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## Letters to the Editor

## Author's response re. "Changes in lipid metabolism in pediatric patients with severe sepsis and septic shock"



We would like to thank Chiarla et al. [1] for recognizing our work. There is limited knowledge concerning the lipid profiles of critically ill pediatric patients with systemic inflammatory response syndrome; thus, we conducted our study to evaluate whether changes in lipid profiles were present in children admitted to our pediatric intensive care unit (PICU) with a clinical diagnosis of severe sepsis/septic shock and whether these changes were attenuated according to clinical improvement [2]. We are pleased to have the opportunity to respond to the considerations and questions regarding our work.

Regarding the question of patients with cholestasis, one of our exclusion criteria was a patient with a known severe hepatic dysfunction (liver cirrhosis and fulminant hepatitis) and consequently patients with clinical jaundice. Furthermore, the first original Pediatric Risk of Mortality Score (PRISM) was applied and total bilirubin parameter was used to identify significant cholestasis. Therefore, we did not evaluate the effect of cholestasis on moderating the degree of hypocholesterolemia.

Concerning the correlation between cholesterol and absolute lymphocyte count (ALC), our study demonstrated the following observations:

1. Nineteen of the patients (47.5%) included in the study presented  $ALC < 1500 \text{ cell/mm}^3$ , and 10 of these patients presented  $< 500 \text{ cell/mm}^3$  on admission to the PICU.
2. On study day 1, ALC showed statistically significant inverse correlations with the increased C-reactive protein (CRP) levels (bivariate correlations between CRP and absolute lymphocyte count  $r = -9.7$ ;  $P 0.001$ ) and this correlation showed the same reduction pattern compared with total cholesterol (TC), lipoprotein, and apolipoprotein concentrations.
3. ALC increased significantly on study day 7, being statistically different between days 1 and 7, as did TC, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and apolipoprotein concentrations.

Despite these observations, the increase in ALC between study days 1 and 7 did not influence increases in TC, HDL, LDL, and apolipoprotein levels; thus, there was no direct correlation between cholesterol and ALC.

As for a direct correlation between degree of hypertriglyceridemia and severity of illness, the study showed that on

day 1 the median serum triacylglycerol (TG) concentration was significantly higher in septic patients admitted to the PICU than in the controls ( $P \leq 0.05$ ). Similar to our results, previous studies with adult patients have shown increased TG levels in septic patients [3–5]. However, higher TG concentrations were not influenced by the increase of CRP levels ( $r = 0.159$ ;  $P = 0.32$ ) at PICU admission or by PRISM ( $r = -0.177$ ;  $P = 0.3$ ). Thus, no significant differences were found between TG levels of survivors and non-survivors on day 1 in the PICU. Briassoulis et al. [6] demonstrated that hypertriglyceridemia could be a significant biomarker used to differentiate critically ill children with or without sepsis.

In other words, finding the ideal biomarker for sepsis/septic shock in critically ill children and adolescents is like looking for a needle in a haystack. The changes in plasma lipid profile, as suggested, could contribute to the early identification of these clinical conditions.

We hope this information has helped answer pertinent questions regarding this matter; lipid profile seems to be rather promising for a more accurate characterization of systemic inflammatory response.

### References

- [1] Chiarla C, Giovannini I, Miggiano GA. Changes in plasma lipid profiles in sepsis. *Nutrition* 2018. <https://doi.org/10.1016/j.nut.2018.05.014>. Available online 19 June 2018.
- [2] Bermudes ACG, de Carvalho WB, Zamberlan P, Muramoto G, Maranhão RC, Delgado AF. Changes in lipid metabolism in pediatric patients with severe sepsis and septic shock. *Nutrition* 2018;47:104–9.
- [3] Levels JH, Lemaire LC, van den Ende AE, van Deventer SJ, Van Lanschot JJ. Lipid composition and lipopolysaccharide binding capacity of lipoproteins in plasma and lymph of patients with systemic inflammatory response syndrome and multiple organ failure. *Crit Care Med* 2003;31:1647–53.
- [4] Cappi SB, Noritomi DT, Velasco IT, Curi R, Loureiro TC, Soriano FG. Dyslipidemia: a prospective controlled randomized trial of intensive glycemic control in sepsis. *Intensive Care Med* 2012;38:634–41.
- [5] Lekkou A, Mouzaki A, Siagris D, Ravani I, Gogos CA. Serum lipid profile, cytokine production, and clinical outcome in patients with severe sepsis. *J Crit Care* 2014;29:723–7.
- [6] Briassoulis G, Venkataraman S, Thompson A. Cytokines and metabolic patterns in pediatric patients with critical illness. *Clin Dev Immunol* 2010;2010:354047.

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