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CHROMATOGRAPHIC DETERMINATION OF SQUALENE IN AMARANTH OIL

Stukalo Myroslava,

Student

Bogomolets National Medical University

Syrotchuk Oleksandr,

teaching assistant

Bogomolets National Medical University

Glushachenko Olga,

candidate of chemical sciences, Associate Professor

Bogomolets National Medical University

Today, squalene is increasingly used as biologically active supplement and a natural triterpene known as an important intermediate of cholesterol or phytosterol biosynthesis in animal and plant organisms. According to the studies of a Japanese scientist Dr. Mitsumaru Tsujimoto, squalene is originally obtained from the liver of the shark, *Centrophorus squamosus*. [1] It is, also, a component of many vegetable oils, such as olive, amaranth, palm, soybean and argan oils.

The first vegetable oil in which it was found was olive oil, but, today, there were a lot of studies about amaranth oil. It is known to be a plant with the highest concentration of squalene. Amaranth oil is consist of an unique combination of vitamin E, different fatty oils and squalene.

At the end of 20th century, scientists learned that squalene is contained in the human body in small quantities. It is synthesized by the liver and is secreted by the sebaceous glands. So, the highest concentration of squalene in humans is found in the sebum of the human skin. [2] Squalene plays an essential role in protecting skin from free radical oxidative damage. Squalene acts in skin as a quencher of singlet oxygen, protecting by this mechanism the skin surface from lipid peroxidation due to exposure to UV light. [3] It is distributed in human tissues where it is transported in the serum in association with low density lipoproteins.

Squalene is the 30-carbon isoprenoid compound and intermediate metabolite in the synthesis of cholesterol. Molecular formula of squalene – $C_{30}H_{50}$. It is a triterpene, which consist of six double bonds at the 2, 6, 10, 14, 18, 22 positions and is built from six isoprene units. The molecular weight of the compound is 410,73. It is a non-colored liquid, freely soluble in petroleum ether, acetone; slightly soluble in alcohol, lipids, organic solvents and practically insoluble in water.

Nowadays, squalene is widely used in cosmetology to treat different skin diseases and in production of cosmetics. Also, it is a main compound in different biological activity supplements. There are some studies about using squalene in the treatment of different cardiovascular diseases. [4] Squalene may have some radioprotective and

antiproliferative activity. It seems that squalene may stop the tumor cells' development or prevent some forms of chemically induced cancer and even produce regression of existing tumors in some cases. The suggested mechanism by which squalene could inhibit tumor formation implies either its inhibitory effect on the catalytic activity of β -hydroxy- β -methylglutaryl-CoA reductase. [5]

It was also used as an adjuvant in vaccines, stimulating the immune response and increasing the patient's response to vaccine. It is added to lipid emulsions as drug carrier in vaccine applications. [6]

There are some modern methods of quantitative determination of squalene in plants oil. One of them is chromatographic: gas chromatography coupled with mass spectrometry or high performance liquid chromatography. This is method of quantitative determination and qualitative analysis, as well as separation of complex organic mixtures or substances.

To sum up, squalene is an interesting natural compound, with different useful application in food, cosmetics and medical industry. It is often used to prevent or treat some of human diseases.

Reviewing the existing literature data, we concluded that there are a big amount vegetable oils like olive, soybean, or palmer oils that represent a valuable natural source for squalene. Amaranth oil could be considered an interesting source as the squalene concentration in this oil is probably the greatest in the vegetable kingdom.

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