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A PATIENTS GUIDE TO ESSIAC®

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About the Author

Ana Aleksic, MSc (Pharmacy), is an integrative pharmacist and independent scientist with many years of medical writing, clinical research, and health advising experience. Previously, she was a graduate clinical researcher at the University of British Columbia, focusing on novel treatments for psychiatric illnesses, neuroimaging, and the side effects of psychoactive medications. Ana has collaborated on several projects aimed at providing clinical resources for Canadian healthcare professionals and is the co-author of the *Clinical Handbook of Psychotropic Drugs, 22nd and 23rd editions*. She also published a number of articles in peer-reviewed journals. Ana is passionate about communicating cutting-edge science and empowering people to achieve their optimal health. As a professional medical writer and editor, Ana has edited over 1000 and written over 400 blog posts and articles, some of which reached over one million people. She has also authored several ebooks. Her specialties are dietary and herbal supplements and drug-supplement interactions. Ana is a strong advocate of bridging scientific knowledge with holistic medicine.

Essiac Company Vision

For over 100 years, Essiac has been trusted worldwide as an immune system support supplement. A lot has changed since Rene Caisse introduced Essiac in 1922. Similar to Rene's commitment to perfecting the Essiac formula, we are committed to evolving to meet the natural health needs of our customers. We believe that nutritional supplements can play a vital role in a wellness program. By providing information on the properties of the herbs in our formulas to our customers, they can make informed choices about their health.

At our core, we believe that everyone deserves access to reliable and effective immune support supplements that can enhance their well-being. We strive to unlock the potential of natural plant-based ingredients and scientific advancements to create evidence-based formulas that support optimal health. When Essiac was developed, alternatives were few and not very effective. Modern medicine has advanced substantially in 100 years, and we view that Essiac can play a complementary role in an integrative wellness

program along with modern medicine.

It was Rene's wish that research be conducted on Essiac's formula. Since then, over 70 research articles have reviewed the product and the herbal components. We prioritize strategic partnerships with academic institutions, independent researchers, and health professionals to tap into their expertise and leverage their facilities for conducting studies. In 2025, we will be sponsoring our first double-blind placebo-controlled trials.

We are committed to transparency and accountability, sharing the results of our research openly with our customers and the scientific community. By fostering a culture of continuous learning and improvement, we are ensuring that every dollar invested in our research delivers maximum value and impact for those who trust us with their supplement needs. We are determined to make a lasting impact on the lives of individuals, championing affordable and effective natural plant-based solutions that empower them to live healthier and happier lives.

Lucille Perreault, MBA, CPA, PhD

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Introduction

Essiac is an herbal mixture that people take to boost immunity, get rid of toxins, and reduce inflammation. It's also a controversial add-on to cancer treatment and a supplement used by cancer survivors.

If you're thinking "Oh no, not another book about an alternative cancer treatment that claims to cure everything," we get you. We would hate to see another book about a fake cancer cure, and that's exactly *why* we've created this guide as an evidence-based resource on Essiac.

Essiac is a unique herbal blend, but is it a cure-all? Most certainly not! Can taking Essiac help you or somebody you know feel a bit more healthier and vital? It sure can, as long as you pay attention to your overall lifestyle and diet.

The Patient's Guide to Essiac is the most comprehensive and up-to-date resource on Essiac that we know of. It shares what experts and scientists know about Essiac and what individuals have experienced when using this herbal preparation.

Scientists have discovered that the combination of herbs in Essiac acts in synergy to help boost the immune system, strengthen the cells' antioxidant defense, and contribute to a normal anti-inflammatory response in the whole body. Essiac is rich in antioxidants that quench oxidative stress and free radicals, botanicals that balance the immune response, and many active compounds that work together to soothe inflammation and detoxify harmful compounds from the body.

We discuss these mechanisms in greater depth later in the book, but for now let's just say that a strong and healthy immune system is key to not only fighting infections like the cold and flu, but also to protecting the body against many chronic diseases like heart disease, diabetes, arthritis, autoimmune diseases, and cancer. What's common to many of these diseases is that they are under the control of the immune system and the body's antioxidant status.

Although Essiac has been used for over 100 years and studied for more than 50 years, scientists continue to learn something new about it every day. Each new study brings more insight and knowledge, paving the way forward.

The Patient's Guide to Essiac covers the complete research on Essiac to date, the evidence behind each individual herb in Essiac, the science behind the original

Essiac formulation, and the data behind an array of Essiac uses—from immune support to cancer to parasites to certain uncommon conditions. Hundreds of conditions are discussed, and you can simply use the search function ("Ctrl + F") to read about the conditions you're most interested in.

As you read along, you'll learn how to tease apart the true potential health benefits of Essiac from myth, marketing hype, bad science, and distorted historical data. This guide compiles hundreds and hundreds of peer-reviewed scientific references. The findings from scientific studies are broken down and explained in an easy-to-understand way, while each study is hyperlinked so you can quickly access it.

Get ready to dive into the world of Essiac—from understanding the history of this unique herbal blend to learning about each herb in the formulation to finally grasping the science behind it all.

We hope that you approach the book with a curious and critical mind and a passion for detective work. Together, we are on the quest for the truth. We'll analyze historical documents, search for missed clues, travel through the largest scientific databases that exist, distill thousands of scientific facts, and come out at the other end transformed by the knowledge gained and the ways we can apply it to our life.

The discoveries made so far hold great potential and can have big implications for many. But, sometimes it takes just a small step in the right direction to start improving your health. Join us on this journey so you can unveil how Essiac could make a positive difference in your life today. We promise to leave no stone unturned.

Chapter 1

Essiac: From Folk Roots to Evidence-Based Knowledge

Essiac is unique by being a herbal remedy whose historical roots date far back into indigenous folk herbalism while at the same time being steeped in modern science.

From traditional use among Canada's indigenous population to widespread popularization by Canadian nurse Rene Caisse to being used and disputed in Canadian clinics and universities, Essiac has seen it all.

Although the traditional knowledge and history of Essiac have their place and importance, we are now entering an era of Essiac as an evidence-based herbal remedy. This is exactly what makes Essiac so hard to characterize—it's a bridge between the old and new. Herbalism fans tend to be distanced from modern Essiac research while people taking an evidence-based approach tend to be wary of its "alternative" label.

By acknowledging Essiac's past and diving deep into its scientific now, we are able to see this remedy for what it is: a complex herbal formulation with tremendous health potential.

The Four Foundational Herbs in Essiac

Essiac is a botanical formulation of four herbs. It was popularized in the 1920s by the Canadian nurse Rene Caisse (Essiac is Caisse spelled backward) (Cassileth, 2011).

It is believed that Caisse obtained the formula from a patient who allegedly cured her breast cancer with the mixture, which she learned about from an Ojibwa healer. The Ojibwe (Anishinaabe) are an Indigenous people in Canada and the United States with a rich history of traditional medicine (Cassileth, 2011).

Proponents claim that Essiac can help detoxify the body, strengthen the immune system, and reduce inflammation and oxidative stress.

Researchers have identified antioxidant, anti-inflammatory, and immune-balancing compounds in Essiac and its individual herbs. However, few clinical trials have been published (Leonard et al., 2006; Kabeel et al., 2018).

There is ongoing controversy around the use of Essiac as an alternative cancer therapy. Some proponents claim it may improve the quality of life, help relieve cancer pain, reduce chemotherapy side effects, and kill cancer cells. Skeptics point out that no controlled human studies are available to back up its use. If you want to read more about Essiac and cancer, skip to Chapter 5 - Essiac, Cancer, and Chemotherapy.

The original Essiac tea formula likely contained the following four herbs and their approximate ratios (Seely et al., 2007):

- Burdock root (*Artium lappa*): ~60%
- Sheep sorrel leaves (*Rumex acetosella*): ~30%
- Slippery elm inner bark (*Ulmus rubra*): ~8%
- Indian or Turkey rhubarb root (*Rheum officinale* Baillon/*Rheum palmatum* L.): ~2%

Essiac should not be confused with Flor-Essence. Flor-Essence is a more recent, modified Essiac product that also includes:

- Red clover blossom (*Trifolium pratense*)
- Blessed thistle herb (*Carduus benedictus*)
- Kelp (*Laminaria digitata*)
- Watercress herb (*Nasturtium officinale*)

More about the differences between the two formulations is covered in Chapter 6, ("Phytoestrogens in Essiac vs. Flor-Essence").

Supposedly, Caisse agreed to modify the original Essiac recipe in the '60s and '70s while working with American physician Dr. Charles Armao Brusch. The pair purportedly named the new blend Flor-Essence. However, Caisse also continued to use the original Essiac formula independently (LeMoine, 1997).

Essiac Gold is a new formulation that contains the original four-herb formula and AHCC (active hexose correlated compound).

Historical Perspective

According to historical records, Rene Caisse (image on the left, taken from Bracebridge Library) first heard about Essiac in 1922 while she was working in a hospital in Ontario. She began offering it to terminal cancer patients that were considered medically untreatable shortly after (LeMoine, 1997).

Caisse attracted the attention of medical doctors and health authorities over the next couple of decades. However, it wasn't until the mid-70s that the first research studies on Essiac took place (LeMoine, 1997).

Some sources claim that Essiac was given either by mouth or injection on a case-by-case basis. Others state that one herb was given by injection while the other ones were given orally. Caisse may have tested sheep sorrel herb alone by injection in some patients. Commercial websites may twist this data in an attempt to bring credibility to their modified Essiac formulations and herb ratios (LeMoine, 1997; I Was "Canada's Cancer Nurse").

The exact ratios and plant parts that Rene Caisse used are still a subject of debate. We go over this controversy in Chapter 3 - The Science of the Original Essiac Formulation.

Published Peer-Reviewed Essiac Research

Small Human Studies & Case Reports

A survey study of 510 women with breast cancer did not find a link between the use of Essiac and improvements in quality of life or mood. Essiac users reported beneficial effects and only two women reported minor adverse events (Zick et al., 2006).

Case reports mention favorable outcomes using Essiac tea in patients with:

- Pancreatic cancer (Smiley et al., 2016)
- Prostate cancer (Al-Sukhni, 2005)
- Lung cancer (Gladwish et al., 2010; Yoon et al., 2009)

Preclinical Studies (Animals & Cells)

Clinical evidence is lacking to support the use of Essiac for any of the conditions listed below. The existing animal and cell-based research is outlined to direct future research but cannot be interpreted as supportive of any health benefit.

Antitumor Potential

Cell-based studies reveal that Essiac has antioxidant properties, as well as that it can be toxic to cancer cells. However, studies on breast and prostate cancer cells yielded conflicting results. Essiac also had anti-leukemic activity in rats and roundworms (Ulbricht et al., 2009; Kulp et al., 2006; Ottenweller et al., 2004; Eberding et al., 2007; Tai et al., 2004; Kabeel et al., 2018; Ruiz et al., 2021).

Read more about the research on Essiac and cancer in Chapter 5 - Essiac, Cancer, and Chemotherapy.

Antioxidant & Anti-inflammatory Activity

Essiac undoubtedly has antioxidant activity, but exactly how this can affect our health is uncertain.

Essiac showed strong antioxidant activity in roundworms, increasing their lifespan and ability to withstand oxidative stress (Ruiz et al., 2021).

One cellular study revealed that, at high concentrations, antioxidants in Essiac help protect against DNA damage in test tubes (Leonard et al., 2006).

Another study demonstrated the antioxidant and anti-inflammatory potential of both Essiac and Flor-Essence in mouse cells. Essiac seemed to have a stronger and more widespread effect than Flor-Essence in this study (Cheung et al., 2005).

One team of researchers reported significant antioxidant, immune-balancing, and anti-inflammatory activity in cells. Essiac was a more potent antioxidant than red wine, green tea, and cocoa (Seely et al., 2007).

In the same study, Essiac also blocked CYP450 liver enzymes. CYP450 enzymes are involved both in the metabolism of drugs and in cancer formation (Seely et al., 2007; Rodriguez-Antona & Ingelman-Sundberg, 2006).

Immune-balancing Effects

Essiac had immune-balancing (*immunomodulatory*) effects in cellular experiments. It stimulated immune cells called granulocytes to engulf pathogens, which strengthens the immune response. Essiac also increased the activity of CD8+ cells, which are key for tumor surveillance in the body and immune defense against bacteria and viruses (Seely et al., 2007).

In a study on mice, Flor-Essence had beneficial effects on the immune system. It increased the number of spleen cells, which support the immune response; it boosted the activity of macrophages, which specialize in removing dead and dying cells from the body. Plus, the mixture made NK immune cells more efficient at killing leukemia cells (Wu et al., 2020).

In the same mouse study, Flor-Essence increased the survival of immune cells in mice with weakened immune systems from treatment with the cancer drug cyclophosphamide. The authors say that further research should test if Flor-Essence can prevent immune damage caused by cyclophosphamide chemotherapy in humans (Wu et al., 2020).

Stomach Protection

Essiac helped protect the stomachs of rats from alcohol damage in one study. However, the researchers didn't find any positive effects on the liver, blood sugar regulation, or immunity in this experiment (Leonard et al., 2006).

Uses Lacking Evidence

Despite anecdotal claims, evidence is lacking to back up the use of Essiac for the following conditions:

- Underactive thyroid
- Arthritis
- Fibromyalgia
- Chronic Fatigue Syndrome (CFS)
- HIV/AIDS

Individual herbs in Essiac have anti-inflammatory potential, though. This might *theoretically* explain its use for arthritis, fibromyalgia, and CFS. Read more about some experimental uses of Essiac in Chapter 6 ("Uncommon Uses (Chronic and Complex Diseases)").

Unpublished Essiac Research

The Pre-Research Era

According to historical records, Rene Caisse first heard about Essiac in 1922 while she was working in a hospital in Ontario (*please see LeMoine, 1997 as a reference for this section*).

Caisse began to offer the herbal formula to terminal cancer patients for whom there were no medical interventions. The first to receive it was her aunt in 1924, who allegedly lived for another 21 years.

Dr. Fisher, her aunt's doctor, took an interest in the treatment. He and Caisse began to administer Essiac to patients who didn't qualify for any medical treatment. Over the next few years, Caisse's work started gaining recognition from medical doctors.

She also started getting the attention of health authorities, which first charged her with practicing medicine without a license. They let her continue her work once they realized that she was only offering the herbal formula to terminal cancer patients who had no other options.

The Rene Caisse Cancer Clinic in Bracebridge, Ontario. Image taken from Muskoka Digital Archives

She treated many patients in the 1930s, first at her home in Toronto and then at the Bracebridge Clinic (an old hotel that was turned into a cancer clinic shown in the image above).

However, it wasn't until the mid-70s that the first official research on Essiac took place. This was shortly before Caisse died in 1978. One year prior, she sold the original formula to the

Resperin Corporation for one dollar in the hope that it would be properly researched after her death.

Unpublished Research

Skeptics are quick to point out that the unpublished preclinical and clinical trials of Essiac were a failure. Yet, the data are inconclusive. Human trials were either stopped by government authorities or kept hidden from the public.

The 1930s-1970s

Human studies from the '30s and '40s are rarely mentioned, although there are records of doctors describing good results with Essiac on over 400 patients (LeMoine, 1997).

In 1938, Canada's Health Minister established a commission for investigating unproven cancer treatments. The commission concluded that some benefits were noted with Essiac but the evidence wasn't strong enough to approve it as a remedy for cancer (LeMoine, 1997).

Official animal studies were first done in the mid-'70s at the Memorial Sloan-Kettering Cancer Center (MSKCC), but the mixture they used was likely not properly prepared. These studies found no effect on cancer or immunity (PDQ, 2015; LeMoine, 1997).

Many sources don't mention that Caisse discovered the researchers were freezing instead of boiling the mixture. She refused to supply the cancer center with more herbs afterward (LeMoine, 1997).

All subsequent studies were conducted after Rene Caisse's death.

