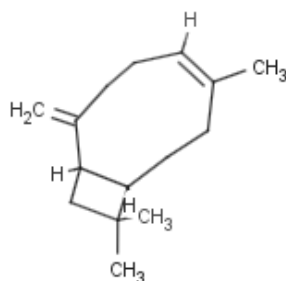


# Phytochemical analysis, antieczematic, anti-inflammatory, and anticancer activities of Iso-caryophyllene

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The phytochemical, Iso-caryophyllene (Figure 1) is present various essential oils including black pepper (*Piper nigrum* L.). Iso-caryophyllene also known as gamma-caryophyllene. In this study an *in silico* method is used to estimate pharmacological value of Iso-caryophyllene.



**Figure 1.** Structures of Iso-caryophyllene.

The Computational prediction (<http://www.pharmaexpert.ru/passonline>) for biological activity (Poroikov VV and Filimonov DA, 2002; Filimonov *et al.*, 2014) of Iso-caryophyllene resulted that the most prominent activity as antineoplastic (91.5%) followed by antieczematic (89.7%), apoptosis agonist (84.7%), anti-inflammatory (74.5%) etc. (Table 1).

**Table 1.** Predicted biological activity of Iso-caryophyllene.

Predicted biological activity	Probability %
Antineoplastic	91.50%
Antieczematic	89.70%
Apoptosis agonist	84.70%
Transcription factor NF kappa B stimulant	79.20%
Transcription factor stimulant	79.20%
CYP2J substrate	79.90%
Antineoplastic (lung cancer)	76.30%
MMP9 expression inhibitor	76.00%
Testosterone 17beta-dehydrogenase (NADP+) inhibitor	78.00%
Antiinflammatory	74.50%
Antipsoriatic	73.40%
Dermatologic	73.40%
NF-E2-related factor 2 stimulant	72.20%
Phosphatase inhibitor	70.90%
CYP2C12 substrate	74.60%
Ovulation inhibitor	69.00%
Antineoplastic (melanoma)	68.20%

Transcription factor inhibitor	64.30%
Antileukemic	63.80%
Transcription factor NF kappa B inhibitor	61.50%
Immunosuppressant	62.60%
Phosphatidylcholine-retinol O-acyltransferase inhibitor	61.40%
TP53 expression enhancer	61.70%
Antimetastatic	57.20%
Antifungal	58.20%
All-trans-retinyl-palmitate hydrolase inhibitor	56.50%
Adenomatous polyposis treatment	56.10%
Hepatoprotectant	54.00%
CYP2J2 substrate	58.60%
Antiulcerative	53.50%
Antineoplastic (breast cancer)	52.70%
Caspase 8 stimulant	52.30%
Bone diseases treatment	51.80%
Antineoplastic (ovarian cancer)	50.80%
Alkylacetyl glycerophosphatase inhibitor	54.30%
5-O-(4-coumaroyl)-D-quinic 3'-monooxygenase inhibitor	55.70%
Antiosteoporotic	50.90%
CYP2B5 substrate	52.10%
Acylcarnitine hydrolase inhibitor	54.20%
Calcium regulator	49.90%
Antineoplastic (pancreatic cancer)	48.80%
Nitric oxide antagonist	48.50%
CYP2C11 substrate	50.10%
Hepatic disorders treatment	49.00%
Menopausal disorders treatment	49.10%
Antineoplastic (squamous cell carcinoma)	47.40%
Glutamyl endopeptidase II inhibitor	54.20%
Carminative	48.40%
Retinol dehydrogenase inhibitor	46.60%
CYP2C19 substrate	49.00%
Chemopreventive	47.20%
Phobic disorders treatment	58.40%
Prostaglandin-E2 9-reductase inhibitor	48.80%
Antiacne	45.30%
Alpha-pinene-oxide decyclase inhibitor	44.80%
Antipruritic, allergic	48.80%
Antiprotozoal (Leishmania)	47.00%
Aspulinone dimethylallyltransferase inhibitor	55.50%
Dementia treatment	46.30%
Erythropoiesis stimulant	48.00%
CYP2C8 inhibitor	49.80%
NOS2 expression inhibitor	44.60%
Contraceptive	44.00%
Contraceptive female	43.40%
JAK2 expression inhibitor	48.20%

