# Modulation of dendritic cells and toll-like receptors by marathon running

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The focus of this study was to assess exercise-induced alterations of circulating dendritic cell (DC) subpopulations and toll-like receptor (TLR) expression after marathon running. Blood sampling was performed in 15 obese non-elite (ONE), 16 lean non-elite (LNE) and 16 lean elite (LE) marathon runners pre- and post-marathon as well as 24 h after the race. Circulating DC-fractions were measured by flow-cytometry analyzing myeloid DCs (BDCA-1+) and plasmacytoid DCs (BDCA-2+). We further analyzed the (TLR) -2/-4/-7 in peripheral blood mononuclear cells (rt-PCR/Western Blot) and the cytokines CRP, IL-6, IL-10, TNF-$\alpha$ and oxLDL by ELISA. After the marathon, BDCA-1 increased significantly in all groups [LE (pre/post): 0.35/0.47%; LNE: 0.26/0.50% and ONE: 0.30/0.49%; all p <0.05]. In contrast, we found a significant decrease for BDCA-2 directly after the marathon (LE: 0.09/0.01%; LNE: 0.12/0.03% and ONE: 0.10/0.02%; all p <0.05). Levels of TLR-7 mRNA decreased in all groups post-marathon (LE 44%, LNE 67% and ONE 52%; all p <0.01), with a consecutive protein reduction (LE 31%, LNE 52%, ONE 42%; all p <0.05) 24 h later. IL-6 and IL-10 levels increased immediately after the run, whereas increases of TNF-$\alpha$ and CRP-levels were seen after 24 h. oxLDL levels remained unchanged post-marathon. In our study population, we did not find any relevant differences regarding training level or body weight. Prolonged endurance exercise induces both pro- and anti-inflammatory cytokines. Anti-inflammatory cytokines, such as IL-10, may help to prevent excessive oxidative stress. Marathon running is associated with alterations of DC subsets and TLR-expression independent of training level or body weight. Myeloid and plasmacytoid DCs are differently affected by the excessive physical stress. Immunomodulatory mechanisms seem to play a key role in the response and adaptation to acute excessive exercise.
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