Altered Polyunsaturated Fatty Acids (PUFA) Profiles and Lipid Peroxidation in Muscle of Different Genetic Mice Lines Fed High Fat Diets

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High level of dietary fat or an imbalance between saturated fat and polyunsaturated fat or between n-6 and n-3 PUFA are related to a number of chronic diseases in humans. The present investigations were focused on muscle fatty acid profile with special emphasis on polyunsaturated fatty acids (PUFA), and lipid peroxidation in obese vs. motoric active mice fed high fat diets. Three genetically different mice lines selected for high body weight mice (DU6), high treadmill performance mice (DUhTP) and a control mice (DUK) line were fed high fat diets (25% fat) enriched with n-3 PUFA (fish oil) and n-6 PUFA (sunflower oil). The control diet was standard mice chow (7% fat). N-3 and n-6 PUFA enriched high fat diets caused significant changes predominantly in the total PUFA, n-3 and n-6 PUFA, and saturated fatty acid (SFA) contents in all investigated mice lines. N-3 PUFA enriched diet caused up to two time’s higher contents of SFA in muscle of DU6 and DUhTP mice lines compared to n-6 PUFA enriched and control diet. In contrast, n-6 PUFA enriched diet significantly increased the total PUFA contents in DU6 and DUK mice lines compared to n-3 PUFA enriched and control diets. The extent of lipid peroxidation in the muscle was affected by both factors different PUFA enriched diets and the different mice lines. High fat diets enriched with n-3 PUFA increased the level of lipid peroxidation in muscle of all three investigated mice lines compared to n-6 PUFA enriched diet, because of higher susceptibility of n-3 PUFA to peroxidation. The muscle of high treadmill performance mice (DUhTP) showed the highest lipid peroxidation followed by high body weight mice (DU6) and control mice (DUK) line.