



APPLICATION:

CHOCOLATE & CEREAL BARS NUTRITIONALLY FORTIFIED WITH NATURAL OLIVE FRUIT ANTIOXIDANTS (POLYHEALTH S.A. - MEDOLIVA POWDER)



SUMMARY OF THE APPLICATION

A series of new organic, healthy and bioactive snacks were developed including dark and milk chocolate as well as cereal bars which are fortified by natural olive fruit antioxidants (POLYHEALTH A.E. MEDOLIVA POWDER) in order to help the consumer to fight and block the free radical produced by oxidative stress. Furthermore in the new products, the sugar was substituted by healthy stevia glucosides making them suitable for anti-diabetic nutrition (low glucemic index nutrition). The addition of the olive fruit natural antioxidant in the new products presents a multi factor improvement of them over the conventional ones as at the same time improves the organoleptic characteristics of the products , retards the fat oxidation and functions as a pre-biotic compound activating the probiotic lactic acid bacteria in the intestinal track of the consumer.

Dark Chocolate, milk chocolate and cereal bars are considered as healthy foods with various good effects to the human health if consumed in reasonable quantities. They contain antioxidants and nutritional fibers which contribute in good health and improve the human body mechanisms to fight certain diseases.

According to the scientific literature, some of the many health benefits of dark chocolate are as follows (<https://www.organicfacts.net/health-benefits/other/health-benefits-of-dark-chocolate.html>, Netherlands Journal of medicine, **Chocolate/cocoa and human health: a review R. Latif** Department of Physiology, College of Medicine, University of Dammam, Dammam, Kingdom of Saudi Arabia.):

Blood Pressure: Dark chocolate is rich in minerals such as magnesium and copper. These minerals aid in regulating normal blood pressure and subsequently maintaining proper heartbeat levels.



Stress: Eating a delicious piece of chocolate can possibly reduce stress levels; it works by stimulating the production of endorphins that may give rise to a happy feeling. In addition, the dark chocolate variety contains stimulants such as theobromine and caffeine, which are major stimulants.

Blood Circulation: Eating dark chocolate not only relaxes the body, but also makes the blood vessels more flexible. It also boosts the functioning of the endothelial cells that line the blood cells. It also decreases the risk of developing innumerable cardiovascular diseases.

Cholesterol Levels: Dark chocolate has been medically proven to reduce the bad cholesterol levels in the human body significantly (up to 10-12%).

Immunity: The two kinds of flavonoids present in chocolates are mainly Catechins and Epicatechins. Dark chocolate has a high level of Catechins, which boosts the human body's immune system and possibly prevents major chronic ailments.

Good for Anemia: The flavonoid compounds are useful in treating anemic patients as well as those having poor dietary habits.

Rich in Antioxidants: Dark chocolate is a potent antioxidant. Reports from the National Institute of Food & Nutrition Research in Italy suggests that these antioxidants actually neutralize free radicals and other dangerous molecules that may be potential health hazards, causing diseases like cancer, premature aging, and heart disease.

Depression: The serotonin level in dark chocolate may act as an effective anti-depressant. Dark chocolate contains serotonin, which has nearly identical qualities of anti-depressants.

Heart Health: Even a small intake of dark chocolate boosts vascular health. It contains a lot of polyphenols and antioxidants.

Antioxidants: The antioxidants present in dark chocolate helps in fighting against premature aging. The antioxidants also help in fighting against heart diseases.

The cocoa used in the production of chocolate (both dark or milk chocolate) contains a significant amount of antioxidants which unfortunately are reduced by 90% during the chocolate production process. For this reason a new emerging application is to produce chocolates artificially fortified by natural polyphenolic antioxidants in order to compensate the lost of the cocoa antioxidant during chocolate production. For this reason dark chocolate, milk chocolate and cereal bars fortified by MEDOLIVA polyphenol powder while at the same time the sugar was substituted by stevia glucosides in order to avoid problems with diabetes and improve the health of the consumer.