The early 1980s

Clinical studies in the '80s were run by the company Caisse sold the formula to.

Again, the research was faulty, being guilty of variable production of Essiac batches, breaking clinical trial rules, and a lack of transparency. The government stopped the trials before completion. Yet, their incomplete study results are often used to interpret the effectiveness of Essiac in humans (PDQ, 2015; LeMoine, 1997).

Researchers at MSKCC tested Essiac again in 17 animal studies in the '80s and purportedly found no anticancer activity. The results were never made available to the public and the exact samples used were never specified (PDQ, 2015).

The National Cancer Institute (NCI) tested liquid Essiac in 1983 and reported no anticancer activity. Allegedly, very high doses killed the animals. These results were never published either (PDQ, 2015).

Around the same time, the Canadian government reviewed case studies written by doctors on 86 cancer patients who had taken Essiac. They concluded that it was unclear whether the improvements in the patients' conditions were caused by Essiac or something else (PDQ, 2015).

The late 1980s

In the late 1980s, Canadian health officials allowed family practitioners to supervise Essiac treatment in terminal cancer patients. From their reports, Health Canada concluded that "no clinical evidence exists to support claims that Essiac is an effective treatment for cancer" (LeMoine, 1997).

The results of this attempt were published in a 1989 statement titled "Essiac - an ineffective cancer treatment." This document also notes that Essiac isn't harmful as long as it's not taken in place of approved treatments and that it may have positive psychological effects. In turn, Health Canada allowed for Essiac to be used on compassionate grounds (LeMoine, 1997).

This family-physician study has been criticized. Richard Thomas, a journalist, claims that the participating doctors weren't able to get Essiac when they needed it and that the quality of the product was unpredictable. He also states that the doctors didn't seem to keep proper patient records, weren't monitored, and some didn't get a chance to send in their results (LeMoine, 1997).

Health Canada recognized the study's limitations. Critics have questioned the government's rationale in making statements about the effectiveness of Essiac based on faulty research.

Summary

To sum it up, findings from unpublished human and animal studies are still unclear. The data are low-quality, flawed, unverified, and biased, and insufficient to properly assess the effectiveness of Essiac.

Many books discuss these and other historical documents. Have in mind that all archive records are unverified and can be interpreted in various ways. That's why the proper, peer-reviewed, published scientific data on Essiac are so important.

Research Standstill

Further research came to a standstill until the 2000s. Only in 2004 did a lab study at Indiana University-Purdue University report that Essiac slowed the growth of prostate cancer cells. This marks a new era of published Essiac research. Several other animal studies were published soon after (Ottenweller et al., 2004).

In 2007, a clinical trial of 20 women undergoing treatment for breast or ovarian cancer aimed to evaluate whether Essiac can improve the overall quality of life. The results were never published (ClinicalTrials.gov).

Some reputable web sources falsely claim that there have been no published research studies on Essiac since 2007.

Yet, one of the best animal studies on Essiac was published in 2018. Another important study of Essiac on roundworms and 5 cancer cell lines was published in 2021 (Kabeel et al., 2018; Ruiz et al., 2021)—studies covered in the previous section of this chapter ("Published Peer-Reviewed Essiac Research") and discussed in more detail in Chapter 5 - Essiac, Cancer, and Chemotherapy.

Takeaway

Studies confirm that Essiac contains antioxidants, nutrients, and other active compounds that support a healthy immune response and good digestion.

Clinical studies on Essiac have yet to be carried out. Case reports and animal studies suggest that the use of Essiac for cancer should be further researched, but we have no solid data yet to speak about its effectiveness.

Findings from unpublished human and animal studies remain unreliable and insufficient to properly assess the effectiveness of Essiac.

Future research should include randomized controlled trials to assess to health effects and safety of Essiac in an evidence-based manner.

Chapter 2

Essiac Individual Herbs

Burdock: The Main Active Compound in Essiac

Burdock root is the main ingredient in Essiac. It's present in the largest amounts in the original and most other commercially available Essiac products (at around 76%). Burdock root likely carries the main health benefits of the formulation as a whole. Its traditional uses support this, while the studies carried out so far hint at it as well (Kabeel et al., 2018).

Burdock (*Arctium lappa*) is a hairy shrub that belongs to the daisy family, although its bluish-red prickly flowers look nothing like daisies. If you spot burdock, be careful not to brush against it—its furry flowerheads will firmly cling onto your clothes. That explains the expression "to stick like a burr."

Burdock's well-developed root system makes up for its unsightly flowers. It has fleshy, yellowish roots that may reach 60 cm below ground.

Burdock root is a key part of Japanese and Chinese cuisine. People have also used it as a medicinal and table herb throughout Europe, Russia, North America, and Asia for hundreds of years (Moro & Clerici, 2021; Chan et al., 2011)

It goes by many names such as greater burdock, thorny burr, beggar's buttons, gobo, happy major, lappa, love leaves, and niubang. Some of these refer to a similar plant species (common burdock or *Arctium minus*) (Gross et al., 1980).

Many burdock subspecies exist. For example, purple burdock (*A Iappa f . purpurascens*) grows only in Quebec (Gross et al., 1980).

Traditionally, burdock root is used to cleanse toxins from the body, help fight infection, and relieve coughs and skin issues (Chan et al., 2011; Don & Yap, 2019).

Burdock is a staple and medicinal plant throughout Europe, Asia, and North America. Its roots are rich in antioxidants, fiber, immune-balancing, and anti-inflammatory compounds.

The Origins of Burdock in North America

Nobody is certain about the geographical origin of burdock. Some scientists think it may be native to Japan. Others say it's native to other parts of Asia or Europe. The official narrative claims it was brought to North America by early European settlers (Moro & Clerici, 2021).

But burdock might even be from North America. There is evidence that native people used burdock before colonial times (Cao JianFeng et al., 2012; Lewis & Lewis, 2003; Drummond, 1904; Gross et al., 1980).

Wherever it came from, burdock is now widespread throughout the U.S. and Canada. Considered a "weed," burdock can be spotted on many roadsides and vacant lots.

Traditional and Modern Uses

Burdock has been used in China for over 3,000 years. Its use is mentioned in the "bible" of Traditional Chinese medicine (TCM) called *the Compendium of Materia Medica* (Chan et al., 2011; JianFeng et al., 2012).

TCM practitioners believe burdock root helps cleanse toxins from the body. They also consider it a remedy for fertility, infections, sore throat, boils, rashes, and other skin problems (Chan et al., 2011; Don & Yap, 2019).

In Canada, burdock has been used for coughs, asthma, blood and skin diseases, rheumatism, and gout. It was also added to sarsaparilla, a popular saloon drink. Native Americans may have included the root in herbal preparations for women in labor. It's also believed to be a diuretic and laxative (Gross et al., 1980; JianFeng et al., 2012; Lewis & Lewis, 2003).

The entire plant is edible. The Iroquois cooked young leaves as greens and prepared dried roots in soup. In Russia, the roots are roasted and served as a coffee substitute (Lee & Kim, 2017; Kuhnlein & Turner, 2020; Hutchens, 1992).

Japanese chefs prepare the root as a side dish, while Koreans like to drink it as tea (Silver & Krantz, 1931; Lee & Kim, 2017)

Although most medicinal preparations mention burdock root, the seeds are claimed to better flush fluids from the body. The fruit and leaves are said to be especially helpful for soothing the skin and mucous membranes (Lee & Kim, 2017).

Despite such diverse use, most traditional indications for burdock haven't yet been backed by clinical studies.

People nowadays use burdock by mouth for the following conditions (Gao et al., 2018):

- Cold and flu
- Immune support
- Low appetite and anorexia
- Gastrointestinal complaints
- Fever
- Diabetes
- Heart disease (inducing high blood pressure and clogged arteries)
- Inflammatory conditions (including gout, liver, bladder, joint, and colon inflammation)
- Trimethylaminuria (TMAU)
- General support alongside cancer therapy

Applied on the skin, burdock is used for (Gao et al., 2018):

- Aging skin
- Dry skin
- Inflammatory skin conditions (acne, psoriasis, eczema)
- Vaginal inflammation

As with traditional use, however, most modern uses of burdock root lack sufficient clinical research.

Active Compounds

The main active compounds in burdock are arctigenin and arctiin. All parts of the plant contain them. Arctigenin is more active and is being investigated for its anti-inflammatory and potential anti-cancer properties (Gao et al., 2018).

Cell-based and animal experiments hint that arctigenin may work by blocking key inflammatory pathways and helping balance immune function (Gao et al., 2018).

The downside is that arctigenin is quickly broken down by the liver and intestinal enzymes, which might limit its clinical benefits (Gao et al., 2018).

In one cell-based study, arctigenin helped reduce the loss of gut lining cells. Scientists hypothesize it achieves health effects by (Wu et al., 2014; Chan et al., 2010):

- Turning "off" major inflammatory genes and pathways (like COX-2, TNF-alpha, IL-6, NF-κB, and MAPK)
- Reducing markers of oxidative stress (like malondialdehyde or MDA)
- Boosting key antioxidant enzymes (like SOD and glutathione).

This has yet to be confirmed in human studies.

Burdock root is considered to be a functional food. It's rich in inulin and inulin-like prebiotic fiber, enzymes that help digest complex carbs and antioxidants. Burdock root has stronger antioxidant activity than many vegetables and fruits. Plus, burdock extract is a more powerful antioxidant than vitamin C (Moro & Clerici, 2021; Ferracane et al., 2010; Yari et al, 2018).

Burdock is also a source of (Moro & Clerici, 2021; Jaiswal & Kuhnert, 2011; Wu et al., 2014; Zhang et al., 2019):

- Mucilage, which helps protect the gut lining
- Over 15 chlorogenic acids, antioxidants that may help support normal blood pressure, blood sugar, and weight loss
- Cinnarine, which may promote detox and reduce allergies
- Quercetin, a well-researched plant antioxidant
- Polysaccharides, which reduce inflammation and feed good gut bacteria

Studies suggest that the antioxidants, nutrients, and unique health-promoting active compounds in burdock act in synergy (Moro & Clerici, 2021).

The seeds also seem to be high in anti-inflammatory compounds while the leaves may be a better source of antimicrobials (Chan et al., 2011).

Health Benefits

Inflammatory Conditions

Most of burdock's health benefits seem to rely on its anti-inflammatory potential, backed by a couple of clinical trials.

In one trial of 36 people with knee osteoarthritis, drinking 3 cups of burdock root tea per day reduced markers of inflammation and oxidative stress (CRP, IL-6, MDA). It also improved total antioxidant status and the levels of a key antioxidant enzyme called SOD (superoxide dismutase) (Maghsoumi-Norouzabad et al., 2014).

Drinking burdock tea three times per day for about 26 months reduced symptom recurrence in patients with colon inflammation (*colonic diverticulitis*). Only 10.6% of those who drank burdock tea experienced recurrence, compared with 31.8% of those not taking the tea. The symptom-free duration was also increased by 14 months (Mizuki et al., 2019)

Arctigenin in burdock may improve colon inflammation by balancing the immune system. It stops the body from making immune cells (Th1 and Th17) associated with autoimmunity and inflammation in test tubes (Wu et al., 2015).

According to small clinical studies in women and children with vaginal inflammation (vaginitis), a solution containing burdock, chamomile, and aloe improves symptoms like itching, redness, swelling, and discharge (Guinot et al., 2019; Garcia et al., 2018).

In another trial, a multi-ingredient supplement with burdock (Infla-Kine) reduced inflammatory markers and improved the quality of life in healthy volunteers over 4 weeks. The supplement also contained anti-inflammatory herbs like curcumin, so it's uncertain if burdock contributed (Mikirova et al., 2017).

All in all, human studies suggest that burdock may help reduce inflammation, but more clinical research is needed to assess its effectiveness.

Stomach Ulcers & Infections

H. pylori infection is a major cause of stomach ulcers.

A multi-ingredient supplement with 64% burdock improved *H. pylori* infection, inflammation, and ulcer wound healing in a placebo-controlled study of 36 people. This product also contained angelica, gromwell, and sesame oil—so the contribution of each herb is unknown (Yen et al., 2018).

In test tubes, burdock stopped *H. pylori* from attaching to stomach cells and setting off an inflammatory response. In animals, burdock helped restore antioxidant enzymes, heal the stomach lining, and reduce ulcer size (Yen et al., 2018; Silva et al., 2013).

The root extract also prevented stomach damage in animals by reducing excessive acid production and neutralizing harmful free radicals (Dos Santos et al., 2008).

Plus, bitter compounds in burdock leaf extract killed bacteria and their sticky biofilms—a big cause of antibiotic resistance—in test tubes. For this reason, researchers think burdock leaves can be used to naturally preserve food (Lou et al., 2016; Pirvu et al., 2017).

Burdock root has been tested against the many bacteria and yeast in test tubes, including candida and hospital-dwelling superbugs. One study even claimed anti-HIV effects, but this hasn't been confirmed (Rajasekharan et al., 2017; Gentil et al., 2006; Rajasekharan et al., 2015; Schröder et al., 1990).

To sum it up, limited evidence suggests that burdock may help protect the stomach lining from *H. pylori* infection and inflammation. Larger clinical studies are needed before it's recommended.

Skin & Hair Health

Burdock is often added to facial creams to encourage skin rejuvenation. It may improve the appearance of aging skin by lowering inflammation and boosting collagen production. In one study, an emulsion with burdock fruit extract reduced wrinkles around the eyes better than placebo in women aged 39-65 (Knott et al., 2008).

In a human study, homeopathic burdock taken by mouth improved acne. However, the study was small (34 people), used varying dilutions (which mostly don't contain active substances), and lacked a placebo control (Miglani & Manchanda, 2014).

One study protocol mentions burdock seed extract for the relief of dry skin and eczema, but no results have been published (Lee et al., 2013).

Hair loss and baldness have been linked with inflammation and oxidative stress, pathways that burdock is purported to block. Burdock is a common ingredient in hair care products, but none of them have yet been tested in humans (Koriem et al., 2016; Trüeb, 2009).

Heart Health & Lipid Levels

Folk healers say that burdock root is good for the circulatory system, but only one clinical study tested this benefit so far.

In the study, burdock root along with aquarobic exercise improved blood lipids in 40 elderly Korean women. It reduced total cholesterol, triglycerides, and "bad" LDL cholesterol, but it also lowered the "good" HDL cholesterol (Ha et al., 2018).

Burdock improved lipid status in quails fed an unhealthy, high-fat diet. Its effects were similar to cholesterol medication (simvastatin), with the added perk of enhanced antioxidant status. Human studies haven't yet compared burdock to any medication, though (Wang et al., 2016).

In one study on mice, burdock root improved heart function and helped prevent heart enlargement. An enlarged heart can be caused by heart disease and lead to serious complications (Li et al., 2017).

Also, complex sugars from burdock root reduced platelet clumping and improved blood flow in rats. Excessive platelet clumping can result in heart attack, stroke, and even death (Qiu et al., 2020).

Blood Sugar Control & Diabetes

One review concluded that there is not enough clinical evidence to recommend burdock to people with diabetes. Animal studies have had promising results (Annunziata et al., 2019).

Inulin, the main prebiotic fiber in burdock, supports healthy blood sugar levels. A recent analysis of 25 studies concluded that inulin helps improve insulin resistance, the hallmark of type 2 diabetes (Moro & Clerici, 2021; Rao et al., 2019).

One study conducted back in 1931 reported that batter prepared from dried burdock root prevents dangerous post-meal spikes in blood sugar in diabetic patients (Silver & Krantz, 1931).

The same group reported that diabetic patients taking crackers with burdock root powder as a substitute for regular carbs needed lower insulin doses. As soon as burdock crackers were replaced with typical carbs, blood sugar spiked again (Silver & Krantz, 1931).

Burdock root extract lowered high blood sugar and liver markers and increased low insulin and leptin in mice with diabetes (Ahangarpour et al., 2017).

