

Table 6.0: Major chemical components (phenolic lignans, alkaloids and coumarins) of pharmacological interest in the Magnoliaceae

The literature on the anticancer properties of *Magnolia* (*M. officinalis*), magnolol and honokiol is extensive. A significant amount of research has been done in the last 5 years, with a particular focus on enhancing bioavailability. Therefore the sources referred to here, while providing a good overview of the extent of the anticancer research that has been undertaken, are not exhaustive.

Compound: botanical source and activity	References
Phenolic Lignans: Magnolol and Honokiol	
genus <i>Magnolia</i>	
<i>Note:</i> The lignan content can vary between batches and species e.g. <i>Magnolia ovata</i> : some samples were particularly rich in magnolol (0.8–7%), when compared to <i>M. officinalis</i> (1.0–1.25%). Honokiol levels were lower: 0.55–1.25% and 0.17–1.8%, respectively.	Lee et al. (2011a); see also Lovecka et al. (2020)
Bioavailability: stability and physicochemical properties of magnolol & honokiol differ; gastrointestinal processing of <i>Magnolia officinalis</i> allows substantial metabolic activation of active components (magnolol and honokiol); lecithin-based mixed polymeric micelles developed to enhance honokiol and magnolol solubility and bioavailability overcoming problems with absorption (extreme hydrophobicity)	Sarrica et al. (2018); Lin et al. (2021a); Niu et al. (2021); Usach et al. (2021)
Anticancer: there is a significant synergistic effect between magnolol and honokiol, which are active against various cell lines, particularly liver and brain cancers (numerous research papers); also urothelial (bladder) carcinoma, oral cancer; potential for use in drug-resistant forms of cancer	Lee et al. (2011a); Arora et al. (2012); Han & van Anh (2012); Kapoor (2012); Chilampalli et al. (2013); Kumar et al. (2013); Prasad & Katiyar (2016); Zhang et al. (2019); Wang et al. (2020a); Bui et al. (2020)
Anticancer: review of honokiol and magnolol as anticancer agents	Mottaghi & Abbaszadeh (2021)
Anti-inflammatory, antioxidant, analgesic; potential for use in inflammatory pain conditions	Lin et al. (2007); Lee et al. (2011a); Zhang et al. (2019)
Respiratory function: smooth muscle relaxant, anti-asthmatic	Ko et al. (2003); Lee et al. (2011a); Poivre & Duez (2017)
Cardiovascular system: cardioprotective; antiplatelet, anti-thrombocytic, anti-ischaemic; anti-atherosclerosis	Lee et al. (2011a); Poivre & Duez (2017); Yuan et al. (2019)
Antiviral: potential use for prevention of norovirus foodborne disorders and gastroenteritis (<i>Magnolia officinalis</i>)	Kim et al. (2021)
Antimicrobial (poultry farming): anti- <i>Salmonella</i>	Chen et al. (2021c)

improvement in growth performance; magnolol could also improve the intestinal microbial and mucosal barrier	
Antibacterial: active against MRSA, significant synergistic effect between magnolol and honokiol; active against poisoning by <i>Vibrio cholerae</i>	Shih & Chou (2012); Liu et al. (2014); Zuo et al. (2015); Choi et al. (2015a); Kim et al. (2015a & 2015b)
Antibacterial: honokiol/magnolol amphiphiles showed potent anti-MRSA activity	Guo et al. (2021a)
Antifungal: enhance immune response to infection anti-yeast, active against <i>Candida albicans</i> ; synergistic potential with antimicrobial agents; fungicidal against <i>Fusarium</i> isolates	Sun et al. (2015b, 2017a); Lu et al. (2017); Oufensou et al. (2019 & 2020)
Antifungal: excellent activity against plant pathogens, particularly against <i>Rhizoctonia solani</i>	Choi et al. (2009); Yan et al. (2020)
Antifungal (aquaculture): active against the <i>Saprolegnia</i> pathogen of fish with potential for use in aquaculture operations	Hu et al. (2019a)
Dental health: antibacterial and anti-inflammatory, active against oral pathogens eg. <i>Porphyromonas gingivalis</i> and <i>Streptococcus mutans</i> ; antibiofilm activity and reduce antibiotic resistance	Murakami et al. (2012); Sakaue et al. (2016); Poivre & Duez (2017); Zhang et al. (2019); Chiu et al. (2021)
Immunomodulatory: enhanced immune response against bacterial and viral infection; potential for use in aquaculture and farming industries	Choi et al. (2015a); Chen et al. (2017)
Eye disorders: protective effect on ocular function	Vavilala et al. (2013 & 2014); Yang et al. (2016a)
Metabolic function: anti-diabetic, benefits for insulin-resistance and inflammation	Kim et al. (2013c); Poivre & Duez (2017)
Gastrointestinal disorders: antidiarrhoeal, significant protective effect on gastrointestinal mucosa and maintain cellular integrity; acts to improve gastric function and intestinal motility	Zhang et al. (2005); Deng et al. (2015 & 2018a); Poivre & Duez (2017); Deng et al. (2018c)
Skin disorders: anti-inflammatory, antibacterial and healing properties	Shen et al. (2010)
Liver function: hepatoprotective; protective against fatty liver (also <i>Magnolia officinalis</i>)	Yin et al. (2009a & 2009b); Lee et al. (2015)
Kidney protection: renoprotective effect in aristolochic acid nephropathy	Bunel et al. (2016)
Amyloidosis (a rare disease involving amyloid protein accumulation): potential activity against amyloidosis	Guo et al. (2015)
Neurological function: neuroprotective, antidepressant, anxiolytic, prevent memory impairment, anticonvulsant; anti-Alzheimer's activity	Xu et al. (2008); Hoi et al. (2010); Lee et al. (2011a); Lee et al. (2013b); Akagi et al. (2015); Poivre

	& Duez (2017)
Anti-seizure: anticonvulsant activity <i>Magnolia officinalis</i> , honokiol and magnolol; potential for treatment of epilepsy	Li et al. (2020b)
Antidepressant: mixture of honokiol, magnolol and ginger oil show antidepressant potential	Qiang et al. (2009)
Neuroprotective: improvement in mood disorders using a combination of L-theanine, <i>Melissa officinalis</i> and <i>Magnolia officinalis</i>	Borgonetti et al. (2020)
Magnolol (additional information)	
Bioavailability: enhanced activity with micelle and nanosuspension formulations; also zirconium-based organometallic frameworks	Li et al. (2020a); Santos et al. (2020); Lin et al. (2021b)
Anticancer: active against various cell lines including colon, colorectal, bladder, breast, cervix, liver, lung, oral, renal, ovarian, pancreas, prostate, melanoma, myeloma; evaluation of derivatives for improved bioavailability and anticancer activity	Poivre & Duez (2017); Ranaware et al. (2018); Wang et al. (2018d); Wen et al. (2019); Zhang et al. (2019); Chen et al. (2020a); Cheng et al. (2020); Su et al. (2020); Wang et al. (2020a); Jin et al. (2021); Lin et al. (2021b); Sun et al. (2021)
Breast cancer: enhanced activity with lipid polymer nanoparticles (magnolol + gold nanoparticles)	Elhabak et al. (2020)
Liver carcinoma: anticancer and antimetastatic potential; radiosensitizing activity to enhance radiation therapy; synergistic potential with conventional anticancer drugs; derivatives show enhanced anticancer potential eg. 2-O-methylmagnolol	Kuan et al. (2018); Maioli et al. (2018); Chen et al. (2020b); Chen et al. (2020c); Tsai et al. (2020); Chen et al. (2021f)
Radioprotective: active against UV skin damage	Im et al. (2015)
Chemoprotective: against cisplatin toxicity (muscle wasting)	Lee et al. (2020)
Antimicrobial: anti- <i>Staphylococcus</i> activity, potential anti-sepsis properties with anti-inflammatory, anticoagulant and antioxidant activity; anti-acne potential	Yang et al. (2008a); Tsai et al. (2010); Wang et al. (2011); Miao et al. (2013); Sinha et al. (2014); Lin et al. (2021b)
Antifungal (anti-mycotoxin): magnolol and <i>M. officinalis</i> show antifungal and antimycotoxigenic activity against <i>Alternaria</i> , with potential use for crop protection	Wang et al. (2020c); Jiang et al. (2021)
Antifungal (plant pathogens): active against soil and crop pathogens causing rice blast, tomato late blight, wheat leaf rust and red pepper anthracnose; active against <i>Fusarium</i> isolates and <i>Rhizoctonia solani</i> ; magnolol derivatives examined for activity against <i>Fusarium</i> , <i>Botrytis</i> , <i>Sclerotinia</i> , <i>Rhizoctonia</i>	Choi et al. (2009); Oufensou et al. (2019 & 2020); Mo et al. (2021); Li et al. (2021c)

Antimicrobial: anti- <i>Candida</i> with potential for use in oral candidiasis, also for drug resistant forms of <i>Candida</i> and in combination with antifungal therapy	Sun et al. (2015b & 2015c); Behbehani et al. (2017); Zhou et al. (2017); Zhang et al. (2019)
Antimicrobial: food packaging; chitosan-based films integrated with magnolol	Song et al. (2021)
Antimicrobial (animal farming): potential to replace antibiotics in feed of ducks, with supportive antioxidant action for animal health and meat quality	Lin et al. (2017 & 2020)
Animal farming (poultry): anti- <i>Salmonella</i> ; supplementation supported intestinal health of hens, increased egg laying performance and egg quality	Chen et al. (2021c & 2021d)
Antimicrobial (fish farming): antiviral, antiparasitic and antibacterial with potential for use in aquaculture industry	Dong et al. (2017); Chen et al. (2018a); Lin et al. (2021b)
Dental care: anti-inflammatory with potential for use in treating oral inflammation (gingivitis, periodontitis); prevention for diabetic periodontitis	Lu et al. (2013); Lu et al. (2015a); Zhang et al. (2019); Chiu et al. (2021); Liu et al. (2021b)
Antiviral: active against hepatitis B; noroviruses; investigated for anti-COVID activity	Li et al. (2013c); Kim et al. (2021); Junior et al. (2021)
Anti-inflammatory: influence immune function; analgesic and anti-arthritic potential	Wang et al. (2012); Chen et al. (2019); Lin et al. (2021b); Zhang et al. (2021c); Zhang et al. (2021d)
Cosmetic: UV protectant, anti-photoaging activity	Lin et al. (2021b)
Skin disorders: anti-inflammatory, antioxidant; potential for the prevention of dermatitis	Guo et al. (2021b)
Gastrointestinal function: anti-inflammatory, antioxidant, protective benefits for sepsis induced damage; anti-ulcer; active against intestinal inflammation (including chemotherapy side effects) e.g. colitis, mucositis; nanoparticle formulations for site specific drug delivery strategies	Yang et al. (2008a); Zhao et al. (2017b); Shen et al. (2018); Zhang et al. (2018a); Chen et al. (2019); Xia et al. (2019a); Zhang et al. (2019); Lin et al. (2021b); Wang et al. (2021)
Antidiabetic: protective against pancreatic damage; anti-hyperglycaemic; shows promise for use with conventional drugs in the management of diabetes	Wang & Zhang (2010); Wang et al. (2014b); Liang et al. (2015); Suh et al. (2017); Lin et al. (2021b); Szałabska-Rapala et al. (2021)
Kidney function: renoprotective, anti-ischaemic	Huang et al. (2017a); Tang et al. (2017); Zhang et al. (2019)
Liver function: hepatoprotective, anti-fibrosis; anti-hepatitis potential; potential for use in fatty liver and alcoholic liver disease	Li et al. (2013c); Wang et al. (2014b); Zhang et al. (2017a); Liu et al. (2019a); Kuo et al. (2020)
Lung function: anti-inflammatory protective effect on acute lung injury; anti-fibrotic; anti-asthmatic for use in allergic asthma	Ni et al. (2012); Lin et al. (2015); Zhang et al. (2015a); Tsai et al. (2016); Huang et al. (2019); Zhang et al. (2019)
Cardiovascular system: cardioprotective antioxidant;	Chen et al. (2001); Ho & Hong

anti-fibrotic; protection from venous injury following surgery (restenosis inhibition); antihypertensive properties	(2012); Seok et al. (2012); Karki et al. (2013); Liang et al. (2015); Wu et al. (2015); Chang et al. (2018a); Yuan et al. (2019); Zhang et al. (2019); Chen et al. (2021e); Lin et al. (2021b)
Venous tonic: venous supportive potential with benefits for varicose veins and prevention of spider veins	Kuk et al. (2017)
Musculoskeletal disorders: anti-inflammatory and protective action on bone cells (eg. benefits for osteoporosis and osteoarthritis); potential for the treatment of intervertebral disc degeneration	Kwak et al. (2012); Lu et al. (2013); Lu et al. (2015b); Fei et al. (2019); Hu et al. (2019b); Liu et al. (2020a); Zhang et al. (2020b); Lin et al. (2021b)
Musculoskeletal (tendinopathy): prevention of ossification of tendon e.g. repeated Achilles tendon injury	Zhou et al. (2019)
Musculoskeletal: protective against muscle wasting due to cisplatin treatment	Lee et al. (2020)
Gynaecology: anti-inflammatory potential for uterine inflammation (endometritis) and breast inflammation (mastitis)	Luo et al. (2013); Wei et al. (2015)
Cerebrovascular function: anti-inflammatory, neuroprotective; benefits for ischaemic brain injury (i.e. stroke) with microemulsions enhancing bioavailability	Kou et al. (2017); Liu et al. (2017); Liu et al. (2018b); Zhou et al. (2018a); Guo et al. (2020)
Nervous system: sedative, anti-epileptic; anticonvulsant	Chen et al. (2011a); Chen et al. (2012a); Vega-Garcia et al. (2019); Li et al. (2020b)
Neuroprotective: antioxidant, anti-inflammatory, chemoprotective, anti-ischaemia for brain function (clinical potential); potential for Parkinson's and Alzheimer's disease; supportive to cognition and memory function	Chen et al. (2011b); Lee et al. (2012a); Li et al. (2012); Muroyama et al. (2012); Li et al. (2013a); Wang et al. (2013a); Chen et al. (2014b); Li et al. (2015a); Kim & Kim et al. (2016); Matsui et al. (2016); Weng et al. (2017); Huang et al. (2018); Zhang et al. (2019); Xie et al. (2020); Xian et al. (2020); Lin et al. (2021b); Santos et al. (2021)
Neuroprotective: anti-inflammatory anti-depressant	Bai et al. (2018); Cheng et al. (2018); Yang et al. (2018); Zhang et al. (2019); Tao et al. (2021b)
Neuropathic pain: analgesic	Zhang et al. (2021c)

Antiparasitic: moderate antiplasmodial activity	Latif et al. (2017)
Honokiol (additional information)	
Anticancer: anti-leukaemia; active against numerous cell lines i.e. rectal, lung, colorectal, prostate, breast, liver, kidney, oral and tongue cancers, gastric cancer and brain cancer e.g. glioma (numerous research papers); anti-melanoma; anti-metastatic; chemoprotective; potential to enhance chemotherapy and radiotherapy treatments	Lee et al. (2011a); Arora et al. (2012); Cheng et al. (2016); Prasad & Katiyar (2016); Poivre & Duez (2017); Prasad et al. (2017); Guillermo-lagae et al. (2017); Fan et al. (2018); Maioli et al. (2018); Rauf et al. (2018); Banik et al. (2019); Bui et al.(2020); Emran et al. (2019); Ong et al. (2019); Liu et al. (2020c); Chen et al. (2021a); Lee et al. (2021); Liu et al. (2021a); Peng et al. (2021)
Anticancer: antifibrotic against oral submucosis fibrosus due to chewing areca (betel) nut; chemoprotective against arecoline cancerous changes	Chen et al. (2021b)
Anticancer derivatives: lung carcinoma chemotherapy	Deng et al. (2019)
Chemotherapy: honokiol-camptothecin synergistic activity with nanoparticle development for enhanced anticancer drug delivery; honokiol-berberine show enhanced activity for mitochondrial-targeting antitumor agents	Deb et al. (2020); Shi et al. (2020); Lou et al. (2021)
Breast cancer: enhancement of transdermal honokiol delivery for clinical treatment options; honokiol reduced breast cancer cell resistance to doxorubicin chemotherapy (enhanced chemosensitivity)	Gao et al. (2018); Yi et al. (2021); Zhang et al. (2021a)
Chemotherapy enhancement: enhance activity of cisplatin (oral cancer), paclitaxel (lung cancer), enhance anti-metastasis properties of doxorubicin; synergistic with 5-fluorouracil (urothelial carcinoma)	Chang et al. (2018b); Wang et al. (2018g); Zou et al. (2018); Lee et al. (2019a); Li et al. (2021b)
Lung cancer: honokiol + curcumin combination sensitised drug-resistant lung cancer cells to cisplatin treatment (enhanced drug efficacy); synergistic liposome formulation (betulinic acid, parthenolide, honokiol and ginsenoside Rh2) for lung cancer treatment (reduced side effects in comparison to conventional treatment)	Jin et al. (2020); Qi et al. (2021)
Chemotherapy: potential for use in nanoparticle or liposomal formulations for targeted drug delivery	Tang et al. (2018a); Zhou et al. (2018b); Yu et al. (2019a); Dong et al. (2021)
Chemotherapy: enhance drug therapy for malignant brain tumour (glioma, neuroblastoma)	Lin et al. (2012); Chio et al. (2018); Rickert et al. (2018)
Chemoprotective: moderate side effects of anticancer	Chen et al. (2015b); Huang et al.

drugs e.g. cisplatin (reduced nephrotoxicity, testicular damage and ototoxicity); doxorubicin (mediate cardiotoxicity)	(2017b); Wang et al. (2018b); Tan et al. (2020); Wang et al. (2020b)
Radiotherapy: enhanced radiotherapy efficacy against lung cancer	Liu et al. (2020b)
Radioprotective: antioxidant, anti-inflammatory in radiation associated brain damage	Liao et al. (2020)
Heatstroke: antioxidant, anti-inflammatory with potent protective effects	Hsu et al. (2014)
Antiviral: anti-HIV (human immunodeficiency viruses); profoundly active against Dengue virus; active against herpes simplex and hepatitis-C virus; antiviral activity in flaviviruses (Zika virus, Usutu virus, West Nile virus)	Arora et al. (2012); Lan et al. (2012); Fang et al. (2015); Meng et al. (2015); Liu et al. (2019c); Albentosa-Gonzalez et al. (2021)
Antiviral (derivative): 2-O-methylhonokiol was immunostimulant and active against hepatitis-C virus	Jeong et al. (2021)
Antiviral (anti-COVID): remarkable inhibition of SARS-CoV-2 infection and suggestions for potential use in prevention and treatment options (antithrombotic and immunomodulatory benefits)	Ricordi et al. (2021); Tanikawa et al. (2021)
Antimicrobial (antibacterial and antifungal): potent broad-spectrum antimicrobial and antifungal properties; anti- <i>Listeria</i> for prevention of food poisoning; anti- <i>Candida</i> ; anti-biofilm against <i>Staphylococcus aureus</i> ; active against <i>Fusarium</i> isolates	Arora et al. (2012); Lee et al. (2011a); Li et al. (2016a); Sun et al. (2017a & 2017b); Oufensou et al. (2019 & 2020)
Antifungal: auranofin and honokiol were active against <i>Scedosporium</i> species and the related fungus <i>Lomentospora prolificans</i>	Yaakoub et al. (2021)
Antifungal: active against the crop pathogens rice blast, tomato late blight, wheat leaf rust and red pepper anthracnose; active against <i>Botrytis cinerea</i>	Choi et al.(2009); Ma et al. (2020a)
Respiratory tract: anti-inflammatory protective effect on lung tissue; anti-fibrotic and anti-asthmatic; potential as a protective agent in asbestos-induced lung fibrosis	Chen et al. (2018b); Hong et al. (2018); Xu et al. (2018); Pulivendala et al. (2020); Cheresch et al. (2021)
Immunomodulatory: anti-inflammatory, antibacterial; potential in sepsis treatments may have benefits for combination therapies	Klingensmith et al. (2018); Lu et al. (2020); Lv et al. (2021)
Immunomodulatory: derivatives show potential for use as vaccine adjuvants (enhance immune response to increase vaccine efficacy)	Moser et al. (2020)
Dental care: potential for antimicrobial use in dental disorders; enhanced bioavailability strategies for anti-caries activity with excellent enamel remineralizing	Solinski et al. (2018); Tao et al. (2021a)

ability	
Eye disorders: antifungal for the prevention of <i>Aspergillus</i> keratitis (infection of the cornea)	Zhan et al. (2020)
Eye disorders (drug delivery): potential use for nanoparticle delivery of ophthalmic drugs	Deng et al. (2018b)
Eye disorders: honokiol-loaded micelles with enhanced bioavailability for prevention and treatment of macular degeneration	Shahid et al. (2021)
Skin disorders: anti-inflammatory and anti-psoriasis; potential for clinical use as trans-dermal preparation; radioprotective; potential to prevent scar formation (anti-fibrotic); protective against cigarette smoke damage	Shen et al. (2010); Wen et al. (2015); Costa et al. (2017); Zhao et al. (2017a); Fang et al. (2018); Prasad et al. (2017)
Burns: analgesic anti-inflammatory	Khalid et al. (2019)
Hair growth: liposomal honokiol promoted hair growth	Li et al. (2021a)
Cardiovascular system: cardioprotective, anti-arrhythmic; anti-atherosclerosis; anti-ischaemia; anti-hypertensive; active against cardiac hypertrophy (heart muscle enlargement); honokiol-silica nanoparticles prevent vascular restenosis following coronary procedures (including surgery); chemoprotective against doxorubicin toxicity	Lee et al. (2011a); Wang et al. (2013b); Han et al. (2014); Pillai et al. (2015); Qiu et al. (2015); Wang et al. (2018c); Wei et al. (2018); Zhang et al. (2018b); Tan et al. (2019); Wang et al. (2019b); Yuan et al. (2019); Huang et al. (2020a); Liu et al. (2020f); Wei et al. (2020); Jayakumari et al. (2021)
Drug bioavailability: nanosuspensions significantly increase honokiol bioavailability for treatment of inflammatory, cardiovascular and cerebral disorders	Han et al. (2014); Lu et al. (2020)
Nervous system: honokiol readily cross the blood brain barrier and the blood-cerebrospinal fluid barrier, with high bioavailability; anti-inflammatory, neuroprotective with clinical potential; antidepressant; potential use for anxiety, pain, cerebrovascular injury, surgery and epilepsy; significant anti-thrombotic activity and anti-ischaemic protection against brain injury e.g. diabetes, stroke damage and surgery	Lin et al. (2012); Yang et al. (2013); Hu et al. (2012); Bu et al. (2014); Wang et al. (2014a); Woodbury et al. (2013 & 2015); Sulakhiya et al. (2014 & 2015); Jangra et al. (2016); Talarek et al. (2017); Rickert et al. (2018); Wang et al. (2018a); Wang et al. (2018e); Zheng et al. (2018); Ye et al. (2019); Zhang et al. (2020a); Wu et al. (2020b); Borgonetti et al. (2021); Chen et al. (2021a); Pacifici et al. (2021)
Neuroprotective: potential for inflammatory neurological disorders eg. multiple sclerosis, encephalomyelitis; nanosome formulations to improve bioavailability	Hsiao et al. (2020)
Neuroprotective: memory disorders including	Woodbury et al. (2013); Xian et al.

Alzheimer's disease; anti-Parkinson's activity; surgery/anaesthesia memory loss	(2015 & 2016); Chen et al. (2018c); Li et al. (2018a); Cetin & Deveci (2019); Guo et al. (2019); Ye et al. (2019)
Neuroprotective: chemoprotective against ammonia induced neurotoxicity secondary to cirrhosis	Anamika & Trigun (2021)
Sedative: potential for insomnia (clinical use has been limited by poor bioavailability)	Yang et al. (2019)
Pain: analgesic and anaesthetic (useful for neonatal pain); useful for inflammatory pain conditions	Woodbury et al. (2013 & 2015); Khalid et al. (2018)
Musculoskeletal disorders: anti-inflammatory, cartilage protective and anti-arthritis; potential for osteoarthritis treatment; anti-osteoporosis; prevent disc degeneration; excellent potential for degenerative conditions and sport injuries; protection of bone cells against chemical damage; potential for treatment of disc damage and other forms of spinal injury; anti-fibrotic activity to enhance healing and prevent complications following surgery	Yamaguchi et al. (2011); Chen et al. (2015a); Liu et al. (2015); Wang et al. (2015); Chen et al. (2014a); Shim et al. (2015); An et al. (2016); Suh et al. (2016); Tang et al. (2018b); Wang et al. (2018f); Xu et al. (2020a); Zhu et al. (2020); Tan et al. (2021a)
Metabolic function: anti-diabetic (hypoglycaemic); pancreatic cell protective; protection against heatstroke oxidative stress in diabetes; also diabetes-associated cardiac disorders; combination with rhein protected against acute pancreatitis	Hsu et al. (2014); Rios et al. (2015); Sun et al. (2015a); Zhao et al. (2016); Lone & Yun (2017); Li et al. (2018b); Kim & Jung et al. (2019); Huang et al. (2020b); Kerr et al. (2020); Jayakumari et al. (2021); Ye & Meng (2021)
Anti-obesity potential; regulation of gut microbiota	Ding et al. (2019 & 2021); Weng et al. (2021)
Kidney function: renoprotective, protective against renal ischaemia and sepsis-induced injury; anti-fibrotic; chemoprotective (cisplatin injury); potential nephroprotective for lupus-induced nephritis	Li et al. (2014a); Yu et al. (2016); Wang et al. (2018b); Xia et al. (2019b); Zhang & Xiang (2019); Liu et al. (2019b); Park et al. (2020); Quan et al. (2020); Yang et al. (2020b); Zhang et al. (2021b)
Liver function: significant chemoprotective and hepatoprotective activity; antifibrotic; potential for use in the treatment of fatty liver disorders and fibrosis; also in iron-overload damage	Cao et al. (2005); Yin et al. (2009a); Sulakhiya et al. (2015); Zhao et al. (2016); Jeong et al. (2018); Liu et al. (2018c); Zhong & Liu (2018); Yu et al. (2019b); Elfeky et al. (2020); Zhai et al. (2020); Lee et al. (2021); Mandala et al. (2021); Okuda et al. (2021)
Gynaecology: protection against ovarian ischaemia and for treating endometriosis, endometritis, and anti-adhesion (prevent formation of abdominal adhesions)	Luo et al. (2013); Agacayak et al. (2015); Wang et al. (2016); Yaman Tunc et al. (2016)

Insecticide: mosquito larvicidal activity	Wang et al. (2019a)
Insecticide: derivatives developed with pesticidal activity	Zhi et al. (2020)
Other Phenolics:	See also Song & Fischer (1999)
4-O-methylhonokiol (lignan):	
genus <i>Magnolia</i>	
Anti-inflammatory, analgesic, antioxidant, anaesthetic potential	Oh et al. (2009); Schuhly et al. (2009); Kim et al. (2015c); Maldifassi et al. (2016)
Anticancer: anti-inflammatory, antioxidant, anti-tumour, anticancer (oral, colon, cervical and prostate cancer cells);	Han & Van Anh (2012); Oh et al. (2012); Lee et al. (2013a); Cho et al. (2015a); Hyun et al. (2015); Xiao et al. (2017)
Antiviral: 2-O-methylhonokiol was immunostimulant and active against hepatitis-C virus	Jeong et al. (2021)
Liver function: hepatoprotective	Patsenker et al. (2017)
Renoprotective: against diabetes-induced kidney damage	Ma et al. (2019)
Cardioprotective: protective against diabetes-induced cardiac damage	Singha et al. (2019); Zheng et al. (2019)
Metabolic function: cardioprotective, anti-obesity and antidiabetic potential; anti-inflammatory derivatives to prevent diabetes side effects	Zhang et al. (2014b & 2015b); Kim et al. (2015c); Seo et al. (2018)
Shin and hair: benefits for hair growth	Kim et al. (2011); Kim et al. (2017a)
Musculoskeletal function: anti-inflammatory, anti-arthritic and support bone function	Schuehly et al. (2011); Park et al. (2017)
Neuroprotective: anti-inflammatory, anti-stroke, neurological support (support mental function and memory), anti-seizure; anti-Alzheimer's potential	Lee et al. (2010a); Lee et al. (2009b, 2009c & 2011b); Choi et al. (2011); Lee et al. (2011a, 2012b, 2012c); Gertsch & Anavi-Goffer (2012); Lee et al. (2013a); Baur et al. (2014); Jung et al. (2014); Chicca et al. (2015); Han et al. (2015)
Neuroprotective: anti-anxiety	Han et al. (2011)
Neuroprotective: neurotrophic; enhance nerve cell growth	Lee et al. (2009b); Seo et al. (2018)
Chemoprotective: active against nicotine toxicity (potential for prevention of foetal damage during pregnancy)	Lin et al. (2014a)
Antiparasitic: moderate antiplasmodial activity	Latif et al. (2017)
Obovatol (lignan):	
genus <i>Magnolia</i> ; notably <i>M. obovata</i> (leaves and bark)	Lovecka et.al. (2020)

