

ABSTRACT

The composition of biological membranes has a major effect on their properties. Highly polyunsaturated fatty acids (PUFAs) such as DHA are highly susceptible to free radical damage compared to monounsaturated (MUFA) and saturated (SFA) fatty acids. The pacemaker theory of aging has emerged from the hypothesis that cellular metabolism, as well as sensitivity to oxidative damage and consequently the aging rate increase with membrane unsaturation.

This hypothesis is composed of two parts. The first concerns the relationship between membrane composition and life expectancy when animals with more unsaturated membranes (with a higher peroxidation index and a number of double bonds) should have a shorter lifespan due to higher sensitivity to oxidative stress. This section has been supported in this research. The second part, relating to the composition of the membranes and the rate of metabolism, was mostly refuted by the study. Vertebral membranes with a higher rate of metabolism were rather less unsaturated compared to the slower metabolic membranes of the animals, or no significant correlation was found, which is inconsistent with the pacemaker hypothesis.