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# Vitamin D Deficiency in Swiss Elite Wheelchair Athletes

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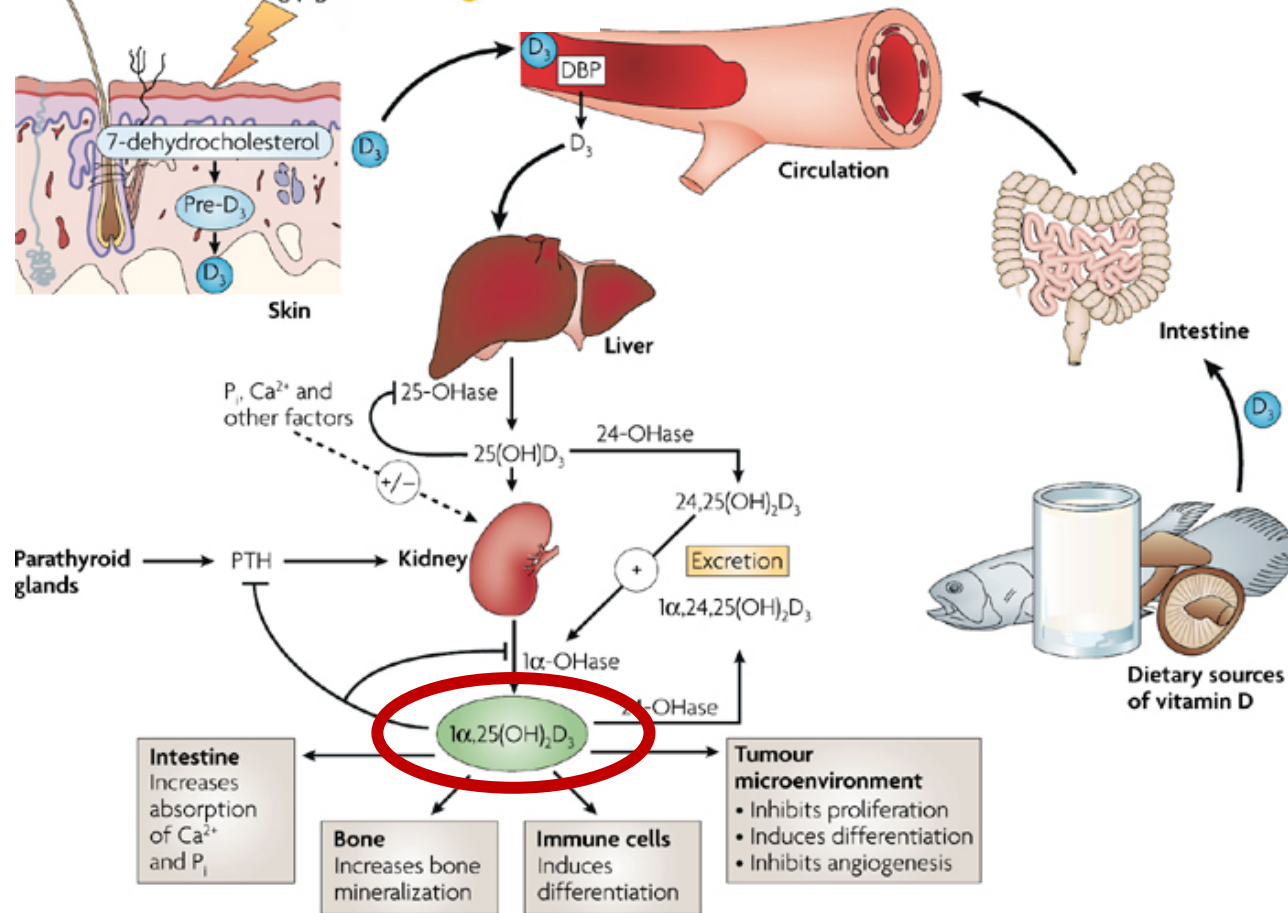
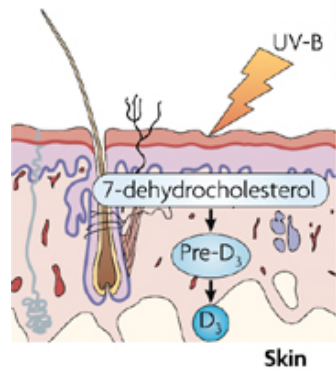