Alkenylglycerophosphocholine hydrolase inhibitor	48.40%
CYP2A4 substrate	45.80%
Non-steroidal antiinflammatory agent	43.50%
Acetylcholine neuromuscular blocking agent	49.20%
Antibacterial	43.70%
Lipid metabolism regulator	47.00%
27-Hydroxycholesterol 7alpha-monooxygenase inhibitor	47.30%
CYP2C9 substrate	45.60%
Antipruritic	44.20%
Antineoplastic (carcinoma)	40.00%
Steroid N-acetylglucosaminyltransferase inhibitor	42.80%
CYP2C29 substrate	39.90%
CYP2C substrate	44.50%
CYP3A4 inducer	42.70%
Ecdysone 20-monooxygenase inhibitor	44.20%
Antialcoholic	40.30%
Nicotinic alpha6beta3beta4alpha5 receptor antagonist	50.20%
Growth hormone agonist	39.50%
Pediculicide	40.00%
Gestagen antagonist	41.00%
CYP3A inducer	42.10%
Antineoplastic (brain cancer)	38.60%
Kidney function stimulant	48.30%
Transforming growth factor beta 1 agonist	37.50%
Antidyskinetic	44.50%
Insecticide	36.80%
Ubiquinol-cytochrome-c reductase inhibitor	50.70%
Alopecia treatment	43.90%
ICAM1 expression inhibitor	37.40%
Microtubule formation inhibitor	36.50%
Mannan endo-1,4-beta-mannosidase inhibitor	41.00%
EIF4E expression inhibitor	40.00%
Caspase 3 stimulant	40.20%
Antiparasitic	38.20%
Fatty-acyl-CoA synthase inhibitor	41.60%
Transplant rejection treatment	36.50%
Peptidoglycan glycosyltransferase inhibitor	39.70%
Membrane permeability enhancer	39.80%
Ribulose-phosphate 3-epimerase inhibitor	44.20%
Prostate disorders treatment	37.90%
Respiratory analeptic	39.40%
Sugar-phosphatase inhibitor	42.70%
BRAF expression inhibitor	33.30%
Antinociceptive	41.40%
Platelet adhesion inhibitor	43.70%
CYP2D15 substrate	39.10%
Protein synthesis inhibitor	33.50%
HMOX1 expression enhancer	37.50%

Oxidoreductase inhibitor	41.10%
Anthelmintic	33.40%
DNA ligase (ATP) inhibitor	33.50%
Alkenylglycerophosphoethanolamine hydrolase inhibitor	37.00%
Omptin inhibitor	41.90%
CYP4A11 substrate	37.30%
Reductant	36.20%
Hypolipemic	36.60%
Acetylgalactosaminyl-O-glycosyl-glycoprotein beta-1,3-N-acetylglucosaminyltransferase inhibitor	37.50%
Dolichyl-diphosphooligosaccharide-protein glycotransferase inhibitor	35.70%
Immunomodulator	34.50%
Electron-transferring-flavoprotein dehydrogenase inhibitor	40.90%
Mucomembranous protector	44.80%
Antimitotic	31.80%
Vascular dementia treatment	32.00%
Albendazole monooxygenase inhibitor	34.50%
Acute neurologic disorders treatment	41.60%
Antineoplastic (liver cancer)	30.40%
Antiviral (Rhinovirus)	38.90%
Complement factor D inhibitor	40.30%
Antineoplastic (thyroid cancer)	28.80%
Gonadotropin antagonist	36.10%
UGT1A4 substrate	31.10%
CYP7 inhibitor	33.60%
Neurotransmitter antagonist	38.10%
CYP3A4 substrate	37.50%
Antipruritic, non-allergic	30.70%
Interferon antagonist	27.90%
Keratosis actinic (solar) treatment	27.40%
AR expression inhibitor	32.80%
UGT2B7 substrate	30.00%
Protein kinase stimulant	27.40%
Antineoplastic (renal cancer)	27.80%
Phosphopantothenoylecysteine decarboxylase inhibitor	32.80%
Interferon gamma antagonist	27.00%
H <sup>+</sup> -transporting two-sector ATPase inhibitor	32.70%
Antitussive	29.80%
CYP2E1 inducer	33.70%
Chloride peroxidase inhibitor	37.40%
Anthelmintic (Nematodes)	33.30%
Aldosterone antagonist	28.10%
Nitric oxide scavenger	26.40%
CYP3A substrate	35.50%
Glucan endo-1,3-beta-D-glucosidase inhibitor	37.00%
Limulus clotting factor B inhibitor	36.90%
Transcription factor NF kappa A inhibitor	28.60%
Choleretic	28.30%

