

Utjecaj predanalitičkih čimbenika na koncentraciju vitamina D

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Predanalitika

- Interferencije
- Vrsta uzorka
- Stabilnost
- Transport
- Spol, dob, BMI
- Prehrana
- Sunce

Interferencije

- Endogene
 - Hemoliza
 - Ikterija
 - Lipemija
- Egzogene
 - Lijekovi
 - Biotin

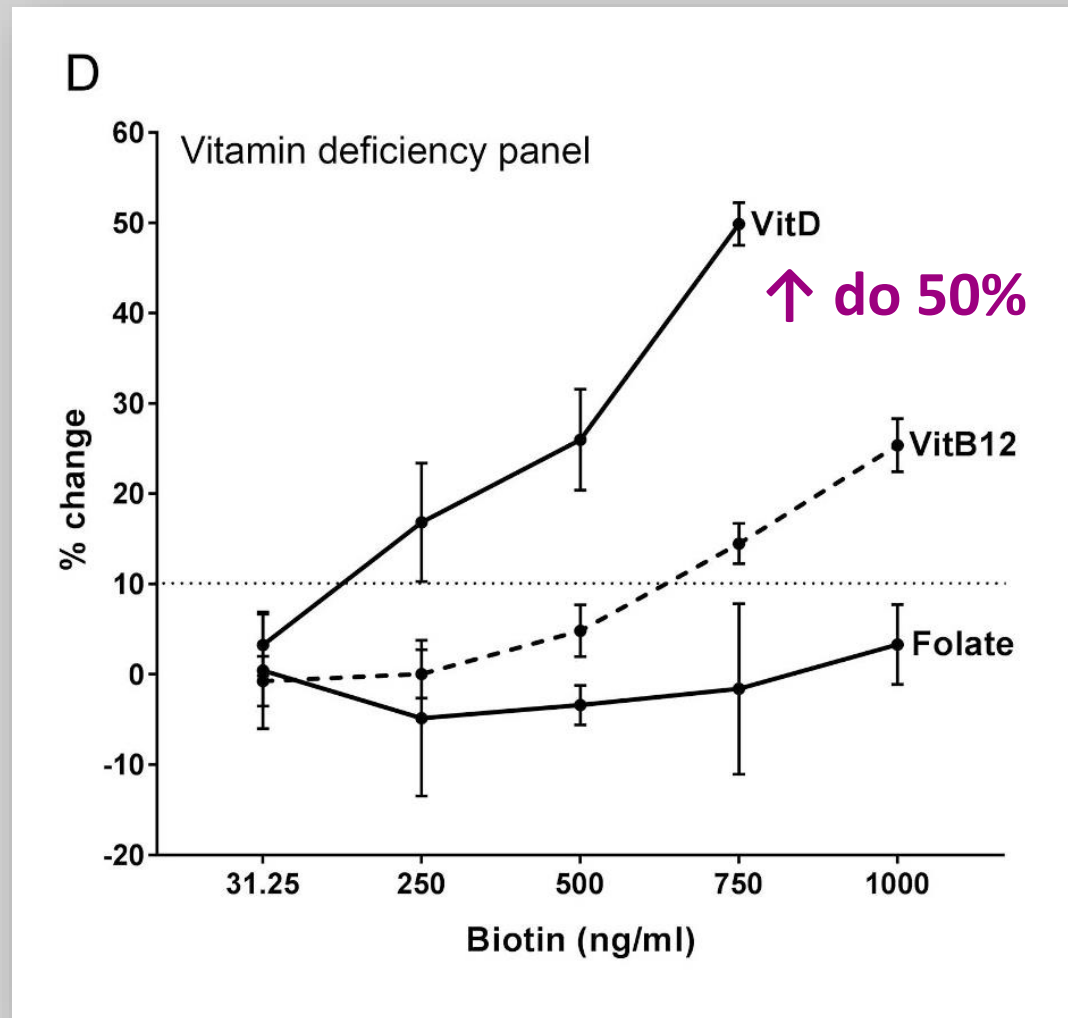
Endogene interferencije

	Abbott Architect CMIA	ADVIA Centaur CLIA	Diazyme Beckman Imunoturb.	DiaSorin Liaison CLIA	HPLC, LC-MS/MS	Mindray CL-1000i CLIA	Roche Elecsys CLIA
Hemoliza (g/L hemoglobina)	5	1,25	6	2	5	5	2
Ikterija ($\mu\text{mol/L}$ bilirubina)	513	800	684	684	500	342	1128,6
Lipemija (mmol/L triglicerida)	5,65	2,8	11,3	6,7	17	17	3,39

Interferencije lijekova

- Hormonska terapija (estrogen) ↑
- Izonijazid ↑
- Diuretici ↑
- Blokatori Ca kanala ↓
- Antacidi ↓
- Statini ↓
- Antikonvulzivi ↓

Interferencije biotina



Ovisno o
metodi
↓ ili ↑

Vrsta uzorka i stabilnost

Cobas E411

TABLE 1

Median and interquartile range values of hour 0, hour 4 (room temperature) and hour 24 (4 °C) results after centrifugation of plasma and serum samples at room temperature.

Vitamin D	Hour 0	Hour 4	Hour 24 (4 °C)	P value
Plasma (nmol/L)	36.84 (32.19–54.66)	38.48 (29.92–55.01)	39.93 (31.64–48.39)	0.145
Serum (nmol/L)	41.18 (29.70–59.23)	43.00 (31.17–50.24)	37.44 (32.09–49.22)	0.516

