Inflammation and hypertension: new clinical information on pentraxin- 3

İnflamasyon ve hipertansiyon: Pentraksin-3 ile ilgili yeni klinik bilgi

One of the recent topics in the field of hypertension is that inflammation or activation of immunity can be involved in the initiation as well as the development of hypertension (1). Over the past three decades, alterations in both humoral and cellular immunity have been described in patients with hypertension and in animal models (1, 2).

In the current issue of the Anatolian Journal of Cardiology, Parlak et al. (3), report the novel finding that an inflammatory biomarker, pentraxin 3 (PTX 3), is associated with high BP in middle-aged subjects. These results were obtained in never-treated, newly diagnosed patients with hypertension who were free from overt cardiovascular disease and not currently receiving any anti-hypertensive agents. In that study, the circulatory PTX 3 level was significantly higher in stage I hypertensive subjects than healthy control subjects, and the differences remained significant even after adjustment for body mass index (35.25±5.45 ng/ml vs. 0.27±0.24 ng/ml; p<0.001). Intriguingly, the PTX 3 level, rather than C-reactive protein (CRP), was strikingly higher in hypertensive patients than healthy control subjects, suggesting that PTX 3 might be more closely associated with high blood pressure (BP) than in CRP. A multivariate regression analysis showed that each of PTX 3 and CRP was independently associated with systolic or diastolic BP, which may indicate that PTX 3 provides additional clinical information apart from that given by CRP in the association with high BP. The cross-sectional design of the present study did not allow us to elucidate the pathophysiological pathway linking high PTX3 and high BP. However, there are some possible explanations for the observed associations.

Pentraxins are a superfamily of proteins that are highly conserved in evolution, recognize a wide range of exogenous pathogenic substances, alter self-molecules, and behave as acute-phase proteins (4, 5) They are categorized as short and long pentraxins on the basis of their primary structure. CRP and serum amyloid P are classic short pentraxins produced in the liver. In contrast, PTX 3, a prototype of the long pentraxins, is directly synthesized by innate immunity cells (e.g., dendritic cells and monocyte or macrophages) or vascular cells (e.g., smooth muscle cell and endothelial cells) in response to pro-inflammatory signals and Toll-like receptor engagement (4, 5). Therefore, it's in vivo level may more directly reflect the inflammatory status of the affected tissues, including the vasculature, than the in vivo level of CRP. In fact, increased PTX 3 levels have been observed in the serum of patients with several diseases affecting blood vessels, such as small-vessel vasculitis (6), Takayasu arteritis in the active stage (7) and acute coronary syndrome (8, 9). The vascular inflammatory process plays an important role in the pathophysiology of hypertension (1, 2) and a high level of circulating PTX 3 may reflect vascular inflammation in hypertensive patients. However, due to the nature of cross-sectional analysis, it is not possible to address the cause-effect association between high PTX 3 and hypertension in the present study. Moreover, whether the high level of circulating PTX 3 in hypertensive patients is an epiphenomenon of the inflammatory process or whether the protein has an active role in the pathogenesis of the disease is beyond the scope of the present study.

Hypertension is a potent but highly modifiable risk factor for cardiovascular morbidity and mortality, and thus prevention of hypertension is a major public health challenge. To answer this challenge, clarification of the risk factors contributing to hypertension, and identification of subjects who are likely to develop the disease are becoming top research priorities. Prehypertension, which is defined as systolic BP/diastolic BP of 120-139/80-89 mmHg, constitutes an increased risk of progression to hypertension, and thus individuals within this BP range are targets for non-pharmacological intervention as well as close follow-up (10). However, there is a considerable inter individual variability in the rates of progression to hypertension among pre-hypertensive subjects. If a high PTX 3 level is associated with the development of future hypertension, detection of high PTX 3 in pre-hypertensive subjects could indicate a need for early preventive measures. Further studies confirming the findings of the current report will be needed, particularly a prospective study to examine whether the circulating PTX 3 level

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can predict the development of hypertension in the general population, or can provide additional information for predicting hypertension beyond that provided by other inflammatory biomarkers (e.g., CRP).

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