Insulin promoter	34.20%
Keratolytic	26.40%
CYP2B11 substrate	30.00%
Analeptic	33.00%
Testosterone agonist	24.60%
Trimethylamine-oxide aldolase inhibitor	35.00%
GABA aminotransferase inhibitor	32.70%
1,4-Lactonase inhibitor	35.80%
Venombin AB inhibitor	35.40%
Fusarinine-C ornithinesterase inhibitor	39.50%
Glycolate dehydrogenase inhibitor	29.30%
Cytostatic	29.80%
Antineoplastic (endocrine cancer)	25.20%
Beta-adrenergic receptor kinase inhibitor	33.10%
G-protein-coupled receptor kinase inhibitor	33.10%
Nicotinic alpha4beta2 receptor antagonist	26.20%
CYP2C9 inducer	32.50%
DNA synthesis inhibitor	28.60%
Antiseborrheic	33.50%
Alkylglycerophosphoethanolamine phosphodiesterase inhibitor	26.80%
Retinal dehydrogenase inhibitor	26.20%
Tpr proteinase ( <i>Porphyromonas gingivalis</i> ) inhibitor	31.80%
Retinyl-palmitate esterase inhibitor	24.60%
Antiparkinsonian, rigidity relieving	28.50%
Glucan 1,4-alpha-maltotriohydrolase inhibitor	30.30%
Vasodilator, coronary	32.20%
Antithrombotic	31.20%
Oxytocic	26.40%
CYP2D2 inhibitor	30.50%
Guanosine-3',5'-bis(diphosphate) 3'-diphosphatase inhibitor	25.10%
Cardiovascular analeptic	28.00%
CYP2A5 substrate	29.30%
Opioid kappa 3 receptor antagonist	30.10%
Postmenopausal disorders treatment	22.30%
Antiperistaltic	26.60%
Vasodilator, peripheral	33.30%
Oxidizing agent	26.60%
ATP-binding cassette A1 stimulant	25.50%
Nicotinic alpha2beta2 receptor antagonist	35.80%
Apoptosis antagonist	26.50%
Parathyroid hormone antagonist	21.30%
CYP2A2 substrate	27.10%
Retinoprotector	26.90%
CYP2A8 substrate	30.90%
L-glutamate oxidase inhibitor	30.40%
Proliferative diseases treatment	26.80%
Antineoplastic (colorectal cancer)	25.40%
Polyporopepsin inhibitor	39.20%

Cytoprotectant	34.40%
Antineoplastic (colon cancer)	24.80%
H <sup>+</sup> -exporting ATPase inhibitor	27.20%
Lysase inhibitor	33.30%
TNF expression inhibitor	30.20%
Phenol O-methyltransferase inhibitor	30.30%
Protein-disulfide reductase (glutathione) inhibitor	35.80%
VCAM1 expression inhibitor	21.50%
Myc inhibitor	29.60%
Steroid synthesis inhibitor	26.80%
CYP3A2 substrate	36.30%
Nicotinic receptor alpha7 subunit antagonist	19.70%
NADPH-cytochrome-c2 reductase inhibitor	34.30%
Plastoquinol-plastocyanin reductase inhibitor	28.80%
Retinoic acid beta receptor agonist	19.60%
Acrocyllindropepsin inhibitor	37.10%
Chymosin inhibitor	37.10%
Saccharopepsin inhibitor	37.10%
Factor XIIIa stimulant	19.50%
Neurotrophic factor enhancer	22.90%
Estradiol 17alpha-dehydrogenase inhibitor	21.10%
Hydroxysteroid dehydrogenase inhibitor	23.50%
4-Nitrophenol 2-monooxygenase inhibitor	32.00%
Myosin-light-chain-phosphatase inhibitor	22.40%
Dolichyl-phosphatase inhibitor	22.10%
CYP3A3 substrate	29.60%
UGT2B17 substrate	23.90%
Pterin deaminase inhibitor	31.10%
Vitamin	19.50%
Protein kinase C stimulant	18.70%
Prostatic (benign) hyperplasia treatment	21.00%
CYP19 inhibitor	20.60%
3-Hydroxybenzoate 6-monooxygenase inhibitor	30.50%
Antibiotic	20.60%
Gluconate 5-dehydrogenase inhibitor	28.70%
Macrophage colony stimulating factor agonist	34.50%
N-formylmethionyl-peptidase inhibitor	26.80%
Imidazoline receptor agonist	24.50%
ATPase stimulant	24.20%
Chemoprotective	23.10%
UDP-N-acetylglucosamine 4-epimerase inhibitor	32.20%
Hair growth stimulant	18.50%
CYP2G1 substrate	24.00%
Morphine 6-dehydrogenase inhibitor	24.30%
Diuretic inhibitor	27.70%
UGT2B28 substrate	23.40%
CYP2C6 substrate	25.50%
CYP2D16 substrate	30.50%

