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Comprehensive Review

Type B natriuretic peptide (NT-PROBNP), A Multipurpose Biomarker? A Possible Use in Pediatric Pneumology

Giovanni Cacciaguerra[1]*, Monica Palermo[2], Salvatore Michele Carnazzo[1], Giusi Maria.Caltabiano[1], Desiree Balconara[1], Maria Papale[3], Giuseppe Fabio Parisi[3] and Salvatore Leonardi[3]

[1]Department of Clinical and Experimental Medicine, Section of Pediatrics and Child Neuropsychiatry, Unit of Rare Diseases of the Nervous System in Childhood, University of Catania, Catania, Italy

[2]Clinica di Radiologia, EOC, Istituto Imaging della svizzera italiana, Lugano, Switzerland

[3]Pediatric Respiratory Unit, Department of Clinical and Experimental Medicine, San Marco Hospital, University of Catania, Catania, Italy

***Corresponding Author:** Giovanni Cacciaguerra, Department of Clinical and Experimental Medicine, Section of Pediatrics and Child Neuropsychiatry, Unit of Rare Diseases of the Nervous System in Childhood, University of Catania, Catania, Italy.

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Introduction

B-type natriuretic peptide is a neurhormone isolated in ventricular cardiomyocytes and influences the balance of sodium and water by inducing natriuresis, diuresis and vasodilation, counteracting the renin-angiotensin-aldosterone system. The N-terminal pro-B natriuretic peptide (NT-proBNP), formed by 76 amino acids, has no bioactivity, the bioptive peptide is composed of 32 amino acids and derives from the cleavage of a precursor molecule. Type B natriuretic peptide is secreted mainly by the ventricles in response to the increase of left or right ventricular pressure and volume loads. Historically, B-type natriuretic peptide levels are related to one's severity and prognosis congestive and left ventricular heart failure. However, some studies have shown that NT-proBNP levels can also be elevated in diseases not purely cardiac such as acute infections, such as sepsis and other diseases in children. The association between serum levels of NTproBNP now measured in series and severity is the goal of numerous studies of the disease in children with pulmonary arterial hypertension (PAH). PAH is characterized by a progressive increase in pulmonary vascular resistance in the system pulmonary vascular precapillary, ultimately leading to right ventricular failure and death. Recent than publications, and one of the main ones we refer to for this communication, confirm that NT-proBNP has predictive value not only at diagnosis but also during the entire course of the disease.

The evolution of the serum levels of NT-proBNP over time reflects the pregression and predicts the negative outcome of the patient; therefore, standardized serial monitoring can support clinical decision making on the timing of escalation of therapy and on the list for lung (heart) transplantation [1]. We do not allow cardiologists to use this important non-invasive serum biomarker, we take advantage of a new ally in the daily fight against pediatric lung diseases.

Discussion

Three major natriuretic peptides (NPs) have been discovered including atrial NP, B-type NP (BNP), and C-type NP. These NPs are activated to protect from volume or pressure overload in cardiovascular disease. The overload of the right or left ventricle leads to synthesis of the intracellular prohormone in the myocardium. The pro-BNP is cleaved into the biologically active hormone, BNP, and an inactive amino-terminal fragment (NTproBNP). [2] NTproBNP is cleared by the kidney and may be falsely evaluated with significant renal disease.

The peptide levels are dependent on age, assay, and possibly gender. The NT-proBNP levels in healthy subjects are very high during the first days of life but decrease drastically thereafter. There is a mild gradual decline with age throughout childhood. Girls have somewhat higher NT-proBNP levels during puberty [3].

The measurement of BNP and NTproBNP are utilized in the decisionmaking process in various clinical settings. Plasma levels of the natriuretic peptides are elevated in many cardiac diseases.

In the pediatric age group, head-to-head comparisons of BNP and NT-proBNP values in the same samples from both healthy children and those with congenital heart disease using different kits also have shown good correlation [4]. Recent studies have shown that BNP and NT-proBNP levels can predict prognosis in various clinical situations. For children with dilated cardiomyopathy, elevated BNP levels were associated with future cardiac death, hospitalization, or listing for transplantation [5].

A recent study in adults with PAH, using data from the GRIPHON trial (Prostacyclin Receptor Agonist in PAH), reported that the risk of morbidity/mortality was lowest for patients with a stable low (<271 ng/L) or improved NT-proBNP level [6].

The association between serum levels of NTproBNP now measured in series and severity is the goal of numerous studies of the disease in children with pulmonary arterial hypertension (PAH). In addition, elevated plasma BNP concentrations are associated with increased mortality in patients with PAH [7].

PAH is a rare and severe disease with a broad spectrum of etiologies. PAH is characterized by a progressive increase in pulmonary vascular resistance in the system pulmonary vascular precapillary, ultimately leading to right ventricular failure and death.

Children diagnosed with PAH and a high NT-proBNP level at diagnosis are at risk for clinical decline and therefore may require more intense therapy than those recently diagnosed patients with low NT-proBNP levels. In the same way, children with increasing NT-proBNP over time may require more frequent follow-up visits and opportune escalation of PAH targeted therapy [8].

Conclusions

Despite the growing availability of effective PAH-targeted therapies and the emergence of treatment guidelines, PAH remains lethal, with a variable disease course that is often unpredictable in individual patients. This underscores the need for optimization or, better, individual customization of treatment schemes. For this, noninvasive serum biomarkers that accurately reflect disease severity and are prognostic for outcome at any time in the disease course are needed.

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