

Do we eat enough extra virgin olive oil?

The question leaves space for considerations that can reveal and raise troubling concerns. One study by Massimo Cocchi and Giovanni Lercker sheds light on a reality that urge to be thorough

by Giovanni Lercker, Massimo Cocchi

Massimo Cocchi, DIMORFIPA, University of Bologna - Giovanni Lercker, DISA, University of Bologna



On this question, about the logic of the nutritional interpretation of a food compared to the health status, there are considerations that can reveal and raise troubling concerns. For many decades, we have spoken of the relationships between health status and extra virgin olive oil, so that it seems to be, now, subject to underground legend.

Especially those who spoke in a more widespread way were the Americans.

We have discovered the so-called Mediterranean diet, passing through the United States of America.

The oleic acid and especially what we get from the pressing of the olives is a crucial element in the prevention of ischemic cardiovascular disease, as it has been demonstrated by a series of impressive scientific work of international prestige.

We just mention a few and you can read what they say:

...Fatty acids other than the n-3 PUFAs also can interact with eicosanoid metabolism and potentially influence platelet function. For example, there is evidence that diets rich in unsaturated fatty acids such as linoleic acid and oleic acid also can decrease thrombosis tendency by replacing arachidonic acid in platelet phospholipids, decreasing in vitro [TXA.sub.2] production and platelet aggregation. However, there is little conclusive evidence that platelet function in vivo is affected by these diets... (1)

...Oleic acid was found to be a potent inhibitor of PAF-induced platelet aggregation and serotonin secretion. Consequently, in order to understand the molecular mechanism of oleic acid action, we investigated the effects of this FFA on several biochemical events associated with platelet aggregation induced by PAF...

...The decrease in the levels of [32P] PIP and [32P]PIP2 caused by oleic acid was associated with an inhibition of platelet aggregation induced by PAF...

...These results suggest that inhibition of the PAF response by oleic acid may be at one of the steps in the signal transduction... (2)

...Several reports in the literature have suggested that olive oil may inhibit platelet function. This possible effect is of interest for two reasons: it may contribute to olive oil's apparent anti-atherogenic effect, and it may invalidate the use of olive oil as an inert placebo in studies of platelet function...

...After olive oil supplementation, platelet aggregation and thromboxane A [sub. 2] release decreased, platelet membrane oleic acid content increased significantly, and platelet membrane arachidonic acid content decreased significantly. The data suggest that an excess of oleic acid impairs the incorporation of arachidonic acid into platelet phospholipids...

...The authors conclude that "olive oil supplementation has an inhibitory effect on various aspects of platelet function," an effect that might decrease heart disease risk, although fish intake also plays a protective role... (3)

...this study shows that the effect of olive oil is attributed to its high content of oleic acid (70-80%). The intake of olive oil increases the levels of oleic acid in the membrane, which regulates membrane lipid structure on the control of signal-mediated G-protein, causing a reduction in blood pressure ... (4)

... Our results indicate that cardiovascular tissues of rats treated 2-OHOA (hydroxy oleic acid), show activation of cAMP in response to activation of the Gsa protein, that might be attributed to increased expression of Gsa proteins. As a result of this effect, there was a significant reduction in systolic blood pressure ... (5)

... The exclusive use of olive oil during food preparation seems to offer significant protection against ischemic heart disease, despite the clinical, lifestyle and other characteristics of participants ... (6)

We remember also those most historic:

... In 1985, Mattson and Grundy (7), University of Dallas, have reported that olive oil reduced the serum cholesterol, HDL cholesterol, which plays a protective, anti-atherogenic function favoring the elimination of LDL-cholesterol. In 1986, Sirtori et al. (8) have shown that in addition to its effect on cholesterol and atherosclerosis, olive oil has a preventive effect on thrombosis and platelet aggregation. High intakes of olive oil are not harmful, they reduce the levels of LDL-cholesterol, but not those of HDL, which may even increase: Carmena et al., 1996 (9), Mata et al., 1992b (10) ; Jacotot et al., 1998 (11); Mensink Katan, 1989 (12); Carmena et al., 1989 (13), Grundy et al., 1986, 1988 (14, 15), Mattson and Grundy, 1985 (16) ; Keys, 1970 (17) ...

It seems that there are no doubts about the utility of oleic acid.

We recently demonstrated, Cocchi et al. 2008 (18), which not only reduced amounts of oleic acid are the most critical in the biochemical classification of ischemic heart disease (the result obtained by using a Self Organizing Map) but it is also common in the condition that characterizes the relationship between depression and ischemia. Cocchi and Tonello, 2008 (19).

Already in 2000, Weyers and Colquhoun (20) reported an improvement of depression in patients with CHD, by the use of olive oil.

Building on this strong evidence, we have set ourselves the question whether there is a sufficient introduction of olive oil and oleic acid, in the Italian population.

To check as oleic acid can significantly change the composition of platelet fatty acids, which are crucial in the genesis of plaque formation, and can significantly move the amount of oleic acid in platelet membranes, an experiment on a large group of pigs has been made. Cocchi et al. (21).

Changes of platelets fatty acids composition were obtained for a contribution of about 20 grams of oleic acid in a diet with 25% total fat, corresponding to the percentage desired for man.

