

# Technical Data Report

for

## **Bellaco-Caspi** (*Himatanthus succuba*)



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# Bellaco-Caspi

**Family:** Apocynaceae

**Taxon:** *Himatanthus sucuuba* (Spruce ex Müll. Arg.) Woodson

**Synonyms:** *Himatanthus lancifolius* (Müll. Arg.) Woodson, *Plumeria floribunda* Müll. Arg., *Plumeria sucuuba* (Spruce ex Müll. Arg.), *Plumeria tarapotensis* (K. Schum. ex Markgr.)

**Common names:** agoniada, agonium, anaguba, arapue, bashi pasha, bellaco-caspi, bellaku-caspi, caracucha, caracuchu, caracuchu blanco, ceneiwe, kanraw-muni, mabwa, na'aypere, platanete, platanote, quina-mole, sanago, shipotma, socoba, succuba-verdadeira, suche, sucoba sanago, sucova, sucuba, sucuuba da Amazonia, sucuuba

**Parts Used:** bark and latex

Herbal Properties & Actions		
<b>Main Actions:</b>	<b>Other Actions:</b>	<b>Standard Dosage:</b> Bark
relieves pain	reduces fever	<b>Decoction:</b> 1 cup twice daily
reduces inflammation	calms coughs	<b>Capsules:</b> 1 gram 2-3 times daily
kills bacteria	cleanses blood	<b>Tincture:</b> 2-4 ml twice daily
kills fungi & candida	expels worms	
kills cancer cells		
heals wounds		
prevents ulcers		
balances menstruation		
cleanses lymph glands		

Bellaco-caspi is a tropical rainforest tree growing 8-16 m in height with a tall, narrow, pyramidal crown. The trunk is 30-40 cm in diameter with rough mottled bark. The tree produces white perfumed flowers and a 20 cm seed pod with numerous winged seeds inside. The leaves are bright green and about 25 - 30 cm long by 3-5 cm wide. When the leaves are broken off their stems, and the stems are broken from the branches, a milky white latex is exuded. Wounding the tree bark will also exude the latex.

There are 7 to 8 species of *Himatanthus* trees that can be found from Central America to Northern South America—most indigenous to the Amazon are medium to large trees found in the moist and flooded forests at lower elevations (below 500 m).

## TRIBAL AND HERBAL MEDICINE USES

The bark and the latex of bellaco-caspi has a long history of use among the Indians in the Amazon. The Karijonas powder the tree bark and sprinkle it directly onto stubborn wounds and sores. The Shipibo-Conibo Indians in Peru prepare a decoction of the bark and take it internally for rheumatism and body aches and pain. They also put the latex in warmed baths and bathe the part of the body suffering from arthritis, pain and/or inflammation, as well as put the latex directly onto abscesses, sores, and skin ulcers. The Ka'apor Indians in the Brazilian Amazon take a bark decoction for stomachaches and use the decoction topically for dog mange and feed it to dogs who are sick and skinny. The Tikuna Indians also apply the latex topically to treat wounds and the Waoranis rub the latex on bot-fly bites to suffocate and kill the larvae under the skin (in animals and humans).

Bellaco-caspi is also popular as a natural remedy in Peruvian herbal medicine systems. It is considered a pain-reliever, blood cleanser, fever-reducer, astringent, anti-inflammatory and laxative. It is often employed for arthritis, rheumatism and back pain; cancer and tumors; skin issues such as wounds, abscesses, ulcers, boils, rashes and sores; gastric ulcers, intestinal and skin parasites (worms); and for tuberculosis and fevers.

In Brazilian herbal medicine, bellaco-caspi is considered analgesic, anti-inflammatory, antitumoral, antifungal, anthelmintic (against worms), aphrodisiac, emmenagogue (menstrual stimulant), emollient, febrifuge (reduces fevers), purgative, tonic, vermifuge (kills parasites), and vulnerary (heals wounds). Practitioners and herbalists in Brazil recommend it for lymphatic gland diseases and inflammation; female disorders such as endometriosis, uterine fibroid tumors, menstrual irregularities and pain, ovarian cysts and ovarian inflammation; cancerous tumors and skin cancers; digestion problems such as indigestion, stomachaches, bowel inflammation and gastric ulcers; general pain and inflammation (arthritis, rheumatism, and fractures); coughs, fevers, headaches, asthma and other lung disorders, and various skin issues such as wounds, ulcers, and rashes.