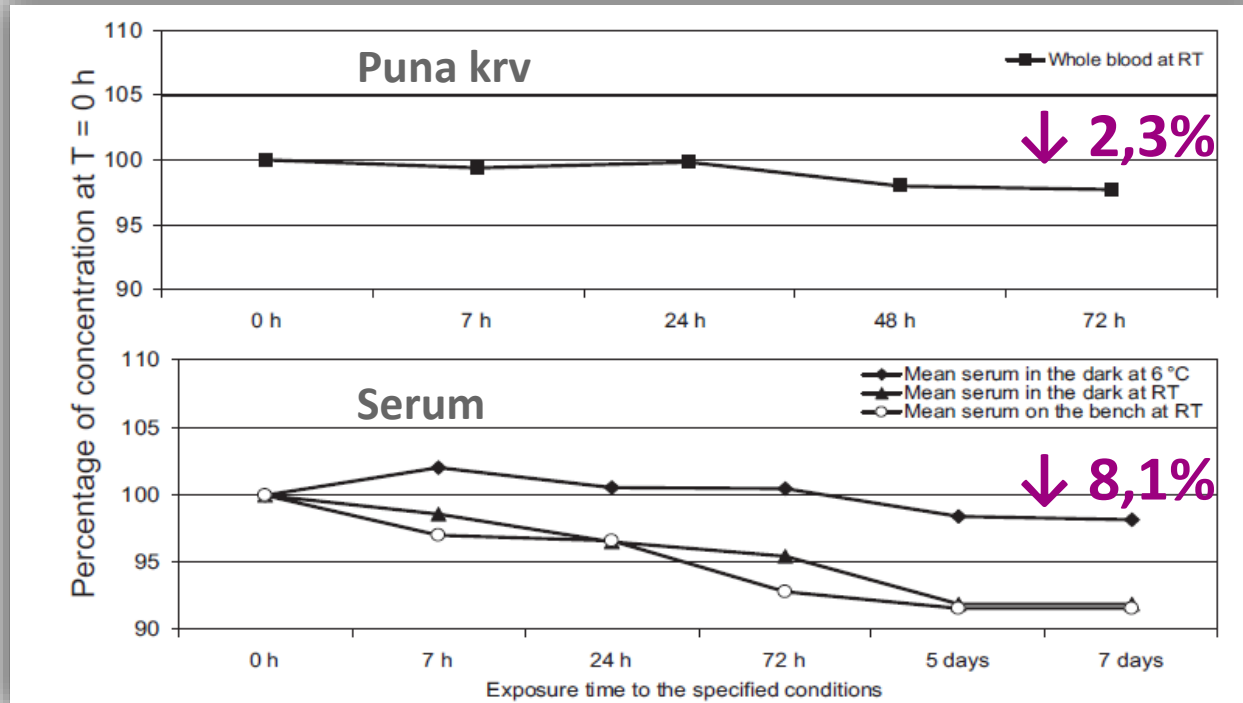
P > 0,05

TABLE 2

Median and interquartile range values of hour 0, hour 24, day 7 and month 3 results of plasma and serum samples at low temperature conditions.

Vitamin D	Hour 0	Hour 24 (–20 °C)	Day 7 (–20 °C)	Month 3 (–80 °C)	P value
Plasma (nmol/L)	40.18 (28.09–54.46)	40.38 (28.60–53.68)	44.02 (35.39–55.11)	39.61 (28.42–55.18)	0.610
Serum (nmol/L)	40.80 (29.87–59.40)	42.55 (33.07–58.98)	40.78 (34.36–53.48)	44.06 (34.24–51.29)	0.489

Stabilnost analita i transport



Do 4 ciklusa otapanja i zamrzavanja!

„SOLID AS
A ROCK”

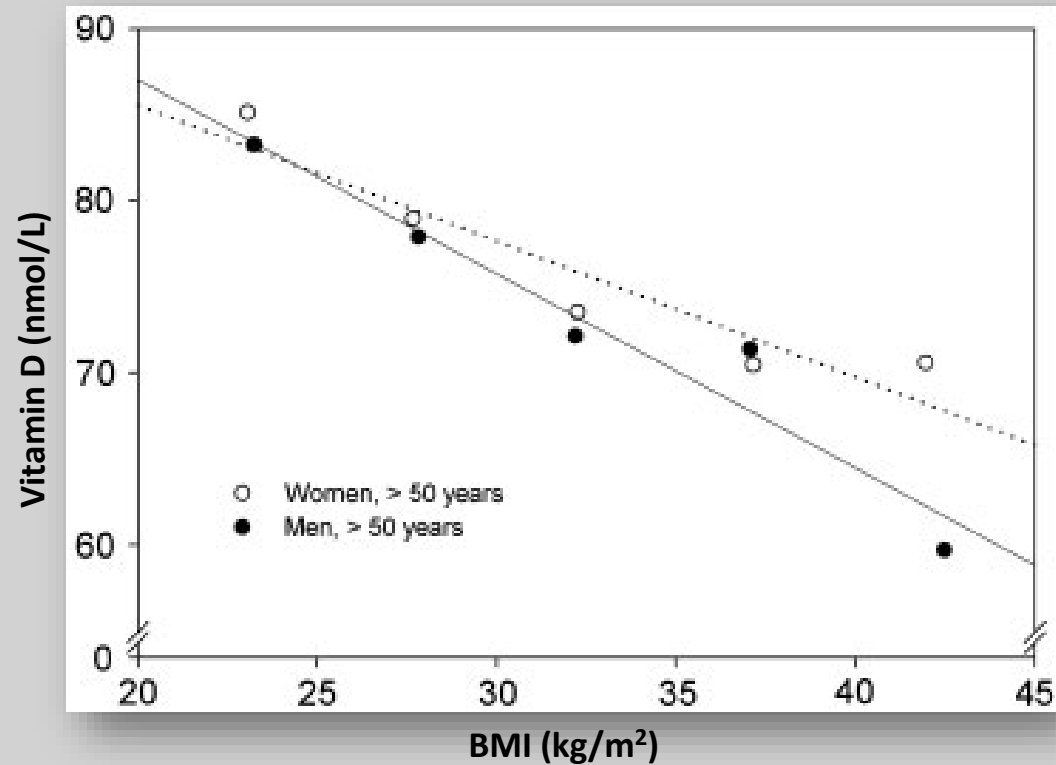


Metabolizam vitamina D

- Skladištenje viška 25(OH)D u masnom tkivu – nekoliko mjeseci



Utjecaj BMI na koncentraciju vitamina D



5 kg/m² ↑ BMI

↓ 25(OH)D za 5 nmol/L

Lagunova Z, Porojnicu AC, Grant WB, Bruland Ø, Moan JE. Obesity and increased risk of cancer: does decrease of serum 25-hydroxyvitamin D level with increasing body mass index explain some of the association? *Mol Nutr Food Res* 2010;54(8):1127-33.

