



Bone fractures and cruciate ligament ruptures in competitive sports: are vitamin d receptor and collagen Ia1 polymorphisms causative and what impact do they show on the micronutrient status of elite athletes?

Supporting document: Author has provided few insights to the questions asked by fellow researchers as follows below.

Reviewer's questions:

1. In the whole article, what is the rate of recovery for extensive sports like RUGBY, FIELD HOCKEY and can they be fast forwarded (recovery)?
2. As a detailed report, all the observations are well placed and illustrated in perfect manner. Can there be a limit of micronutrient inducted through supplements naturally to athletes keeping DOPING regulation on mind?

Response to questions:

The decision to the intensity of the surgical and regenerative interventions as well as the quality of recommended support with micronutrients (concentration and origin) is always in responsibility of the team doctor, so that a standardized follow-up study was impossible. All participants in the above-mentioned gene study were treated with high-dose vitamin D3/K2 (MK7) supplementation [daily 40000 IU. 25(OH)VitD3 plus 800µg vitamin K2(MK7)] and optimization of all micronutrients [all bioactive B vitamins and all trace elements (daily 2x1 capsule BIONOVELIA B-Complex, Fagus Pharma, Brühl – Germany)].

The median follow-up (3 years) of all participants shows that intense rehabilitation under control of VDR/COL1A1 polymorphisms and high-dose optimization of VitD3-K2 deficiency is always worthwhile, especially in case of these severe injuries. Information on faster recovery of their severe stress-fracture-/tendon-rupture-injuries of our study participants could not be evaluated. Rate of recovery: 18/22 (82%) athletes, all recovered athletes are in training and competition 3 years after their serious injury.

Sports	Gender	Age	Recovery
Soccer	M	26	+
Soccer	M	24	+
Soccer	M	24	+(R)1
Soccer	M	12	+
Soccer	M	30	+
Soccer	M	19	+
Soccer	M	21	+
Soccer	M	21	+
Soccer	M	21	+
Soccer	M	30	+
Soccer	M	25	+
Soccer *	M	31	-
Field Hockey	W	27	+
Field Hockey	W	17	+



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Field Hockey	W	16	+
Field Hockey	M	15	+
Field Hockey	W	31	+
Field Hockey #	W	22	-
Tennis	W	19	+
Marathon §	W	35	-
Boxing	M	26	+ (R)2
Judo ‡	M	28	-

Table 1: Recovery of all athletes. * = stress fracture of right heel (end of career), # = stress fracture of the right hip (end of career), § = stress fracture of metatarsale (end of career), ‡ = stress fracture of the left hip (end off career). (R) = replace 1 = quadriceps muscle rupture after 14 months – 2 = stress fracture of right hand during competition after 26 months.

4 athletes suffered severe stress fractures and ended their careers. 2 athletes experienced an injury recurrence (quadriceps muscle rupture during training after 14 months – stress fracture of right hand during boxing competition after 26 months). Both athletes had stopped their high-dose substitution before.

Just Case-Controll-studies with a predetermined protocol can clarify the questions of faster healing under high-dose vitamin D3/K2 supplementation.

Currently, there are no data to high-dose micronutrient supplementation and doping (1). All products recommended to the participants are listed in the Cologne List, evaluated as doping-free and recommended for athletes for substitution (6).

Table 1 Examples of micronutrients often requiring supplementation in athletes (see Larson-Meyer <i>et al</i> ¹⁸ for additional information)			
Micronutrient	Overview	Diagnosis and outcomes of insufficiency	Protocols and outcomes of supplementation
Vitamin D	It is important in the regulation of gene transcription in most tissues, so insufficiency/deficiency affects many body systems. ⁴² Many athletes are at risk of insufficiency at various times throughout the year. ⁴³	No consensus over the serum 25-hydroxyvitamin D concentration (the marker of vitamin D status) that defines deficiency, insufficiency, sufficiency and a tolerable upper limit. The need to supplement depends on UVB exposure and skin type.	Supplementation of between 800 IU and 1000–2000 IU/day is recommended to maintain status for the general population. Supplementation guidelines are not yet established in athletes. Short-term, high-dose supplementation which includes 50 000 IU/week for 8–16 weeks or 10 000 IU/day for several weeks may be appropriate for restoring status in deficient athletes. Careful monitoring is necessary to avoid toxicity. ⁴⁴

Reference: (1)

Whether there will ever be a doping prohibition to high-dose vitamin D3 intake remains to be seen. But if VDR/COL1A1 polymorphism with consequences (stress fractures or muscle-tendon tears) is detected in elite athletes, an exception should definitely be found, because of these athletes would otherwise be significantly disadvantaged by their genes and would be very endangered in terms of health.

References



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2 (18 in table 1) Larson-Meyer DE, Woolf K, Burke LM (2018) Assessment of nutrient status in athletes and the need for supplementation. Int J Sport Nutr Exerc Metab 2018. doi: 10.1123/ijsnem.2017-0338

3 (42 in table 1) Hossein-nezhad A, Holick MF (2013) Vitamin D for health: a global perspective. Mayo Clin Proc 88:720–55.

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6 <https://www.koelnerliste.com/produkt-datenbank?suche=BIONOVELIA>