The new products developed in this way were tested by DPPH method and the results proved that the addition of olive fruit polyphenols MEDOLIVA upgraded the antioxidant power of the chocolates and cereal bars as it is suggested from the substantially reduced IC50 value compared with the control samples without addition of polyphenols. This fact



practically means that by the addition of the polyphenols in the chocolate and cereal snacks makes these products more effective in deactivation of the free radicals which are developed in the consumers body via the oxidative stress and contribute in this way to the consumers health.

Additionally, the increase in antioxidant content of the chocolate and cereal bars snack protect the fat contained in these products from oxidation improving the taste and the stability of the products and making them more desirable to the consumer due to better organoleptic properties.

In the following three Figures 1,2 &3 it is graphically presented the reduction of the IC_{50} values at the DPPH test for the chocolate and cereal snack samples in direct comparison to the control samples without addition of polyphenols.

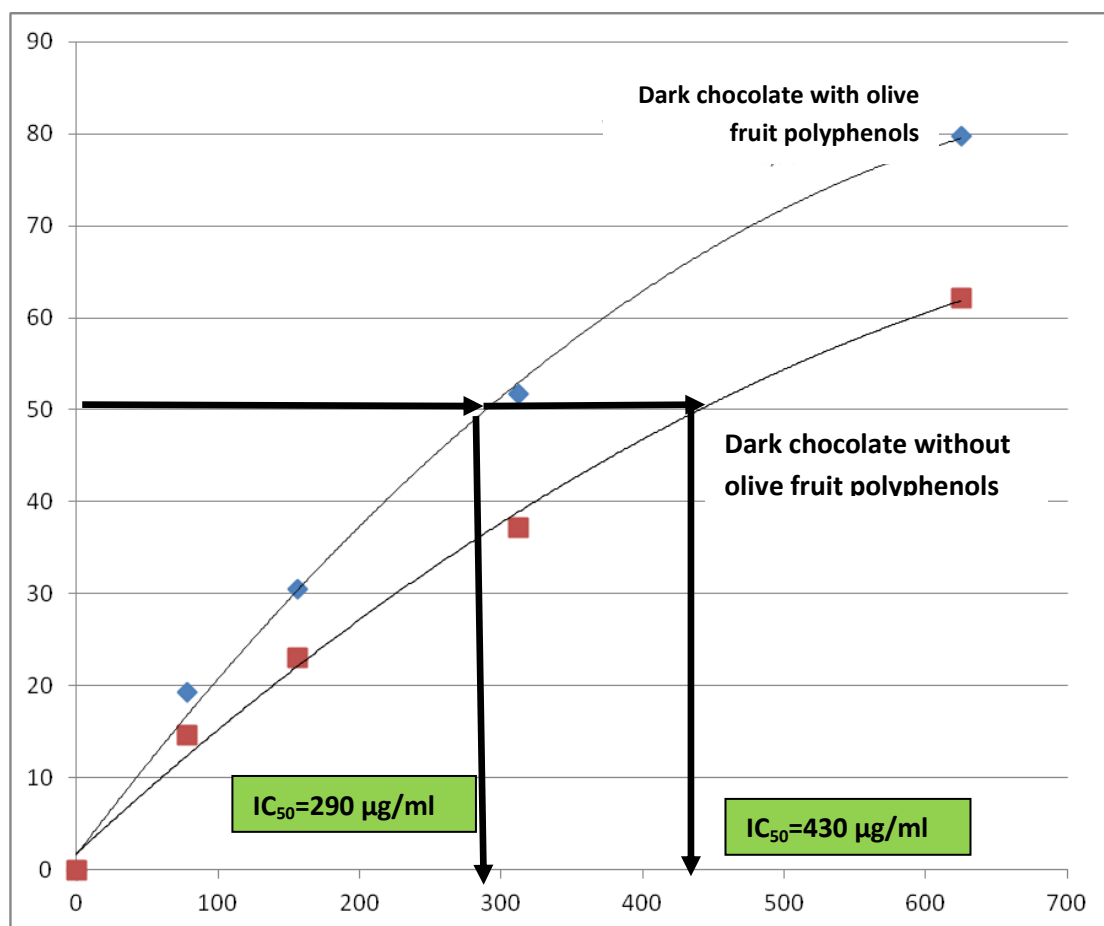


Figure 1. The of DDPH test for dark chocolate. The IC_{50} value was substantial reduced by polyphenols addition.

