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Letter to the Editor

Comment on 2018 ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition: Calcium, phosphorus and magnesium

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Recommendations

Dear Editor,

After thirteen years a revision of the guidelines on pediatric parenteral nutrition was needed and has long been awaited. This evidence based guideline provides recommendations for children ranging from preterm infants up to teenage children with adult weight. Unfortunately this guideline lacks recommendations specifically for extremely preterm infants, in particular with regard to supplementation of calcium (Ca) and phosphorus (P), [1]. This specific group comprises the smallest number of infants, however they belong to the most challenging patients for any neonatologist, being the most vulnerable patients with the greatest need for parenteral nutrition, the highest risk to develop nutritional deficits, and last but not least have the most immature organ systems that compromise any nutritional support as a result of inadequate absorption and renal reabsorption of administered nutrients.

The current recommendations concerning Ca and P requirements are based on a theoretical model, namely the association between fetal/postnatal growth and mineral content and the association between protein accretion and P [1]. Since actual Ca, P and protein accretion are quantitatively unknown in the individual child it is advised to ensure optimal PN intake by evaluation of urine samples using the 'slight surplus' method [2]. In two cohort studies we demonstrated, using this method, that preterm infants have a urinary excretion of P far above the surplus even in case of low intake or hypophosphatemia [3,4]. This was specifically related to low gestational age. Minerals excreted in urine will not be available for energy metabolism or bone mineralization. Therefore this method seems not sufficient as guide for optimal mineral supplementation. Firstly, the method of 'small surplus' should be adapted by defining an upper range of renal mineral loss that would enable to differentiate between immaturity and unbalanced intake. Secondly, the lower limit of blood P concentration in extremely preterm infants needs to be higher to guarantee sufficient availability of P. Instead of the currently advised 1.6 mmol/l of P, a target blood concentration of 2 mmol/l, as has previously been recommended, seems more appropriate for extremely preterm infants [5].

For preterm infants the recommendations are divided into 'first days of life', with lower intake, and 'growing premature'. While it is uncertain when the period of stable growth exactly starts, this recommendation may lead to serious hypophosphatemia in combination with the advice to fully provide amino acids from day 2 onwards. We estimated that for a stable blood P concentration, every additional gram/kg of protein should be accompanied with 1 mmol/kg of additional P, leading to higher intake than currently recommended [4].

In conclusion, extremely preterm infants do not fit the general recommendation for preterm infants due to immature renal function, but more important adequate research evaluating nutritional supply in this group is urgently needed.

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References

[1] Mihatsch W, Fewtrell M, Goulet O, Molgaard C, Picaud JC, Senterre T, et al. ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition: calcium, phosphorus and magnesium. Clin Nutr 2018;37:2360–5. https://doi.org/10.1016/jclnu.2018.06.950.

[2] Pohlandt F. Prevention of postnatal bone demineralization in very low-birthweight infants by individually monitored supplementation with calcium and phosphorus. Pediatr Res 1994;35(1):125–9. https://doi.org/10.1203/00006450-199401000-00027.

[3] Christmann V, de Grauw AM, Visser R, Matthijsse RP, van Goudoever JB, van Heijst AF. Early postnatal calcium and phosphorus metabolism in preterm infants. J Pediatr Gastroenterol Nutr 2014;58(4):398–403. https://doi.org/10.1097/MPG.0000000000000251.

[4] Christmann V, Gradussen CJ, Kornmann MN, Roeleveld N, van Goudoever JB, van Heijst AF. Changes in biochemical parameters of the calcium-phosphorus homeostasis in relation to nutritional intake in very-low-birth-weight infants. Nutrients 2016;8(12). https://doi.org/10.3390/nu8120764.

https://doi.org/10.1016/j.clnu.2019.03.013

[5] Hellstern G, Poschl J, Linderkamp O. Renal phosphate handling of premature infants of 23–25 weeks gestational age. Pediatr Nephrol 2003;18(8):756–8. https://doi.org/10.1007/s00467-003-1165-6.

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