

# Eugenol-A Review

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## Abstract:

Eugenol is a compound found in certain plants, such as basil, cinnamon, lemon balm, and nutmeg, but is primarily extracted from clove plants. When extracted, it appears as a clear yellow liquid that smells strongly of clove. The name is derived from the scientific name for clove, *Eugenia aromaticum* or *Eugenia caryophyllata*. It has medicinal value, but it is also used in products such as perfume and clove-flavored cigarettes. In medicine, eugenol is used as an antiseptic and an anesthetic. It is believed to relieve pain when applied to skin or to other injured body parts as well. Some men even apply the liquid to their genitals to prevent premature ejaculation. In dentistry, it is often applied to cavities, used during restorative procedures, and rubbed on the gums to numb them before dentures are inserted. Eugenol also is commonly used as an additive in a particular kind of cigarette, called clove cigarettes. Despite its varied uses, eugenol may be dangerous, particularly if more than the recommended dosage is taken. In other cases, it may cause convulsions, nausea, rapid heartbeat, and dizziness. Some research studies have indicated that it may be an immune system toxicant, and many people believe it may cause mutations in the body's DNA, leading to cancer.

**Key Words** \*Antibacterial activity, \*Dentin bonding, \*anesthetics, \*Aflatoxins, \*Hepatotoxic.

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## INTRODUCTION:

Eugenol is a component of clove oil and other essential oils. Eugenol play a prominent role in dental and oral hygiene preparations. Eugenol is used as flavor, irritant, sensitizer and can produce local anaesthesia. Eugenol-producing dental materials are used in clinical dentistry. When zinc oxide-eugenol (ZOE) is applied to a dentinal cavity, small quantities of eugenol diffuse through the dentin to the pulp. In Lower concentrations, eugenol possess anti-inflammatory and local anesthetic effects on the dental pulp. Thus use of ZOE temporary filling may facilitate pulpal healing; on the other hand, high eugenol concentrations are cytotoxic. Direct application of eugenol to pulp tissue may result in extensive tissue damage. The ability of ZOE-based endodontic sealers to influence periapical tissue healing is considered in view of eugenol's anti-inflammatory and toxic properties. Eugenol-containing dental materials are frequently used in clinical dentistry. When zinc oxide-eugenol (ZOE) is applied to a dentinal cavity, small quantities of eugenol diffuse through the dentin to the pulp. Low concentrations of eugenol exert anti-inflammatory and local anesthetic effects on dental pulp. Eugenol and the essential oils have also been observed to possess membrane stabilizing properties on synaptosomes, erythrocytes and mast cells (1)

## HEALTH EFFECTS OF EUGENOL:

### Antioxidant activity

Processes that prevent free radical formation, remove radicals before damage can occur, repair oxidative damage, eliminate damaged molecules, or prevent mutations are important mechanisms in cancer prevention (2)

### Antiinflammatory action

Prostaglandins and other eicosanoids are hypothesized to influence carcinogenesis through action on nuclear transcription sites and downstream gene products important in the control of cell proliferation (3). Nonsteroidal

antiinflammatory drugs, potent inhibitors of cyclooxygenase (COX), the enzyme responsible for prostaglandin synthesis, are associated with reduced risk of several cancers (3).

### Antibacterial and antiviral effects

Several bacterial infections are associated with the risk of certain cancer, and viruses are now recognized as the second most important cause of human cancer. Given that many chemicals are produced in plants as antimicrobial and antiviral agents, these compounds are being examined for their potential to inhibit human pathogens. A preliminary screening of 35 different Indian spices and herbs indicated that clove, cinnamon, bishop's weed, chili (*Capsicum annum*), horseradish, cumin, tamarind, black cumin, pomegranate seeds, nutmeg, garlic, onion, tejpata, celery, and cambodge had potent antimicrobial activities against the test organisms *Bacillus subtilis* (ATCC 6633), *Escherichia coli* (ATCC 10536), and *Saccharomyces cerevisiae* (ATCC 9763) (4).

## TOXICITY:

### Cytotoxicity assay

A simple colorimetric assay developed by Mosmann (1983), as a test for cell proliferation and survival, has been adapted for the measurement of cytotoxicity. 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) (Sigma, St. Louis, MO, USA) solution was prepared as 1 mg mL<sup>-1</sup> in complete medium just before use. Cells were diluted in fresh complete medium and seeded in 96-well plates (V79: 1 × 10<sup>4</sup> cells well<sup>-1</sup>, PDL: 2 × 10<sup>4</sup> cells well<sup>-1</sup>). After overnight attachment, cells were treated with various extracts of sealers (200 μL well<sup>-1</sup>) for 20 h, then 50 μL MTT dye was added to each well. Plates were incubated in a CO<sub>2</sub> incubator for 4 h. Optical density was determined by eluting the dye with dimethyl sulfoxide (Sigma, St. Louis, MO, USA), and the spectrophotometric absorbance was measured at 550 nm using a spectrophotometer (Hitachi, Tokyo, Japan).

**CONCLUSION:**

EUGENOL has many potent activities and more research has to be done to study about the Eugenol mechanisms.

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