Bellaco-caspi is found in *The Dispensatory of the United States of America* which was published in 1918 and asserted febrifuge, anthelmintic and emmenagogue actions to the tree.

## PLANT CHEMICALS

A review of some of the chemicals found in bellaco-caspi might explain some of the many traditional uses of this tropical rainforest tree. An antitumor iridoid compound and two depsides showing inhibitory activity of monoamine oxidase B (MAO-B) have been isolated from bellaco-caspi bark.<sup>1,2</sup> In addition, two iridoid chemicals called *plumericin* and *isoplumericin* have been found in the tree bark and the latex.<sup>1,3,4</sup> These two chemicals have been reported with cytotoxic, anticancerous, antifungal and antibacterial actions in laboratory research.<sup>5-9</sup> The latex also contains a polymeric material called cis-polyisoprene as well as calcium, magnesium, arabinose, glucose, xylose, rhamnose and galactose.<sup>10</sup>

Chemicals reported in bellaco-caspi bark thus far include: 2'-O-methyl-perlatolic acid, 4-hydroxybenzoic acid, amyirin, alpha-amyirin, alpha-amyirin cinnamate, beta-dihydro-plumbercinic acid, beta-phenyl-propionate lupeol, cis-polyisoprene, confluentic acid, demethoxy-aspidospermine, fulvoplumerin, iso-plumericin, iso-uleine, lupeol acetate, lupeol cinnamate, para-coumaric acid, plumericin, plumeride, uleine, and vanillic acid.

## BIOLOGICAL ACTIVITIES AND CLINICAL RESEARCH

Many of bellaco-caspi's traditional uses are being verified in preliminary studies and laboratory research. In 2005, Brazilian researchers verified bellaco-caspi's traditional use for stomach ulcers and digestion problems. They reported that an extract of the bark significantly protected rats from lab-induced ulcers and reduced gastric hypersecretion through several novel mechanisms of actions.<sup>11</sup> The tree's long standing use for healing wounds was verified by Peruvian researchers in an animal study published in 1997.<sup>12</sup> Brazilian researchers confirmed in 2000 that the latex evidenced significant anti-inflammatory and pain relieving actions in laboratory animals<sup>13</sup> which confirmed earlier anti-inflammatory research in 1978.<sup>2</sup> They reported that bellaco-caspi could exert anti-inflammatory effects even in the acute phase of the inflammatory process and attributed these effects to the cinnamate chemicals found in the latex and bark.<sup>13</sup> In 2001, researchers in the United States reported that the bark of bellaco-caspi was significantly cytotoxic *in vitro* to 5 different human cancer cell lines which may help explain why the tree has been used against cancer and tumors for many years in South America.<sup>2,3</sup> They related this anti-cancerous action to the iridoids and triterpenoids in the tree bark. It also passed a brine shrimp assay which predicts anti-tumor activity in 2003.<sup>14</sup>

Bellaco-caspi's uses for infected wounds, tuberculosis, syphilis, and even mange might be explained by the tree's documented antimicrobial actions. In 1998, researchers in Brazil reported that the bark evidenced a greater antifungal effect than the control drug that was used (nistatin) and related this action to the triterpenic esters found in the bark.<sup>4</sup> Research published in Brazil in 2006 and 2004 also reported *in vitro* antimicrobial effects of the bark against candida, *E. coli*, *Staphylococcus*, *Bacillus*, *Mycobacterium phlei*, and other Gram (+) and Gram (-) pathogenic bacteria.<sup>15,16</sup> The latex was also documented with *in vitro* actions against *Bacillus* and *Pseudomonas*.<sup>17</sup> Its use for asthma might be explained by the smooth-muscle relaxant actions documented in 2005 by Brazilian researchers working with a bark extract.<sup>18</sup>

Toxicity studies in laboratory animals indicate that the use of bellaco-caspi at traditional dosages is non-toxic.<sup>3,12</sup> Even when a bark extract was given to pregnant rats, there were no toxic, abortive, or birth defects reported.<sup>19</sup>

## CURRENT PRACTICAL USES

Bellaco-caspi is a well respected and widely used medicinal plant in herbal medicine systems in the Amazon and South America. With many of its traditional uses being explained and verified by research, it is sure to remain an important plant in the naturopathic and herbal medicine practitioner's treasure chest of natural remedies. It is gaining some recognition outside of the South America and a handful of bark extract and latex extract products can now be found for sale in the United States and Europe. It is mainly used for pain and inflammation related to many conditions (including female reproductive organ conditions), cancerous tumors (internal and external), and as a broad spectrum antimicrobial for various internal and external infections.