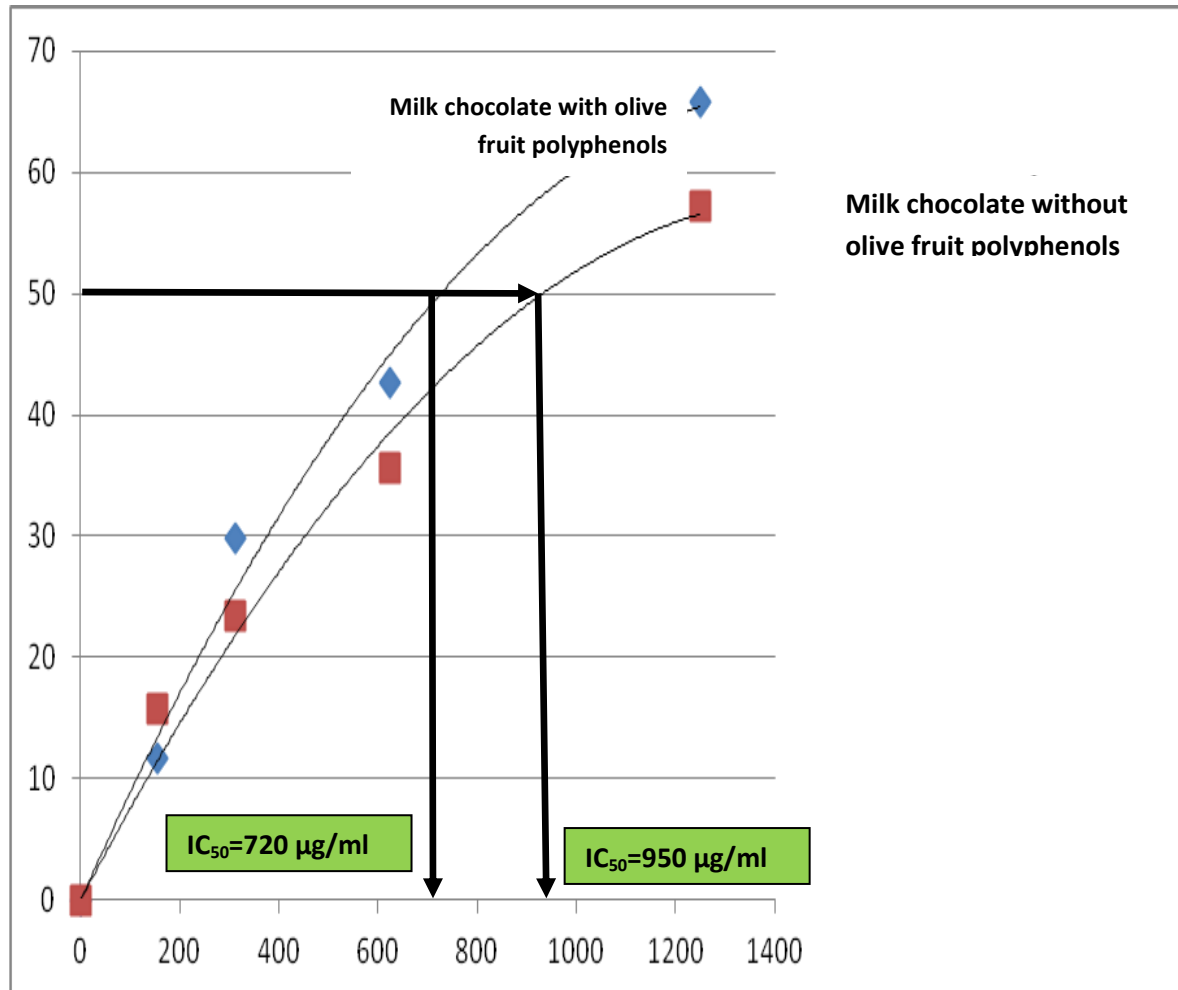


Figure 2. The of DDPH test for milk chocolate. The IC_{50} value was substantial reduced by polyphenols addition.