If we consider the characteristics always described for the pig as a model of atherosclerosis and, therefore, the similarity with humans, we conclude that we should introduce a quantity of oleic acid and, consequently, extra virgin olive oil, at least double compared to current consumption.

To assert this, we made simple considerations on the data that relate to the consumption of olive oil.

We have asked ISMEA for clarification on purchases by region, and ISMEA has given us the following table:

Based on data provided and taking into account that the value derived from the table, must be increased by 40%, since from the data of purchase are excluded amount equal to about 40%, we can consider that the consumption of extra virgin olive oil, for each Italian is, on average, about 11.76 grams of oleic acid every day.

Maybe a little less, if we consider that much is also used for frying and, therefore, we cannot calculate it for equal amounts in the raw consumption. It is not difficult to understand how this quantity is very small. It appears also evident from the numbers, the significant difference between north and south of Italy, confirming that the use of olive oil should be strongly promoted everywhere, particularly in the regions of the north.

This observation cannot be separated from the observation that the current model does not allow large consumption of this food. We should remember that the meal outside home, often consisting of a sandwich, makes it difficult to consume extra virgin olive oil in the quantities envisaged and hoped for. Maybe the food habits of rural areas are still able to cope with the problem, even if you think that they may be increasingly geared towards a gradual departure from tradition.

Did Ancel Keys say, again, today, that the model of the Mediterranean diet is still an instrument of health, referring to the consumption of extra virgin olive oil?

According to the numbers probably do not.

The argument must be also considered in terms of technology.

Not all oils from olives have the same composition.

The International Olive Oil Council (IOOC) provides that the content of oleic acid in these oils can fluctuate from 55% up to 83% of total fatty acids (22).

Regulation of the European Community does not indicate the amount of oleic acid in olive oil, simply indicate the specifications of many other parameters of the composition, useful for detecting fraud, but requires the distinction between the various commercial products obtained from the olives processing.

Among those, extra virgin oils are those that must have the best quality. The content of oleic acid has always been regarded with the highest quality of extra virgin olive oil, but because of the improved stability of oil in storage, due to the low reactivity of oleic acid compared with polyunsaturated fats.

The Food and Drug Administration (FDA) has written that U.S. consumption of 23 g of olive oil each day (about two tablespoons), helps prevent cardiovascular diseases. This important statement of FDA, worldwide reference institution for biochemical and biological aspects of food, refers to the content of oleic acid that olive oils have.

Today there are other sources available of oil high in oleic acid, such as safflower, sunflower and canola also (the new name for rapeseed low in erucic acid), so if it were up to the oleic acid also these other sources would be optimal for that purpose. In fact, the reputation as a healthy product that the oil produced from the processing of olives, has earned over the years, it is more likely due to the simultaneous presence of "minor elements" that contain these oils when they are not refined, how they should be for Law the oils obtained from all other oil plants. (23, 24, 25).

Among the minor components are to remember the biophenol, which consists of phenols and polyphenols with strong antioxidant and antiradical activity, some triterpene alcohols, phytosterols, Squalene and the tocopherols. These are considered important because their vitamin (Vit E) activity, but also for their ability to facilitate the assimilation by the body of polyunsaturated fatty acids (1 mg allows the assimilation of 1 g of polyunsaturated fatty acids) .

The rediscovery of health effects due to many of the minor components contained in olive oil has dug a huge gap between the nutritional properties of edible oils. In fact, oils from seeds, subject to refining, have lost many minor components and no longer have health properties that could have the corresponding matrices.

The technology for olives processing is able to influence the quality and organoleptic characteristics of the product and this is not always known to the operators in the industry (producers of olives and frantoiani) because many of the scientific knowledge about that are particularly new.

The oil content in olive is encapsulated in small drops (10-30 micrometers) within vacuoles with a polysaccharide wall: the droplets of oil, during processing, are released in crushing and they go in contact with all other components of olive during grinding of the paste.

It is with the contact oil-pasta, prolonged to join the small droplets so that they could then leave the dough in the process of separation that takes place the amalgamation of all the minor components that are dissolved in oil or, within it, emulsify.

Therefore time and processing temperatures can affect the result, also if the characteristics of the olives are the same at the start, and they can give very different products. Moreover, during the same touch oil-paste, the enzyme activities are capable of forming the fragrance of the future oil with a series of biochemical steps that, in part, however, may reduce the antioxidant ability of biophenol components and their action on health. Therefore, the choices you make during the processing of olives should consider these technological effects.

The olive cultivars grown in the national territory is known to be several hundred, and this leads to many oils that have a very different composition, although all of excellent quality. In particular, the richness in antioxidants (biophenol, especially) can affect technology of the oil produced, in terms of smell, taste, storage stability and health properties.

Even if you have gained much scientific knowledge about olives production and processing

technology, there are still many questions that must be solved to improve the quality, especially the health one of the oils obtained by processing olives.

One can conclude that our observations, in fact, correspond to those of FDA and that will never be sufficiently well-spent the money and time used to support the consumption of the traditional food and of the, locally produced, extra virgin olive oil.

by Giovanni Lercker, Massimo Cocchi

**Massimo Cocchi, DIMORFIPA, University of Bologna - Giovanni Lercker, DISA,
University of Bologna**

04 May 2009 TN 4 Year 1