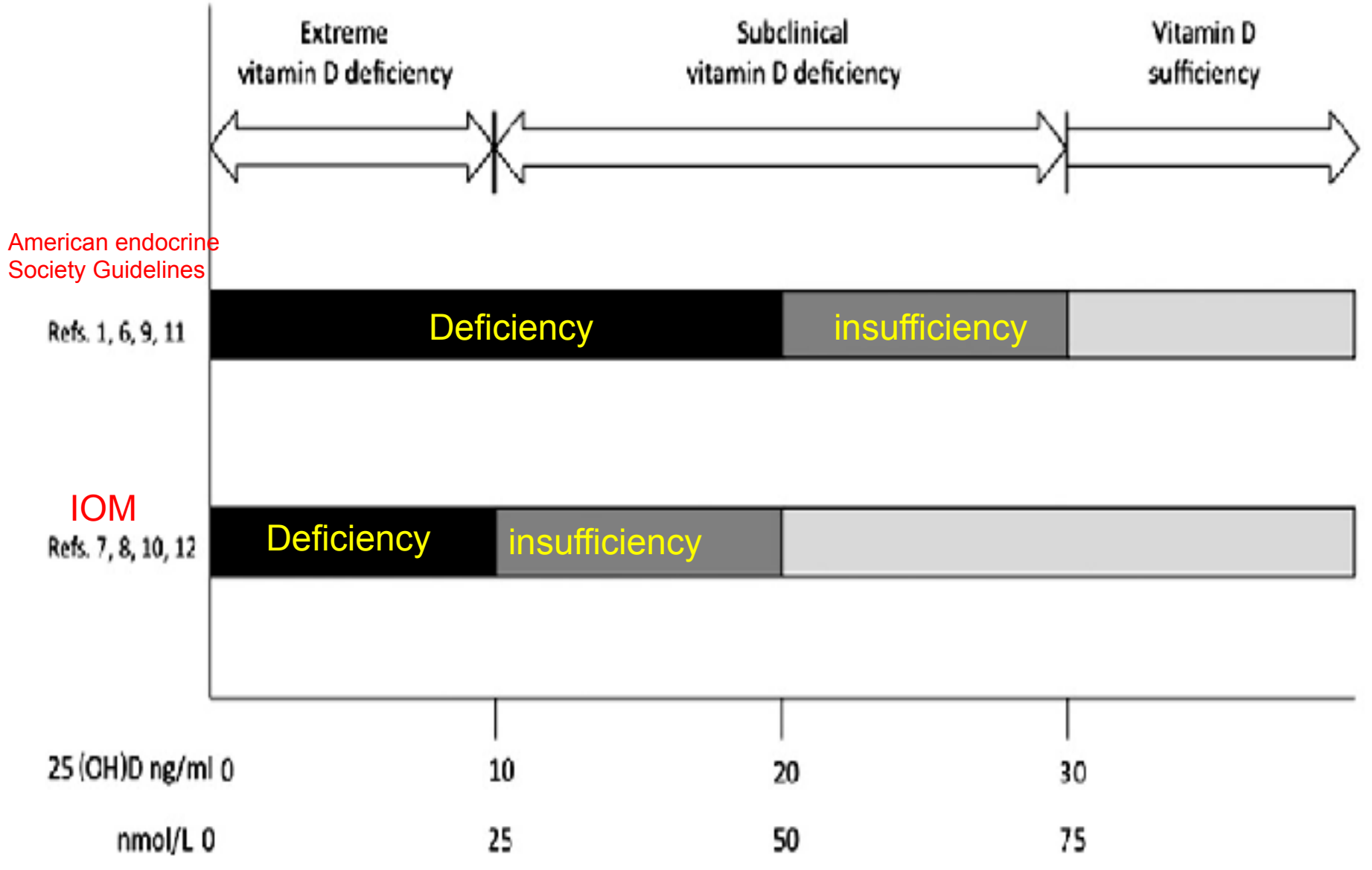
A.M. Parfitt

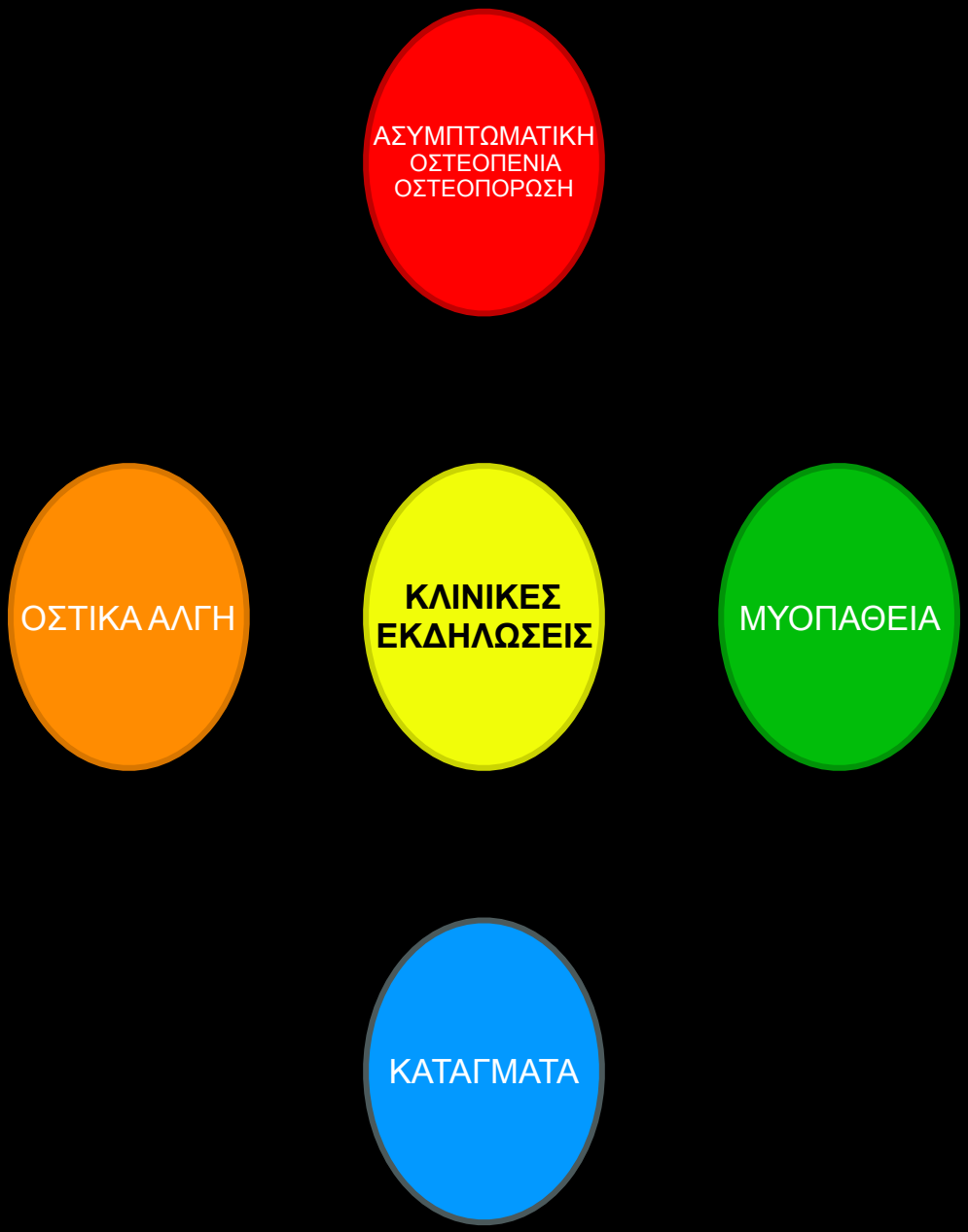

Vitamin D Deficiency in the Elderly
Osteomalacia
(pain,myopathy,loser zones)
Low Calcium Intake
Osteoporotic
Fracture
BMD
Bone
Biomarkers
PTH
25(OH)D
High Calcium Intake
Degree
Duration