Anti-inflammatory, antioxidant; anti-arthritic, support bone formation (osteogenic)	Choi et al. (2007a); Seo et al. (2013); Yang et al. (2013); Kim et al. (2014a); Poivre & Duez (2017); Kim et al. (2019b)
Cosmetic: UV protectant; protective against skin photo-aging	Choi et al. (2007b)
Antimicrobial: antibacterial, antifungal; anti- <i>Salmonella</i> (reduced virulence)	Yu et al. (2012); Choi et al. (2017a); Poivre & Duez (2017)
Antifungal: activity against <i>Saccharomyces</i> and <i>Cryptococcus</i> ; antifungal derivatives evaluated	Hwang et al. (2002); Yang et al. (2020a)
Antifungal: active against plant pathogens ie. rice blast and wheat leaf rust	
Gastroprotective: anti-ulcer	Yu et al. (2012)
Anti-allergy	Yu et al. (2012)
Cardiovascular system: influence cholesterol metabolism (cholesterol acyltransferase inhibition); anti-atherosclerosis and potential use for prevention of restenosis (obovitol and derivatives); muscle relaxant	Kwon et al. (1997); Lim et al. (2010 & 2011)
Cardiovascular: antithrombotic; obovatol and derivatives show antiplatelet activity	Pyo et al. (2002); Kwak et al. (2011); Park et al. (2011); Yu et al. (2012)
Gynaecology: antifibrotic, antiproliferative; protection against uterine fibroid development	Chen et al. (2020c)
Anticancer: anti-leukaemia; colon, prostate, oral, tongue and lung cancer; enhance chemotherapy activity eg. docetaxel against prostate and colon cancer	Lee et al. (2009a); Kim et al. (2014b); Kim et al. (2016); Poivre & Duez (2017); Duan et al. (2018)
Neurological activity: sedative, anxiolytic	Seo et al. (2007); Ma et al. (2009)
Neuroprotective: anti-inflammatory antioxidant, chemoprotective; promote nerve cell growth (neurotrophic properties); support for memory; anti-Alzheimer's potential	Lee et al. (2010b); Ock et al. (2010); Choi et al. (2012a & 2012b); Lee et al. (2012d); Suk & Ock (2012); Lee et al. (2013b); Yang et al. (2013); Seo et al. (2018); Mir et al. (2021)
Magnosalin (lignan):	
genus <i>Magnolia</i> , also found in the genus <i>Acorus</i> e.g. Sweet Flag (<i>Acorus calamus</i>) and <i>Piper</i> e.g. Cubebs (<i>Piper cubeba</i>)	
Anti-inflammatory, antiarthritic and anticancer (anti-angiogenic)	Kimura et al. (1990, 1991 & 1992); Kobayashi et al. (1996 & 1998); Lee et al. (2011a)
Syringin (phenolic glycoside, lignan; also known as eleutheroside B)	

genus <i>Magnolia</i> ; also found in diverse medicinal herbs i.e. Dandelion (<i>Taraxacum</i> spp.), Lilac (<i>Syringa vulgaris</i>), Siberian Ginseng (<i>Acanthopanax senticosus</i>), Cubebs (<i>Litsea cubeba</i>) and <i>Tinospora cordifolia</i>	
Immunomodulatory: significant antioxidant and anti-inflammatory activity; immune supportive (<i>Tinospora crispa</i>); anti-allergy potential	Sharma et al. (2012); Yang et al. (2012); Ahmad et al. (2016 & 2018); Kim et al. (2017b); Zhang et al. (2017b); Lau et al. (2019); Jin et al. (2020); Kwon et al. (2020); Ahmed et al. (2021)
Haematology: support blood cell parameters	Us et al. (2020)
Antiviral: active against Zika virus and influenza A	Wang et al. (2017c); Sangeetha et al. (2020)
Anticancer: anti-angiogenic activity; active in breast cancer cell lines (chemopreventive)	Lee et al. (2019b); Aventurado et al. (2020)
Radioprotective: protect neurological function	Zhou et al. (2018c); Zang et al. (2019)
Neuroprotective and anti-fatigue: facilitate recovery from exercise stress	Lau et al. (2019)
Neuroprotective: anti-inflammatory; anti-ischaemic, anti-Alzheimer's potential	Bai et al. (2011); Wang et al. (2020e); Liu et al. (2021c); Tan et al. (2021b)
Neuroprotective: antidepressant (combined with geniposide)	Zhang et al. (2021g)
Gastrointestinal tract: anti-inflammatory, support intestinal barrier functions; potential protective activity for colonic inflammation (colitis)	Che et al. (2019); Zhang et al. (2020)
Respiratory tract: anti-inflammatory, protect against lung injury; anti-asthmatic	Zhang et al. (2017c); Dai et al. (2021)
Cardiovascular system: cardioprotective, cardiotonic; anti-fibrillatory chemoprotective; enhanced cardioprotective activity with combination with tilianin in diabetic cardiac disease	Li et al. (2017a); Yao et al. (2021); Zhang et al. (2021f)
Nervous system: neuroprotective; sedative (potentiate sleep); prevention of Alzheimer's disease	Cui et al. (2015); Lau et al. (2019); Wang et al. (2020d); Zhang et al. (2021e)
Musculoskeletal function: anti-osteoporosis, protective effect on bone loss	Liu et al. (2018a); Imtiyaz et al. (2020)
Liver function: hepatoprotective	Gong et al. (2014)
Kidney function: renoprotective against ischaemia and cisplatin toxicity (chemoprotective); antifibrotic (nanoparticle formulation)	Zang et al. (2019); Chen et al. (2021f)
Metabolic disorders: antidiabetic, supportive to pancreatic function; improve insulin secretion; anti-	Seo et al. (2015); Lau et al. (2019); Shen et al. (2020); Us et al. (2020)

hyperglycaemic, prevention of gestational diabetes	
Metabolic disorders: ant-obesity potential	Hossini et al. (2021)
Syringaresinol (eleutheroside E; and derivatives; lignan):	
genus <i>Magnolia</i> , also <i>Liriodendron tulipifera</i> and <i>Michelia champaca</i> .	
Anti-inflammatory, immune supportive; analgesic, anti-arthritic	Huang et al. (2011c); He et al. (2014); Bajpai et al. (2018); Lau et al. (2019); Liu et al. (2019d)
Adaptogen: anti-fatigue, anti-stress, anti-ageing activity; protect against sleep-deprivation stress	Nishibe et al. (1990); Huang et al. (2011a & 2011b); Huang et al. (2011c); Kim et al. (2017); Luo et al. (2019)
Adaptogen: anti-stress for bees stressed by nosemosis (<i>Nosema</i> parasites); increase resistance (<i>Eleutherococcus senticosus</i>)	Ptaszynska & Zaluski (2020)
Anticancer: anti-leukaemia; potential for use in some forms of prostate cancer	Yamazaki et al. (2007); Park et al. (2008); Selvaraj et al. (2021)
Hormonal influence: phytoestrogen; oestrogen inhibition; preventive potential for prostate cancer (androgen receptor antagonist)	Luecha et al. (2009); Selvaraj et al. (2021)
Gastrointestinal: modification of gut integrity and microbiota diversity (<i>Lactobacillus</i> and <i>Bifidobacterium</i>); enhance immunity against influenza vaccination	Cho et al. (2016a)
Liver function: anti-fibrotic	Jeong et al. (2015)
Musculoskeletal system: bone formation, stimulation osteoblast cells; anti-osteoporosis	Yang et al. (2007); Ma et al. (2020b)
Cardiovascular function: cardioprotective, anti-ischaemic, also good anti-thrombotic activity (<i>Piper wallichii</i>)	Cho et al. (2015b); Shi et al. (2015); Wang & Yang (2020)
Cardioprotective: antioxidant, anti-inflammatory, antifibrotic against diabetic cardiomyopathy	Li et al. (2020c)
Antimicrobial: antibacterial with good activity against <i>E. coli</i> , <i>B. subtilis</i> and <i>Staph. aureus</i> ; active against <i>Helicobacter pylori</i>	Miyazawa et al. (2006); Yang et al. (2010)
Antifungal: synergistic with antifungal agents against aflatoxin contamination (<i>Aspergillus flavus</i>)	Tian et al. (2021)
Skin and cosmetic: anti-melanogenic; UV protective, anti-photoaging; potential anti-ageing agent for skin; prevention of scar formation	Li et al. (2013b); Kim et al. (2017c); Kim et al. (2019c); Oh et al. (2020); Lin et al. (2021c)
Radioprotective	Huang et al. (2011c); Zhou et al. (2018c)
Neuroprotective: antioxidant, anti-inflammatory; anti-	Huang et al. (2011c); In et al.

seizure, anti-stress, anti-anxiety	(2015); Cho et al. (2018); Yang et al. (2020c); Zhang et al. (2021h)
Neuroprotective: protective effect on memory function; radioprotective for nerve damage and memory	Bai et al. (2011); Zhou et al. (2018c); Lu & Xiao-Qing (2019); Liu et al. (2020e)
Metabolic function: antioxidant, antidiabetic, regulate lipid metabolism	Ahn et al.(2013); Wang et al. (2017b); Zhai & Wang (2018)
Kidney function: nephroprotective against diabetes (high glucose) induced damage	Yang et al. (2016b)
Industrial use: non-toxic bisphenol (BPA) resin substitute	Janvier et al. (2017)
Yangambin (lignan):	
<i>Liriodendron tulipifera</i> ; also <i>Piper amalago</i> , <i>Tinospora cordifolia</i> <i>Zanthoxylon rhetsa</i>	
Anti-inflammatory, anti-allergic protective against endotoxic shock	Serra et al. (1997); Aaraujo et al. (2001); Li et al. (2013b)
Anti-tumour activity: anti-melanoma	Li et al. (2013b); Bala et al. (2015); Santhanam et al. (2016)
Cardiovascular function: cardioprotective, ameliorate cardiovascular collapse, vasorelaxant and hypotensive	Araujo et al. (2001); Ribeiro et al. (1996); Monte Neto et al. (2011); Tibirica (2001); Araujo et al. (2014)
Neuroactive: yangambin-like component exhibited anxiolytic properties	Mullally et al. (2016)
Antiparasitic: anti- <i>Leishmania</i>	Monte et. al. (2007); Monte Neto et al. (2011); Marquele-Oliveira et al. (2016)
Alkaloids	
Bioactive alkaloids are widespread in the Magnoliales and Laurales: liriodenine and magnoflorine are of particular interest	
Cytotoxic activity: quinoline alkaloids i.e. liriodenine, magnoflorine, languinosine and anonaine	Duke & Ayensu (1985); Mohamed et al. (2010); Graziose et al. (2011); Poivre & Duez (2017)
Antibacterial: magnocurarine and magnoflorine	
Antimalarial (antiplasmodial) activity (<i>Liriodendron tulipifera</i>): asimilobine, norushinsunine, norglaucine, liriodenine, anonaine and oxoglaucine, also leaf sesquiterpene lactones	See also Hernandia et al. (Chapter 6)
Antiplasmodial (<i>Michelia figo</i>): magnoline, magnolamine	Kumar et al. (2012)
Renoprotective: magnoline has a protective action on kidney function in diabetic animals	Zhou et al. (2013); Zhao et al. (2016)
Liriodenine:	
genera <i>Liriodendron</i> , <i>Magnolia</i> and <i>Michelia</i> ; also the	

Lauraceae, Annonaceae and the Sacred Lotus, <i>Nelumbo nucifera</i>	
Antimicrobial: antibacterial and antifungal; potential clinical use as an antibacterial agent; active against Gram (+ve) and Gram (-)ve bacteria; anti- <i>Staphylococcus</i> (<i>S. epidermis</i>); also anti- <i>Mycobacterial</i> (<i>M. phlei</i>) potential	Hufford et al. (1980); Villar et al. (1987); Rios et al. (1989); Neuwigner (1996); Khan et al. (2002); Rahman et al. (2005); Costa et al. (2010); Mollataghi et al. (2012); Costa et al. (2013); Chen et al. (2013a); Nugraha et al. (2019)
Antibacterial: antibiofilm against <i>Yersinia enterocolitica</i> responsible for food poisoning (undercooked pork, sausages)	Di Marco et al. (2020)
Antifungal: active against plant pathogens <i>Rhizopus stolonifer</i> and <i>Aspergillus glaucus</i> ; active on systemic fungal infections eg. <i>Cryptococcus</i> , <i>Paracoccidioides</i> , <i>Candida</i> yeasts; anti- <i>Candida</i> (liriodenine methiodide); ineffective against <i>Aspergillus fumigatus</i>	Clark et al. (1987); Pabuccuoglu et al. (1991); Khan et al. (2002); De la Cruz-Chacon et al. (2011); Tripathi et al. (2017); Vinche et al. (2020)
Anti-inflammatory and analgesic (cited as liriodendrin), potential use in colitis	Jung et al. (2003); Zhang et al. (2017d)
Cardiovascular system: vasorelaxant; cardioprotective anti-ischaemic, anti-arrhythmic, antiplatelet and antioxidant	Chulia et al. (1995); Chang et al. (1996); Chen et al. (1996); Chang et al. (2001); Pyo et al. (2003); Chang et al. (2004b)
Neurological: CNS sedative and dopamine-regulation properties; antidepressant and anti-Parkinson's potential; contribute to antidepressant activity of various herbs eg. <i>Annona cherimolia</i>	Jin et al. (2007); Fazel Nabavi et al. (2016); Perviz et al. (2016); Martinez-Vazquez et al. (2012)
Neuroprotective: MAO-A and cholinesterase inhibition with potential for neurodegenerative disorders eg. anti-Alzheimer's potential	Lorenzo et al. (2017); Cavallaro et al. (2020)
Cosmetic: skin whitening (anti-melanogenic) potential	Chu et al. (2015)
Antiparasitic: antiplasmodial (antimalarial potential), anti-trypanosoma, anti- <i>Leishmania</i> ; active against <i>Toxoplasma gondii</i> and <i>Hymenolepis nana</i> (anthelmintic)	Waechter et al. (1999); Camacho et al. (2000); Mbah et al. (2004); Costa et al. (2006 & 2011); Graziose et al. (2011); Ferreira et al. (2012); Lin et al. (2014b); Gontijo et al. (2019)
Anticancer: antitumour and cytotoxic with a wide spectrum of activity against cancer cell lines i.e. leukaemia, fibrosarcoma, melanoma, colon, nasopharyngeal, lung, kidney cancer; recent studies also show activity against breast, ovarian, throat and liver cancers	Neuwigner (1996); Goren et al. (2003); Chang et al. (2004a); Khamis et al. (2004); Hsieh et al. (2005); Li et al. (2009); Yang et al. (2009a); Chiu et al. (2012); Chan et al. (2014); Li et al. (2015b); Nordin et al. (2015);

	Singh et al. (2016); Li et al. (2017b); Anantachoke et al. (2020); Deng et al. (2021)
Drug bioactivity (synergist): metal complexes (gold, platinum, manganese, zinc, copper, iron): show enhanced anticancer activity	Liu et al. (2009); Chen et al. (2009b, 2012b & 2013b); Li et al. (2014b)
Anticancer: enhance radiosensitivity of oesophageal cancer cells	Wu et al. (2018)
Magnoflorine:	
genus <i>Magnolia</i> : <i>M. officinalis</i> (0.0075mg/g), <i>M. grandiflora</i> (0.0033 mg/g); high levels in <i>Phellodendron amurense</i> (1.05mg/g)	Xu et al. (2020b)
Bioavailability: magnoflorine has low bioavailability and high absorption and elimination rates, although other herbal compounds such as berberine (e.g. <i>Coptis chinensis</i> , <i>Phellodendron amurense</i>) can and increase bioavailability (ie. reduce the absorption and removal rates); toxicity studies are favourable suggesting non-toxic cellular effects	Xue et al. (2017); Okon et al. (2020a); Xu et al. (2020b)
Bioavailability: phospholipid complexes can improve penetration	Xu et al. (2020b)
Antioxidant: strong activity and cellular protective potential	Sakumoto et al. (2015); Okon et al. (2020a); Xu et al. (2020b)
Antimicrobial: antibacterial eg. active against <i>Salmonella</i> and <i>S. aureus</i> ; antifungal with activity against diverse fungi (eg. <i>Penicillium</i>) including dermatophytes (eg. <i>Trichophyton</i>)	Chen et al. (2009a); Okon et al. (2020a); Xu et al. (2020b); Luo et al. (2021)
Anti-Candida: good activity; synergistic with miconazole	Kim et al. (2018); Okon et al. (2020a)
Antiviral: active against polio virus and HSV-1; anti SARS-CoV-2 potential	Okon et al. (2020a); Alagu Lakshmi et al. (2021); Manne et al. (2021)
Immunomodulatory: anti-inflammatory and immune supportive; anti-allergy; immune suppressive	Ahmad et al. (2016 & 2018); Haque et al. (2018); Okon et al. (2020a); Xu et al. (2020b)
Eye: anti-cataract (aldose reductase inhibition); immunomodulatory (<i>Tinospora cordifolia</i>); potential for prevention of diabetic retinopathy (synergistic component <i>Berberis dictyophylla</i>)	Jung et al. (2008); Patel & Mishra (2012); Li et al. (2021d)
Skin: anti-inflammatory skin inflammation (atopic dermatitis)	Wu et al. (2020a)
Cosmetic: skin whitening properties	Li & Wang (2014)
Respiratory tract: anti-inflammatory, antioxidant against acute lung injury	Guo et al. (2018)

Musculoskeletal function: anti-osteoporosis potential; promote bone regeneration and prevent intervertebral disc degeneration, also cartilage degeneration in osteoarthritis (with hyaluronic acid); prevent bone loss around implants reducing inflammation and normalising bone functions	Cai et al. (2018); Sun et al. (2020b); Okon et al. (2020a); Zhao et al. (2021)
Musculoskeletal: prevent muscle wasting eg. in diabetes	Lee et al. (2017); Yadav et al. (2021)
Metabolic function: antidiabetic, hypoglycaemic with good clinical potential; antidiabetic component in various herbal medicines(<i>Coptis</i> rhizome, <i>Tinospora cordifolia</i>);	Patel & Mishra (2011); Tian et al. (2014); Choi et al. (2015c); Xiong et al. (2016); Khanal et al. (2019); Okon et al. (2020a); Xu et al. (2020b); Yadav et al. (2021)
Metabolic function: anti-obesity, cholesterol lowering (synergist potential in herbal medicine complexes)	Choi et al. (2014); Okon et al. (2020a)
Kidney function: renoprotective anti-inflammatory anti-fibrotic in diabetic nephropathy; contribute to nephroprotective activity of various herbs (eg. <i>Tinospora cordifolia</i>)	Gupta & Sharma (2011); Chan et al. (2020a)
Liver function: hepatoprotective; potential for treating fatty liver (steatosis) (<i>Coptis</i> rhizome)	Okon et al. (2020a)
Cardiovascular system: little direct effect on heart function; cardioprotective potential; hypotensive, anti-arrhythmic; benefit cholesterol levels and atherosclerosis (<i>Coptis</i> rhizome)	Hung et al. (2007a & 2007b); Tan et al. (2016); Okon et al. (2020); Xu et al. (2020b)
Neurological function: marked activity of central nervous system; neuromuscular blocking, sedative and anxiolytic; cholinesterase inhibition; ability to cross the blood-brain barrier with benefits for memory e.g. anti-dementia, anti-amnesia, properties	de la Pena et al. (2013); Kukula-Koch et al. (2017); Okon et al. (2020aa); Xu et al. (2020b); Naldi et al. (2021)
Anti-depressant: improved bioavailability across blood-brain barrier in phospholipid complex	Yamahara (1976); Li et al. (2019); Okon et al. (2020a)
Anticancer: important antitumour component of herbal medicines (eg. <i>Coptidis</i> rhizome, <i>Tinospora cordifolia</i>) activity appears to be synergistic with other components in herbal extracts; active against various cancer cell lines ie. cervix, liver, brain, oral, ovarian; also active in gastric, lung, breast glioma and rhabdomyosarcoma cancers	Mohamed et. al. (2010); Okon et al. (2020a & 2020b); Sun et al. (2020a)
Cancer (synergist): increase sensitivity to cisplatin chemotherapy with combined therapy showing promise for the treatment of some types of bone, breast, lung cancers, rhabdomyosarcoma and glioblastoma.	Okon et al. (2020c); Wang et al. (2020e)
Cancer (synergist): enhance doxorubicin activity against	Wei et al. (2020); Okon et al.

breast cancer cells and reduce side effects of chemotherapy	(2020a); Xu et al. (2020b)
Insecticide: insect antifeedant	Tringali et al. (2001)
Coumarin:	
Scoparone:	
genera <i>Magnolia</i> and <i>Liriodendron</i> ; also present in numerous medicinal herbs, particularly in the genus <i>Artemisia</i> - and the Mexican Tarragon, <i>Tagetes lucida</i>	
Antioxidant, analgesic and antipyretic: significant benefits for liver function, asthma, allergy, diabetes and the cardiovascular system	Hoult & Paya (1996); Cespedes et al. (2006); Choi & Yan (2009); Witaicenis et al. (2014); Wang et al. (2017a)
Antimicrobial: antifungal, antibacterial (against <i>Vibrio cholerae</i>)	Simonsen et al. (2004); Cespedes et al. (2006)
Antifungal: natural defensive chemical; protective effect in Citrus fruits against <i>Penicillium</i> mould contamination (citrus green mould)	Arras et al. (2005); Ballester et al. (2013); Sanzani et al. (2014)
Antiviral: potential use for eradication of latent HIV infection	Kuo et al. (2011); Li et al. (2016b)
Anti-inflammatory: anti-arthritic potential	Jang et al. (2005); Lu et al. (2018)
Immune and allergy: immunosuppressive, anti-allergy, vasodilatory and anti-inflammatory	Huang et al. (1991); Choi & Yan (2009); Witaicenis et al. (2014)
Cosmetics and skin disorders: UV radioprotective; stimulate skin pigmentation via. melanogenesis	Yang et al. (2006); Kim et al. (2007a); Sourivong et al. (2007)
Hair: support hair growth and quality	Suwanprakorn et al. (2021)
Metabolic disorders: antidiabetic; protective and antifibrotic effect on pancreatic function	Kim et al. (2007); Xu et al. (2016); Wang et al. (2017a); Juang et al. (2020)
Eye disorders: anti-inflammatory benefits for eye function, as well as improving ocular blood flow to help recover eyesight in ischaemic retinopathy	Liu & Chiou (1996); Liu et al. (1997)
Respiratory tract: anti-inflammatory protective effect on lung function; anti-asthmatic; potential for use in allergic rhinitis	Fang et al. (2003); Cheng et al. (2013); Niu et al. (2014)
Kidney function: renoprotective, may help mitigate diabetic renal damage	Kim et al. (2007)
Genitourinary Tract: potential use in male impotence	Choi et al. (2015b & 2017b)
Anticancer: anti-tumour in various cell lines eg. pancreas, prostate, laryngeal cancers	Kielbus et al. (2013); Kim et al. (2013a); Wang et al. (2017a); Li et al. (2021e)
Cardiovascular system: cardioprotective, cardiotonic; anti-cholesterol; anti-hypertensive (vasodilatory, vascular relaxant), anticoagulant; potential for use in cardiac	Sharma (1988); Yamahara et al. (1989); Chen et al. (1994); Huang et al. (1991, 1992 &

fibrosis (anti-fibrotic), vascular restenosis (reduce tissue hyperplasia); anti-ischaemic for damaged cardiac blood supply (eg. heart attack)	1993); Park et al. (2015); Zhang et al. (2016); Choi et al. (2017b); Wang et al. (2017a); Fu et al. (2018); Wan et al. (2018); Jung et al. (2019); Lyu et al. (2021)
Neurological function: anti-inflammatory neuroprotective; promote nerve cell growth; anticonvulsant; influence dopamine levels	Yang et al. (2008b); Yang et al. (2009b); Cho et al. (2016b); Xia et al. (2018)
Liver function: anti-inflammatory, choloretic (enhance secretion of bile acids); hepatoprotective, anti-fibrosis, treatment of hepatitis (<i>Artemisia capillaris</i> , <i>A. scoparia</i>), acute liver injury, fulminant hepatitis, alcohol-induced hepatotoxicity, non-alcoholic fatty liver disease (steatosis)	Yang et al. (2011); Kang et al. (2013); Zhang et al. (2013 & 2014a); Fang et al. (2016); Choi et al. (2017b); Liu & Zhao (2017); Tasdemir et al. (2017); Liu et al. (2019 & 2020d); Cai et al. (2020); Gao et al. (2020); Hui et al. (2020)
Gastrointestinal system: scoparone (and derivatives) show antioxidant, anti-inflammatory and gastroprotective activity	Witaicensis et al. (2014); Son et al. (2015)
Musculoskeletal system: one protective, anti-osteoporosis	Lee & Jang (2015); Lee et al. (2017)
Antiparasitic: moderate activity against <i>Leishmania</i>	Vila-Nova et al. (2013)
Insecticidal: active against mite egg-laying on agricultural crops	Zhou et al. (2021)

Resources:

- Agacayak E, Tunc SY, Icen MS, Alabalik U, Findik FM, Yuksel H, Gul T. (2015). Honokiol decreases intra-abdominal adhesion formation in a rat model. *Gynecologic and Obstetric Investigation*. 79(3):160-7.
- Ahmad W, Jantan I, Kumolosasi E, Bukhari SN. (2016) Standardized extract of *Tinospora crispa* stimulates innate and adaptive immune responses in Balb/c mice. *Food & Function*. 7(3):1380-9.
- Ahmad W, Jantan I, Kumolosasi E, Haque MA, Bukhari SNA. (2018). Immunomodulatory effects of *Tinospora crispa* extract and its major compounds on the immune functions of RAW 264.7 macrophages. *International Immunopharmacology*. 60:141-151
- Ahmed S, Moni DA, Sonawane KD, Paek KY, Shohael AM. (2021) A comprehensive in silico exploration of pharmacological properties, bioactivities and COX-2 inhibitory potential of eleutheroside B from *Eleutherococcus senticosus* (Rupr. & Maxim.) Maxim. *Journal of Biomolecular Structure & Dynamics*. 39(17):6553-6566.
- Ahn J, Um MY, Lee H, Jung CH, Heo SH, Ha TY. (2013) Eleutheroside E, An Active Component of *Eleutherococcus senticosus*, Ameliorates Insulin Resistance in Type 2 Diabetic db/db Mice. *Evidence Based Complementary & Alternative Medicine*. 2013:934183.
- Akagi M, Matsui N, Akae H, Hirashima N, Fukuishi N, Fukuyama Y, Akagi R. (2015). Nonpeptide neurotrophic agents useful in the treatment of neurodegenerative diseases such as Alzheimer's disease. *Journal of Pharmacological Sciences*. 127(2):155-63.
- Alagu Lakshmi S, Shafreen RMB, Priya A, Shunmugiah KP. (2021) Ethnomedicines of Indian origin for combating COVID-19 infection by hampering the viral replication: using structure-based drug discovery approach. *Journal of Biomolecular Structure & Dynamics*. 39(13):4594-4609.
- Albentosa-González L, Jimenez de Oya N, Arias A, Clemente-Casares P, Martin-Acebes MÁ, Saiz JC, Sabariego R, Mas A. (2021) Akt Kinase Intervenes in Flavivirus Replication by Interacting with Viral Protein NS5. *Viruses*. 13(5):896.

- An J, Yang H, Zhang Q, Liu C, Zhao J, Zhang L, Chen B. (2016). Natural products for treatment of osteoporosis: The effects and mechanisms on promoting osteoblast-mediated bone formation. *Life Sciences*. 147:46-58.
- Anamika, Trigun SK. (2021) Sirtuin-3 activation by honokiol restores mitochondrial dysfunction in the hippocampus of the hepatic encephalopathy rat model of ammonia neurotoxicity. *Journal of Biochemical & Molecular Toxicology*. 35(5):e22735.
- Anantachoke N, Lovacharaporn D, Reutrakul V, Michel S, Gaslonde T, Piyachaturawat P, Suksen K, Prabpai S, Nuntasaen N. (2020) Cytotoxic compounds from the leaves and stems of the endemic Thai plant *Mitrephora sirikitiae*. *Pharmaceutical Biology*. 58(1):490-497.
- Araújo CV, Barbosa-Filho JM, Cordeiro RS, Tibiriçá E. (2001) Protective effects of yangambin on cardiovascular hyporeactivity to catecholamines in rats with endotoxin-induced shock. *Naunyn Schmiedeberg's Archives of Pharmacology*. 363(3):267-75.
- Araujo IG, Silva DF, do Carmo de Alustau M, Dias KL, Cavalcante KV, Veras RC, Barbosa-Filho JM, Neto Mdos A, Bendhack LM, de Azevedo Correia N, Almeida de Medeiros I. (2014). Calcium influx inhibition is involved in the hypotensive and vasorelaxant effects induced by yangambin. *Molecules*. 19(5):6863-76.
- Arora S, Singh S, Piazza GA, Contreras CM, Panyam J, Singh AP. (2012). Honokiol: a novel natural agent for cancer prevention and therapy. *Current Molecular Medicine*. 12(10):1244-52.
- Arras G, Dhalwein G, Petretto A, Marceddu S, Loche M, Agabbio M. (2005) Biological and physical approaches to improve induced resistance against green mold of stored citrus fruit. *Communications in Agricultural & Applied Biological Sciences*. 70(3):391-7.
- Aventurado CA, Billones JB, Vasquez RD, Castillo AL. (2020) In Ovo and In Silico Evaluation of the Anti-Angiogenic Potential of Syringin. *Drug Design, Development & Therapy*. 14:5189-5204.
- Bai Y, Song L, Dai G, Xu M, Zhu L, Zhang W, Jing W, Ju W. (2018). Antidepressant effects of magnolol in a mouse model of depression induced by chronic corticosterone injection. *Steroids*. 135:73-78.
- Bai Y, Tohda C, Zhu S, Hattori M, Komatsu K. (2011) Active components from Siberian ginseng (*Eleutherococcus senticosus*) for protection of amyloid β (25-35)-induced neuritic atrophy in cultured rat cortical neurons. *Journal of Natural Medicines*. Jul;65(3-4):417-23.
- Bajpai VK, Alam MB, Quan KT, Ju MK, Majumder R, Shukla S, Huh YS, Na M, Lee SH, Han YK. (2018). Attenuation of inflammatory responses by (+)-syringaresinol via MAP-Kinase-mediated suppression of NF- κ B signaling in vitro and in vivo. *Scientific Reports*. 8(1):9216
- Bala M, Pratap K, Verma PK, Singh B, Padwad Y. (2015) Validation of ethnomedicinal potential of *Tinospora cordifolia* for anticancer and immunomodulatory activities and quantification of bioactive molecules by HPTLC. *Journal of Ethnopharmacology*. 175:131-7.
- Ballester AR, Teresa Lafuente M, González-Candelas L. (2013) Citrus phenylpropanoids and defence against pathogens. Part II: gene expression and metabolite accumulation in the response of fruits to *Penicillium digitatum* infection. *Food Chemistry* 136(1):285-91.
- Banik K, Ranaware AM, Deshpande V, Nalawade SP, Padmavathi G, Bordoloi D, Sailo BL, Shanmugam MK, Fan L, Arfuso F, Sethi G, Kunnumakkara AB. (2019). Honokiol for cancer therapeutics: A traditional medicine that can modulate multiple oncogenic targets. *Pharmacological Research*. 144:192-209
- Baur R, Schuehly W, Sigel E. (2014). Moderate concentrations of 4-O-methylhonokiol potentiate GABAA receptor currents stronger than honokiol. *Biochimica et Biophysica Acta*. 1840(10):3017-21
- Behbehani J, Shreaz S, Irshad M, Karched M. (2017). The natural compound magnolol affects growth, biofilm formation, and ultrastructure of oral *Candida* isolates. *Microbial Pathogenesis*. 113:209-217
- Borgonetti V, Governa P, Biagi M, Galeotti N. (2020) Novel Therapeutic Approach for the Management of Mood Disorders: In Vivo and In Vitro Effect of a Combination of L-Theanine, *Melissa officinalis* L. and *Magnolia officinalis* Rehder & E.H. Wilson. *Nutrients*. 12(6):1803.
- Borgonetti V, Governa P, Manetti F, Miraldi E, Biagi M, Galeotti N. (2021) A honokiol-enriched *Magnolia officinalis* Rehder & E.H. Wilson. bark extract possesses anxiolytic-like activity with neuroprotective effect through the modulation of CB1 receptor. *Journal of Pharmacy & Pharmacology*. 73(9):1161-1168.
- Bu Q, Liu X, Zhu Y, Liu Y, Wang Y. (2014). w007B protects brain against ischemia-reperfusion injury in rats through inhibiting inflammation, apoptosis and autophagy. *Brain Research*. 1558:100-8
- Bui D, Li L, Yin T, Wang X, Gao S, You M, Singh R, Hu M. (2020) Pharmacokinetic and Metabolic Profiling of Key Active Components of Dietary Supplement *Magnolia officinalis* Extract for Prevention against Oral Carcinoma. *Journal of Agricultural & Food Chemistry*. 68(24):6576-6587.
- Bunel V, Antoine MH, Stévigny C, Nortier J, Duez P. (2016). New in vitro insights on a cell death pathway induced by magnolol and honokiol in aristolochic acid tubulotoxicity. *Food and Chemical Toxicology*. 87:77-87
- Cai Y, Zheng Q, Sun R, Wu J, Li X, Liu R. (2020) Recent progress in the study of *Artemisiae Scopariae Herba* (Yin Chen), a promising medicinal herb for liver diseases. *Biomedicine & Pharmacotherapy*. 130:110513
- Cai Z, Feng Y, Li C, Yang K, Sun T, Xu L, Chen Y, Yan CH, Lu WW, Chiu KY. (2018). Magnoflorine with hyaluronic acid gel promotes subchondral bone regeneration and attenuates cartilage degeneration in early osteoarthritis. *Bone*. 116:266-278
- Camacho MR, Kirby GC, Warhurst DC, Croft SL, Phillipson JD. (2000) Oxoaporphine alkaloids and quinones from *Stephania dinklagei* and evaluation of their antiprotozoal activities. *Planta Medica*. 66(5):478-80.