Utjecaj spola na koncentraciju vitamina D

- 2017. godina
- 5053 ispitanika



- 55 (39-72) nmol/L
- 10% deficit



- 58 (40-74) nmol/L
- 7% deficit

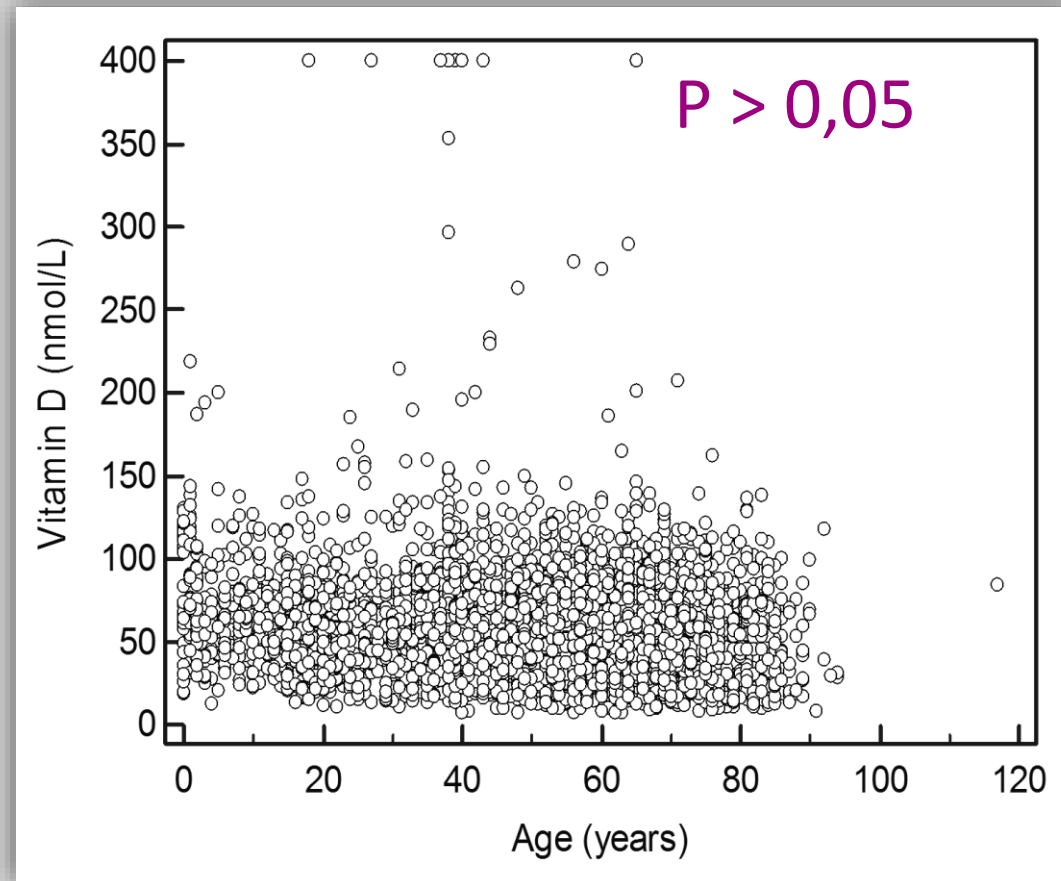
Utjecaj dobi na koncentraciju vitamina D

Europa

- Adolescenti (Danska, Finska, Poljska, Irska) – *OPTIFORD* studija
 - < 25 nmol/L: 26-51%
 - < 50 nmol/L: 90%
- Stariji – povećani rizik – češća deficijencija vitamina D
 - < 25 nmol/L: 8% M, 14% Ž (LASA studija)
 - < 30 nmol/L: 36% muškaraca, 47% žena (SENECA studija)
 - < 50 nmol/L: 45% M, 56% Ž (LASA studija)

Utjecaj dobi na koncentraciju vitamina D

KBCSM



Sinteza vitamina D



80-90%



< 20%

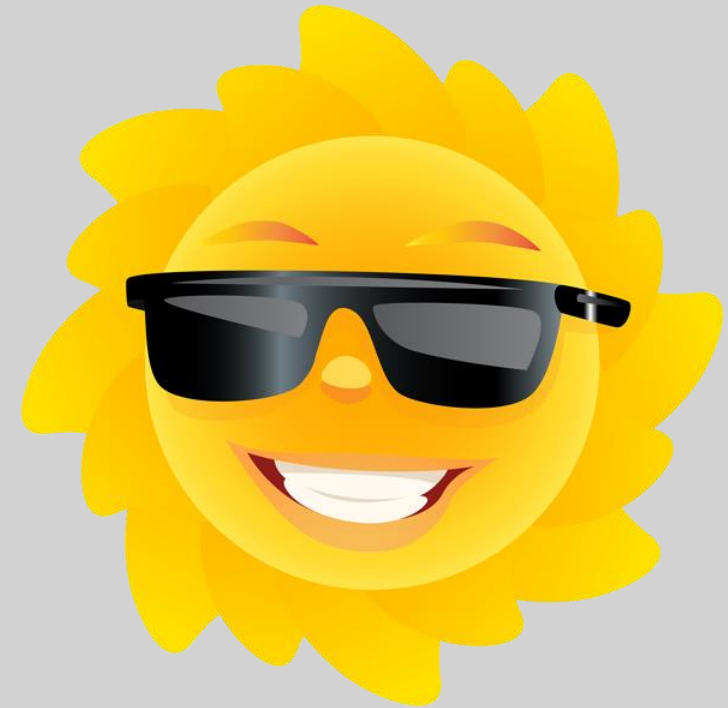
Utjecaj prehrane

- Hrana bogata vitaminom D
 - Losos, srdele, haringe, bakalar, tuna
 - Kamenice, škampi
 - Jaja
 - Gljive
 - Mlijeko i mliječni proizvodi
 - Pahuljice



Utjecaj sunca

- Boja/tip kože
- Godišnja doba
- Izloženost suncu
- Zaštitne kreme



Utjecaj boje/tipa kože

The Fitzpatrick Scale



Type 1

Light, Pale White

Always burns, Never tans



Type 2

White, Fair

Usually Burns,
Tans with difficulty



Type 3

Medium,
White to Olive

Sometimes mild burns,
gradually tans to Olive



Type 4

Olive,
Moderate Brown

Rarely burns, Tans with
ease to a Moderate Brown



Type 5

Brown,
Dark Brown

Very rarely burns,
Tans very easily

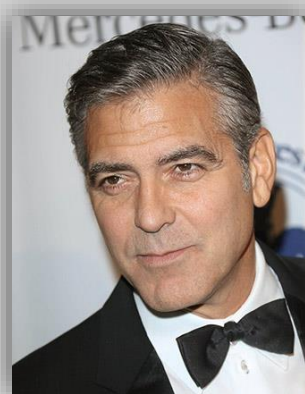


Type 6

Black, Very dark
Brown to Black

Never burns, Tans Very
easily, Deeply Pigmented

Tko ima bolju sintezu vitamina D?



