Effects on metabolic markers are modified by PPARG2 and COX2 polymorphisms in infants randomized to fish oil.

Long-chain n-3 fatty acids (n-3 LCPUFA) improve blood pressure (BP) and lipid profile in adults and improve insulin sensitivity in rodents. We have previously shown that n-3 LCPUFA reduces BP and plasma triacylglycerol (TAG) in infants. Few studies have found effects on glucose homeostasis in humans. We explored possible effect modification by FADS, PPARG2, and COX2 genotypes to support potential effects of n-3 LCPUFA on metabolic markers in infants. Danish infants (133) were randomly allocated to daily supplementation with a teaspoon (~5 mL/day) of fish oil (FO) or sunflower oil (SO) from 9 to 18 months of age. Before and after the intervention, we assessed BP, erythrocyte n-3 LCPUFA, plasma lipid profile, insulin, and glucose in addition to functional single nucleotide polymorphisms in FADS, PPARG2, and COX2.

At 18 months, plasma TAG was lower in the FO compared with SO group (p = 0.014). This effect was modified by PPARG2-Pro12Ala, as TAG only decreased among heterozygotes. FO supplemented PPARG2 Pro12Ala heterozygotes also had decreased plasma glucose compared with the SO group (p = 0.043). The effect of FO on mean arterial BP at 18 months was gender dependent (p = 0.020) and reduced in boys only (p = 0.028). Diastolic BP was, however, lower among all FO supplemented homozygous COX2-T8473C variant allele carriers compared with the SO group (p = 0.001). In conclusion, our results confirm that FO supplementation in late infancy reduces TAG and BP and indicates that the effects are mediated via peroxisome proliferator-activated receptor-γ and cyclooxygenase-2. Furthermore, FO reduced plasma glucose only in PPARG2 heterozygotes.