SWIMMING TRAINING PREVENTS UNSTABLEATHEROSCLEROTIC PLAQUE IN HYPERCHOLESTEROLEMIC AND HYPERTENSIVE ApoE-/-MICE.
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INTRODUCTION: exercise training is a deterrent of atherosclerotic cardiovascular disease. However, the effects of exercise on unstable atherosclerotic plaque susceptible to rupture with dramatic consequences remain poorly understood. In this study, we explored the effect of aerobic exercise on atherosclerotic plaque progression and morphology in a mouse model of vulnerable atherosclerotic plaques. METHODS: we used ApoE-/- mice with either stable or vulnerable plaques. Mice with vulnerable plaques were generated by increasing endogenous angiotensin (Ang) II production (two kidney-1 clip, 2K1C, renovascular hypertension model). Normotensive sham (non-operated) ApoE-/- mice with normal Ang II levels and stable plaques were used as controls. 9-week old ApoE-/- mice were divided into 2 groups: the exercise group which underwent a 11-week swimming program and the sedentary group. After 6 weeks in the program, training and sedentary ApoE-/- mice were generated in 2K1C or sham ApoE-/- animals. Swimming was then resumed for another 5 weeks. Quantification of atherosclerosis was determined in thoraco-abdominal aorta by Oil red staining. To assess plaque morphology in aortic sinus, we quantified smooth muscle cell (SMC) content in the fibrous cap of the plaque and we explored plaque inflammation by macrophage quantification (immunohistochemistry analysis). RESULTS: 2K1C ApoE-/- mice developed significant hypertension compared to sham mice. Swimming did not reduce blood pressure in 2K1C and sham ApoE-/- mice. Swimming exercise significantly reduced atherosclerotic lesions in aortas of hypertensive 2K1C and normotensive sham ApoE-/- mice as compared with sedentary mice. Swimming training increased SMC content in fibrous cap and decreased macrophage plaque content in 2K1C ApoE-/- in comparaison to the sedentary ApoE-/- 2k1C mice suggesting a better stability of these plaques. CONCLUSION: our data showed for the first time that exercise directly affects the plaque morphology and prevents unstable plaques.

Keywords: Prevention, Exercise Training, Atherosclerotic Disease