



Reid, D. and Knox, S. and Talwar, D. and O'Reilly, D.S.J. and Blackwell, S. and Kinsella, J. and McMillan, D. and Wallace, A.M. (2010) *Acute changes in the systemic inflammatory response are associated with transient decreases in circulating 25-hydroxyvitamin D concentrations following elective knee arthroplasty [POSTER]*. In: Focus: Association for Clinical Biochemistry National Meeting, 11-13 May 2010, Glasgow, UK.

<http://eprints.gla.ac.uk/29889/>

Deposited on: 31 May 2010

Acute changes in the systemic inflammatory response are associated with transient decreases in circulating 25-hydroxyvitamin D concentrations following elective knee arthroplasty.

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Introduction

There is increasing awareness that vitamin D is more than just a fat-soluble vitamin that regulates calcium metabolism. Vitamin D deficiency has recently been associated with numerous diseases including cancer and cardiovascular disease and has apparent anti-inflammatory and anti-proliferative properties.^{1,2} Vitamin D deficiency has also been associated with mortality in intensive care.³ There is, however, good evidence that plasma concentrations of other fat soluble vitamins fall following an inflammatory insult.⁴ In the current study we investigated whether plasma 25-hydroxyvitamin D (25-OHD) concentrations were altered during the evolution of the systemic inflammatory response in patients following elective knee arthroplasty.

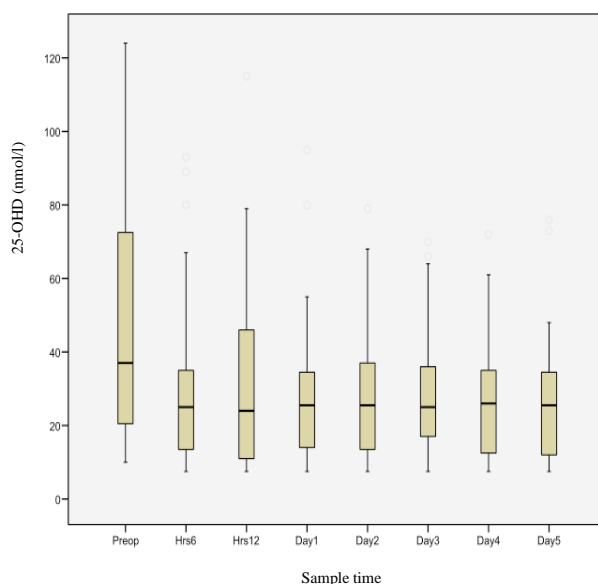
Methods

34 patients who underwent elective knee arthroplasty and had no evidence of a systemic inflammatory response were recruited in to the study. Venous blood samples were withdrawn before surgery and post-operatively at 6 and 12 hours and each morning for the next 5 days. Albumin and C-reactive protein were measured on an Adiva 1650 analyser (Bayer Corporation, Tarrytoen, NY USA). Measurement of plasma 25-OHD incorporated an automated solid-phase extraction (SPE) procedure followed by liquid chromatography-tandem mass spectrometry (LC-MS/MS).⁵ The lower limit of sensitivity was 4nmol/L. Within- and between-assay precision was below 10% over the concentration range of 22.5-120nmol/L. Comparisons of data from different time periods were carried out using a non-parametric ANOVA (Friedman test, SPSS software).

Results

The median 25-OHD concentration fell significantly within 6 hours and remained low for the following 5 days. The results are shown in table 1 and figure 1. Over the same time period there was a significant increase in the median plasma CRP concentrations (169 mg/l at 48hrs, p<0.001) and a significant fall in the median albumin concentrations (31 g/l at 48hrs, p< 0.001). CRP remained significantly elevated at 100mg/l on day 5.

Figure 1: Box plot of 25-OHD concentrations at each sampling time point



Conclusions

The results of the present study indicate, that in apparently healthy subjects undergoing an acute inflammatory insult, plasma 25-OHD concentrations are reduced, by approximately 30%, during the evolution of the systemic inflammatory response. Plasma concentrations of 25-OHD are therefore unlikely to be a reliable indicator of vitamin D status in patients exhibiting a systemic inflammatory response.

References

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Table 1

Sample time	Median 25-OHD (nmol/l)	P value (ANOVA)
Pre-operative	37	
6 hours	26	<0.001
12 hours	24	<0.001
Day 1	26	<0.001
Day 2	28	<0.001
Day 3	25	<0.001
Day 4	27	<0.001
Day 5	28	<0.001