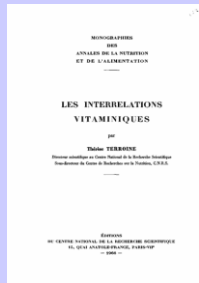




DEVELOPING THE CONCEPT OF FUNCTIONALLY BOUND VITAMINS TO INCREASE CHOLECALCIFEROL BIOAVAILABILITY

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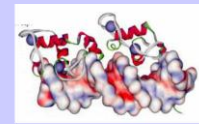
Bioavailability and bioefficacy of vitamin D is a subject of influence from the side of other water-soluble and fat-soluble vitamins and stands out as clear example to the existence of interaction between vitamins (T. Terroine Les interrelations vitaminiques, Paris, 1966).



Modern form of fish oil supplement (Möller – 5 ml) consists of vitamin A (250 mcg), vitamin D (10 mcg i.e. 400 IU), vitamin E (10 mg) and polyunsaturated fatty acids (0.4 - 1.2 g). The recommended single dose of it is 2.5 ml.

Fish oil which was used as a remedy against rickets since 1918 represents in fact the mixture of vitamin A (60-1500 IU/g), vitamin D (300 IU/g) and polyunsaturated fatty acids.

Classical value for the daily requirements in 10 mcg (400 IU) of vitamin A (60-1500 IU/g), vitamin D (300 IU/g) and polyunsaturated fatty acids (0.4 - 1.2 g). The recommended single dose of it is 2.5 ml.



Genomic action of 1,25-dihydroxyvitamin D3 is mediated through heterodimeric DNA binding by the vitamin D receptor and retinoid X receptor followed by the additional involvement of co-activators resulted in increasing of target gene expression. *It's a vivid example of the interaction between vitamins!*

The modern micellar form of vitamin D supplement consists of retinyl palmitate (vitamin A) - 20000 IU/ml and vitamin D - 10000 IU/ml (Aquadetrim Plus, Medana Pharma S.A., Poland).



Considering the widely distributed vitamin D deficiency in a diet among the population and polyhypovitaminosis the studies was carried out to examine the inter-vitamin relationships in a different vitamin states. The results obtained by V.B. Spirichev and I.N. Sergeev in 1987-1991 are presented in Table 1 and 2.

Table 1 – Effect of vitamin deficiency on vitamin D endocrine system

Vitamin deficiency	Blood 25(OH)D	Blood 1.25 (OH) ₂ D	Liver 25(OH)ase	Kidney 1-(OH)ase	Kidney 24-(OH)ase	Calcitriol receptors in intestines and kidneys		
						Unoccupied receptors	Occupied receptors	DNA-bound receptors
C	-	-	-	-	+	-	-	-
B ₂	-	-	-	0-	-	-	-	0
B ₆	0	-	0	0-	0-	+	++	+
PP	+	-	0-	0	0			
Folate	0	0	-	0	0		-	-
E	0	-	-	-	-	-	-	0
K	0	0	0-	0	0	+	+	++

Notes: (-), decrease; (+), increase; (0), unchanged parameter; two similar signs, marked parameter change; (0-) or (0+), tendency to changes in the parameter with indication of direction

Sergeev I.N. Metabolism, reception and application of active metabolites of vitamin D. Diss. Moscow, 1991

Table 2 – Effect of vitamin deficiency on calcium metabolism and bone tissue

Vitamin deficiency	Blood calcium	Blood parathyroid hormone	Ca intestinal absorption	Intestinal alkaline phosphatase	Bone tissue	
					Density	Ca
C	-	-	-	-	-	-
B ₂	0-	-	0-	-	0-	-
B ₆	0	-	0-	0-	0-	0
PP	-	0	0-	0-		
Folate	0	+	0-	0-	0	-
E	-	-	0-	0	0-	-
K	0	0+	-	-	0	0

Notes: (-), decrease; (+), increase; (0), unchanged parameter; two similar signs, marked parameter change; (0-) or (0+), tendency to changes in the parameter with indication of direction

Sergeev I.N., Spirichev V.B. Ascorbic acid effects on 1-OHase and 24-OHase activity in kidneys and 1.25(OH)₂D₃ receptor binding in the intestinal mucosa of guinea pigs // In: Vitamin D: molecular, cellular and clinical endocrinology. (Ed. A.W.Norman). 1988. P. 191-193.