It also reduced the weight of obese rats fed an unhealthy diet. It might work by reducing the activity of enzymes that produce fatty tissue (Hou et al., 2018; Kuo et al., 2012).

Burdock has anti-diabetic and anti-obesity potential, but clinical trials are needed to determine its effects in humans.

Digestion & Gut Health

Inulin prebiotic fiber in burdock root feeds good gut bacteria and encourages digestion. It stimulates the release of immune-balancing butyric acid in the colon. Plus, burdock root's high mucilage content may help soothe the gut (Duke, 2002; Watanabe et al., 2020).

Inulin from burdock helped probiotic bacteria grow in test tubes. Also, dietary burdock inulin increased the number of *Bifidobacteria* and *Lactobacilli*—the main good probiotic bacteria—in mice (Moro & Clerici, 2021; Li et al., 2008).

An imbalanced gut microbiome (*dysbiosis*) with low diversity has been linked with many diseases, including inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS) (Kriss et al., 2019)

Burdock root powder increased the gut microbiome diversity in mice better than pure inulin. Taking burdock in the evening vs. morning had a stronger effect (Watanabe et al., 2020).

Arctigenin from burdock is being investigated for maintaining the integrity of the gut lining in IBD. It might keep the junctions between gut cells strong by activating estrogen receptor beta (ERβ). Estrogenic activity is usually seen as "bad," but ERβ is anti-inflammatory and a key target of new IBD therapies (Tao et al., 2020; Saleiro et al., 2012).

Polysaccharides from burdock are complex sugars that may help balance the gut and whole-body immune response. They act on cytokines, the main signaling molecules involved in an inflammatory response (Zhang et al., 2019).

In a study on immune cells, a burdock polysaccharide called *ALP-1* reduced proinflammatory cytokines and boosted an anti-inflammatory cytokine (IL-10). In mice, ALP-1 increased

beneficial gut bacteria, reduced potentially harmful gut bacteria (*Bacteroides*), and enhanced the production of anti-inflammatory short-chain fatty acids (SCFAs) (Zhang et al., 2019).

Burdock is also a herbal bitter. Bitters work by stimulating digestive juices and are traditionally used for low appetite, indigestion, bloating, and heartburn (McMullen et al., 2015).

Burdock contains prebiotics and bitter compounds that support digestion and gut health. However, its effects on people with gut disorders have yet to be tested in human trials.

Immunity, Allergies & Autoimmunity

Burdock root may help balance the immune system without stimulating it. An overactive immune response may cause either allergies or autoimmune disease. Herbal immune stimulants can worsen autoimmune diseases, according to research (Lee & Werth, 2004).

In animals, burdock root suppressed both allergic and autoimmune inflammation. In cells, burdock reduced histamine and other inflammatory compounds. (Yang et al., 2016; Li et al., 2016).

Cancer Research

Burdock root in Essiac

Essiac is a burdock-containing herbal formulation reported to be used by some cancer patients. No clinical studies on Essiac have yet been carried out.

According to a study published in 2006, people use Essiac as an add-on to breast cancer treatment, for reducing the negative side effects of conventional breast cancer treatment, and as prevention in cancer survivors (Zick et al., 2006).

The same study sent out a survey to 510 women who were diagnosed with breast cancer, 8% of which used Essiac. Women using Essiac reported beneficial effects. Yet, the study did not find a link between the use of Essiac and improvements in quality of life or mood. Well-controlled, clinical trials are needed (Zick et al., 2006)

Burdock alone

One study reported favorable outcomes of a specific burdock fruit extract called GBS-01 at high doses (12 g/day) in a pilot trial. The trial included 15 patients with advanced pancreatic cancer who didn't respond to the standard chemo (gemcitabine). They describe a partial response in one patient and stable disease in four patients. Larger trials are needed (Ikeda et al., 2016).

GBS-01 is high in arctigenin. Scientists hypothesize it might act by reducing the tolerance of cancer cells to glucose deprivation. In theory, this might make cancer cells die off quicker if starved of sugar. However, this hypothesis remains unproven for now (Ikeda et al., 2016).

In one study, burdock extract injections enhanced survival and reduced inflammation and tumor growth in mice with melanoma (Nascimento et al., 2019).

In other mice studies, high oral doses of arctigenin reduced prostate tumor growth by up to 70%. Yet, it's important to have in mind that findings from animal studies can't be applied to humans. Clinical studies are needed (Wang et al., 2018).

In cells, arctigenin turned "off" cancer-promoting genes while making cancer cells more susceptible to chemotherapy medication (Wang et al., 2018; Yao et al., 2011).

According to scientists, arctigenin may activate crucial cancer-fighting mechanisms such as apoptosis (programmed cell death). One of the ways in which cancer cells evade death and cause metastasis in the body is by becoming resistant to apoptosis. Arctigenin could trigger apoptosis in cells and animals, but it's unknown whether it might have this effect in humans (He et al., 2018).

Another burdock active compound called L-asparagine increased the effects of chemotherapy (cyclophosphane) that prevents the spread of cancer in animals. It also killed cancer cells in test tubes (Urazova et al., 2011).

A Japanese research team found burdock extract the most active out of 364 herbal plant extracts screened using cancer and healthy cells. Arctigenin from burdock killed lung, liver, and stomach cancer cells and stopped them from dividing (Susanti et al., 2013).

Other cellular studies investigated the mechanisms of burdock root extracts on blood, breast, and other cancer cells. Active compounds in burdock appear to act selectively on cancer cells without harming healthy cells in test tubes (Don & Yap, 2019; Ghafari et al., 2017; Susanti et al., 2013; Wegiera et al., 2012; Baba et al., 2018; Lee et al., 2019)

This tells us little about its effects in humans, though, as a compound may behave completely differently in humans than it does in test tubes.

The bottom line

Proponents claim burdock root supports the immune system and overall health. However, evidence is currently lacking to support its use—alone or in multi-ingredient herbals—for

cancer prevention or treatment. Clinical studies are needed to assess its efficacy and safety in this population.

Detox & Liver Health

Burdock is purported to help the body detox toxins, drugs, and carcinogens. Only animal and cell-based studies have been carried out, so this benefit remains uncertain.

In lab animals, burdock reduced inflammation from cigarette smoke exposure and liver-damaging chemicals. It also protected the liver against the heavy metal cadmium, acetaminophen, a toxic Chinese herb, and a diet high in unhealthy fats (Possebon et al., 2018; Lin et al., 1996; Predes et al., 2014; El-Kott et al., 2015; Zhou et al., 2020; Romualdo et al., 2020).

Libido & Fertility

Anecdotes and traditional medicine say that burdock helps with libido and fertility, but no human studies exist.

In male rats, burdock root extract increased testosterone and enhanced sexual function and behavior. The extract also increased sperm viability in diabetic rats. Diabetes is a known cause of poor sperm quality and erectile dysfunction (JianFeng et al., 2012; Ahangarpour et al., 2015).

Burdock root extract also improved markers of reproductive and sexual function in healthy mice (increasing sperm count, testosterone, LH, and FSH) (Ahangarpour et al., 2015).

In another rat study, burdock extract helped heal testicular damage caused by alcohol by acting as a strong antioxidant (Yari et al., 2018).

Mood, Brain & Bone Health

Evidence is lacking to support the use of burdock root for mood, brain, and bone health. The research is limited to animal and cellular studies.

Arctigenin from burdock reduced depression and anxiety in mice exposed to stress. It also improved memory and helped clear toxic beta-amyloid plaques from the brains of mice with Alzheimer's disease. In brain cells, arctigenin reduced inflammation and injury (Du et al., 2019; Zhu et al., 2013; Song et al., 2016).

Burdock root improved memory by blocking acetylcholinesterase (AChE) in mice. AChE is an enzyme that breaks down acetylcholine, the brain's most powerful innate nootropic. By blocking AChE, burdock root may help boost acetylcholine (Lee et al., 2011).

Arctigenin from burdock root blocked the activity of bone-degrading cells in test tubes, but its effects on bone health remain unexplored (Wei et al., 2019).

Precautions

Disease and drug interactions are possible. Please consult your doctor before use.

Pregnant and breastfeeding women should avoid burdock root due to a lack of safety data.

Takeaway

Burdock plays an important part in traditional medicine. Herbalists consider it a cleansing, immune-strengthening herb.

Unfortunately, only 8 clinical trials have been conducted with burdock so far. Most burdock uses rely on animal and cellular studies and anecdotes. The published findings are promising, but more clinical trials are needed to assess its health benefits.

Sheep Sorrel: The Most Misunderstood Herb in Essiac

Sheep sorrel is the second most dominant herb in Essiac. This undervalued medicinal and culinary plant has a long history of traditional use among Canadian indigenous people (Korpelainen & Pietiläinen, 2020; Bello et al., 2019).

Science reveals that sheep sorrel is a potent source of antioxidants, nutrients, and unique active compounds. It's often described as the most important component of the original Essiac formula. But is this true?

Despite popular claims, there is no direct evidence to claim that sheep sorrel is the most important ingredient in Rene Caisse's original Essiac formula. It's the second most predominant ingredient, after burdock root.

Some manufacturers claim that the "original" Essiac tea contains the whole sheep sorrel plant, including the root. However, evidence is also lacking to support this.

Rene Caisse did refer to the importance of using the roots of one of the plants in Essiac. Based on archive documents, she was likely referring to burdock root (the main ingredient), *not* to sheep sorrel.

In fact, a recent animal study used Essiac with aerial parts of sheep sorrel to demonstrate anti-leukemic activity in rats (Kabeel et al., 2018).

Learn more about the different properties and health benefits of sheep sorrel root and leaves in Chapter 3 ("Sheep Sorrel Leaves vs. Roots").

About Sheep Sorrel

Sheep sorrel (*Rumex acetosella L.*) is a medicinal and culinary herb that belongs to the buckwheat family. The whole plant is edible. Other names it goes by are common sorrel, red sorrel, sour weed, and dock.

Folk healers around the world have foraged and prepared the wild plant for millennia. They treasured the whole plant for its medicinal properties and prepared the leaves and aerial parts in salads and soups (Korpelainen & Pietiläinen, 2020; Bello et al., 2019).

Sheep sorrel has such a rich and long history of cultural use that even scientists describe it as underutilized by modern medicine (Bello et al., 2019).

It grows worldwide and can adapt to diverse environments, but it favors the northern hemisphere. You can spot it in fields, meadows, and open woods.

To the untrained eye, sheep sorrel can pass as "just another weed." It's not as exotic as other heavily commercialized plants, so its health-promoting potential gets neglected. The biggest danger that can come from this is its disappearance.

Sheep sorrel is easy to forage or grow, and use as a functional food—especially in poor rural areas and harsh climates. It can also be made into tea, tinctures, and salves to support health.

It is an incredibly adaptable wild edible with unique medicinal properties. It's time to bring together the traditional and modern scientific knowledge about the benefits of this plant, many of which are still an active area of research.

Sheep sorrel botanical names

Understanding the potential benefits of sheep sorrel leaves and roots relies on properly identifying the plant used in scientific studies.

There are about 200 sorrel and dock species under the *Rumex* genus. All belong to the buckwheat family and grow throughout Europe, Asia, and North America. These various sorrel species go by many names that often overlap and are used interchangeably, which can cause confusion (Korpelainen & Pietiläinen, 2020).

Sheep sorrel is botanically known as *Rumex acetosella L.* or, less commonly, *Acetosella vulgaris*. Other common names it goes by are red sorrel, sour weed, and dock.

Rumex acetosa L. is similar, but not the same as sheep sorrel. It is also called common sorrel, garden sorrel, and English sorrel.

Since none of the common names are reliable, always pay attention to the botanical name.

Active Compounds

Scientists have isolated over 70 active compounds from sheep sorrel. Each part of the plant has a characteristic imprint of these compounds. This is key to understanding its benefits! (Bello et al., 2019).

Whole Plant

Some traditional texts mention using the whole herb. The whole plant extract contains the highest amount of:

- Quercetin, also called the "master flavonoid" (Mostafa et al., 2011)
- Emodin, which is believed to have anticancer effects. It might also improve blood flow, bowel movements, and viral and parasitic defense (Mostafa et al., 2011; El-Bakry et al., 2012; Gupta & Rai, 2018)

Roots

Sheep sorrel roots are a source of:

- Anthraquinones and polysaccharides, which are suggested to carry some antitumor effects (Korpelainen & Pietiläinen, 2020)
- Total antioxidants (El-Bakry et al., 2012)

Leaves & Aerial Parts

The aerial parts (leaves, flowers, fruits, stalks) are a concentrated source of:

- Antioxidant flavonoids and polyphenols, also suggested to carry potential anticancer effects (Korpelainen & Pietiläinen, 2020; Mostafa et al., 2011)
- Tannins, *astringent* or "shrinking" plant actives that help stop bleeding and diarrhea (Derksen et al., 2014)

Sorrel leaves are a great source of nutrients but are also high in sour-tasting oxalic acid—an anti-nutrient that can be dangerous for people with kidney problems. Cooking them destroys most of the oxalic acid, but raw leaves shouldn't be used regularly (Tuazon-Nartea & Savage, 2013).

Both the leaves and roots are high in many antioxidants. Antioxidants can scavenge and neutralize free radicals that cause oxidative stress, cellular damage, and DNA mutations (Lobo et al., 2010).

Traditional and Modern Uses

Sheep sorrel has an incredible number of traditional and historical uses. It's believed to help with scurvy, cancer, infections, jaundice, mild diabetes, skin, respiratory, gut, liver, gallbladder, heart, and inflammatory disorders. Clinical studies have yet to test its effects, so most of these uses remain unverified by modern science (Bello et al., 2019).

Folk remedies from ancient times speak of sheep sorrel's anti-inflammatory, antioxidant, diuretic, antimicrobial, anti-tumor, anti-nausea, heart-protective, diuretic, painkilling, antiviral, and antifungal properties (Korpelainen & Pietiläinen, 2020).

The Iroquois and many other native people ate sheep sorrel's sour-tasting leaves raw or occasionally cooked. Some strains of sheep sorrel are believed to be indigenous to Canada (Kuhnlein & Turner, 1991).

People traditionally used water from boiled sorrel to wash chickenpox sores, boils, shingles-afflicted skin, poison ivy rashes, blisters, acne, and other skin sores. It is purported to reduce pain and itching and speed up the healing process (Korpelainen & Pietiläinen, 2020).

Drinking sorrel water with a bit of honey was also believed to bring down a fever, clear sinus infections, and help recover from the cold and flu. It's said to reduce pain and inflammation, encourage sweating, and help flush excess fluids from the body (Bello et al., 2019).

The roasted seeds were eaten as a purported cure for dysentery (a type of infectious intestinal inflammation) (Mostafa et al., 2011).

In the Czech Republic, sheep sorrel is said to be used to manage lumps and tumors. Folk healers of Eastern Europe consider it a "blood cleanser" (Bello et al., 2019).

Products that contain sheep sorrel extracts have registered drug status in Europe and are used for acute and chronic viral respiratory infections (Derksen et al., 2014).

Health Benefits

Source of Potent Antioxidants & Nutrients

Sheep sorrel is packed with antioxidants and nutrients. Antioxidants can quench oxidative stress and contribute to good health. Oxidative stress is suspected to underlie aging and many diseases of the modern lifestyle, including cancer, diabetes, chronic inflammation, and neurodegenerative disorders (Isbilir et al., 2013).

Sheep sorrel is among the plants with the highest quercetin content, according to the USDA Database for the Flavonoid Content of Selected Foods (Bhagwat et al., USDA).

The database lists that 100g of fresh sheep sorrel contains 86.2 mg of quercetin. The typical quercetin dosage in supplements is 500 mg/day, which is impossible to achieve with most other foods (Bhagwat et al., USDA; Li et al., 2006).

