

Effects of calcifediol versus cholecalciferol on 25(OH)D₃ serum levels, appendicular muscle strength, and physical performance in post-menopausal women

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BACKGROUND

Vitamin D can be considered a steroid hormone because of its biological effects on several tissues, beyond the bone [1]. Vitamin D stimulates the proliferation and differentiation of muscle cells through gene transcription in myoblasts, inducing an increased synthesis of muscle-specific proteins, such as myosin- and calcium-binding proteins (figure 1) [2,3]. It has been hypothesized that vitamin D supplementation increases muscle function and physical performance [4]. The aim of our study is to compare women taking cholecalciferol versus those taking calcifediol in terms of improvement of the serum levels of 25(OH)D₃, muscle strength and muscle performance.

METHODS

In this prospective study we included postmenopausal women aged ≥ 50 years, naïve to vitamin D or calcifediol administration. We divided this cohort into two groups: women using cholecalciferol [20 μ g (800 IU), 4 oral drops per day] and women using calcifediol (20 μ g, 4 oral drops per day). We evaluated at the baseline (T0) and after 6 months (T1) the following parameters: serum levels of 25(OH)D₃, appendicular muscle strength, using the Hand Grip Strength Test (HGS) and the Knee Extensor Strength Test (KES), and physical performance, using the Short Physical Performance Battery (SPPB).

RESULTS

We evaluated 205 post-menopausal women, mean aged 69.28 ± 9.16 years, 103 treated with calcifediol and 102 with cholecalciferol. No significant differences between groups was observed in both age and BMI (table 1). Within-groups analysis demonstrated that once-daily administration of calcifediol significantly increased serum levels of 25(OH)D₃, handgrip strength, knee extension strength and muscle performance compared to cholecalciferol supplementation (table 2). The same findings were confirmed in the between-groups analysis (table 3).