Bellaco-Caspi Plant Summary
<b>Main Actions (in order):</b> antimicrobial, antitumoros, anti-inflammatory, vulnerary, analgesic
<b>Main Uses:</b> 1. as a wound healer and broad spectrum antimicrobial (bacteria, fungi, candida) 2. for tumors and cancer 3. for lymphatic cleansing, inflammation, and infections 4. for endometriosis, uterine fibroid tumors, menstrual irregularities and pain, ovarian cysts and ovarian inflammation 5. as an anti-inflammatory and analgesic for arthritis, back pain, and muscle injury
<b>Properties/Actions Documented by Research:</b> analgesic, antibacterial, antifungal, anti-ulcerogenic, cicatrizant, cytotoxic (cancer cell lines), smooth muscle relaxant, vulnerary
<b>Other Properties/Actions Documented by Traditional Use:</b> analgesic, anthelmintic, anti-fungal, anti-inflammatory, antitumoral, antifungal, anthelmintic, aphrodisiac, astringent, depurative, emmenagogue, emollient, febrifuge, laxative, purgative, tonic, vermifuge, vulnerary
<b>Cautions:</b> None reported. High dosages may have a laxative or purgative effect.

**Traditional Preparation:** In traditional Indian medicine systems the bark is prepared as a decoction or infusion and the straight latex is applied to the skin topically and ingested in a small amount of water. In herbal medicine systems in the cities of South America, various tinctures, fluid extracts, and capsules are sold in the market place for easier use and longer storage.

**Contraindications:** None reported.

**Drug Interactions:** None reported.

WORLDWIDE ENTHNOMEDICAL USES	
<b>Amazonia</b>	as an analgesic, anthelmintic, antitumoral, antifungal and anti-inflammatory; for back pain, boils, bot-fly infections, fractures, gastritis, hemorrhoids, hernias, lung ailments, stomachaches, stomach ulcers, tumors, and wounds
<b>Brazil</b>	as an analgesic, anti-inflammatory, antitumoral, antifungal, anthelmintic, aphrodisiac, emmenagogue, emollient, febrifuge, purgative, tonic, vermifuge, and vulnerary; for adenoid gland inflammation, anemia, arthritis, asthma, cancer, constipation, coughs, digestion problems, endometriosis, fractures, gastritis, gastric ulcers, headaches, hemorrhoids, hypertension, intermittent fevers, intestinal disorders, kidney pain, lymphatic disorders and inflammation, lung disorders, menstrual pain, menstrual irregularity, ovarian cysts, ovarian inflammation, rashes, rheumatism, skin eruptions, skin ulcers, stomach problems, syphilis, tumors, uterine fibroids, uterine inflammation, ulcers, and weakness
<b>Ecuador</b>	used for bot-fly infections
<b>Guyana</b>	as an anthelmintic (bot-fly) and to treat liver disorders
<b>Peru</b>	as an analgesic, anthelmintic, antitumoral, astringent, depurative, febrifuge, laxative, purgative; for abscesses, arthritis, back pain, blood cleanser, boils, bowel cleanser, fever, gastric ulcers, hernias, inflammation, pain, rheumatism, skin problems, sores, swellings, tuberculosis, tumors, ulcers, worms, wounds

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## Ethnomedical Information on Bellaco-caspi (*Himatanthus succuba*)

