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EDITORIAL COMMENT

The many faces of inflammation in the cardiovascular arena: The importance of air pollution

Luís Bronze[a,b]

[a] Universidade da Beira Interior, Covilhã, Portugal
[b] Serviço de Cardiologia, Hospital das Forças Armadas, Polo de Lisboa, Lisboa, Portugal

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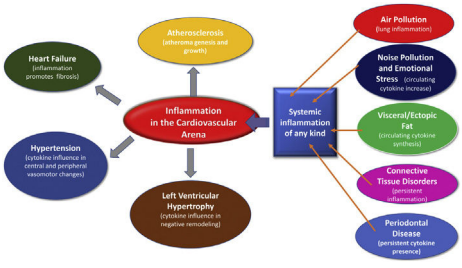
GRAPHICAL ABSTRACT



Inflammation in the cardiovascular arena[1]: inflammation induced by visceral fat, connective disease disorders, periodontal disease, emotional stress, and pollution (under several forms) can increase circulating cytokines[2]; this increase in systemic inflammation favors atheroma growth and instability, progression of heart failure, negative vascular changes in hypertension and the progression of negative remodeling in left ventricular hypertrophy.

In this volume of the Portuguese Journal of Cardiology, we were very happy to read and comment on Gaio et al.'s paper on the effects of air pollution in hypertension, a study performed in mainland Portuguese residents.[1] The theme presented: the influence of pollution in hypertension – is important and especially interesting to us, since one of the mechanisms for such a connection is the general state of inflammation induced by the pollution particles. Indeed, as summarized in the graphical abstract accompanying this text, the larger realm of environmental factors also seems to be related to a heightened inflammatory status connecting aggressors (pollution, noise, environmental stress, and others) to hypertension.[2–8] Furthermore, this connection has been recently exposed by the current pandemic (taking less noise and less pollution as the positive side of the Covid pandemic lockdowns)[9].

We have also been following these authors for their very serious work in determining the prevalence of hypertension in Portugal.[10,11] In this respect, other figures (for the prevalence of hypertension) have been put forward,[12] but the group has presented valid and interesting work. In this paper, a correlation is sought between the systolic and diastolic values of a previous registry (The Portuguese Health Examination Survey) obtained in 2015[10] and air quality monitoring obtained in the same year, according to the Portuguese Environmental Agency. However, despite the correct methodology, there was no impact between the obtained

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E-mail address: luis.bronze@gmail.com

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results on breathable Particulate Matter and blood pressure values. So, the publishing of a negative study also needs courage and emphasizes the authors' scientific rigor.

As the authors explain, the long distance between participant residence and air quality monitoring stations, might contribute to the negative results. Other confounding factors may be important, especially those related to the plethora of factors influencing hypertension and the difficulty to factor in all the confounders. Indeed, hypertension is a complex syndrome, consequently it is very hard to study even in simpler contexts.

The discussion is exhaustive and true to the most recent scientific evidence, especially with regard to the difference between the demonstrated minor effects of pollution in hypertension in European countries, as opposed to other regions of the world. It is well-known that poorer underdeveloped countries have a higher connection between hypertension (and other cardiovascular risks) and pollution. One must understand that in many of these countries people still use firewood combustion for their cooking, so the number of inhaled particles is much higher, this is called combustion environmental risk,[13] understandably lower in developed countries.

In conclusion, we truly enjoyed this work and believe it has merit, particularly because – as the authors duly emphasize – it is the first Portuguese reports on the matter. Further work will certainly follow. As for the future role of inflammation in the cardiovascular arena, even though we have reasonable doubts on the proposed use of anti-inflammatory drugs for the treatment of vascular hypertension,[14] we truly believe that the ever-increasing knowledge on the complex vascular inflammation biology will be very important for the understanding of the ever growing connection between environmental factors and cardiovascular disease. Such are the ''many faces of inflammation'' that we are still trying to unveil ... instinctively, we all feel that some (maybe many) present day environmental and social factors, including the ever-present global warming, are potentially bad. Let us hope that common sense and good science will help us fight such serious foes.

Conflicts of interest

The author has no conflicts of interest to declare.

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