Quercetin is a strong antioxidant and natural antihistamine. According to limited research, it may help fight viruses, reduce inflammation, and support immune and heart health. It's also being researched for preventing and inactivating cancer in cells, but its effects on people remain unexplored (Shoskes et al., 1999; Zahedi et al., 2013; Kowalski et al., 2005).

Sheep sorrel is an exceptional source of vitamin C. The leaves contain 750 to 1200 mg/100 g, which is over 800% of the RDA (Atanassova et al., 2018).

This explains why indigenous people used sheep sorrel leaves to prevent scurvy. Folk healers also gave it as therapeutic food for health conditions caused by vitamin C deficiency. Plus, the leaves are a good plant-based source of protein and contain all essential amino acids (Bello et al., 2019).

It's important to use wild-crafted sheep sorrel. One study discovered that wild sheep sorrel is much higher in the total amount and activity of antioxidant phenolics than the cultivated variety. Sheep sorrel's antioxidants are also being researched against Alzheimer's disease in test tubes (Isbilir et al., 2013; Mantle et al., 2000).

Herbal Addition to Cancer Treatment

In Essiac

Sheep sorrel is the second most predominant herb in Essiac after burdock root (the other two being slippery elm bark and Indian rhubarb).

Some people use Essiac as an alternative cancer therapy. Clinical studies on Essiac haven't yet been carried out. Only survey data, case studies, animal data, archive, and anecdotal and clinical information is available.

One survey-based study looked at the use of Essiac in 510 breast cancer patients and survivors. Women using Essiac reported beneficial effects and few side effects. However, this study did not find a link between Essiac use and markers of quality of life or mood (Zick et al., 2006).

In a recent study on mice with leukemia, a water extract containing the four Essiac herbs—including sorrel leaves not roots—reduced abnormal leukemia blood cells by two-thirds and helped the animals recover normal weight and blood counts (Kabeel et al., 2018).

We don't know how and if these findings would apply to leukemia patients without human studies.

Sheep sorrel alone

In 1970, a scientist named Hartwell led a field study to discover that sheep sorrel and other sorrel species (*Rumex*) are traditionally used against various types of tumors and cancer in American indigenous medicine. This plant is cherished by indigenous folk healers who have knowledge about many recipes and formulations that use different plant parts (Hartwell, 1970).

Almost two decades after Hartwell, a Japanese researcher found that a polysaccharide from sheep sorrel had the strongest antitumor activity out of 3 tested plants. It activated immune pathways involved in locating, engulfing, and removing cancerous cells (*phagocytosis*) in mice with bone cancer (Ito, 1986).

Most recently, in 2022, a team of Iraqi scientists found that whole plant sheep sorrel extract had strong anticancer action. The extract prevented tumor progression in mice with breast adenocarcinoma, a promising finding highlighting the need for more research (Ahmed et al., 2022).

Emodin from sheep sorrel root stopped four tumor cell lines from dividing and mutating in another study (Lee et al., 2005).

In leukemia cells, sheep sorrel extract triggered cellular suicide or *apoptosis*. Cancer cells have a way to avoid apoptosis, which allows them to evade death and multiply in excess (Wegiera et al., 2012; Wong, 2011)

An analysis of sheep sorrel leaves suggests that this plant can be used as a source of nutrients that aid healthy weight gain, which is important for cancer patients (Ladeji & Okoye, 1993).

However, modern science hasn't tested sheep sorrel for cancer prevention or treatment in humans. It's impossible to know how and if findings on cells and animals in the lab will translate to people.

Against Ulcers, Inflammation & Fever

The hot water extract of sheep sorrel is a traditional remedy for stomach ulcers and stomach inflammation (gastritis).

Sheep sorrel extract reduced stomach ulcers in mice. It helped soothe stomach inflammation, swelling, moderate bleeding, and loss of cells of the stomach lining (Bae et al., 2012).

The alcohol extract had a stronger protective effect on mice than the water extract. It also neutralized damaging free radicals without harming healthy cells in test-tube experiments. Emodin from the root is suspected to carry this effect (Bae et al., 2012).

Sorrel's antiinflammatory potential may explain its use for reducing fever, but no scientific studies have yet investigated this.

Gut Disorders

A Pakistani field study noted that the whole sheep sorrel plant is traditionally used for jaundice, vomiting, and liver problems in rural northern parts of the country (Khan & Khatoon, 2008)

Studies on tissues show that sheep sorrel might help with nausea and gut disorders like constipation and diarrhea by relaxing smooth muscles. Smooth muscles line the gut and their excessive contractions can cause pain and cramping (Hussain et al., 2015)

Wounds, Skin Irritation & Diarrhea

Sheep sorrel is traditionally used to stop excessive bleeding thanks to its tannin content. Witch hazel, another indigenous plant, also contains tannins and is used for similar purposes (Bicker et al., 2009; Touriño et al., 2008).

Tannins constrict body tissues, which also helps if there's any inflammation, open wounds, swelling, or irritation. The same mechanism can reduce diarrhea, as tannins attract excess water and soothe irritated cells of the gut lining. The roots and aerial parts of sheep sorrel are used for this purpose (Bicker et al., 2009).

Immune Health, Lung Health & Allergies

Sheep sorrel is traditionally used as a lung and immune remedy. It's high in quercetin, which is a known antioxidant immune balancer.

Quercetin stimulated a healthy immune response and reduced allergic and autoimmune reactions in cellular and animal experiments (Li et al. 2016).

Research reveals that quercetin may lower inflammatory substances like histamine, leukotrienes, and prostaglandins. These substances can trigger and worsen allergies and histamine issues. It may also relax the airways, acting on similar pathways as asthma

medications, according to tissue studies (Anand David et al., 2016; Townsend & Emala Sr, 2013; Mlcek et al., 2016).

In one clinical trial, a multi-herb product containing sheep sorrel improved symptoms of acute and chronic sinusitis like congestion and headache. This product also contained gentian root, European elderflower, verbena, and cowslip flower—so it's uncertain how much each herb contributed to the effect (Neubauer & März, 1994).

No studies have yet tested sheep sorrel alone in patients with allergic, autoimmune, or respiratory problems.

Liver Protection & Detox

Liver damage can affect all other organs in the body. Sheep sorrel extract protected the livers of rats from toxic chemicals in one study. Plus, the extract helped reduce toxin damage to other organs. Antioxidants in sorrel are believed to help protect the liver by neutralizing the harmful effects of toxins (Alkushi, 2017).

Sheep sorrel is traditionally used as a diuretic, but there is no mention of its diuretic effects in scientific studies.

Viral, Bacterial & Fungal Infections

Sheep sorrel was active against the following viruses in test tubes:

- HSV-1 (Gescher et al., 2011)
- Influenza A (Derksen et al., 2014)

Its antioxidants are suspected to help stop viruses from attaching to and penetrating cells. Sheep sorrel might also help cells get rid of viruses that do enter, but studies so far have been limited (Gescher et al., 2011).

Specific root extracts of various sorrel species that grow in Europe, including sheep sorrel, showed antibacterial activity in one study in test tubes (Orbán-Gyapai et al., 2017).

Sheep sorrel was also active against a type of tropical candida yeast (*Candida tropicalis*) in one Brazilian study (Johann et al., 2010).

Heart Health

Sheep sorrel is traditionally believed to strengthen the heart, but the science on this benefit is extremely limited. Nutrients like potassium and vitamin C in sheep sorrel support heart health, but no human data on its effects are available (Atanassova et al., 2018).

In one study, sheep sorrel reduced blood pressure in rats. It seems to work by helping relax overly stiff and contracted blood vessels. The water extract worked better than the alcohol extract in this case (Qamar et al., 2018).

In cell experiments, sorrel whole plant extract reduced the excessive clumping of platelets that can clog arteries and cause heart disease. Plus, extract from the leaves boosted nitric oxide production, which relaxes blood vessels and improves blood flow (Jeong et al., 2020; Sun et al., 2015).

Precautions

Sheep sorrel is considered to be safe when used in food amounts. Larger amounts of raw sheep sorrel leaves may cause gut and kidney side effects due to high oxalate content. For this reason, sheep sorrel leaves should be used with caution in people with kidney disease.

People who are allergic to sheep sorrel, other members of the buckwheat family, or weed pollen should avoid this herb.

The high oxalate content in sheep sorrel leaves may also reduce the absorption of some minerals like zinc, calcium, iron, and others.

Drug and disease interactions with sheep sorrel are also possible. Please consult your doctor before use.

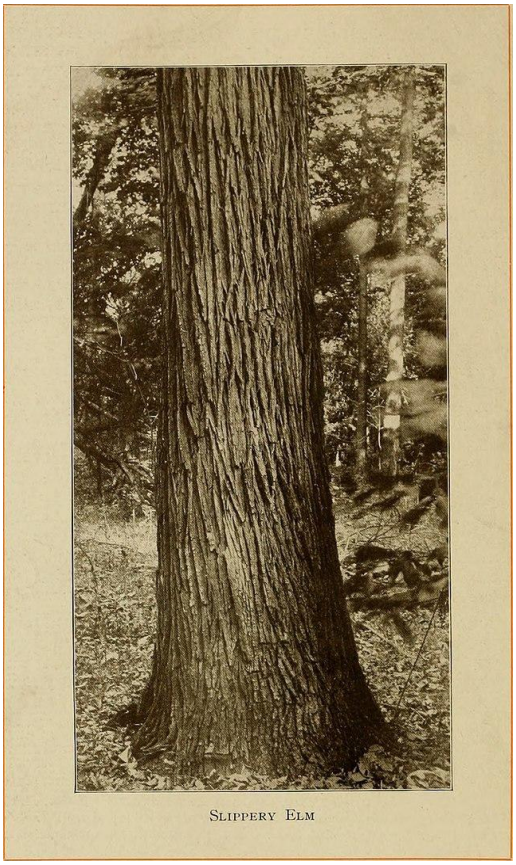
Takeaway

Although sheep sorrel has a rich history of use in traditional medicine, scientific studies on its benefits are still in the early stages.

Researchers say this herb is underrated since it grows wild and is high in antioxidants and nutrients that support health. Limited evidence suggests that it may help balance the immune system, reduce inflammation and oxidative stress, and soothe ulcers and wounds.

Animal and cellular studies point to its anticancer potential, but human studies are needed to determine how effective it is.

Slippery Elm: Soothing and Protecting



Slippery elm (*Ulmus rubra*) is the third most predominant ingredient in Essiac. Slippery elm is a tall tree that grows throughout parts of eastern and central Canada and the United States.

Slippery elm inner bark is a mucilage-rich Native American remedy for various inflammatory conditions. It's believed to soothe a sore throat and irritated gut, help heal wounds, and encourage the healing of damaged mucous membranes.

In times of famine, people chewed on its sweet-tasting inner bark to quench thirst and hunger. Saliva or water mixed with mucilage hiding in the tree's inner bark creates a slippery, wet feel—hence how slippery elm earned its name. It is also known under a host of other names, including Indian elm, moose elm, red elm, and sweet elm (Braun, 2006).

Thanks to its polysaccharide-rich mucilage, slippery elm is among the best-known herbal *demulcents*: remedies believed to soothe irritated tissue and coat and protect the digestive tract (Braun, 2006).

The inner bark of slippery elm is usually dried and made into a fine powder that's used for medicinal purposes. Traditional preparations also mention poultices for wounds, burns, and skin problems.

Sadly, slippery elm is increasingly becoming an endangered species, although it can be sustainably harvested. During warm weather, its bark peels easily away from the tree trunk. Only small amounts should be collected to enable the bark to regrow and the tree to live.

Be careful not to confuse slippery elm with American elm (*Ulmus americana*) or with other elm species that grow in different parts of the world.

Active Compounds

The main active compound in slippery elm is mucilage, a mixture of simple (hexose, pentose) and complex sugars (polyuronides). These compounds form a strong, semi-solid matrix that holds in water without getting dissolved (Watts, 2012).

For this reason, powder preparations of slippery elm can form a protective coating over tissues and mucous membranes of the mouth and throat when mixed with water.

The mucilage in slippery elm also acts as dietary fiber (along with celluloses, lignin, and gums in the bark) that feeds good gut bacteria and supports digestive health. Plus, the inner bark contains some starch, which aids digestion too (Braun, 2006).

The second most important compounds in slippery elm are tannins. Tannins are *astringents*, which means that they can help "shrink" tissues. This is useful in the case of wounds, diarrhea, and excessive bleeding. Tannins are also anti-inflammatory and antioxidant (Watts, 2012; Anderson et al., 1996).

Slippery elm contains up to 3% tannins. Another Essiac herb, sheep sorrel, is also high in tannins (Anderson et al., 1996; Tamayo et al., 2000).

In addition, scientists identified the following compounds in slippery elm (Watts, 2012; Romm, 2010; Anderson, 1934; Braun, 2006; Wijesundara & Rupasinghe, 2019):

- Flavonoids, antioxidants that support general health
- Phytosterols, which may support cholesterol balance
- Salicylic acid, an anti-inflammatory that's also known as "nature's aspirin"
- Betulinic and ursolic acid, potential antiviral and anticancer compounds
- Fatty acids with potential antibacterial, antifungal, and anti-inflammatory properties (capric, caprylic, oleic, and palmitic acid)
- Minerals and vitamins (magnesium, iron, calcium, potassium, beta-carotene, and B vitamins)

Traditional and Modern Uses

Native Americans have used slippery elm as a traditional remedy for coughs, diarrhea, inflammation, swelling, and gastrointestinal tract diseases. A decoction of the bark was used as a laxative and to aid childbirth. Slippery elm is also believed to be a mild diuretic that may help soothe bladder and urinary tract inflammation. To date, there is no clinical evidence to support these claims (Watts, 2012).

Allegedly, the same infusion of the inner bark is used in smaller amounts as a laxative and in larger amounts to soothe diarrhea. No studies have yet tested this either.

Recently, the antioxidants in the bark of slippery elm started being researched for improving symptoms of irritable bowel syndrome (IBS). The available studies are limited (Joo, 2014, Watts, 2012)

In the United States, slippery elm is marketed as a remedy for coughs and upper airway inflammatory conditions. It's also popular among individuals with voice disorders. However, there's not enough scientific evidence to support its use for any of these conditions (Watts, 2012)

Proponents claim that slippery elm may also help with psoriasis, syphilis, herpes, gout, upper respiratory tract infections, and even some types of cancer. Evidence is currently lacking to back up these claims.

Health Benefits

No published clinical trials have yet investigated slippery elm, other than in combination with other herbs. The first two benefits rely on these small, low-quality clinical trials.

The alleged benefits of slippery elm listed from number 3 onward lack human evidence. Findings rely on animal and cellular data that cannot be applied to people. Clinical research is needed.

All in all, there is not enough evidence to recommend slippery elm for any of the purported health benefits listed below until more research comes out.

Irritable bowel syndrome (IBS)

A mixture of slippery elm and other ingredients (lactulose, oat bran, and licorice root) improved symptoms of constipation-predominant IBS in one pilot trial on 10 people after 5 weeks. The supplement improved stool frequency by 20% and stool consistency by 29%. It also reduced straining, stomach pain, and bloating (Hawrelak & Myers, 2010).

A different slippery elm mixture (containing dried bilberries, cinnamon, and agrimony) reduced straining, stomach pain, bloating, and flatulence in 21 people with diarrhea-predominant IBS after 5 weeks. However, it increased stool frequency by 9%—an unwanted effect in people with diarrhea (Hawrelak & Myers, 2010).

It is unclear if these findings are due to slippery elm, other ingredients, or the combination. Larger studies are needed.

Cough & Sore Throat

Lozenges containing slippery are popularly taken to relieve cough and sore throat. Some consider them a better option than typical herbal preparations as they provide sustained release of mucilage to the throat. However, clinical research is sparse.

Slippery elm bark tea had a stronger throat-soothing effect than Lipton tea in one pilot study on 24 graduates with laryngitis or throat inflammation and voice problems. However, the results weren't statistically significant (Watts, 2012).