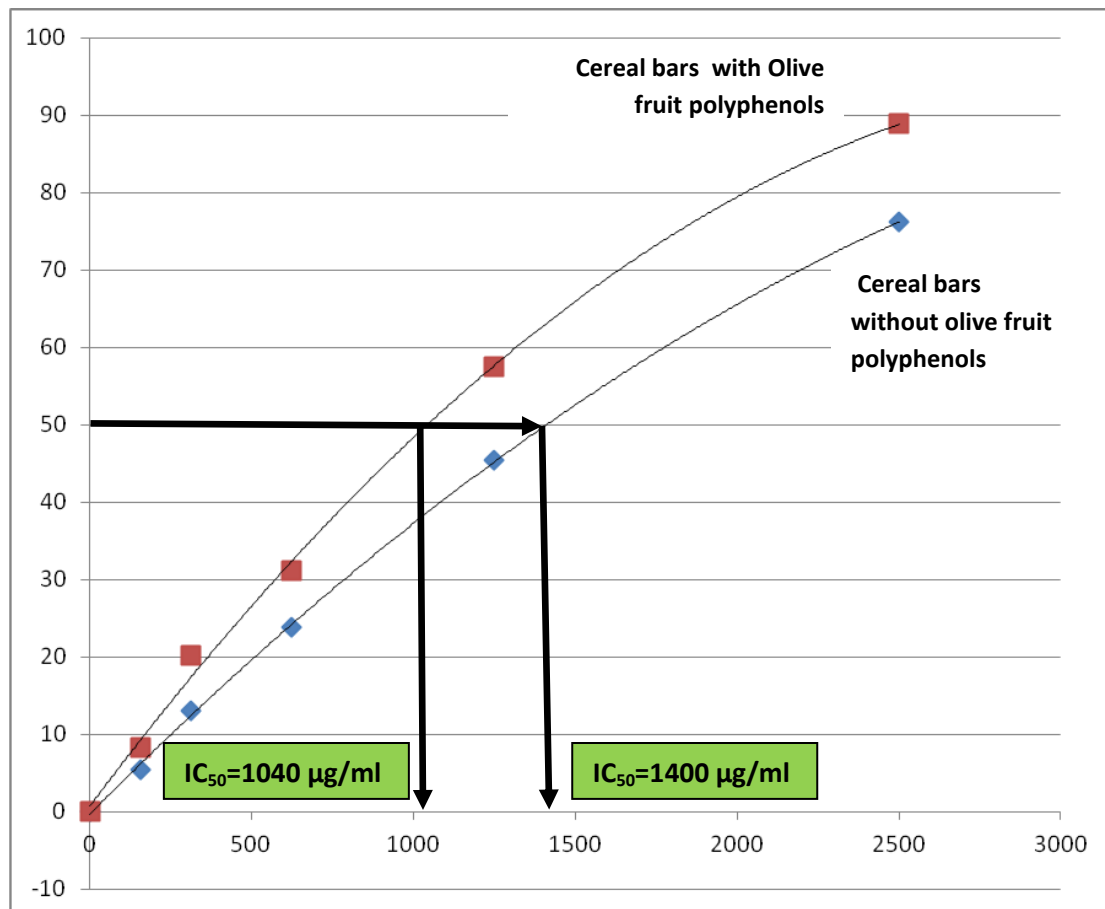


Figure 3. The of DDPH test for cereal bars. The IC_{50} value was substantial reduced by polyphenols addition.



CONCLUSIONS

The addition of natural olive mill polyphenols (MEDOLIVA powder) to chocolate snacks (dark chocolate & milk chocolate) or cereal bars substantially improved the ability of these products to deactivate the free radicals produced in the consumers body by oxidative stress. Furthermore, the addition of the olive mill natural antioxidant, in the form of the MEDOLIVA powder a commercial organic product of POLYHEALTH S.A. company (www.polyhealth.gr), can protect the fat contained in these snacks from lipid oxidation thus improving the taste and the organoleptic properties of the products. It is also acting as a natural pre-biotic material which activates the useful probiotic lactic acid bacteria in the intestinal track of the consumer. On top of this, the substitution of sugar with stevia glucosides in the new products reduces the glycemic index and make them suitable for anti-diabetic diet. Therefore, the new products can be classified in the bioactive category and present significant advantages concerning the protection of human health when they are compared with the conventional ones.