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# A Research Review on the Short and Long-Term Use of Echinacea

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## ECHINACEA: A BRIEF HISTORY OF USE AND RESEARCH



*Echinacea purpurea* flower

**E**chinacea has been used and revered for hundreds of years in North America. As a plant that is native to this country, it was used extensively by both Native Americans and Eclectic physicians in the late 19th and early 20th centuries. By 1921, Echinacea was the most popular treatment prescribed by eclectic physicians to treat a wide range of conditions including syphilis, dysentery and even snake bites.

However, in recent years, Echinacea has received negative media attention, causing confusion as to whether or not this botanical actually works. The confusion stems from some negative outcome studies that were published several years ago in reputable journals, which implied that Echinacea does not work. This implication was unfortunately spread through the media and caused a great deal of confusion for practitioners and consumers who have found Echinacea to work very well as an immune supportive agent.

Annual sales of Echinacea products in the US totaled over \$120 million in 2009 (source: NBJ). Commercial Echinacea preparations primarily come from *E. purpurea*, *E. angustifolia*, and *E. pallida*, and are widely used for the treatment and prevention of upper respiratory infections (URIs). However, there is a lack of agreement in the scientific community about effectiveness for this purpose, and clinical trials have yielded conflicting results.

Most consumers and physicians are not aware that products available under the name Echinacea differ considerably in their phyto-chemical composition, due to the variability of plant material, extraction practices, time of harvest, and overall quality of plant and seed. Unfortunately, if rigorous randomized clinical trials are to be the gold standard of Echinacea's effectiveness, then the variability of plant material and qualities used leaves many questions unanswered. There is also disagreement as to which constituents from Echinacea are responsible for its suspected usefulness for URIs, and how these act in the body. This lack of knowledge prevents effective quality control of Echinacea and limits the ability to conduct successful clinical trials in the greater scientific community. Despite the limitations, there are still many things about Echinacea we do know and continue to learn through research.

### ROOT, AERIAL PARTS, OR WHOLE PLANT

As with any plant, the chemical makeup of Echinacea is not consistent throughout the entire plant. For example, recent studies have shown that the root contains a diverse mixture of active chemicals beneficial for acute conditions. Harvest, processing and manufacturing (as well as what part of the plant is used) will ultimately determine how it affects the immune system. As a general rule, extracts made by using ethanol contain higher levels of alkylamides and phenolic compounds, while extracts made by using water are more likely to contain compounds such as polysaccharides, lipoproteins, and glycoproteins.



*Echinacea purpurea* bud

The current consensus in the field of Echinacea research is that Echinacea preparations can have either immune stimulatory or anti-inflammatory effects depending on the nature of the preparation used. Echinacea fresh pressed juice appears to enhance immunity by increasing production of certain cytokines, particularly for people who find themselves getting sick frequently. It is often suggested that this stimulatory effect may aid the body in warding off infection, and perhaps be helpful for preventing colds and flu. Polysaccharides and/or lipoproteins present in aerial parts extracts appear to be responsible for their immune-stimulatory activity.



*Echinacea purpurea* roots

Alternatively, there is a growing community of scientists that attributes the usefulness of Echinacea in treating infection to its ability to block the inflammatory response, thereby suppressing symptoms associated with the infection. It appears that ethanolic extracts of Echinacea roots are most likely to exhibit anti-inflammatory activity likely due to the presence of alkylamides.

### REVIEW OF THE RESEARCH

Much of the confusion around Echinacea stems from the following studies. A 2003 study by Taylor *et al* in the *Journal of the American Medical Association* found that when Echinacea products made from the fresh pressed juice were taken just after the second cold symptom (URIs) appeared there was no measurable beneficial effect for children in treating the severity or duration of symptoms. The study has since been criticized for using the aerial portion extract instead of root extracts or whole plant extract including root, and the dosages studied were lower than those recommended by practitioners. A follow-up analysis of this study found that while this particular Echinacea preparation failed to treat URIs in children, it was effective in reducing the occurrence of subsequent URIs in children. This important finding failed to make headline news.

A 2005 study in the *New England Journal of Medicine* focused on several root extracts and URIs, but still found no statistically significant effects on duration, intensity, or prevention of symptoms. Concern over this negative finding led some researchers to believe that although the correct part of the plant was



*Echinacea purpurea* field

used, the dose was likely too low to show beneficial effects. Despite the awareness of possible problems with the above mentioned studies, the media only discussed a single message and failed to discuss it in the broader context of previous positive outcome studies.