ΕΠΙΠΕΔΑ ΒΙΤΑΜΙΝΗΣ D

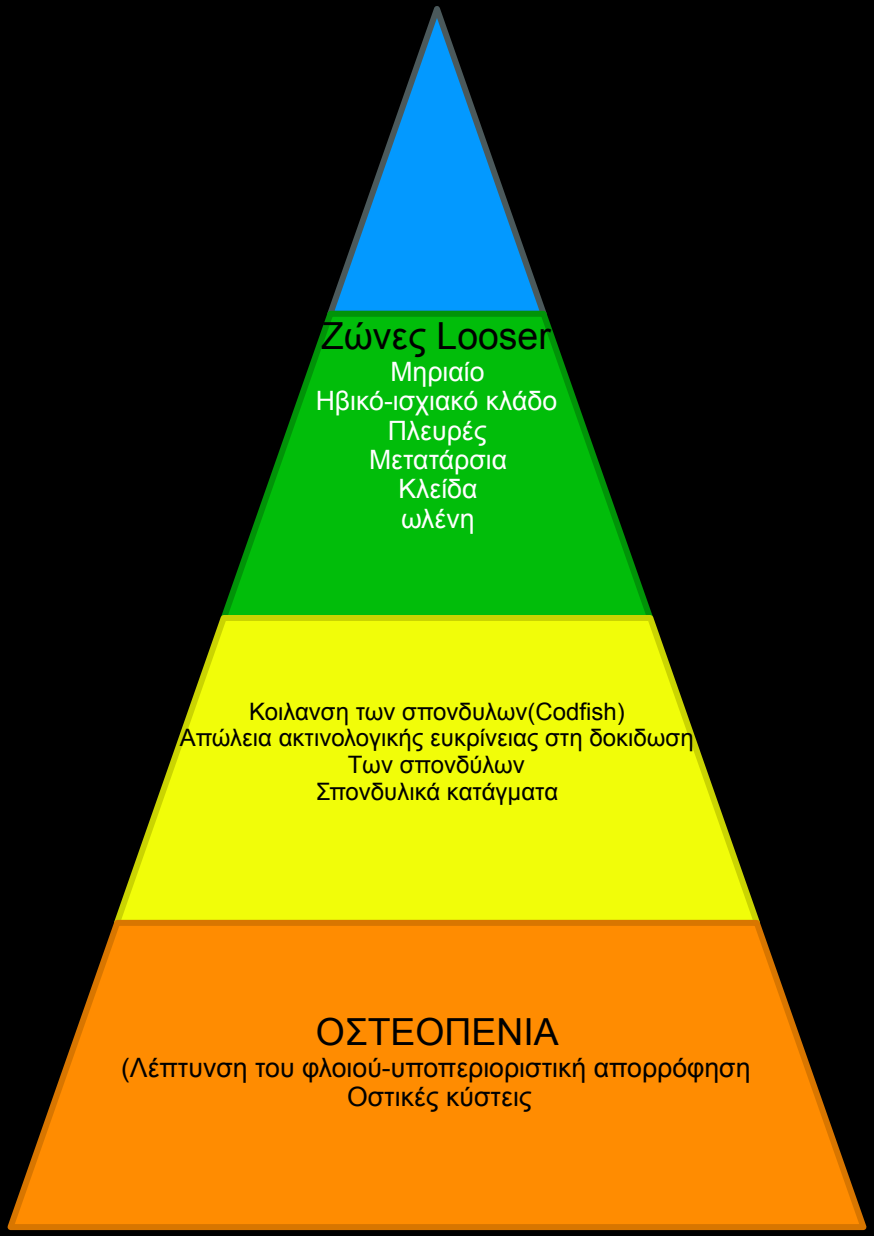


ΟΡΙΣΜΟΙ


Extreme vitamin D deficiency
Subclinical vitamin D deficiency
Vitamin D sufficiency
American endocrine Society Guidelines
Refs. 1, 6, 9, 11
Deficiency
insufficiency
IOM
Refs. 7, 8, 10, 12
Deficiency
insufficiency
25 (OH)D ng/ml 0
10
20
30
nmol/L 0
25
50
75

