Plasticity of Peroxisome Proliferator-Activated Receptors (PPARs) and Translocator Protein 18KDa (TSPO 18KDa) receptors following chronic exposure to vegetable omega-3 and omega-6 fatty acids.

Campioli Enrico
Tutor: Prof.ssa Avallone Rossella

Peroxisome Proliferator-Activated Receptors (PPARs) are nuclear receptors that heterodimerized with Retinoid X Receptor (RXR). They act as transcription factors for genes involved in lipid and glucose metabolism. Many compounds bind with high affinity to PPARs, for example unsaturated fatty acids (linoleic and linolenic acid), eicosanoids, leukotrienes and fibrates.

After chronic treatment of one month with a flaxseed oil and a mixed vegetable and fish oil at the dose of 1 g of \(\alpha\)-linolenic acid (ALA) / kg, I studied the bioavailability of the major \(\omega\)-3 and \(\omega\)-6 fatty acids in rats brain, liver and adipose tissue. The analysis was performed by HPLC / UV with a C18 reversed phase column after derivatisation with p-bromofenacil bromide to obtain the corresponding p-bromofenacil bromide derivatives.

It has been noted a significant increase in brain and adipose tissue values of ALA, eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA), docosahexaenoic acid (DHA) and linoleic acid (LA) in accordance with previous studies. In the liver it has been noted an increase in ALA, EPA and DPA levels.

Secondly I evaluated the expression of PPAR-\(\gamma\) in the adipose tissue of the same rats by a Western blot analysis. Tissues were homogenized in RIPA lysis buffer, addicted with protease inhibitors and centrifuged. The samples were loaded onto a polyacrylamide gel bis-tris 10% and subjected to Western blot analysis. After normalization with \(\beta\)-tubulin PPAR-\(\gamma\) bands were analyzed with a densitometer and it was observed a decreased expression of the receptor in the adipose tissue of treated rats compared with control.

The decreased expression of the PPAR-\(\gamma\) receptor, associated with the increased tissue concentration of polyunsaturated \(\omega\)-3 and 6 fatty acids, could be explained as a mechanism of receptor downregulation against an excessive stimulation by ligand.
Further studies are needed to evaluate the expression of other isoforms in physiological conditions and after an enriched fatty acids diet, and their involvement in diseases such as cancer and stress-related diseases.