



CLÍNICA E INVESTIGACIÓN EN ARTERIOSCLEROSIS

www.elsevier.es/arterio



EDITORIAL

Cardiovascular risk factors and oxidative stress in young people[☆]



Factores de riesgo cardiovascular y estrés oxidativo en jóvenes

Raquel Rodrigues-Díez, Mercedes Salaices^{*}

Departamento de Farmacología, Facultad de Medicina, Universidad Autónoma de Madrid, Instituto de Investigación Hospital Universitario La Paz (IdiPAZ), CIBER de Enfermedades Cardiovasculares, Madrid, Spain

Available online 5 October 2017

Although cardiovascular disease is the leading cause of death in developed countries, the multifactorial origin of this disease makes it difficult to understand and treat. This is why determination of cardiovascular risk factors (CVRFs), such as hypertension, smoking, diabetes, obesity and dyslipidaemias, including hypercholesterolaemia, hypertriglyceridaemia, high levels of low density lipoproteins (LDLs) and low concentrations of high density lipoprotein (HDLs), is fundamental in the early detection and management of cardiovascular diseases.^{1,2} As Villalpando Sánchez et al.³ indicate in their article published in this issue of *Clínica e Investigación en Arteriosclerosis* [Clinical and Research in Arteriosclerosis], early identification of risk factors in populations susceptible to lifestyle changes, such as young adults or adolescents, is a key factor in developing prevention strategies.

There is ample evidence that oxidative stress plays a major role in the development and progression of cardiovascular diseases, including hypertension, diabetes,

atherosclerosis or coronary disease.⁴ Oxidative stress is defined as a disturbance in the balance between the production of reactive oxygen species and antioxidant defences, which leads to cell damage due to the oxidation of nucleic acids, lipids and proteins. The oxidation of plasma proteins gives rise to what has been called advanced oxidation protein products (AOPP). AOPPs were initially identified as biomarkers of plasma oxidative stress in patients with chronic kidney disease⁵; later, they were also described as proinflammatory mediators in numerous diseases, including chronic kidney disease,⁶ hypertension and atherosclerosis.⁷ This demonstrated that there is a correlation between plasma AOPP levels and blood pressure.⁸ In addition, several studies have shown an association between elevated plasma AOPP levels and the onset and progression of atherosclerosis, and with the carotid intima-media thickness in patients with carotid atherosclerotic plaques.⁹

In their article, Villalpando Sánchez et al.³ have made a major breakthrough in the early detection of cardiovascular disease by studying for the first time AOPP levels in apparently healthy young individuals and their correlation with CVRFs. Despite the small sample size, significant differences in weight, body mass index, waist circumference and lipids levels, but not blood pressure, were observed between groups, depending on the number of risk factors. This in turn is reflected in the frequency of risk factors, where the highest percentage is observed in obese and overweight (40%) individuals, while the percentage of hypertensive

DOI of original article:

<http://dx.doi.org/10.1016/j.arterio.2017.08.001>

[☆] Please cite this article as: Rodrigues-Díez R, Salaices M. Factores de riesgo cardiovascular y estrés oxidativo en jóvenes. Clin Invest Arterioscler. 2017;29:216–217.

^{*} Corresponding author.

E-mail address: mercedes.salaices@uam.es (M. Salaices).

patients was 15%. The study also shows a progressive increase in AOPP levels based on the number of CVRFs, with the highest levels observed in groups with 3 and 4 risk factors. It is also striking to note that, contrary to expectations, a negative correlation was observed between AOPP levels and the atherogenic index and LDL levels, while HDL levels correlated positively with AOPP. This, as the authors suggest, could be due to the limitations of the study, including their failure to quantify oxidised LDL, and the small sample size.

The findings of this study show the need for further research to determine the relationship between AOPPs and CVRFs in a similar population. However, since AOPP levels are rapidly and relatively easily quantified using the method described by Witko-Sarsat et al.,⁵ routine determination of these products could serve as a new early indicator of cardiovascular disease. Therapies that inhibit the formation of AOPPs, therefore, could be beneficial in diseases such as atherosclerosis, coronary artery disease or in cardiac events.

Acknowledgements

RR has received a Sara Borrell grant (CD15/00003). MS's research is funded by MINECO research project grants (SAF2016-80305-P) and ISCIII (CB16/1100286).

References

1. O'Donnell CJ, Elosua R. Cardiovascular risk factors. Insights from Framingham Heart Study. *Rev Esp Cardiol*. 2008;61:299–310.
2. García-Redondo AB, Aguado A, Briones AM, Salaices M. NADPH oxidases and vascular remodeling in cardiovascular diseases. *Pharmacol Res*. 2016;114:110–20.
3. Villalpando Sánchez DC, Alvarez Aguilar C, Gómez García A. Productos avanzados de oxidación proteica (PAOP) y su relación con los factores de riesgo cardiovascular en jóvenes aparentemente sanos. *Clin Investig Arterioscler*. 2017;29:209–15.
4. Münzel T, Camici GG, Maack C, Bonetti NR, Fuster V, Kovacic JC. Impact of oxidative stress on the heart and vasculature: Part 2 of a 3-Part Series. *J Am Coll Cardiol*. 2017;70:212–29.
5. Witko-Sarsat V, Friedlander M, Capeillère-Blandin C, Nguyen-Khoa T, Nguyen AT, Zingraff J, et al. Advanced oxidation protein products as a novel marker of oxidative stress in uraemia. *Kidney Int*. 1996;49:1304–13.
6. Descamps-Latscha B, Witko-Sarsat V, Nguyen-Khoa T, Nguyen AT, Gausson V, Mothu N, et al. Advanced oxidation protein products as risk factors for atherosclerotic cardiovascular events in nondiabetic predialysis patients. *Am J Kidney Dis*. 2005;45:39–47.
7. Liu SX, Hou FF, Guo ZJ, Nagai R, Zhang WR, Liu ZQ, et al. Advanced oxidation protein products accelerate atherosclerosis through promoting oxidative stress and inflammation. *Arterioscler Thromb Vasc Biol*. 2006;26:1156–62.
8. Xu H, Cabezas-Rodríguez I, Qureshi AR, Heimbürger O, Barany P, Snaedal S, et al. Increased levels of modified advanced oxidation protein products are associated with central and peripheral blood pressure in peritoneal dialysis patients. *Perit Dial Int*. 2015;35:460–70.
9. Ou H, Huang Z, Mo Z, Xiao J. The characteristics and roles of advanced oxidation protein products in atherosclerosis. *Cardio-vasc Toxicol*. 2017;17:1–12.