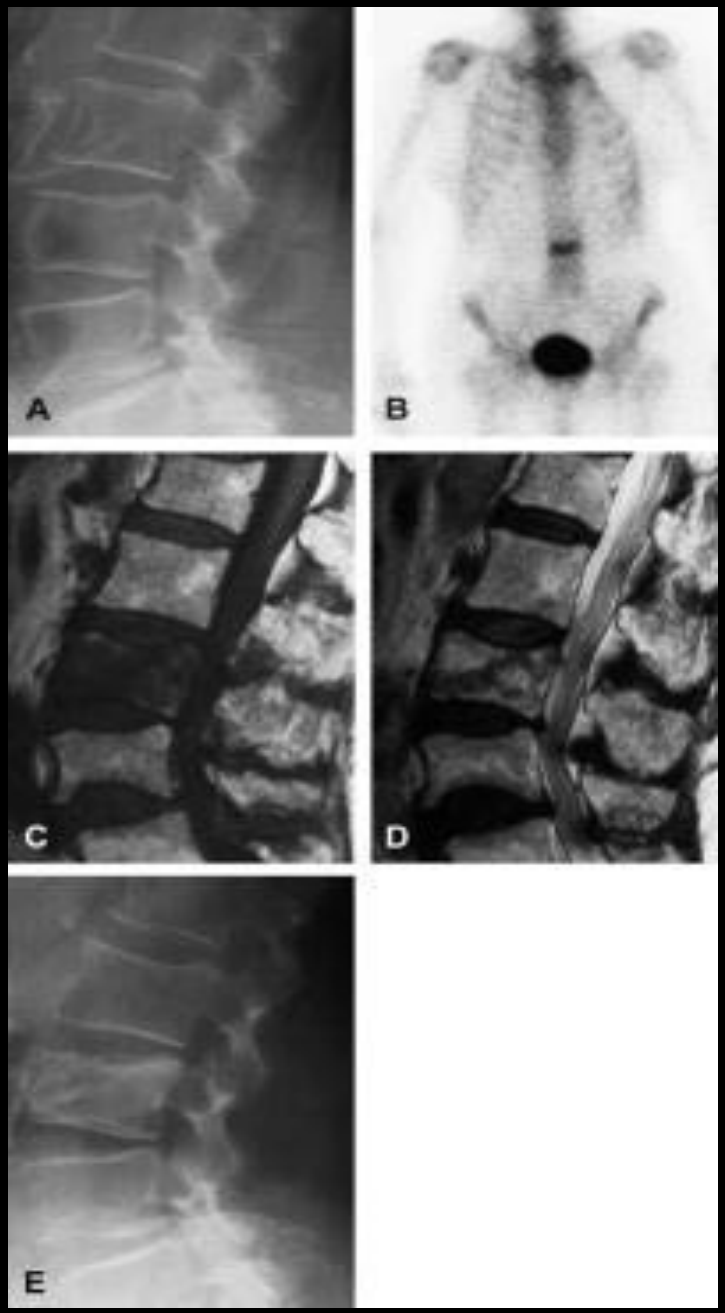

ΑΣΥΜΠΤΩΜΑΤΙΚΗ
ΟΣΤΕΟΠΕΝΙΑ
ΟΣΤΕΟΠΟΡΩΣΗ
ΟΣΤΙΚΑ ΑΛΓΗ
ΚΛΙΝΙΚΕΣ
ΕΚΔΗΛΩΣΕΙΣ
ΜΥΟΠΑΘΕΙΑ
ΚΑΤΑΓΜΑΤΑ

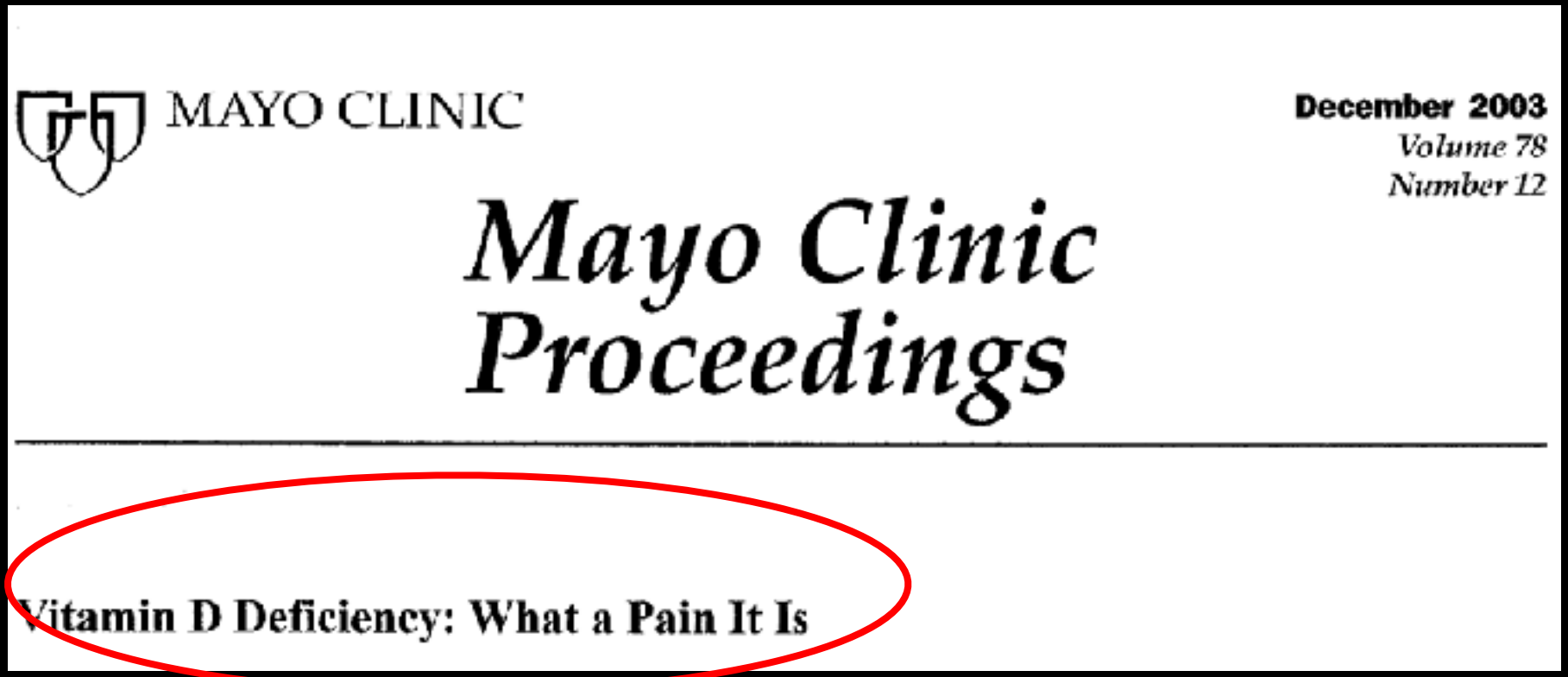
ΑΚΤΙΝΟΛΟΓΙΚΑ ΕΥΡΗΜΑΤΑ



Εικόνα 80.2. *α/χ λεκάνης με κάταγμα σε ασθενή με οστεομαλακία.*

