

Summer Meeting hosted by the Irish Section, 16–19 July 2012, Translational nutrition: integrating research, practice and policy

Lower levels of damaged protein biomarkers in the plasma of overweight type 2 diabetic men following supplementation with a standardised bilberry extract

F. M. Campbell, P. F. Nicol, K-M. Moar, M. Cruickshank and N. Hoggard
Rowett Institute of Nutrition and Health, University of Aberdeen, Aberdeen AB21 9SB, UK

Type 2 diabetics have increased levels of oxidative stress. This results in specific modifications to proteins and is linked to health complications such as cardiovascular disease⁽¹⁾. Dietary strategies for alleviating these complications are being pursued as alternatives or supplementary to pharmaceutical interventions. Berries from the genus *Vaccinium* such as bilberry are enriched in anthocyanins, polyphenolics recognized for their ability to provide and activate cellular antioxidant protection⁽²⁾. This pilot study investigated whether three weeks supplementation with a concentrated bilberry extract would alter oxidised protein markers in the blood plasma of overweight/obese type 2 diabetics compared to pre-supplementation samples.

The volunteer subjects in this study were overweight/obese males (BMI>25) with type 2 diabetes controlling their diabetes by diet alone ($n = 11$). All subjects provided informed written consent before inclusion in the study which was approved by the NOSREC. Volunteers were given 1.4 g a day of Mirtoselect[®] Indena S.p.A. (standardized bilberry extract, 36% (w/w) anthocyanins), formulated in gelatin capsules. Three different oxidised protein markers were measured in plasma samples: protein-pyrroles, protein-nitrotyrosine (3-NT) and oxidised LDL. Protein-pyrroles were determined using a slot-blot after labelling the pyrroles with biotin tagged Ehrlich's Reagent⁽³⁾. Protein-3-NT was determined by immunoblotting. Plasma levels of oxidised LDL were determined using Mercodia Oxidized LDL ELISA from Mercodia AB (Sweden).

Protein marker	Pre-supplementation		Post-supplementation		% change
	mean	SE	mean	SE	
Pyrroles (nmole/mg protein)	3.01	0.12	2.74*	0.18	9.3
Protein-3-NT (U/ μ g ¹ NT-BSA)	0.52	0.02	0.46*	0.02	9.1
Oxidised LDL (U/L)	43.2	4.2	37.0*	2.6	14.4

¹NT-BSA, nitrated bovine serum albumin standard (Sigma-Aldrich, UK), * $p \leq 0.05$ post-supplementation values vs. pre-supplementation values using t-test paired 2 samples for mean.

In conclusion three weeks of taking capsules containing concentrated standardised bilberry extract resulted in a significant reduction in three sensitive markers of oxidative stress in the plasma of overweight/obese type 2 diabetics. This gives support for the use of such dietary supplements to reduce diabetes associated oxidative stress. However, one limitation to this study is a lack of a control group taking suitable placebo capsules for a direct comparison of the effects of the bilberry extract. We intend following up this pilot study with a larger cohort of volunteers including such a control group.

This work was funded by the Scottish Government Rural and Environment Science and Analytical Services (RESAS).

1. Rabbani N, Chittari MV, Bodmer CW *et al.* (2010) *Diabetes* **59**, 1038–45.
2. Zafra-Stone S, Yasmin T, Bagchi M *et al.* (2007) *Mol Nutr Food Res* **51**, 675–83.
3. Campbell FM, Rucklidge GJ, Reid MD *et al.* (2010) *Anal Biochem* **398**, 76–82.