In another clinical trial with 60 people with a sore throat, tea made from slippery elm, licorice root, and marshmallow root reduced pain and eased swallowing better than the placebo. The effect lasted for about 30 minutes and it's uncertain which herb had the strongest soothing action (BMJ, 2003).

Scientists think that some compounds in slippery elm may help kill microbes, but this hasn't been proven. In cells, slippery elm extract was active against a bacterium that causes sore throat (*Streptococcus pyogenes*) and its biofilms, a type of plaque that contributes to antibiotic resistance. However, other tested herbs like sage and purple coneflower had a stronger effect (Wijesundara & Rupasinghe, 2019).

Healthy Gut Flora

When mucilage from slippery elm is mixed with water, it swells. Human digestive enzymes can't break down mucilage, but bowel flora can transform it into beneficial metabolites such as short-chain fatty acids (SCFA). SCFAs have anti-inflammatory properties and are also a source of nutrients and prebiotic fiber (Bone & Mills, 2013).

According to some scientists, this may explain the traditional use of slippery elm bark as a food for people recovering from illness or medical treatment (Bone & Mills, 2013).

In one small study on 12 healthy people, slippery elm (Peterson et al., 2018)

- Increased beneficial gut bacteria (*Bifidobacteria*, *Lactobacilli*, and *Bacteroides*)
- Reduced the harmful gut bacteria linked with disease, inflammation, and infection (*Citrobacter, Pseudocitrobacter, Enterococcus,* and *Enterobacter*)

Additional research is needed.

Inflammatory bowel disease (IBD)

Inflammatory bowel disease (IBD) is marked by dysbiosis and a lower diversity of beneficial gut bacteria. Theoretically, slippery elm might help by supporting a healthy gut flora and soothing

gut inflammation, but it hasn't been tested in clinical trials of IBD patients (Stojanov et al., 2020).

Slippery elm had antioxidant effects in a study on colon tissue samples from people with IBD. The authors concluded that further research is needed to test whether slippery elm would have the same effects in animals and humans (Langmead et al., 2002).

Heartburn & GERD

Mucilage in slippery elm is believed to help with heartburn and gastroesophageal reflux disease (GERD) by coating the esophagus. This might protect the esophagus from the damaging effects of regurgitated stomach acid.

Three case reports mention symptom improvement in people with GERD using slippery elm along with other herbs, minerals, and vitamins. Slippery elm was usually used as part of a complementary approach to help heal the damaged esophagus in addition to conventional treatment (Kines & Krupczak, 2016; Elliot, 2016; Martin & Seaman, 2015).

Although sometimes useful, case studies are considered weak scientific evidence. Clinical trials would need to explore this potential benefit.

Mouth & Stomach Ulcers

Slippery elm is thought to help with mouth and stomach ulcers by creating a protective coating over damaged mucosa. In theory, it might act in part through the same mechanism as mentioned for GERD.

Additionally, mucilage from slippery elm might stimulate nerve endings in the gut, triggering a reflex that increases the body's own mucus production. Mucus helps protect the gut lining from ulcers caused by drugs or excess stomach acid (Anderson et al., 1996).

Despite interest in using slippery elm for mouth and stomach ulcers, there is still no reliable information about its clinical effects.

Immune Support & Antioxidant Effects

The immune and antioxidant effects of slippery elm are limited to cellular studies. Have in mind that it's impossible to know if and how their findings would translate to animals and humans.

In one cellular study, slippery elm prevented the formation of reactive species that can damage cells (Choi et al., 2002).

In another cellular study, slippery elm neutralized free radicals that can cause inflammation, DNA damage, and cancerous mutations (Langmead, 2002).

Other studies explored different elm species. For example, Chinese elm bark was investigated for its anti-inflammatory and antioxidant properties in cells. Japanese elm bark increased the immune response in animals. Slippery elm may not carry these effects (Cho et al., 1996; Lee et al., 2007).

Cancer Research

The original Essiac formula contains about 6% slippery elm inner bark. You can jump over to Chapter 5 - Essiac, Cancer, and Chemotherapy to read about Essiac and cancer.

In cells, the inner bark of slippery elm reduced the production of an inflammatory compound called interleukin 8 (IL-8). IL-8 may be involved in the development of cancer (Wijesundara & Rupasinghe, 2019).

Scientists hypothesize that compounds like oleanolic, ursolic, and betulinic acid in slippery elm inner bark may have anti-tumor potential. Future studies would need to investigate this (Braun, 2006).

Allegedly, the mucilage in slippery elm is also said to help with appetite by sustaining the stomach lining in people undergoing chemotherapy. However, studies have not yet tested this claim either. More about how Essiac may affect chemotherapy side effects can be found in a subsection of Chapter 5 ("Essiac and Chemotherapy").

Precautions

Slippery elm is considered to be safe when used by mouth or applied onto the skin and mucous membranes at the recommended doses.

Some people are allergic to slippery elm and may experience skin irritation.

Drug interactions after oral use are possible. The mucilage in slippery elm may reduce the absorption of drugs. For this reason, some practitioners recommend taking slippery elm 2 hours before or after other herbs or medications.

There is not enough safety information about the use of slippery elm in pregnant or breastfeeding women. Slippery elm may have been used in the past to induce abortions when inserted vaginally. According to historical records, it's unlikely to have an abortive effect when taken by mouth. However, human data are lacking.

Takeaway

No clinical studies have yet investigated the effects of slippery elm alone on any purported health benefit.

According to pilot trials using multi-ingredient formulations, slippery elm may ease the symptoms of constipation-predominant IBS.

Science has validated that slippery elm is a rich source of mucilage, tannins, and other potentially beneficial active compounds. It also contains antioxidants and nutrients that support general well-being.

Limited evidence suggests that mucilage in slippery elm may help soothe a sore throat, irritated gut, and damaged stomach lining. Mucilage and fiber in slippery elm may also support a balanced gut microbiome. Overall, more research is needed.

Rhubarb Root: A Cleansing Antioxidant Booster

Rhubarb is the least dominant herb in Essiac, found in about 3% across formulations. Yet, it's an important component of the original formula.

Rhubarb root is among the most important traditional Chinese medicine herbs. It's believed to encourage the cleansing and purging of toxins from the body. Western medicine is interested in its antioxidant, laxative, and anti-diarrheal compounds.

Rhubarb is a culinary and medicinal herb native to Asia. Its tart-flavored, pink-green stalks are a popular ingredient in pies and jams. In fact, the roots and underground stalks (rhizome) are the only edible part of rhubarb, while its leaves are toxic due to extremely high oxalate levels (Barceloux, 2009).

Rhubarb thrives in colder climates. It was likely brought to North America in the 18th century. Rhubarb was introduced to Europe a bit earlier and became a health fad of the time, being called the "All Bran of the Age of Reason" (Barceloux, 2009).

In Traditional Chinese Medicine (TCM), the stalks and roots of rhubarb are described as purging and cleansing. Rhubarb is traditionally used to help the body flush accumulated toxins, clear heat, cool the blood, unblock meridians, and drain dampness (China Pharmacopoeia Committee, 2010; Wen et al., 2018).

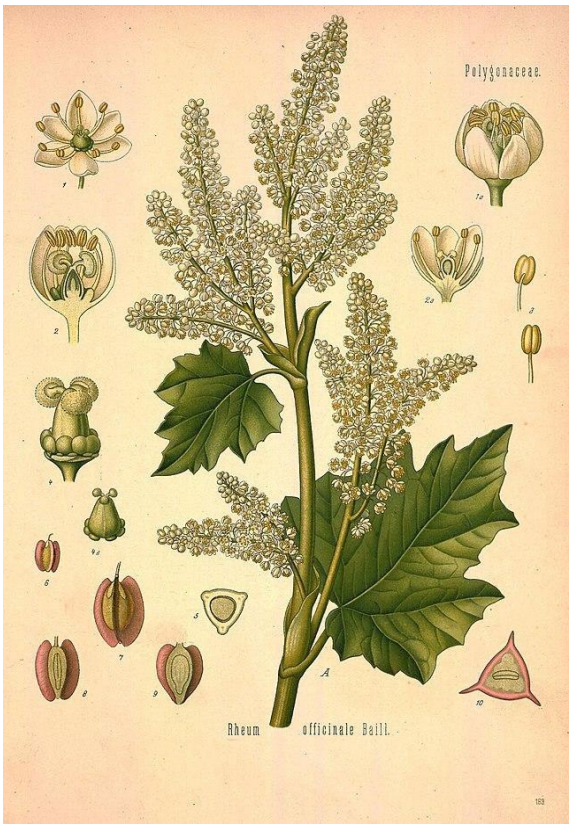
These concepts may sound alien to Western medicine, but modern science confirms its purgative, anti-inflammatory, antioxidant, antimicrobial, and liver-protective potential (Yang et al., 2012; Gao et al., 2013).

Types of Rhubarb

The two main types of medicinal rhubarb, which this chapter goes over, are (Barceloux, 2009):

- Indian rhubarb (*Rheum officinale* Baillon), and
- Turkey rhubarb (*Rheum palmatum* L.)

Indian and Turkey rhubarb are closely related. *Both* seem to be referred to as Chinese rhubarb, which can cause confusion. Plus, Turkey rhubarb is sometimes called East Indian rhubarb or Russian rhubarb (Zhang et al., 2019).



The confusion doesn't end there. In Chinese medicinal material markets, dried roots and rhizomes of *R. officinale* are called "south rhubarb" and of *R. palmatum* "north rhubarb" (Wang et al., 2012).

Aside from Indian and Turkey rhubarb, rhubarb's plant genus (*Rheum*) also includes garden rhubarb and false rhubarb. Garden rhubarb doesn't have medicinal value. False rhubarb root extract (ERr 731) is used for menopausal symptoms (Barceloux, 2009; Heger et al., 2006).

Indian and Turkey rhubarb *may* differ in active compounds. Even the same type of rhubarb grown in Asia, Europe, and North America may have different active compounds (Barceloux, 2009).

Few studies have investigated these differences. But keep in mind that the study findings using Indian rhubarb from southern China *might* not apply to Turkey rhubarb grown in northern Canada, and vice versa.

Despite this, both Turkey and Indian rhubarb seem to have similar (if not identical) health properties, as testified by the widespread traditional use of both rhubarb types in Asia.

Both Indian and Turkey rhubarb have been used in traditional Chinese medicine since the third millennium BC. Some even mention rhubarb as the most important Chinese medicinal herb (Barceloux, 2009; Zhang et al., 2019).

Essiac usually contains Indian rhubarb, although some products use Turkey rhubarb. There is no evidence to claim that Indian rhubarb is superior to Turkey rhubarb or the other way around. As with all high-quality plant supplements, the most important factors revolve around well-defined and ethical cultivation, harvesting, processing, testing, and packaging practices.

Active Compounds

Scientists have discovered about 200 compounds in rhubarb root and rhizome. Some actives that both *Rheum palmatum* and *Rheum officinale* likely contain include (Tang et al., 2007; Song et al., 2019; Wen et al., 2018; Aichner & Ganzera, 2015; Yang et al., 2012; Gao et al., 2013; Cao et al., 2017):

- Emodin - a potential anti-tumor, antimicrobial, and anti-inflammatory compound (also found in sheep sorrel)
- Chrysophanol - an anti-inflammatory and antiviral active
- Rhein - another possible antitumor compound; also a laxative
- Tannins - *astringents* or "shrinking" plant actives that help with bleeding and diarrhea
- Sennosides A and B - actives with strong laxative and colon-cleansing action
- Flavanols and flavans like kaempferol - antioxidants that help guard the body against oxidative stress
- Stilbenes - liver-protectants that may also help balance cholesterol

Rhubarb is also a herbal bitter, which explains its use as a stomach tonic. Indian rhubarb is typically described as more bitter than Turkey rhubarb. Herbal bitters help jumpstart digestion by stimulating the body's own production of stomach acid and digestive enzymes. Burdock root is another well-known herbal bitter (McMullen et al., 2015).

Traditional and Modern Uses

People use rhubarb for:

- Digestive complaints (constipation, diarrhea, heartburn, stomach pain, gastrointestinal bleeding)
- Symptoms of menopause
- Menstrual cramps (dysmenorrhea)
- Inflammation of the pancreas and other inflammatory conditions
- Cold sores and canker sores (applied to the skin)
- Immunosuppression (to boost the immune response)
- High blood pressure
- Fever
- Complementing cancer treatment

This guide will focus on the potential antioxidant and anti-inflammatory whole-body health benefits of using rhubarb root by mouth. It won't cover the research on topical rhubarb formulations.

There is a decent amount of clinical studies on rhubarb but with major limitations. Some study findings have been mixed. Most studies were low-quality or published only in Chinese. Some studies had a small sample and used multi-ingredient supplements.

For this reason, more quality research is needed before rhubarb can be recommended for these uses.

Health Benefits

Source of Antioxidants and Nutrients

Rhubarb is packed with polyphenol antioxidants like anthocyanins and proanthocyanidins, which give it its reddish-pink color. These antioxidants have potential anti-bacterial, anti-inflammatory, and antioxidant properties. Rhubarb also contains other anti-inflammatory compounds (Gao et al., 2013).

Scientists believe that antioxidants in rhubarb may help scavenge harmful free radicals and reduce inflammatory molecules that are thought to be involved in aging and many chronic diseases including cancer, heart disease, and diabetes (Cai et al., 2004; Zhang et al., 2015).

This might explain why some people think rhubarb root has a role in cancer prevention, though this hasn't been proven. Head over to Chapter 6 ("Essiac and Cancer Prevention") to understand the science behind using Essiac, which contains rhubarb, as part of a cancer prevention strategy.

According to the USDA database, rhubarb contains:

- Vitamin K - important for blood clotting and bone health
- Beta carotene - provitamin A, has antioxidant effects and supports immunity and eye health
- Calcium - supports bone health
- Vitamin C - key for strong immunity
- Potassium - supports heart health
- Folate - helps the body produce white and red blood cells and DNA
- Magnesium - contributes to muscle and nerve health
- Fiber - aids digestion and feeds good gut bacteria

Pancreas Inflammation

According to 16 small clinical studies, rhubarb reduced hospital and ICU stay and overall symptoms in patients with pancreas inflammation (Hu et al., 2018; Wan et al., 2014).

Rhubarb also reduced disease severity, inflammation, and complications like sepsis, liver damage, and kidney failure in these patients. It was given via a gastric tube or enema, alongside conventional treatment (Hu et al., 2018; Wan et al., 2014).

In another clinical study, rhubarb helped prevent pancreas inflammation in high-risk patients undergoing a medical procedure (endoscopy) on the pancreas. More research is needed (Wang et al., 2017).

Gastrointestinal Protection & Food Tolerance

Limited studies reveal that rhubarb may help protect the intestinal barrier, prevent gut bacteria from entering the bloodstream, and promote regular bowel movements (Zhang et al., 2018).

One analysis of 14 preliminary clinical trials concluded that rhubarb powder and extract may help reduce stomach bleeding. In one trial, rhubarb reduced stomach bleeding and lowered the risk of recurrent bleeding by about 58% over 2 days (Liu et al., 2020).

In another trial of 312 patients, Indian rhubarb (*Rheum officinale*) extract reduced bleeding from duodenal ulcers by ~91%, and Turkey rhubarb (*Rheum palmatum*) extract by ~94%. The authors concluded that both types of rhubarb were effective, but more research is needed (Zhou & Jiao, 1990).

Most critically ill patients struggle to keep any food down. They usually already have a damaged stomach and gut lining from chemotherapy, other medications, radiation, or the disease itself and suffer poor nutrient status. Altogether, these factors increase the risk of death (Gungabissoon et al., 2014).

According to one clinical study on 368 patients, rhubarb might help critically ill patients with gastrointestinal injury tolerate food better, without serious adverse reactions. Rhubarb also lowered CRP, an inflammatory marker, and reduced ICU stay in these patients (Zhang et al., 2018).