Εικόνα 80.3. *Ατελές κάταγμα οστεομαλακίας.*


A
B
C
D
E



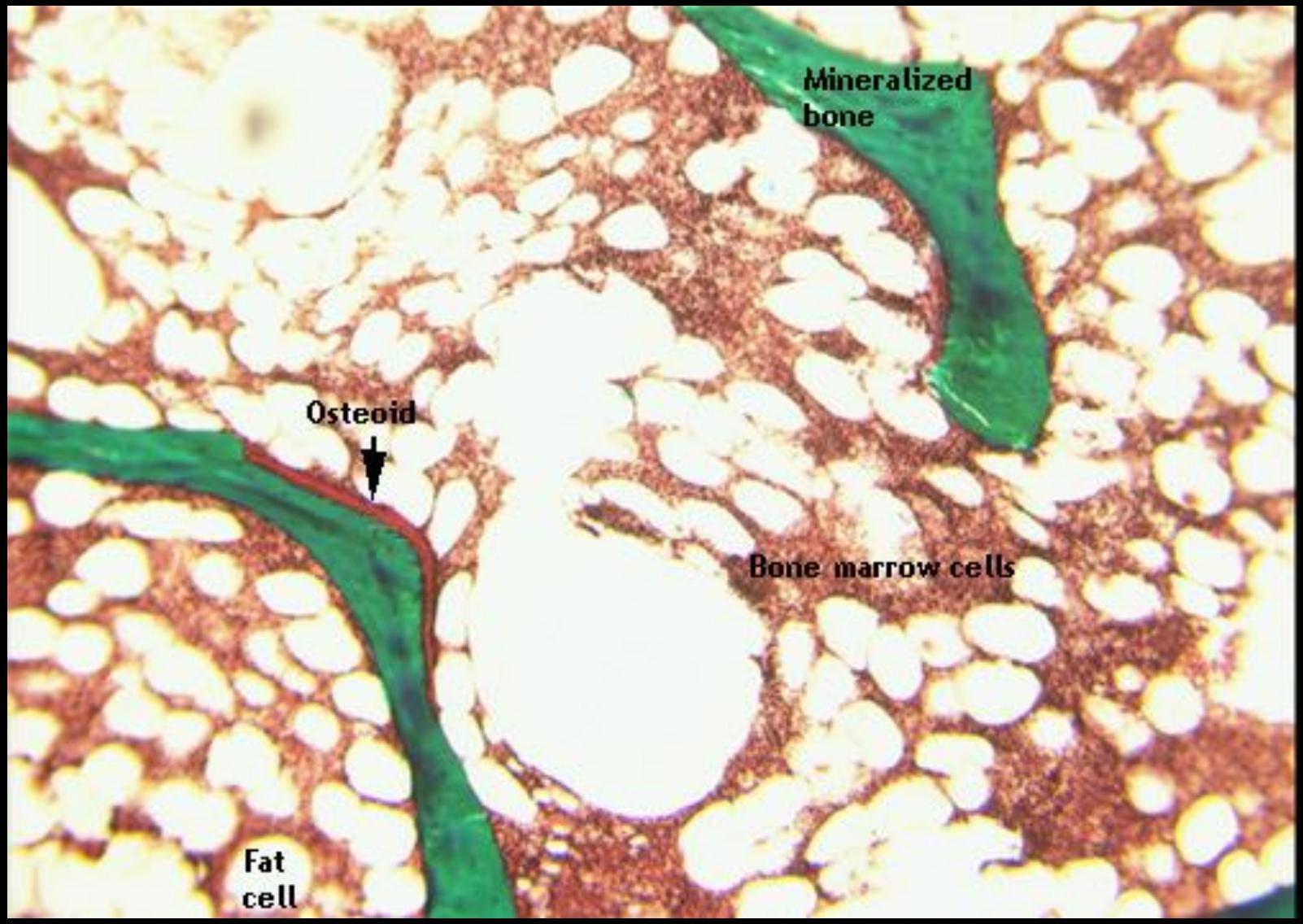
ASSOCIATIONS BETWEEN VITAMIN D STATUS AND PAIN IN OLDER ADULTS:THE INVECCIARE IN CHIANTI STUDY
Journal of the American Geriatrics Society 2008