Tip I

Tip III

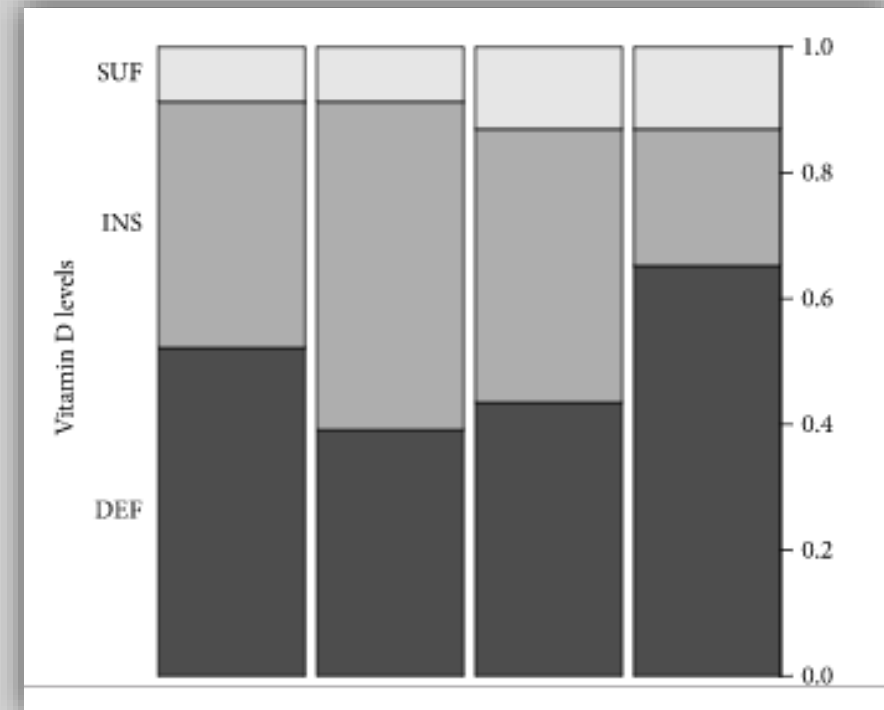
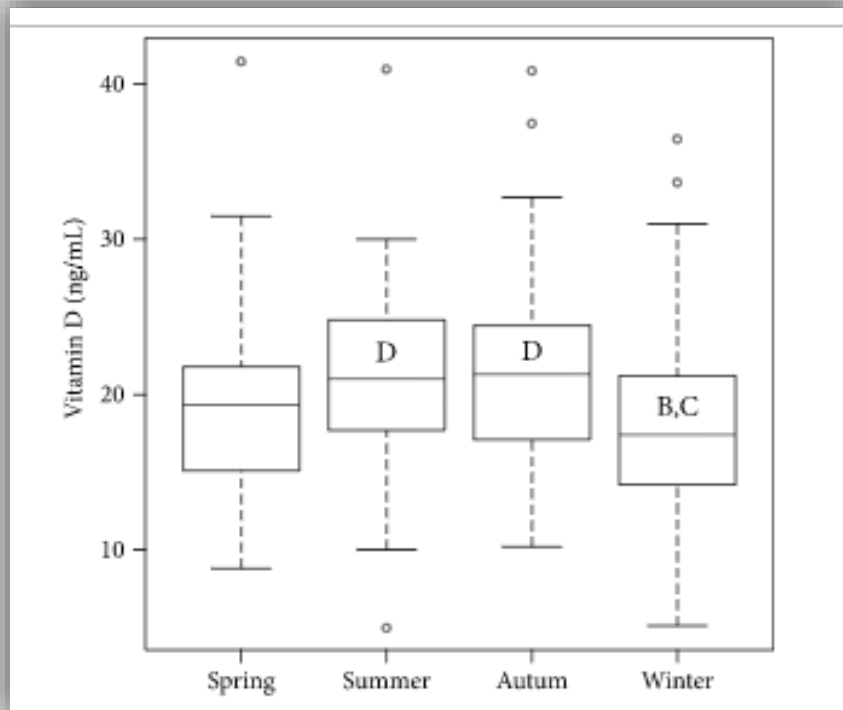
Tip VI