Chapter 5, section "Essiac and Chemotherapy", discusses the use of Essiac in addition to chemotherapy.

Kidney Failure

Several small, low-quality clinical studies suggest that taking rhubarb as part of traditional Chinese medicine may improve kidney function in people with kidney failure. This was the case when rhubarb was used alone or in addition to the standard medication (captopril) (Zhang & Zhang, 1990; Song et al., 2000; Wang & Cheng, 1996; Sun et al., 2000; Sheng & Ge., 1994).

However, the studies had a risk of bias, some used multi-ingredient supplements, and all were limited to the Chinese population.

Detox

According to 12 small studies on nearly 900 people, crude rhubarb may reduce the symptoms and toxic effects of pesticide poisoning. Plus, two studies used rhubarb in combination with other herbs and holistic strategies to detox and reduce the effects of herbicide and pesticide poisoning (Wang & Pan, 2015; Wang et al., 2015; Yu et al., 2012).

All studies were low-quality. Additional research is needed to verify their findings.

Digestion

Rhubarb contains both laxative and antidiarrheal active compounds. However, few clinical studies have tested the digestive effects of Turkey or Indian rhubarb (Cao et al., 2017).

Rhubarb improved gut health in one trial of 30 patients with severe burns. It likely encourages bowel movements by making the body release more digestive hormones and enzymes (Meng et al., 2011).

A Chinese formulation with rhubarb improved gut function and recovery in another small trial of 89 critically ill children. Larger trials are required (Yu et al., 2002).

Obesity & High Cholesterol

Rhubarb stalks are high in fiber, which supports balanced cholesterol levels. In one study, powder from rhubarb stalks reduced high levels of total and "bad" LDL cholesterol (Goel et al., 1997).

Rhubarb reduced weight and belly fat in two studies, used as part of Chinese herbal medicine. However, it didn't have an effect on weight in two studies using different multi-ingredient herbal supplements (Zhou et al., 2014; Tong et al., 2013; Roberts et al., 2007; Greenway et al., 2006).

Risk of Sepsis

An analysis of 15 small, low-quality clinical studies on close to 900 patients concluded that rhubarb may reduce the risk of dying from sepsis when added to standard treatment. Sepsis or blood poisoning is a life-threatening reaction to infection (Zhang et al., 2015).

Animal studies reveal that rhubarb may also help prevent organ damage from sepsis thanks to its antioxidant and anti-inflammatory active compounds. This has yet to be tested clinically (Lai et al., 2015).

Precautions

The roots and stalks (rhizome) of rhubarb are safe when used in food amounts or as recommended by the supplement manufacturer.

In clinical studies, rhubarb has been reported to cause cramping, gut discomfort, stomach pain, watery diarrhea, nausea, vomiting, and uterine contractions. Serious adverse effects were rare.

Some people may be allergic to rhubarb and develop a skin rash or severe allergic reaction.

Chronic rhubarb use at high doses is not recommended as it might cause electrolyte and hormone imbalances (McGuffin, 1997).

Due to its vitamin K content, rhubarb may interact with blood-thinning medication. Talk to your doctor before supplementing.

Rhubarb leaves should not be used due to their high oxalate content, which can cause severe poisoning. The stalks and roots contain some oxalates, though far less than the leaves. People with kidney problems use rhubarb with caution and only in small amounts after consulting a healthcare professional.

Takeaway

Many of the benefits of rhubarb are still uncertain due to a lack of high-quality studies.

Rhubarb root and stalk are rich in antioxidants, nutrients, and anti-inflammatory compounds that may help reduce pancreas inflammation, stomach bleeding, and pesticide poisoning. Rhubarb may even improve symptoms and outcomes of serious illnesses.

It’s likely safe when used as recommended. However, more research is needed to determine its health effects.

Chapter 3

The Science of the Original Essiac Formulation

The original Essiac formula is available in several formats. Some formulations use or contain alcohol, some don't. Some formulations claim to be the original formula but contain sheep sorrel roots, not leaves. Some formulations are herbal liquid extracts, other ones are dried and packed into capsules.

What's the difference between all these products? Which product should you take?

This chapter explains the key differences between sheep sorrel leaves and roots and goes over the basics of herbal extraction and what you can expect from each available Essiac formulation.

Herbal ratios in the original Essiac formula

The following herbal ratios are found unequivocally across different formulations (capsules, powder, liquid extract) in the original Essiac formula:

- Burdock (*Arctium Lappa*) Root: 76%
- Sheep Sorrel (*Rumex Acetosella*) Leaves: 15%
- Slippery Elm (*Ulmus Fulva*) Bark: 6%
- Indian Rhubarb (*Rheum Officinale*) Root: 3%

Sheep Sorrel Leaves vs. Roots

One of the most controversial questions about the original Essiac formula is whether it contained sheep sorrel leaves or roots. Many users can be led down websites that rely on convincing copy rather than on evidence to learn about Essiac constituent plants.

This section details the science behind using sheep sorrel leaves vs. roots. It cites research studies and unpacks popular manufacturer claims to help you choose for yourself.

Key points

- All recent scientific studies on Essiac used formulations with sheep sorrel leaves and aerial parts
- Essiac formulations with sheep sorrel leaves show strong antioxidant activity and potential anti-cancer properties, according to preclinical studies
- Research to support the use of Essiac formulations with sheep sorrel roots is lacking
- Most scientific studies on sheep sorrel as a standalone remedy investigated the aerial parts. The leaves are high in flavonoid antioxidants, nutrients, and active compounds with potential anti-inflammatory and anticancer properties
- Research on the health properties of sheep sorrel roots as a remedy is sparse; a couple of studies suggest detoxification potential and higher levels of immune-supportive polysaccharides; More quality research is needed
- Additional clinical research is required to support the use of Essiac and sheep sorrel in general

A critical look at the data and manufacturer claims

Sheep sorrel (*Rumex acetosella L.*) is a medicinal and culinary herb. The whole plant is edible.

The aerial parts of sheep sorrel include:

- Leaves
- Flowers
- Fruits
- Stalks

These parts of the plant are often also collectively referred to as sheep sorrel herb.

The Essiac online community and websites promoting Essiac contain contradictory information about the parts of the plant that were used in the original formula.

Some manufacturers say that the original formula used the whole plant. Others boldly state that the original Essiac formula "must contain sheep sorrel roots."

Several such unverified sources cite the same archive document: Rene Caisse's letter to Dr. Chester Stock of the Memorial Sloan-Kettering Cancer Center. Allegedly, she wrote the following:

"I am very shocked at the way your people are using the materials I sent you. The way they are preparing it for injections is an absolute waste. They might as well inject sterile water… They are just using leaves and stems, leaving out the roots. They [the roots] are a part of Essiac."

It's easy to jump to the conclusion that Rene was talking about sheep sorrel in the above excerpt.

Yet, this is not mentioned anywhere in this or other archive documents. Based on the above letter, we can only infer that Rene considered the roots of *some* Essiac constituent plant essential.

Based on the scientific data, it is more likely that Rene was referring to burdock root as "a part of Essiac." Burdock root is the dominant constituent plant in Essiac, making up about 60% of the formula. Sheep sorrel is the second most predominant plant (Seely et al., 2007).

Therefore, there is no proof that sheep sorrel roots were used in Rene Caisse's original Essiac formula. There is also no direct evidence to claim that sheep sorrel is the most important ingredient in Essiac.

Published studies

All recent animal and cellular studies used Essiac with sheep sorrel aerial parts. These studies reported anti-leukemic and antioxidant activity (Kabeel et al., 2018; Ruiz et al., 2021; Leonard et al., 2006).

Essiac liquid extract containing sheep sorrel leaves increased the lifespan of *C. elegans* roundworms and their ability to tolerate oxidative stress in one study (Ruiz et al., 2021).

Antioxidants in Essiac water extract with sheep sorrel aerial parts protected against DNA damage in test tubes (Leonard et al., 2006).

In another study on mice, Essiac water extract with sheep sorrel aerial parts reduced abnormal leukemia blood cells, improved weight, and recovered normal blood markers. The herbs used in this study were locally obtained in Egypt; their composition may differ from the herbs used in Essiac from Canada (Kabeel et al., 2018).

Essiac also had antioxidant, immune-balancing, and anti-inflammatory activity in cells. The researchers used Essiac® (from Essiac International Canada, Ottawa, Canada) but don't

specify the exact formulation. However, all products from Essiac International Canada contain sheep sorrel leaves, not roots (Seely et al., 2007).

Another study reports antioxidant and anti-inflammatory activity of both Essiac and Flor-Essence in mouse cells. Essiac seemed to have a stronger and more widespread effect than Flor-Essence in this study, but the exact formulation used is unclear (Cheung et al., 2005).

Sheep sorrel leaves & aerial parts

Flavonoid antioxidants

Different parts of sheep sorrel contain different active compounds. The composition of these active compounds affects the benefits of sheep sorrel as a standalone herbal remedy and as an essential part of Essiac.

Sheep sorrel aerial parts are rich in antioxidant flavonoids and polyphenols. The leaves and fruits contain the highest amount of flavonoids. (Korpelainen & Pietiläinen, 2020; Mostafa et al., 2011; El-Bakry et al., 2012).

Flavonoids and polyphenols are strong antioxidants that support general health. Flavonoids may help prevent or reduce the DNA and cellular damage that can cause cancerous mutations, but more research is needed (Korpelainen & Pietiläinen, 2020).

Additionally, flavonoids in sorrel shoots may bind aluminum and other heavy metals into non-toxic forms (Korpelainen & Pietiläinen, 2020).

The leaves are also high in other antioxidants that can scavenge and neutralize free radicals (Lobo et al., 2010).

In another experiment, sheep sorrel leaf extract showed the strongest activity in an antioxidant assay (DPPH assay). This assay measures how good different plant extracts are at scavenging and neutralizing free radicals that cause oxidative stress and cellular damage (El-Bakry et al., 2012).

Quercetin

Quercetin is the master flavonoid and one of the most promising active compounds in Essiac. This well-researched plant antioxidant with anticancer potential is higher in sorrel than in any other leafy green.

According to the USDA Database for the Flavonoid Content of Selected Foods, 100g of fresh sorrel (the dock plant) packs 86.2 mg of quercetin. In comparison, 100 g of fresh onions—popularly viewed as the food with the highest quercetin content—contain between

22.40 mg and 51.82 mg (Bhagwat et al., USDA; National Onion Association, Onion health research, 2020).

All fresh plants contain plenty of water. Dried and powdered sorrel leaf, which is found in Essiac, is expected to be far more concentrated in quercetin.

The USDA analysis did not specify the exact species of sorrel tested. Another analysis confirmed that sheep sorrel leaves are also an exceptional source of quercetin. An extract from sheep sorrel leaves (at early vegetative stages) contained the highest amount of quercetin compared to the whole plant and the roots (El-Bakry et al., 2012).

Quercetin boosts glutathione and other vital antioxidant pathways in the body. Glutathione cleanses free radicals and toxins and has been called "the mother of all antioxidants" and "the master detoxifier." Thanks to its mechanism, quercetin has broad medicinal potential. Scientists believe it may reduce inflammation, soothe allergies, fight viruses, and support immune and heart health (Adeoye et al., 2018; Shoskes et al., 19i99; Zahedi et al., 2013)

Based on experiments in animals and cells, quercetin may act on several anti-cancer pathways. It's thought to have direct "proapoptotic effects," which means that it might block human cancers from developing or progressing in the first place. Clinical studies have yet to be carried out, though (Tang et al., 2020; Kowalski et al., 2005).

Additionally, some scientists hypothesize that quercetin may reduce the division and spread of already existing tumors. Preliminary data reveal that quercetin seems to stop tumors from forming new blood vessels (angiogenesis) and increases their susceptibility to cellular death. However, this hasn't been proven in humans either (Rauf et al., 2018).

All in all, researchers agree that quercetin has strong anticancer potential that deserves further attention as a prospective safe complementary cancer therapy (Tang et al., 2020).

Tannins

Aerial parts of sheep sorrel contain tannins. Tannins are *astringents*, "shrinking" plant actives that help stop bleeding and diarrhea. They're the reason red wine and dark chocolate can cause a drying sensation in your mouth. Tannins may also help reduce inflammation and boost antioxidant defense (Derksen et al., 2014).

Vitamin C

Sorrel leaves are an excellent source of vitamin C. The leaves of common sorrel from Bulgarian markets contained 750 to 1200 mg of vitamin C per 100 g of plant matter, which is over 800% of the RDA (Atanassova et al., 2018).

Like common sorrel, sheep sorrel leaves are also high in vitamin C (Stopps et al., 2011).

Due to its tart-tasting leaves rich in vitamin C, European and North American cultures used sheep sorrel leaves as both food and medicine. Many North American aboriginal people prepared sheep sorrel leaves (raw, in teas, or extracts) to treat and prevent scurvy. Folk healers also gave it as therapeutic food for health conditions caused by vitamin C deficiency (Stopps et al., 2011).

Other Nutrients

Sheep sorrel leaves are a good plant-based source of protein and contain all essential amino acids (including anti-inflammatory methionine derivatives) (Kuhnlein & Turner, 1991; Bello et al., 2019).

Other nutrients found in sheep sorrel leaves include vitamins C, D, E, K, vitamins of the B complex, provitamin A, iron, calcium, and organic acids (Stopps et al., 2011).

However, raw sheep sorrel leaves can also be high in oxalic acid, a sour-tasting anti-nutrient. Oxalic acid can reduce the absorption of minerals like calcium and magnesium and be dangerous for people with kidney problems. For this reason, the use of raw sheep sorrel leaves should be limited (Tuazon-Nartea & Savage, 2013).

Cooking the leaves and preparing them with calcium-rich foods neutralizes most of the oxalic acid. Also, herbal supplements with sorrel leaf are low in oxalic acid (Tuazon-Nartea & Savage, 2013).

Emodin

The leaves of sheep sorrel and the whole plant contain the greatest amount of the antioxidant emodin (Mostafa et al., 2011; El-Bakry et al., 2012).

Some scientists believe emodin may have anti-tumor activity. Emodin was active against liver, pancreatic cancer, breast, ovarian, prostate, and lung cancer cells in test tubes. It's also being researched for making tumor cells more sensitive to chemotherapy, but human studies are lacking (Gupta & Rai, 2018).

Additionally, emodin may improve blood flow, stimulate bowel movements, and help fight viruses and parasites (Gupta & Rai, 2018).

Other sorrel species

One analysis discovered a variety of flavonoid antioxidants in an extract of the aerial parts of common sorrel (*Rumex acetosa*), including several catechins. Catechins are thought to be responsible for the strong antioxidant action of green tea. It's uncertain to what extent sheep sorrel herb contains these flavonoids (Bicker et al., 2009).

An extract from the aerial parts of common sorrel (*Rumex acetosa*) reduced the spread of the herpes simplex virus type-1 (HSV-1) in cells. Scientists identified proanthocyanidin and flavonoid antioxidants as the active compounds (Gescher et al., 2011).

A similar extract of common sorrel (*Rumex acetosa*) protected cells from infection with the influenza A virus, a common cause of the flu. Sorrel seemed to prevent infection by stopping the virus from entering cells. The authors identified a specific antioxidant (procyanidin B2-di-gallate) as the promising active (Derksen et al., 2014)

It's unknown whether sheep sorrel has similar antiviral activity.

Sheep sorrel roots

Anthraquinones and polysaccharides

The roots of sheep sorrel are high in **anthraquinones and polysaccharides**. These compounds may carry some antitumor and immune-supportive potential. For example, emodin is an anthraquinone. Although emodin is higher in sheep sorrel leaves, other anthraquinones may be higher in the roots (Korpelainen & Pietiläinen, 2020).

Total antioxidants

According to some analyses, sheep sorrel roots may contain the highest amount of total antioxidants. However, the leaves show stronger antioxidant activity (El-Bakry et al., 2012).