Table 2

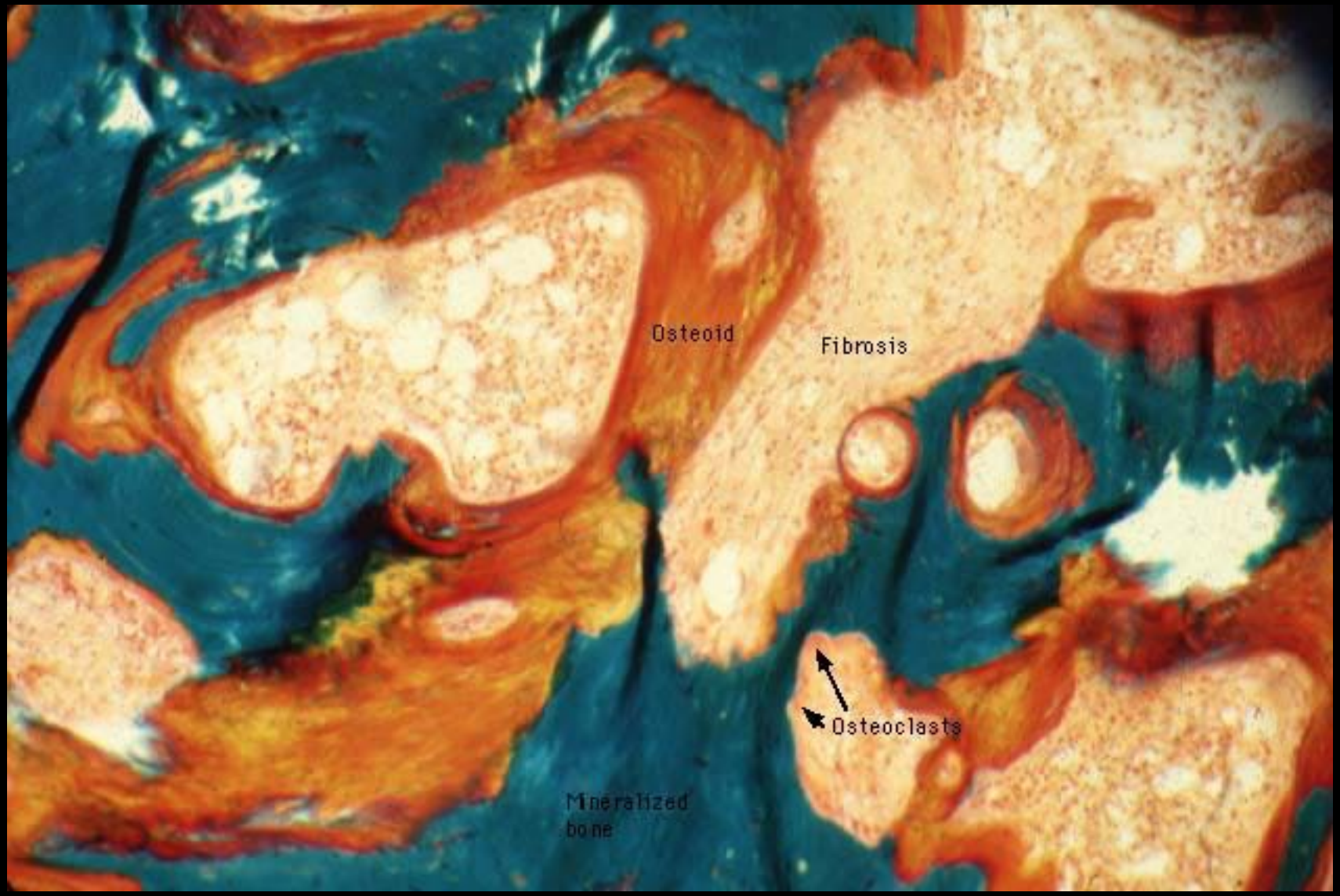
Vitamin D status and associated biochemistries: serum levels of 25(OH)D, 1,25$(OH)_2$D, Ca, HPO_4^{2-}, alkaline phosphatase (Alk. phos.), PTH, and FGF23