- Cao AH, Vo LT, King RG. (2005). Honokiol protects against carbon tetrachloride induced liver damage in the rat. *Phytotherapy Research*. 19(11):932-7
- Cavallaro V, Murray AP, Pungitore CR, Gutiérrez LJ. (2020) Aporphinoid Alkaloids Derivatives as Selective Cholinesterases Inhibitors: Biological Evaluation and Docking Study. *Molecular Informatics*. 39(11):e1900125.
- Céspedes CL, Avila JG, Martínez A, Serrato B, Calderón-Mugica JC, Salgado-Garciglia R. (2006). Antifungal and antibacterial activities of Mexican Tarragon (*Tagetes lucida*). *Journal of Agricultural and Food Chemistry* 54/10:3521–27.
- Cetin A, Deveci E. (2019). Expression of VEGF and GFAP in a rat model of traumatic brain injury treated with Honokiol: a biochemical and immunohistochemical study. *Folia Morphologica (Warsz)*. 78(4):684-694
- Chan YY, Juang SH, Huang GJ, Liao YR, Chen YF, Wu CC, Chang HT, Wu TS. (2014) The constituents of *Michelia compressa* var. *formosana* and their bioactivities. *International Journal of Molecular Sciences*. 15(6):10926-35.
- Chang GJ, Wu MH, Wu YC, Su MJ. (1996). Electrophysiological mechanisms for antiarrhythmic efficacy and positive inotropy of liriodenine, a natural aporphine alkaloid from *Fissistigma glaucescens*. *British Journal of Pharmacology* 118:1571-83
- Chang H, Chang CY, Lee HJ, Chou CY, Chou TC. (2018a). Magnolol ameliorates pneumonectomy and monocrotaline-induced pulmonary arterial hypertension in rats through inhibition of angiotensin II and endothelin-1 expression. *Phytomedicine*. 51:205-213
- Chang HC, Chang FR, Wu YC, Lai YH. (2004a). Anti-cancer effect of liriodenine on human lung cancer cells. *Kaohsiung Journal of Medical Sciences*. 20(8):365-71.
- Chang KC, Su MJ, Peng YI, Shao CC, Wu YC, Tseng YZ. (2001). Mechanical effects of liriodenine on the left ventricular-arterial coupling in Wistar rats: pressure-stroke volume analysis. *British Journal of Pharmacology*. 133(1):29-36.
- Chang L, Wang Q, Ju J, Li Y, Cai Q, Hao L, Zhou Y. (2020) Magnoflorine Ameliorates Inflammation and Fibrosis in Rats With Diabetic Nephropathy by Mediating the Stability of Lysine-Specific Demethylase 3A. *Frontiers in Physiology*. 11:580406.
- Chang MT, Lee SP, Fang CY, Hsieh PL, Liao YW, Lu MY, Tsai LL, Yu CC, Liu CM. (2018b). Chemosensitizing effect of honokiol in oral carcinoma stem cells via regulation of IL-6/Stat3 signaling. *Environmental Toxicology*. 33(11):1105-1112.
- Chang WL, Chung CH, Wu YC, Su MJ. (2004b). The vascular and cardioprotective effects of liriodenine in ischemia-reperfusion injury via NO-dependent pathway. *Nitric Oxide*. 11(4):307-15.
- Che D, Zhao B, Fan Y, Han R, Zhang C, Qin G, Adams S, Jiang H. (2019) Eleutheroside B increase tight junction proteins and anti-inflammatory cytokines expression in intestinal porcine jejunum epithelial cells (IPEC-J2). *J Animal Physiology & Animal Nutrition (Berl)*. 103(4):1174-1184.
- Chen C, Zhang QW, Ye Y, Lin LG. (2021a) Honokiol: A naturally occurring lignan with pleiotropic bioactivities. *Chinese Journal of Natural Medicine*. 19(7):481-490.
- Chen CH, Chiang CJ, Wu LC, Yang CH, Kuo YJ, Tsai TH. (2015a). In vitro Penetration and in vivo Distribution of Honokiol into the Intervertebral Disc in Rat. *Analytical Sciences*. 31(12):1297-302.
- Chen CH, Hsu FT, Chen WL, Chen JH. (2021f) Induction of Apoptosis, Inhibition of MCL-1, and VEGF-A Expression Are Associated with the Anti-Cancer Efficacy of Magnolol Combined with Regorafenib in Hepatocellular Carcinoma. *Cancers (Basel)*. 13(9):2066.
- Chen CR, Tan R, Qu WM, Wu Z, Wang Y, Urade Y, Huang ZL. (2011a). Magnolol, a major bioactive constituent of the bark of *Magnolia officinalis*, exerts antiepileptic effects via the GABA/benzodiazepine receptor complex in mice. *British Journal of Pharmacology*. 164(5):1534-46.
- Chen CR, Zhou XZ, Luo YJ, Huang ZL, Urade Y, Qu WM. (2012a). Magnolol, a major bioactive constituent of the bark of *Magnolia officinalis*, induces sleep via the benzodiazepine site of GABA(A) receptor in mice. *Neuropharmacology*. 63(6):1191-9
- Chen CY, Chen JY, Chen CC, Chuang WY, Leu YL, Ueng SH, Wei LS, Cheng SF, Hsueh C, Wang TH. (2020b) 2-O-Methylmagnolol, a Magnolol Derivative, Suppresses Hepatocellular Carcinoma Progression via Inhibiting Class I Histone Deacetylase Expression. *Frontiers in Oncology*. 10:1319.
- Chen CY, Wu H-M, Chao W-Y, Lee C-H. (2013a). Review on pharmacological activities of liriodenine. *African Journal of Pharmacy and Pharmacology* 7(18):1067-70.
- Chen F, Zhang H, Du E, Fan Q, Zhao N, Jin F, Zhang W, Guo W, Huang S, Wei J. (2021c) Supplemental magnolol or honokiol attenuates adverse effects in broilers infected with *Salmonella pullorum* by modulating mucosal gene expression and the gut microbiota. *Journal of Animal Science & Biotechnology*. 12(1):87.
- Chen F, Zhang H, Du E, Jin F, Zheng C, Fan Q, Zhao N, Guo W, Zhang W, Huang S, Wei J. (2021d) Effects of magnolol on egg production, egg quality, antioxidant capacity, and intestinal health of laying hens in the late phase of the laying cycle. *Poultry Science*. 100(2):835-843.
- Chen H, Fu W, Chen H, You S, Liu X, Yang Y, Wei Y, Huang J, Rui W. (2019). Magnolol attenuates the inflammation and enhances phagocytosis through the activation of MAPK, NF-κB signal pathways in vitro and in vivo. *Molecular Immunology*. 105:96-106

- Chen HH, Chang PC, Wey SP, Chen PM, Chen C, Chan MH. (2018c). Therapeutic effects of honokiol on motor impairment in hemiparkinsonian mice are associated with reversing neurodegeneration and targeting PPAR γ regulation. *Biomedicine & Pharmacotherapy*. 108:254-262
- Chen HH, Lin SC, Chan MH. (2011b). Protective and restorative effects of magnolol on neurotoxicity in mice with 6-hydroxydopamine-induced hemiparkinsonism. *Neurodegenerative Diseases*. 8(5):364-74
- Chen JH, Du ZZ, Shen YM, Yang YP. (2009a). Aporphine alkaloids from *Clematis parviloba* and their antifungal activity. *Archives of Pharmacal Research*. 32(1):3-5.
- Chen JH, Lin SS, Wang WX, Yuan ST, Shi JS, Jia AQ. (2014b). Magnolol protects neurons against ischemia injury via the downregulation of p38/MAPK, CHOP and nitrotyrosine. *Toxicology and Applied Pharmacology* 279(3):294-302.
- Chen KS, Ko FN, Teng CM, Wu YC. (1996) Antiplatelet and vasorelaxing actions of some aporphinoids. *Planta Medica*. 62(2):133-6.
- Chen L, Hou Q, Feng L, Xin LL, Ma L. (2020c) Inhibitory and protective effect of obovatol against uterine fibroid (leiomyoma) cells. *Pakistan Journal of Pharmaceutical Sciences*. 33(1, Suppl.):281-285.
- Chen L, Li W, Qi D, Lu L, Zhang Z, Wang D. (2018b). Honokiol protects pulmonary microvascular endothelial barrier against lipopolysaccharide-induced ARDS partially via the Sirt3/AMPK signaling axis. *Life Sciences*. 210:86-95.
- Chen L, Wu YT, Gu XY, Xie LP, Fan HJ, Tan ZB, Zhang WT, Chen HM, Li J, Huang GQ, Liu B, Zhou YC, Sun XM. (2021e) Magnolol, a natural aldehyde dehydrogenase-2 agonist, inhibits the proliferation and collagen synthesis of cardiac fibroblasts. *Bioorganic & Medicinal Chemistry Letters*. 43:128045.
- Chen MC, Chen YL, Lee CF, Hung CH, Chou TC. (2015b). Supplementation of Magnolol Attenuates Skeletal Muscle Atrophy in Bladder Cancer-Bearing Mice Undergoing Chemotherapy via Suppression of FoxO3 Activation and Induction of IGF-1. *PLoS One*. 10(11):e0143594.
- Chen PY, Ho DC, Liao YW, Hsieh PL, Lu KH, Tsai LL, Su SH, Yu CC. (2021b) Honokiol inhibits arecoline-induced oral fibrogenesis through transforming growth factor- β /Smad2/3 signaling inhibition. *Journal of the Formosan Medical Association*. 120(11):1988-1993.
- Chen S, Shen J, Zhao J, Wang J, Shan T, Li J, Xu M, Chen X, Liu Y, Cao G. (2020a) Magnolol Suppresses Pancreatic Cancer Development In Vivo and In Vitro via Negatively Regulating TGF- β /Smad Signaling. *Frontiers in Oncology*. 10:597672.
- Chen X, Hao K, Yu X, Huang A, Zhu B, Wang GX, Ling F. (2018a). Magnolol protects Ctenopharyngodon idella kidney cells from apoptosis induced by grass carp reovirus. *Fish and Shellfish Immunology*. 74:426-435
- Chen X, Hu Y, Shan L, Yu X, Hao K, Wang GX. (2017). Magnolol and honokiol from *Magnolia officinalis* enhanced antiviral immune responses against grass carp reovirus in Ctenopharyngodon idella kidney cells. *Fish and Shellfish Immunology*. 63:245-254
- Chen X, Liu Q, Yang J, Kan M, Jin R, Pu T, Yang Y, Xing T, Meng X, Zang H. (2021) Eleutheroside B-loaded poly (lactic-co-glycolic acid) nanoparticles protect against renal fibrosis via Smad3-dependent mechanism. *Phytotherapy Research*. Sep 28.
- Chen YJ, Tsai KS, Chan DC, Lan KC, Chen CF, Yang RS, Liu SH. (2014a). Honokiol, a low molecular weight natural product, prevents inflammatory response and cartilage matrix degradation in human osteoarthritis chondrocytes. *Journal of Orthopaedic Research* 32(4):573-80
- Chen YL, Huang HC, Weng YI, Yu YJ, Lee YT. (1994). Morphological evidence for the antiatherogenic effect of scoparone in hyperlipidaemic diabetic rabbits. *Cardiovascular Research* 28(11):1679-85.
- Chen YL, Lin KF, Shiao MS, Chen YT, Hong CY, Lin SJ. (2001). Magnolol, a potent antioxidant from *Magnolia officinalis*, attenuates intimal thickening and MCP-1 expression after balloon injury of the aorta in cholesterol-fed rabbits. *Basic Research in Cardiology* 96(4):353-63
- Chen YS, Sun R, Chen WL, Yau YC, Hsu FT, Chung JG, Tsai CJ, Hsieh CL, Chiu YM, Chen JH. (2020c) The In Vivo Radiosensitizing Effect of Magnolol on Tumor Growth of Hepatocellular Carcinoma. *In Vivo*. 34(4):1789-1796.
- Chen ZF, Liu YC, Huang KB, Liang H. (2013b) Alkaloid-metal based anticancer agents. *Current Topics in Medicinal Chemistry*. 13(17):2104-15.
- Chen ZF, Liu YC, Liu LM, Wang HS, Qin SH, Wang BL, Bian HD, Yang B, Fun HK, Liu HG, Liang H, Orvig C. (2009b) Potential new inorganic antitumor agents from combining the anticancer traditional Chinese medicine (TCM) liriodenine with metal ions, and DNA binding studies. *Dalton Transactions*. 14;(2):262-72.
- Chen ZF, Liu YC, Peng Y, Hong X, Wang HH, Zhang MM, Liang H. (2012b) Synthesis, characterization, and in vitro antitumor properties of gold(III) compounds with the traditional Chinese medicine (TCM) active ingredient liriodenine. *Journal of Biological Inorganic Chemistry*. 17(2):247-61.
- Cheng G, Hardy M, Zielonka J, Weh K, Zielonka M, Boyle KA, Abu Eid M, McAllister D, Bennett B, Kresty LA, Dwinell MB, Kalyanaraman B. (2020) Mitochondria-targeted magnolol inhibits OXPHOS, proliferation, and tumor growth via modulation of energetics and autophagy in melanoma cells. *Cancer Treatment & Research Communications*. 25:100210.
- Cheng J, Dong S, Yi L, Geng D, Liu Q. (2018). Magnolol abrogates chronic mild stress-induced depressive-like behaviors by inhibiting neuroinflammation and oxidative stress in the prefrontal cortex of mice. *International Immunopharmacology*. 59:61-67.

- Cheng L, Wang Z, Jiang C, Zhang S. (2013) Effect of Scoparone on Th1/Th2 cytokines and IgE in the experimental allergic rhinitis rats. *Lin Chung Er Bi Yan Hou Tou Jing Wai Ke Za Zhi*. 27(23):1310-2. [Chinese].
- Cheng S, Castillo V, Welty M, Eliaz I, Sliva D. (2016). Honokiol inhibits migration of renal cell carcinoma through activation of RhoA/ROCK/MLC signaling pathway. *International Journal of Oncology*. 49(4):1525-1530.
- Cheresh P, Kim SJ, Jablonski R, Watanabe S, Lu Z, Chi M, Helmin KA, Gius D, Budinger GRS, Kamp DW. (2021) SIRT3 Overexpression Ameliorates Asbestos-Induced Pulmonary Fibrosis, mt-DNA Damage, and Lung Fibrogenic Monocyte Recruitment. *International Journal of Molecular Sciences*. 25;22(13):6856.
- Chicca A, Gachet MS, Petrucci V, Schuehly W, Charles RP, Gertsch J. (2015). 4'-O-methylhonokiol increases levels of 2-arachidonoyl glycerol in mouse brain via selective inhibition of its COX-2-mediated oxygenation. *Journal of Neuroinflammation*. 12:89.
- Chilampalli C, Zhang X, Kaushik RS, Young A, Zeman D, Hildreth MB, Fahmy H, Dwivedi C. (2013). Chemopreventive effects of combination of honokiol and magnolol with α -santalol on skin cancer developments. *Drug Discoveries and Therapeutics*. 7(3):109-15
- Chio CC, Tai YT, Mohanraj M, Liu SH, Yang ST, Chen RM. (2018). Honokiol enhances temozolomide-induced apoptotic insults to malignant glioma cells via an intrinsic mitochondrion-dependent pathway. *Phytomedicine*. 49:41-51
- Chiu CC, Chou HL, Wu PF, Chen HL, Wang HM, Chen CY. (2012) Bio-functional constituents from the stems of *Liriodendron tulipifera*. *Molecules*. 17(4):4357-72.
- Chiu KC, Shih YH, Wang TH, Lan WC, Li PJ, Jhuang HS, Hsia SM, Shen YW, Yuan-Chien Chen M, Shieh TM. (2021) In vitro antimicrobial and antipro-inflammation potential of honokiol and magnolol against oral pathogens and macrophages. *Journal of the Formosan Medical Association*. 120(2):827-837.
- Cho DY, Ko HM, Kim J, Kim BW, Yun YS, Park JI, Ganesan P, Lee JT, Choi DK. (2016b). Scoparone Inhibits LPS-Simulated Inflammatory Response by Suppressing IRF3 and ERK in BV-2 Microglial Cells. *Molecules*. 21(12). pii: E1718.
- Cho JH, Lee RH, Jeon YJ, Shin JC, Park SM, Choi NJ, Seo KS, Yoon G, Cho SS, Kim KH, Cho JJ, Cho YS, Kim DH, Hong JT, Lee TH, Park HJ, Jung S, Seo JM, Chen H, Dong Z, Chae JI, Shim JH. (2015a). Role of transcription factor Sp1 in the 4-O-methylhonokiol-mediated apoptotic effect on oral squamous cancer cells and xenograft. *International Journal of Biochemistry and Cell Biology*. 64:287-97
- Cho S, Cho M, Kim J, Kaeberlein M, Lee SJ, Suh Y. (2015b). Syringaresinol protects against hypoxia/reoxygenation-induced cardiomyocytes injury and death by destabilization of HIF-1 α in a FOXO3-dependent mechanism. *Oncotarget*. 6(1):43-55.
- Cho SY, Kim J, Lee JH, Sim JH, Cho DH, Bae IH, Lee H, Seol MA, Shin HM, Kim TJ, Kim DY, Lee SH, Shin SS, Im SH, Kim HR. (2016a). Modulation of gut microbiota and delayed immunosenescence as a result of syringaresinol consumption in middle-aged mice. *Scientific Reports*. 6:39026.
- Cho YS, Song WS, Yoon SH, Park KY, Kim MH. (2018). Syringaresinol suppresses excitatory synaptic transmission and picrotoxin-induced epileptic activity in the hippocampus through presynaptic mechanisms. *Neuropharmacology*. 131:68-82.
- Choi BR, Kim HK, Park JK. (2017b). Penile Erection Induced by Scoparone from *Artemisia capillaris* through the Nitric Oxide-Cyclic Guanosine Monophosphate Signaling Pathway. *World Journal of Mens Health*. 35(3):196-204
- Choi BR, Kumar SK, Zhao C, Zhang LT, Kim CY, Lee SW, Jeon JH, Soní KK, Kim SH, Park NC, Kim HK, Park JK. (2015b). Additive effects of *Artemisia capillaris* extract and scopoletin on the relaxation of penile corpus cavernosum smooth muscle. *International Journal of Impotence Research* 27(6):225-32
- Choi DY, Lee JW, Peng J, Lee YJ, Han JY, Lee YH, Choi IS, Han SB, Jung JK, Lee WS, Lee SH, Kwon BM, Oh KW, Hong JT. (2012b) Obovatol improves cognitive functions in animal models for Alzheimer's disease. *Journal of Neurochemistry*. 20(6):1048-59.
- Choi DY, Lee YJ, Lee SY, Lee YM, Lee HH, Choi IS, Oh KW, Han SB, Nam SY, Hong JT. (2012a). Attenuation of scopalamine-induced cognitive dysfunction by obovatol. *Archives of Pharmacal Research*. 35(7):1279-86
- Choi EJ, Kim HI, Kim JA, Jun SY, Kang SH, Park DJ, Son SJ, Kim Y, Shin OS. (2015a). The herbal-derived honokiol and magnolol enhances immune response to infection with methicillin-sensitive *Staphylococcus aureus* (MSSA) and methicillin-resistant *S. aureus* (MRSA). *Applied Microbiology and Biotechnology*. 99(10):4387-96
- Choi IS, Lee YJ, Choi DY, Lee YK, Lee YH, Kim KH, Kim YH, Jeon YH, Kim EH, Han SB, Jung JK, Yun YP, Oh KW, Hwang DY, Hong JT. (2011) 4-O-methylhonokiol attenuated memory impairment through modulation of oxidative damage of enzymes involving amyloid- β generation and accumulation in a mouse model of Alzheimer's disease. *Journal of Alzheimers Disease*. 27(1):127-41.
- Choi JS, Ali MY, Jung HA, Oh SH, Choi RJ, Kim EJ (2015c). Protein tyrosine phosphatase 1B inhibitory activity of alkaloids from Rhizoma Coptidis and their molecular docking studies. *Journal of Ethnopharmacology*. 171:28-36
- Choi JS, Kim JH, Ali MY, Min BS, Kim GD, Jung HA. (2014) *Coptis chinensis* alkaloids exert anti-adipogenic activity on 3T3-L1 adipocytes by downregulating C/EBP- α and PPAR- γ . *Fitoterapia*. 98:199-208.

- Choi MS, Lee SH, Cho HS, Kim Y, Yun YP, Jung HY, Jung JK, Lee BC, Pyo HB, Hong JT. (2007a) Inhibitory effect of obovatol on nitric oxide production and activation of NF-kappaB/MAP kinases in lipopolysaccharide-treated RAW 264.7 cells. *European Journal of Pharmacology*. 556(1-3):181-9.
- Choi MS, Yoo MS, Son DJ, Jung HY, Lee SH, Jung JK, Lee BC, Yun YP, Pyo HB, Hong JT. (2007b) Increase of collagen synthesis by obovatol through stimulation of the TGF-beta signaling and inhibition of matrix metalloproteinase in UVB-irradiated human fibroblast. *Journal of Dermatological Science* 46(2):127-37.
- Choi NH, Choi GJ, Min BS, Jang KS, Choi YH, Kang MS, Park MS, Choi JE, Bae BK, Kim JC. (2009) Effects of neolignans from the stem bark of *Magnolia obovata* on plant pathogenic fungi. *Journal of Applied Microbiology*. 106(6):2057-63.
- Choi WS, Lee TH, Son SJ, Kim TG, Kwon BM, Son HU, Kim SU, Lee SH. (2017a). Inhibitory effect of obovatol from *Magnolia obovata* on the *Salmonella* type III secretion system. *Journal of Antibiotics (Tokyo)*. 70(11):1065-1069
- Choi YH, Yan GH. (2009). Anti-allergic effects of scoparone on mast cell-mediated allergy model. *Phytomedicine*. 16(12):1089-94.
- Chu CW, Liu CM, Chung MI, Chen CY. (2015). Biofunctional Constituents from *Michelia compressa* var. *lanyuensis* with Anti-Melanogenic Properties. *Molecules*. 20(7):12166-74.
- Chulia S, Noguera MA, Ivorra MD, Cortes D, D'Ocón MP. (1995). Vasodilator effects of liriodenine and norushinsunine, two aporphine alkaloids isolated from *Annona cherimolia*, in rat aorta. *Pharmacology*. 50(6):380-7.
- Clark AM, Watson ES, Ashfaq MK, Hufford CD. (1987) In vivo efficacy of antifungal oxoaporphine alkaloids in experimental disseminated candidiasis. *Pharmaceutical Research*. 4(6):495-8.
- Costa A, Facchini G, Pinheiro ALTA, da Silva MS, Bonner MY, Arbiser J, Eberlin S. (2017). Honokiol protects skin cells against inflammation, collagenolysis, apoptosis, and senescence caused by cigarette smoke damage. *International Journal of Dermatology*. 56(7):754-761
- Costa EV, da Cruz PE, de Lourenço CC, de Souza Moraes VR, de Lima Nogueira PC, Salvador MJ. (2013). Antioxidant and antimicrobial activities of aporphinoids and other alkaloids from the bark of *Annona salzmannii* A. DC. (Annonaceae). *Natural Product Research* 27(11):1002-6.
- Costa EV, Pinheiro ML, Barison A, Campos FR, Salvador MJ, Maia BH, Cabral EC, Eberlin MN. (2010). Alkaloids from the bark of *Guatteria hispida* and their evaluation as antioxidant and antimicrobial agents. *Journal of Natural Products*. 73(6):1180-3.
- Costa EV, Pinheiro ML, de Souza AD, Barison A, Campos FR, Valdez RH, Ueda-Nakamura T, Filho BP, Nakamura CV. (2011). Trypanocidal activity of oxoaporphine and pyrimidine- β -carboline alkaloids from the branches of *Annona foetida* Mart. (Annonaceae). *Molecules*. 16(11):9714-20.
- Costa EV, Pinheiro ML, Xavier CM, Silva JR, Amaral AC, Souza AD, Barison A, Campos FR, Ferreira AG, Machado GM, Leon LL. (2006) A pyrimidine-beta-carboline and other alkaloids from *Annona foetida* with antileishmanial activity. *Journal of Natural Products*. 69(2):292-4.
- Cui Y, Zhang Y, Liu G. (2015). Syringin may exert sleep-potentiating effects through the NOS/NO pathway. *Fundamental and Clinical Pharmacology*. 29(2):178-84.
- Dai R, Niu M, Wang N, Wang Y. (2021) Syringin alleviates ovalbumin-induced lung inflammation in BALB/c mice asthma model via NF- κ B signaling pathway. *Environmental Toxicology*. 36(3):433-444
- De la Cruz-Chacon I. (2011). Liriodenine, early antimicrobial defence in *Annona diversifolia*. *Zeitschrift für Naturforschung C*. 66(7-8):377-84.
- de la Pena JB, Lee HL, Yoon SY, Kim GH, Lee YS, Cheong JH. (2013). The involvement of magnoflorine in the sedative and anxiolytic effects of *Sinomeni* Caulis et rhizoma in mice. *Journal of Natural Medicines*. 67/4:814-21
- Deb A, Andrews NG, Raghavan V. (2020) Honokiol-camptothecin loaded graphene oxide nanoparticle towards combinatorial anti-cancer drug delivery. *IET Nanobiotechnology*. 14(9):796-802.
- Deng F, Hu W, Chen H, Tang Y, Zhang L. (2018b). Development of a Chitosan-based Nanoparticle Formulation for Ophthalmic Delivery of Honokiol. *Current Drug Delivery*. 15(4):594-600.
- Deng S, Zhang C, Yang L, Ma L. (2019). Formylated honokiol analogs showed antitumor activity against lung carcinoma. *Anticancer Drugs*. 30(8):795-802.
- Deng Y, Ding T, Deng L, Hao X, Mu S. (2021) Active constituents of *Zanthoxylum nitidum* from Yunnan Province against leukaemia cells in vitro. *BMC Chem*. 15(1):44.
- Deng Y, Han X, Tang S, Li C, Xiao W, Tan Z. (2018a). Magnolol and Honokiol Attenuate Apoptosis of Enterotoxigenic Escherichia Coli-Induced Intestinal Epithelium by Maintaining Secretion and Absorption Homeostasis and Protecting Mucosal Integrity. *Medical Science Monitor*. 24:3348-3356.
- Deng Y, Han X, Tang S, Li C, Xiao W, Tan Z. (2018c). Magnolol and Honokiol Attenuate Apoptosis of Enterotoxigenic Escherichia Coli-Induced Intestinal Epithelium by Maintaining Secretion and Absorption Homeostasis and Protecting Mucosal Integrity. *Medical Science Monitor*. 24:3348-3356.
- Deng Y, Han X, Tang S, Xiao W, Tan Z, Zhou C, Wang M, Kang J. (2015). Magnolol and honokiol regulate the calcium-activated potassium channels signaling pathway in Enterotoxigenic *Escherichia coli*-induced diarrhea mice. *European Journal of Pharmacology*. 755:66-73.
- Di Marco NI, Pungitore CR, Lucero-Estrada CSM. (2020) Aporphinoid alkaloids inhibit biofilm formation of *Yersinia enterocolitica* isolated from sausages. *Journal of Applied Microbiology*. 129(4):1029-1042.

