

NSHRF PROJECT FACT SHEET

Inside Echinacea

Investigator: Allyn Meredith Bowen
Department of Microbiology and Immunology
Faculty of Medicine
Dalhousie University

In recent years, more and more people have turned to non-traditional therapies to prevent and treat disease. The dramatic upsurge of interest in herbal medicine has raised questions among health professionals regarding the efficacy and safety of herbal preparations. Some of these preparations, however, show promise for development as new treatments, particularly with respect to infectious disease. One such product is the commonly used botanical *Echinacea*.

Echinacea is a Native American herb that is said to help or cure a variety of conditions, but primarily used to enhance immune function. There have been a number of unsubstantiated claims of efficacy for *Echinacea*, but over the last 20 years only a small number of rigorous, controlled scientific studies have been conducted. These studies have provided preliminary evidence that certain extracts of *Echinacea* have the potential to activate the immune system by enhancing macrophage function. (A macrophage is a tissue cell that has a role in protecting the body against infection.)

In this study, the researcher used a filter-sterilized, polysaccharide-enriched *Echinacea purpurea* extract in controlled experimentation. The intent was not to isolate specific active components from *Echinacea* but to focus on the effects of a whole polysaccharide extract on immune function. Such extracts are widely used by the public; however, claims as to their effectiveness are generally speculative.

The research found that *Echinacea* activated the immune response, stimulating macrophages to produce pro-inflammatory mediators *in vitro* (outside the body). Along with evidence of enhanced macrophage function, the study showed that oral administration of *Echinacea purpurea* reduces the bacterial load during infection by *Listeria monocytogenes*, demonstrating its efficacy *in vivo* (in the body).

Determining *Echinacea*'s mechanism of action is important as the effects of this popular alternative remedy on the immune system, although touted by some, are generally speculative. The researchers determined that the immune-enhancing properties of *Echinacea* arose from the interaction with specific receptors on the macrophage cell surface. These receptors, called Toll-like receptors, have evolved to alert the innate immune system (the body's first line of defense) to the presence of particular components characteristic of invading microorganisms. Through its interaction with TLRs, the researchers found evidence that *Echinacea* ultimately triggers signaling through

intercellular pathways (including MAP kinases and NF- κ B) that are known to be involved in promoting inflammatory responses.

That *Echinacea*, and other medicinal botanicals stimulate innate immune cells through TLRs, thereby inducing gene expression and potentially subsequent innate immune-mediated effects, may explain why such plant-derived products have been widely utilized as therapeutics by a variety of cultures worldwide.

Contact information:

Allyn Meredith Bowen
Department of Microbiology and Immunology
Dalhousie University
Phone: (902) 494-2811
allynbowen@hotmail.com