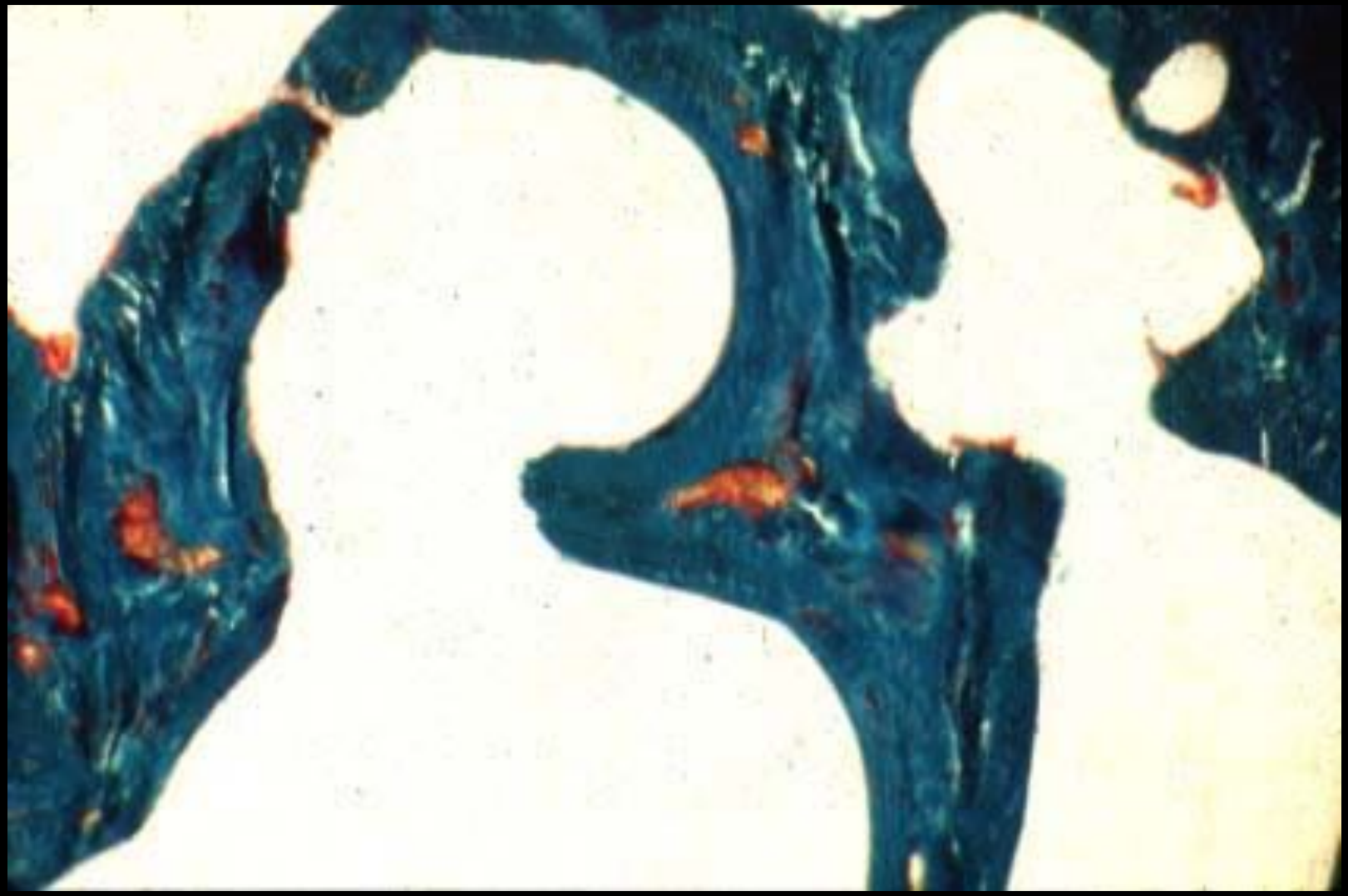
	25(OH) D, ng/ml	1,25(OH)2D	Ca	HPO_4^{2-}	Alk. phos.	PTH	FGF23	Skeletal disease
Vitamin D deficiency	<20	↑	↓ NL	↓	↑	↑	NL	Rickets/osteomalacia
Vitamin D insufficiency	21–29	↑ or NL	NL	NL	↑ or NL	↑ or NL	NL	↓ BMD
Vitamin D sufficiency	>30	NL	NL	NL	NL	NL	NL	None
XLH	NL	↓	NL	↓↓	↑	NL	↑ or NL	Rickets
ADHR	NL	↓	NL	↓↓	↑	NL	↑↑	Rickets
TIO	NL	↓	NL	↓↓	↑	NL	↑↑	Rickets

The upward-pointing arrows (↑ and ↑↑) indicate that the level is moderately or markedly above the normal range, respectively, and the downward-pointing arrows (↓ and ↓↓) indicate that the serum level is moderately or markedly below the normal range, respectively. NL represents levels within the normal range. BMD, bone mineral density; XLH, X-linked hypophosphatemic rickets; ADHR, autosomal dominant hypophosphatemic rickets; TIO, tumor-induced osteomalacia.


Mineralized bone
Osteoid
Bone marrow cells
Fat cell


Mineralized bone
Osteoid


Osteoid
Fibrosis
Osteoclasts
Mineralized bone



Strategies to Prevent and Treat Vitamin D Deficiency

Holick M. N Engl J Med 2007;357:266-281

Table 3. Vitamin D intakes recommended by the IOM and the Endocrine Practice Guidelines Committee

Life Stage Group	IOM Recommendations				Committee recommendations for patients at risk for vitamin D deficiency	
	AI	EAR	RDA	UL	Daily requirement	UL
INFANTS						
0 to 6 months	400 IU (10 µg)			1,000 IU (25 µg)	400–1,000 IU	2,000 IU
6 to 12 months	400 IU (10 µg)			1,500 IU (38 µg)	400–1,000 IU	2,000 IU
CHILDREN						
1–3 yr		400 IU (10 µg)	600 IU (15 µg)	2,500 IU (63 µg)	600–1,000 IU	4,000 IU
4–8 yr		400 IU (10 µg)	600 IU (15 µg)	3,000 IU (75 µg)	600–1,000 IU	4,000 IU
MALES						
9–13 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	600–1,000 IU	4,000 IU
14–18 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	600–1,000 IU	4,000 IU
19–30 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
31–50 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
51–70 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
> 70 yr		400 IU (10 µg)	800 IU (20 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
FEMALES						
9–13 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	600–1,000 IU	4,000 IU
14–18 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	600–1,000 IU	4,000 IU
19–30 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
31–50 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
51–70 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
> 70 yr		400 IU (10 µg)	800 IU (20 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
PREGNANCY						
14–18 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	600–1,000 IU	4,000 IU
19–30 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
31–50 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
LACTATION[a]						
14–18 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	600–1,000 IU	4,000 IU
19–30 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU
31–50 yr		400 IU (10 µg)	600 IU (15 µg)	4,000 IU (100 µg)	1,500–2,000 IU	10,000 IU

AI, Adequate Intake; EAR, estimated average requirement; UL, tolerable upper intake level.

a Mother's requirement; 4,000–6,000 IU/d [mother's intake for infant's requirement if infant is not receiving 400 IU/d].