Potrebno vrijeme izloženosti suncu

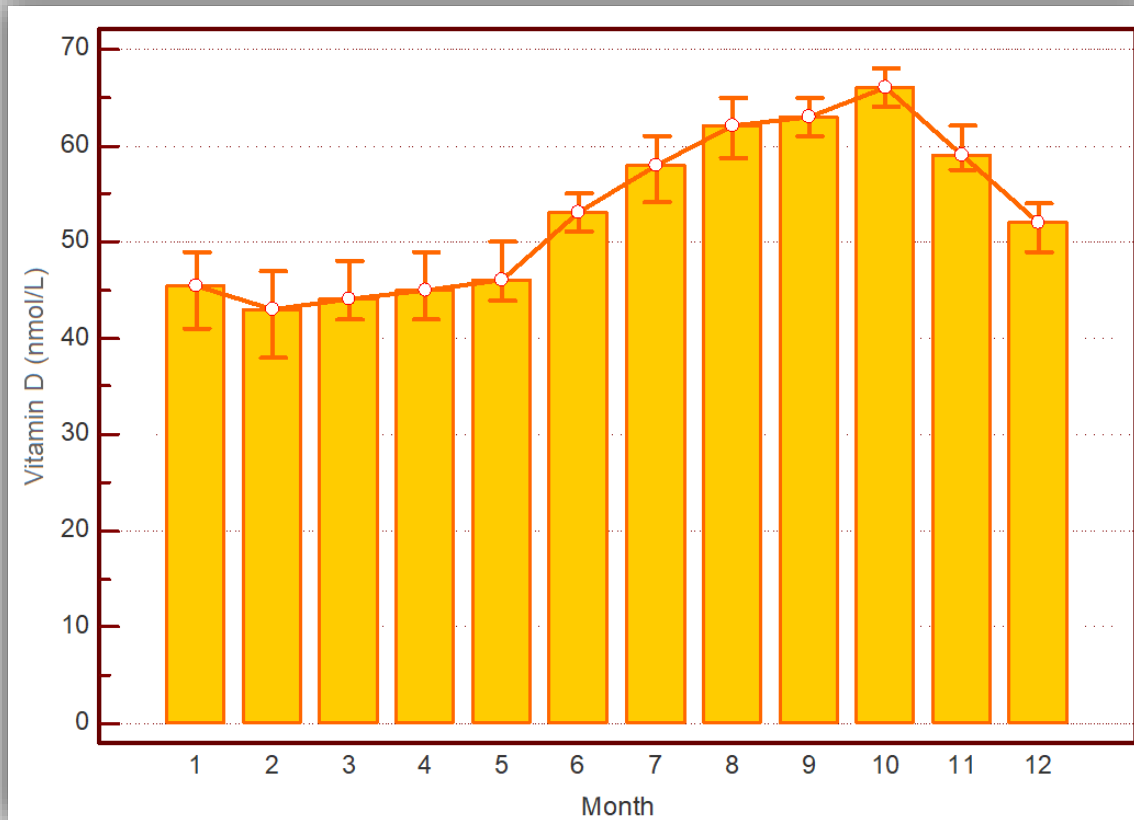
	Tip kože I do IV	Tip kože V-VI
Ljeto	6 – 7 minuta	15 – 50 minuta
Zima	7 – 40 minuta	ovisno o geografskoj širini

- Ljeti – ruke; zimi – lice, ruke, šake
- Podnevno sunce
- Zaštita kože ljeti!
- Melanin apsorbira UV zračenje i smanjuje efikasnost sinteze vit D

Sezonske razlike u konc. vitamina D



Sezonske razlike u konc. vitamina D

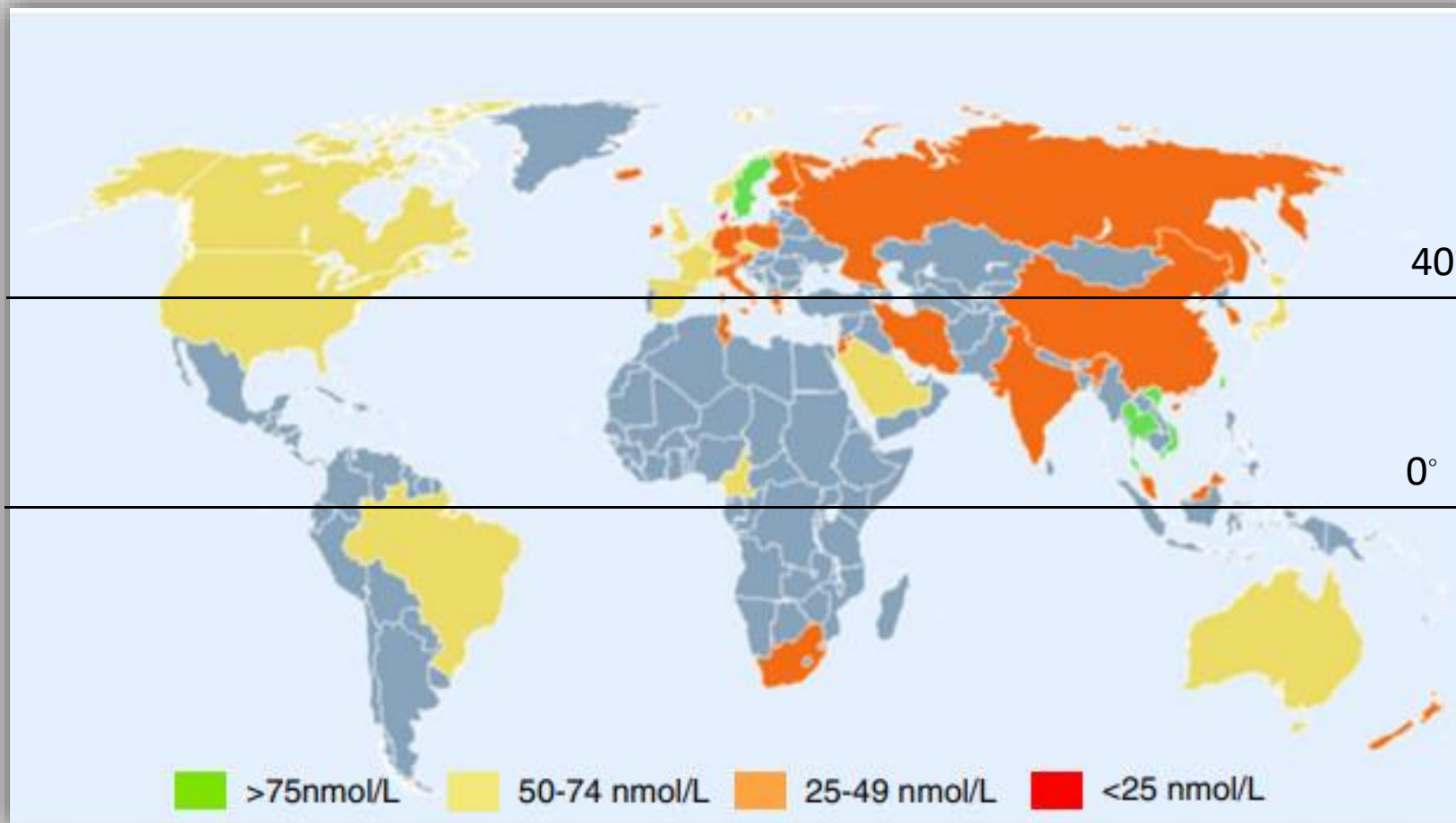


- Zagreb, KBCSM
- jesen – najviše koncentracije vitamina D

Razlike u geografskom položaju

- Meta-analiza: *A global representation of vitamin D status in healthy populations*
- 200 istraživanja (42 reprezentativna) iz 46 država
 - Europa
 - Sjeverna Amerika
 - Azijsko-pacifička regija
- Zimski period
- Razlike u metodama (RIA, CLIA, HPLC, LC-MS/MS) – 20-40%

