

Lower cathelicidin concentrations in Irish athletes compared to controls: a role for vitamin D?

J.J. Todd¹, E.M. McSorley¹, L.K. Pourshahidi¹, S.M. Madigan², E. Laird³, R.R. Weir¹, M. Healy⁴, M.B.E. Livingstone¹, C. Beggan¹, L. Beggan¹ and P.J. Magee¹

¹Northern Ireland Centre for Food and Health, Ulster University, Coleraine, BT52 1SA,

²Irish Institute of Sport, Sports Campus Ireland, Abbotstown, Dublin, Republic of Ireland,

³School of Medicine, Trinity College Dublin, Republic of Ireland and

⁴Department of Biochemistry, St. James' Hospital, Dublin, Republic of Ireland

Despite strong *in vitro* evidence supporting pleiotropic actions of vitamin D in the immune system⁽¹⁾, including synthesis of LL-37 antimicrobial peptide⁽²⁾, human studies have yielded inconsistent results. LL-37 has been linked with total 25-hydroxyvitamin D [25(OH)D] concentrations and the number of self-reported upper respiratory tract infection symptoms in endurance athletes⁽³⁾. This observational study investigated whether LL-37 concentration varied between athletes and a general population control group and also tested if total 25(OH)D was a positive predictor of LL-37 concentration.

Overall, 221 stored plasma samples from male and female athletes (*n* 101) and a healthy control group (*n* 120) were obtained from four previous studies and analysed for LL-37 using an ELISA. Total 25(OH)D concentration was quantified by LC-MS/MS during each original study. Prior to statistical analyses, outliers (*n* = 24) were removed.

Measure	Athletes (<i>n</i> 96)		Healthy controls (<i>n</i> 101)	
	Mean	SD	Mean	SD
Age, years	21 ^a	3	24	5
Height, cm	170 ^b	10	173	9
Weight, kg	67.50 ^a	12.59	75.17	13.21
BMI, kg/m ²	23.27 ^a	2.57	25.16	4.38
Total 25(OH)D, nmol/L	59.26 ^a	30.11	35.87	18.93
PTH, pg/mL	39.24	17.10	41.37	18.19
LL-37, ng/mL	29.93 ^b	18.89	43.76	26.63

BMI, body mass index; 25(OH)D, total 25-hydroxyvitamin D, PTH, parathyroid hormone; LL-37, biologically active cathelicidin antimicrobial peptide. ^a *P* < 0.001, ^b *P* < 0.05 versus healthy controls (independent *t* test).

Athletes had a significantly lower mean LL-37 concentration than controls. In contrast, the athlete group exhibited a higher mean total 25(OH)D concentration compared to the control group. Total 25(OH)D concentration did not predict LL-37 concentration overall ($\beta = 0.073$, *P* = 0.386), or in either group after adjusting for age, sex, BMI and season of sampling (athletes $\beta = -0.033$, *P* = 0.762; controls $\beta = 0.145$, *P* = 0.197). These findings question the purported link between vitamin D and LL-37 *in vivo*. Although significantly lower LL-37 concentrations were observed in athletes compared to controls, the clinical implications of this disparity require further investigation.

This study was funded by the Department of Employment and Learning, Northern Ireland and Translational Research Group: Diabetes, Endocrinology & Nutrition, HSC Research & Development Division, Public Health Agency, Belfast. Ethical approval was obtained from the University of Ulster Research Ethics Committee (REC/08/0044; REC/13/0235; REC/14/0087) or from the Office of Research Ethics Committees Northern Ireland (13/NI/0091) and the study was conducted according to the guidelines laid down in the Declaration of Helsinki.

1. Baeke F, Etten EV, Overbergh L *et al.* (2007) *Nutr Res Rev* **20**, 106–118.
2. Vandamme D, Landuyt B, Luyten W *et al.* (2012) *Cell Immunol* **280**, 22–35.
3. He C, Handzlik M, Fraser WD *et al.* (2013) *Exerc Immunol Rev* **19**, 86–101.