Liver protection

According to one animal study, sheep sorrel may reduce liver damage. Sorrel extract helped protect the animals' livers and vital organs from toxins. The researchers likely used sheep sorrel roots, but their methodology is unclear and the quality of the study is poor (Alkushi, 2017).

Also, citrate in sorrel roots may bind aluminum into non-toxic forms (Korpelainen & Pietiläinen, 2020).

Other sorrel species

According to one analysis of a type of Tunisian sorrel (*Rumex roseus*), extracts from the roots had stronger antioxidant activity than the leaves. Both the roots and stems reduced inflammation in intestinal cells. (Chelly et al., 2021)

It's uncertain if these findings have implications for sheep sorrel.

Wild vs. cultivated varieties

Wild-crafted sheep sorrel is likely superior to cultivated plants. One study discovered that wild sheep sorrel is higher in the total amount and activity of antioxidant phenolics than the cultivated variety (Isbilir et al., 2013).

Understanding Different Essiac Formulations

Types of Essiac Extracts & Available Products

The following products are available through Essiac Canada:

- *Essiac herbal powder*: contains the dried herbs that should be dissolved in water (alcohol isn't used at all)
- *Essiac liquid herbal extract:* contains the alcoholic extract in liquid form (the final product is *not* alcohol-free)
- *Essiac herbal capsules*: contains the dried alcoholic extract (the final product is alcohol-free)
- *Essiac daily drops*: contains the alcoholic extract in which the alcohol is replaced with glycerin (the final product is alcohol-free)
- *Essiac Gold capsules*: contains the dried alcoholic extract of the four herbs (the final product is alcohol-free), plus AHCC

Water vs. alcohol extraction in plant science

First, let's clarify some basic terminology:

- *Water/aqueous extract*: refers to using distilled water, either hot or cold, to make herbal extracts
- *Alcoholic/hydroalcoholic extract*: refers to using anywhere from 20 to 90 percent ethanol dissolved in distilled water to make herbal extracts

You may wonder: why use one solvent over the other? What's the point, if the final product is made from the same plants and their ratios? The reason is that different solvents can extract different active compounds, which can change the health benefits and uses of the final product.

Essiac Water Extract

Water: good for extracting complex carbohydrates

In general, water will do a good job of extracting active compounds that are highly soluble in it. In chemistry, these compounds are labeled as *polar*. Some examples include (Petkova, 2021; Wang et al., 2019):

- Fiber, inulin-type fructans, and pectic and other polysaccharides from burdock root with immune-balancing, anti-inflammatory, prebiotic, and anti-constipation benefits
- Other complex polysaccharides like mucilage from burdock root and slippery elm bark that soothes irritated tissues and protects the gastrointestinal lining
- Some flavonoids (in their sugar-bound glycoside form) from all constituent herbs with antioxidant action
- Tannins from sheep sorrel, slippery elm bark, and rhubarb root with anti-inflammatory and anti-diarrheal effects
- Water-soluble vitamins like vitamin C in sheep sorrel leaves
- Proteins and minerals

Many traditional herbal preparations use water as it's the simplest, healthiest, and most abundant solvent.

Studies of the whole extract

A study testing anti-leukemic activity in mice used a water extract prepared from the four constituent herbs. The extract decreased abnormal leukemia blood cells, improved weight gain, and helped restore blood count when given to the animals as a drink (Kabeel et al., 2018).

The authors used a process similar to the manufacturer's instructions to prepare the water extract (as described in an earlier study) (Leonard et al., 2006).

However, the herbs used in the study were locally obtained from the Egyptian herbal market. The difference in their active compounds compared to the herbs in the Essiac formula sold in Canada is unknown (Kabeel et al., 2018).

Active compounds in individual herbs

In one study, burdock root water extracts showed stronger antioxidant activity than ethanol extracts (and extracts with nonpolar solvents) (Duh, 1998).

In the same study, hot water extracts were as efficient as cold water extracts. Remember, Essiac tea is made with boiling water. Heat can deactivate some active compounds, so it's important to know that it doesn't seem to diminish the antioxidant potential of burdock root as the main constituent herb in Essiac.

The authors of the above study didn't identify the exact antioxidants responsible for this effect, but they suspect it comes from sugar-bound flavonoids such as quercetin, myricetin, and rutin.

In another study, both the water and ethanol extract of burdock fruit blocked inflammation and histamine production in immune mast cells (Kee & Hong, 2017).

Essiac Alcohol Extract

Alcohol: good for extracting compounds slightly to moderately insoluble in water

Ethanol-water mixtures seem to be great at extracting a wide variety of phytochemicals from medicinal plants (Kerry Bone, A Clinical Guide to Blending Liquid Herbs, 2003).

Alcohol should extract the active compounds found in the water extract, plus compounds that are less soluble in water. Chemically, this makes up a mixture of polar and slightly *non-polar* actives.

Ethanol is not the only type of alcohol, but it's the preferred choice for herbal extraction. Methanol, another type of alcohol, is more toxic.

Many traditional preparations also use varying concentrations of ethanol. Old texts describe steeping herbs in wine for long periods and then using the resultant liquid. Ethanol is also a great preservative if used in at least 20% concentration (Kerry Bone, A Clinical Guide to Blending Liquid Herbs, 2003).

Active compounds that ethanol can extract

Compared to higher concentrations, lower concentrations of ethanol (~25%) will extract more water-soluble compounds (covered in the previous section) (Kerry Bone, A Clinical Guide to Blending Liquid Herbs, 2003).

Still, the concentration of highly water-soluble active compounds like polysaccharides is likely to be lower in the alcoholic extract than in the water extract.

Traditionally, ethanolic extracts with 45-60% ethanol are thought to extract polar and non-polar compounds if the extraction process lasts at least 3 days. These may include (Lee et al., 2011; Bae et al., 2012; Yang et al., 2016; Wang et al., 2019):

- Certain flavonoids, including free forms of the antioxidants quercetin from sheep sorrel and burdock root and various flavonoids from all constituent herbs
- Lignans arctigenin and arctiin from burdock root, which may carry antitumor and anti-inflammatory potential
- Anthraquinones like emodin and aloe-emodin from sheep sorrel and rhubarb root with possible cancer-fighting activity
- Chlorogenic acids, antioxidants rich in burdock root
- Fatty acids like immune-balancing oleamide from burdock root and phytosterols

- Organic acids such as ursolic, betulinic, and oleanolic acids from burdock root and slippery elm with antioxidant, anti-inflammatory, and antimicrobial properties
- Essential oils/volatile compounds with various potential health benefits

Higher ethanol levels of 70 to 90% can also extract more non-polar active compounds such as gums, resins, and oils. Drying the herbs first can reduce the need for higher ethanol concentrations Kerry Bone, A Clinical Guide to Blending Liquid Herbs, 2003).

To sum it up, the alcohol extract is likely to be higher in a greater variety of active compounds from all four constituent herbs in Essiac than the water extract.

What ethanol can't extract

Even the highest concentrations of ethanol are unlikely to extract all compounds that are highly insoluble in water (highly *non-polar*). Other types of fat-soluble chemicals are typically used in research studies if that's the goal (ether, acetone, n-hexane, and others). The downside is that most are toxic, and are thus avoided in traditional medicine.

Traditional preparations aiming to extract fat-soluble compounds usually use natural oils. This is called *maceration*. The resulting products are typically applied on the skin (with some exceptions) and are not relevant to the scope of this guide.

Studies of the whole extract

A 2021 study used the alcohol-based original Essiac liquid extract to explore antioxidant and anticancer activity (Ruiz et al., 2021).

The extract increased the ability of *C. elegans* roundworms to withstand dying from excessive oxidative stress. Scientists use *C. elegans* to experimentally assess lifespan, oxidative stress, and innate immunity. Essiac liquid extract increased the roundworms' lifespan and overall health.

Active compounds in individual herbs

Lignans arctiin and arctigenin are often viewed as the most important active ingredients in burdock root. Arctigenin is thought to be anti-inflammatory, gut-protective, immune-supportive, and antioxidant. Scientists are also exploring its anti-cancer potential (Wu et al., 2014; Chan et al., 2010):

All in all, arctigenin doesn't seem to dissolve well in water. It's soluble in ethanol and organic solvents like DMSO (Arctigenin product description, Cayman chemical).

Experiments have used several solvents and enzymes in multiple steps to extract the highest amounts of arctiin and arctigenin from burdock. This is because arctiin and arctigenin are

partially soluble in each of the chemicals used (water, ethanol, and others), making combined solvents the most effective (Lü et al., 2016; Liu et al., 2014).

Scientists confirmed the presence of arctiin and its derivatives in an ethanolic extract (95%) of burdock seeds (Ming et al., 2004).

Therefore, alcoholic extracts are likely to be higher in arctigenin and arctiin than the water extracts.

Studies on flaxseed suggest that it may be possible to extract lignans with higher water temperatures and pressure. Therefore, it's *theoretically* possible that burdock water extracts may also contain some arctigenin and arctiin. Studies are needed to test this (Cacace & Mazza, 2006).

Additionally, burdock root alcoholic extract is higher in antioxidant phenolic compounds than the water extract (~72-77 mg gallic acid/g extract vs. ~62-65 mg gallic acid/g extract) (Predes et al., 2011).

Another study confirmed the strong antioxidant activity of burdock root ethanolic extract in cells (Lee et al., 2011).

An ethanol extract of burdock root also helped reduce an inflammatory and allergic reaction in mice and leukemia cells in one experiment. Oleamide, a fatty acid, was identified as an active compound. Oleamide isn't soluble in water (Yang et al., 2016).

Another analysis reported sheep sorrel ethanol extract had a stronger protective effect than the water extract in mice with stomach ulcers (90.9% vs. 41.2%). The alcoholic extract was more effective at relieving inflammation, edema, bleeding, and loss of cells of the gut lining. The authors suspect that higher emodin levels are responsible for the observed benefits (Bae et al., 2012).

Which Essiac Formulation Is Right for You?

Water Extract/Tea

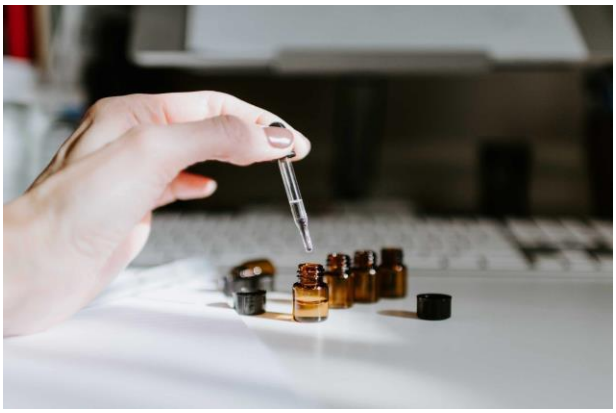
Essiac powder contains only the dried, powdered four constituent herbs in the specified ratios. It is used to prepare tea.

The powder is dissolved in and boiled with filtered, distilled, or spring water according to the manufacturer's instructions. Tea prepared this way is referred to as a water extract.

Essiac tea possibly contains a lower overall level of active compounds, but it may be higher in immune- and digestion-supportive polysaccharides. It is also the cleanest formulation.

Essiac tea prepared from the herbal powder also contains the whole plant matter, including active compounds that may be dispersed but not soluble in water. This means that, hypothetically, its level of active compounds may be higher than thought. Studies would need to test this possibility.

Essiac Liquid Extract



Essiac liquid extract is an alcohol extract with ethanol retained in the final product. It's made by extracting the plant matter with 40% ethanol over a period of time. The solution is then diluted to contain about 18% ethanol in the final product.

The ethanol dilemma

The downside of ethanol is that it can be toxic in large amounts and in people who are highly sensitive to it. Many cancer patients avoid alcohol/ethanol altogether and report bad reactions to herbal products that contain it.

Supplementing with a liquid herbal extract that contains ethanol means taking in a certain amount of alcohol on a daily basis. For Essiac liquid extract, this amounts to 60 ml/2 fluid ounces of an extract with 18% ethanol per day. This equates to less than two-thirds of a standard drink in a day (e.g. a standard drink is one shot of 40% alcohol or 43 ml/1.5 oz).

People who are sensitive to ethanol but want to take this extract may want to try taking lower doses at a greater frequency, with food or water.

On the other hand, many healthy foods also contain alcohol. For example, 100% natural fruit juices may contain up to 0.9% alcohol. Some bread and ripe bananas may contain up to 1% alcohol. The alcohol content in these foods is a result of natural fermentation that turns sugar into ethanol. One study found that children can inadvertently consume 2- to 4-fold more alcohol from food than from herbal medicines (Gorgus et al., 2016).

According to the renowned herbalist Kerry Bone, humans have evolved and adapted to levels of ethanol intake through food that are similar to those from herbal extracts (Kerry Bone, A Clinical Guide to Blending Liquid Herbs, 2003).

Liquid Extract without Alcohol

People who strictly avoid alcohol but want the benefits of the alcoholic extract in liquid form can choose Essiac daily drops with glycerin. Although this formulation uses ethanol for

extraction, the ethanol is completely replaced with glycerin in the final product. Glycerin is a clear and liquid made from vegetable oils with about 95% glycerol.

Glycerol is less toxic than ethanol. Studies suggest that it has minimal adverse effects. However, glycerol is also chemically classified as an alcohol and can be toxic at high levels (Crebelli et al., 2017; Armitage & Mazur, 1984).

So, although Essiac drops with glycerin might be a better option than ethanol for some people, this formulation is not completely "non-toxic" either.

On the upside, glycerol is often used in cough syrups and we know that it can have a soothing effect on coughs and throat irritation—a possible side effect of chemotherapy (Eccles & Mallefet, 2017).

Capsules

Another option is Essiac capsules, which contain the dried alcohol herbal extract. This formulation is made by drying the liquid extract into a powder and packing it into vegetable capsules. The final product is free from alcohol.

Capsules are a preferred choice by users who don't enjoy the taste of herbs. Essiac contains several herbal bitters that some users describe as unpleasant.

Dosing capsules is also easy when sticking to the recommended regimen, and capsules are convenient to have on the go.

Liquid vs. solid-form

Liquid extracts in general may have better bioavailability than capsules and other solid-dose preparations. Capsules have to first disintegrate in the body, while liquid formulations contain already dissolved active compounds. Although this applies to both water and alcohol extracts, alcohol extracts are better researched (Kerry Bone, A Clinical Guide to Blending Liquid Herbs, 2003).

Liquid extracts are also the preferred option for people who have difficulty swallowing capsules. Many cancer patients have esophageal damage as a result of chemotherapy or aversion to pills and prefer to take herbal liquids.

Takeaway

Science does not support popular claims that sheep sorrel roots are of higher medicinal value than the leaves. All published studies on Essiac used sheep sorrel aerial parts, not roots. Sheep sorrel leaves have higher levels of active compounds and antioxidant activity than the roots, according to research.

The majority of published studies on sheep sorrel alone tested the leaves or aerial parts. Quality studies on sheep sorrel roots are lacking. Stronger evidence supports the use of sheep sorrel aerial parts than the roots in Essiac and in herbal medicine in general.

Essiac products rely on either alcoholic or water extraction. Users can get Essiac herbal powder and prepare a water extract at home according to the manufacturer's instructions. The water extract may be lower in several active compounds, but it's higher in immune-supportive polysaccharides.

Essiac alcohol extracts are higher in various active compounds (like arctigenin, quercetin, and emodin) than water extracts. Alcoholic extracts are available in liquid form with alcohol, in liquid form with glycerin, and as capsules containing the dry alcoholic extract. Users who strictly avoid alcohol can choose between the latter two. In general, liquid formulations have superior bioavailability.

If you're unsure which formulation is right for you, consult a care provider knowledgeable about herbal medicine.