Plant Part / Location	Documented Ethnic Use	Type Extract / Route	Used For	Ref #
Bark / Amazon	Karijona Indians sprinkle the powdered bark onto hard to heal wounds.	Powder / External	Human adult	ZZ1005
Bark / Amazon	Used for lung ailments.	Decoction / Oral	Human adult	ZZ1011
Bark / Amazon	Used to treat gastritis, stomach ulcers, hemorrhoids, hernias, boils, tumors, and as an analgesic.	Not stated / Not stated	Human adult	BC2001
Bark / Brazil	Taken internally for lymph gland inflammation, adenoid gland inflammation, intermittent fevers, general weakness, asthma, constipation, headaches, hypertension, difficult digestion, stomach and intestinal disorders, menstrual pain and irregularity, uterine and ovarian inflammation, ovarian cysts, urinary tract disorders, and as a reconstitutive tonic. Applied topically for skin ulcers, rashes, and eruptions. Used in elevated dosages as a drastic purgative.	Decoction / Internal  Decoction / External Decoction / Internal	Human adult	ZZ1013
Bark / Brazil	As an aphrodisiac, and for ulcers.	Not stated	Human adult	L18995
Bark / Brazil	Considered a febrifuge, emmenagogue, and purgative. Used for uterine fibroids, endometriosis, lymphatic gland inflammation, menstrual pain and disorders.	Decoction / Internal	Human adult	ZZ1007
Bark / Brazil	Used for anemia and gastritis. Used for hemorrhoids.	Infusion / Oral Infusion / Rectal	Human adult	J13522
Bark / Brazil	Used as a febrifuge, antirheumatic and to treat cancer and bone fractures.	Decoction / Oral	Human adult	ZZ1099
Bark / Brazil	Used as an antitumoral, antifungal, vermifuge, and anti-anemic.	Not stated / Oral	Human adult	BC2002
Bark / Brazil	Used for gastric ulcers.	Decoction / Oral	Human adult	T08730
Bark / Brazil	Used for kidney pain and coughs.	Infusion / Oral	Human adult	K16654
Bark / Brazil	Used as an anthelmintic and emmenagogue as for intermittent fever.	Decoction / Oral	Human adult	W02290
Bark / Peru	For the treatment of wounds, tumors, boils, swellings, arthritis, worms, and as a laxative.	Infusion / External Infusion / Internal	Human adult	L18995

Plant Part / Location	Documented Ethnic Use	Type Extract / Route	Used For	Ref #
Bark / Peru	Used as a febrifuge.	Decoction / Internal	Human adult	BC2004
Bark / Peru	Shipibo-Conibo use for rheumatism and body aches/pain.	Decoction / Oral	Human adult	ZZ2003
Bark / Peru	Considered an astringent for healing wounds and skin problems. Used as a depurative blood and bowel cleanser.	Decoction / External Decoction / Oral	Human adult	ZZ1093
Bark / Peru	Used for wound healing. Used for gastric ulcers.	Decoction / External Decoction / Internal	Human adult	L12623
Bark / Peru	Used for gastric ulcers and tuberculosis. Used for recalcitrant sores.	Infusion / Internal Not stated / External	Human adult	L04137
Bark / Peru	Used as a vermifuge and laxative; to treat arthritis. Used for tumors, boils, and skin inflammation and rashes.	Infusion / Oral Infusion / External	Human adult	M01013
Bark / Peru	Used for malaria.	Decoction / Oral	Human adult	ZZ2016
Latex / Amazon	Used as an antihelmintic, anti-tumor, antifungal, and anti-inflammatory. Used in poultices and for fractures.	Not stated / Not stated	Human adult	BC2001
Latex / Amazon	Tikuna Indians used the latex to treat wounds. Waorani Indians rub latex on warble-fly bites to suffocate and kill the larva.	Latex / External	Human adult	ZZ1005
Latex / Amazon	To treat wounds, bot-fly infection, tumors, hernias, back pains, and broken bones.	Latex / External	Human adult	ZZ1011
Latex / Amazon	Used an anti-inflammatory remedy	Not stated	Human adult	L10112
Latex / Brazil	Used as an antitumor agent.	Decoction / Oral	Human adult	T08730
Latex / Brazil	Used as an antitumor agent.	Decoction / Oral	Human adult	L18995
Latex / Brazil	Used as a anthelmintic and purgative. Used in poultices as an emollient, vulnerary, and antiarthritic.	Infusion / Oral Latex / External	Human adult	ZZ1099
Latex / Brazil	Used for fevers and malaria.	Infusion / Oral	Human adult	K07977
Latex / Ecuador	Used to kill warble fly infections ( <i>Dematobius hominis</i> ).	Latex / External	Human adult	K12280
Latex / Guyana	Latex taken as an anthelmintic and to treat liver disorders.	Infusion / Oral	Human adult	ZZ1104
Latex / Peru	For fever, rheumatism, tumors, and gastric ulcers. For hernias, skin conditions, fractures, and lumbar pain.	Infusion / Internal Latex / External	Human adult	ZZ1101

