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Hemp Seed Oil

DESCRIPTION

Hemp seed oil is derived from the seeds of the plant *Cannabis sativa*. Hemp seed oil is a relatively rich source of alpha-linolenic acid (ALA) and is one of the few plant seed oils containing more than small amounts of gamma-linolenic acid (GLA). ALA concentrations in hemp seed oil range from approximately 15% to 25%. GLA concentration ranges from approximately 1% to 6%. The most abundant fatty acid in hemp seed oil is linoleic acid, which comprises approximately 50% to 70% of the fatty acid content.

Hemp seed and hemp seed oil normally do not contain significant quantities of tetrahydrocannabinol or any of the other psychoactive substances produced by *Cannabis sativa*. However, trace amounts of these substances have been reported in some batches of the oil. This is most likely due to contamination of the seed by adherent resin or other plant residues.

ALA, GLA, linoleic acid and all fatty acids in hemp seed oil are present in the form of triglycerides or neutral fats.

ACTIONS AND PHARMACOLOGY

ACTIONS

Hemp seed oil has putative antithrombotic and anti-inflammatory activities.

MECHANISM OF ACTION

Antithrombotic and anti-inflammatory activities have not been demonstrated with hemp seed oil. Therefore, any proposed mechanism of actions is entirely speculative. Hemp seed oil is relatively rich in ALA, which may be metabolized to eicosapentaenoic acid (EPA). EPA is a precursor of the anti-inflammatory and antithrombotic eicosanoids. ALA metabolites may also inhibit the production of some pro-

inflammatory eicosanoids, as well as some of the pro-inflammatory cytokines.

GLA is a precursor in the synthesis of prostaglandin E₁ (PGE₁), which inhibits platelet aggregation and has vasodilatory activity.

PHARMACOKINETICS

There are no reported pharmacokinetic studies of hemp seed oil. However, much is known about the physiology and biochemistry of edible oils, and certain assumptions can be made. ALA- and GLA-laden triglycerides in hemp seed oil are probably absorbed from the small intestine, aided by bile salts. During the process, there is some deacylation of the fatty acids of the triglycerides. Reacylation takes place within the mucosal cells of the small intestine, and the ALA- and GLA-laden triglycerides enter the lymph system in the form of chylomicrons. ALA- and GLA-laden chylomicrons are transported from the lymph into the blood, where ALA and GLA are then carried in lipid particles to the various cells of the body. They then get metabolized to EPA, PGE₁ and various eicosanoids.

INDICATIONS AND USAGE

It has been claimed that hemp seed oil inhibits platelet aggregation, favorably affects lipids and reduces the risk of heart attack. Other claims include usefulness in arthritis, autoimmune disorders and inflammation, in general. There is no research that supports any of these claims.

RESEARCH SUMMARY

There is no published research showing benefit (or lack of benefit) from the use of hemp seed oil. To the extent that it is a source of alpha-linolenic acid, as well as gamma-linolenic acid, it may have some of the benefits of those substances.

CONTRAINDICATIONS, PRECAUTIONS, ADVERSE REACTIONS

CONTRAINDICATIONS

Known hypersensitivity to a hemp seed oil-containing product.

PRECAUTIONS

Pregnant women and nursing mothers should avoid supplemental hemp seed oil. Because of possible antithrombotic activity of hemp seed oil, those with hemophilia and those taking warfarin should be cautious. Likewise, hemp seed oil should be halted in those having surgical procedures. Hemp seed oil is abundant in linoleic acid. Some laboratory studies suggest linoleic acid may stimulate the growth of prostate cancer and breast cancer cells. It is unclear if this has relevance to those with prostate or breast cancer. However, to be on the safe side, those with prostate or breast cancer should be cautious about using this substance. Cannabinoids have been found in certain batches of hemp seed oil.

ADVERSE REACTIONS

Hemp seed oil may cause mild gastrointestinal symptoms, such as nausea and diarrhea.

INTERACTIONS**DRUGS**

Interactions may occur between hemp seed oil, ALA and its metabolites, and aspirin and other NSAIDs. Such interactions, if they were to occur, might be manifested by nosebleeds and increased susceptibility to bruising. If this occurs, consideration should be given to lowering or stopping intake. Such interaction may also occur between hemp seed oil and warfarin.

NUTRITIONAL SUPPLEMENTS

Interactions may occur if hemp seed oil is used with such nutritional supplements as fish oils, which have possible antithrombotic activity.

HERBS

Interactions may occur between hemp seed oil, ALA and its metabolites, and such herbs as garlic (*Allium sativum*) and ginkgo (*Ginkgo biloba*). Such interactions might be manifested by nosebleeds and easy bruising.

OVERDOSAGE

There are no reports of hemp seed overdose.

DOSAGE AND ADMINISTRATION

Hemp seed oil comes in capsules and bottles of oil. The ALA content ranges from 15 to 25%. Three to 4 grams of ALA is approximately equivalent to the 0.3 grams, which one would derive from a fish-rich diet. Since hemp seed oil is easily oxidized, it is important that it contain an antioxidant, such as vitamin E.

LITERATURE

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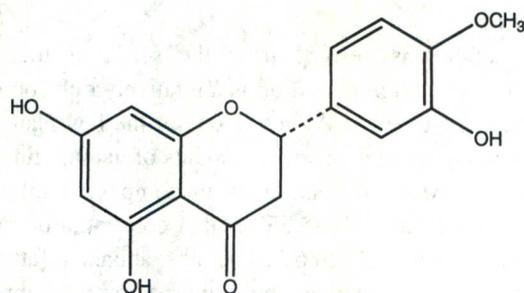
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Hesperetin

DESCRIPTION

Hesperetin belongs to the flavanone class of flavonoids. Hesperetin, in the form of its glycoside hesperidin, is the predominant flavonoid in lemons and oranges.

Hesperetin is a solid substance that is poorly soluble in water. Its molecular formula is $C_{16}H_{14}O_6$, and its molecular weight is 302.28 daltons. It is also known as 3',5,7-trihydroxy-4'-methoxyflavanone and (S)-2,3-dihydro-5,7-dihydroxy-2-(3-hydroxy-4-methoxyphenyl)-4-H-1-benzopyran-4-one. Hesperetin is the aglycone (aglucon) of hesperidin. Hesperetin has the following structural formula:



Hesperetin

ACTIONS AND PHARMACOLOGY**ACTIONS**

Hesperetin may have antioxidant, anti-inflammatory, anti-allergic, hypolipidemic, vasoprotective and anticarcinogenic actions.

MECHANISM OF ACTION

Hesperetin is a phenolic antioxidant. It may scavenge such reactive oxygen species as superoxide anions and may protect against peroxidation.

Hesperetin's possible anti-inflammatory activity may be accounted for by its interference with the metabolism of arachidonic acid and histamine release. There is evidence that hesperetin inhibits phospholipase A₂, lipoxygenase and cyclo-oxygenase. Hesperetin may inhibit histamine release from mast cells.

Hesperetin may reduce plasma cholesterol levels by inhibition of 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase as well as acylcoenzyme A: cholesterol acyltransferase (ACAT). Inhibition of these enzymes has been demonstrated in rats fed a high-cholesterol diet.