Neointima Formation is Prevented by Physical Exercises that Increase CD34⁺, VEGFR2⁺ and CD34⁺/VEGFR2⁺ Cells in Atherosclerotic Mice Peripheral Blood (PB).

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Introduction: Endothelial progenitor cells (EPC) are characterized by the presence of cellular markers like CD34 and VEGFR2. Physical exercises (PE) can increase EPCs levels, while atherosclerosis can decrease it. This decrease may impair endothelium recovering after an arterial lesion. Material and Methods: We investigated CD34⁺ and VEGFR2⁺ cells by flow cytometry in PB and the levels of cholesterol (Cho), triglycerides (TG) in plasma, before and after 7 or 14 days of treadmill running and arterial injury in LDLr⁻/⁻ mice fed a western diet (atherosclerotic mice) and also neointima formation (NF) by immunohistochemistry. Results and Discussion: Cho levels were higher in sedentary atherosclerotic mice (control), but PE for 7 or 14 days was not capable to rescue it (615.31 or 738.73 or 633.93 mg/dl, p<0.05). PE decreased TG (136.32 vs. 81.62 or 99.14 mg/dl, p<0.05) and LDL-cholesterol decreased after 14 days of exercises (526.22 vs. 259.97 mg/dl, p<0.05), and HDL-cholesterol was increased (61.82 vs. 94.26 or 138.34 mg/dl, p<0.05). CD34⁺, VEGFR2⁺ and CD34⁺/VEGFR2⁺ cells in control mice were 0.028%, 0.032%, 0.0%, respectively. PE increased all these cells levels, CD34⁺ (0.028% in control vs. 0.08 or 0.3%, after 7 and 14 days of exercise respectively), VEGFR2⁺ (0.032 vs. 0.10 or 1.28%) and CD34⁺/VEGFR2⁺ (0.00 vs. 0.01 or 0.043%). Arterial injury concomitant with PE increased these cells number but not at the same level as we observed in control mice; CD34⁺ cells (0.028 in control vs. 0.2 or 0.057% after surgery and 7 or 14 days of exercises), VEGFR2⁺ (0.032 vs. 0.28 or 0.142 %) and CD34⁺/VEGFR2⁺ (0.0 vs. 0.11 or 0.020%). At the same time, PE prevented NF in injured LDLr⁻/⁻ mice. Conclusions: PE helps maintaining EPCs levels by improving the physical
conditions of atherosclerotic mice and can be used as a non-pharmacological therapy to prevent vessel restenosis.

Keywords: Endothelial progenitor cells, Atherosclerosis, neointima formation, Physical exercises