# Introduction

Vitamin D Food Source	IUs per serving
High Vitamin Cod Liver Oil, 1 tsp	1,150
Standard Cod Liver Oil, 1 tsp	400
Salmon, cooked, 3.5 oz	360
Mackerel, cooked, 3.5 oz	345
Tuna, canned in oil, 3 oz	200
Sardines, canned in oil, drained, 1.75 oz	250
Egg Yolk	20
Beef Liver, cooked, 3.5 oz	15
Cheese, swiss, 1 oz	12

Source: National Institutes of Health, 2009

# Introduction



# Vitamin D Deficiency: Risk Factor

- Rickets
- Osteomalacia
- Osteoporosis
- Diabetes
- Depression
- Multiple sclerosis
- Cancer
- Cardiovascular diseases (hypertonia, ischemia, etc.)

## **But also:**

- Impaired neuromuscular function
- Impaired performance

Holick et al. 2011

# Aim of the Study

→ Prevalence of vitamin D deficiency in Swiss elite wheelchair athletes

- National team members in their discipline
- Sports: rugby, basketball, paracycling, athletics, curling, tennis, ski alpine
- Blood samples during the whole year (medical check-up, performance testing)

# Methods

- Total serum 25[OH] vitamin D
- Automated benchtop immunoanalyzer (VIDAS®, bioMérieux, France)

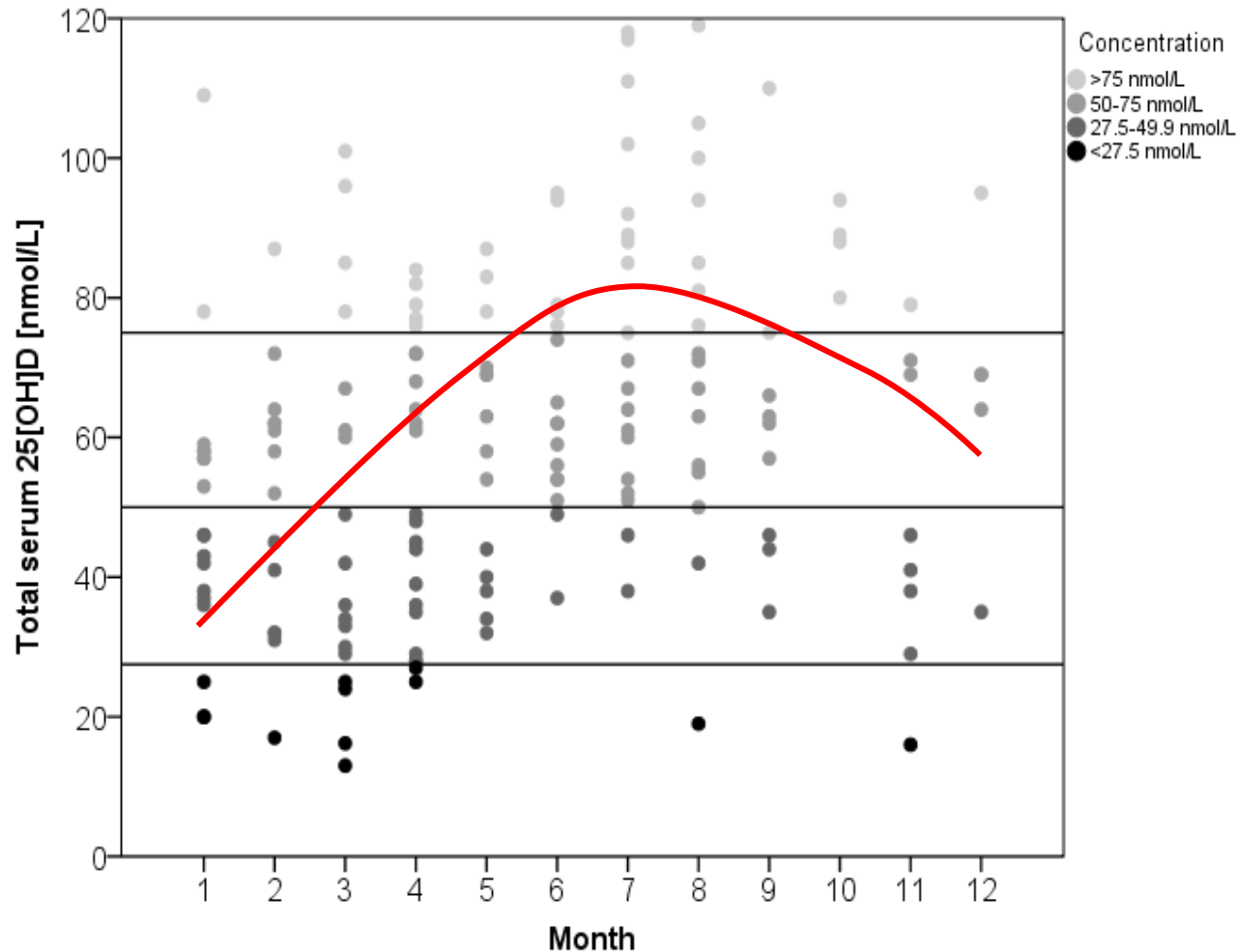
## Vitamin D status:

