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High cholesterol diets modify gene expression in atherosclerosis

High Cholesterol and Atherosclerosis

Scientists from the department of Biochemistry and Molecular Biology 1 of the University of Granada (Universidad de Granada) have proven that a **high cholesterol diet** causes changes in gene expression of chicken aortic smooth muscle cells at the early stages of an experimental atherosclerosis. This study associates cholesterol intake with the expression of genes codifying certain proteins, even before the disease is detected on blood vessel walls.

Andalucía Investiga Experts carried out research on atherosclerosis from its earliest stages to discover the origin of atheromatous plaques – fatty deposits gradually and irregularly formed in the main arteries, causing the narrowing of the blood vessel. Although there are many causes for this disease, UGR scientists focused on smooth muscle cells (SMCs) transformation into dedifferentiated and proliferative cells, able to carry lipids in culture. In this sense, cells from animals fed with control diet represent a difference. Experts carried out an early cell atherosclerosis experimental model with chickens, as these birds develop atherosclerosis very rapidly: a 20-day high cholesterol diet is enough to detect atheromatous plaques in their arteries.

Experts obtained SMCs from arteries before the formation of the plaques. Ten days after the start of the high cholesterol diet – when atheromatous plaques are not still visible using an electron microscopic – aortic SMCs are extracted and in-vitro cultured. Experts cultured SMC-Cs (obtained from animals without a cholesterol dietary supplement) and SMC-Chs

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(extracted from animals with cholesterol dietary supplement) under the same conditions.

After genetic analysis, scientists confirmed that regarding the samples (without cholesterol) modifications took place in birds fed with a high cholesterol diet. Differences show that cholesterol causes changes in messenger RNA synthesis in proteins related to lipid metabolism control, proliferation and apoptosis (programmed cell death) and, therefore, that diet has an influence on gene expression.

Through other studies, these experts discovered that, whilst cholesterol causes changes in gene expression, fish oil reverts such changes. In this case, scientists fed the animals with a high cholesterol diet for ten days, then substituted cholesterol for fish oil (rich in omega-3 and omega-6 polyunsaturated fatty acids) for another ten days.

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