2-Haloacid dehalogenase inhibitor	25.30%
UDP-glucuronosyltransferase substrate	23.70%
Anesthetic	22.30%
UGT2B substrate	21.70%
Menstruation disorders treatment	21.00%
Vasoprotector	30.80%
Nitrite reductase (NO-forming) inhibitor	26.00%
DELTA14-sterol reductase inhibitor	24.50%
CYP2A1 substrate	30.00%
Thioredoxin inhibitor	31.70%
Carboxypeptidase Taq inhibitor	30.50%
FMO1 substrate	26.80%
CYP2A11 substrate	22.80%
Estrogen agonist	17.60%
Anabolic	16.40%
Aminobutyraldehyde dehydrogenase inhibitor	31.50%
Hypercalcemia treatment	16.00%
RNA synthesis inhibitor	25.20%
Phospholipid-translocating ATPase inhibitor	32.60%
Cholestanetriol 26-monooxygenase inhibitor	23.80%
NADH kinase inhibitor	23.70%
Cholesterol synthesis inhibitor	20.00%
(R)-Pantolactone dehydrogenase (flavin) inhibitor	27.70%
Phosphoinositide 5-phosphatase inhibitor	26.40%
N-acetylneuraminatate 7-O(or 9-O)-acetyltransferase inhibitor	28.10%
Epoxide hydrolase substrate	16.00%
Pseudolysin inhibitor	36.00%
Interleukin agonist	20.50%
UGT2B9 substrate	19.90%
Cl--transporting ATPase inhibitor	28.60%
Skin irritation, inactive	21.90%
Dextranase inhibitor	23.80%
Adenylate cyclase stimulant	18.00%
Spasmolytic	25.40%
Protein synthesis stimulant	18.60%
Sulfite dehydrogenase inhibitor	27.90%
Hyaluronic acid agonist	23.90%
Fumarate reductase (NADH) inhibitor	21.80%
Bile-salt sulfotransferase inhibitor	19.30%
Glucan 1,4-alpha-maltotetraohydrolase inhibitor	23.30%
Alkane 1-monooxygenase inhibitor	26.10%
Vitamin D3 hydroxylase inhibitor	14.60%
Narcotic antagonist	16.40%
Polyamine-transporting ATPase inhibitor	27.10%
Indanol dehydrogenase inhibitor	23.80%
5-Alpha-reductase inhibitor	14.90%
Heme oxygenase stimulant	14.10%
Glyoxylate oxidase inhibitor	22.30%

UGT2B10 substrate	19.90%
Choloylglycine hydrolase inhibitor	16.80%
Platelet aggregation stimulant	33.60%
MAP kinase stimulant	30.80%
Plasmanylethanolamine desaturase inhibitor	19.40%
Microtubule stabilization	13.90%
CYP17 inhibitor	26.00%
CDP-diacylglycerol-glycerol-3-phosphate 3-phosphatidyltransferase inhibitor	21.30%
TH expression enhancer	16.20%
DELTA24-sterol reductase inhibitor	15.50%
LDLR expression enhancer	19.00%
UGT1A1 substrate	20.10%
Hydrogen dehydrogenase inhibitor	28.50%
Antiseptic	20.40%
UGT2B4 substrate	22.80%
Growth stimulant	19.50%
Antiviral (Herpes)	25.60%
CYP3A7 substrate	25.30%
Antidote	21.90%
Antisecretoric	25.10%
Cyclomaltodextrinase inhibitor	24.10%
N-(long-chain-acyl)ethanolamine deacylase inhibitor	20.40%
Apyrase inhibitor	30.50%
Laxative	18.90%
Phthalate 4,5-dioxygenase inhibitor	32.50%
Cholesterol oxidase inhibitor	17.10%
Flavin-containing monooxygenase inhibitor	21.30%
Aromatase inhibitor	14.10%
Malate oxidase inhibitor	27.10%
Antineoplastic antibiotic	15.80%
Octopamine antagonist	31.70%
CYP26A substrate	16.00%
Chlordecone reductase inhibitor	28.70%
CYP4B substrate	17.30%
Dimethylargininase inhibitor	27.60%
CYP3A5 inducer	15.60%
Thymidylate 5'-phosphatase inhibitor	27.50%
Diuretic	20.60%
Nootropic	36.80%
11-Cis-retinyl-palmitate hydrolase inhibitor	13.50%
Aspartate-phenylpyruvate transaminase inhibitor	27.20%
Fibrinogen receptor antagonist	27.40%
Thiosulfate dehydrogenase inhibitor	23.60%
Melanin inhibitor	17.00%
Interleukin 6 antagonist	19.70%
Long-chain-aldehyde dehydrogenase inhibitor	21.80%
Hyperparathyroidism treatment	12.10%



