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Modulating effects of omega-3 fatty acids and pioglitazone combination on insulin resistance through toll-like receptor 4 in type 2 diabetes mellitus

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Toll-like receptor 4 (TLR-4) plays an important role in innate immunity. Changes in the reduction-oxidation balance of tissues can lead to a pro-inflammatory state and insulin resistance typically seen in diabetes. An action thought to be mediated by TLRs. Omega-3 fatty acids and Peroxisome Proliferator Activated Receptor gamma (PPAR- γ) agonists as pioglitazone are currently used for decreasing inflammation in diabetes. The aim of this study is to investigate the potential anti-diabetic effects of combining omega-3 fatty acid with the insulin sensitizer "pioglitazone" in a rat model of type 2 diabetes, and the modulating effects on TLR-4. Type 2 diabetes was induced in male Sprague-Dawley rats by combination of high fat diet and low dose streptozotocin (35 mg/kg). Diabetic rats were treated with omega-3 fatty acids (10%W/W diet), pioglitazone (20 mg/kg), and their combination for a period of 4 weeks. Omega-3 fatty acids and combination therapy significantly decreased TLR-4 activation, compared to diabetic group. Omega-3 fatty acids, pioglitazone, and combination therapy showed significant decrease in TLR-4 mRNA expression. Omega-3 fatty acids, pioglitazone and their combination significantly lowered hepatic malondialdehyde, total cholesterol and triglycerides levels, compared to diabetic group. Pioglitazone and combination significantly decreased blood glucose levels and improved insulin resistance. In conclusion, combining PPAR- α agonists, as omega-3 fatty acids with PPAR- γ agonists as pioglitazone showed potential effects in lowering blood glucose levels and improving lipid profile and insulin resistance. Such effects are mediated through modulation of TLR-4.

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Moving the prevention of type 2 diabetes into public health: A randomized control trial showing the promise of commercial weight loss programs to scale prevention

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Objectives: In spite of solid evidence that risk for developing type 2 diabetes can be prevented by lifestyle interventions, it has been difficult to scale prevention research to address the growing public health demand. This study investigated if an already-scaled weight management program (Weight Watchers-WW) could achieve weight loss levels in persons with prediabetes.

Methods: An individual, randomized intervention trial evaluated the effects of the WW program in 225 persons with prediabetes on weight and metabolic regulation compared with a program developed by the National Diabetes Education Program at baseline, 6 and 12 months.

Results: Intervention participants lost significantly more weight than controls at 6 (5.6 % vs. 0.8%) and 12 months (5.6% vs. 0.1%); both p values<.0001). The intervention group also had significantly greater improvements in A1c and HDL than did controls.

Conclusion: These data suggest that a scalable weight management program is effective for achieving lifestyle changes associated with diabetes prevention. Such scalable programs could significantly increase the availability of diabetes prevention programs worldwide making an immediate and significant public health impact.

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