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CHEMICAL STRUCTURE AND PRACTICAL SIGNIFICANCE OF RESVERATROL

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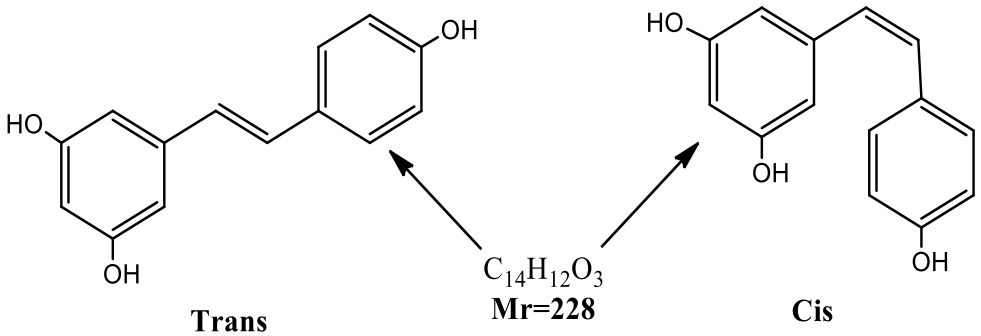
Abstract:

Polyphenolic compounds are a class of chemical compounds that contain two or more hydroxyl groups in the benzene ring. Natural polyphenol compounds are plant compounds that are very important for health. The antioxidant effects of these compounds reduce the risk of many diseases such as diabetes, heart disease and bone health. One such polyphenol is gossypol, which is found in large quantities (0.02-1.6%) in cotton seed and root bark, and is rare in other parts. Gossypol - has an active effect on the virus, so interferon inducers and other substances used against viruses are isolated from gossypol. Another natural polyphenol, resveratrol, found in the flesh of fruits such as red grapes, raspberries, cocoa, and peanuts, exhibits antioxidant, free radical, and anti-inflammatory properties.

Keywords: Resveratrol, configuration, radical, polyphenol, antioxidant, concentration, extract, metabolite, immunity.

Resveratrol (trans-3,5,4-trihydroxystilbene) is a natural polyphenol compound produced when plants are infected by bacteria and fungi, and its chemical composition can be expressed as $C_{14}H_{12}O_3$. Pure resveratrol is a pale yellow powder, tasteless, almost insoluble in water (<0,05 mg/ml), but soluble in organic solvents such as diethyl ether, chloroform, methanol, ethanol, acetone, ethyl acetate. Resveratrol liquefies at about 255°C, sublimates at 261°C. Ferric chloride-potassium ferrocyanide, alkaline solutions, characteristic of polyhydric alcohols, can be used for the determination of resveratrol. Resveratrol has trans- and cis-isomers and both are in the form of glucosides. Trans-resveratrol has been found by many studies to be the most biologically active and useful form of resveratrol.

Resveratrol is used in oriental medicine in the treatment of skin inflammation, cardiovascular and liver diseases. In traditional Chinese and Japanese medicine, it has been used for over 2,000 years to cleanse the body, prevent and treat disease. Resveratrol is best known for its anti-aging properties as well as its ability to reduce normal biological stress.



Chemical structure of trans- and cis-resveratrol

Resveratrol - neutralizes and destroys free radicals in the body. When they accumulate, the aging process accelerates and favorable conditions for the development of various diseases appear. It has been scientifically proven that resveratrol has an effect against environmental factors such as viral infections, pathogen attacks, ultraviolet or radioactive rays.

Plants produce resveratrol in response to adverse environmental conditions, so it may play an important role in maintaining human health with its antioxidant and other properties. When studying the effects of resveratrol on mammals, rodents showed that this polyphenol has the ability to lower blood sugar, fight abnormal cell growth, and fight inflammation.

Resveratrol is a plant substance found in more than 70 plant species. Since resveratrol is produced in response to plant infection, its concentration in the same food is not constant and depends on climatic conditions, the area where the plant grows, the use of protective means (herbicides) and many other factors.