- >75 nmol/L: no deficiency
- 50 – 75 nmol/L: insufficiency
- 27.5 – 49.9 nmol/L: deficiency
- <27.5 nmol/L: severe deficiency

# Results: Study Participants

- 164 blood samples from 72 Swiss elite wheelchair athletes
- Age:  $32 \pm 13$  years
- 73.2% of all samples showed an insufficiency/deficiency during the whole year (independent of the season)
- Indoor vs. outdoor athletes
- Summer vs. winter

# Results: Insufficiency or deficiency?





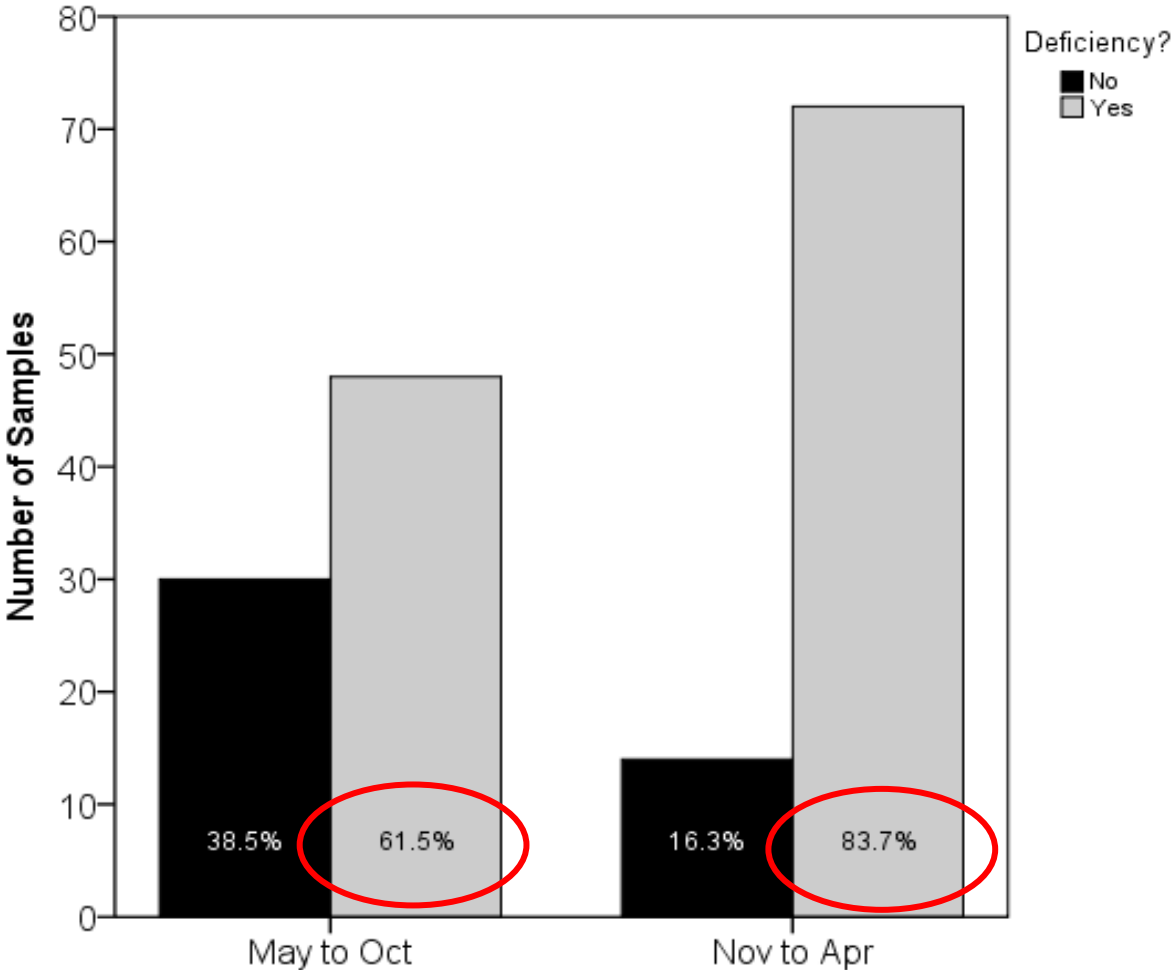
# Results: 25[OH]D month per month

Month	No. of samples (N)	Total serum 25[OH]D [nmol/L]
January	18	49.0 ± 21.2
February	14	51.1 ± 19.0
March	18	48.8 ± 27.3
April	23	53.5 ± 20.3
May	14	58.5 ± 18.5
June	16	65.3 ± 16.2
July	19	75.8 ± 24.4
August	16	72.2 ± 25.4
September	9	62.0 ± 21.9
October	4	87.8 ± 5.8
November	8	48.6 ± 22.3
December	5	66.4 ± 21.3

## Results: 25[OH]D between groups

Groups	Total serum 25[OH]D (nmol/L) (mean $\pm$ SD)	p value
Gender		
Male	60.4 $\pm$ 23.2	0.77
Female	59.2 $\pm$ 24.1	
Impairment level		
Paraplegia	60.6 $\pm$ 22.6	0.69
Tetraplegia	58.1 $\pm$ 29.2	
Impairment extent		
Complete	63.7 $\pm$ 24.7	0.12
Incomplete	57.7 $\pm$ 22.6	
Season		
Summer	69.5 $\pm$ 21.4	<0.001
Winter	51.5 $\pm$ 21.9	
