

Effects of acute exercise on expressions of functional receptors on CD56^{dim} and CD56^{bright} natural killer cells.

Abstract

PURPOSE: Mobilization and cytotoxicity of natural killer (NK) cells are regulated by cell surface receptors such as adhesion molecules and activating/inhibitory receptors. In this study, we examined the effects of acute exercise on the expression of these cell surface molecules and receptors.

METHODS: Six healthy male college students (22.8 ± 0.8 years olds) exercised on the cycle ergometer for 30 min at intensities corresponding to the individual onset of blood lactate accumulation level (70-85%VO₂max). Venous blood samples were collected at rest (PRE); just before the end of exercise (END) and 30 (POST 30), 60 (POST 60), 120 (POST 120) and 180 (POST 180) min post exercise. The densities of cell surface molecules and receptors on CD56^{dim} and CD56^{bright} NK cells were determined by flow cytometry. One-way ANOVA and MANOVA were used for statistical analyses.

RESULTS: At PRE, expressions of CD16, CD56, CD44, CD62L, CD314, CD335, CD159a and CX₃CR₁ differed between CD56^{dim} and CD56^{bright} NK cells. Expressions of adhesion molecules CD62L and CX₃CR₁ changed significantly in both subsets during and after exercise. The expressions of CD62L tended to decrease at END, and then they increased significantly at POST 30. These changes were mainly due to the proportional changes in CD62L^{negative} cells. The opposite patterns of changes were seen in the expressions of CX₃CR₁. Additionally, the expressions of CX₃CR₁ decreased at POST 120 and 180 only in CD56^{dim} NK cells. The changes in the expressions of CD44 were similar to those seen in the expressions of CD62L. Although changes in the expression of adhesion molecules were statistically significant, they were relatively unclear in histogram analyses. With regard to the expressions of NK cell activating/inhibitory receptors, most changes were observed in CD56^{dim} NK cells. The expressions of CD16 decreased at END and returned at POST 30. The expressions of CD212 dropped from END to POST 30. In contrast, the expressions of CD335 increased from END to POST 30. Exceptionally, changes in the expressions of CD226 were found in both subsets. The expressions decreased at POST180.

CONCLUSION: These results suggest that acute exercise influences the expressions of cell surface molecules and receptors. Changes were mainly observed at END and POST 30 in CD56^{dim} NK cell. However, the delayed changes were also seen in some receptors. The changes in several receptors were related to cell mobilization. In contrast, the changes in other receptors were not directly related to mobilization and cytotoxicity.