

Use of Echinaforce to Prevent Coronavirus Infections

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The current outbreak of zoonotic coronavirus SARS-CoV-2 epidemic has produced a lot of media attention and uncertainty on how to protect against the infection. The WHO recommends typical hygiene measures as published on <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>. Intensive research is focussing on a specific vaccination against SARS-CoV-2 and on antiviral medications acting directly against this virus.

Individuals may wish to modulate their unspecific immune system towards better protection against respiratory tract infections. The extract of *Echinacea purpurea* Echinaforce® (EF) from A. Vogel AG, Switzerland is licensed in Switzerland and other countries for the prevention and treatment of respiratory tract infections. There is scientific evidence from several *in-vitro* and *in-vivo* studies including double-blind, randomized, controlled, clinical studies following GCP guidelines and published in peer-reviewed journals. This scientific evidence shows as follows.

***In vitro* effects on enveloped respiratory viruses**

- EF *in vitro* inactivates enveloped respiratory viruses at physiologically relevant concentrations [1,2]:
 - Influenza A and B at concentrations of 0.58 - 50 µg/ml¹
 - Respiratory syncytial virus (RSV) at 2.5 µg/ml
 - Herpes simplex virus (HSV) at 0.39 µg/ml
- EF inhibits virally induced expression of pro-inflammatory cytokines including interleukin (IL) 6 or IL 8 by epithelial cells. Effects were seen with many kinds of viral stimuli including coronavirus [3].

The multicomponent extract non-specifically and irreversibly interferes with viral docking receptors (e.g. influenza) to block infectivity of pathogens [2,3]. EF further reduces secretion of pro-inflammatory cytokines upon viral infection.

***In vitro* effects on coronaviruses**

- EF *in vitro* inactivates infectivity of α - and β -Coronaviruses (HCoV-229E, SARS-CoV and MERS-CoV) at concentrations < 10 µg/ml [3].

¹A/Victoria/3/75; A/Thailand/KAN-1/2004; A/FPV/Bratislava/79; A/Puerto Rico/8/34 and A/Hamburg/1/09; A/Anhui/1/2013 (H7N9).

- Similar to other enveloped viruses direct contact of virus and EF is required for full inactivation.
- Intracellular effects (e.g. inhibition of viral replication) is only seen at very high concentrations, less likely to play a role *in vivo*.
- Replication in an organotypic cell culture system (MucilAir™) shows that prophylactic application of EF prevents coronavirus infection also under more *in vivo*-like situations.

Results show that antiviral effects of EF apply to a broad range of enveloped respiratory viruses. Due to its non-specific action, coronaviruses and potentially the new occurring SARS-CoV-2 are susceptible to EF as well, though the latter virus has not been studied yet.

In vivo effects of EF on enveloped respiratory viruses

Preventive application of EF over 4 months reduced enveloped virus infections (nasal samples from symptomatic patients positively tested for influenza, RSV, coronaviruses, parainfluenza or metapneumoviruses): 24 infections, of which 21 were coronaviruses (9: 229E; 11: HKU1; 1: OC43) were detected with EF and 47 samples in the placebo group, of which 33 were positive for coronaviruses (15: 229E; 17: HKU1; 1: OC43). Whereas the effect on enveloped viruses was statistically significant with $p=0.0114$, the difference for coronaviruses was not ($p=0.154$) possibly due to low sample size.

Another randomized, blinded, controlled study with $n=203$ children (4 - 12 years) administered EF over 4 months and collected nasal secretions for pathogen analysis analogous to Jawad [5]. Again, a total of 47 enveloped virus infections with control was reduced to 28 infections with EF ($p=0.0218$). No difference was seen in this study including children for coronavirus infections in particular [4].

In a meta-analysis of six clinical studies with a total of 2458 participants [6] the use of Echinacea extracts was associated with reduced risk of recurrent respiratory infections (RR 0.649, 95% CI 0.545 - 0.774, $p < 0.0001$). Ethanol extracts from echinacea like EF appeared to provide superior effects over pressed juices and increasing dosing during acute episodes further enhanced these effects. Three independent studies found that in individuals with higher susceptibility, stress or a state of immunological weakness, Echinacea halved the risk of recurrent respiratory infections. Complications including pneumonia, otitis media, pharyngitis and tonsillitis were also less frequent with echinacea treatment.

Despite the limited evidence, available *in vitro* data suggest that EF may provide protection against enveloped virus infections. As viral inhibition is non-specific, a broad range of membranous viruses may be covered, possibly including the newly occurring SARS-CoV-2. Two randomized, blinded, controlled clinical studies support the preventive effects against enveloped viruses. A meta-analysis gives evidence for reducing the risk of recurrent respiratory tract infections and complications with echinacea treatment.

I recommend Echinaforce for the prevention and treatment of respiratory tract infections in children from 4 years on and adults, in the absence of clinically tested and specific therapeutic options also for the possible prevention of coronavirus infections. The available evidence suggests a preventive rather than therapeutic benefit, whereas suspected SARS-CoV-2 infections require consultation with a medical practitioner.

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