Sport		
Outdoor	62.5 $\pm$ 22.6	0.042
Indoor	53.9 $\pm$ 24.7	

# Results: winter vs. summer



# Discussion

- Surprising?

No! → Results from questionnaire with 65 wheelchair athletes:

Supplement	Training	Competition
Energy Gel	5 (8%)	5 (8%)
Regi-Shake	11 (17%)	17 (26%)
Sports drink	19 (29%)	5 (8%)
Proteine	7 (11%)	1 (1.5%)
Creatine	1 (1.5%)	3 (5%)
Caffeine	3 (5%)	3 (5%)
Multivitamin	0 (1.4%)	2 (5%)
<b>Vitamin D</b>	<b>10 (15%)</b>	<b>4 (6%)</b>
Bicarbonate	0	1 (1.5%)
Iron supplement	6 (9%)	1 (1.5%)
Calcium	3 (5%)	0
Carnosine	0	0
Beta-alanine	0	1 (1.5%)
Glucose	0	0
L-Carnitine	0	0
Nitrate/Beetroot juice	1 (1.5%)	1 (1.5%)
Prebiotics	0	0
Vitamin C	4 (6%)	3 (5%)
Arginine	0	0
BCAA	2 (3%)	0
Chrome	0	0
Coenzyme	0	0
Cordyceps	0	0
Magnesium	8 (12%)	3 (5%)
Pyruvaet	0	0
Ribose	0	0
Others	3 (5%)	0

# Take Home Message

- Relative high prevalence of vitamin D insufficiency/deficiency overall (73.2%)
- Very high prevalence during **winter months**
- **Indoor athletes** showed a higher prevalence and lower total serum 25[OH]D
- **We recommend to check vitamin D status in all athletes during fall and supplement, where an insufficiency or deficiency was detected!!**

# Thank you for the attention!!

