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## Vitamin K2 deficiency in children with inflammatory bowel disease and healthy controls with reference to their eating habits- pilot study

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**Introduction.** Vitamin K as  $\gamma$ -carboxylase cofactor takes part in bone metabolism. Among children requirements for this vitamin are the greatest, its' insufficient intake with diet may have an impact on the peak bone mass appearance time as well as on osteoporosis risk in adulthood. Pediatric patients with inflammatory bowel disease (IBD) seem to be prone to vitamin K deficiency due to ongoing inflammation.

**Aim.** To assess the circulating levels of undercarboxylated (inactive) osteocalcin (ucOC), carboxylated fraction of osteocalcin (cOC) and ucOC; cOC ratio (UCR) (indicator for vitamin K2 status), in healthy children and children with IBD in reference to dietary intake.

**Subjects and methods.** In a pilot prospective study 24 children were enrolled (15 healthy and 9 with IBD in clinical remission), mean age was 12 years. From each participant a blood sample was obtained for cOC and ucOC levels analysis with ELISA kits and vitamin D3 concentration using standard methods. Additionally a quantitative evaluation of studied vitamins dietary intake was obtained using 24-hour interview and analyzed by ALIANT computer program. Nutritional habits were assessed using a questionnaire.

**Results.** In both studied groups poor implementation of recommended vitamin K and D dietary intake was observed, approximately 34% of norm for vitamin K and 32,6% for vitamin D (56%-for controls, 45%-IBD group). The median ucOC serum concentration in whole examined group equaled 34,30 ng/ml [7,37- 37,51; SD-8,37], it was 32,29 ng/ml [20,38- 37,51; SD-5,48] in healthy children and 35,03 ng/ml [7,37- 36,40; SD-12,03] in IBD group. The median UCR serum concentration was 1,85 [0,94- 4,30; SD- 1,04] in the healthy group and 1,11 ng/ml [0,48- 3,46; SD-1,15] in IBD group. The median vitamin D serum concentration was surprisingly low in both groups, especially in healthy children- 15,40 ug/ml [10,00- 44,80] compared to the IBD group - 27,20 ug/ml [20,40- 43,30] (p- 0,0027). Only 7/24 (29%) children received vitamin supplementation daily, 6 from the IBD group and only 1 from the healthy group.

**Conclusion.** Children do not implement recommended norms for vitamins K and D dietary intake. Our laboratory results suggest deficiency of vitamin K2 (high ucOC UCR levels) and vitamin D3 in both examined groups. We found that both vitamin K2 and vitamin D3 deficiencies were higher in the control group then the IBD group in clinical remission. Further studies on larger groups are required.