Over the years, several meta-analyses have been done to explore and understand the vast amounts of research that have been conducted on Echinacea. In 2007, a study by the University of Connecticut combined findings from fourteen previously-reported clinical trials examining Echinacea and concluded that Echinacea can cut the chances of catching a cold by more than half, and shorten the duration of a cold by an average of 1.4 days. In 2006, the Cochrane database did a review on Echinacea in all of its forms; root and fresh pressed juice, and assessed the trials for proper methodology and outcomes. Of the nineteen studies conducted that compared an Echinacea preparation with placebo as treatment for acute infections, a significant effect was reported in nine studies, a trend in one, and no difference in six.



A fair number of in vitro studies have been conducted on various Echinacea extracts which generally show positive results, even more so than clinical studies on humans. Most recently, an in vitro study explored Echinacea's anti-viral effects and found that in hemagglutination assays, the Echinacea extract inhibited the receptor binding activity of the virus (H1N1 and Avian HPAIV), suggesting that this extract interferes with the viral entry into cells which ultimately limits virus replication and dissemination.

Another significant problem that we see in Echinacea studies is that many authors do not identify which part of the plant was used. If there is a negative outcome in a study, it may be because the wrong part of the plant was used, but it is difficult to determine based on the information given. Also, many commercially available Echinacea preparations fail to identify important information on their label, which may be confusing for the consumer trying to purchase a product. It is important to find a product that properly identifies what part of the plant is used as well as what genus and species. Not all genus and species of Echinacea have the same phyto-chemistries in both root and aerial parts. For example, *Echinacea pallida* root is not a rich source of alkylamides, but is still found in some commercial products.

## LONG TERM USE AND AUTOIMMUNE DISEASE

Echinacea's role in long term use and autoimmune disease has also long been debated. The concern that is often discussed is that if Echinacea is taken long term, it may over-stimulate the immune system. This is not a finding that has consistently been reported and in fact, the primary documentation supporting these concerns is a single mention in the *German Commission E Report*, and a single case study published in 2002. Clinical studies that have been done over the past few decades on Echinacea have not reported such findings.

Eclectic physicians were not averse to using Echinacea long-term. According to Ellingwood, *Echinacea angustifolia* was recommended for the following chronic conditions: mammary cancer, chronic mastitis, chronic ulceration, chronic glandular indurations, scrofulous nodules, syphilitic nodules and syphilis. A 2006 study explored the use of Echinacea in patients with autoimmune uveitis, and found that patients who did not receive Echinacea as a part of their treatment (placebo) required a longer treatment period with steroids. This study demonstrated that systemic Echinacea appears not only to be safe in autoimmune disease, but also effective in the control of symptoms.

To err on the side of caution, it may be advisable for people with autoimmune diseases like rheumatoid arthritis or lupus to avoid long-term use of any of the immune-enhancing botanicals, including Echinacea, unless it is done under the supervision of a qualified integrative health practitioner. Short term use for acute ailments (particularly using a root extract rich in alkylamides, which have an anti-inflammatory mechanism) would likely be beneficial, even in the cases mentioned above.

## CONCLUSIONS ON THE USE OF ECHINACEA

After reviewing the research and seeing the volume of studies that continue to be performed on Echinacea in varying stages of the immune cycle, it seems we are just beginning to understand the complexities and multiple uses of this botanical. A few negative studies does not mean that Echinacea does not work, but seems to indicate that we are finally beginning to understand that each part of Echinacea has unique phyto-chemistries that can benefit the immune system in many ways.



The root fraction, naturally rich in alkylamides, is anti-inflammatory and is likely beneficial in the acute stages of a cold or flu. It may also be more effective when used in conjunction with other immune supportive herbs such as Black Elderberry, Ginger root, and Andrographis. During this time, Echinacea root must be taken in high dose and frequency to be effective as soon as symptoms begin to appear. On the other hand, the aerial portion of Echinacea is best taken to stimulate and strengthen the immune system throughout the season. Echinacea in this form is thought to enhance the immune system and should be taken in a lower dose long term. The fresh pressed juice of Echinacea aerial parts is also best taken with other immune stimulating herbs that are also rich in immune polysaccharides such as Astragalus root, Larch gum and Maitake mushroom extract.