Dopamine release stimulant	20.90%
Vitamin-K-epoxide reductase (warfarin-insensitive) inhibitor	19.00%
CYP4B1 substrate	15.80%
Poly(beta-D-mannuronate) lyase inhibitor	21.30%
Anticarcinogenic	21.60%
[acyl-carrier-protein] S-acetyltransferase inhibitor	20.80%
Expectorant	19.10%
Membrane permeability inhibitor	33.90%
Cytochrome P450 stimulant	26.90%
Calcium channel (voltage-sensitive) activator	34.70%
UGT1A substrate	20.20%
Cancer associated disorders treatment	26.20%
2,3-Oxidosqualene-lanosterol cyclase inhibitor	12.10%
Heme oxygenase inhibitor	12.30%
Radioprotector	22.80%
3-Alpha-hydroxysteroid dehydrogenase (B-specific) inhibitor	11.10%
Geranylgeranyl-diphosphate geranylgeranyltransferase inhibitor	16.40%
Retinoic acid metabolism inhibitor	25.40%
G-protein-coupled bile acid receptor 1 agonist	12.00%
Leukopoiesis stimulant	29.20%
Androgen antagonist	12.10%
Protein-Npi-phosphohistidine-sugar phosphotransferase inhibitor	18.50%
Opioid dependency treatment	22.90%
Beta-carotene 15,15'-monooxygenase inhibitor	20.00%
Cholestenone 5alpha-reductase inhibitor	13.20%
Prostaglandin-A1 DELTA-isomerase inhibitor	24.00%
Progesterone receptor B antagonist	10.20%
Prostaglandin E1 antagonist	18.40%
Arachidonic acid antagonist	18.10%
Antioxidant	17.40%
Benzaldehyde dehydrogenase (NADP+) inhibitor	19.90%
Sclerosant	19.70%
Chenodeoxycholoyltaurine hydrolase inhibitor	23.10%
Testosterone 17beta-dehydrogenase inhibitor	16.00%
2-Methyleneglutarate mutase inhibitor	12.40%
CYP3A5 substrate	26.00%
Secretase alpha stimulant	13.70%
Secretase stimulant	13.70%
Pin1 inhibitor	28.20%
Phosphatidylinositol diacylglycerol-lyase inhibitor	23.30%
Acetylerase inhibitor	24.40%
Sorbitol-6-phosphate 2-dehydrogenase inhibitor	19.80%
CYP24 substrate	10.10%
CYP19 substrate	14.30%
Ferrochelatae inhibitor	16.20%
Sigma receptor agonist	21.70%
DNA directed DNA polymerase inhibitor	14.00%
CYP24 inhibitor	10.00%