- Ding Y, Song Z, Li H, Chang L, Pan T, Gu X, He X, Fan Z. (2019). Honokiol Ameliorates High-Fat-Diet-Induced Obesity of Different Sexes of Mice by Modulating the Composition of the Gut Microbiota. *Frontiers in Immunology*. 10:280
- Ding Y, Zhang L, Yao X, Zhang H, He X, Fan Z, Song Z. (2021) Honokiol Alleviates High-Fat Diet-Induced Obesity of Mice by Inhibiting Adipogenesis and Promoting White Adipose Tissue Browning. *Animals (Basel)*. 11(6):1493.
- Dong J, Ding H, Liu Y, Yang Q, Xu N, Yang Y, Ai X. (2017). Magnolol protects channel catfish from *Aeromonas hydrophila* infection via inhibiting the expression of aerolysin. *Veterinary Microbiology*. 211:119-123.
- Dong Z, Qiu H, Han M, Wang R, Guo Y, Wang X. (2021) Honokiol-Based Nanomedicine Decorated with Ethylene Glycols Derivatives Promotes Antitumor Efficacy. *Journal of Biomedical Nanotechnology*. 17(8):1564-1573.
- Duan M, Du X, Ren G, Zhang Y, Zheng Y, Sun S, Zhang J. (2018) Obovatol inhibits the growth and aggressiveness of tongue squamous cell carcinoma through regulation of the EGF-mediated JAK-STAT signaling pathway. *Molecular Medicine Reports*. 18(2):1651-1659.
- Duke JA, Ayensu ES. (1985). *Medicinal Plants of China*. Reference Publications, Algonac, MI.
- Elfeky MG, Mantawy EM, Gad AM, Fawzy HM, El-Demerdash E. (2020). Mechanistic aspects of antifibrotic effects of honokiol in Con A-induced liver fibrosis in rats: Emphasis on TGF- β /SMAD/MAPK signaling pathways. *Life Sciences*. 240:117096.
- Elhabak M, Osman R, Mohamed M, El-Borady OM, Awad GAS, Mortada N. (2020) Near IR responsive targeted integrated lipid polymer nanoconstruct for enhanced magnolol cytotoxicity in breast cancer. *Scientific Reports*. 10(1):8771.
- Emran AA, Chinna Chowdary BR, Ahmed F, Hammerlindl H, Huefner A, Haass NK, Schuehly W, Schaidler H. (2019). Magnolol induces cell death through PI3K/Akt-mediated epigenetic modifications boosting treatment of BRAF- and NRAS-mutant melanoma. *Cancer Medicine*. Feb 21
- Fan Y, Xue W, Schachner M, Zhao W. (2018). Honokiol Eliminates Glioma/Glioblastoma Stem Cell-Like Cells Via JAK-STAT3 Signaling and Inhibits Tumor Progression by Targeting Epidermal Growth Factor Receptor. *Cancers (Basel)*. 11(1):22
- Fang CY, Chen SJ, Wu HN, Ping YH, Lin CY, Shiuan D, Chen CL, Lee YR, Huang KJ. (2015). Honokiol, a Lignan Biphenol Derived from the Magnolia Tree, Inhibits Dengue Virus Type 2 Infection. *Viruses*. 7(9):4894-910.
- Fang H, Zhang A, Yu J, Wang L, Liu C, Zhou X, Sun H, Song Q, Wang X. (2016). Insight into the metabolic mechanism of scoparone on biomarkers for inhibiting Yanghuang syndrome. *Scientific Reports*. 6:37519.
- Fang JY, Huang TH, Hung CF, Huang YL, Aljuffali IA, Liao WC, Lin CF. (2018). Derivatization of honokiol by integrated acetylation and methylation for improved cutaneous delivery and anti-inflammatory potency. *European Journal of Pharmaceutical Sciences*. 114:189-198.
- Fang Y, Li Z, Watanabe Y. (2003). Pharmacokinetics of a novel anti-asthmatic, scoparone, in the rabbit serum assessed by a simple HPLC method. *Journal of Ethnopharmacology*. 86(1):127-30.
- Fazel Nabavi S, Uriarte E, Rastrelli L, Modak B, Sobarzo-Sánchez E. (2016) Aporphines and Parkinson's Disease: Medical Tools for the Future. *Current Topics in Medicinal Chemistry*. 16(17):1906-9.
- Fei WY, Huo Q, Zhao PQ, Qin LJ, Li T. (2019). Magnolol prevents ovariectomy-induced bone loss by suppressing osteoclastogenesis via inhibition of the nuclear factor- κ B and mitogen-activated protein kinase pathways. *International Journal of Molecular Medicine*. 43(4):1669-1678.
- Ferreira RA, de Oliveria AB, Gualberto SA, Miguel Del Corral JM, Fujiwara RT, Gazzinelli Guimarães PH, de Almeida Vitor RW. (2012). New naphthoquinones and an alkaloid with in vitro activity against *Toxoplasma gondii* RH and EGS strains. *Experimental Parasitology*. 132(4):450-7.
- Fu B, Su Y, Ma X, Mu C, Yu F. (2018). Scoparone attenuates angiotensin II-induced extracellular matrix remodeling in cardiac fibroblasts. *Journal of Pharmacological Sciences*. 137(2):110-115
- Gao X, Patel MG, Bakshi P, Sharma D, Banga AK. (2018). Enhancement in the Transdermal and Localized Delivery of Honokiol Through Breast Tissue. *AAPS PharmSciTech*. 19(8):3501-3511.
- Gao Y, Xi B, Li J, Li Z, Xu J, Zhong M, Xu Q, Lian Y, Wei R, Wang L, Cao H, Jin L, Zhang K, Dong J. (2020) Scoparone alleviates hepatic fibrosis by inhibiting the TLR-4/NF- κ B pathway. *Journal of Cellular Physiology*. Oct 8.
- Gertsch J, Anavi-Goffer S. (2012) Methylhonokiol attenuates neuroinflammation: a role for cannabinoid receptors? *Journal of Neuroinflammation*. 9:135.
- Gong X, Zhang L, Jiang R, Wang CD, Yin XR, Wan JY. (2014). Hepatoprotective effects of syringin on fulminant hepatic failure induced by D-galactosamine and lipopolysaccharide in mice. *Journal of Applied Toxicology*. 34(3):265-71.
- Gontijo DC, Nascimento MFAD, Brandão GC, Oliveira AB. (2019). Phytochemistry and antiplasmodial activity of *Xylopi sericea* leaves. *Natural Product Research*. Feb 27:1-5.
- Gören AC, Zhou BN, Kingston DG. (2003) Cytotoxic and DNA damaging activity of some aporphine alkaloids from *Stephania dinklagei*. *Planta Medica*. 69(9):867-8.
- Graziose R, Rathinasabapathy T, Lategan C, Poulev A, Smith PJ, Grace M, Lila MA, Raskin I. (2011). Antiplasmodial activity of aporphine alkaloids and sesquiterpene lactones from *Liriodendron tulipifera* L. *Journal of Ethnopharmacology*. 133(1):26-30.

- Guillermo-Lagae R, Santha S, Thomas M, Zoelle E, Stevens J, Kaushik RS, Dwivedi C. (2017). Antineoplastic Effects of Honokiol on Melanoma. *Biomed Research International*. 2017:5496398.
- Guo C, Ma L, Zhao Y, Peng A, Cheng B, Zhou Q, Zheng L, Huang K. (2015). Inhibitory effects of magnolol and honokiol on human calcitonin aggregation. *Scientific Reports*. 5:13556.
- Guo JW, Cheng YP, Liu CY, Thong HY, Lo Y, Wu CY, Jee SH. (2021b) Magnolol may contribute to barrier function improvement on imiquimod-induced psoriasis-like dermatitis animal model via the downregulation of interleukin-23. *Experimental & Therapeutic Medicine*. 21(5):448.
- Guo JW, Chien CC, Chen JH. (2020) CYP3A Excipient-Based Microemulsion Prolongs the Effect of Magnolol on Ischemia Stroke Rats. *Pharmaceutics*. 12(8):737.
- Guo S, Jiang K, Wu H, Yang C, Yang Y, Yang J, Zhao G, Deng G. (2018). Magnoflorine Ameliorates Lipopolysaccharide-Induced Acute Lung Injury via Suppressing NF- κ B and MAPK Activation. *Frontiers in Pharmacology*. 9:982.
- Guo S, Xu JJ, Wei N, Han JY, Xue R, Xu PS, Gao CY. (2019). Honokiol Attenuates the Memory Impairments, Oxidative Stress, Neuroinflammation, and GSK-3 β Activation in Vascular Dementia Rats. *Journal of Alzheimers Disease*. 71(1):97-108
- Guo Y, Hou E, Wen T, Yan X, Han M, Bai LP, Fu X, Liu J, Qin S. (2021a) Development of Membrane-Active Honokiol/Magnolol Amphiphiles as Potent Antibacterial Agents against Methicillin-Resistant *Staphylococcus aureus* (MRSA). *Journal of Medicinal Chemistry*. 64(17):12903-12916.
- Gupta R, Sharma V. (2011) Ameliorative effects of *Tinospora cordifolia* root extract on histopathological and biochemical changes induced by aflatoxin-b(1) in mice kidney. *Toxicology International*. 18(2):94-8.
- Han H, Jung JK, Han SB, Nam SY, Oh KW, Hong JT. (2011). Anxiolytic-like effects of 4-O-methylhonokiol isolated from *Magnolia officinalis* through enhancement of GABAergic transmission and chloride influx. *Journal of Medicinal Food*. 14(7-8):724-31
- Han HK, Van Anh LT. (2012). Modulation of P-glycoprotein expression by honokiol, magnolol and 4-O-methylhonokiol, the bioactive components of *Magnolia officinalis*. *Anticancer Research* 32(10):4445-52.
- Han JY, Ahn SY, Yoo JH, Nam SY, Hong JT, Oh KW. (2015). Alleviation of kainic acid-induced brain barrier dysfunction by 4-o-methylhonokiol in in vitro and in vivo models. *Biomed Research International*. 2015:893163.
- Han M, Yu X, Guo Y, Wang Y, Kuang H, Wang X. (2014). Honokiol nanosuspensions: preparation, increased oral bioavailability and dramatically enhanced biodistribution in the cardio-cerebro-vascular system. *Colloids and Surfaces B: Biointerfaces*. 116:114-20
- Haque MA, Jantan I, Harikrishnan H, Abdul Wahab SM. (2018). Magnoflorine Enhances LPS-Activated Pro-Inflammatory Responses via MyD88-Dependent Pathways in U937 Macrophages. *Planta Medica*. 84(17):1255-1264.
- He C, Chen X, Zhao C, Qie Y, Yan Z, Zhu X. (2014) Eleutheroside E ameliorates arthritis severity in collagen-induced arthritis mice model by suppressing inflammatory cytokine release. *Inflammation*. 37(5):1533-43.
- Ho JH, Hong CY. (2012). Cardiovascular protection of magnolol: cell-type specificity and dose-related effects. *Journal of Biomedical Science*. 19:70
- Hoi CP, Ho YP, Baum L, Chow AH. (2010). Neuroprotective effect of honokiol and magnolol, compounds from *Magnolia officinalis*, on beta-amyloid-induced toxicity in PC12 cells. *Phytotherapy Research*. 24(10):1538-42.
- Hong T, Min H, Hui Z, Yuejian L, Lixing Y, Liang XZ. (2018). Oral administration of honokiol attenuates airway inflammation in asthmatic mouse model. *Pakistan Journal of Pharmaceutical Science*. 31(4):1279-1284.
- Hossin AY, Inafuku M, Takara K, Nugara RN, Oku H. (2021) Syringin: A Phenylpropanoid Glycoside Compound in *Cirsium brevicaulis* A. GRAY Root Modulates Adipogenesis. *Molecules*. 26(6):1531.
- Hoult JR, Payá M. (1996). Pharmacological and biochemical actions of simple coumarins: natural products with therapeutic potential. *General Pharmacology*. 27(4):713-22.
- Hsiao YP, Chen HT, Liang YC, Wang TE, Huang KH, Hsu CC, Liang HJ, Huang CH, Jan TR. (2020) Development of Nanosome-Encapsulated Honokiol for Intravenous Therapy Against Experimental Autoimmune Encephalomyelitis. *International Journal of Nanomedicine*. 15:17-29.
- Hsieh TJ, Liu TZ, Chern CL, Tsao DA, Lu FJ, Syu YH, Hsieh PY, Hu HS, Chang TT, Chen CH. (2005). Liriodenine inhibits the proliferation of human hepatoma cell lines by blocking cell cycle progression and nitric oxide-mediated activation of p53 expression. *Food and Chemical Toxicology*. 43(7):1117-26.
- Hsu CC, Chen LF, Lin MT, Tian YF. (2014). Honokiol Protected against Heatstroke-Induced Oxidative Stress and Inflammation in Diabetic Rats. *International Journal of Endocrinology*. 2014:134575.
- Hu Y, Shen Y, Tu X, Wu X, Wang GX, Ling F. (2019a). Isolation of anti-*Saprolegnia* lignans from *Magnolia officinalis* and SAR evaluation of honokiol/magnolol analogs. *Bioorganic & Medicinal Chemistry Letters*. 29(3):389-395.
- Hu Z, Bian X, Liu X, Zhu Y, Zhang X, Chen S, Wang K, Wang Y. (2012). Honokiol protects brain against ischemia-reperfusion injury in rats through disrupting PSD95-nNOS interaction. *Brain Research*. 1491:204-12.
- Hu ZC, Luo ZC, Jiang BJ, Fu X, Xuan JW, Li XB, Bian YJ, Ni WF, Xue JX. (2019b). The Protective Effect of Magnolol in Osteoarthritis: In vitro and in vivo Studies. *Frontiers in Pharmacology*. 10:393

- Huang F, Zhang RY, Song L. (2017a). Beneficial effect of magnolol on lupus nephritis in MRL/lpr mice by attenuating the NLRP3 inflammasome and NF- κ B signaling pathway: A mechanistic analysis. *Molecular Medicine Reports*. 16(4):4817-4822.
- Huang HC, Chu SH, Chao PD. (1991). Vasorelaxants from Chinese herbs, emodin and scoparone, possess immunosuppressive properties. *European Journal of Pharmacology*. 198 (2-3):211-3.
- Huang HC, Lee CR, Weng YI, Lee MC, Lee YT. (1992). Vasodilator effect of scoparone (6,7-dimethoxycoumarin) from a Chinese herb. *European Journal of Pharmacology*. 218(1):123-8.
- Huang HC, Weng YI, Lee CR, Jan TR, Chen YL, Lee YT. (1993). Protection by scoparone against the alterations of plasma lipoproteins, vascular morphology and vascular reactivity in hyperlipidaemic diabetic rabbit. *British Journal of Pharmacology*. 110(4):1508-14.
- Huang L, Zhang K, Guo Y, Huang F, Yang K, Chen L, Huang K, Zhang F, Long Q, Yang Q. (2017b). Honokiol protects against doxorubicin cardiotoxicity via improving mitochondrial function in mouse hearts. *Scientific Reports*. 7(1):11989.
- Huang L, Zhao H, Huang B, Zheng C, Peng W, Qin L. (2011c) *Acanthopanax senticosus*: review of botany, chemistry and pharmacology. *Pharmazie*. 66(2):83-97.
- Huang LZ, Huang BK, Ye Q, Qin LP. (2011b) Bioactivity-guided fractionation for anti-fatigue property of *Acanthopanax senticosus*. *Journal of Ethnopharmacology*. 133(1):213-9.
- Huang LZ, Wei L, Zhao HF, Huang BK, Rahman K, Qin LP. (2011a) The effect of Eleutheroside E on behavioral alterations in murine sleep deprivation stress model. *European Journal of Pharmacology*. 658(2-3):150-5.
- Huang PP, Fu J, Liu LH, Wu KF, Liu HX, Qi BM, Liu Y, Qi BL. (2020a). Honokiol antagonizes doxorubicin-induced cardiomyocyte senescence by inhibiting TXNIP-mediated NLRP3 inflammasome activation. *International Journal of Molecular Medicine*. 45(1):186-194.
- Huang Q, Han L, Lv R, Ling L. (2019). Magnolol exerts anti-asthmatic effects by regulating Janus kinase-signal transduction and activation of transcription and Notch signaling pathways and modulating Th1/Th2/Th17 cytokines in ovalbumin-sensitized asthmatic mice. *Korean Journal of Physiology & Pharmacology*. 23(4):251-261
- Huang SY, Tai SH, Chang CC, Tu YF, Chang CH, Lee EJ. (2018). Magnolol protects against ischemic-reperfusion brain damage following oxygen-glucose deprivation and transient focal cerebral ischemia. *International Journal of Molecular Medicine* 41(4):2252-2262
- Huang W, Liu H, Li Y, Mai G. (2020b) The Effects of Rhein and Honokiol on Metabolic Profiles in a Mouse Model of Acute Pancreatitis. *Medical Science Monitor*. 26:e925727.
- Hufford CD, Sharma AS, Oguntimein BO. (1980) Antibacterial and antifungal activity of liriodenine and related oxoaporphine alkaloids. *Journal of Pharmaceutical Sciences*. 69(10):1180-3.
- Hui Y, Wang X, Yu Z, Fan X, Cui B, Zhao T, Mao L, Feng H, Lin L, Yu Q, Zhang J, Wang B, Chen X, Zhao X, Sun C. (2020) Scoparone as a therapeutic drug in liver diseases: Pharmacology, pharmacokinetics and molecular mechanisms of action. *Pharmacological Research*. 160:105170.
- Hung TM, Lee JP, Min BS, Choi JS, Na M, Zhang X, Ngoc TM, Lee I, Bae K. (2007b). Magnoflorine from *Coptidis Rhizoma* protects high density lipoprotein during oxidant stress. *Biological and Pharmaceutical Bulletin*. 30(6):1157-60.
- Hung TM, Na M, Min BS, Zhang X, Lee I, Ngoc TM, Thuong PT, Sok DE, Bae K. (2007a). Protective effect of magnoflorine isolated from *Coptidis rhizoma* on Cu²⁺-induced oxidation of human low density lipoprotein. *Planta Medica*. 73(12):1281-4.
- Hwang EI, Kwon BM, Lee SH, Kim NR, Kang TH, Kim YT, Park BK, Kim SU. (2002) Obovatols, new chitin synthase 2 inhibitors of *Saccharomyces cerevisiae* from *Magnolia obovata*. *Journal of Antimicrobial Chemotherapy*. 49(1):95-101.
- Hyun S, Kim MS, Song YS, Bak Y, Ham SY, Lee DH, Hong J, Yoon DY. (2015). The peroxisome proliferator-activated receptor-gamma agonist 4-O-methylhonokiol induces apoptosis by triggering the intrinsic apoptosis pathway and inhibiting the PI3K/Akt survival pathway in SiHa human cervical cancer cells. *Journal of Microbiology and Biotechnology*. 25(3):334-42.
- Im AR, Song JH, Lee MY, Chae S. (2015). Magnolol reduces UVB-induced photodamage by regulating matrix metalloproteinase activity. *Environmental Toxicology and Pharmacology*. 39(1):417-23
- Imtiyaz Z, Lin YT, Cheong UH, Jassey A, Liu HK, Lee MH. (2020) Compounds isolated from *Euonymus spraguei* Hayata induce ossification through multiple pathways. *Saudi Journal of Biological Sciences*. 27(9):2227-2237.
- In SJ, Seo KH, Song NY, Lee DS, Kim YC, Baek NI. (2015). Lignans and neolignans from the stems of *Viburnum erosum* and their neuroprotective and anti-inflammatory activity. *Archives of Pharmacol Research*. 38(1):26-34.
- Jang SI, Kim YJ, Lee WY, Kwak KC, Baek SH, Kwak GB, Yun YG, Kwon TO, Chung HT, Chai KY. (2005) Scoparone from *Artemisia capillaris* inhibits the release of inflammatory mediators in RAW 264.7 cells upon stimulation cells by interferon-gamma Plus LPS. *Archives of Pharmacol Research*. 28(2):203-8.
- Jangra A, Dwivedi S, Sriram CS, Gurjar SS, Kwatra M, Sulakhiya K, Baruah CC, Lahkar M. (2016). Honokiol abrogates chronic restraint stress-induced cognitive impairment and depressive-like behaviour by

- blocking endoplasmic reticulum stress in the hippocampus of mice. *European Journal of Pharmacology*. 770:25-32.
- Janvier M, Hollande L, Jaufurally AS, Pernes M, Ménard R, Grimaldi M, Beaugrand J, Balaguer P, Ducrot PH, Allais F. (2017). Syringaresinol: A Renewable and Safer Alternative to Bisphenol A for Epoxy-Amine Resins. *ChemSusChem*. 10(4):738-746
- Jayakumari NR, Rajendran RS, Sivasailam A, Parambil ST, Reghuvaran AC, Sreelatha HV, Gopala S. (2021) Honokiol regulates mitochondrial substrate utilization and cellular fatty acid metabolism in diabetic mice heart. *European Journal of Pharmacology*. 896:173918.
- Jeong EJJ, Kim NH, Heo JD, Lee KY, Rho JR, Kim YC, Sung SH. (2015). Antifibrotic compounds from *Liriodendron tulipifera* attenuating HSC-T6 proliferation and TNF- α production in RAW264.7 cells. *Biological and Pharmaceutical Bulletin*. 38(2):228-34.
- Jeong S, Lee YS, Kim K, Yoon JS, Kim S, Ha J, Kang I, Choe W. (2021) 2-O-Methylhonokiol Suppresses HCV Replication via TRAF6-Mediated NF- κ B Activation. *International Journal of Molecular Sciences*. 22(12):6499.
- Jeong YH, Hur HJ, Jeon EJ, Park SJ, Hwang JT, Lee AS, Lee KW, Sung MJ. (2018). Honokiol Improves Liver Steatosis in Ovariectomized Mice. *Molecules*. 23(1):194.
- Jiang D, Wei D, Li H, Wang L, Jiang N, Li Y, Wang M. (2021) Natural occurrence of *Alternaria* mycotoxins in wheat and potential of reducing associated risks using magnolol. *Journal of the Science of Food & Agriculture*. 101(7):3071-3077.
- Jin CM, Lee JJ, Yang YJ, Kim YM, Kim YK, Ryu SY, Lee MK. (2007). Liriodenine inhibits dopamine biosynthesis and L-DOPA-induced dopamine content in PC12 cells. *Archives of Pharmacol Research*. 30(8):984-90.
- Jin L, Schmich M, El Gaafary M, Zhang X, Syrovets T, Simmet T. (2020) A comparative study on root and bark extracts of *Eleutherococcus senticosus* and their effects on human macrophages. *Phytomedicine*. 68:153181.
- Jin W, Wang X, Zeng Y, Lan Y, Wang X. (2021) Magnolol suppressed cell migration and invasion and induced cell apoptosis via inhibition of the NF- κ B signaling pathway by upregulating microRNA-129 in multiple myeloma. *Neoplasma*. 68(2):404-415.
- Jin X, Yang Q, Cai N, Zhang Z. (2020) A cocktail of betulinic acid, parthenolide, honokiol and ginsenoside Rh2 in liposome systems for lung cancer treatment. *Nanomedicine (Lond)*. 15(1):41-54.
- Juang SH, Hsieh MT, Hsu PL, Chen JL, Liu HK, Liang FP, Kuo SC, Chiu CY, Liu SH, Chou CH, Wu TS, Hung HY. (2020) Studies of Coumarin Derivatives for Constitutive Androstane Receptor (CAR) Activation. *Molecules*. 26(1):164.
- Jung HA, Yoon NY, Bae HJ, Min BS, Choi JS. (2008). Inhibitory activities of the alkaloids from *Coptidis Rhizoma* against aldose reductase. *Archives of Pharmacol Research*. 31(11):1405-12.
- Jung HJ, Park HJ, Kim RG, Shin KM, Ha J, Choi JW, Kim HJ, Lee YS, Lee KT. (2003) In vivo anti-inflammatory and antinociceptive effects of liriodendrin isolated from the stem bark of *Acanthopanax senticosus*. *Planta Medica*. 69(7):610-6.
- Jung SH, Lee GB, Ryu Y, Cui L, Lee HM, Kim J, Kim B, Won KJ. (2019). Inhibitory effects of scoparone from chestnut inner shell on platelet-derived growth factor-BB-induced vascular smooth muscle cell migration and vascular neointima hyperplasia. *Journal of the Science & Food Agriculture*. 99(9):4397-4406
- Jung YY, Lee YJ, Choi DY, Hong JT. (2014). Amelioration of Cognitive Dysfunction in APP/PS1 Double Transgenic Mice by Long-Term Treatment of 4-O-Methylhonokiol. *Biomolecules and Therapeutics (Seoul)*. 22(3):232-8
- Junior AG, Tolouei SEL, Dos Reis Lívero FA, Gasparotto F, Boeing T, de Souza P. (2021) Natural Agents Modulating ACE-2: A Review of Compounds with Potential against SARS-CoV-2 Infections. *Current Pharmaceutical Design*. 27(13):1588-1596.
- Kang JW, Kim DW, Choi JS, Kim YS, Lee SM. (2013). Scoparone attenuates D-galactosamine/lipopolysaccharide-induced fulminant hepatic failure through inhibition of toll-like receptor 4 signaling in mice. *Food and Chemical Toxicology*. 57:132-9.
- Kapoor S. (2012). Attenuation of tumor growth by honokiol: an evolving role in oncology. *Drug Discoveries and Therapeutics*. 6(6):327-8
- Karki R, Kim SB, Kim DW. (2013). Magnolol inhibits migration of vascular smooth muscle cells via cytoskeletal remodeling pathway to attenuate neointima formation. *Experimental Cell Research* 319(20):3238-50.
- Kerr M, Miller JJ, Thapa D, Stiewe S, Timm KN, Aparicio CNM, Scott I, Tyler DJ, Heather LC. (2020) Rescue of myocardial energetic dysfunction in diabetes through the correction of mitochondrial hyperacetylation by honokiol. *JCI Insight*. 5(17):e140326.
- Khalid S, Khan A, Shal B, Ali H, Kim YS, Khan S. (2019). Suppression of TRPV1 and P2Y nociceptors by honokiol isolated from *Magnolia officinalis* in 3rd degree burn mice by inhibiting inflammatory mediators. *Biomedicine & Pharmacotherapy*. 114:108777
- Khalid S, Ullah MZ, Khan AU, Afridi R, Rasheed H, Khan A, Ali H, Kim YS, Khan S. (2018). Antihyperalgesic Properties of Honokiol in Inflammatory Pain Models by Targeting of NF- κ B and Nrf2 Signaling. *Frontiers in Pharmacology*. 9:140.

- Khamis S, Bibby MC, Brown JE, Cooper PA, Scowen I, Wright CW. (2004) Phytochemistry and preliminary biological evaluation of *Cyathostemma argenteum*, a Malaysian plant used traditionally for the treatment of breast cancer. *Phytotherapy Research*. 18(7):507-10.
- Khan MR, Kihara M, Omoloso AD. (2002) Antimicrobial activity of *Michelia champaca*. *Fitoterapia*. 73(7-8):744-8.
- Khanal P, Mandar BK, Patil BM, Hullattii KK. (2019), In silico antidiabetic screening of borapetoside C, cordifolioside A and magnoflorine, *Indian Journal of Pharmaceutical Sciences*. 81:550–555.
- Kielbus M, Skalicka-Wozniak K, Grabarska A, Jeleniewicz W, Dmoszynska-Graniczka M, Marston A, Polberg K, Gawda P, Klatka J, Stepulak A. (2013) 7-substituted coumarins inhibit proliferation and migration of laryngeal cancer cells in vitro. *Anticancer Research*. 33(10):4347-56.
- Kim B, Kim MS, Hyun CK. (2017b). Syringin attenuates insulin resistance via adiponectin-mediated suppression of low-grade chronic inflammation and ER stress in high-fat diet-fed mice. *Biochemical and Biophysical Research Communications*. 488(1):40-45
- Kim DJ, Kim YS. (2016). Magnolol protects against trimethyltin-induced neuronal damage and glial activation in vitro and in vivo. *Neurotoxicology*. 53:173-185.
- Kim EK, Kwon KB, Lee JH, Park BH, Park JW, Lee HK, Jhee EC, Yang JY. (2007). Inhibition of cytokine-mediated nitric oxide synthase expression in rat insulinoma cells by scoparone. *Biological and Pharmaceutical Bulletin*. 30(2):242-6.
- Kim H, Lim CY, Chung MS. (2021) *Magnolia officinalis* and Its Honokiol and Magnolol Constituents Inhibit Human Norovirus Surrogates. *Foodborne Pathogens & Disease*. 18(1):24-30.
- Kim H, Shin EA, Kim CG, Lee DY, Kim B, Baek NI, Kim SH. (2016). Obovatol Induces Apoptosis in Non-small Cell Lung Cancer Cells via C/EBP Homologous Protein Activation. *Phytotherapy Research*. 30(11):1841-1847.
- Kim HI, Kim JA, Choi EJ, Harris JB, Jeong SY, Son SJ, Kim Y, Shin OS. (2015a). In vitro and in vivo antimicrobial efficacy of natural plant-derived compounds against *Vibrio cholerae* of O1 El Tor Inaba serotype. *Bioscience Biotechnology and Biochemistry*. 79(3):475-83
- Kim HJ, Hong JM, Yoon HJ, Kwon BM, Choi JY, Lee IK, Kim SY. (2014a). Inhibitory effects of obovatol on osteoclast differentiation and bone resorption. *European Journal of Pharmacology*. 723:473-80.
- Kim HS, Lim GY, Hwang J, Ryoo ZY, Huh TL, Lee S. (2014b). Induction of apoptosis by obovatol as a novel therapeutic strategy for acute myeloid leukemia. *International Journal of Molecular Medicine*. 34(6):1675-80.
- Kim J, Ahn H, Han BC, Shin H, Kim JC, Jung EM, Kim J, Yang H, Lee J, Kang SG, Lee SH, Lee GS. (2019b). Obovatol inhibits NLRP3, AIM2, and non-canonical inflammasome activation. *Phytomedicine*. 63:153019
- Kim J, Cho SY, Kim SH, Cho D, Kim S, Park CW, Shimizu T, Cho JY, Seo DB, Shin SS. (2017c) Effects of Korean ginseng berry on skin antipigmentation and antiaging via FoxO3a activation. *Journal of Ginseng Research*. 41(3):277-283.
- Kim J, Ha Quang Bao T, Shin YK, Kim KY. (2018). Antifungal activity of magnoflorine against *Candida* strains. *World Journal of Microbiology & Biotechnology*. 34(11):167
- Kim J, Toda T, Watanabe K, Shibuya S, Ozawa Y, Izuo N, Cho S, Seo DB, Yokote K, Shimizu T. (2019c). Syringaresinol Reverses Age-Related Skin Atrophy by Suppressing FoxO3a-Mediated Matrix Metalloproteinase-2 Activation in Copper/Zinc Superoxide Dismutase-Deficient Mice. *The Journal of Investigative Dermatology*. 139(3):648-655
- Kim JK, Kim JY, Kim HJ, Park KG, Harris RA, Cho WJ, Lee JT, Lee IK. (2013a). Scoparone exerts anti-tumor activity against DU145 prostate cancer cells via inhibition of STAT3 activity. *PLoS One*. 8(11):e80391.
- Kim S, Ka SO, Lee Y, Park BH, Fei X, Jung JK, Seo SY, Bae EJ. (2015c) The new 4-O-methylhonokiol analog GS12021 inhibits inflammation and macrophage chemotaxis: role of AMP-activated protein kinase α activation. *PLoS One*. 10(2):e0117120.
- Kim SC, Kang JI, Hyun JW, Kang JH, Koh YS, Kim YH, Kim KH, Ko JH, Yoo ES, Kang HK. (2017a). 4-O-Methylhonokiol Protects HaCaT Cells from TGF- β 1-Induced Cell Cycle Arrest by Regulating Canonical and Non-Canonical Pathways of TGF- β Signaling. *Biomolecules and Therapeutics* (Seoul). 25(4):417-426.
- Kim SC, Kang JI, Kim MK, Boo HJ, Park DB, Lee YK, Kang JH, Yoo ES, Kim YH, Kang HK. (2011). The hair growth promoting effect of 4-O-methylhonokiol. *European Journal of Dermatology*. 21(6):1012-4.
- Kim SY, Kim J, Jeong SI, Jahng KY, Yu KY. (2015b). Antimicrobial Effects and Resistant Regulation of Magnolol and Honokiol on Methicillin-Resistant *Staphylococcus aureus*. *Biomedical Research International*. 2015:283630.
- Kim YJ, Choi MS, Cha BY, Woo JT, Park YB, Kim SR, Jung UJ. (2013c). Long-term supplementation of honokiol and magnolol ameliorates body fat accumulation, insulin resistance, and adipose inflammation in high-fat fed mice. *Molecular Nutrition and Food Research*. 57(11):1988-98.
- Kim YJ, Jung UJ. (2019). Honokiol Improves Insulin Resistance, Hepatic Steatosis, and Inflammation in Type 2 Diabetic db/db Mice. *International Journal of Molecular Sciences*. 20(9):2303
- Kimura I, Nagaura T, Kobayashi S, Kimura M. (1992) Inhibitory effects of magnoshinin and magnosalin, compounds from "Shin-i" (*Flos magnoliae*), on the competence and progression phases in proliferation of subcultured rat aortic endothelial cells. *Japanese Journal of Pharmacology*. 60(1):59-62.
- Kimura M, Kobayashi S, Luo B, Kimura I. (1990) Selective inhibition by magnosalin and magnoshinin, compounds from 'shin-i' (*Flos magnoliae*), of adjuvant-induced angiogenesis and granuloma formation in the mouse pouch. *International Archives of Allergy & Applied Immunology*. 93(4):365-70.