V.B. Spirichev formulates his concept as follows:

«Taking into consideration wide prevalence of polyhypovitaminous states, including those in women preparing for maternity, pregnant and nursing ones, there is every reason to suggest that the cause for insufficient vitamin D efficacy in prevention and treatment of various forms and manifestations of rachitis cannot be insufficiency of the applied dose of this vitamin. This is rather due to lack of quite a number of other vitamins so necessary for production of the hormone-active forms of vitamin D and successful implementation of its diverse functions in the mother and child organisms.»

Table 3 – Changes in manifestations of vitamin D deficiency by the levels of its biomarker 25(OH) in patients after administration of VALETEC product (400 IU) - 1st group, Aquadetrim (1000 IU) - 2nd group, Aquadetrim (500 IU + Vitamin complex - mixture containing vitamins C, B2, B6 and folicin) in addition to combination therapy - 3rd group.

	Normal levels (30±30)	Insufficiency (20-29 ng/ml)	Deficiency (10-19 ng/ml)	Pronounced deficiency (10-19 ng/ml)
1 st group (Valetex)				
before treatment	0 %	52,9 %	29,4 %	17,8 %
after 1 month of treatment	29,4 %	23,5 %	35,3 %	11,8 %
after 3 months of treatment	70,7 %	17,6 %	11,7 %	0 %
2 nd group (Aquadetrim)				
before treatment	0 %	44,4 %	38,9 %	16,7 %
after 1 month of treatment	27,8 %	44,4 %	22,2 %	5,6 %
after 3 months of treatment	55,5 %	0 %	38,9 %	5,6 %
3 rd group (500 IU+vitamin)				
before treatment	0 %	50 %	42,9 %	7,1 %
after 1 month of treatment	42,9 %	28,6 %	21,4 %	7,1 %

CONCEPT OF D3 + 12 VITAMINS

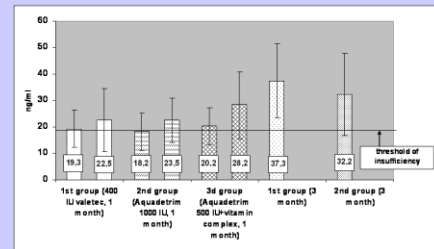
C
B2
B6
PP
FA
E
K
Realization of numerous and vital functions of vitamin D in the human body is closely dependent on allowance with all other vitamins required for formation of the vitamin D hormone-active form and normal performance of vital biochemical processes controlled by this vitamin form.

According to our knowledge the use of "Valetex" drink containing 10 mkg of vitamin D3 (400 IU) and complex of vitamins (A, C, E, K, B1, B2, B6, B12, niacin, pantothenic acid, folicin, biotin) or «Aquadetrim» (Poland) in a dose equivalent to 500 IU of vitamin D + complex mixture containing vitamins C, B2, B6 and folicin in addition to combination therapy in clinic trials on patients with chronic heart failure during the period of 2 - 3 month led to increased levels of 25(OH)D in blood plasma [25(OH)D was measured by enzyme immunoassay analysis with DRG reagent (USA)] as well as the treatment of the same group of patients with the daily dose 1000 IU "Aquadetrim" available in the form of drops caused the same effects after one month of treatment. But after 3 months of treatment the Valetex product showed better efficacy.

Prof. Strichev V.B. Food Industry: Science and Technologies, 2014

CONCLUSIONS

- Intake of vitamin D at a dose of 400 ME + 12 vitamins (Valetex) over 3 months allowed achievement of optimum bodily vitamin D level in 70.7% of cases.
- Intake of cholecalciferol (Aquadetrim) at a dose of 1000 ME over 3 months enables achievement of optimum bodily vitamin D level in 55.5% of cases
- Significant differences in the parameter between group I and group II were not determined. However, this indicates that the Vitamin D-containing Valetex Forter with less than 2-fold lower cholecalciferol daily dose showed the same efficacy as the Aquadetrim.



CONCLUSIONS

- This confirms the concept that bioavailability and functionality of vitamin D-correcting technologies depends on allowances of some other vitamins. This was implemented in the D3+12 vitamins scientific concept and in manufacturing the Valetex Forte vitamin drink.
- The patients were recommended to continue intake of either Valetex or Aquadetrim over the next 3 months, controlling blood plasma vitamin D level.
- D vitamin status optimization could be achieved by combining the Aquadetrim micellar form with the complex of vitamins C, B₂, B₆ and folicin.



Thank you!

Welcome to Royal Grodno!

The potentiation of cholecalciferol availability was observed when "Aquadetrim" in a dose of 500 IU in combination with complex of vitamins C, B2, B6, folicin was applied.

Thus the coverage of vitamin D status is provided by the combined application of different vitamins required for production of hormonally active forms of vitamin D to sustain vitally important functions of organisms.