Dietary fat intake: the importance of quality. The case of cardiovascular health.

Alain Grynberg, INRA, France
(grynberg@jouy.inra.fr**)**

ABSTRACT

Dietary fat quantity is usually considered to influence body weight and plasma lipoprotein profiles. However, the effect on body weight has been poorly evidenced and several data indicate that decreasing the total fat in the diet may decrease plasma HDL-cholesterol level and increase triglyceride level. Dietary fat quality has been proven to influence significantly the development of cardiovascular disease, since saturated fatty acids (SFA) and trans-fatty acids tend to increase LDL-cholesterol levels, but not unsaturated fatty acids. Polyunsaturated fatty acids (PUFAs), mainly those of the omega-3 series EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), are known to decrease the triglyceride levels in hypertriglyceridemic patients and the risk of developing coronary heart disease (CHD). In addition to these effects on circulating lipids, the relative proportion of omega-3 and omega-6 PUFAs is a potent regulatory factor in various functions involved in the cardiovascular risk, including platelet aggregation, blood pressure and heart function (as stated in a WHO report in 2001). Experimental investigations revealed a correlation between SFA and a high systolic pressure. Moreover, when female rats were fed a saturated diet during gestation, their male pups displayed at maturity a high systolic pressure. Although the mechanism of this effect is unknown, it could be attributed to a SFA/PUFA ratio. Numerous investigations have led to the conclusion that long chain omega-3 PUFAs show ability in decreasing high pressure and preventing blood pressure rise, although the efficient intake level remains a matter of debate. Moreover, recent findings in animals showed that EPA and DHA display different effects according to the etiology of hypertension. This difference is associated with the fact that dietary DHA makes DHA a major constituent of cardiac membranes by replacement of arachidonic acid, whereas dietary EPA does not enter in cardiac structures. The GISSI-prevenzione Study showed that dietary supplementation with long chain omega-3 PUFAs in post-infarct patients induced a significant reduction in cardiovascular mortality associated with anti-arrhythmic properties. Previous investigations had showed that in several animal species, the incorporation of DHA in cardiac membranes significantly prevents the arrhythmias generated by ischemia and reperfusion. Moreover, cardiac DHA was shown to decrease the activity of cardiac ?-adrenergic system and cardiac frequency and this could be considered as a major goal of prevention when considering the importance of the ?-blockers in cardiology. The message of the protective effect of DHA in the cardiovascular health is well documented, but remains unclear for the other omega-3 PUFAs. Additionally, the efficient amount of dietary intake remains to be determined as well as the ability of omega-3 PUFA supplies other that fish oils or extracts to induce the same prevention. In conclusion, when considering the effect of fat on cardiovascular health, the quality of fatty acids is key factor although a

multivariate factor, involving SFA vs PUFA in fat intake, omega-3 vs omega-6 in PUFA intake and EPA vs DHA in omega-3 PUFA intake.