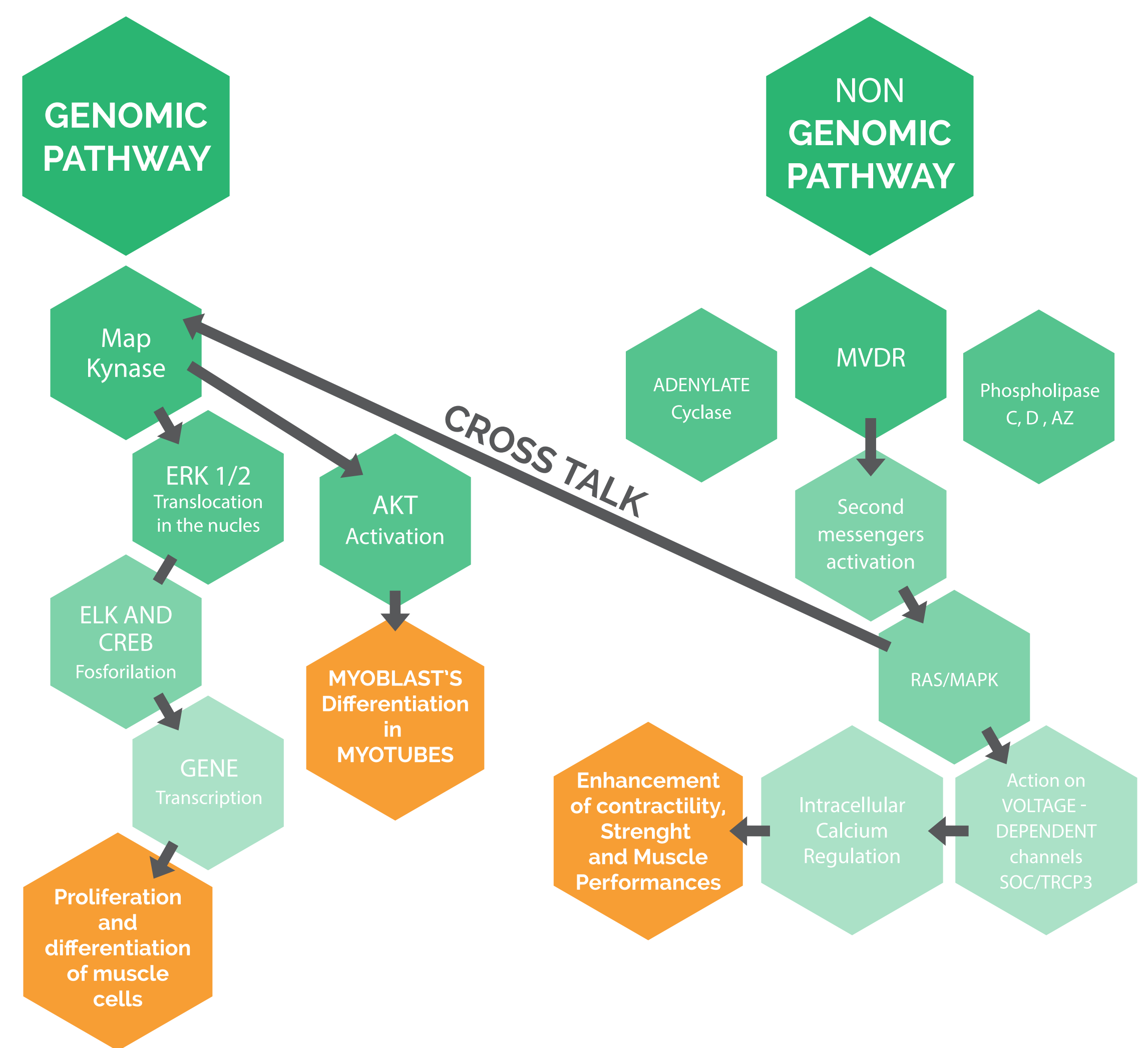


FIGURE 1: BIOLOGICAL EFFECTS OF THE VITAMIN D ON THE MUSCULAR STRENGTH AND PERFORMANCE.

Table 1. Baseline characteristics

	Cholecalciferol T0 (n=102)	Calcifediol T0 (n=103)	P values
AGE (years)	71.19 \pm 8.13	66.67 \pm 9.77	0.057
BMI (kg/m ²)	24.75 \pm 3.23	25.74 \pm 3.48	0.352
25(OH)D ₃ (ng/ml)	35.15 \pm 11.57	31.24 \pm 13.04	0.211
HGS(kg)	15.36 \pm 6.06	15.54 \pm 6.65	0.978
KES(kg)	12.12 \pm 5.74	14.49 \pm 6.92	0.135
SPPB	7.81 \pm 3.66	8.41 \pm 3.32	0.558

Results are expressed as means \pm standard deviations. Between groups analysis was performed using an independent t-test

Table 2. Outcome measurements assessed at the baseline and after 6 months of vitamin D supplementation.

	Calcifediol T0 (n=103)	Calcifediol T1 (n=103)	P values
25(OH)D ₃ (ng/ml)	31.74 \pm 13.03	51.80 \pm 19.85	<0.001
HGS(kg)	15.54 \pm 6.65	18.29 \pm 3.85	0.014
KES(kg)	14.49 \pm 6.92	17.05 \pm 5.62	0.050
SPPB	8.41 \pm 3.32	9.70 \pm 2.14	0.008
	Cholecalciferol T0 (n=102)	Cholecalciferol T1 (n=102)	P values
25(OH)D ₃ (ng/ml)	35.15 \pm 11.57	40.28 \pm 13.04	0.118
HGS(kg)	15.36 \pm 6.06	16.38 \pm 5.14	0.257
KES(kg)	12.12 \pm 5.74	12.58 \pm 5.67	0.627
SPPB	7.81 \pm 3.66	8.02 \pm 3.41	0.638

Results are expressed as means \pm standard deviations. Between groups analysis was performed using an independent t-test

CONCLUSIONS

Our results showed that post-menopausal women treated with calcifediol had significant improvements in serum levels of 25(OH)D₃, muscle strength, and physical performance. Thus calcifediol might play a key role in patients with impairment of skeletal muscle function. Further studies are needed to support the clinical benefits of vitamin D on muscle functioning.

Table 3. Outcome measurements assessed after 6 months of vitamin D supplementation.

	Cholecalciferol T1 (n=102)	Calcifediol T1 (n=103)	P values
25(OH)D ₃ (ng/ml)	40.28 \pm 13.04	51.80 \pm 19.85	0.032
HGS(kg)	16.38 \pm 5.14	18.29 \pm 3.85	0.095
KES(kg)	12.58 \pm 5.67	17.05 \pm 5.62	0.038
SPPB	8.02 \pm 3.41	9.70 \pm 2.14	0.019

(Results are expressed as means \pm standard deviations. Between groups analysis was performed using an independent t-test)

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