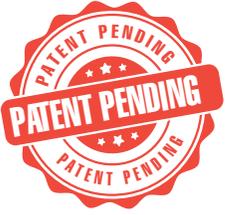




immun<sup>®</sup>

HOPE



Standardized high quality dry extract  $\geq 5\%$  total polyphenols

**Influenza (flu) is an acute respiratory illness caused by influenza viruses;** normally, it presents a seasonal epidemic trend, but it may result also in a pandemic. Influenza is a disease of great importance for public health because of its clinical and economic impact, caused by the marked tendency of influenza viruses to genetic mutations, thus evading the **immune defenses**, developed both by immunized people and by those who have already contracted the disease. **Vaccination and preventive hygiene measures** are still the only weapons to counteract the spread of the disease.



**Sambucus nigra L.**, fam. Adoxaceae, is a typical tree of temperate Europe that has always been traditionally used to soothe respiratory ailments and flu, due to its anti-inflammatory and diaphoretic actions; the latter helps to reduce fever by increasing sweating.



**Humulus lupulus L.**, fam. Cannabaceae, is a climbing dioecious plant, native to the temperate zones of Eurasia, whose inflorescences are used as flavorings in beer since the 11<sup>th</sup> century. It is traditionally used as a digestive and to promote relaxation and sleep.

**immunHopE<sup>®</sup>** is characterized by antioxidant, cytoprotective and antiviral properties, useful to support **natural body defenses**



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## IMMUNHOPE® HAS ANTIOXIDANT AND ANTIVIRAL PROPERTIES

*immunHopE*® is able to restore cell viability after treatment with the pro-oxidant agent tBOOH.

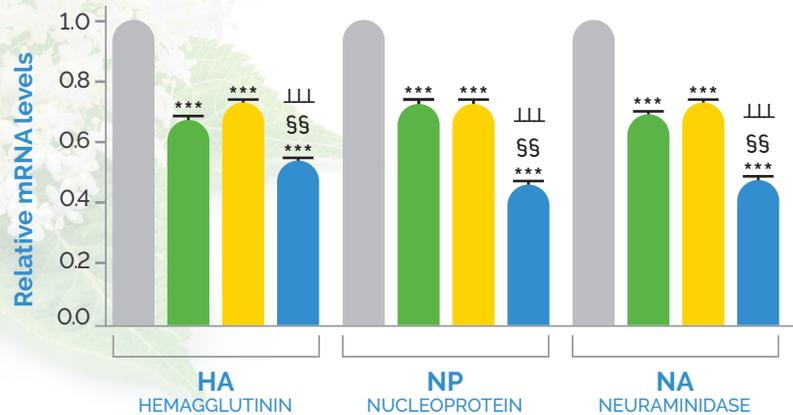
*immunHopE*® produces an **enhanced effect** compared to single extracts in reducing the mRNA levels of all viral proteins tested, particularly nucleoprotein (-53%) and neuraminidase (-52%), highlighting a **synergy**.

Effect of treatment with **Hop extract** (green ●), **Elderflower extract** (yellow ●) and *immunHopE*® (blu ●) according to the b.d.p.i. (before, during and post-infection) treatment protocol with PR8/H1N1 influenza virus on viral proteins (RT-PCR analysis)

\*\*\*p < 0.001 indicates a statistically significant difference from the infected control

§ p < 0.05, §§ p < 0.01 e §§§ p < 0.001 indicate a statistically significant difference of *immunHopE*® compared to hop extract alone

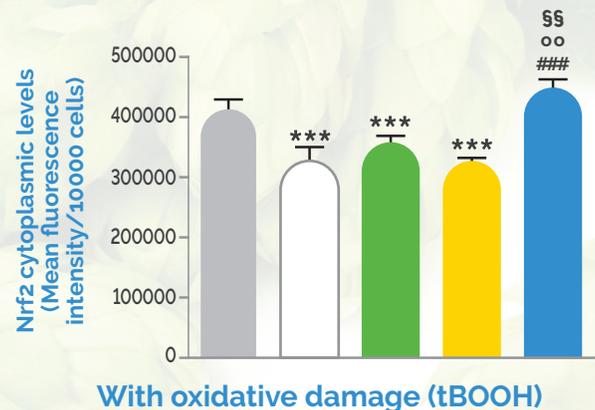
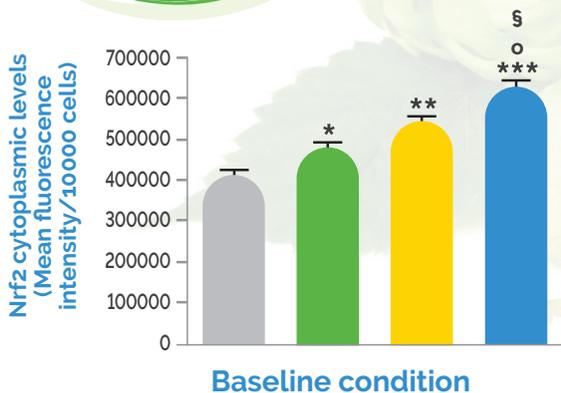
† p < 0.05, p < 0.01 e p < 0.001 indicate a statistically significant difference of *immunHopE*® compared to elderflower extract alone



## IMMUNHOPE® HAS A BOOSTER EFFECT ON CELLULAR DEFENSES

*immunHopE*® was also evaluated in relation to the activity of the nuclear factor erythroid-2 (Nrf2), i.e., a transcription factor that regulates the gene expression of a wide variety of **antioxidant cytoprotective enzymes**, including **glutathione**.

*immunHopE*® increases Nrf2 expression significantly not only compared to the control, but also in comparison with single extracts. This effect is also evident in the case of **oxidative damage induced by tBOOH**; in fact, the mixture restores the normal levels of Nrf2, reduced by tBOOH.



Effect of treatment with **Hop extract** (green ●), **Elderflower extract** (yellow ●) and *immunHopE*® (blu ●) on cytoplasmic Nrf2 levels in A549 lung cancer cells undergoing 24 h pretreatment.

\* p < 0.05, \*\* p < 0.01 e \*\*\* p < 0.001 indicate a statistically significant difference compared to control (Ctrl).

○ p < 0.05 indicates a statistically significant difference of *immunHopE*® compared to hop extract.

§ p < 0.05 indicates a statistically significant difference of *immunHopE*® compared to elderflower extract.

Effect of treatment with **Hop extract** (green ●), **Elderflower extract** (yellow ●) and *immunHopE*® (blu ●) on tBOOH-induced cytoplasmic Nrf2 levels reduction in A549 lung cancer cells after 30 minutes of co-treatment.

\*\*\* p < 0.001 indicates a statistically significant reduction compared to the control (Ctrl).

### p < 0.001 indicates a statistically significant difference of *immunHopE*® compared to tBOOH.

○○ p < 0.01 indicates a statistically significant difference of *immunHopE*® compared to hop extract.

§§ p < 0.05 indicates a statistically significant difference of *immunHopE*® compared to elderflower extract.