Razlike u geografskom položaju

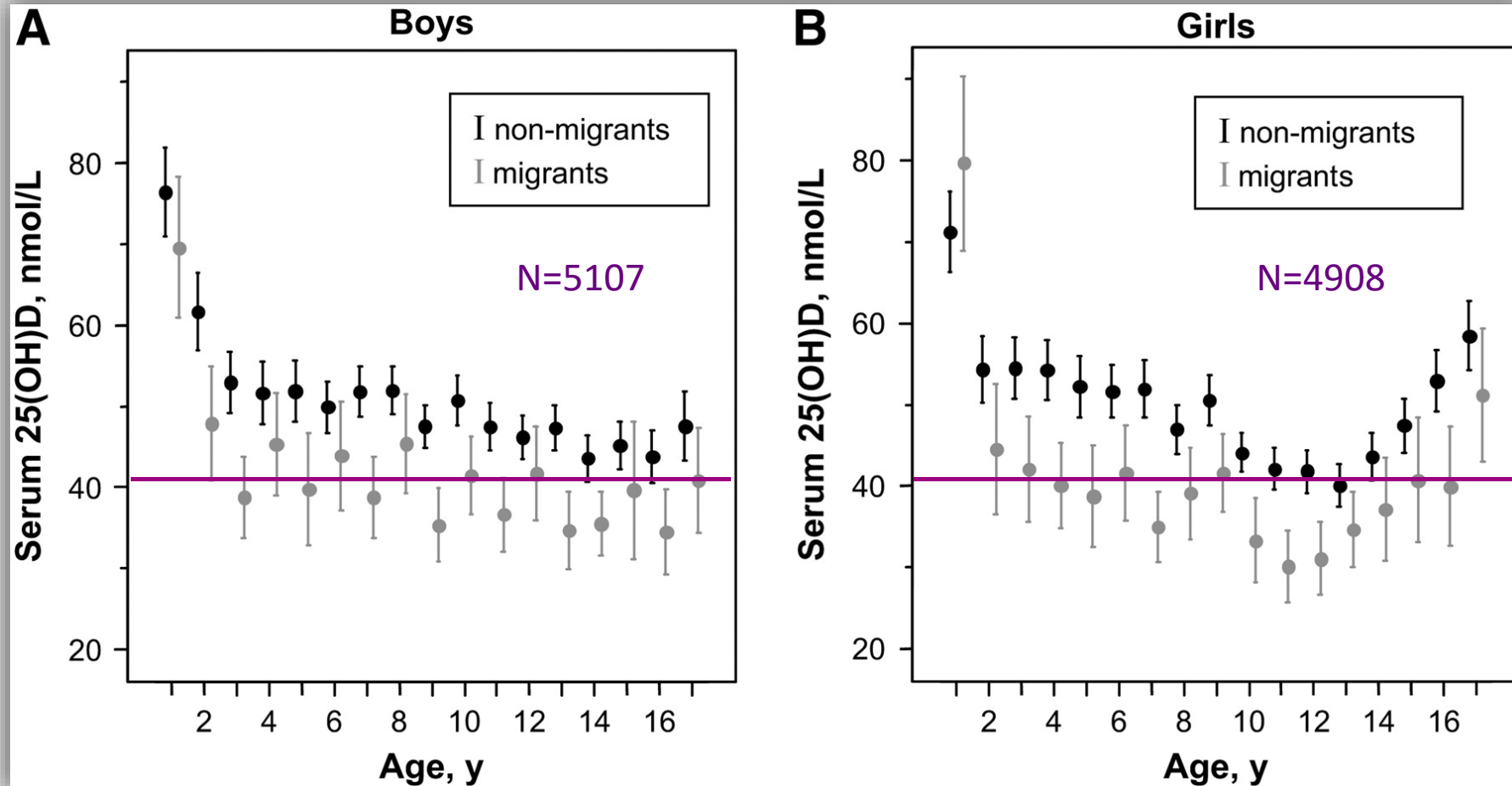


Wahl DA, Cooper C, Ebeling PR, Eggersdorfer M, Hilger J, Hoffmann K, et al. A global representation of vitamin D status in healthy populations. *Arch Osteoporos.* 2012;7:155-72.

Razlike u koncentraciji vitD kod imigranata

- Deficijencija **< 15-20 nmol/L** – 50% imigranata (ne-zapadnih)
 - manja izloženost suncu
 - jača pigmentacija kože
 - veća pokrivenost površine tijela odjećom
 - slabiji unos vitamina D hranom
 - slabiji unos Ca hranom