- Kimura M, Kobayashi S, Luo B, Kimura I. (1991) Selective inhibition by magnosalin and magnoshinin, compounds from "Shin-i" (*Flos magnoliae*), of adjuvant-induced angiogenesis and granuloma formation in the mouse pouch. *Agents & Actions Suppl.* 32:197-201.
- Klingensmith NJ, Chen CW, Liang Z, Burd EM, Farris AB, Arbiser JL, Ford ML, Coopersmith CM. (2018). Honokiol Increases CD4+ T Cell Activation and Decreases TNF but Fails to Improve Survival Following Sepsis. *Shock.* 50(2):178-186.
- Ko CH, Chen HH, Lin YR, Chan MH. (2003). Inhibition of smooth muscle contraction by magnolol and honokiol in porcine trachea. *Planta Medica* 69(6):532-6.
- Kobayashi S, Kimura I, Kimura M. (1996) Inhibitory effect of magnosalin derived from *Flos magnoliae* on tube formation of rat vascular endothelial cells during the angiogenic process. *Biological & Pharmaceutical Bulletin.* 19(10):1304-6.
- Kobayashi S, Kobayashi H, Matsuno H, Kimura I, Kimura M. (1998). Inhibitory effects of anti-rheumatic drugs containing magnosalin, a compound from 'Shin-i' (*Flos magnoliae*), on the proliferation of synovial cells in rheumatoid arthritis models. *Immunopharmacology.* 39(2):139-47.
- Kou DQ, Jiang YL, Qin JH, Huang YH. (2017). Magnolol attenuates the inflammation and apoptosis through the activation of SIRT1 in experimental stroke rats. *Pharmacological Reports.* 69(4):642-647.
- Kuan LY, Chen WL, Chen JH, Hsu FT, Liu TT, Chen WT, Wang KL, Chen WC, Liu YC, Wang WS. (2018). Magnolol Induces Apoptosis and Inhibits ERK-modulated Metastatic Potential in Hepatocellular Carcinoma Cells. *In Vivo.* 32(6):1361-1368.
- Kuk H, Arnold C, Meyer R, Hecker M, Korff T. (2017). Magnolol inhibits venous remodeling in mice. *Scientific Reports.* 7(1):17820
- Kukula-Koch W, Kruk-Słomka M, Stępnik K, Szalak R, Biała G. (2017). The Evaluation of Pro-Cognitive and Antiamnestic Properties of Berberine and Magnoflorine Isolated from Barberry Species by Centrifugal Partition Chromatography (CPC), in Relation to QSAR Modelling. *International Journal of Molecular Sciences.* 18(12):2511.
- Kumar A, Kumar Singh U, Chaudhary A. (2013). Honokiol analogs: a novel class of anticancer agents targeting cell signaling pathways and other bioactivities. *Future Medicinal Chemistry.* 5(7):809-29.
- Kumar D, Kumar S, Taprial S, Kashyap D, Kumar A, Prakash O. (2012). A review of chemical and biological profile of the genus *Michelia*. *Journal of Chinese Integrative Medicine.* 10(12):1336-40
- Kuo NC, Huang SY, Yang CY, Shen HH, Lee YM. (2020) Involvement of HO-1 and Autophagy in the Protective Effect of Magnolol in Hepatic Steatosis-Induced NLRP3 Inflammasome Activation In Vivo and In Vitro. *Antioxidants (Basel).* 9(10):924.
- Kuo PC, Hwang TL, Lin YT, Kuo YC, Leu YL. (2011) Chemical constituents from *Lobelia chinensis* and their anti-virus and anti-inflammatory bioactivities. *Archives of Pharmacal Research.* 34(5):715-22.
- Kwak EJ, Lee YS, Choi EM. (2012). Effect of magnolol on the function of osteoblastic MC3T3-E1 cells. *Mediators of Inflammation.* 2012:829650.
- Kwak JH, Lee S, Park ES, In JK, Song J, Kim YJ, Choi NS, Lee H, Yun YP, Hong JT, Kwak YS, Min KH, Jung JK. (2011) Synthesis and anti-platelet activity of obovatol derivatives. *Archives of Pharmacal Research.* 34(7):1107-12.
- Kwon BM, Kim MK, Lee SH, Kim JA, Lee IR, Kim YK, Bok SH. (1997) Acyl-CoA : cholesterol acyltransferase inhibitors from *Magnolia obovata*. *Planta Medica.* 63(6):550-1.
- Kwon KS, Lim H, Kwon YS, Kim MJ, Yoo JH, Yoo NH, Kim HP. (2020) Inhibitory Mechanisms of Water Extract of *Oplopanax elatus* on Lipopolysaccharide-Induced Inflammatory Responses in RAW 264.7 Murine Macrophage Cells. *Chinese Journal of Integrative Medicine.* 26(9):670-676.
- Lan KH, Wang YW, Lee WP, Lan KL, Tseng SH, Hung LR, Yen SH, Lin HC, Lee SD. (2012). Multiple effects of Honokiol on the life cycle of hepatitis C virus. *Liver International.* 32(6):989-97.
- Latif A, Du Y, Dalal SR, Fernández-Murga ML, Merino EF, Cassera MB, Goetz M, Kingston DGI. (2017). Bioactive Neolignans and Other Compounds from *Magnolia grandiflora* L.: Isolation and Antiplasmodial Activity. *Chemistry and Biodiversity.* Sep;14(9).
- Lau KM, Yue GG, Chan YY, Kwok HF, Gao S, Wong CW, Lau CB. (2019). A review on the immunomodulatory activity of *Acanthopanax senticosus* and its active components. *Chinese Medicine.* 14:25
- Lee C, Jeong H, Lee H, Hong M, Park SY, Bae H. (2020b) Magnolol Attenuates Cisplatin-Induced Muscle Wasting by M2c Macrophage Activation. *Frontiers in Immunology.* 11:77.
- Lee CH, Huang CW, Chang PC, Shiau JP, Lin IP, Lin MY, Lai CC, Chen CY. (2019b) Reactive oxygen species mediate the chemopreventive effects of syringin in breast cancer cells. *Phytomedicine.* 61:152844.
- Lee H, Tuong LT, Jeong JH, Lee SJ, Bae GU, Ryu JH. (2017) Isoquinoline alkaloids from *Coptis japonica* stimulate the myoblast differentiation via p38 MAP-kinase and Akt signaling pathway. *Bioorganic & Medicinal Chemistry Letters.* 27(6):1401-1404
- Lee IH, Im E, Lee HJ, Sim DY, Lee JH, Jung JH, Park JE, Shim BS, Kim SH. (2021) Apoptotic and antihepatofibrotic effect of honokiol via activation of GSK3β and suppression of Wnt/β-catenin pathway in hepatic stellate cells. *Phytotherapy Research.* 35(1):452-462.
- Lee JH, Jung JY, Jang EJ, Jegal KH, Moon SY, Ku SK, Kang SH, Cho IJ, Park SJ, Lee JR, Zhao RJ, Kim SC, Kim YW. (2015). Combination of honokiol and magnolol inhibits hepatic steatosis through AMPK-SREBP-1 c pathway. *Experimental Biology and Medicine (Maywood).* 240(4):508-18.

- Lee JW, Lee YK, Lee BJ, Nam SY, Lee SI, Kim YH, Kim KH, Oh KW, Hong JT. (2010a) Inhibitory effect of ethanol extract of *Magnolia officinalis* and 4-O-methylhonokiol on memory impairment and neuronal toxicity induced by beta-amyloid. *Pharmacology, Biochemistry & Behaviour*. 95(1):31-40.
- Lee M, Kwon BM, Suk K, McGeer E, McGeer PL. (2012d). Effects of obovatol on GSH depleted glia-mediated neurotoxicity and oxidative damage. *Journal of Neuroimmune Pharmacology*. 7(1):173-86.
- Lee MY, Shi CS, Hsu YC, Huang KJ, Chen SH, Zhao PW, Chung HC, Huang YC, Lee YR. (2019a). Honokiol Is a Potential Therapeutic Agent and Has a Synergistic Effect With 5-FU in Human Urothelial Cell Carcinoma Cells. *Anticancer Research*. 39(12):6555-6565
- Lee NJ, Oh JH, Ban JO, Shim JH, Lee HP, Jung JK, Ahn BW, Yoon DY, Han SB, Han YW, Hong JT. (2013a). 4-O-methylhonokiol, a PPAR γ agonist, inhibits prostate tumour growth: p21-mediated suppression of NF- κ B activity. *British Journal of Pharmacology*. 168(5):1133-45.
- Lee SH, Jang HD. (2015). Scoparone attenuates RANKL-induced osteoclastic differentiation through controlling reactive oxygen species production and scavenging. *Experimental Cell Research*. 331(2):267-77.
- Lee SH, Lee JY, Kwon YI, Jang HD. (2017). Anti-Osteoclastic Activity of *Artemisia capillaris* Thunb. Extract Depends upon Attenuation of Osteoclast Differentiation and Bone Resorption-Associated Acidification Due to Chlorogenic Acid, Hyperoside, and Scoparone. *International Journal of Molecular Sciences*. 18(2):322
- Lee SY, Cho JS, Yuk DY, Moon DC, Jung JK, Yoo HS, Lee YM, Han SB, Oh KW, Hong JT. (2009a) Obovatol enhances docetaxel-induced prostate and colon cancer cell death through inactivation of nuclear transcription factor-kappaB. *Journal of Pharmacological Sciences*. 111(2):124-36.
- Lee WT, Lin MH, Lee EJ, Hung YC, Tai SH, Chen HY, Chen TY, Wu TS. (2012a). Magnolol reduces glutamate-induced neuronal excitotoxicity and protects against permanent focal cerebral ischemia up to 4 hours. *PLoS One*. 7(7):e39952.
- Lee YJ, Choi DY, Choi IS, Kim KH, Kim YH, Kim HM, Lee K, Cho WG, Jung JK, Han SB, Han JY, Nam SY, Yun YW, Jeong JH, Oh KW, Hong JT. (2012c). Inhibitory effect of 4-O-methylhonokiol on lipopolysaccharide-induced neuroinflammation, amyloidogenesis and memory impairment via inhibition of nuclear factor-kappaB in vitro and in vivo models. *Journal of Neuroinflammation*. 9:35.
- Lee YJ, Choi DY, Lee YK, Lee YM, Han SB, Kim YH, Kim KH, Nam SY, Lee BJ, Kang JK, Yun YW, Oh KW, Hong JT. (2012b). 4-O-methylhonokiol prevents memory impairment in the Tg2576 transgenic mice model of Alzheimer's disease via regulation of β -secretase activity. *Journal of Alzheimers Disease*. 29(3):677-90.
- Lee YJ, Choi DY, Yun YP, Han SB, Kim HM, Lee K, Choi SH, Yang MP, Jeon HS, Jeong JH, Oh KW, Hong JT. (2013b). Ethanol extract of *Magnolia officinalis* prevents lipopolysaccharide-induced memory deficiency via its antineuroinflammatory and anti-amyloidogenic effects. *Phytotherapy Research* 27(3):438-47.
- Lee YJ, Lee YM, Lee CK, Jung JK, Han SB, Hong JT. (2011a). Therapeutic applications of compounds in the *Magnolia* family. *Pharmacology and Therapeutics*. 130(2):157-76.
- Lee YK, Choi IS, Kim YH, Kim KH, Nam SY, Yun YW, Lee MS, Oh KW, Hong JT. (2009b) Neurite outgrowth effect of 4-O-methylhonokiol by induction of neurotrophic factors through ERK activation. *Neurochemical Research*. 34(12):2251-60.
- Lee YK, Song JK, Choi IS, Jeong JH, Moon DC, Yun YP, Han SB, Oh KW, Hong JT. (2010b) Neurotrophic activity of obovatol on the cultured embryonic rat neuronal cells by increase of neurotrophin release through activation of ERK pathway. *European Journal of Pharmacology*. 649(1-3):168-76.
- Lee YK, Yuk DY, Kim TI, Kim YH, Kim KT, Kim KH, Lee BJ, Nam SY, Hong JT. (2009c) Protective effect of the ethanol extract of *Magnolia officinalis* and 4-O-methylhonokiol on scopolamine-induced memory impairment and the inhibition of acetylcholinesterase activity. *Journal of Natural Medicine*. 63(3):274-82.
- Lee YK, Choi IS, Ban JO, Lee HJ, Lee US, Han SB, Jung JK, Kim YH, Kim KH, Oh KW, Hong JT. (2011b). 4-O-methylhonokiol attenuated β -amyloid-induced memory impairment through reduction of oxidative damages via inactivation of p38 MAP kinase. *Journal of Nutritional Biochemistry*. 22(5):476-86.
- Lee YS, Jeong S, Kim KY, Yoon JS, Kim S, Yoon KS, Ha J, Kang I, Choe W. (2021) Honokiol inhibits hepatoma carcinoma cell migration through downregulated Cyclophilin B expression. *Biochemical & Biophysical Research Communications*. 552:44-51.
- Li B, Han L, Cao B, Yang X, Zhu X, Yang B, Zhao H, Qiao W. (2019) Use of magnoflorine-phospholipid complex to permeate blood-brain barrier and treat depression in the CUMS animal model. *Drug Delivery*. 26(1):566-574.
- Li C, Lee D, Graf TN, Phifer SS, Nakanishi Y, Riswan S, Setyowati FM, Saribi AM, Soejarto DD, Farnsworth NR, Falkinham JO 3rd, Kroll DJ, Kinghorn AD, Wani MC, Oberlies NH. (2009). Bioactive Constituents of the Stem Bark of *Mitrephora glabra*. *Journal of Natural Products*. 72:1949-53
- Li C, Wang MH. (2014). Potential biological activities of magnoflorine: a compound from *Aristolochia debilis* Sieb. et Zucc, *Korean Journal of Plant Resources*. 27:223–228,
- Li CG, Ni CL, Yang M, Tang YZ, Li Z, Zhu YJ, Jiang ZH, Sun B, Li CJ. (2018b). Honokiol protects pancreatic β cell against high glucose and intermittent hypoxia-induced injury by activating Nrf2/ARE pathway in vitro and in vivo. *Biomedicine and Pharmacotherapy*. 97:1229-1237.
- Li F, Zhang N, Wu Q, Yuan Y, Yang Z, Zhou M, Zhu J, Tang Q. (2017a). Syringin prevents cardiac hypertrophy induced by pressure overload through the attenuation of autophagy. *International Journal of Molecular Medicine* 39(1):199-207.

- Li G, Lu Y, Fan Y, Ning Q, Li W. (2020a) Enhanced oral bioavailability of magnolol via mixed micelles and nanosuspensions based on Soluplus®-Poloxamer 188. *Drug Delivery*. 27(1):1010-1017.
- Li G, Yang L, Feng L, Yang J, Li Y, An J, Li D, Xu Y, Gao Y, Li J, Liu J, Yang L, Qi Z. (2020c) Syringaresinol Protects against Type 1 Diabetic Cardiomyopathy by Alleviating Inflammation Responses, Cardiac Fibrosis, and Oxidative Stress. *Molecular Nutrition & Food Research*. 64(18):e2000231
- Li H, He YH, Hu YM, Chu QR, Chen YJ, Wu ZR, Zhang ZJ, Liu YQ, Yang CJ, Liang HJ, Yan YF. (2021c) Design, Synthesis, and Structure-Activity Relationship Studies of Magnolol Derivatives as Antifungal Agents. *Journal of Agricultural & Food Chemistry*. Sep 28.
- Li H, Jia J, Wang W, Hou T, Tian Y, Wu Q, Xu L, Wei Y, Wang X. (2018a). Honokiol Alleviates Cognitive Deficits of Alzheimer's Disease (PS1V97L) Transgenic Mice by Activating Mitochondrial SIRT3. *Journal of Alzheimers Disease*. 64(1):291-302
- Li H, Liu X, Zhu Y, Liu Y, Wang Y. (2015a). Magnolol derivative 002C-3 protects brain against ischemia-reperfusion injury via inhibiting apoptosis and autophagy. *Neuroscience Letters*. 588:178-83
- Li J, Copmans D, Partoens M, Hunyadi B, Luyten W, de Witte P. (2020b) Zebrafish-Based Screening of Antiseizure Plants Used in Traditional Chinese Medicine: *Magnolia officinalis* Extract and Its Constituents Magnolol and Honokiol Exhibit Potent Anticonvulsant Activity in a Therapy-Resistant Epilepsy Model. *ACS Chemical Neuroscience*. 11(5):730-742.
- Li J, Meng AP, Guan XL, Li J, Wu Q, Deng SP, Su XJ, Yang RY. (2013c). Anti-hepatitis B virus lignans from the root of *Strebilus asper*. *Bioorganic and Medicinal Chemistry Letters*. 23(7):2238-44.
- Li L, Xu Y, Wang B. (2015b). Liriodenine induces the apoptosis of human laryngocarcinoma cells via the upregulation of p53 expression. *Oncology Letters*. 9(3):1121-1127.
- Li LF, Lu J, Li XM, Xu CL, Deng JM, Qu R, Ma SP. (2012). Antidepressant-like effect of magnolol on BDNF up-regulation and serotonergic system activity in unpredictable chronic mild stress treated rats. *Phytotherapy Research*. 26(8):1189-94
- Li N, Xie H, Li L, Wang J, Fang M, Yang N, Lin H. (2014a). Effects of honokiol on sepsis-induced acute kidney injury in an experimental model of sepsis in rats. *Inflammation*. 37(4):1191-9
- Li N, Yang F, Liu DY, Guo JT, Ge N, Sun SY. (2021e) Scoparone inhibits pancreatic cancer through PI3K/Akt signaling pathway. *World Journal of Gastrointestinal Oncology*. 13(9):1164-1183.
- Li R, Ai X, Hou Y, Lai X, Meng X, Wang X. (2021) Amelioration of diabetic retinopathy in db/db mice by treatment with different proportional three active ingredients from Tibetan medicine *Berberis dictyophylla* F. *Journal of Ethnopharmacology*. 276:114190.
- Li S, Chen J, Chen F, Wang C, Guo X, Wang C, Fan Y, Wang Y, Peng Y, Li W. (2021a) Liposomal honokiol promotes hair growth via activating Wnt3a/ β -catenin signaling pathway and down regulating TGF- β 1 in C57BL/6N mice. *Biomedicine & Pharmacotherapy*. 141:111793.
- Li WJ, Lin YC, Wu PF, Wen ZH, Liu PL, Chen CY, Wang HM. (2013b). Biofunctional constituents from *Liriodendron tulipifera* with antioxidants and anti-melanogenic properties. *International Journal of Molecular Sciences*. 14:1698-1712
- Li WL, Zhao XC, Zhao ZW, Huang YJ, Zhu XZ, Meng RZ, Shi C, Yu L, Guo N. (2016a). In vitro antimicrobial activity of honokiol against *Staphylococcus aureus* in biofilm mode. *Journal of Asian Natural Products Research*. 18(12):1178-1185
- Li X, Zeng H, Wang P, Lin L, Liu L, Zhen P, Fu Y, Lu P, Zhu H. (2016b) Reactivation of latent HIV-1 in latently infected cells by coumarin compounds: Hymecromone and Scoparone Reactivation of Latent HIV-1 in Latently Infected Cells by Coumarin Compounds: Hymecromone and Scoparone. *Current HIV Research*. 14(6):484-490.
- Li XQ, Ren J, Wang Y, Su JY, Zhu YM, Chen CG, Long WG, Jiang Q, Li J. (2021b) Synergistic killing effect of paclitaxel and honokiol in non-small cell lung cancer cells through paraptosis induction. *Cellular Oncology (Dordrecht)*. 44(1):135-150.
- Li Y, Li T, Miao C, Li J, Xiao W, Ma E. (2013c). β -Eudesmol induces JNK-dependent apoptosis through the mitochondrial pathway in HL60 cells. *Phytotherapy Research*. 27(3):338-43.
- Li YL, Qin QP, Liu YC, Chen ZF, Liang H. (2014b) A platinum(II) complex of liriodenine from traditional Chinese medicine (TCM): Cell cycle arrest, cell apoptosis induction and telomerase inhibition activity via G-quadruplex DNA stabilization. *Journal of Inorganic Biochemistry*. 137:12-21.
- Li YS, Hong YF, He J, Lin JX, Shan YL, Fu DY, Chen ZP, Ren XR, Song ZH, Tao L. (2013a). Effects of magnolol on impairment of learning and memory abilities induced by scopolamine in mice. *Biological and Pharmaceutical Bulletin*. 36(5):764-71
- Li ZH, Gao J, Hu PH, Xiong JP. (2017b). Anticancer effects of liriodenine on the cell growth and apoptosis of human breast cancer MCF-7 cells through the upregulation of p53 expression. *Oncology Letters*. 14(2):1979-1984.
- Liang X, Xing W, He J, Fu F, Zhang W, Su F, Liu F, Ji L, Gao F, Su H, Sun X, Zhang H. (2015). Magnolol administration in normotensive young spontaneously hypertensive rats postpones the development of hypertension: role of increased PPAR gamma, reduced TRB3 and resultant alleviative vascular insulin resistance. *PLoS One*. 10(3):e0120366.
- Liao G, Zhao Z, Yang H, Li X. (2020) Honokiol ameliorates radiation-induced brain injury via the activation of SIRT3. *Journal of International Medical Research*. 48(10):300060520963993.

- Lim Y, Kwon JS, Kim DW, Lee SH, Park RK, Lee JJ, Hong JT, Yoo HS, Kwon BM, Yun YP. (2010). Obovatol from *Magnolia obovata* inhibits vascular smooth muscle cell proliferation and intimal hyperplasia by inducing p21Cip1. *Atherosclerosis*. 210(2):372-80.
- Lim Y, Tudev M, Park ES, Kim WS, Lim IH, Lee MY, Lee H, Jung JK, Hong JT, Yoo HS, Lee MK, Pyo MY, Yun YP. (2011) Inhibitory effects of OD 78 [3-(4-bromo-phenoxy)-4,5-dihydroxybenzoic acid-methyl ester] on the proliferation and migration of TNF- α -induced rat aortic smooth muscle cells. *Archives of Pharmacal Research*. 34(7):1191-9.
- Lin C, Yon JM, Hong JT, Lee JK, Jeong J, Baek IJ, Lee BJ, Yun YW, Nam SY. (2014a). 4-O-methylhonokiol inhibits serious embryo anomalies caused by nicotine via modulations of oxidative stress, apoptosis, and inflammation. *Birth Defects Research Part B. Developmental & Reproductive Toxicology*. 101(2):125-34.
- Lin HL, Cheng WT, Chen LC, Ho HO, Lin SY, Hsieh CM. (2021a) Honokiol/Magnolol-Loaded Self-Assembling Lecithin-Based Mixed Polymeric Micelles (lbMPMs) for Improving Solubility to Enhance Oral Bioavailability. *International Journal of Nanomedicine*. 16:651-665.
- Lin JW, Chen JT, Hong CY, Lin YL, Wang KT, Yao CJ, Lai GM, Chen RM. (2012). Honokiol traverses the blood-brain barrier and induces apoptosis of neuroblastoma cells via an intrinsic bax-mitochondrion-cytochrome c-caspase protease pathway. *Neuro Oncology*. 14(3):302-14.
- Lin MH, Chen MC, Chen TH, Chang HY, Chou TC. (2015). Magnolol ameliorates lipopolysaccharide-induced acute lung injury in rats through PPAR- γ -dependent inhibition of NF- κ B activation. *International Immunopharmacology*. 28(1):270-8
- Lin Q, Peng S, Li Y, Jiang G, Liao Z, Fan Z, He X, Dai Q. (2020) Magnolol additive improves carcass and meat quality of Linwu ducks by modulating antioxidative status. *Animal Science Journal*. 91(1):e13301.
- Lin Q, Zhao J, Xie K, Wang Y, Hu G, Jiang G, Dai Q, Fan Z, He J, He X, Hou DX. (2017). Magnolol additive as a replacer of antibiotic enhances the growth performance of Linwu ducks. *Animal Nutrition*. 3(2):132-138.
- Lin RJ, Wu MH, Ma YH, Chung LY, Chen CY, Yen CM. (2014b) Anthelmintic activities of aporphine from *Nelumbo nucifera* Gaertn. cv. Rosa-plena against *Hymenolepis nana*. *International Journal of Molecular Sciences*. 15(3):3624-39.
- Lin SX, Guo BY, Hui Q, Tao K. (2021c) Effects and mechanism of eleutheroside E on the growth of human hypertrophic scar fibroblasts. *Zhonghua Shao Shang Za Zhi*. 37(3):279-287. [Chinese].
- Lin Y, Li Y, Zeng Y, Tian B, Qu X, Yuan Q, Song Y. (2021b) Pharmacology, Toxicity, Bioavailability, and Formulation of Magnolol: An Update. *Frontiers in Pharmacology*. 12:632767.
- Lin YR, Chen HH, Ko CH, Chan MH. (2007). Effects of honokiol and magnolol on acute and inflammatory pain models in mice. *Life Sciences*. 81(13):1071-8.
- Liu B, Chen W, Li H, Li F, Jin X, Li Q. (2020b) Radiosensitization of NSCLC cells to X-rays and carbon ions by the CHK1/CHK2 inhibitor AZD7762, Honokiol and Tunicamycin. *Radiation & Environmental Biophysics*. 59(4):723-732.
- Liu B, Deng X, Jiang Q, Li G, Zhang J, Zhang N, Xin S, Xu K. (2019) Scoparone alleviates inflammation, apoptosis and fibrosis of non-alcoholic steatohepatitis by suppressing the TLR4/NF- κ B signaling pathway in mice. *International Immunopharmacology* 75:105797.
- Liu B, Deng X, Jiang Q, Li G, Zhang J, Zhang N, Xin S, Xu K. (2020d). Scoparone improves hepatic inflammation and autophagy in mice with nonalcoholic steatohepatitis by regulating the ROS/P38/Nrf2 axis and PI3K/AKT/mTOR pathway in macrophages. *Biomedicine & Pharmacotherapy*. 125:109895
- Liu CM, Chen SH, Liao YW, Yu CH, Yu CC, Hsieh PL. (2021b) Magnolol ameliorates the accumulation of reactive oxidative stress and inflammation in diabetic periodontitis. *Journal of the Formosan Medical Association*. 120(7):1452-1458.
- Liu HT, Wang TE, Hsu YT, Chou CC, Huang KH, Hsu CC, Liang HJ, Chang HW, Lee TH, Tsai PS. (2019b). Nanoparticulated Honokiol Mitigates Cisplatin-Induced Chronic Kidney Injury by Maintaining Mitochondria Antioxidant Capacity and Reducing Caspase 3-Associated Cellular Apoptosis. *Antioxidants (Basel)*. 8(10):466.
- Liu J, Zhang C, Liu Z, Zhang J, Xiang Z, Sun T. (2015). Honokiol downregulates Kruppel-like factor 4 expression, attenuates inflammation, and reduces histopathology after spinal cord injury in rats. *Spine (Phila Pa 1976)*. 40(6):363-8.
- Liu J, Zhang Z, Guo Q, Dong Y, Zhao Q, Ma X. (2018a). Syringin prevents bone loss in ovariectomized mice via TRAF6 mediated inhibition of NF- κ B and stimulation of PI3K/AKT. *Phytomedicine*. 42:43-50.
- Liu JX, Shen SN, Tong Q, Wang YT, Lin LG. (2018c). Honokiol protects hepatocytes from oxidative injury through mitochondrial deacetylase SIRT3. *European Journal of Pharmacology*. 834:176-187.
- Liu M, Xiong Y, Shan S, Zhu Y, Zeng D, Shi Y, Zhang Y, Lu W. (2020e) Eleutheroside E Enhances the Long-Term Memory of Radiation-Damaged *C. elegans* through G-Protein-Coupled Receptor and Neuropeptide Signaling Pathways. *Journal of Natural Products*. 83(11):3315-3323.
- Liu S, Li L, Tan L, Liang X. (2019c). Inhibition of *Herpes Simplex Virus-1* Replication by Natural Compound Honokiol. *Virologica Sinica*. 34(3):315-323
- Liu SX, Chiou GC. (1996). Effects of Chinese herbal products on mammalian retinal functions. *Journal of Ocular Pharmacology and Therapeutics*. 12(3):377-86.
- Liu SX, Kapingu MC, Wang MS, Chiou GC. (1997). Facilitation of retinal function recovery by coumarin derivatives. *Journal of Ocular Pharmacology and Therapeutics*. 13(1):69-79.

