

## Fibrinogen and Atherosclerosis

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### To the Editor,

I have read with great interest the article entitled “Early Markers of Atherosclerotic Disease in Individuals with Excess Weight and Dyslipidemia” by Menti et al.<sup>1</sup> recently published in *Arquivos Brasileiros de Cardiologia* 2016; 106: 457-63. The investigators reported that fibrinogen is associated with subclinical atherosclerosis in individuals with excess weight.<sup>1</sup>

Several studies have shown that high serum levels of fibrinogen are strongly associated with coronary artery disease.<sup>2,3</sup> High serum levels of fibrinogen may contribute to vascular disease by increasing blood viscosity, stimulating fibrin formation, or increasing platelet-platelet interaction.<sup>2,3</sup>

Catena et al.<sup>4</sup> reported that plasma homocysteine (Hcy) levels were directly correlated with age, waist circumference,

fasting glucose, triglyceride, uric acid, and fibrinogen levels, and inversely correlated with creatinine clearance and high-density lipoprotein cholesterol, vitamin B12, and folate levels. Low vitamin B12 concentration and hyperhomocysteinemia are common, and might affect serum fibrinogen levels.

25-hydroxyvitamin D [25(OH)D] deficiency with increased risks of cardiovascular disease and venous thromboembolism may relate to adverse hemostatic and inflammatory responses. Blondon et al.<sup>5</sup> reported that low levels of serum [25(OH)D] were cross-sectionally associated with higher levels of interleukin-6, homocysteine, total tissue factor pathway inhibitor and plasminogen activator inhibitor-1.

In light of these findings, it might be beneficial to evaluate serum levels of vitamin B12, Hcy, and [25(OH)D] because of their close association with fibrinogen levels.

### Keywords

Fibrinogen; Coronary Artery Disease; Obesity; Dyslipidemias.

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Manuscript received June 06, 2016; revised manuscript June 16, 2016; accepted September 06, 2016.

DOI: 10.5935/abc.20170017

### References

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## Reply

We were honored by your interest in our article entitled "Early Markers of Atherosclerotic Disease in Individuals with Excess Weight and Dyslipidemia" published in *Arquivos Brasileiros de Cardiologia*.

The finding of high fibrinogen levels in patients with atherosclerotic disease has generated a large volume of clinical evidences in the past few decades, and has been considered a risk marker for cardiovascular events. High fibrinogen levels are also known to promote atherosclerotic disease by increasing blood viscosity, stimulating fibrin formation and increasing platelet aggregation. In the setting of an inflammatory status such as that seen in individuals with excess weight, the higher hepatic production of fibrinogen regulated by inflammatory cytokines may be an important link in the progression of the atherosclerotic disease in its different subclinical and clinical stages. Our study had a small sample size, however large enough to bring this association to light.<sup>1</sup>

As regards the assessment of serum levels of vitamin B12 and vitamin D, in a recent study with a small sample, Baser et al<sup>2</sup> observed the association of vitamin D deficiency with high fibrinogen levels and pro-oxidative serum markers. Vitamin

B12 deficiency, by hyperhomocysteinemia induction, also plays a role in the development of cardiovascular disease. Every 5-mcmol/L increase above 10 mcmol/L in serum levels of homocystein is associated with a 20% increase in the risks of circulatory disorders.<sup>3</sup>

Although the assessment of changes in endothelial function in patients with vitamin B12 and vitamin D deficiency had not been included in this study, it is a promising research field. In a study with a small sample assessing endothelial function using flow-mediated brachial artery dilatation in patients with vitamin B12 deficiency, increased dilatation after proper vitamin B12 replacement was observed.<sup>4</sup> A similar finding was observed in a sample of individuals undergoing hemodialysis after vitamin D replacement.<sup>5</sup>

We thank Dr. Cerit's remarks and are satisfied to stimulate discussion regarding this important field of clinical cardiology, which has been a frequent concern in daily practice, in view of the growing incidence of obesity among our society.

**Eduardo Menti**

## References

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