Neopterin

Neopterin is a catabolic product of guanosine triphosphate (GTP), a purine nucleotide.

Neopterin belongs to the chemical group known as pteridines. It is synthesised by human macrophages upon stimulation with the cytokine interferon-gamma and is indicative of a pro-inflammatory immune status. Neopterin serves as a marker of cellular immune system activation.

Measurement of neopterin concentrations in body fluids like blood serum, cerebrospinal fluid or urine provides information about activation of cellular immune activation in humans under the control of T helper cells type 1. High neopterin production is associated with increased production of reactive oxygen species, neopterin concentrations also allow to estimate the extent of oxidative stress elicited by the immune system.

Aneurysmal subarachnoid hemorrhage (aSAH) is associated with high rates of mortality and morbidity. The main predictor for the poor outcome is the World Federation of Neurosurgical Societies grading (WFNS) scale. However, this scale does not take into account proinflammatory events, such as infection occurring after the aSAH, which could modify the long-term status of patients. The aim of this study was to evaluate neopterin as an inflammatory biomarker for outcome and infection prediction in aSAH patients.

Plasma concentrations of neopterin were measured in 61 aSAH patients (22 male and 39 female; mean age [± SD] 52.8 ± 11.8 years) using a commercial ELISA kit. Samples were collected daily for 10 days. Outcome at 12 months was determined using the Glasgow Outcome Scale (GOS) and dichotomized as poor (GOS score 1, 2, or 3) or good (GOS score 4 or 5). Infection was determined by the presence of a positive bacterial culture.

Patients with poor outcome at 12 months had higher concentrations of neopterin than patients with good outcome. In the same way, patients who had an infection during the hospitalization had significantly higher concentrations of neopterin than patients without infection ($p = 0.001$). Moreover, neopterin concentrations were significantly ($p < 0.008$) elevated in infected patients 2 days before infection detection and antibiotic therapy.

Neopterin is an efficient outcome predictor after aSAH. Furthermore, it is able to differentiate between infected and uninfected patients as early as 2 days before clinical signs of infection, facilitating earlier antibiotic therapy and better management [1)].

1)
Azurmendi L, Degos V, Tiberti N, Kapandji N, Sanchez-Peña P, Sarrafzadeh A, Puybasset L, Turck N, Sanchez JC. Neopterin plasma concentrations in patients with aneurysmal subarachnoid hemorrhage: correlation with infection and long-term outcome. J Neurosurg. 2015 Sep 25:1-13. [Epub ahead of print] PubMed PMID: 26406798.