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On the effects of combustion generated nanoparticles on human health: Overview of the current body of understanding

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During combustion, various materials undergo chemical reactions that lead to the formation of ultrafine particles or nanoparticles, that can be composed of different materials depending on the source, such as metal oxides, carbon, or other combustion byproducts. After the year 2000, there has been a continuous research effort to evaluate the toxicity of particles resulting from combustion [1], and epidemiological investigations have successfully pinpointed particles derived from combustion as a significant factor contributing to the adverse effects associated with particulate matter [2]. There is a wide palette of pathologies already associated, or under scrutiny to be associated, with combustion generated nanoparticles, which possess the capability to migrate from their initial deposition site in the lungs [3] to other organs, such as kidneys, liver or brain, with their ultimate accumulation site being contingent upon their specific physicochemical properties. Our comprehension of the molecular toxicology of combustion-generated nanoparticles has advanced, revealing a clearer understanding. The ultimate shared pathways involving oxidative stress-mediated inflammation are now recognized as the foundation for the effects induced by various combustion-generated nanoparticles [4]. However, there is still a long way ahead of fully comprehending the complete health hazards of combustions generated nanoparticles, not to mention, the progress still required for identifying ways to fully cancel such hazards. In this work we provide a literature overview summarizing the current level of knowledge existing on the adverse health effects combustions generated nanoparticles. We also discuss a series of perspectives on potential remedies, either on the prevention, or on the therapeutic side, enabled by emerging nanotechnologies [5].

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