5.6.1 LipoFishins

LipoFishins (LFs) are a new class of lipoproteins derived from the muscle of different fish species. Examples of LPs obtained from biomarine sources by means of non-denaturing biotechnological procedures include the following: E-JUR-94013 (DefenVid®), E-CAB-94011 (CabyMar®), E-Congerine-10423 (AntiGan®), E-SAR-94010 (LipoEsar®), and E-MHK-0103 (MineraXin®).[189–194] Most effects of these novel bioproducts are genotype-dependent, showing specific nutrigenomic and pharmacogenomic profiles.[10,11,195]

E-CAB-94011 is an LF obtained from the muscle of the species *Scombrus scombrus*, with anti-oxidant, anti-inflammatory, and bio-energizing properties, with potential utility in several medical conditions (anemia, debilitating disorders, alterations in growth and development, ROS generation, NDDs).[191]

E-Congerine-10423 is an LP extracted from muscular structures of the species *Conger conger*. This compound displays a powerful anti-tumoral effect in many different tumor cell-lines, with specific effects in colon cancer, ulcerative colitis, and Crohn's disease.[194]

E-MHK-0103 is an atypical LP derived from the Atlantic mollusc *Mytillus galloprovincialis* cultivated on the Atlantic coast of Galicia (Spain). This bioproduct regulates hypothalamus-pituitary hormones, influences growth and development, protects against menopause-related biological decline, and modulates bone metabolism, acting as a powerful anti-osteoporotic agent.[196]

5.6.1.1 E-SAR-94010 (LipoEsar®)

E-SAR-94010 (Sardilipin, LipoEsar®, LipoSea®) is an LP obtained from the species *Sardina pilchardus.*[189] The main chemical compounds of LipoEsar® are lipoproteins (60–80%) whose micelle structure probably mimics that of physiological lipoproteins involved in lipid metabolism. In preclinical studies, sardilipin has been shown to be effective in: (i) reducing blood cholesterol (CHO), triglyceride (TG), uric acid (UA), and glucose (Glu) levels, as well as liver alanine aminotransferase (ALT), and aspartate aminotransferase (AST) activity; (ii) enhancing immunological function by regulating both lymphocyte and microglia activity; (iii) inducing antioxidant effects mediated by superoxide dismutase activity; and (iv) improving cognitive function.[190] This LP shows a powerful effect in the regulation of lipid metabolism, especially by reducing total-cholesterol and LDL-cholesterol levels in cases of dyslipidemia or hypercholesterolemia, and also acting as an effective co-adjuvant of statins (Figure 5.9). E-SAR is effective in liver steatosis and in cases of primary or secondary transaminitis. It is also a strong anti-atherogenic agent, reducing the size of atheroma plaques in systemic atherosclerosis. E-SAR has shown cognitive-enhancing properties in hypercholesterolemic patients with AD. The therapeutic response of patients with dyslipidemia to sardilipin is *APOE*-related. The best responders are patients with *APOE-3*/*3*> *APOE-3*/*4*>*APOE-4*/*4*. Patients with the other *APOE* genotypes (*2*/*2*, *2*/*3*, *2*/*4*) do not show any hypolipemic response to this novel compound. In patients