

Essential oil constituent	Cited research	Method of research	Method of delivery	Influenza strain(s) used	Mechanism identified	Timing of action
Eugenol	Dai et al 2013, Vimalanathan and Hudson 2014	<i>In vitro</i>	Liquid media (both), vapor (Dai et al 2013 only)	H1N1 (4 strains), H3N2 (2 strains), H9N2 (2 strains), H5N1 (1 strain)	Inhibits autophagy, which impairs viral replication and cytokine storm caused by virus; inhibits cell death [Dai et al 2013]; inhibition of NA (liquid) and HA activity (liquid and vapor) [Vimalanathan and Hudson 2014]	1-5 hr post-infection [Dai et al 2013]; not stated in Vimalanathan and Hudson 2014 ("early")
Germacrone	Liao et al 2013, Reviewed in Setzer 2016	<i>In vitro, in vivo</i>	Liquid media, injected into mice	H1N1 (2 strains, and 1 strain with amantadine resistance), H3N2 (2 strain), and Influenza B virus (1 strain)	Reduced viral genome transcription, protein expression, and progeny virus production at multiple points in early infection	2-4 hr post-infection ("early to mid")
Patchoulol	Kiyohara et al 2012, Li et al 2012, Wu et al 2011, Reviewed in Setzer 2016	<i>In vitro</i> (Kiyohara et al 2012), <i>in vivo</i> (Li et al 2012)	Liquid media, ingestion by mice	H1N1 (2 strains), H2N2 (1 strain), H3N2 (1 strain), and Influenza B virus (1 strain)	Lung inflammation and damage reduced due to improvement in host immunity as measured by T cell activation and cytokine/chemokine levels (Li et al 2012), patchoulol binds NA protein at its active site, and interferes with NA activity (Wu et al 2011)	Not stated
β-Santalol	Paulpandi et al 2012, Kiyohara et al 2012, Reviewed in Setzer 2016	<i>In vitro</i>	Liquid media	H3N2 (1 strain), H1N1 (1 strain)	Reduces viral mRNA synthesis	Not stated
Terpinen-4-ol	Garozzo et al 2009, Garozzo et al 2011	<i>In vitro</i>	Liquid media	H1N1 (1 strain)	Inhibits uncoating in endosomes by interfering with acidification (Garozzo et al 2011)	Not stated
α-Terpineol	Garozzo et al 2009, Garozzo et al 2011	<i>In vitro</i>	Liquid media	H1N1 (1 strain)	Inhibits uncoating in endosomes by interfering with acidification (Garozzo et al 2011)	Not stated
Terpinolene	Garozzo et al 2009, Garozzo et al 2011	<i>In vitro</i>	Liquid media	H1N1 (1 strain)	Inhibits uncoating in endosomes by interfering with acidification (Garozzo et al 2011)	Not stated
<i>trans</i>-Cinnamaldehyde	Hayashi et al 2007, Reviewed in Setzer 2016	<i>In vitro, in vivo</i>	Liquid media, intranasal inoculations into mice	H1N1 (2 strains), H3N2 (1 strain), Influenza B virus (2 strains)	Targets mid-stage of virus growth, specifically the synthesis of virus proteins necessary for progeny viruses (but not mRNAs), treats lethal influenza virus-induced pneumonia	3 hr post-infection in vitro, 1 hr post-infection in vivo (daily tx) ("mid")