



VIRTUAL ENVIRONMENTAL ERGONOMICS

Training and Competition in a High Pollution Environment

Accompanying video <https://youtu.be/Dgg6K8WenMM?t=268>

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The beneficial effects of physical activity on many domains of health are well known. Likewise, the adverse effects of air pollution exposure are extensive and wide ranging. Since exercise can lead to an increase in ventilation and hence inhaled dose of pollutants there is a theoretical potential that it could worsen the negative effects of air pollution.

The diversity and heterogeneity of air pollution in terms of constituents, and its distribution both temporally and geographically, make this a complex area of research. Furthermore, challenges around how best to study this question have led to a lack of clear evidence on how to safely exercise in conditions when the air pollution is high.

A variety of models exist for studying the interaction between these two inputs. Epidemiological studies have the benefit of long-term data and health outcomes, but are limited by a lack of blinding and other potential confounders. Exposure studies can be better controlled, but rely on surrogate outcomes and can be limited in the type of pollution to which the participants are exposed.

Epidemiological and exposure studies of healthy participants confirm the positive effects of exercise and physical activity and have to-date been unable to consistently show any synergistic negative effects of exercise and concomitant air pollution exposure. These findings seem to hold up across a variety of outcomes.

More work needs to be done in populations that have clinical conditions such as respiratory and cardiovascular disease. Furthermore, longer bouts of exercise need to be addressed (such as the marathon distance).

The question of masks remains inadequately investigated. Data confirm that masks are able to reduce the particulate dose when worn. However, studies in exercise with masks are not yet sufficient to demonstrate their benefit.

The presentation concludes with practical recommendations for both training and competition in a polluted environment that are based on the level of knowledge to date.



Questions

- 1) Why might exercise increase the harmful effects of air pollution?
- 2) Name three of the key constituents of air pollution/
- 3) Describe three research models used to study air pollution and exercise, and name an advantage of each.
- 4) Name 3 recommended strategies for reducing the potential of health effects while training during high pollution conditions.