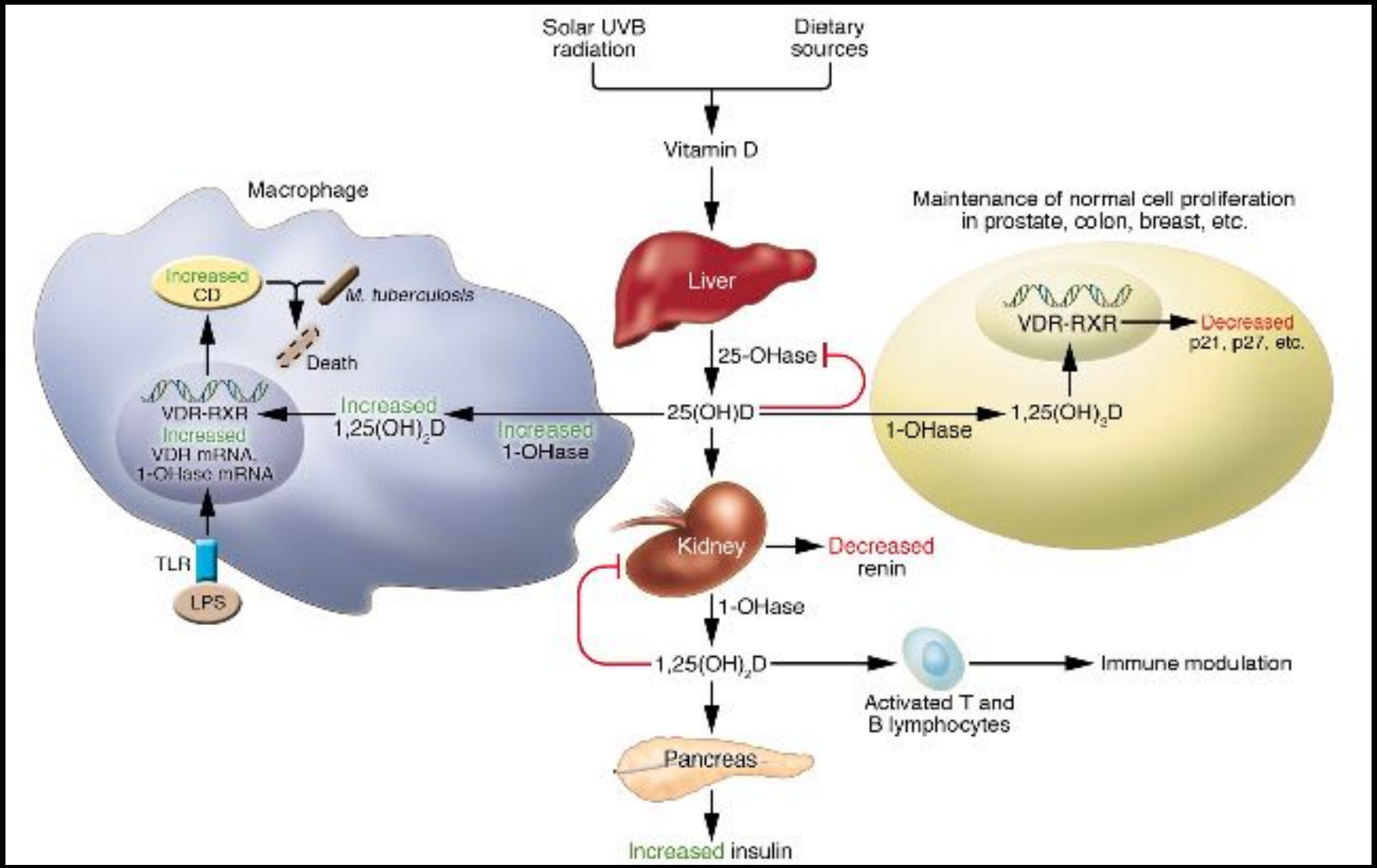
American Academy of Pediatrics

SUMMARY GUIDELINES

To prevent rickets and vitamin D deficiency in healthy infants, children, and adolescents, a vitamin D intake of at least 400 IU/day is recommended. To meet this intake requirement, we make the following suggestions:

Oct 2008

ΕΞΩΣΚΕΛΕΤΙΚΕΣ ΔΡΑΣΕΙΣ 1,25 OHD3



Holick, M. F. J. Clin. Invest.2006;116:2062-2072

ΕΥΧΑΡΙΣΤΩ