Plant Part / Location	Documented Ethnic Use	Type Extract / Route	Used For	Ref #
Latex / Peru	Shipibo-Conibo Indians use latex for abscesses, sores, and ulcers. Latex mixed with hot water and used as a bath for rheumatic pain.	Latex / External Infusion / External	Human adult	ZZ2003
Latex / Peru	Used for skin tumors.	Latex / External	Human adult	ZZ1093
Latex / Peru	Used topically to treat lumbar pain.	Latex / External	Human adult	L04137
Latex / Peru	Used as a painkiller and for skin tumors. Used as a purgative.	Latex / External Infusion / Oral	Human adult	L17008
Latex / Peru	Used for fevers, rheumatism, gastric ulcers, tumors, and tuberculosis. Used for lumbar back pain and skin sores.	Infusion / Internal Latex / External	Human adult	ZZ2013
Latex / Peru	Used to treat worms. Used to kill bot-fly larva under the skin. Used to treat tumors, hernias, and wounds.	Infusion / Oral Latex / External Latex / External	Human adult	L04137
Latex / Peru	Used as a febrifuge, antirheumatic; for skin conditions, fractures, hernias, back pain, gastric ulcers	Infusion / Oral	Human adult	ZZ1105
Leaves / Peru	Used as a liniment for rheumatism and acne.	Tincture / External	Human adult	ZZ1093
Not stated / Amazon	Ka'apor Indians use it for stomachaches. Fed to sick dogs to gain weight. Used to treat dog mange.	Not stated / Internal Not stated / Internal Not stated / External	Human adult Dogs Dogs	ZZ1003
Not stated / Brazil	Used for lung disorders.	Not stated	Human adult	ZZ1106
Not stated / Brazil	Used for as an emmenagogue and purgative. Used to treat asthma, lung disorders, and syphilis.	Not stated	Human adult	ZZ1022

## Presence of Compounds in Bellaco-Caspi (*Himatanthus sucuuba*)

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Amyrin, alpha: cinnamate	Triterpene	Dried Bark Dried Bark	Peru Brazil	00.0172% Not stated	L18995 BC2002
Aspidospermine, demethoxy; (+)	Indole Alkaloid	Dried Bark Dried Bark Dried Bark	Brazil Brazil Brazil	00.0015% Not stated Not stated	L07627 BC2005 BC2008
Benzoic acid, 4-hydroxy:	Benzenoid	Dried Bark	Brazil	00.0006%	J13522
Cis-polyisoprene	Isoprenoid	Latex	Brazil	2.97%	BC2001
Confluent acid	Depside	Dried Bark	Brazil	00.00209%	J13522
Coumaric Acid, para:	Phenylpropanoid	Dried Bark	Brazil	00.00363%	J13522
Fulvoplumierin	Iridoid Monoterpene	Stembark	Peru	00.0075%	M01013
Lupeol acetate	Triterpene	Dried Bark Dried Bark Latex	Peru Brazil Brazil	00.082% Not stated Not stated	L18995 BC2002 L10112
Lupeol cinnamate	Triterpene	Dried Bark Dried Bark	Peru Brazil	00.0064% Not stated	L18995 BC2002
Lupeol-beta-phenyl-propionate	Triterpene	Dried Bark	Peru	00.0032%	L18995
Perlatolic acid, 2'-O-methyl:	Depside	Dried Bark	Brazil	00.00354%	J13522
Plumbericinic acid, beta-dihydro:	Iridoid Monoterpene	Dried Bark	Brazil	00.00372%	J13522
Plumeride	Iridoid Monoterpene	Dried Bark	Brazil	Not stated	T03321
Plumericin	Iridoid Monoterpene	Dried Bark Dried Bark Dried Bark	Brazil Peru Brazil	00.01142% 00.00088% Not stated	J13522 L18995 BC2002
Plumericin, iso:	Iridoid Monoterpene	Dried Bark Dried Bark	Brazil Brazil	00.01412% Not stated	J13522 BC2002