- Liu T, Liu H, Wang P, Hu Y, Yang R, Liu F, Kim HG, Dong Z, Liu K. (2020c) Honokiol Inhibits Melanoma Growth by Targeting Keratin 18 in vitro and in vivo. *Frontiers in Cell Development & Biology*. 8:603472.
- Liu T, Pan Y, Lai R. (2014). New mechanism of magnolol and honokiol from *Magnolia officinalis* against *Staphylococcus aureus*. *Natural Product Communications*. 9(9):1307-9
- Liu X, Chen X, Zhu Y, Wang K, Wang Y. (2017). Effect of magnolol on cerebral injury and blood brain barrier dysfunction induced by ischemia-reperfusion in vivo and in vitro. *Metabolic Brain Disease*. 32(4):1109-1118.
- Liu X, Gu Y, Bian Y, Cai D, Li Y, Zhao Y, Zhang Z, Xue M, Zhang L. (2021a) Honokiol induces paraptosis-like cell death of acute promyelocytic leukemia via mTOR & MAPK signaling pathways activation. *Apoptosis*. 26(3-4):195-208.
- Liu X, Wang Y, Wu D, Li S, Wang C, Han Z, Wang J, Wang K, Yang Z, Wei Z. (2019a). Magnolol Prevents Acute Alcoholic Liver Damage by Activating PI3K/Nrf2/PPAR γ and Inhibiting NLRP3 Signaling Pathway. *Frontiers in Pharmacology*. 10:1459
- Liu X, Zhao X. (2017). Scoparone attenuates hepatic stellate cell activation through inhibiting TGF- β /Smad signaling pathway. *Biomedicine & Pharmacotherapy* 93:57-61.
- Liu Y, Cheng P, Wu AH. (2020f) Honokiol inhibits carotid artery atherosclerotic plaque formation by suppressing inflammation and oxidative stress. *Aging (Albany NY)*. 12(9):8016-8028.
- Liu Y, Zhu X, Tong X, Tan Z. (2021c) Syringin protects against cerebral ischemia/reperfusion injury via inhibiting neuroinflammation and TLR4 signaling. *Perfusion*. 2676591211007025.
- Liu YC, Chen ZF, Liu LM, Peng Y, Hong X, Yang B, Liu HG, Liang H, Orvig C. (2009). Divalent later transition metal complexes of the traditional Chinese medicine (TCM) liriodenine: coordination chemistry, cytotoxicity and DNA binding studies. *Dalton Transactions*. 48:10813-23
- Liu YC, Yang YJ, Chen MS, Wang Z, Chen YH, Zhang YF, Shan YM, Yu B. (2019d) Anti-inflammatory and analgesic effects of eleutheroside E in alcoholic beverage. *Journal of Biological Regulators & Homeostatic Agents*. 33(6):1815-1821.
- Liu Z, Xie J, Lin K, Qi L. (2018b). Influencing mechanism of magnolol on expression of BDNF and Bax in rats with cerebral ischemic stroke. *Experimental & Therapeutic Medicine*. 16(6):4423-4428.
- Liu Z, Zhang H, Wang H, Wei L, Niu L. (2020a). Magnolol Alleviates IL-1 β -Induced Dysfunction of Chondrocytes Through Repression of SIRT1/AMPK/PGC-1 α Signaling Pathway. *Journal of Interferon & Cytokine Research*. 40(3):145-151
- Lone J, Yun JW. (2017). Honokiol exerts dual effects on browning and apoptosis of adipocytes. *Pharmacological Reports*. 69(6):1357-1365
- Lorenzo VP, Alves MF, Scotti L, Dos Santos SG, de Fatima Formiga Melo Diniz M, Scotti MT. (2017) Computational Chemistry Study of Natural Alkaloids and Homemade Databank to Predict Inhibitory Potential Against Key Enzymes in Neurodegenerative Diseases. *Current Topics in Medicinal Chemistry*. 17(26):2926-2934.
- Lou GG, Luo YT, Xie LP, Yao HP, Hu Q. (2021) Mechanism of apoptotic induction on T24 cells by honokiol and its synergistic anticancer effect in combination with hydroxycamptothecin. *Journal of Traditional Chinese Medicine*. 41(4):515-522.
- Lovecká P, Svobodová A, Macůrková A, Vrchotová B, Demnerová K, Wimmer Z. (2020) Decorative Magnolia Plants: A Comparison of the Content of Their Biologically Active Components Showing Antimicrobial Effects. *Plants (Basel)*. 9(7):879.
- Lu C, Li Y, Hu S, Cai Y, Yang Z, Peng K. (2018). Scoparone prevents IL-1 β -induced inflammatory response in human osteoarthritis chondrocytes through the PI3K/Akt/NF- κ B pathway. *Biomedicine & Pharmacotherapy*. 106:1169-1174
- Lu M, Li T, Wan J, Li X, Yuan L, Sun S. (2017). Antifungal effects of phytocompounds on *Candida* species alone and in combination with fluconazole. *International Journal of Antimicrobial Agents*. 49(2):125-136.
- Lu SH, Chen TH, Chou TC. (2015b). Magnolol Inhibits RANKL-induced osteoclast differentiation of raw 264.7 macrophages through heme oxygenase-1-dependent inhibition of NFATc1 expression. *Journal of Natural Products*. 78(1):61-8
- Lu SH, Hsu WL, Chen TH, Chou TC. (2015a). Activation of Nrf2/HO-1 signaling pathway involves the anti-inflammatory activity of magnolol in *Porphyromonas gingivalis* lipopolysaccharide-stimulated mouse RAW 264.7 macrophages. *International Immunopharmacology*. 29(2):770-8.
- Lu SH, Huang RY, Chou TC. (2013). Magnolol ameliorates ligature-induced periodontitis in rats and osteoclastogenesis: in vivo and in vitro study. *Evidence Based Complementary and Alternative Medicine*. 2013:634095.
- Lu X, Lu X, Zhang Z, Lv H. (2020). Preparation and Characterization of Honokiol Nanosuspensions and Preliminary Evaluation of Anti-Inflammatory Effect. *AAPS PharmSciTech*. 21(2):62.
- Lu X, Xiao-Qing C. (2019) Eleutheroside E attenuates isoflurane-induced cognitive dysfunction by regulating the α 7-nAChR-NMDAR pathway. *Neuroreport*. 30(3):188-194.
- Luecha P, Umehara K, Miyase T, Noguchi H. (2009). Antiestrogenic constituents of the Thai medicinal plants *Capparis flavicans* and *Vitex glabrata*. *Journal of Natural Products*. 72(11):1954-9.
- Luo C, Xu X, Wei X, Feng W, Huang H, Liu H, Xu R, Lin J, Han L, Zhang D. (2019) Natural medicines for the treatment of fatigue: Bioactive components, pharmacology, and mechanisms. *Pharmacological Research*. 148:104409.

- Luo J, Xu Y, Zhang M, Gao L, Fang C, Zhou C. (2013). Magnolol inhibits LPS-induced inflammatory response in uterine epithelial cells: magnolol inhibits LPS-induced inflammatory response. *Inflammation*. 36(5):997-1003
- Luo N, Jin L, Yang C, Zhu Y, Ye X, Li X, Zhang B. (2021) Antifungal activity and potential mechanism of magnoflorine against *Trichophyton rubrum*. *Journal Antibiotics* (Tokyo). 74(3):206-214.
- Lv D, Luo M, Yan J, Yang X, Luo S. (2021) Protective Effect of Sirtuin 3 on CLP-Induced Endothelial Dysfunction of Early Sepsis by Inhibiting NF- κ B and NLRP3 Signaling Pathways. *Inflammation*. 44(5):1782-1792
- Lyu L, Chen J, Wang W, Yan T, Lin J, Gao H, Li H, Lv R, Xu F, Fang L, Chen Y. (2021) Scopolamine alleviates Ang II-induced pathological myocardial hypertrophy in mice by inhibiting oxidative stress. *Journal of Cellular & Molecular Medicine*. 25(6):3136-3148
- Ma D, Cui X, Zhang Z, Li B, Xu Y, Tian S, Chen T. (2020a) Honokiol suppresses mycelial growth and reduces virulence of *Botrytis cinerea* by inducing autophagic activities and apoptosis. *Food Microbiology*. 88:103411.
- Ma H, Jo YJ, Ma Y, Hong JT, Kwon BM, Oh KW. (2009) Obovatol isolated from *Magnolia obovata* enhances pentobarbital-induced sleeping time: Possible involvement of GABAA receptors/chloride channel activation. *Phytomedicine*. 16(4):308-13.
- Ma T, Zheng Z, Guo H, Lian X, Rane MJ, Cai L, Kim KS, Kim KT, Zhang Z, Bi L. (2019). 4-O-methylhonokiol ameliorates type 2 diabetes-induced neuropathy in mice likely by activation of AMPK-mediated fatty acid oxidation and Nrf2-mediated anti-oxidative stress. *Toxicology & Applied Pharmacology*. 370:93-105
- Ma YS, Hou ZJ, Li Y, Zheng BB, Wang JM, Wang WB. (2020b) Unveiling the Pharmacological Mechanisms of Eleutheroside E Against Postmenopausal Osteoporosis Through UPLC-Q/TOF-MS-Based Metabolomics. *Frontiers in Pharmacology*. 11:1316.
- Maioli M, Basoli V, Carta P, Fabbri D, Dettori MA, Cruciani S, Serra PA, Delogu G. (2018). Synthesis of magnolol and honokiol derivatives and their effect against hepatocarcinoma cells. *PLoS One*. 13(2):e0192178.
- Maldifassi MC, Baur R, Pierce D, Nourmahad A, Forman SA, Sigel E. (2016). Novel positive allosteric modulators of GABAA receptors with anesthetic activity. *Scientific Reports*. 6:25943.
- Mandala A, Chen WJ, Armstrong A, Malhotra MR, Chavalmame S, McCommis KS, Chen A, Carpenter D, Biswas P, Gnana-Prakasam JP. (2021) PPAR α agonist fenofibrate attenuates iron-induced liver injury in mice by modulating the Sirt3 and β -catenin signaling. *American Journal of Physiology. Gastrointestinal & Liver Physiology*. 321(4):G262-G269.
- Manne M, Goudar G, Varikasuvu SR, Khetagoudar MC, Kanipakam H, Natarajan P, Ummiti MD, Yenagi VA, Chinthakindi S, Dharani P, Thota DSS, Patil S, Patil V. (2021) Cordifolioside: potent inhibitor against Mpro of SARS-CoV-2 and immunomodulatory through human TGF- β and TNF- α . *3 Biotech*. 11(3):136.
- Marquele-Oliveira F, Torres EC, Barud Hda S, Zoccal KF, Faccioli LH, Hori JI, Berretta AA. (2016). Physicochemical characterization by AFM, FT-IR and DSC and biological assays of a promising antileishmania delivery system loaded with a natural Brazilian product. *Journal of Pharmaceutical and Biomedical Analysis*. 123:195-204.
- Martínez-Vázquez M, Estrada-Reyes R, Araujo Escalona AG, Ledesma Velázquez I, Martínez-Mota L, Moreno J, Heinze G. (2012) Antidepressant-like effects of an alkaloid extract of the aerial parts of *Annona cherimolia* in mice. *Journal of Ethnopharmacology*. 139(1):164-70.
- Matsui N, Akae H, Hirashima N, Kido Y, Tanabe S, Koseki M, Fukuyama Y, Akagi M. (2016). Magnolol Enhances Hippocampal Neurogenesis and Exerts Antidepressant-Like Effects in Olfactory Bulbectomized Mice. *Phytotherapy Research*. 30(11):1856-1861.
- Mbah JA, Tane P, Ngadjui BT, Connolly JD, Okunji CC, Iwu MM, Schuster BM. (2004) Antiplasmodial agents from the leaves of *Glossocalyx brevipes*. *Planta Medica* 70(5):437-40.
- Meng R, Zhao Z, Guo N, Liu Z, Zhao X, Li W, Li X, Shi C, Nie D, Wang W, Liu T, Ma W, Yu L6, Li J. (2015). Effect of honokiol on exotoxin proteins listeriolysin O and p60 secreted by *Listeria monocytogenes*. *Journal of Medical Microbiology*. 64(12):1474-80.
- Miao B, Zhang S, Wang H, Yang T, Zhou D, Wang BE. (2013). Magnolol pretreatment prevents sepsis-induced intestinal dysmotility by maintaining functional interstitial cells of Cajal. *Inflammation*. 36(4):897-906
- Mir RH, Shah AJ, Mohi-Ud-Din R, Potttoo FH, Dar MA, Jachak SM, Masoodi MH. (2021) Natural Anti-inflammatory Compounds as Drug Candidates in Alzheimer's Disease. *Current Medicinal Chemistry*. 28(23):4799-4825.
- Miyazawa M, Utsunomiya H, Inada K, Yamada T, Okuno Y, Tanaka H, Tatematsu M. (2006). Inhibition of *Helicobacter pylori* motility by (+)-Syringaresinol from unripe Japanese apricot. *Biological and Pharmaceutical Bulletin*. 29(1):172-3.
- Mo F, Hu X, Ding Y, Li R, Long Y, Wu X, Li M. (2021) Naturally produced magnolol can significantly damage the plasma membrane of *Rhizoctonia solani*. *Pesticide Biochemistry & Physiology*. 178:104942.
- Mohamed SM, Hassan EM, Ibrahim NA. (2010). Cytotoxic and antiviral activities of aporphine alkaloids of *Magnolia grandiflora* L. *Natural Product Research*. 24(15):1395-402
- Mollataghi A, Coudiere E, Hadi AH, Mukhtar MR, Awang K, Litaudon M, Ata A. (2012) Anti-acetylcholinesterase, anti- α -glucosidase, anti-leishmanial and anti-fungal activities of chemical constituents of *Beilschmiedia* species. *Fitoterapia*. 83(2):298-302.

- Monte Neto RL, Sousa LM, Dias CS, Barbosa Filho JM, Oliveira MR, Figueiredo RC. (2011). Morphological and physiological changes in *Leishmania* promastigotes induced by yangambin, a lignan obtained from *Ocotea duckei*. *Experimental Parasitology*. 127(1):215-21.
- Monte RL, Barbosa JM, Sousa LM, Athayde PF, Dias CS, Oliveira MR. (2007) Crude ethanolic extract, lignoid fraction and yangambin from *Ocotea duckei* (Lauraceae) show antileishmanial activity. *Zeitschrift für Naturforschung C, Journal of Biosciences*. 62(5-6):348-52.
- Moser BA, Escalante-Buendia Y, Steinhardt RC, Rosenberger MG, Cassaidy BJ, Naorem N, Chon AC, Nguyen MH, Tran NT, Esser-Kahn AP. (2020) Small Molecule NF- κ B Inhibitors as Immune Potentiators for Enhancement of Vaccine Adjuvants. *Frontiers in Immunology*. 11:511513.
- Mottaghi S, Abbaszadeh H. (2021) Natural Lignans Honokiol and Magnolol as Potential Anticarcinogenic and Anticancer Agents. A Comprehensive Mechanistic Review. *Nutrition & Cancer*. May 28:1-18.
- Mullally M, Cayer C, Muhammad A, Walshe-Roussel B, Ahmed F, Sanchez-Vindas PE, Otarola Rojas M, Merali Z, Cal V, Durst T, Trudeau VL, Arnason JT. (2016) Anxiolytic activity and active principles of *Piper amalago* (Piperaceae), a medicinal plant used by the Q'eqchi' Maya to treat susto, a culture-bound illness. *Journal of Ethnopharmacology*. 185:147-54.
- Murakami Y, Kawata A, Seki Y, Koh T, Yuhara K, Maruyama T, Machino M, Ito S, Kadoma Y, Fujisawa S. (2012). Comparative inhibitory effects of magnolol, honokiol, eugenol and bis-eugenol on cyclooxygenase-2 expression and nuclear factor-kappa B activation in RAW264.7 macrophage-like cells stimulated with fimbriae of *Porphyromonas gingivalis*. *In Vivo*. 26(6):941-50.
- Muroyama A, Fujita A, Lv C, Kobayashi S, Fukuyama Y, Mitsumoto Y. (2012). Magnolol Protects against MPTP/MPP(+)-Induced Toxicity via Inhibition of Oxidative Stress in In Vivo and In Vitro Models of Parkinson's Disease. *Parkinson's Disease*. 2012:985157.
- Naldi M, Brusotti G, Massolini G, Andrisano V, Temporini C, Bartolini M. (2021) Bio-Guided Fractionation of Stem Bark Extracts from *Phyllanthus muellarianus*: Identification of Phytocomponents with Anti-Cholinesterase Activity. *Molecules*. 26(14):4376.
- Neuwigner HD. (1996). *African Ethnobotany: Poisons and Drugs: Chemistry, Pharmacology, Toxicology*. CRC Press.
- Ni YF, Jiang T, Cheng QS, Gu ZP, Zhu YF, Zhang ZP, Wang J, Yan XL, Wang WP, Ke CK, Han Y, Li XF. (2012). Protective effect of magnolol on lipopolysaccharide-induced acute lung injury in mice. *Inflammation*. 35(6):1860-6
- Nishibe S, Kinoshita H, Takeda H, Okano G. (1990) Phenolic compounds from stem bark of *Acanthopanax senticosus* and their pharmacological effect in chronic swimming stressed rats. *Chemical & Pharmaceutical Bulletin*. 38(6):1763–1765.
- Niu L, Hou Y, Jiang M, Bai G. (2021) The rich pharmacological activities of *Magnolia officinalis* and secondary effects based on significant intestinal contributions. *Journal of Ethnopharmacology*. 281:114524.
- Niu N, Li B, Hu Y, Li X, Li J, Zhang H. (2014). Protective effects of scoparone against lipopolysaccharide-induced acute lung injury. *International Immunopharmacology*. 23(1):127-33.
- Nordin N, Majid NA, Hashim NM, Rahman MA, Hassan Z, Ali HM. (2015). Liriodenine, an aporphine alkaloid from *Enicosanthellum pulchrum*, inhibits proliferation of human ovarian cancer cells through induction of apoptosis via the mitochondrial signaling pathway and blocking cell cycle progression. *Drug Design, Development and Therapy*. 9:1437-48.
- Nugraha AS, Damayanti YD, Wangchuk P, Keller PA. (2019) Anti-Infective and Anti-Cancer Properties of the *Annona* Species: Their Ethnomedicinal Uses, Alkaloid Diversity, and Pharmacological Activities. *Molecules*. 24(23):4419.
- Ock J, Han HS, Hong SH, Lee SY, Han YM, Kwon BM, Suk K. (2010) Obovatol attenuates microglia-mediated neuroinflammation by modulating redox regulation. *British Journal of Pharmacology*. 159(8):1646-62.
- Oh JH, Ban JO, Cho MC, Jo M, Jung JK, Ahn B, Yoon DY, Han SB, Hong JT. (2012). 4-O-methylhonokiol inhibits colon tumor growth via p21-mediated suppression of NF- κ B activity. *Journal of Nutritional Biochemistry*. 23(7):706-15.
- Oh JH, Joo YH, Karadeniz F, Ko J, Kong CS. (2020) Syringaresinol Inhibits UVA-Induced MMP-1 Expression by Suppression of MAPK/AP-1 Signaling in HaCaT Keratinocytes and Human Dermal Fibroblasts. *International Journal of Molecular Sciences*. 21(11):3981.
- Oh JH, Kang LL, Ban JO, Kim YH, Kim KH, Han SB, Hong JT. (2009) Anti-inflammatory effect of 4-O-methylhonokiol, compound isolated from *Magnolia officinalis* through inhibition of NF-kappaB [corrected]. *Chemico-Biological Interactions*. 180(3):506-14.
- Okon E, Kukula-Koch W, Halasa M, Jarzab A, Baran M, Dmoszynska-Graniczka M, Angelis A, Kalpoutzakis E, Guz M, Stepulak A, Wawruszak A. (2020b) Magnoflorine-Isolation and the Anticancer Potential against NCI-H1299 Lung, MDA-MB-468 Breast, T98G Glioma, and TE671 Rhabdomyosarcoma Cancer Cells. *Biomolecules*. 10(11):1532.
- Okon E, Kukula-Koch W, Jarzab A, Halasa M, Stepulak A, Wawruszak A. (2020a). Advances in Chemistry and Bioactivity of Magnoflorine and Magnoflorine-Containing Extracts. *International Journal of Molecular Sciences*. 21(4):1330

- Okon E, Luszczki JJ, Kukula-Koch W, Halasa M, Jarzab A, Khurelbat D, Stepulak A, Wawruszak A. (2020C) Synergistic or Additive Pharmacological Interactions between Magnoflorine and Cisplatin in Human Cancer Cells of Different Histological Origin. *Int Journal of Molecular Sciences*. 21(8):2848.
- Okuda K, Umemura A, Umemura S, Kataoka S, Taketani H, Seko Y, Nishikawa T, Yamaguchi K, Moriguchi M, Kanbara Y, Arbiser JL, Shima T, Okanoue T, Karin M, Itoh Y. (2021) Honokiol Prevents Non-Alcoholic Steatohepatitis-Induced Liver Cancer via EGFR Degradation through the Glucocorticoid Receptor-MIG6 Axis. *Cancers (Basel)*. 13(7):1515.
- Ong CP, Lee WL, Tang YQ, Yap WH. (2019). Honokiol: A Review of Its Anticancer Potential and Mechanisms. *Cancers (Basel)*. 12(1):48.
- Oufensou S, Balmas V, Azara E, Fabbri D, Dettori MA, Schüller C, Zehetbauer F, Strauss J, Delogu G, Migheli Q. (2020) Naturally Occurring Phenols Modulate Vegetative Growth and Deoxynivalenol Biosynthesis in *Fusarium graminearum*. *ACS Omega*. 5(45):29407-29415.
- Oufensou S, Scherm B, Pani G, Balmas V, Fabbri D, Dettori MA, Carta P, Malbrán I, Migheli Q, Delogu G. (2019). Honokiol, magnolol and its monoacetyl derivative show strong anti-fungal effect on *Fusarium* isolates of clinical relevance. *PLoS One*. 14(9):e0221249.
- Pabuccuoglu V, Rozwadowska MD, Brossi A, Clark A, Hufford CD, George C, Flippen-Anderson JL. (1991) Oxoaporphine alkaloids: conversion of lysicamine into liriodendronine and its 2-O-methyl ether, and antifungal activity. *Archiv der Pharmazie (Weinheim)*. 324(1):29-33.
- Pacifici F, Rovella V, Pastore D, Bellia A, Abete P, Donadel G, Santini S, Beck H, Ricordi C, Daniele ND, Lauro D, Della-Morte D. (2021) Polyphenols and Ischemic Stroke: Insight into One of the Best Strategies for Prevention and Treatment. *Nutrients*. 13(6):1967.
- Park BY, Oh SR, Ahn KS, Kwon OK, Lee HK. (2008). (-)-Syringaresinol inhibits proliferation of human promyelocytic HL-60 leukemia cells via G1 arrest and apoptosis. *International Immunopharmacology*. 8(7):967-73.
- Park EJ, Dusabimana T, Je J, Jeong K, Yun SP, Kim HJ, Kim H, Park SW. (2020) Honokiol Protects the Kidney from Renal Ischemia and Reperfusion Injury by Upregulating the Glutathione Biosynthetic Enzymes. *Biomedicines*. 8(9):352.
- Park ES, Lim Y, Lee SH, Kwon BM, Yoo HS, Hong JT, Yun YP. (2011) Antiplatelet activity of obovatol, a biphenolic component of *Magnolia Obovata*, in rat arterial thrombosis and rabbit platelet aggregation. *Journal of Atherosclerosis & Thrombosis*. 18(8):659-69.
- Park KR, Kim JY, Kim EC, Yun HM, Hong JT. (2017). RANKL-induced osteoclastogenesis is suppressed by 4-O-methylhonokiol in bone marrow-derived macrophages. *Archives of Pharmacal Research*. 40(8):933-942.
- Park S, Kim JK, Oh CJ, Choi SH, Jeon JH, Lee IK. (2015) Scoparone interferes with STAT3-induced proliferation of vascular smooth muscle cells. *Experimental & Molecular Medicine*. 47(3):e145.
- Patel MB, Mishra S. (2011). Hypoglycemic activity of alkaloidal fraction of *Tinospora cordifolia*. *Phytomedicine*. 18(12):1045-52.
- Patel MB, Mishra S. (2012). Isoquinoline alkaloids from *Tinospora cordifolia* inhibit rat lens aldose reductase. *Phytotherapy Research* 26(9):1342-7.
- Patsenker E, Chicca A, Petrucci V, Moghadamrad S, de Gottardi A, Hampe J, Gertsch J, Semmo N, Stickel F. (2017). 4-O'-methylhonokiol protects from alcohol/carbon tetrachloride-induced liver injury in mice. *Journal of Molecular Medicine (Berl)*. 95(10):1077-1089.
- Peng CY, Yu CC, Huang CC, Liao YW, Hsieh PL, Chu PM, Yu CH, Lin SS. (2021) Magnolol inhibits cancer stemness and IL-6/Stat3 signaling in oral carcinomas. *Journal of the Formosan Medical Association*. S0929-6646(21)00026-7.
- Perviz S, Khan H, Pervaiz A. (2016). Plant Alkaloids as an Emerging Therapeutic Alternative for the Treatment of Depression. *Frontiers in Pharmacology*. 7:28.
- Pillai VB, Samant S, Sundaresan NR, Raghuraman H, Kim G, Bonner MY, Arbiser JL, Walker DI, Jones DP, Gius D, Gupta MP. (2015). Honokiol blocks and reverses cardiac hypertrophy in mice by activating mitochondrial Sirt3. *Nature Communications*. 6:6656.
- Poivre M, Duez P. (2017). Biological activity and toxicity of the Chinese herb *Magnolia officinalis* Rehder & E. Wilson (Houpo) and its constituents. *Journal of Zhejiang University-Science B* 18(3):194-214
- Prasad R, Singh T, Katiyar SK. (2017). Honokiol inhibits ultraviolet radiation-induced immunosuppression through inhibition of ultraviolet-induced inflammation and DNA hypermethylation in mouse skin. *Scientific Reports*. 7(1):1657.
- Prasad R., Katiyar SK. (2016). Honokiol, an Active Compound of Magnolia Plant, Inhibits Growth, and Progression of Cancers of Different Organs. *Advances in Experimental Medicine and Biology*. 928:245-265
- Ptaszyńska AA, Załuski D. (2020) Extracts from *Eleutherococcus senticosus* (Rupr. et Maxim.) Maxim. Roots: A New Hope Against Honeybee Death Caused by Nosemosis. *Molecules*. 25(19):4452.
- Pulivendala G, Bale S, Godugu C. (2020) Honokiol: A polyphenol neolignan ameliorates pulmonary fibrosis by inhibiting TGF-β/Smad signaling, matrix proteins and IL-6/CD44/STAT3 axis both in vitro and in vivo. *Toxicology & Applied Pharmacology*. 391:114913.
- Pyo MK, Lee Y, Yun-Choi HS. (2002) Anti-platelet effect of the constituents isolated from the barks and fruits of *Magnolia obovata*. *Archives of Pharmacal Research*. 25(3):325-8.

- Pyo MK, Yun-Choi HS, Hong YJ. (2003) Antiplatelet activities of aporphine alkaloids isolated from leaves of *Magnolia obovata*. *Planta Medica*. 69(3):267-9.
- Qi M, Chen X, Bian L, Zhang H, Ma J. (2021) Honokiol combined with curcumin sensitizes multidrug-resistant human lung adenocarcinoma A549/DDP cells to cisplatin. *Experimental & Therapeutic Medicine*. 22(5):1301.
- Qiang LQ, Wang CP, Wang FM, Pan Y, Yi LT, Zhang X, Kong LD. (2009). Combined administration of the mixture of honokiol and magnolol and ginger oil evokes antidepressant-like synergism in rats. *Archives of Pharmacol Research*. 32(9):1281-92
- Qiu L, Xu R, Wang S, Li S, Sheng H, Wu J, Qu Y. (2015). Honokiol ameliorates endothelial dysfunction through suppression of PTX3 expression, a key mediator of IKK/I κ B/NF- κ B, in atherosclerotic cell model. *Experimental and Molecular Medicine*. 47:e171.
- Quan Y, Park W, Jin J, Kim W, Park SK, Kang KP. (2020). Sirtuin 3 Activation by Honokiol Decreases Unilateral Ureteral Obstruction-Induced Renal Inflammation and Fibrosis via Regulation of Mitochondrial Dynamics and the Renal NF- κ B/TGF- β 1/Smad Signaling Pathway. *International Journal of Molecular Sciences*. 21(2):402
- Rahman MM, Lopa SS, Sadik G, Harun-Or-Rashid, Islam R, Khondkar P, Alam AH, Rashid MA. (2005) Antibacterial and cytotoxic compounds from the bark of *Cananga odorata*. *Fitoterapia*. 76(7-8):758-61.
- Ranaware AM, Banik K, Deshpande V, Padmavathi G, Roy NK, Sethi G, Fan L, Kumar AP, Kunnumakkara AB. (2018). Magnolol: A Neolignan from the Magnolia Family for the Prevention and Treatment of Cancer. *International Journal of Molecular Sciences*. 19(8):2362.
- Rauf A, Patel S, Imran M, Maalik A, Arshad MU, Saeed F, Mabkhot YN, Al-Showiman SS, Ahmad N, Elsharkawy E. (2018). Honokiol: An anticancer lignan. *Biomedicine & Pharmacotherapy*. 107:555-562.
- Ribeiro R, Carvalho FA, Barbosa-Filho JM, Cordeiro RS, Tibiriçá EV. (1996). Protective effects of Yangambin - a naturally occurring platelet-activating factor (PAF) receptor antagonist - on anaphylactic shock in rats. *Phytomedicine*. 3(3):249-56.
- Rickert U, Cossais F, Heimke M, Arnold P, Preuß-Prange A, Wilms H, Lucius R. (2018). Anti-inflammatory properties of Honokiol in activated primary microglia and astrocytes. *Journal of Neuroimmunology*. 323:78-86
- Ricordi C, Pacifici F, Lanzoni G, Palamara AT, Garaci E, Della-Morte D. (2021) Dietary and Protective Factors to Halt or Mitigate Progression of Autoimmunity, COVID-19 and Its Associated Metabolic Diseases. *International Journal of Molecular Sciences*. 22(6):3134.
- Rios JL, Francini F, Schinella GR. (2015). Natural Products for the Treatment of Type 2 Diabetes Mellitus. *Planta Medica*. 81(12-13):975-94.
- Rios JL, Simeon S, Villar A. (1989). Pharmacological activity of aporphinoid alkaloids. *Fitoterapia*. 60(5):387-412.
- Sakaue Y, Domon H, Oda M, Takenaka S, Kubo M, Fukuyama Y, Okiji T, Terao Y. (2016). Anti-biofilm and bactericidal effects of magnolia bark-derived magnolol and honokiol on *Streptococcus mutans*. *Microbiology and Immunology*. 60(1):10-6.
- Sakumoto H, Yokota Y, Ishibashi G, Maeda S, Hoshi C, Takano H, Kobayashi M, Yahagi T, Ijiri S, Sakakibara I, Hara A. (2015). Sinomenine and magnoflorine, major constituents of *Sinomeni caulis* et rhizoma, show potent protective effects against membrane damage induced by lysophosphatidylcholine in rat erythrocytes. *Journal of Natural Medicine*. 69(3):441-8.
- Sangeetha K, Martín-Acebes MA, Saiz JC, Meena KS. (2020) Molecular docking and antiviral activities of plant derived compounds against zika virus. *Microbial Pathogenesis*. 149:104540.
- Santhanam RK, Ahmad S, Abas F, Safinar Ismail I, Rukayadi Y, Tayyab Akhtar M, Shaari K. (2016) Bioactive Constituents of *Zanthoxylum rhetsa* Bark and Its Cytotoxic Potential against B16-F10 Melanoma Cancer and Normal Human Dermal Fibroblast (HDF) Cell Lines. *Molecules*. 21(6):652.
- Santos J, Quimque MT, Liman RA, Agbay JC, Macabeo APG, Corpuz MJ, Wang YM, Lu TT, Lin CH, Villaflores OB. (2021) Computational and Experimental Assessments of Magnolol as a Neuroprotective Agent and Utilization of UiO-66(Zr) as Its Drug Delivery System. *ACS Omega*. 6(38):24382-24396.
- Santos JH, Quimque MTJ, Macabeo APG, Corpuz MJT, Wang YM, Lu TT, Lin CH, Villaflores OB. (2020) Enhanced Oral Bioavailability of the Pharmacologically Active Lignan Magnolol via Zr-Based Metal Organic Framework Impregnation. *Pharmaceutics*. 12(5):437.
- Sanzani SM, Schena L, Ippolito A. (2014) Effectiveness of phenolic compounds against citrus green mould. *Molecules*. 19(8):12500-8.
- Sarrica A, Kirika N, Romeo M, Salmona M, Diomedea L. (2018) Safety and Toxicology of Magnolol and Honokiol. *Planta Medica*. 84(16):1151-1164.
- Schuehly W, Paredes JM, Kleyer J, Huefner A, Anavi-Goffer S, Raduner S, Altmann KH, Gertsch J. (2011) Mechanisms of osteoclastogenesis inhibition by a novel class of biphenyl-type cannabinoid CB(2) receptor inverse agonists. *Chemistry & Biology*. 18(8):1053-64.
- Schühly W, Khan SI, Fischer NH. (2009) Neolignans from North American *Magnolia* species with cyclooxygenase 2 inhibitory activity. *Inflammopharmacology*. 17(2):106-10.
- Selvaraj D, Muthu S, Kotha S, Siddamsetty RS, Andavar S, Jayaraman S. (2021). Syringaresinol as a novel androgen receptor antagonist against wild and mutant androgen receptors for the treatment of

