

New emerging biological markers of neonatal sepsis

Sir,

Neonatal sepsis (NS) is recognized as a leading global public health challenge and has a fulminant and fatal evolution if the treatment is not commenced promptly. Neonatal infections annually claim lives of 1.4 million neonates worldwide. Early-onset NS (EONS) occurs within 72 h of birth, while late-onset NS (LONS) occurs after the first 72 h of life and both are major causes of infant mortality. Biomarkers have an important place in the pathophysiology of sepsis; they can indicate the presence, absence, or severity of sepsis and can differentiate bacterial from viral and fungal infection and systemic sepsis from local infection.

BIOMARKERS FOR EARLY-ONSET NEONATAL SEPSIS

Various markers have already been suggested for early diagnosis of sepsis. These proteins are C-reactive protein (CRP), procalcitonin (PCT), pancreatic stone protein (PSP), alpha 1-acid glycoprotein, fibronectin, haptoglobin, lactoferrin, neopterin, and oromucosoid. Concentrations of CRP increase at around 24 h after onset of infection, peak between 36 and 50 h and remain elevated throughout infection. PCT starts rising 4 h after exposure to bacterial endotoxins, peaking at 6–8 h and remaining elevated 24 h. A study that included 69 neonates with suspected infection suggested that PCT is a better marker than CRP in the diagnosis of NS.^[1] In very low birth weight neonates was observed that a serum PCT value >2.4 ng/ml prompts early empirical antibiotic therapy, while in normal birth weight infants, a PCT value ≤2.4 ng/ml carries a low risk of missing a NS. Reviews and meta-analysis of 29 studies suggested that serum PCT has very good diagnostic accuracy (area under the curve = 0.87) for the diagnosis of NS.^[2] The diagnostic performance of PSP and procalcitonin was superior to that of traditional markers. A bioscore combining PSP (>9 ng/ml) and PCT (>2 ng/ml) was the best predictor of early-onset sepsis. Another study suggested that visfatin and resistin can be used as a diagnostic marker similar to CRP, PCT, and interleukin-6 in NS.^[3]

BIOMARKERS FOR LATE-ONSET NEONATAL SEPSIS

Acute phase reactants, pro- and anti-inflammatory mediators including chemokines and cytokines, and

cell-surface antigens are nonspecific biomarkers that have been extensively studied for the diagnosis and management of LONS. Serum amyloid A increases up to 1000-fold in response to inflammation-associated reactive amyloidosis. The utility of hepcidin as a regulator of inflammation for the diagnosis of late-onset sepsis in very low birth weight infants was recently evaluated.^[4] Ischemia-modified albumin (IMA) has been advocated as a biomarker of oxidative stress in different pathologies, and the levels of IMA were positively correlated with white blood cell count, CRP, and PCT in the sepsis group before treatment. Therefore, the serum IMA levels may be useful in LONS at the time of diagnosis and after therapy.^[5]

CONCLUSIONS

A panel of biomarkers with minimal blood collection and expense should be used in both EONS diagnoses. Whatever, further research is needed to identify the best multiple infection biomarkers with high diagnostic accuracy and validity.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Mirabela Dima, Daniela Iacob, Otilia Marginean¹, Emil Radu Iacob²

Departments of Neonatology, ¹Pediatrics and ²Pediatric Surgery, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania

Address for correspondence: Dr. Daniela Iacob, Department of Neonatology, Victor Babes University of Medicine and Pharmacy, Eftimie Murgu Square, No. 2, Timisoara 300041, Romania.
E-mail: danielariacob@yahoo.com

REFERENCES

1. Adib M, Bakhshiani Z, Navaei F, Saheb Fousoul F, Fouladi S, Kazemzadeh H. Procalcitonin: a reliable marker for the diagnosis of neonatal sepsis. *Iran J Basic Med Sci* 2012;15:777-82.
2. Vouloumanou EK, Plessa E, Karageorgopoulos DE, Mantadakis E, Falagas ME. Serum procalcitonin as a diagnostic marker for neonatal sepsis: a systematic review and meta-analysis. *Intensive Care Med* 2011;37:747-62.
3. Cekmez F, Canpolat FE, Cetinkaya M, Aydinöz S, Aydemir G, Karademir F, *et al.* Diagnostic value of resistin and visfatin, in comparison with C-reactive protein, procalcitonin and interleukin-6 in neonatal sepsis. *Eur Cytokine Netw* 2011;22:113-7.
4. Wu TW, Tabangin M, Kusano R, Ma Y, Ridsdale R, Akinbi H. The utility of serum hepcidin as a biomarker for late-onset neonatal sepsis. *J Pediatr* 2013;162:67-71.
5. Yerlikaya FH, Kurban S, Mehmetoglu I, Annagur A,

Altunhan H, Erbay E, *et al.* Serum ischemia-modified albumin levels at diagnosis and during treatment of late-onset neonatal sepsis. *J Matern Fetal Neonatal Med* 2014;27:1723-7.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

Access this article online	
Quick Response Code: 	Website: www.jmsjournal.net
	DOI: 10.4103/jrms.JRMS_912_15

How to cite this article: Dima M, Iacob D, Marginean O, Iacob ER. New emerging biological markers of neonatal sepsis. *J Res Med Sci* 2017;22:65.