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Uleine, (+)	Indole Alkaloid	Dried Bark	Brazil	00.003%	L07627
		Dried Bark	Brazil	Not stated	BC2005
		Dried Bark	Brazil	Not stated	BC2008
Uleine, iso	Indole Alkaloid	Died Bark	Brazil	Not stated	BC2005
Vanillic Acid	Benzenoid	Dried Bark	Brazil	00.001%	J13522

## Biological Activities of Bellaco-Caspi (*Himatanthus sucuba*)

Plant Part - Origin	Activity Tested For	Type Extract	Test Model	Dosage	Result	Notes/Organism tested	Ref #
Bark Peru	Toxicity Assessment	Not stated	IP Mouse	1.0 mg/gm	Inactive		L12623
Bark Brazil	Abortifacient Activity	Decoction	IG Rat	40 mg/animal	Inactive		T16662
Bark Brazil	Teratogenic Activity	Decoction	IG Rat	40 mg/animal	Inactive		T16662
Bark Brazil	Monoamine Oxidase Type B Inhibition	MEOH Ext	IC50	Not stated	Active	A reaction mixture containing an enzyme preparation from rat brain homogenates and kynuramine as a substrate was used.	J13522
Latex Peru	Capillary Permeability	Latex	IP Rat	2.5 mg/animal	Active		L12623
Bark Peru	Cytotoxic Activity	Hexane Ext	Cell culture	125 mcg/ml	Active	CA-H460 lung cancer line CA-ME-180 lymphoma line DU-145 prostate cancer line MCF-7 breast cancer line HT20 colon cancer line	L18995
Stembark Peru	Cytotoxic Activity	Decoction	Cell culture	< 20 mcg/ml	Active	CA-YOSIHDA-ASC cancer	M01013
Latex Brazil	Anti-inflammatory Activity	Hexane Ext	IG Rat	200 mg/kg	Active	vs. carrageenan-induced pedal edema	L10112
Latex Brazil	Analgesic Activity	Hexane Ext	IG Rat	200 mg/kg	Active	vs. acetic acid-induced writhing	L10112
Bark Brazil	Gastroprotective Activity	Alkaloid Ext	PO Rat	30 mg/kg	Active	vs. ethanol-induced gastric lesions	BC2005
Bark Brazil	Smooth Muscle Activity	Not stated	Rat aorta	3-30 mcg/ml	Active	vs contractile responses by acetylcholine, caffeine, and phenylephrine	BC2006
Bark Peru	Anti-Yeast Activity	ETOH Ext	Agar plate	4 mg/ml	Active	vs. engineered yeasts	L18995

GI = Gastric Intubation IG = Intra gastric IP = Intraperitoneally IV = Intravenously SC = Subcutaneously PO = Orally

Plant Part - Origin	Activity Tested For	Type Extract	Test Model	Dosage	Result	Notes/Organism tested	Ref #
Bark Brazil	Anti-Yeast Activity	ETOH ext CHCL ext Hexane ext	Agar plate	Not stated	Active	<i>Candida albicans</i>	BC2003
Bark Brazil	Antifungal Activity	Hexane ext	Agar plate	5 mcg/ml	Active	<i>Cladosporium sphaerospermum</i>	BC2002
Latex Peru	Antibacterial Activity	MEOH Ext	Agar plate	10 mcl/plate	Active Active	<i>Pseudomonas aeruginosa</i> <i>Bacillus subtilis</i>	L17008
Bark Brazil	Antibacterial Activity	ETOH ext	Agar plate	Not stated	Active	Gram (+) & Gram (-) bacteria	BC2007
Bark Brazil	Antibacterial Activity	ETOH ext CHCL ext Hexane ext	Agar plate	Not stated	Active	<i>Bacillus subtilis</i> <i>Staphylococcus aureus</i> <i>Klebsiella pneumoniae</i> <i>Escherichia coli</i> <i>Mycobacterium phlei</i>	BC2003
Wood Peru	Antibacterial Activity	ETOH Ext	Agar plate	100 mcg/ml	Inactive	<i>Staphylococcus</i> strains <i>Streptococcus</i> strains <i>Bacillus</i> strains <i>Corynebacterium</i> strains <i>Clostridium histolyticum</i> <i>Bacteroides fragilis</i> <i>Escherichia coli</i>	L10234

GI = Gastric Intubation IG = Intra gastric IP = Intraperitoneally IV = Intravenously SC = Subcutaneously PO = Orally

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