Resveratrol was first discovered in the laboratory in 1940 by a Japanese scientist. It was originally extracted from the roots of Japanese yarrow and soon became the main source of resveratrol. Currently, resveratrol is extracted from the roots of the Polygonum cuspidatum plant in solvents. Today, one of the best sources of valuable polyphenol - resveratrol - is Japanese knotweed. Japanese hibiscus contains up to 187 mg/kg of resveratrol, which is about 50-100 times more than other natural sources. Common in East Asia, this plant is the most reliable source of resveratrol.

A food source rich in resveratrol is products made from red grapes (red and light red wine, red grape juice), as well as the berry itself. Resveratrol is on average 0,2-5,8 mg/l in red wine, 3-4 times less in white wine than in red wine, and its concentration in grape skin is 50-100 µg/g. Wine contains more resveratrol than grapes. It also depends on the technology of wine production, and its content is especially high in grape skins. Walnuts, almonds, peanuts, cocoa powder and dark chocolate are also rich in resveratrol. There are many fruits containing resveratrol in our country, such as red grapes, mulberries, and peanuts. In order to provide resveratrol in a constant food diet, it is advisable to regularly eat seasonal berries - grapes, mulberries in the form of raisins, raspberries, walnuts, almonds. Many people eat the red skin of peanuts, which is actually rich in resveratrol - about 73 micrograms in a handful of peanuts.

Resveratrol is an antioxidant, vitamins C and E, trace elements zinc, copper and selenium, carotenoids lutein and zeaxanthin, omega-3 polyunsaturated acids, together with vitamin D, helps maintain vision, reduces the risk of vision impairment, diseases. is of great importance to reduce. The sources of these substances are many vegetables, fruits, nuts, legumes.

Especially in the autumn-winter season, the human body weakens and the effect of viruses and bacteria increases. The body fights against them with antioxidants and antibodies, but various negative factors can cause the formation of free radicals. If their levels are too high, these compounds can damage cells. When the balance between the formation and elimination of free radicals is disturbed, the body is not protected, and the disorder, called "oxidative stress," leads to progressive deterioration of the body's health.

A 2017 study on the effects of resveratrol on infectious diseases, including MERS-Cov, confirms the strong antiviral activity of resveratrol, which means that resveratrol reduces the ability of viruses to reproduce in the body, reduces inflammation and helps reduce cell death caused by the virus.

In experiments with mice and rats, resveratrol has been found to have anti-inflammatory, blood sugar-lowering, cardioprotective and other positive effects. In addition, in 2003 it was discovered that resveratrol could increase the life span of some invertebrates, but this was not proven in other animal experiments. Clinical studies have not been conducted to confirm the effects of resveratrol in increasing life expectancy in humans.

Resveratrol exhibits antioxidant and anti-inflammatory properties in the human body. Harmful substances and free radicals can accumulate in the body as a result of aging, metabolic diseases, various environmental factors, stress, etc. They tend to disrupt the functioning of tissues and organs, leading to premature aging. Antioxidants are a natural defense against this and neutralize the effects of free radicals. Due to its antioxidant properties, this substance protects the cardiovascular system, regulates the immune system, and reduces the likelihood of developing age-related eye diseases, such as cataracts.

Resveratrol helps treat cardiovascular disease because it is a natural antioxidant that reduces platelet stickiness and helps keep blood vessels open and flexible. Although the French have a lot of fatty foods in their diet, the regular consumption of alcohol and red wine may be related to their longer life expectancy.

A 2013 Science article by David Sinclair and Basil Hubbard found that resveratrol increased the lifespan of experimental mice, bees and flies by 30-50%. However, no tests have been conducted to confirm this effect on human health.

Recent clinical studies have shown positive effects of resveratrol at doses up to 5 g per day and have been proven to be pharmacologically safe. Resveratrol has a dual effect as an antioxidant: it can increase the activity of antioxidant enzymes and act as a free radical scavenger. Resveratrol has been shown to maintain intracellular antioxidant concentrations in biological systems. For example, resveratrol significantly reduced the oxidation of thiol groups in human platelet proteins. Resveratrol has also been found to increase the concentration of some antioxidant enzymes such as glutathione peroxidase, glutathione S-transferase and glutathione reductase.

