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LIFELONG TRAINING HELPS MAINTAINING CD4 AND CD8 NAÏVE T-CELLS WHILE REDUCING THE NUMBER OF SENESCENT NAÏVE T CELLS

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KEYWORDS: Immunosenescence; master athletes; lifelong training; naïve; lymphocytes T.

BACKGROUND

Some of the characteristics of immunosenescence in the T-cell pool, include low numbers and proportions of naïve T-cells, specially CD8⁺ T-cells, and a large number of memory T-cells, mainly CD8⁺ T-cells in late stage of differentiation. However, it has been suggested that chronic exercise can have an “anti” immunosenescence effect by maintaining/increasing the number of naïve T-cells.

PURPOSE

The aim of this study was to evaluate the effect of lifelong training on senescence and percentage of naïve T-lymphocytes in response to acute exercise.

MATERIAL AND METHODS

Nineteen master athletes who regularly participated in training and competitions for more than 20 years and a control group of 9 healthy individuals participated in this study.

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All subjects performed a progressive test to exhaustion on a cycle ergometer. Blood samples were obtained before (Pre), 10 min after the test (Post) and 1 h after the test (1h). The phenotypic study of peripheral blood T-cells was performed by flow cytometry. Expression genes of interest were done on naïve T-cells purified by cell sorting. For the analyses of change, accounting for the multilevel design of the study, hierarchical random effects models (REM) were constructed using a multilevel modeling approach.

RESULTS

We observed a negative influence of age on naïve CD8⁺ T-cells and a positive effect of VO_{2max} on naïve CD4⁺ T-cells (-0.5964 ± 0.2192 and 0.0599 ± 0.0024 , respectively). This suggests that the effect of age is greater than training on naïve CD8⁺ T-cells, whereas individuals with a better physical condition (higher VO_{2max} values) tend to have a higher number of naïve CD4⁺ T-cells. Master athletes showed lower percentages of senescent CD4⁺ (-5.8145 ± 2.4227) and CD8⁺ (-13.0661 ± 4.9568) T-cells including lower percentage of senescent naïve CD4⁺ and CD8⁺ T-cells (-5.3182 ± 2.5761 and -9.3624 ± 2.0992 , respectively). The mRNA expression of the CCR7 gene for naïve CD8⁺ T-cells was not different between masters and controls and did not change in response to the maximal protocol test.

CONCLUSION

Maintaining high levels of aerobic fitness during the natural course of aging may help prevent the accumulation of senescent T-cells while maintaining an adequate number of naïve T-cells and preserving the immune system ability to recognize and respond to new pathogens with ageing.