Acaricide	17.20%
Thermomycolin inhibitor	13.20%
D-lactaldehyde dehydrogenase inhibitor	22.70%
Mannose isomerase inhibitor	22.40%
Progesterone agonist	10.40%
Hepatocyte nuclear factor 4 alpha antagonist	15.30%
Hepatocyte nuclear factor antagonist	15.30%
(R)-6-hydroxynicotine oxidase inhibitor	27.10%
Hydroxylamine reductase (NADH) inhibitor	22.30%
Progesterone receptor B1 antagonist	9.50%
Alpha-glucuronidase inhibitor	16.90%
Alpha glucosidase inhibitor	11.40%
Bilirubin oxidase inhibitor	24.30%
Antimycobacterial	23.00%
Antiprotozoal (Amoeba)	23.90%
Bcl2 antagonist	12.90%
Inositol polyphosphate-5-phosphatase D stimulant	9.20%
(S)-6-hydroxynicotine oxidase inhibitor	23.30%
ATPase inhibitor	18.40%
N-hydroxy-2-acetamidofluorene reductase inhibitor	18.80%
CYP2C18 substrate	22.60%
Corticosteroid antagonist	14.60%
Hot flush treatment	10.00%
1,3-Beta-glucan synthase inhibitor	9.80%
Cyclohexanone monooxygenase inhibitor	25.40%
Urolithiasis treatment	14.00%
Amine dehydrogenase inhibitor	25.90%
Pancreatic elastase inhibitor	27.30%
Arginine 2-monooxygenase inhibitor	25.50%
Linoleate diol synthase inhibitor	25.20%
3-Oxosteroid 1-dehydrogenase inhibitor	11.70%
Dehydro-L-gulonate decarboxylase inhibitor	23.10%
Methylamine-glutamate N-methyltransferase inhibitor	22.60%
2-Hydroxyruconate-semialdehyde hydrolase inhibitor	20.70%
Limulus clotting factor C inhibitor	21.10%
Vitamin D-like	8.20%
Phosphoenolpyruvate mutase inhibitor	17.20%
CYP2F1 substrate	21.50%
Antiprotozoal (Plasmodium)	17.00%
CYP2B6 substrate	22.50%
Cyclohexyl-isocyanide hydratase inhibitor	18.50%
Paget's disease treatment	10.30%
CYP1A1 inhibitor	19.00%
Isovaleryl-CoA dehydrogenase inhibitor	13.40%
Na+-transporting two-sector ATPase inhibitor	25.60%
Polyneuridine-aldehyde esterase inhibitor	16.60%
Estrone sulfotransferase stimulant	8.30%
Androgen agonist	9.30%

CYP26 substrate	10.50%
CYP2C19 inhibitor	22.00%
Aspergillopepsin I inhibitor	22.40%
Arylmalonate decarboxylase inhibitor	20.20%
Undecaprenyl-diphosphatase inhibitor	15.30%
Fibrolase inhibitor	26.40%
Chitosanase inhibitor	20.60%
IgA-specific serine endopeptidase inhibitor	20.40%
Glutathione reductase (NADPH) stimulant	8.80%
Glutathione reductase stimulant	8.80%
UGT2B11 substrate	12.20%
N-hydroxyarylamine O-acetyltransferase inhibitor	25.20%
Actin depolymerization stimulant	8.00%
tRNA-pseudouridine synthase I inhibitor	20.40%
Yeast ribonuclease inhibitor	18.70%
Antiviral (CMV)	21.40%
CYP2A6 inhibitor	15.00%
UGT2B15 substrate	14.60%
Skin whitener	13.30%
Deoxyribose-phosphate aldolase inhibitor	12.90%
Glucan endo-1,6-beta-glucosidase inhibitor	23.70%
UGT2B18 substrate	14.30%
Interleukin 1a antagonist	9.70%
Carbon-monoxide dehydrogenase inhibitor	19.00%
CDC25A inhibitor	10.80%
Crotonoyl-[acyl-carrier-protein] hydratase inhibitor	16.40%
Nitric-oxide synthase inhibitor	9.90%
Cutinase inhibitor	16.90%
Leucine dehydrogenase inhibitor	16.10%
Kainate receptor 1 agonist	8.70%
Urease inhibitor	18.10%
CYP1B substrate	16.00%
2-Hydroxy-3-oxoadipate synthase inhibitor	17.00%
Alcohol dehydrogenase substrate	13.10%
Pregnane X receptor agonist	13.50%
FMO3 substrate	22.00%
CYP2A substrate	21.00%
CYP3A11 substrate	7.30%
Fibrinolytic	28.00%
P-benzoquinone reductase (NADPH) inhibitor	21.60%
Simian immunodeficiency virus proteinase inhibitor	24.80%
Maltose-transporting ATPase inhibitor	14.90%
GST T substrate	13.80%
GST T1-1 substrate	13.80%
Xylan endo-1,3-beta-xylosidase inhibitor	16.80%
Eye irritation, inactive	18.50%
RELA expression inhibitor	23.50%
Arylesterase inhibitor	18.80%

