**INTRODUCTION**

In the AREDS study, AMD has been already connected to important nutrients (antioxidants). Diet is very relevant in order to provide essential nutrients for the visual tissues, among them the essential fatty acid omega-6 and omega-3.

The retina is the richest tissue in the omega-3 DHA, which is the fatty acid with a crucial role in photoreceptor development and functioning as well as their protection from apoptosis. It is also necessary to underline that the susceptibility of DHA to peroxidation is very high; therefore the levels of this fatty acid must be maintained in the right amount, thus avoiding excess that can increase stress-induced degeneration.

The dietary intakes and the efficient incorporation of omega levels of this fatty acid must be maintained in the right amount, thus avoiding excess that can make the retina more susceptible to degeneration. This is particularly important in patients with advanced stages of AMD.

**PURPOSE**

Membrane homeostasis derives from the optimal balance of its phospholipids and fatty acid constituents, in their turn obtained from metabolism and nutrition. Erythrocyte membrane can be used as representative tissue also for estimating not easily reachable tissues. The purpose of this investigation is to evaluate statistical significance of RBC membrane fatty acids in patients affected by age-related macular degeneration (AMD).

**METHODS**

Clinical data collected from a medical database of patients affected by age-related macular degeneration (44 AMD patients: mean age = 68 years old; 74.1% women) assigning the patients to one of the three clinical stages (early, intermediate and advanced) of the disease were combined with the data base of erythrocyte membrane analysis of these patients available at a Lipidomic Laboratory facility (Health Ministry Authorization n° 2011/02/12). The composition of erythrocyte membrane fatty acids was determined by a robotic protocol consisting in the selection of mature RBC, isolation of their membrane phospholipids and analysis as fatty acid methyl esters by gas chromatography (GC).

Statistical evaluation (GraphPad Prism 5.0 using non-parametric unpaired t-test two-tailed with 95% confidence interval) was carried out. The data were compared with those of age-matched healthy control group. All patients gave informed consent to use the data in anonymous form for statistical research purposes.

**RESULTS AND CONCLUSIONS**

The results of the AMD patients were also divided into subgroups related to their disease stadation given by clinical observation. This allowed to highlight differences and similarities between these different stages. Evaluating life style and nutritional habits, new risk factors (e.g., carbohydrate consumption) were envisaged (Fig.1).

The results of the omega-6 pathway pointed attention to the increase of the inflammatory status also linked to the progressive deficits of DGLA, which is the omega-6 with an important anti-inflammatory control via PGE1 formation and production of PG2 from arachidonic acid.

Some PUFAs were significantly changed in patients vs controls as the omega-3 docosahexaenoic acid (DHA) (Fig.2) and the omega-6 arachidonic (Fig.3A). In Fig.3B the interesting variability of DGLA along the 3 stages of the disease is shown. Other unbalances were found such as increase of SFA and ω-6/ω-3 ratio, diminution of eicosapentaenoic acid (EPA).

Our data contribute to the hypothesis of a lipid unbalance involved in AMD, highlighting PUFA changes in the three AMD stages.

**DISCLOSURE**

Financial Disclosure: Studio Medico Vanzini and Lipinutragen are privately owned companies, which contributed to this work by the salaries of the employees involved (MV, VS, SD). The study makes part of the research carried out by the National Council of Research (CNR) on lipodrnic profiles.