

Adaptation of the upper airways in runners to urban air pollution

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ABSTRACT

Introduction: Air pollution continues to be a matter of concern in public health, despite falling levels of some of the major pollutants in industrial and overcrowded cities. The practice of aerobic exercise in urban environments is necessary to keep a health life, despite the increased inhalation of air pollutants. The aim of this research was to investigate the immune adaptations of the upper airways in amateur runners, who live and practice aerobic exercise in São Paulo, Brazil. **Methods:** Forty healthy amateur male runners without any acute or chronic upper airways disease. The subjects trained four times a week, 50 minutes each, along two weeks. In a cross over design, runnings were performed in two different circuits: one week in an urban area (UA) with traffic of vehicles powered by different fuels, and one week in another urban area that is a forest reserve (FR) without circulating vehicles. Running was practiced at 9 to 9.45 A.M., at speed of 10.0 km/h in a 7.5 km distance, between August to November 2012. Particulate matter of diameter < 2.5 µm (PM_{2,5}) was measured with Dust Trak™ 8520 (TSI Inc, MN, USA) along the training period. Data of raining days were excluded. Nasal lavage fluid (NLF) was collected at baseline (initial) before each running circuit and after five days of training for measurements of TNF, IL-4, IL-6, IL-8 and IL-10 levels through enzyme immune assay. Mann Whitney Test was used for PM_{2,5} analysis and Two-way ANOVA test for interleukins levels in NLF analysis. **Results:** Increased levels of PM_{2,5} was observed in UA compared with FR ($p < 0,001$) (Figure 1). No significant changes in levels of TNF, IL-6, IL-8 and IL-10, otherwise, the levels of IL-4 seems to be higher in the UA compared with FR ($p = 0,05$) (Figure 2). **Conclusion:** IL-4 is a cytokine that participates in the regulation of the immune system at multiple levels, mainly with anti-inflammatory action. Our hypothesis for the more elevated levels of IL-4 in the polluted UA circuit (higher levels of PM_{2,5}) is that anti-inflammatory mechanisms are activated to achieve an adaptation of the upper airways to the running practice in a polluted urban area.

Figure 1- PM_{2,5} concentrations in UA and FR

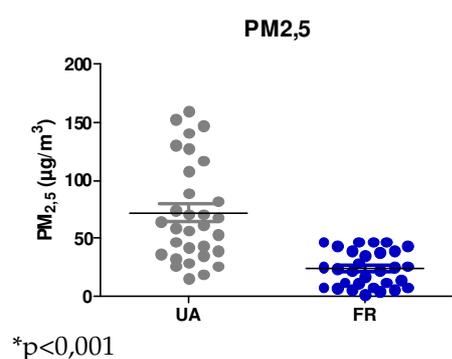


Figure 2. Levels of IL-4 at baseline (initial) and after running in UA and FR