Resveratrol, a component of red grapes, has cancer-preventing properties in rodents. Taking resveratrol is considered safe in healthy people. For hypothesis testing, a phase I trial of oral resveratrol (single doses of 0,5; 1; 2,5; or 5 g) was conducted in 10 healthy volunteers for each dose level. Resveratrol and its metabolites were determined in plasma and urine by high-performance liquid chromatography, mass spectrometry, and quantified by high-performance liquid chromatography-UV. Consuming resveratrol did not cause serious adverse events. Resveratrol and six metabolites were found in plasma and urine. At the highest dose, peak plasma levels of resveratrol were 539 +/- 384 mg/mL (2,4 µmol/L, mean +/- SD; n = 10), occurring 1,5 hours after dosing. it has been. Peak levels of the two monoglucuronides and resveratrol-3-sulfate were 3- to 8-fold higher. The area under the plasma concentration curve values for resveratrol-3-sulfate and resveratrol monoglucuronide were 23 times those of resveratrol. Urinary excretion of resveratrol and its metabolites was rapid, with 77% of all species excreted in urine within 4 hours of the lowest dose. An in vitro level of at least 5 micromol/l is required for the cancer chemopreventive effect of resveratrol in cells. These results suggest that high-dose resveratrol intake is not sufficient to obtain systemic levels commensurate with cancer chemopreventive efficacy. However, the high systemic level of resveratrol metabolites

requires investigation of their cancer chemopreventive properties. In conclusion, the evidence that resveratrol consumption has an effect on human health is currently insufficient and requires further study.

In our country, large-scale work has been carried out in order to organize the cultivation and processing of medicinal plants, to support the establishment of cultural plantations of medicinal plants, as well as to widely use medicinal plants in the prevention and treatment of diseases. is increasing. In particular, a scientific laboratory base for extracting biologically active substance substances based on extracts of medicinal plants was created by "Yuma Green" LLC in Parkent district, and the production of products was launched from June 2022. The enterprise has the capacity to process 2,000 tons of medicinal plants per year, and currently, the processing of grape seed and peel extract produces polyphenols, resveratrol from grape skin, polyphenols and punicalin from pomegranate peel extract, licorice glabridin and glycyrrhizic acid and other medicinal extracts are obtained from its roots.

LIST OF REFERENCES:

1. Patel KR, Brown VA, Jones DJ, Britton RG, Hemingway D, Miller AS, West KP, Booth TD, Perloff M, Crowell JA, Brenner DE, Steward WP, Gescher AJ, Brown K. Clinical pharmacology of resveratrol and its metabolites in colorectal cancer patients. Cancer Res. 2010 Oct 1;70(19):7392-9. doi: 10.1158/0008-5472.CAN-10-2027. Epub 2010 Sep 14. PMID: 20841478; PMCID: PMC2948608.
2. Pacholec M., et al., SRT1720, SRT2183, SRT1460, and resveratrol are not direct activators of SIRT1. J. Biol. Chem. 285, 8340 (2010).
3. Lolita Kuršvietienė, Inga Stanevičienė, Aušra Mongirdienė, Jurga Bernatonienė Multiplicity of effects and health benefits of resveratrol
4. Patel KR, Scott E, Brown VA, Gescher AJ, Steward WP, Brown K. Clinical trials of resveratrol. Ann N Y Acad Sci 2011;1215:161–9.
5. Sadi G, Bozan D, Yildiz HB. Redox regulation of antioxidant enzymes: post-translational modulation of catalase and glutathione peroxidase activity by resveratrol in diabetic rat liver. Mol Cell Biochem 2014;393(1–2):111–22.
6. Olas B, Wachowicz B, Bald E, Głowacki R. The protective effects of resveratrol against changes in blood platelet thiols induced by platinum compounds. J Physiol Pharmacol 2004;55(2):467–76.
7. Yen GC, Duh PD, Lin CW. Effects of resveratrol and 4- hexylresorcinol on hydrogen peroxide-induced oxidative DNA damage in human lymphocytes. Free Radic Res 2003;37(5):509–14.