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EDITORIAL COMMENT

Exposome and cardiometabolic health: Temperature change and humidity are part of the puzzle

Expossoma e a saúde cardiometabólica: mudanças de temperatura e de humidade são partes do quebra-cabeça

Claudio Tinoco Mesquita[a,b,*], **Fernanda Azevedo-Silva**[c]

[a] *Universidade Federal Fluminense, Niteroi, Rio de Janeiro, Brazil*
[b] *Hospital Pró-Cardíaco, Rio de Janeiro, Brazil*
[c] *Hospital Universitário Antônio Pedro, EBSERH-UFF, Niteroi, Rio de Janeiro, Brazil*

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''Intelligence is the ability to adapt to change.''

Stephen Hawking

The global average temperature rose by approximately 0.7°C over the last century, and global warming will continue because of deforestation and greenhouse gas emissions.[1] Consequently, temperature variability and extreme heat events have become more frequent in many parts of the world creating adverse and unpredictable consequences.[2] Epidemiological studies have suggested that high and also low temperatures may cause an in increase in cardiovascular mortality and morbidity.

In this issue of the Portuguese Journal of Cardiology, Vieira et al. expand our knowledge about the relation between atmospheric features and risk of ST-elevation myocardial infarction (STEMI) in the city of Porto, Portugal.[3] The authors reported on the relationship between atmospheric conditions such as temperature, relative humidity (RH), precipitation, and atmospheric pressure and the occurrence of STEMI in 1004 consecutive patients. The study showed that a decrease in temperature or an increase in RH were independent predictors of STEMI. Interestingly, Porto's climate is classified as a warm-summer Mediterranean climate (Csb),[4] which is characterized by an absence of extreme temperatures, a cold and rainy winter and fall, and a mildly hot summer and spring.[5]

The authors must be congratulated because the study of the consequences of life-time environmental exposure is very important in these rapidly changing times. To understand complex diseases such as cancer or coronary artery disease, the exposome concept was introduced. The exposome integrates the effects of external environmental risk factors (e.g., air pollution and noise), lifestyle exposure (e.g., smoking and diet) and environmental factors on the whole (e.g., socioeconomic status, violence and climate).[6] Two-thirds of the European population already live in urban areas and the exposure to noise, air pollution, temperature, humidity, and outdoor light can contribute adversely to their

* Corresponding author.
E-mail address: claudiotinocomesquita@id.uff.br (C. Tinoco Mesquita).

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exposome, increasing the incidence of cardiovascular disease. The consequences of rapid changes in atmospheric conditions may also be very important. Rowland et al. recently stated that ultra-short-term changes in ambient temperature can trigger myocardial infarction (MI). These authors found that temperature in the six hours preceding a MI was positively associated with the risk of MI,[7] something that was not encountered in the Porto study.

One aspect that Vieira et al. did not assess was the effect of air pollution on the incidence of STEMI.[3] Gadikou et al. demonstrated that annually 3.3 million cardiovascular deaths are attributable to air pollution: 2.1 million of which are due to ischemic heart disease (IHD) and 1.1 million due to stroke,[8] corresponding to 19% of all cardiovascular deaths. Recently, Kuzma et al. demonstrated that the effects of air pollution and weather conditions on the number of ACS hospitalizations are also observed in cities with moderately polluted or good air quality like the city of Porto.[9] As the authors pointed out, RH may be a key factor in an increase in air pollutants such as PM2.5 and the climatic conditions may strength the impact of air pollution on cardiovascular health.[10] In five years, the number of people exposed to PM2.5 levels exceeding 10 $\mu g/m^3$ (annual average), which is the maximum tolerated limit established by the World Health Organization, has increased almost 20%.[11] This scenario is disturbing.

The consequences of climate change and increased pollution are not only a challenge to cardiovascular health and affect our exposome adversely, but they also pose a severe threat to life on our planet. Measures to mitigate and reverse this scenario must be considered. Cardiologists must have an active voice in contributing to urban planning, transport interventions, and to the use of technology to manage external environmental exposure to promote heart healthy cities. Stephen Hawking said that intelligence is the ability to adapt to change. We must adapt to these new threats to cardiovascular health.

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Conflicts of interest

The authors have no conflicts of interest to declare.

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