Tropinesterase inhibitor	16.60%
Glyoxylate reductase inhibitor	22.40%
CYP2B10 substrate	21.10%
Sodium channel blocker class Ib	16.70%
CYP2B18 substrate	14.90%
Ribonuclease inhibitor	11.80%
Antimutagenic	15.60%
Cycloartenol synthase inhibitor	13.60%
Tyrosine kinase stimulant	14.80%
Glutarate-semialdehyde dehydrogenase inhibitor	15.90%
Di-trans,poly-cis-decaprenylcistransferase inhibitor	16.80%
Retinol O-fatty-acyltransferase inhibitor	9.90%
Glucuronolactone reductase inhibitor	13.30%
Sterol 24-C-methyltransferase inhibitor	9.50%
Adrenaline release stimulant	19.70%
Deoxyribonuclease I inhibitor	15.40%
CYP2B1 substrate	14.70%
Opheline kinase inhibitor	17.60%
Taurocyamine kinase inhibitor	17.60%
Glycosylphosphatidylinositol phospholipase D inhibitor	28.40%
Clavamate synthase inhibitor	18.10%
Trans-pentaprenyltranstransferase inhibitor	14.00%
SMN2 expression enhancer	14.30%
Ferredoxin-NAD <sup>+</sup> reductase inhibitor	20.40%
Naphthalene 1,2-dioxygenase inhibitor	20.40%
Lysine 2,3-aminomutase inhibitor	25.20%
N-Acyl-D-aspartate deacylase inhibitor	15.60%
Septic shock treatment	16.10%
UGT1A5 substrate	14.90%
CYP2C3 substrate	19.60%
CYP2C2 substrate	8.40%
3(or 17)alpha-hydroxysteroid dehydrogenase inhibitor	8.40%
Antiprotozoal	17.90%
Antirickettsial	16.10%
Aspergillopepsin II inhibitor	17.90%
3-Demethylubiquinone-9 3-O-methyltransferase inhibitor	15.10%
CYP2D1 substrate	14.70%
T-cell protein-tyrosine phosphatase inhibitor	5.40%
Calcium channel activator	19.60%
Phospholipase C inhibitor	19.50%
Steroid sulfotransferase inhibitor	8.50%
Glucocorticoid antagonist	6.30%
Endopeptidase So inhibitor	22.90%
Thiamine-triphosphatase inhibitor	19.80%
3-Cyanoalanine hydratase inhibitor	22.40%
Alzheimer's disease treatment	19.90%
Bone formation stimulant	16.40%
Lipocortins synthesis antagonist	16.50%

Ornithine cyclodeaminase inhibitor	16.20%
Protein 50S ribosomal subunit inhibitor	7.10%
CYP2C8 substrate	24.90%
Alanine-tRNA ligase inhibitor	16.00%
N-benzyloxycarbonylglycine hydrolase inhibitor	20.20%
6-Pyruvoyltetrahydropterin synthase inhibitor	14.30%
Feruloyl esterase inhibitor	21.70%
CYP2B substrate	17.70%
Gingipain K inhibitor	19.10%
Demethylsterigmatocystin 6-O-methyltransferase inhibitor	10.90%
Antineoplastic (multiple myeloma)	23.20%
Glutamine-phenylpyruvate transaminase inhibitor	18.80%
[phosphorylase] phosphatase inhibitor	14.10%
Cholesterol antagonist	22.40%
CYP4A substrate	20.60%
Aldehyde dehydrogenase (pyrroloquinoline-quinone) inhibitor	19.80%
Aspartate-ammonia ligase inhibitor	16.90%
Undecaprenyldiphospho-muramoylpentapeptide beta-N-acetylglucosaminyltransferase inhibitor	19.40%
Gluconolactonase inhibitor	17.00%
2-Dehydropantoate 2-reductase inhibitor	25.50%
2-Dehydropantolactone reductase (A-specific) inhibitor	9.60%
Cell wall biosynthesis inhibitor	19.90%
Estrone sulfotransferase inhibitor	11.00%
Viral entry inhibitor	19.90%
Isoleucine-tRNA ligase inhibitor	4.00%
NAD(P)+ transhydrogenase (B-specific) inhibitor	11.40%
Antispirochetal	10.10%
Progesterone antagonist	5.10%
Exoribonuclease II inhibitor	20.40%
GABA B receptor agonist	15.80%
Phosphoenolpyruvate-protein phosphotransferase inhibitor	12.10%
CYP2A10 substrate	13.80%
Antidiabetic (type 1)	12.90%
2,3,4,5-Tetrahydropyridine-2,6-dicarboxylate N-succinyltransferase inhibitor	15.80%
CYP17 substrate	5.80%
Retinoic acid alpha receptor agonist	5.90%
Farnesyltranstransferase inhibitor	12.60%
4-Carboxymethyl-4-methylbutenolide mutase inhibitor	8.70%
Ca <sup>2+</sup> -transporting ATPase inhibitor	10.30%
Contraceptive male	9.00%
Creatininase inhibitor	20.60%
Sphinganine kinase inhibitor	22.50%
Shikimate O-hydroxycinnamoyltransferase inhibitor	15.30%
Myeloblastin inhibitor	14.10%
Protein phosphatase 2A inhibitor	4.30%
Psychosexual dysfunction treatment	12.60%