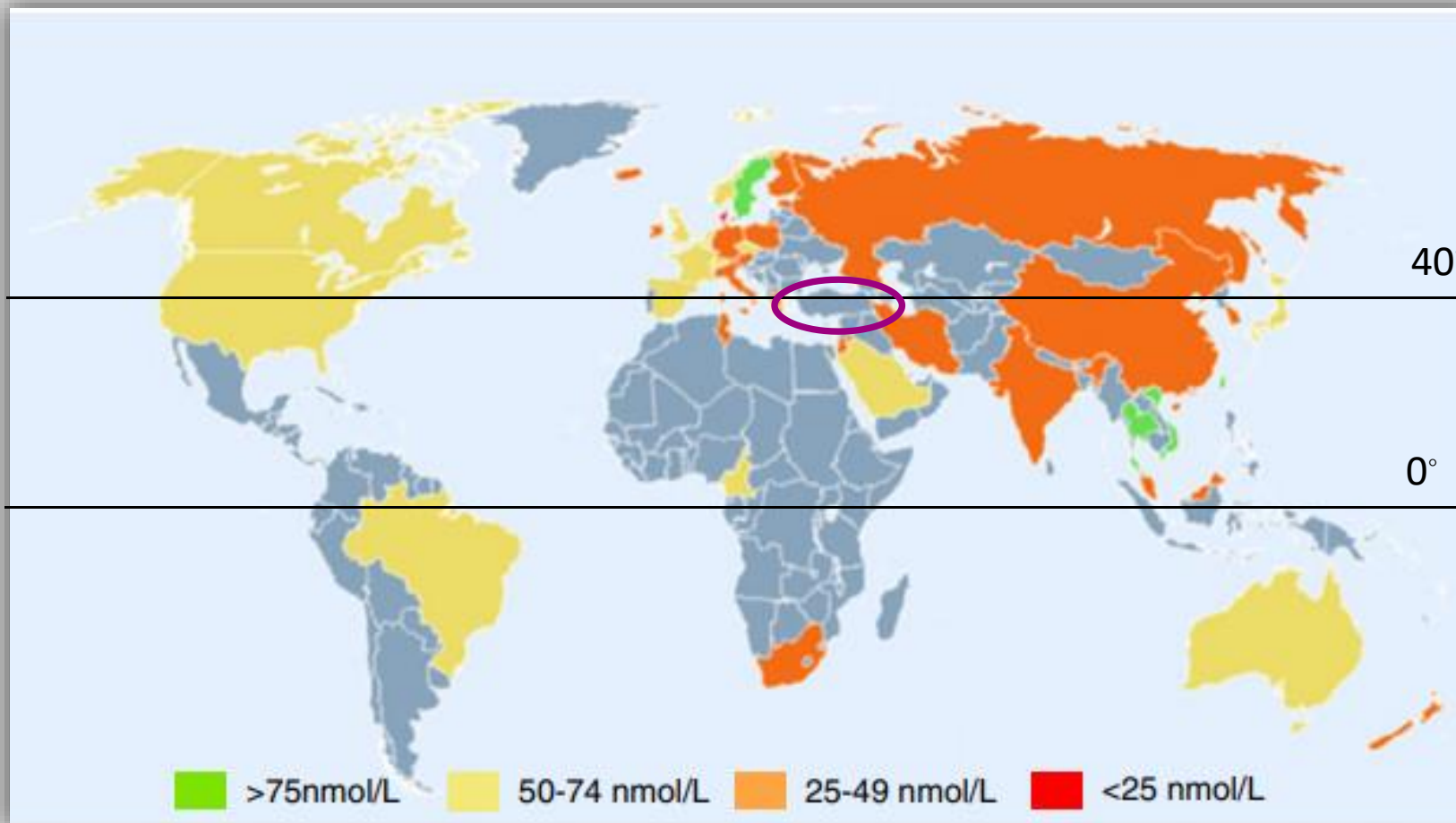
Razlike u konc. vitD kod djece imigranata



Prevalencija deficijencije, Europa

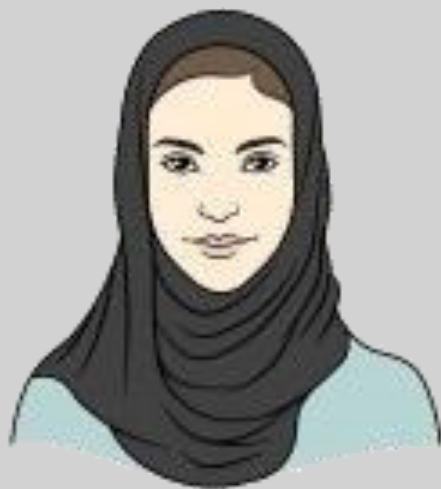
Država	< 25 nmol/L	< 50 nmol/L
Austrija	12 – 25 (stariji)%	30 – 44 (stariji)%
Francuska	2 (stariji) – 5%	42%
Njemačka	16%	57%
Nizozemska	10%	35%
Španjolska	/	34%
Turska	/	75%
Sjeverna Europa (Danska, Finska, Irska, Poljska)	17%	67 – 92 (djeca) %

Razlike u geografskom položaju



Wahl DA, Cooper C, Ebeling PR, Eggersdorfer M, Hilger J, Hoffmann K, et al. A global representation of vitamin D status in healthy populations. *Arch Osteoporos.* 2012;7:155-72.

