Csaba Nyakas, Madridge J Food Technol. 2018
http://dx.doi.org/10.18689/2577-4182.a2.001



# Long-Term Effects of Omega-3 Fatty Acids through Development and Aging

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Health during lifespan including aging is partly predetermined by developmental metabolic imprinting originated by nutritional factors during fetal and early neonatal age. Some of them arise out of endogenous origin and supplemented assuming a chronic deficit. The imprinting bioactive factors are variable and changing according to nutritional habits or therapeutic target tasks like in the case of administration of long-chain poly-unsaturated fatty acids (LC-PUFAs), especially the N-3 types. The aim of the current presentation is to survey the health and aging related long-term effects of pre- and early postnatal supplementation or deficiency of N-3 PUFAs compared to normal-fed control. In addition a chronic treatment of N-3 PUFAs in old age was also studied on cognitive behavior of aged rats.

The following regulatory functions were estimated throughout lifespan: body weight and body composition, food intake, glucose metabolism and lipid profile, development of basic neurotransmitter systems and BDNF in the brain, hormonal effects: pituitary-adrenal hormones, insulin, leptin, adiponectin; cognitive behavior in adulthood and aging, gene regulation during aging, and following the fatty acid composition of phospholipids in the brain in the entire lifespan.

In summary, the following main findings highlighted the health related effects grouped here into two packages: (1) developmental but also elderly chronic administration of DHA and other N-3 PUFAs enhanced cognitive functions in aged rats which support the notion for a beneficial preventive action on cognitive decline in the course of aging which may be handled by different mode of nutritional treatments. The behavioral effects proved to be lifelong although the biochemical changes in the composition of phospholipid fatty acids terminated earlier, in the adult age. (2) The other line of results underscored the importance of N-3 PUFAs deficiency during development which resulted in an infant obesity like syndrome with disturbed glucose regulation and increased resistance to insulin offering a translational model for childhood obesity as well.

## Biography:

Dr. Csaba Nyakas obtained MD at Medical University Pécs (Hungary). His neurobiological career began in the neuroendocrine workgroup of K. Lissák Physiology School in Pécs, and continued in the fields as endocrinology, neuroscience and clinical laboratory work at the Postgraduate Medical Institute, Budapest. PhD (1979) and DSc (1994) degrees received at Hungarian Academy of Sciences. Since 1995 he is professor at Semmelweis University (Budapest) and supplemented his scientific activity to movement and nutrition sciences especially in respect to gerontology and geriatrics. From 1983 he is visiting professor, from 2001 endowed chair professor at the University of Groningen running joint PhD training. Recent priority research: healthy aging, especially healthy brain aging.