

## *Health News from 3Care Therapeutics*

---

### **Olive Oil and Gene Expression: Anti-Inflammatory Action Linked to Nutrigenomics**

Phenolic compounds in olive oil could help repress genes linked to inflammation, thereby providing a nutrigenomic explanation for the reduction of heart disease risk linked to the consumption of olive oil.

The present study, published in Biomed Central (BMC) Genomics, tested the impact of consuming an olive-oil rich breakfast on people suffering from metabolic syndrome, which is a cluster of conditions linked to heart disease and diabetes.

“This study shows that intake of virgin olive oil based breakfast, which is rich in phenol compounds is able to repress in vivo expression of several pro-inflammatory genes, thereby switching activity of peripheral blood mononuclear cells to a less deleterious inflammatory profile,” wrote the researchers.

“These results provide at least a partial nutrigenomic basis for reduced risk of cardiovascular disease observed in Mediterranean countries, where virgin olive oil represents a main source of dietary fat.”

Previous studies had shown that the consumption of olive oil with a high phenolic content (Extra Virgin) could help reduce pro-inflammatory, pro-oxidant and pro-thrombotic markers compared with the consumption of low phenol content olive oil.

The researchers of the current study set out to investigate whether the beneficial effects of olive oil could be linked to gene activity. Their approach was to identify specific expression changes in genes which could be mediated by olive oil phenol compounds.

The study, which followed a double-blinded, randomized, crossover design, involved 20 patients suffering from metabolic syndrome. After an initial six-week wash-out period during which participants did not take supplements, vitamins or drugs, they were fed two virgin olive oil-based breakfasts with high (398 ppm) and low (70 ppm) content of phenolic compounds.

All participants consumed a similar low-fat, carbohydrate rich diet during the study period to eliminate potential impacts resulting from their usual dietary habits.

After tracking the expression of over 15,000 human genes in blood cells during the after-meal period, the researchers identified 79 genes that were underexpressed (or turned down) by the high phenol olive oil, and 19 genes that were overexpressed (or turned up).

“Many of those genes have been linked to obesity, high blood-fat levels, type 2 diabetes and heart disease. Importantly, several of the turned-down genes are known promoters of inflammation, so those genes may be involved in ‘cooling off’ inflammation that often accompanies metabolic syndrome,” writes the US Department of Agriculture’s Agricultural Research Service, which was involved in the study.

The researchers concluded that their findings strengthen the relationship between inflammation, obesity and diet, and provide evidence at transcription level of control of healthy effects derived from virgin olive oil consumption in humans.

However, they added that “it would be interesting to evaluate whether these beneficial effects are maintained after prolonged feeding and if these effects are carried out by one or several olive oil phenolic compounds, or if they are consequence of a synergic effect of the total phenolic fraction.”

Source: Gene expression changes in mononuclear cells in patients with metabolic syndrome after acute intake of phenol-rich virgin olive oil

BMC Genomics 2010, 11:253; doi:10.1186/1471-2164-11-253

Authors: Antonio Camargo, Juan Ruano, Juan M Fernandez, Laurence D Parnell, Anabel Jimenez, Monica Santos-Gonzalez

Carmen Marin, Pablo Perez-Martinez, Marino Uceda, Jose Lopez-Miranda, Francisco Perez-Jimenez

### **Omega-3 linked to lower levels of inflammation**

Increased blood levels of the omega-3 fatty acids DHA and EPA are associated with lower levels of a marker of inflammation linked to heart disease, according to a new study from Australia.

Writing in the *European Journal of Clinical Nutrition*, researchers from the University of Newcastle in New South Wales report that levels of C-reactive protein (CRP), a marker of inflammation and reported to be an independent predictor of cardiovascular-related events, are inversely related to blood levels of omega-3 fatty acids.

“The importance of this study is such that individuals with higher plasma high sensitivity-CRP (>3.0 mg/l) concentrations, have significantly lower plasma n-3 fatty acids,” wrote the researchers, led by Professor Manohar Garg.

“Given that n-3 fatty acids is cardio-protective, this inverse correlation with hs-CRP, a surrogate marker of CVD risk, could represent a possible mechanism by which n-3 fatty acids are involved in CVD risk reduction.”

Professor Garg and his co-workers examined omega-3 fatty acids and CRP levels in the plasma of 124 free-living adults (average age 47.7, average BMI 29.8 kg/m<sup>2</sup>). Participants were divided into three groups depending on their CRP levels (<1.0, 1.0–3.0, and >3.0 mg/l).

Negative relationships between hs-CRP levels and total omega-3, EPA, and DHA levels were observed, with hs-CRP levels over 3.0 mg/l associated with significantly reduced concentrations of total n-3 fatty acids, EPA and DPA.

“We report that plasma n-3 fatty acids concentration is inversely correlated with hs-CRP in healthy individuals,” wrote the researchers.

*European Journal of Clinical Nutrition*

An inverse relationship between plasma n-3 fatty acids and C-reactive protein in healthy individuals

Authors: M A Micallef, I A Munro and M L Garg

*Volume #37 July 2, 2010 3Care Therapeutics*