- castration resistant prostate cancer: Molecular docking, in-vitro and molecular dynamics study. *Journal of Biomolecular Structure & Dynamics*. Jan 13:1-22
- Seo EJ, Fischer N, Efferth T. (2018). Phytochemicals as inhibitors of NF- κ B for treatment of Alzheimer's disease. *Pharmacological Research*. 129:262-273
- Seo JJ, Lee SH, Lee YS, Kwon BM, Ma Y, Hwang BY, Hong JT, Oh KW. (2007) Anxiolytic-like effects of obovatol isolated from *Magnolia obovata*: involvement of GABA/benzodiazepine receptors complex. *Progress in Neuropsychopharmacology & Biological Psychiatry*. 31(7):1363-9.
- Seo KH, Lee DY, Lee DS, Park JH, Jeong RH, Jung YJ, Shrestha S, Chung IS, Kim GS, Kim YC, Baek NI. (2013) Neolignans from the fruits of *Magnolia obovata* and their inhibition effect on NO production in LPS-induced RAW 264.7 cells. *Planta Medica*. 79(14):1335-40.
- Seo KH, Nam YH, Lee DY, Ahn EM, Kang TH, Baek NI. (2015). Recovery effect of phenylpropanoid glycosides from *Magnolia obovata* fruit on alloxan-induced pancreatic islet damage in zebrafish (*Danio rerio*). *Carbohydrate Research*. 416:70-4.
- Seok YM, Kim HY, Garmaa O, Cha BY, Woo JT, Kim IK. (2012). Effects of magnolol on vascular contraction in rat aortic rings. *Clinical and Experimental Pharmacology and Physiology*. 39(1):28-36
- Serra MF, Diaz BL, Barreto EO, Pereira AP, Lima MC, Barbosa-Filho JM, Cordeiro RS, Martins MA, de Silva PM (1997). Anti-allergic properties of the natural PAF antagonist yangambin. *Planta Medica*. 63(3):207-12.
- Shahid A, Bhatt P, Miller A, Sutariya V. (2021) Honokiol-Loaded Methoxy Poly (Ethylene Glycol) Polycaprolactone Micelles for the Treatment of Age-Related Macular Degeneration. *Assay & Drug Development Technologies*. 19(6):350-360.
- Sharma ML. (1988). Mechanism of hypotensive action of scoparone. *Indian Journal of Medical Research*. 87:387-94.
- Sharma U, Bala M, Kumar N, Singh B, Munshi RK, Bhalerao S (2012). Immunomodulatory active compounds from *Tinospora cordifolia*. *Journal of Ethnopharmacology*, 141(3):918-26.
- Shen JL, Man KM, Huang PH, Chen WC, Chen DC, Cheng YW, Liu PL, Chou MC, Chen YH. (2010). Honokiol and magnolol as multifunctional antioxidative molecules for dermatologic disorders. *Molecules*. 15(9):6452-65.
- Shen P, Zhang Z, He Y, Gu C, Zhu K, Li S, Li Y, Lu X, Liu J, Zhang N, Cao Y. (2018). Magnolol treatment attenuates dextran sulphate sodium-induced murine experimental colitis by regulating inflammation and mucosal damage. *Life Sciences*. 196:69-76.
- Shen Z, Yang C, Zhu P, Tian C, Liang A. (2020) Protective effects of syringin against oxidative stress and inflammation in diabetic pregnant rats via TLR4/MyD88/NF- κ B signaling pathway. *Biomedicine & Pharmacotherapy*. 131:110681.
- Shi X, Zhang T, Lou H, Song H, Li C, Fan P. (2020) Anticancer Effects of Honokiol via Mitochondrial Dysfunction Are Strongly Enhanced by the Mitochondria-Targeting Carrier Berberine. *Journal of Medicinal Chemistry*. 63(20):11786-11800.
- Shi YN, Shi YM, Yang L, Li XC, Zhao JH, Qu Y, Zhu HT, Wang D, Cheng RR, Yang CR, Xu M, Zhang YJ. (2015). Lignans and aromatic glycosides from *Piper wallichii* and their antithrombotic activities. *Journal of Ethnopharmacology*. 162:87-96.
- Shih CY, Chou TC. (2012) The antiplatelet activity of magnolol is mediated by PPAR- β/γ . *Biochemical Pharmacology*. 84(6):793-803.
- Shim KS, Kim T, Ha H, Lee CJ, Lee B, Kim HS, Park JH, Ma JY. (2015). Water extract of *Magnolia officinalis* cortex inhibits osteoclastogenesis and bone resorption by downregulation of nuclear factor of activated T cells cytoplasmic 1. *Integrated Medicine Research*. 4(2):102-111.
- Simonsen HT, Adersen A, Bremner P, Heinrich M, Wagner Smitt U, Jaroszewski JW. (2004). Antifungal constituents of *Melicope borbonica*. *Phytotherapy Research*. 18(7):542-5.
- Singh S, Das T, Awasthi M, Pandey VP, Pandey B, Dwivedi UN. (2016) DNA topoisomerase-directed anticancerous alkaloids: ADMET-based screening, molecular docking, and dynamics simulation. *Biotechnology & Applied Biochemistry*. 63(1):125-37.
- Singha SK, Muhammad I, Ibrahim MA, Wang M, Ashpole NM, Shariat-Madar Z. (2019). 4-O-Methylhonokiol Influences Normal Cardiovascular Development in Medaka Embryo. *Molecules*. 24(3):475
- Sinha P, Srivastava S, Mishra N, Yadav NP. (2014). New perspectives on antiacne plant drugs: contribution to modern therapeutics. *Biomedical Research International*. 2014:301304.
- Solinski AE, Ochoa C, Lee YE, Paniak T, Kozlowski MC, Wuest WM. (2018). Honokiol-Inspired Analogs as Inhibitors of Oral Bacteria. *ACS Infectious Diseases*. 4(2):118-122.
- Son DJ, Lee GR, Oh S, Lee SE, Choi WS. (2015). Gastroprotective efficacy and safety evaluation of scoparone derivatives on experimentally induced gastric lesions in rodents. *Nutrients*. 7(3):1945-64.
- Song G, Fischer N H. (1999). Biologically Active Lignans and Neolignans from Magnolia Species. *Revista de la Sociedad Química de México*. 43(6): 211-218
- Song X, Liu L, Wu X, Liu Y, Yuan J. (2021) Chitosan-Based Functional Films Integrated with Magnolol: Characterization, Antioxidant and Antimicrobial Activity and Pork Preservation. *International Journal of Molecular Sciences*. 22(15):7769.
- Sourivong P, Schronerová K, Babincová M. (2007) Scoparone inhibits ultraviolet radiation-induced lipid peroxidation. *Zeitschrift der Naturforschung C Journal of Biosciences*. 62(1-2):61-4.

- Su CM, Weng YS, Kuan LY, Chen JH, Hsu FT. (2020) Suppression of PKC δ /NF- κ B Signaling and Apoptosis Induction through Extrinsic/Intrinsic Pathways Are Associated Magnolol-Inhibited Tumor Progression in Colorectal Cancer In Vitro and In Vivo. *International Journal of Molecular Sciences*. 21(10):3527.
- Suh KS, Chon S, Choi EM. (2016). Protective effects of honokiol against methylglyoxal-induced osteoblast damage. *Chemico-Biological Interactions*. 244:169-77.
- Suh KS, Chon S, Jung WW, Choi EM. (2017). Magnolol protects pancreatic β -cells against methylglyoxal-induced cellular dysfunction. *Chemico-Biological Interactions*. 277:101-109
- Suk K, Ock J. (2012) Chemical genetics of neuroinflammation: natural and synthetic compounds as microglial inhibitors. *Inflammopharmacology*. 20(3):151-8.
- Sulakhiya K, Kumar P, Gurjar SS, Barua CC, Hazarika NK. (2015). Beneficial effect of honokiol on lipopolysaccharide induced anxiety-like behavior and liver damage in mice. *Pharmacology Biochemistry and Behaviour*. 132:79-87.
- Sulakhiya K, Kumar P, Jangra A, Dwivedi S, Hazarika NK, Baruah CC, Lahkar M. (2014). Honokiol abrogates lipopolysaccharide-induced depressive like behavior by impeding neuroinflammation and oxido-nitrosative stress in mice. *European Journal of Pharmacology*. 744:124-31
- Sun J, Fu X, Liu Y, Wang Y, Huo B, Guo Y, Gao X, Li W, Hu X. (2015a). Hypoglycemic effect and mechanism of honokiol on type 2 diabetic mice. *Drug Design, Development and Therapy*. 9:6327-42.
- Sun L, Liao K, Hang C, Wang D. (2017a). Honokiol induces reactive oxygen species-mediated apoptosis in *Candida albicans* through mitochondrial dysfunction. *PLoS One*. 12(2):e0172228.
- Sun L, Liao K, Hang C, Wang D. (2017b). Honokiol induces reactive oxygen species-mediated apoptosis in *Candida albicans* through mitochondrial dysfunction. *PLoS One*. 12(2):e0172228.
- Sun L, Liao K, Wang D. (2015b). Effects of magnolol and honokiol on adhesion, yeast-hyphal transition, and formation of biofilm by *Candida albicans*. *PLoS One*. 10(2):e0117695
- Sun LM, Liao K, Liang S, Yu PH, Wang DY. (2015c). Synergistic activity of magnolol with azoles and its possible antifungal mechanism against *Candida albicans*. *Journal of Applied Microbiology*. 118(4):826-38
- Sun XL, Zhang XW, Zhai HJ, Zhang D, Ma SY. (2020a) Magnoflorine inhibits human gastric cancer progression by inducing autophagy, apoptosis and cell cycle arrest by JNK activation regulated by ROS. *Biomedicine & Pharmacotherapy*. 125:109118.
- Sun XL, Zhu ML, Dai YQ, Li HM, Li BH, Ma H, Zhang CH, Wu CZ. (2021) Semi-Synthesis and In Vitro Anti-Cancer Evaluation of Magnolol Derivatives. *Molecules*. 26(14):4302.
- Sun Z, Zeng J, Wang W, Jia X, Wu Q, Yu D, Mao Y. (2020b) Magnoflorine Suppresses MAPK and NF- κ B Signaling to Prevent Inflammatory Osteolysis Induced by Titanium Particles In Vivo and Osteoclastogenesis via RANKL In Vitro. *Frontiers in Pharmacology*. 11:389.
- Suwanprakorn N, Chanvorachote P, Tongyen T, Sritularak B, Suvanprakorn P. (2021) Scoparone Induces Expression of Pluripotency Transcription Factors SOX2 and NANOG in Dermal Papilla Cells. *In Vivo*. 35(5):2589-2597.
- Szałabska-Rapala K, Borymska W, Kaczmarczyk-Sedlak I. (2021) Effectiveness of Magnolol, a Lignan from Magnolia Bark, in Diabetes, Its Complications and Comorbidities-A Review. *International Journal of Molecular Sciences*. 22(18):10050.
- Talarek S, Listos J, Barreca D, Tellone E, Suredda A, Nabavi SF, Braidy N, Nabavi SM. (2017). Neuroprotective effects of honokiol: from chemistry to medicine. *Biofactors*. 43(6):760-769.
- Tan HL, Chan KG, Pusparajah P, Duangjai A, Saokaew S, Mehmood Khan T, Lee LH, Goh BH. (2016). Rhizoma Coptidis: A Potential Cardiovascular Protective Agent. *Frontiers in Pharmacology*. 7:362.
- Tan J, Luo J, Meng C, Jiang N, Cao J, Zhao J. (2021b) Syringin exerts neuroprotective effects in a rat model of cerebral ischemia through the FOXO3a/NF- κ B pathway. *International Immunopharmacology*. 90:107268.
- Tan X, Zhou Y, Agarwal A, Lim M, Xu Y, Zhu Y, O'Brien J, Tran E, Zheng J, Gius D, Richter CP. (2020) Systemic application of honokiol prevents cisplatin ototoxicity without compromising its antitumor effect. *American Journal of Cancer Research*. 10(12):4416-4434.
- Tan Y, Yu H, Sun S, Gan S, Gong R, Mou KJ, Xue J, Xu S, Wu J, Ma L. (2021a) Honokiol exerts protective effects on neural myelin sheaths after compressed spinal cord injury by inhibiting oligodendrocyte apoptosis through regulation of ER-mitochondrial interactions. *The Journal of Spinal Cord Medicine*. Apr 8:1-10.
- Tan Z, Liu H, Song X, Ling Y, He S, Yan Y, Yan J, Wang S, Wang X, Chen A. (2019). Honokiol post-treatment ameliorates myocardial ischemia/reperfusion injury by enhancing autophagic flux and reducing intracellular ROS production. *Chemico-Biological Interactions*. 307:82-90.
- Tang CY, Lai CC, Huang PH, Yang AH, Chiang SC, Huang PC, Tseng KW, Huang CH. (2017). Magnolol Reduces Renal Ischemia and Reperfusion Injury via Inhibition of Apoptosis. *American Journal of Chinese Medicine*. Voll45(7):1421-1439.
- Tang P, Gu JM, Xie ZA, Gu Y, Jie ZW, Huang KM, Wang JY, Fan SW, Jiang XS, Hu ZJ. (2018b). Honokiol alleviates the degeneration of intervertebral disc via suppressing the activation of TXNIP-NLRP3 inflammasome signal pathway. *Free Radical Biology and Medicine*. 120:368-379.
- Tang P, Sun Q, Yang H, Tang B, Pu H, Li H. (2018a). Honokiol nanoparticles based on epigallocatechin gallate functionalized chitin to enhance therapeutic effects against liver cancer. *International Journal of Pharmaceutics*. 545(1-2):74-83.

- Tanikawa T, Hayashi T, Suzuki R, Kitamura M, Inoue Y. (2021) Inhibitory effect of honokiol on furin-like activity and SARS-CoV-2 infection. *Journal of Traditional & Complementary Medicine*. Sep 16.
- Tao S, Yang X, Liao L, Yang J, Liang K, Zeng S, Zhou J, Zhang M, Li J. (2021a) A novel anticaries agent, honokiol-loaded poly(amido amine) dendrimer, for simultaneous long-term antibacterial treatment and remineralization of demineralized enamel. *Dental Materials*. 37(9):1337-1349.
- Tao W, Hu Y, Chen Z, Dai Y, Hu Y, Qi M. (2021b) Magnolol attenuates depressive-like behaviors by polarizing microglia towards the M2 phenotype through the regulation of Nrf2/HO-1/NLRP3 signaling pathway. *Phytomedicine*. 91:153692.
- Taşdemir E, Atmaca M, Yıldırım Y, Bilgin HM, Demirtaş B, Obay BD, Kelle M, Oflazoğlu HD. (2017). Influence of coumarin and some coumarin derivatives on serum lipid profiles in carbontetrachloride-exposed rats. *Human and Experimental Toxicology*. 36(3):295-301
- Tian F, Lee SY, Woo SY, Choi HY, Park SB, Chun HS. (2021) Effect of plant-based compounds on the antifungal and antiaflatoxinigenic efficiency of strobilurins against *Aspergillus flavus*. *Journal of Hazardous Materials*. 415:125663.
- Tian X, Li Z, Lin Y, Chen M, Pan G, Huang C. (2014). Study on the PK profiles of magnoflorine and its potential interaction in Cortex phellodendri decoction by LC-MS/MS. *Analytical and Bioanalytical Chemistry*. 406(3):841-9.
- Tibirica E. (2001) Cardiovascular properties of yangambin, a lignan isolated from Brazilian plants. *Cardiovascular Drug Reviews*. 19(4):313-28
- Tringali C, Spatafora C, Cali V, Simmonds MJ. (2001). Antifeedant constituents from *Fagara macrophylla*. *Fitoterapia*. 72:538-543
- Tripathi SK, Xu T, Feng Q, Avula B, Shi X, Pan X, Mask MM, Baerson SR, Jacob MR, Ravu RR, Khan SI, Li XC, Khan IA, Clark AM, Agarwal AK. (2017). Two plant-derived aporphinoid alkaloids exert their antifungal activity by disrupting mitochondrial iron-sulfur cluster biosynthesis. *Journal of Biological Chemistry*. 292(40):16578-16593
- Tsai JJ, Chen JH, Chen CH, Chung JG, Hsu FT. (2020) Apoptosis induction and ERK/NF-κB inactivation are associated with magnolol-inhibited tumor progression in hepatocellular carcinoma in vivo. *Environmental Toxicology*. 35(2):167-175.
- Tsai T, Kao CY, Chou CL, Liu LC, Chou TC. (2016). Protective effect of magnolol-loaded polyketal microparticles on lipopolysaccharide-induced acute lung injury in rats. *Journal of Microencapsulation*. 33(5):401-11.
- Tsai YC, Cheng PY, Kung CW, Peng YJ, Ke TH, Wang JJ, Yen MH. (2010). Beneficial effects of magnolol in a rodent model of endotoxin shock. *European Journal of Pharmacology*. 641(1):67-73
- Us MR, Zin T, C SS, Iqbal M. (2020) Effect of syringin (eleutheroside B) on the physiological and hematological parameters in STZ induced Type II diabetic Wistar rats. *Pakistan Journal of Pharmaceutical Sciences*. 33(6):2601-2606.
- Usach I, Alaimo A, Fernández J, Ambrosini A, Mocini S, Ochiuz L, Peris JE. (2021) Magnolol and Honokiol: Two Natural Compounds with Similar Chemical Structure but Different Physicochemical and Stability Properties. *Pharmaceutics*. 13(2):224.
- Vavilala DT, O'Bryhim BE, Ponnaluri VK, White RS, Radel J, Symons RC, Mukherji M. (2013). Honokiol inhibits pathological retinal neovascularization in oxygen-induced retinopathy mouse model. *Biochemical and Biophysical Research Communications*. 438(4):697-702.
- Vavilala DT, Ponnaluri VK, Kanjilal D, Mukherji M. (2014). Evaluation of anti-HIF and anti-angiogenic properties of honokiol for the treatment of ocular neovascular diseases. *PLoS One*. 9(11):e113717.
- Vega-García A, Santana-Gómez CE, Rocha L, Magdaleno-Madrigal VM, Morales-Otal A, Buzoianu-Anguiano V, Feria-Romero I, Orozco-Suárez S. (2019). *Magnolia officinalis* reduces the long-term effects of the status epilepticus induced by kainic acid in immature rats. *Brain Research Bulletin*. 149:156-167.
- Vila-Nova NS, de Moraes SM, Falcão MJ, Alcantara TT, Ferreira PA, Cavalcanti ES, Vieira IG, Campello CC, Wilson M. (2013) Different susceptibilities of *Leishmania* spp. promastigotes to the *Annona muricata* acetogenins annonacinone and corosolone, and the *Platymiscium floribundum* coumarin scoparone. *Experimental Parasitology*. 133(3):334-8. doi: 10.1016/j.exppara.2012.11.025.
- Villar A, Mares M, Rios JL, Canton E, Gobernado M. (1987) Antimicrobial activity of benzyloquinoline alkaloids. *Pharmazie*. 42(4):248-50.
- Vinche ADL, de-la-Cruz-Chacón I, González-Esquinca AR, da Silva JF, Ferreira G, Dos Santos DC, Garces HG, de Oliveira DVM, Marçon C, Cavalcante RS, Mendes RP. (2020) Antifungal activity of liriodenine on agents of systemic mycoses, with emphasis on the genus *Paracoccidioides*. *Journal of Venomous Animals & Toxins Including Tropical Diseases*. 26:e20200023.
- Waechter AI, Cavé A, Hocquemiller R, Bories C, Muñoz V, Fournet A. (1999) Antiprotozoal activity of aporphine alkaloids isolated from *Unonopsis buchtienii* (Annonaceae). *Phytotherapy Research*. 13(2):175-7.
- Wan C, Wei Y, Ma J, Geng X. (2018). Protective effects of scoparone against ischemia-reperfusion-induced myocardial injury. *Molecular Medicine Reports*. 18(2):1752-1760
- Wang C, Gan D, Wu J, Liao M, Liao X, Ai W. (2018a). Honokiol Exerts Antidepressant Effects in Rats Exposed to Chronic Unpredictable Mild Stress by Regulating Brain Derived Neurotrophic Factor Level and Hypothalamus-Pituitary-Adrenal Axis Activity. *Neurochemical Research*. 43(8):1519-1528.

- Wang CC, Lin KC, Lin BS, Chio CC, Kuo JR. (2013a). Resuscitation from experimental traumatic brain injury by magnolol therapy. *Journal of Surgical Research* 184(2):1045-52
- Wang CY, Zhang Q, Xun Z, Yuan L, Li R, Li X, Tian SY, Xin N, Xu Y. (2020d) Increases of iASPP-Keap1 interaction mediated by syringin enhance synaptic plasticity and rescue cognitive impairments via stabilizing Nrf2 in Alzheimer's models. *Redox Biology*. 36:101672.
- Wang D, Jin Q, Xiang H, Wang W, Guo N, Zhang K, Tang X, Meng R, Feng H, Liu L, Wang X, Liang J, Shen F, Xing M, Deng X, Yu L. (2011). Transcriptional and functional analysis of the effects of magnolol: inhibition of autolysis and biofilms in *Staphylococcus aureus*. *PLoS One*. 6(10):e26833
- Wang H, Liao Z, Sun X, Shi Q, Huo G, Xie Y, Tang X, Zhi X, Tang Z. (2014a). Intravenous administration of Honokiol provides neuroprotection and improves functional recovery after traumatic brain injury through cell cycle inhibition. *Neuropharmacology*. 86:9-21.
- Wang HH, Chen Y, Changchien CY, Chang HH, Lu PJ, Mariadas H, Cheng YC, Wu ST. (2020a) Pharmaceutical Evaluation of Honokiol and Magnolol on Apoptosis and Migration Inhibition in Human Bladder Cancer Cells. *Frontiers in Pharmacology*. 11:549338.
- Wang HM, Zhang SW. (2010). The intervention effects of different drugs on dendritic cells in acute pancreatitis in mouse. *Zhongguo Wei Zhong Bing Ji Jiu Yi Xue*. 22(4):201-5 [Chinese]
- Wang J, Nisar M, Huang C, Pan X, Lin D, Zheng G, Jin H, Chen D, Tian N, Huang Q, Duan Y, Yan Y, Wang K, Wu C, Hu J, Zhang X, Wang X. (2018f). Small molecule natural compound agonist of SIRT3 as a therapeutic target for the treatment of intervertebral disc degeneration. *Experimental & Molecular Medicine*. 50(11):146
- Wang JH, Shih KS, Liou JP, Wu YW, Chang AS, Wang KL, Tsai CL, Yang CR. (2012). Anti-arthritis effects of magnolol in human interleukin 1 β -stimulated fibroblast-like synoviocytes and in a rat arthritis model. *PLoS One*. 7(2):e3136
- Wang JJ, Zhao R, Liang JC, Chen Y. (2014b). The antidiabetic and hepatoprotective effects of magnolol on diabetic rats induced by high-fat diet and streptozotocin. *Yao Xue Xue Bao*. 49(4):476-81.
- Wang L, Wang D, Yuan S, Feng X, Wang M. (2020c) Transcriptomic Insights into the Antifungal Effects of Magnolol on the Growth and Mycotoxin Production of *Alternaria alternata*. *Toxins (Basel)*. 12(10):665. doi: 10.3390/toxins12100665.
- Wang Q, Shu M, Xu Q, Xie Y, Ruan S, Wang J, Zeng L. (2018e). Effects of Honokiol on cognitive function in mice with kainic acid-induced epilepsy. *Zhejiang Da Xue Xue Bao Yi Xue Ban*. 47(5):450-456. [Chinese].
- Wang S, Wu C, Li X, Zhou Y, Zhang Q, Ma F, Wei J, Zhang X, Guo P. (2017b). Syringaresinol-4-O- β -d-glucoside alters lipid and glucose metabolism in HepG2 cells and C2C12 myotubes. *Acta Pharmaceutica Sinica B*. 7(4):453-460.
- Wang S, Yang X. (2020) Eleutheroside E decreases oxidative stress and NF- κ B activation and reprograms the metabolic response against hypoxia-reoxygenation injury in H9c2 cells. *International Immunopharmacology*. 84:106513.
- Wang TE, Lai YH, Yang KC, Lin SJ, Chen CL, Tsai PS. (2020b) Counteracting Cisplatin-Induced Testicular Damages by Natural Polyphenol Constituent Honokiol. *Antioxidants (Basel)*. 9(8):723.
- Wang TJ, Liu HT, Lai YH, Jan TR, Nomura N, Chang HW, Chou CC, Lee YJ, Tsai PJ. (2018b). Honokiol, a Polyphenol Natural Compound, Attenuates Cisplatin-Induced Acute Cytotoxicity in Renal Epithelial Cells Through Cellular Oxidative Stress and Cytoskeleton Modulations. *Frontiers in Pharmacology*. 9:357
- Wang X, Cheng L, Xie HJ, Ju RJ, Xiao Y, Fu M, Liu JJ, Li XT. (2018g). Functional paclitaxel plus honokiol micelles destroying tumour metastasis in treatment of non-small-cell lung cancer. *Artificial Cells, Nanomedicine & Biotechnology*. 46(suppl 2):1154-1169.
- Wang X, Gu H, Zhang H, Xian J, Li J, Fu C, Zhang C, Zhang J. (2021) Oral Core-Shell Nanoparticles Embedded in Hydrogel Microspheres for the Efficient Site-Specific Delivery of Magnolol and Enhanced Antiulcerative Colitis Therapy. *ACS Applied Materials & Interfaces*. 13(29):33948-33961.
- Wang X, Xiao D, Ma C, Zhang L, Duan Q, Zheng X, Mao M, Zhu D, Li Q. (2019b). The effect of honokiol on pulmonary artery endothelium cell autophagy mediated by cyclophilin A in hypoxic pulmonary arterial hypertension. *Journal of Pharmacological Sciences*. 139(3):158-165.
- Wang XD, Wang YL, Gao WF. (2015). Honokiol possesses potential anti-inflammatory effects on rheumatoid arthritis and GM-CSF can be a target for its treatment. *International Journal of Clinical and Experimental Pathology*. 8(7):7929-36.
- Wang Y, Jiang LL, Wu JF, Liu Z. (2016). Protective effect of Honokiol against endometriosis in Rats via attenuating Survivin and Bcl-2: A mechanistic study. *Cellular and Molecular Biology (Noisy-le-grand)*. 62(1):1-5.
- Wang Y, Shang G, Wang W, Qiu E, Pei Y, Zhang X. (2020e) Magnoflorine inhibits the malignant phenotypes and increases cisplatin sensitivity of osteosarcoma cells via regulating miR-410-3p/HMGB1/NF- κ B pathway. *Life Sciences*. 256:117967.
- Wang Y, Wang M, Chen B, Shi J. (2017a). Scoparone attenuates high glucose-induced extracellular matrix accumulation in rat mesangial cells. *European Journal of Pharmacology*. 815:376-380.
- Wang Y, Yan W, Chen Q, Huang W, Yang Z, Li X, Wang X. (2017c) Inhibition viral RNP and anti-inflammatory activity of coumarins against influenza virus. *Biomedicine & Pharmacotherapy*. Mar;87:583-588.