Prekrivenost tijela odjećom



Hijab



Chador



Niqab



Burka

Zaštita od sunca – odjeća

- Istanbul 41°N
- dovoljno sunca

Table 1 – Baseline demographic and biological parameters of all participants

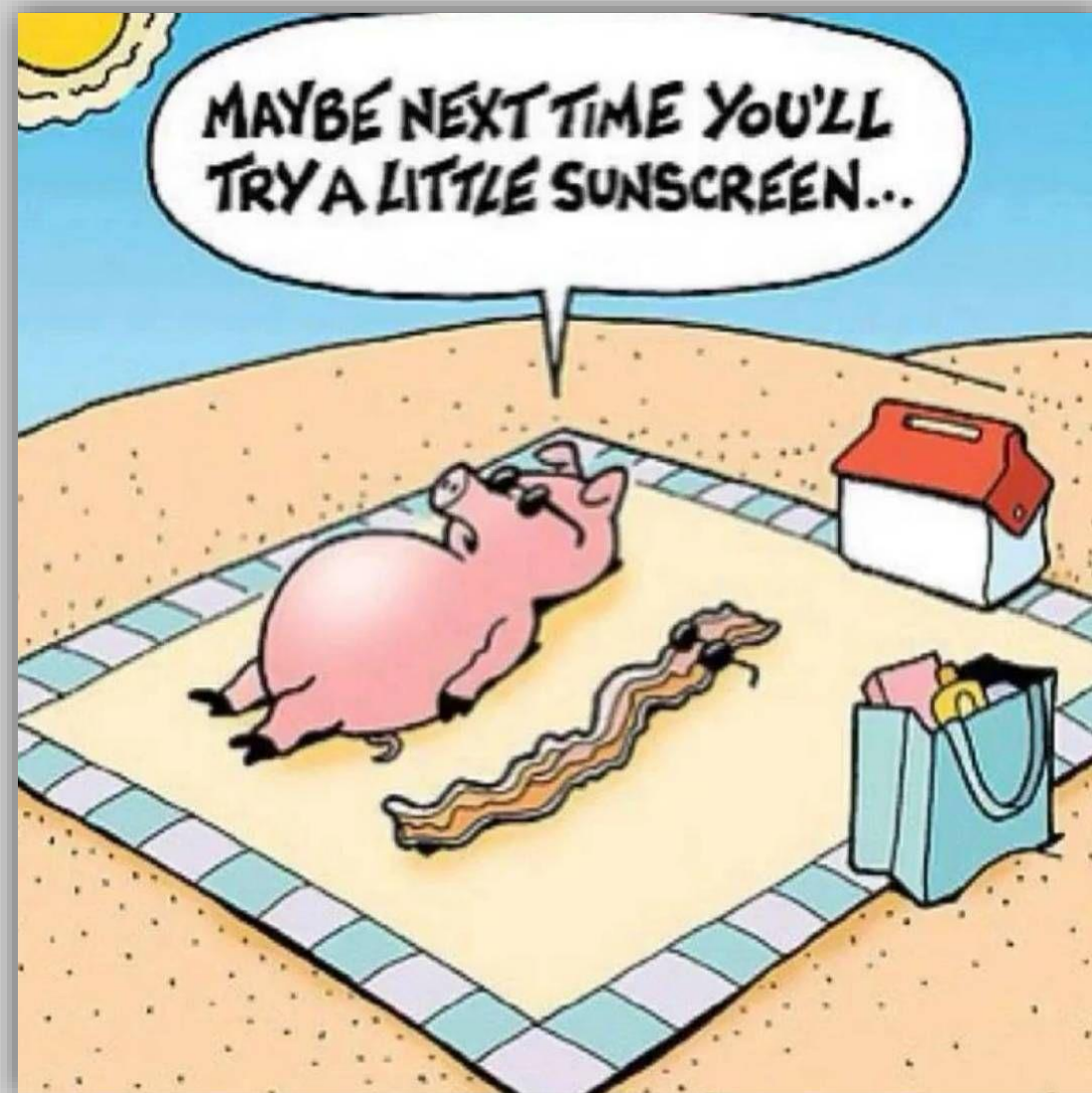
	Total (n = 100)	Clothing style		P
		Covered (n = 40)	Uncovered (n = 60)	
Demographic parameters				
Age (y)	20.9 (2.1)	20.6 (1.7)	21.2 (2.3)	.162
BMI (kg/m ²)	23.0 (3.6)	24.0 (4.0)	22.3 (3.1)	.020 *
Body weight status, n (%)				
Underweight (<18.5)	12 (12.0)	5 (12.5)	7 (11.7)	.674
Normal weight (18.5-24.9)	60 (60.0)	19 (47.5)	41 (68.3)	.286
Overweight (≥25)	28 (28.0)	16 (40.0)	12 (20.0)	.218
Biological parameters ^a				
25(OH)D (ng/mL)	26.3 (10.0)	21.1 (6.7)	29.7 (3.1)	0.000 **
25(OH)D status, n (%)				
< 50 nmol/L Deficient (<20)	34 (34.0)	22 (55.0)	12 (20.0)	.000 **
50-75 nmol/L Insufficient (20-29.9)	36 (36.0)	14 (35.0)	22 (36.7)	
≥ 75 nmol/L Sufficient (≥30)	30 (30.0)	4 (10.0)	26 (43.3)	

P < 0,001

Zaštita od sunca – kreme

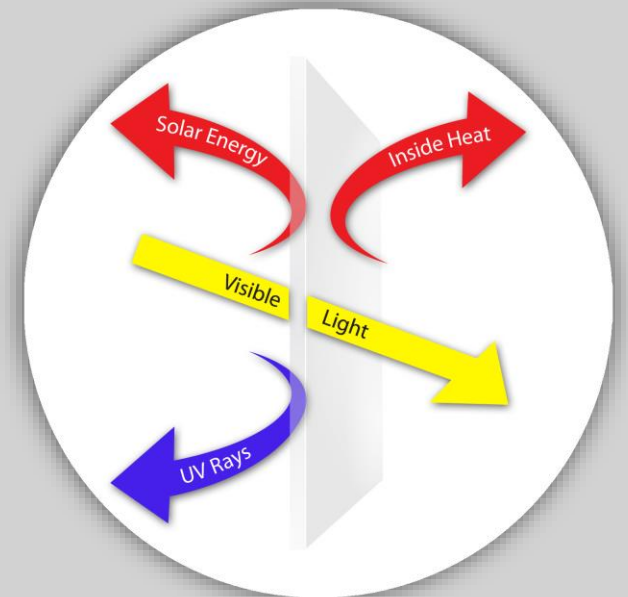
- SPF (*sun protection factor*) > 8 blokira stvaranje vitamina D
- Rizik od melanoma
- SPF 50+
 - Ne nanosi se uvijek
 - Ne nanosi se dovoljno
 - Nije pokriveno cijelo područje kože
 - Ne ponavlja se nanošenje





Zaštita od sunca

- Oblaci ↓ UV zračenje za 50%
- Zagađenje zraka ↓ UV zračenje za 60%
- Staklo – apsorbira > 90% UV zračenja



Zaštita od sunca – zatvoreni prostor

Sportaši

Age group	N	Vitamin D (ng/mL), mean ± SD	p-value
5–17	409	21.4 ± 14.3	0.000*
18–30	110	15.1 ± 9.6	0.440**
30+	36	19.5 ± 11.4	0.026***
Feature			
Autumn months	Outdoor athletes	29 23.7 ± 15.7	0.132
	Indoor athletes	126 29.1 ± 17.8	P > 0,05
Winter months	Outdoor athletes	133 17.2 ± 9.6	
	Indoor athletes	267 16.7 ± 10.3	

Aydın CG, Dinçel YM, Arıkan Y, Taş SK, Deniz S. The effects of indoor and outdoor sports participation and seasonal changes on vitamin D levels in athletes. *SAGE Open Med.* 2019;7:2050312119837480.

Stariji smješteni u domove

80-90% žena: < 50 nmol/L
vitamina D

- Način života
- Radno vrijeme



Hvala!