Taurine-2-oxoglutarate transaminase inhibitor	17.40%
2-Oxoaldehyde dehydrogenase (NADP+) inhibitor	14.80%
Vasodilator	18.80%
Gestagen-like	3.10%
Hypoxia inducible factor 1 alpha inhibitor	12.80%
Endo-1,3(4)-beta-glucanase inhibitor	11.60%
Steroid DELTA-isomerase inhibitor	6.70%
Styrene-oxide isomerase inhibitor	13.30%
Mineralocorticoid antagonist	5.20%
Antimyopathies	24.60%
Dimethylmaleate hydratase inhibitor	15.70%
Chitinase inhibitor	20.20%
Na+ K+ transporting ATPase inhibitor	5.70%
CYP27A substrate	3.10%
4-Hydroxyphenylpyruvate dioxygenase inhibitor	5.60%
CYP4A2 substrate	14.50%
3-Methylbutanal reductase inhibitor	17.00%
Lysostaphin inhibitor	17.90%
Galactolipase inhibitor	15.10%
Glycerone-phosphate O-acyltransferase inhibitor	10.10%
Cortisone alpha-reductase inhibitor	2.90%
Potassium channel Kv1.3 blocker	5.40%
Fragilysin inhibitor	23.50%
P-glycoprotein substrate	24.00%
Glycine N-choloyltransferase inhibitor	5.80%
Quinoline-4-carboxylate 2-oxidoreductase inhibitor	12.00%
Histidine N-acetyltransferase inhibitor	22.30%
CYP27 substrate	2.60%
Alkene monooxygenase inhibitor	12.10%
Retinoid X receptor agonist	3.40%
GABA uptake inhibitor	4.90%
Ornithine decarboxylase inhibitor	7.80%
Peptide alpha-N-acetyltransferase inhibitor	18.70%
Oryzin inhibitor	15.70%
Benzaldehyde dehydrogenase (NAD+) inhibitor	8.60%
NADPH peroxidase inhibitor	23.60%
Thiamine pyridinylase inhibitor	19.20%
Cushing's syndrome treatment	7.50%
CYP27A1 substrate	2.40%
Prostaglandin agonist	5.80%
Rubredoxin-NAD+ reductase inhibitor	25.40%
Postcoital contraceptive	3.40%
Anticholelithogenic	7.60%
Gastrin inhibitor	25.30%
Pyruvate decarboxylase inhibitor	18.10%
GABA C receptor agonist	13.80%
Acyl-CoA oxidase inhibitor	15.80%
Pyruvate dehydrogenase (cytochrome) inhibitor	12.30%

Trans-2-enoyl-CoA reductase (NAD <sup>+</sup> ) inhibitor	12.30%
Vitamin D receptor agonist	1.20%
Glutathione thiolesterase inhibitor	20.60%
N-acetyl-gamma-glutamyl-phosphate reductase inhibitor	13.00%
1-Acylglycerol-3-phosphate O-acyltransferase inhibitor	20.30%
Cathepsin T inhibitor	17.00%
Bisphosphoglycerate phosphatase inhibitor	14.40%
UGT1A8 substrate	10.30%
Gamma-guanidinobutyraldehyde dehydrogenase inhibitor	21.50%
Tankyrase inhibitor	17.10%

The above investigation revealed possible pharmacological potentials especially anti-cancer activity of Iso-caryophyllene as it reflected apoptosis agonist and antineoplastic with higher probability. According to the literatures, iso-caryophyllene was found cytotoxicity in *in vitro* culture cell lines (Legault, *et al.*, 2003) and cytotoxicity of iso-caryophyllene was induced by lipid oxidation, membrane permeabilization and cell shrinking (Legault *et al.*, 2013). The antieczematic and anti-inflammatory property of iso-caryophyllene has not reported yet in literature, however, the higher value of probabilities indicates the very high chances to be obtained in *in vitro/in vivo* methods, further research is required to benefit the potential effect of this sesquiterpene for drug discovery process.

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