- Wang Y, Zhang ZZ, Wu Y, Zhan J, He XH, Wang YL. (2013b). Honokiol protects rat hearts against myocardial ischemia reperfusion injury by reducing oxidative stress and inflammation. *Experimental and Therapeutic Medicine*. 5(1):315-319
- Wang Y, Zhao D, Sheng J, Lu P. (2018c). Local honokiol application inhibits intimal thickening in rabbits following carotid artery balloon injury. *Molecular Medicine Reports*. 17(1):1683-1689.
- Wang YD, Sun XJ, Yang WJ, Li J, Yin JJ. (2018d). Magnolol exerts anticancer activity in hepatocellular carcinoma cells through regulating endoplasmic reticulum stress-mediated apoptotic signaling. *Oncotargets & Therapy*. 11:5219-5226.
- Wang Z, Perumalsamy H, Wang X, Ahn YJ. (2019a). Toxicity and possible mechanisms of action of honokiol from *Magnolia denudata* seeds against four mosquito species. *Scientific Reports* 9(1):411.
- Wei T, Xiaojun X, Peilong C. (2020). Magnoflorine improves sensitivity to doxorubicin (DOX) of breast cancer cells via inducing apoptosis and autophagy through AKT/mTOR and p38 signaling pathways. *Biomedicine & Pharmacotherapy*. 121:109139.
- Wei W, Dejie L, Xiaojing S, Tiancheng W, Yongguo C, Zhengtao Y, Naisheng Z. (2015). Magnolol inhibits the inflammatory response in mouse mammary epithelial cells and a mouse mastitis model. *Inflammation*. 38(1):16-26
- Wei X, Fang Z, Sheng J, Wang Y, Lu P. (2020) Honokiol-mesoporous Silica Nanoparticles Inhibit Vascular Restenosis via the Suppression of TGF- β Signaling Pathway. *International Journal of Nanomedicine*. 15:5239-5252.
- Wei XQ, Zhang HS, Wei GH, Zhang JG, Du YY, Tan HY, Yang J. (2018). Honokiol Protects against Anti- β 1-Adrenergic Receptor Autoantibody-Induced Myocardial Dysfunction via Activation of Autophagy. *Oxidative Medicine & Cellular Longevity*. 2018:1640804.
- Wen H, Zhou S, Song J. (2019). Induction of apoptosis by magnolol via the mitochondrial pathway and cell cycle arrest in renal carcinoma cells. *Biochemical & Biophysical Research Communications*. 508(4):1271-1278.
- Wen J, Wang X, Pei H, Xie C, Qiu N, Li S, Wang W, Cheng X, Chen L. (2015). Anti-psoriatic effects of Honokiol through the inhibition of NF- κ B and VEGFR-2 in animal model of K14-VEGF transgenic mouse. *Journal of Pharmacological Sciences*. 128(3):116-24.
- Weng CC, Chen ZA, Chao KT, Ee TW, Lin KJ, Chan MH, Hsiao IT, Yen TC, Kung MP, Hsu CH, Wey SP. (2017). Quantitative analysis of the therapeutic effect of magnolol on MPTP-induced mouse model of Parkinson's disease using in vivo 18F-9-fluoropropyl-(+)-dihydrotetrabenazine PET imaging. *PLoS One*. 12(3):e0173503.
- Weng G, Duan Y, Zhong Y, Song B, Zheng J, Zhang S, Yin Y, Deng J. (2021) Plant Extracts in Obesity: A Role of Gut Microbiota. *Frontiers in Nutrition*. 8:727951.
- Witaicenis A, Seito LN, da Silveira Chagas A, de Almeida LD Jr, Luchini AC, Rodrigues-Orsi P1, Cestari SH, Di Stasi LC. (2014). Antioxidant and intestinal anti-inflammatory effects of plant-derived coumarin derivatives. *Phytomedicine*. 21(3):240-46.
- Woodbury A, Yu SP, Chen D, Gu X, Lee JH, Zhang J, Espinera A, García PS, Wei L. (2015). Honokiol for the Treatment of Neonatal Pain and Prevention of Consequent Neurobehavioral Disorders. *Journal of Natural Products*. 78(11):2531-6.
- Woodbury A, Yu SP, Wei L, García P. (2013). Neuro-modulating effects of honokiol: a review. *Frontiers in Neurology*. 4:130.
- Wu G, Chen G, Zhou J, Zhu H, Chu J, Zhang F. (2018). Liriodenine enhances radiosensitivity in esophageal cancer ECA-109 cells by inducing apoptosis and G2/M arrest. *Oncology Letters*. 16(4):5020-5026.
- Wu L, Zou H, Xia W, Dong Q, Wang L. (2015) Role of magnolol in the proliferation of vascular smooth muscle cells. *Herz*. 40(3):542-8.
- Wu S, Yu D, Liu W, Zhang J, Liu X, Wang J, Yu M, Li Z, Chen Q, Li X, Ye X. (2020a). Magnoflorine from *Coptis chinensis* has the potential to treat DNCB-induced atopic dermatitis by inhibiting apoptosis of keratinocyte. *Bioorganic & Medicinal Chemistry*. 28(2):115093
- Wu X, Luo J, Liu H, Cui W, Feng D, Qu Y. (2020b) SIRT3 protects against early brain injury following subarachnoid hemorrhage via promoting mitochondrial fusion in an AMPK dependent manner. *Chinese Neurosurgical Journal*. Jan 3;6:1.
- Xia J, Li CY, Wang H, Zhang QM, Han ZM. (2018). Therapeutic effects of scoparone on pilocarpine (Pilo)-induced seizures in mice. *Biomedicine and Pharmacotherapy*. 97:1501-1513
- Xia S, Lin H, Liu H, Lu Z, Wang H, Fan S, Li N. (2019b). Honokiol Attenuates Sepsis-Associated Acute Kidney Injury via the Inhibition of Oxidative Stress and Inflammation. *Inflammation*. 42(3):826-834.
- Xia T, Zhang J, Han L, Jin Z, Wang J, Li X, Man S, Liu C, Gao W. (2019a). Protective effect of magnolol on oxaliplatin-induced intestinal injury in mice. *Phytotherapy Research*. 33(4):1161-1172
- Xian YF, Ip SP, Mao QQ, Su ZR, Chen JN, Lai XP, Lin ZX. (2015). Honokiol improves learning and memory impairments induced by scopolamine in mice. *European Journal of Pharmacology*. 760:88-95.
- Xian YF, Qu C, Liu Y, Ip SP, Yuan QJ, Yang W, Lin ZX. (2020) Magnolol Ameliorates Behavioral Impairments and Neuropathology in a Transgenic Mouse Model of Alzheimer's Disease. *Oxidative Medicine & Cellular Longevity*. 2020:5920476

- Xian YF, Ip SP, Mao QQ, Lin ZX. (2016). Neuroprotective effects of honokiol against beta-amyloid-induced neurotoxicity via GSK-3 β and β -catenin signaling pathway in PC12 cells. *Neurochemistry International*. 97:8-14.
- Xiao S, Chen F, Gao C. (2017). Antitumor activity of 4-O-Methylhonokiol in human oral cancer cells is mediated via ROS generation, disruption of mitochondrial potential, cell cycle arrest and modulation of Bcl-2/Bax proteins. *Journal of BUON [Official Journal of the Bulgarian Union of Oncology]*. 22(6):1577-1581.
- Xie Z, Zhao J, Wang H, Jiang Y, Yang Q, Fu Y, Zeng H, Hölscher C, Xu J, Zhang Z. (2020) Magnolol alleviates Alzheimer's disease-like pathology in transgenic *C. elegans* by promoting microglia phagocytosis and the degradation of beta-amyloid through activation of PPAR- γ . *Biomedicine & Pharmacotherapy*. 124:109886.
- Xiong Y, Liu Q, Yin X. (2016) Synthesis of α -glucosidase-immobilized nanoparticles and their application in screening for α -glucosidase inhibitors. *Journal of Chromatography B. Analytical Technologies in the Biomedical Life Sciences*. 1022:75-80.
- Xu D, Zeng W, Han X, Qian T, Sun J, Qi F, Liu C, Wang Q, Jin H. (2020a) Honokiol protects against epidural fibrosis by inhibiting fibroblast proliferation and extracellular matrix overproduction in rats post-laminectomy. *International Journal of Molecular Medicine*. 46(6):2057-2068.
- Xu J, Lu X, Han F. (2018). Effects of honokiol on particulate matter 2.5-induced lung injury in asthmatic mice and its mechanisms. *Zhong Nan Da Xue Xue Bao Yi Xue Ban*. 43(7):718-724
- Xu M, Cai J, Wei H, Zhou M, Xu P, Huang H, Peng W, Du F, Gong A, Zhang Y. (2016). Scoparone Protects Against Pancreatic Fibrosis via TGF- β /Smad Signaling in Rats. *Cellular Physiology and Biochemistry*. 40(1-2):277-286.
- Xu Q, Yi LT, Pan Y, Wang X, Li YC, Li JM, Wang CP, Kong LD. (2008). Antidepressant-like effects of the mixture of honokiol and magnolol from the barks of *Magnolia officinalis* in stressed rodents. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*. 32(3):715-25.
- Xu T, Kuang T, Du H, Li Q, Feng T, Zhang Y, Fan G. (2020b). Magnoflorine: A review of its pharmacology, pharmacokinetics and toxicity. *Pharmacological Research*. 152:104632
- Xue B, Zhao Y, Su J, Miao Q, Miao P, Chen N, Wang Z, Zhang Y, Ma S. (2017) In Vitro Intestinal Absorption and Metabolism of Magnoflorine and its Potential Interaction in Coptidis Rhizoma Decoction in Rat. *Eur J Drug Metabolism & Pharmacokinetics*. 42(2):281-293.
- Yaakoub H, Staerck C, Mina S, Godon C, Fleury M, Bouchara JP, Calenda A. (2021) Repurposing of auranofin and honokiol as antifungals against *Scedosporium* species and the related fungus *Lomentospora prolificans*. *Virulence*. 12(1):1076-1090.
- Yadav A, Singh A, Phogat J, Dahuja A, Dabur R. (2021) Magnoflorine prevent the skeletal muscle atrophy via Akt/mTOR/FoxO signal pathway and increase slow-MyHC production in streptozotocin-induced diabetic rats. *Journal of Ethnopharmacology*. 267:113510.
- Yamaguchi M, Arbiser JL, Weitzmann MN. (2011) Honokiol stimulates osteoblastogenesis by suppressing NF- κ B activation. *International Journal of Molecular Medicine*. 28(6):1049-53.
- Yamahara J, Kobayashi G, Matsuda H, Katayama T, Fujimura H. (1989). The effect of scoparone, a coumarin derivative isolated from the Chinese crude drug *Artemisiae capillaris* flos, on the heart. *Chem Pharm Bull (Tokyo)* 37:1297–1299
- Yamahara J. (1976) Behavioral pharmacology of berberine-type alkaloids. (1) Central depressive action of Coptidis rhizoma and its constituents. *Nihon Yakurigaku Zasshi*. 72:899–908.
- Yaman Tunc S, Agacayak E, Goruk NY, Icen MS, Turgut A, Alabalik U, Togrul C, Ekinci C, Ekinci A, Gul T. (2016) Protective effects of honokiol on ischemia/reperfusion injury of rat ovary: an experimental study. *Drug Design Development and Therapy*. 10:1077-83.
- Yamazaki T, Shimosaka S, Sasaki H, Matsumura T, Takiyama T, Tokiwa T. (2007) (+)-Syringaresinol-di-O-beta-D-glucoside, a phenolic compound from *Acanthopanax senticosus* Harms, suppresses proinflammatory mediators in SW982 human synovial sarcoma cells by inhibiting activating protein-1 and/or nuclear factor-kappaB activities. *Toxicology In Vitro*. 21(8):1530-7.
- Yan YF, Yang CJ, Shang XF, Zhao ZM, Liu YQ, Zhou R, Liu H, Wu TL, Zhao WB, Wang YL, Hu GF, Qin F, He YH, Li HX, Du SS. (2020) Bioassay-guided isolation of two antifungal compounds from *Magnolia officinalis*, and the mechanism of action of honokiol. *Pesticide Biochemistry & Physiology*. 170:104705.
- Yang B, Chen G, Song X, Chen Z, Song X, Wang J. (2010). Chemical constituents and antimicrobial activities of *Canthium horridum*. *Natural Product Communications*. 5(6):913-4.
- Yang B, Chen G, Song X, Chen Z, Song X, Wang J. (2016a). Anti-angiogenic and anti-inflammatory effect of Magnolol in the oxygen-induced retinopathy model. *Inflammation Research*. 65(1):81-93.
- Yang C, Li T, Jiang L, Zhi X, Cao H. (2020a). Semisynthesis and biological evaluation of some novel Mannich base derivatives derived from a natural lignan obovatol as potential antifungal agents. *Bioorganic Chemistry*. 94:103469.
- Yang CH, Cheng MJ, Lee SJ, Yang CW, Chang HS, Chen IS. (2009a). Secondary metabolites and cytotoxic activities from the stem bark of *Zanthoxylum nitidum*. *Chemistry and Biodiversity*. 6(6):846-57.
- Yang D, Wu W, Gan G, Wang D, Gong J, Fang K, Lu F. (2020c) (-)-Syringaresinol-4-O- β -D-glucopyranoside from Cortex Albizziae inhibits corticosterone-induced PC12 cell apoptosis and relieves the associated dysfunction. *Food & Chemical Toxicology*. 141:111394.

- Yang D, Yang J, Shi D, Deng R, Yan B. (2011) Scoparone potentiates transactivation of the bile salt export pump gene and this effect is enhanced by cytochrome P450 metabolism but abolished by a PKC inhibitor. *British Journal of Pharmacology*. 164(5):1547-57.
- Yang EJ, Lee JY, Park SH, Lee T, Song KS. (2013). Neuroprotective effects of neolignans isolated from *Magnoliae* Cortex against glutamate-induced apoptotic stimuli in HT22 cells. *Food and Chemical Toxicology*. 56:304-12.
- Yang F, Yang L, Wang W, Liu Y, Zhao C, Zu Y. (2012). Enrichment and purification of syringin, eleutheroside E and isofraxidin from *Acanthopanax senticosus* by macroporous resin. *International Journal of Molecular Sciences*. 13(7):8970-86.
- Yang JY, Koo JH, Song YG, Kwon KB, Lee JH, Sohn HS, Park BH, Jhee EC, Park JW. (2006). Stimulation of melanogenesis by scoparone in B16 melanoma cells. *Acta Pharmacologica Sinica* 27(11):1467-73f
- Yang SR, Hsu WH, Wu CY, Shang HS, Liu FC, Chen A, Hua KF, Ka SM. (2020b) Accelerated, severe lupus nephritis benefits from treatment with honokiol by immunoregulation and differentially regulating NF- κ B/NLRP3 inflammasome and sirtuin 1/autophagy axis. *FASEB Journal*. 34(10):13284-13299.
- Yang TC, Zhang SW, Sun LN, Wang H, Ren AM. (2008a). Magnolol attenuates sepsis-induced gastrointestinal dysmotility in rats by modulating inflammatory mediators. *World Journal of Gastroenterology*. 14(48):7353-60.
- Yang TH, Ma YB, Geng CA, Yan DX, Huang XY, Li TZ, Zhang XM, Chen JJ. (2018). Synthesis and biological evaluation of magnolol derivatives as melatonergic receptor agonists with potential use in depression. *European Journal of Medicinal Chemistry*. 156:381-393.
- Yang X, Wang Y, Gao G. (2016b) High glucose induces rat mesangial cells proliferation and MCP-1 expression via ROS-mediated activation of NF- κ B pathway, which is inhibited by eleutheroside E. *Journal of Receptor & Signal Transduction Research*. 36(2):152-7.
- Yang X, Wong MS, Wang NL, Chan SC, Yao XS. (2007). Lignans from the stems of *Sambucus williamsii* and their effects on osteoblastic UMR106 cells. *Journal of Asian Natural Product Research* 9(6-8):583-91
- Yang Y, Wang T, Guan J, Wang J, Chen J, Liu X, Qian J, Xu X, Qu W, Huang Z, Zhan C. (2019). Oral Delivery of Honokiol Microparticles for Nonrapid Eye Movement Sleep. *Molecular Pharmaceutics*. 16(2):737-743.
- Yang YJ, Lee HJ, Choi DH, Huang HS, Lim SC, Lee MK. (2008b). Effect of scoparone on neurite outgrowth in PC12 cells. *Neuroscience Letters*. 440(1):14-8.
- Yang YJ, Lee HJ, Huang HS, Lee BK, Choi HS, Lim SC, Lee CK, Lee MK. (2009b). Effects of scoparone on dopamine biosynthesis and L-DOPA-induced cytotoxicity in PC12 cells. *Journal of Neuroscience Research*. 87(8):1929-37
- Yao J, Li Y, Jin Y, Chen Y, Tian L, He W. (2021) Synergistic cardioprotection by tilianin and syringin in diabetic cardiomyopathy involves interaction of TLR4/NF- κ B/NLRP3 and PGC1 α /SIRT3 pathways. *International Immunopharmacology*. 96:107728.
- Ye H, Meng Y. (2021) Honokiol regulates endoplasmic reticulum stress by promoting the activation of the sirtuin 1-mediated protein kinase B pathway and ameliorates high glucose/high fat-induced dysfunction in human umbilical vein endothelial cells. *Endocrine Journal*. 68(8):981-992.
- Ye JS, Chen L, Lu YY, Lei SQ, Peng M, Xia ZY. (2019). SIRT3 activator honokiol ameliorates surgery/anesthesia-induced cognitive decline in mice through anti-oxidative stress and anti-inflammatory in hippocampus. *CNS Neuroscience & Therapy*. 25(3):355-366.
- Yi X, Lou L, Wang J, Xiong J, Zhou S. (2021) Honokiol antagonizes doxorubicin resistance in human breast cancer via miR-188-5p/FBXW7/c-Myc pathway. *Cancer Chemotherapy & Pharmacology*. 87(5):647-656.
- Yin HQ, Je YT, Kim YC, Shin YK, Sung S, Lee K, Jeong GS, Kim YC, Lee BH. (2009b). *Magnolia officinalis* reverses alcoholic fatty liver by inhibiting the maturation of sterol regulatory element-binding protein-1c. *Journal of Pharmacological Sciences*. 109(4):486-95.
- Yin HQ, Kim YC, Chung YS, Kim YC, Shin YK, Lee BH. (2009a). Honokiol reverses alcoholic fatty liver by inhibiting the maturation of sterol regulatory element binding protein-1c and the expression of its downstream lipogenesis genes. *Toxicology and Applied Pharmacology* 236(1):124-30.
- Yu FL, Wu JW, Zhu H. (2019b). Honokiol alleviates acetaminophen-induced hepatotoxicity via decreasing generation of acetaminophen-protein adducts in liver. *Life Sciences*. 230:97-103
- Yu JY, Lee JJ, Jung JK, Min YK, Kim TJ, Ma JY, Lee MY, Yun YP. (2012). JJK694, a synthesized obovatol derivative, inhibits platelet activation by suppressing cyclooxygenase and lipoxygenase activities. *Bioscience Biotechnology and Biochemistry*. 76(11):2038-43.
- Yu R, Zou Y, Liu B, Guo Y, Wang X, Han M. (2019a). Surface modification of pH-sensitive honokiol nanoparticles based on dopamine coating for targeted therapy of breast cancer. *Colloids & Surfaces. B, Biointerfaces*. 177:1-10
- Yu Y, Li M, Su N, Zhang Z, Zhao H, Yu H, Xu Y. (2016). Honokiol protects against renal ischemia/reperfusion injury via the suppression of oxidative stress, iNOS, inflammation and STAT3 in rats. *Molecular Medicine Reports*. 13(2):1353-60.
- Yuan Y, Zhou X, Wang Y, Wang Y, Teng X, Wang S. (2019). Cardiovascular Modulating Effects of Magnolol and Honokiol, two polyphenolic compounds from Traditional Chinese Medicine-*Magnolia officinalis*. *Current Drug Targets*. 21(6):559-572.

- Zang H, Yang Q, Li J. (2019) Eleutheroside B Protects against Acute Kidney Injury by Activating IGF Pathway. *Molecules*. 24(21):3876. doi: 10.3390/molecules24213876.
- Zhai L, Wang X. (2018). Syringaresinol-di-O-β-D-glucoside, a phenolic compound from *Polygonatum sibiricum*, exhibits an antidiabetic and antioxidative effect on a streptozotocin-induced mouse model of diabetes. *Molecular Medicine Reports*. 18(6):5511-5519.
- Zhai T, Xu W, Liu Y, Qian K, Xiong Y, Chen Y. (2020) Honokiol Alleviates Methionine-Choline Deficient Diet-Induced Hepatic Steatosis and Oxidative Stress in C57BL/6 Mice by Regulating CFLAR-JNK Pathway. *Oxidative Medicine & Cellular Longevity*. 2020:2313641
- Zhan L, Peng X, Lin J, Zhang Y, Gao H, Zhu Y, Huan Y, Zhao G. (2020) Honokiol Reduces Fungal Load, Toll-Like Receptor-2, and Inflammatory Cytokines in *Aspergillus fumigatus* Keratitis. *Investigative Ophthalmology & Visual Science*. 61(4):48.
- Zhang A, Liu Z, Sheng L, Wu H. (2017c). Protective effects of syringin against lipopolysaccharide-induced acute lung injury in mice. *Journal of Surgical Research*. 209:252-257.
- Zhang A, Qiu S, Sun H, Zhang T, Guan Y, Han Y, Yan G, Wang X. (2016). Scoparone affects lipid metabolism in primary hepatocytes using lipidomics. *Scientific Reports*. 6:28031.
- Zhang A, Sun H, Wang X. (2014a). Urinary metabolic profiling of rat models revealed protective function of scoparone against alcohol induced hepatotoxicity. *Scientific Reports*. 4:6768.
- Zhang A, Sun H, Wu G, Sun W, Yuan Y, Wang X. (2013). Proteomics analysis of hepatoprotective effects for scoparone using MALDI-TOF/TOF mass spectrometry with bioinformatics. *OMICS*. 17(4):224-9.
- Zhang B, Chang HS, Hu KL, Yu X, Li LN, Xu XQ. (2021g) Combination of Geniposide and Eleutheroside B Exerts Antidepressant-like Effect on Lipopolysaccharide-Induced Depression Mice Model. *Chinese Journal of Integrative Medicine*. 27(7):534-541.
- Zhang B, Li Y, Liu M, Duan XH, Hu KL, Li LN, Yu X, Chang HS. (2020a) Antidepressant-like mechanism of honokiol in a rodent model of corticosterone-induced depression. *Journal of Integrative Neuroscience*. 19(3):459-467.
- Zhang B, Zhai M, Li B, Liu Z, Li K, Jiang L, Zhang M, Yi W, Yang J, Yi D, Liang H, Jin Z, Duan W, Yu S. (2018b). Honokiol Ameliorates Myocardial Ischemia/Reperfusion Injury in Type 1 Diabetic Rats by Reducing Oxidative Stress and Apoptosis through Activating the SIRT1-Nrf2 Signaling Pathway. *Oxidative Medicine and Cellular Longevity*. 2018:3159801
- Zhang GZ, Deng YJ, Xie QQ, Ren EH, Ma ZJ, He XG, Gao YC, Kang XW. (2020b) Sirtuins and intervertebral disc degeneration: Roles in inflammation, oxidative stress, and mitochondrial function. *Clinica Chimica Acta*. 508:33-42.
- Zhang H, Gu H, Jia Q, Zhao Y, Li H, Shen S, Liu X, Wang G, Shi Q. (2020). Syringin protects against colitis by ameliorating inflammation. *Archives of Biochemistry & Biophysics*. 680:108242
- Zhang H, Ju B, Zhang X, Zhu Y, Nie Y, Xu Y, Lei Q. (2017a). Magnolol Attenuates Concanavalin A-induced Hepatic Fibrosis, Inhibits CD4+ T Helper 17 (Th17) Cell Differentiation and Suppresses Hepatic Stellate Cell Activation: Blockade of Smad3/Smad4 Signalling. *Basic Clinical Pharmacology and Toxicology*. 120(6):560-570
- Zhang H, Li J, Yuan R, Li Y, Zhang Y, Hu X, Qu J, Chen Y, Wang Z, Xia M, Wang D. (2021a) Augment the efficacy of eradicating metastatic lesions and tumor proliferation in breast cancer by honokiol-loaded pH-sensitive targeted lipid nanoparticles. *Colloids & Surfaces B. Biointerfaces*. 207:112008.
- Zhang J, Chen Z, Huang X, Shi W, Zhang R, Chen M, Huang H, Wu L. (2019). Insights on the Multifunctional Activities of Magnolol. *Biomed Research International*. 2019:1847130
- Zhang L, Jiang X, Zhang J, Gao H, Yang L, Li D, Zhang Q, Wang B, Cui L, Wang X. (2021h) (-)-Syringaresinol suppressed LPS-induced microglia activation via downregulation of NF-κB p65 signaling and interaction with ERβ. *International Immunopharmacology*. 99:107986.
- Zhang LL, Qiu J, Hong JR, Xu XQ, Zhang GQ, Li G. (2021d) Magnolol attenuates inflammatory pain by inhibiting sodium currents in mouse dorsal root ganglion neurons. *Inflammopharmacology*. 29(3):869-877.
- Zhang N, Zhao L, Su Y, Liu X, Zhang F, Gao Y. (2021e) Syringin Prevents Aβ25-35-Induced Neurotoxicity in SK-N-SH and SK-N-BE Cells by Modulating miR-124-3p/BID Pathway. *Neurochemistry Research*. 46(3):675-685.
- Zhang PP, Guo ZF, Zhang PH, Liu ZP, Song L, Zhang ZF, Jia YZ, Cao ZZ, Ma JH. (2021f) Eleutheroside B, a selective late sodium current inhibitor, suppresses atrial fibrillation induced by sea anemone toxin II in rabbit hearts. *Acta Pharmacologica Sinica*. 42(2):209-217.
- Zhang Q, Jiang X, He W, Wei K, Sun J, Qin X, Zheng Y, Jiang X. (2017b). MCL Plays an Anti-Inflammatory Role in Mycobacterium tuberculosis-Induced Immune Response by Inhibiting NF-κB and NLRP3 Inflammasome Activation. *Mediators of Inflammation*. 2017:2432904
- Zhang T, Xiang L. (2019). Honokiol alleviates sepsis-induced acute kidney injury in mice by targeting the miR-218-5p/heme oxygenase-1 signaling pathway. *Cellular & Molecular Biology Letters*. 24:15.
- Zhang WW, Li Y, Wang XQ, Tian F, Cao H, Wang MW, Sun QS. (2005). Effects of magnolol and honokiol derived from traditional Chinese herbal remedies on gastrointestinal movement. *World Journal of Gastroenterology*. 11(28):4414-8.
- Zhang X, Huang H, Chang H, Jin X. (2015a). Magnolol reduces bleomycin-induced rodent lung fibrosis. *International Journal of Clinical and Experimental Medicine*. 8(9):15450-7.

- Zhang X, Wang J, Sui A, Zhang N, Lv Q, Liu Z. (2021c) Antinociceptive Effect of Magnolol in a Neuropathic Pain Model of Mouse. *Journal of Pain Research*. 14:2083-2093.
- Zhang Y, Fu LT, Tang F. (2018a). The protective effects of magnolol on acute trinitrobenzene sulfonic acid-induced colitis in rats. *Molecular Medicine Reports*. 17(3):3455-3464.
- Zhang Y, Wen P, Luo J, Ding H, Cao H, He W, Zen K, Zhou Y, Yang J, Jiang L. (2021b) Sirtuin 3 regulates mitochondrial protein acetylation and metabolism in tubular epithelial cells during renal fibrosis. *Cell Death & Disease*. 12(9):847.
- Zhang Z, Chen J, Wang J, Yan X, Zheng Y, Conklin DJ, Kim KS, Kim KH, Tan Y, Kim YH, Cai L. (2014b). The magnolia bioactive constituent 4-O-methylhonokiol protects against high-fat diet-induced obesity and systemic insulin resistance in mice. *Oxidative Medicine and Cellular Longevity*. 2014:965954.
- Zhang Z, Chen J, Zhou S, Wang S, Cai X, Conklin DJ, Kim KS, Kim KH, Tan Y, Zheng Y, Kim YH, Cai L. (2015b). Magnolia bioactive constituent 4-O-methylhonokiol prevents the impairment of cardiac insulin signaling and the cardiac pathogenesis in high-fat diet-induced obese mice. *International Journal of Biological Sciences*. 11(8):879-91.
- Zhang Z, Yang L, Wang B, Zhang L, Zhang Q, Li D, Zhang S, Gao H, Wang X. (2017d). Protective role of liriodendrin in mice with dextran sulphate sodium-induced ulcerative colitis. *International Immunopharmacology*. 52:203-210
- Zhao D, Wang Y, Du C, Shan S, Zhang Y, Du Z, Han D. (2017a). Honokiol Alleviates Hypertrophic Scar by Targeting Transforming Growth Factor- β /Smad2/3 Signaling Pathway. *Frontiers in Pharmacology*. 8:206.
- Zhao F, Guo Z, Hou F, Fan W, Wu B, Qian Z. (2021) Magnoflorine Alleviates "M1" Polarized Macrophage-Induced Intervertebral Disc Degeneration Through Repressing the HMGB1/Myd88/NF- κ B Pathway and NLRP3 Inflammasome. *Frontiers in Pharmacology*. 12:701087
- Zhao L, Xiao HT, Mu HX, Huang T, Lin ZS, Zhong LLD, Zeng GZ, Fan BM, Lin CY, Bian ZX. (2017b). Magnolol, a Natural Polyphenol, Attenuates Dextran Sulfate Sodium-Induced Colitis in Mice. *Molecules*. 22(7):1218.
- Zhao X, Li F, Sun W, Gao L, Kim KS, Kim KT, Cai L, Zhang Z, Zheng Y. (2016). Extracts of *Magnolia* Species-Induced Prevention of Diabetic Complications: A Brief Review. *International Journal of Molecular Science*. 17(10):1629.
- Zheng J, Shi L, Liang F, Xu W, Li T, Gao L, Sun Z, Yu J, Zhang J. (2018). Sirt3 Ameliorates Oxidative Stress and Mitochondrial Dysfunction After Intracerebral Hemorrhage in Diabetic Rats. *Frontiers in Neuroscience*. 12:414.
- Zheng Z, Ma T, Guo H, Kim KS, Kim KT, Bi L, Zhang Z, Cai L. (2019). 4-O-methylhonokiol protects against diabetic cardiomyopathy in type 2 diabetic mice by activation of AMPK-mediated cardiac lipid metabolism improvement. *Journal of Cellular & Molecular Medicine*. 23(8):5771-578
- Zhi XY, Jiang LY, Li T, Song LL, Wang Y, Cao H, Yang C. (2020) Semisynthesis and insecticidal bioactivities of benzoxazole and benzoxazolone derivatives of honokiol, a naturally occurring neolignan derived from *Magnolia officinalis*. *Bioorganic & Medicinal Chemistry Letters*. 30(9):127086
- Zhong X, Liu H. (2018). Honokiol attenuates diet-induced non-alcoholic steatohepatitis by regulating macrophage polarization through activating peroxisome proliferator-activated receptor γ . *Journal of Gastroenterology and Hepatology*. 33(2):524-532.
- Zhou C, Guo C, Li W, Zhao J, Yang Q, Tan T, Wan Z, Dong J, Song X, Gong T. (2018b). A novel honokiol liposome: formulation, pharmacokinetics, and antitumor studies. *Drug Development & Industrial Pharmacy*. 44(12):2005-2012.
- Zhou F, Jiang Z, Yang B, Hu Z. (2018a). Magnolol exhibits anti-inflammatory and neuroprotective effects in a rat model of intracerebral haemorrhage. *Brain, Behaviour & Immunity*. pii: S0889-1591(18)31254-6.
- Zhou H, Liu J, Wan F, Guo F, Ning Y, Liu S, Ding W. (2021) Insight into the mechanism of action of scoparone inhibiting egg development of *Tetranychus cinnabarinus* Boisduval. *Comparative Biochemistry & Physiology C Toxicology & Pharmacology*. 246:109055.
- Zhou P, Fu J, Hua H, Liu X. (2017). In vitro inhibitory activities of magnolol against *Candida* spp. *Drug Design Development and Therapy* 11:2653-2661
- Zhou W, Lin X, Chu J, Jiang T, Zhao H, Yan B, Zhang Z. (2019). Magnolol prevents ossified tendinopathy by inhibiting PGE2-induced osteogenic differentiation of TDSCs. *International Immunopharmacology*. 70:117-124
- Zhou Y, Cheng C, Baranenko D, Wang J, Li Y, Lu W. (2018c) Effects of *Acanthopanax senticosus* on Brain Injury Induced by Simulated Spatial Radiation in Mouse Model Based on Pharmacokinetics and Comparative Proteomics. *International Journal of Molecular Sciences*. 19(1):159.
- Zhou Y, Wang F, Hao L, Wang N. (2013). Effects of magnoline on P-selectin's expression in diabetic rats and its reno-protection. *Kidney and Blood Pressure Research* 37(2-3):211-20.
- Zhu S, Chen P, Chen Y, Li M, Chen C, Lu H. (2020) 3D-Printed Extracellular Matrix/Polyethylene Glycol Diacrylate Hydrogel Incorporating the Anti-inflammatory Phytomolecule Honokiol for Regeneration of Osteochondral Defects. *American Journal of Sports Medicine*. 48(11):2808-2818.
- Zou Y, Zhou Y, Jin Y, He C, Deng Y, Han S, Zhou C, Li X, Zhou Y, Liu Y. (2018). Synergistically Enhanced Antimetastasis Effects by Honokiol-Loaded pH-Sensitive Polymer-Doxorubicin Conjugate Micelles. *ACS Applied Mater Interfaces*. 10(22):18585-600

Zuo GY, Zhang XJ, Han J, Li YQ, Wang GC. (2015). In vitro synergism of magnolol and honokiol in combination with antibacterial agents against clinical isolates of methicillin-resistant *Staphylococcus aureus* (MRSA). BMC Complementary and Alternative Medicine. 15:425.

Disclaimer: CSIRO Publishing publishes and distributes scientific, technical and health science books, magazines and journals from Australia to a worldwide audience and conducts these activities autonomously from the research activities of the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The views expressed in this publication are those of the author(s) and do not necessarily represent those of, and should not be attributed to, the publisher or CSIRO. The information contained in this book comprises general statements based on academic research. The reader/user is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. Neither the author(s) nor the publisher shall be liable for technical or other errors or omissions contained herein. The reader/user accepts all risks and responsibility for losses, damages, costs, expenses, injury and any other consequences (Loss) in connection with using this information. Neither the author(s) nor the publisher accepts any legal responsibility or liability for any Loss in connection with the information contained in this book, any reliance or actions made on, or any use of, the information or from the failure of the reader/user to understand or accurately interpret the information.