Chapter 4

Essiac General Health Uses

According to supporters and some manufacturers, people use Essiac for:

- Detox/as an herbal cleanse
- Strengthening the immune system
- Reducing inflammation or pain
- Balancing blood sugar (in diabetes/prediabetes)
- General wellness, as a health tonic taken by healthy people and cancer survivors
- Easing the symptoms of gut, stomach, and liver disorders
- Improving appetite
- Complementary cancer treatment (to improve the quality of life and/or reduce chemotherapy side effects)
- Complementary HIV/AIDS treatment

To sum it up, people mostly use Essiac either as a health tonic, cleanse, or complimentary add-on to treatment for various health conditions.

Proponents say Essiac tea can help eliminate toxins from the body, reduce inflammation, boost antioxidant defense, and support immunity.

In this section, we'll focus on all potential Essiac uses among healthy people.

Immune Support

Essiac and its constituent herbs had immune-balancing effects in cellular and animal experiments. Essiac increased the activity of CD8+ cells, which are crucial for tumor surveillance and immune defense in the body (Seely et al., 2007).

In mice, Flor-Essence increased spleen cells, which support immunity, and macrophages, which clear cellular debris and dying cells from the body (Wu et al., 2020).

Additionally, arctigenin in burdock may lower colon inflammation by balancing the immune system. It reduced the number of immune cells (Th1 and Th17) linked with autoimmunity and inflammation in test tubes (Wu et al., 2015).

Quercetin, concentrated in sheep sorrel, reduced allergic and autoimmune reactions while supporting a healthy immune response in cellular and animal experiments (Li et al. 2016)."

Sheep sorrel also contains polysaccharides that seem to activate immune pathways involved in locating, engulfing, and removing cancerous cells (*phagocytosis*) in mice with bone cancer (Ito, 1986).

Essiac and Your Mitochondria

Longevity and the prevention of many chronic diseases depend on having healthy and well-functioning mitochondria.

Mitochondria are the powerhouses of cells. They maintain energy balance and provide cells with over 90% of their energy needs. The health of your mitochondria can affect your energy levels, cognition, aging, and susceptibility to diseases such as diabetes, infertility, high blood pressure, traumatic brain injury, and even cancer (Javadov et al., 2020).

Some researchers believe that arctigenin and quercetin from Essiac may support mitochondrial health (Wu et al., 2014; de Oliveira et al., 2015).

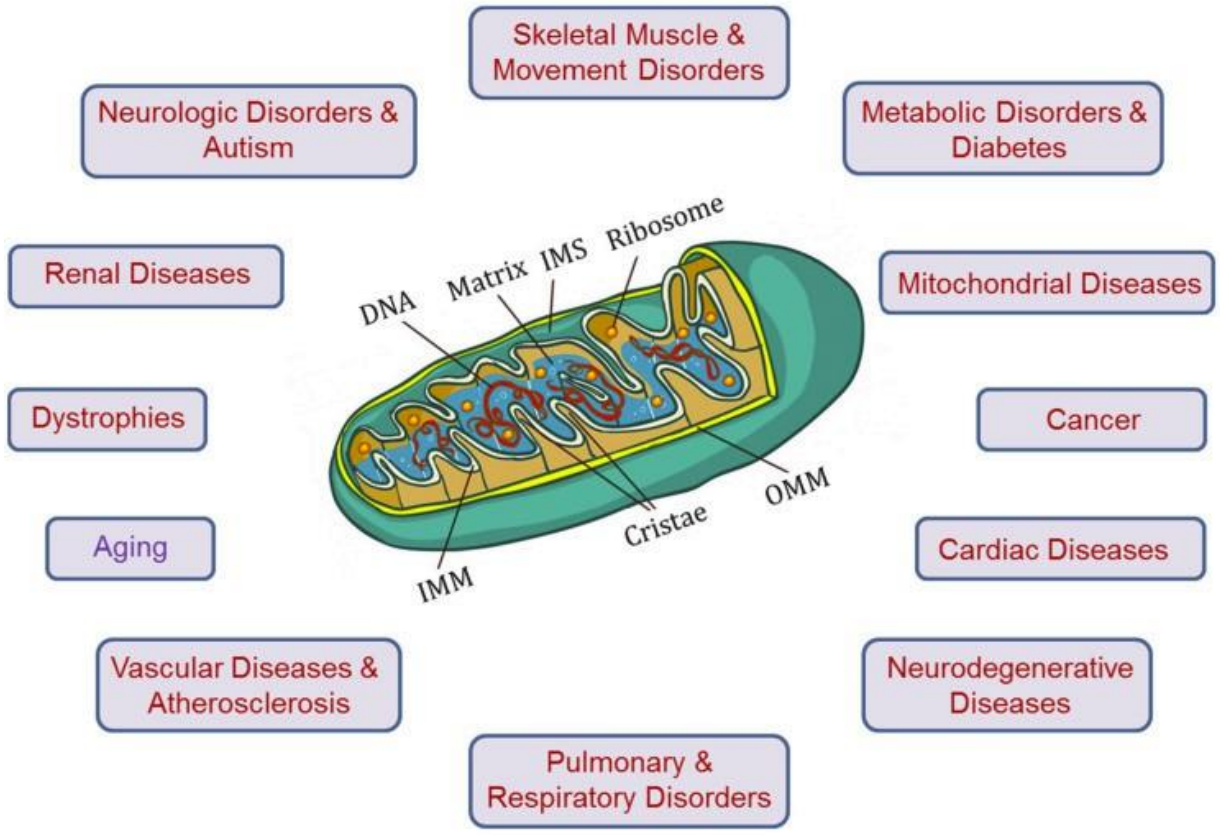


Figure 1: Mitochondria and their involvement in disease and aging (taken from Javadov et al., 2020).

Brain Health & Energy Levels

Fatigue

Based on the research outlined above, scientists think both arctigenin and quercetin have the potential for improving fatigue and related diseases. This theory might, in part, explain why some people with chronic fatigue syndrome (CFS) and fibromyalgia report using Essiac. Clinical data are lacking, though (Wu et al., 2014).

Metabolic Disorders

By activating AMPK in the mitochondria, arctigenin might also support metabolic health. Some researchers believe arctigenin holds potential for type 2 diabetes, but human studies have yet to be carried out (Huang et al., 2012).

In obese rats with metabolic disorders, arctigenin improved blood sugar levels and fat metabolism. It also increased glucose uptake into muscle cells and decreased the production of both glucose and fat in liver cells. Altogether, this helps clear excess glucose and fat from the bloodstream and liver (Huang et al., 2012).

Memory & Cognition

Arctigenin, quercetin, and emodin may have beneficial effects on memory, based on animal experiments.

Arctigenin from burdock seeds prevented and improved memory deficits in mice. It worked by blocking an enzyme called acetylcholinesterase (AChE) that breaks down acetylcholine. Blocking AChE boosts acetylcholine, the brain's main nootropic. The effects of arctigenin were comparable to tacrine (Cognex), a drug approved for the treatment of Alzheimer's disease (Lee et al., 2011).

Arctigenin also protected brain cells involved in memory and attention from neurodegeneration in test tubes (Zhang et al., 2013).

In another animal experiment, a quercetin-rich diet improved cognitive dysfunction during the early-middle stage of Alzheimer's disease. Quercetin seems to help clear amyloid plaques and prevent neurofibrillary tangles, abnormal proteins that play a central role in Alzheimer's disease (Lu et al., 2018; Khan et al., 2020).

Similarly, emodin (found in sheep sorrel and rhubarb) improved cognitive deficits in mice with Alzheimer's disease. High doses reduced amyloid deposits in animals' brains by 50%-70% (Wang et al., 2021).

In one placebo-controlled clinical study, eating quercetin-rich onions improved cognitive function in elderly people. The authors argue that quercetin-rich foods may help prevent dementia (Nishimura et al., 2017).

According to the USDA Database for the Flavonoid Content of Selected Foods, sheep sorrel is even higher in quercetin than onions. Fresh sheep sorrel packs 86.2 mg of quercetin per 100g, whereas raw onions contain about 21.40mg and red onions 31.77 mg/100g (Bhagwat et al., USDA).

Neuroinflammation

Quercetin might also reduce neuroinflammation, inflammation that often sets off a chemical storm in the brain that can lead to degenerative diseases and cognitive dysfunction. Neuroinflammation also contributes to poor appetite and muscle wasting in cancer patients (Costa et al., 2016; Molfino et al., 2014).

Additionally, quercetin might prevent heavy metals like aluminum from causing brain damage. In rats, quercetin increases the survival of brain cells exposed to aluminum, a major neurotoxin. Aluminum exposure has been linked to Alzheimer's disease, Parkinson's disease, and Amyotrophic lateral sclerosis (ALS) (Sharma et al., 2016).

Brain Fog

Aside from accompanying Alzheimer's, dementia, and even autism, mild cognitive dysfunction can also signal poor brain health or "brain fog." People describe brain fog as a lack of mental focus, clarity, and energy. Brain fog may be due to brain inflammation, which is why natural antioxidants have been proposed as potential therapies (Theoharides et al., 2015).

Some people report using Essiac to combat brain fog. In theory, this might be explained by active compounds in Essiac that boost cognitive health, mitochondrial and metabolic function, and anti-inflammatory pathways. However, research on humans is needed to test this theory.

Other Uses

Exercise Endurance

Arctigenin and quercetin hold potential for boosting energy levels and endurance, according to preliminary research.

In one study, arctigenin enhanced the swimming endurance of sedentary rats by boosting the following key antioxidant pathways in the mitochondria (Wu et al., 2014; Burri et al., 2010):

- AMPK and PGC-1α, which activate major antioxidant genes (like superoxide dismutase and glutathione peroxidase)

- PPAR-α, which burns fat, gets the body into ketosis and reduces fatigue and inflammation

Arctigenin is an AMPK activator: a compound thought to mimic exercise, even in sedentary animals. By turning on the same pathways in skeletal muscles as exercise, arctigenin might reduce fatigue and increase endurance without training (Wu et al., 2014).

Quercetin is also an exercise mimetic. In mice, quercetin increased exercise tolerance by boosting mitochondrial numbers in the brain and muscles. It acts on pathways like (Davis et al., 2009; Sahagún et al., 2012; Khateeb et al., 2010; Grabowska et al., 2017):

- PPAR-γ, which supports detox and reduces blood sugar, blood pressure, cholesterol, and inflammation
- Sirtuins, ancient signaling proteins conserved throughout living beings that promote longevity

Longevity

Aging and chronic diseases share the same culprits: oxidative stress, low-grade inflammation, DNA damage, sluggish mitochondria, and poor detox (Petersen & Smith, 2016; Zhang et al., 2012; López-Otín et al., 2013).

Several studies researched the antioxidants in Essiac for combating excessive oxidative stress and inflammation. One group of scientists took the research a step further, proving that Essiac liquid extract could extend the lifespan of *C. elegans* roundworms from an average of 12-18 days out to 23 days. This is pretty significant for roundworms (Leonard et al., 2006; Ruiz et al., 2021).

A recent review also mentioned that both quercetin (high in sheep sorrel) and burdock's arctigenin are promising anti-aging compounds (Corrêa et al., 2018).

In another experiment, arctigenin, arctiin, and other phytochemicals from burdock increased the lifespan of *C. elegans* by up to 25%. These active compounds turned on longevity and stress-resistance pathways in the cell (such as DAF-16 and JNK-1). (Su & Wink, 2015).

Plus, quercetin seems to increase the number of mitochondria in cells. This phenomenon is called *mitochondrial biogenesis*. Limited data reveal that quercetin may also protect mitochondria from damage due to toxins and oxidative stress. Both mechanisms help prevent neuromuscular diseases and are vital to healthy aging (de Oliveira et al., 2015).

Takeaway

Several active compounds in Essiac may help promote well-being by supporting immune, mitochondrial, and metabolic health.

The main active compounds in Essiac may support immune health, energy levels, endurance, and cognition. Limited research suggests that they might activate anti-aging pathways and reduce inflammation in muscle and brain cells. However, clinical research to support these benefits is mostly lacking.

Chapter 5

Essiac, Cancer, and Chemotherapy

Starting Facts

- There is not enough clinical trial data to support the use of Essiac tea in cancer patients
- Essiac has anti-cancer potential based on preclinical studies and case reports
- More research is needed to assess the potential benefits and side effects of Essiac on people with cancer
- Cancer patients should consult their doctor before use

Essiac is among the most common complementary and alternative medicine (CAM) supplements taken by cancer patients (Dy et al., 2004).

According to research done at the Mayo Clinic Comprehensive Cancer Center, 88.2% out of 102 surveyed patients with advanced cancer used at least one CAM modality. Around 48% used both dietary supplements and nonpharmacologic techniques like prayer and spiritual practice. Essiac was the third most common herbal supplement, after green tea and echinacea. Essiac use was reported in 9.5% of cancer patients (Dy et al., 2004).

Additionally, all patients included in Mayo Clinic's study were enrolled in phase I chemotherapy trials. This was important for tracking supplement-chemotherapy interactions. The majority of patients had gastrointestinal/hepatobiliary, lung, pancreatic, renal), and head and neck cancer (Dy et al., 2004).

Most cancer patients use Essiac in addition to conventional treatment. Others turn to Essiac in end-stage disease when no other medical intervention is available to them.

People with cancer use Essiac because they want to:

- Strengthen their immune system
- Feel better
- Increase appetite
- Reduce chemotherapy or radiation side effects
- Control or cure their cancer

A minority of cancer patients take Essiac or other alternative treatments in place of conventional therapy. Cancer centers and institutions warn about using alternative cancer treatments in place of approved ones.

How Essiac Came to Be Controversial

Ever since Rene Caisse popularized its use about 100 years ago, Essiac has been a polarizing topic in the world of alternative and complementary cancer treatments.

Since no alternative cancer treatments have received FDA approval, their use is considered highly controversial. They've been called "pseudo cures," "snake oil," "fake cancer cures," and dismissed as quackery.

Many bogus treatments do fall into this category. But legitimate natural products that warrant further investigation for their anticancer potential or other health benefits end up in the same bucket. The baby gets thrown out with the backwater. Sadly, this makes any further scientific research and discussion difficult.

For example, the existing Wikipedia page on Essiac that readers will see on the first page of Google states that the FDA described Essiac as a "Fake Cancer 'Cure' Consumers Should Avoid." Yet, this is an incomplete fact.

The FDA did make a list of fake cancer cures on this page (https://www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/EnforcementActivitiesbyFDA/ucm171057.htm), but only one highly questionable Essiac manufacturer (Christopher Gussa, Plant Cures Incorporated) is on it. No other Essiac formulas, including the ones from Canada, are listed.

Fact-Checking and Doing Your Own Research

Always check the sources of each claim about Essiac that you find online. Even credible sources can make mistakes, which is why it's important that you do your own research.

Skeptics also point out that manufacturers tend to misinterpret scientific, historical, and anecdotal data for marketing purposes.

No credible company will claim that Essiac can cure cancer.

However, many conventional sources are afraid to talk about promising preclinical research and unpublished data simply because Essiac has been linked with unfounded cancer claims. These sources tend to overemphasize failed and contradictory studies and downplay studies showing antitumor potential. This is another form of bias.

For all these reasons, Essiac use remains so controversial even one century after its first mention.

We strongly believe that the data on Essiac and cancer should be analyzed in an unbiased manner and made available to everyone. We encourage you to read through each reference we bring up in this guide and decide for yourself.

The Science of Cancer Formation and Prevention

What is carcinogenesis?

Carcinogenesis is the process of healthy cells mutating into cancerous cells. It starts with exposure to a carcinogen—a toxic substance that has the potential to trigger cancerous changes.

Cancer is a complex and multifactorial disease. There is no one known cause of cancer, and exactly what contributes to each type of cancer in each individual case is uncertain. Factors like carcinogen and toxin exposure, genetics, nutrition, lifestyle, and other diseases all play in (You & Henneberg, 2018).

Recent analyses suggest that the incidence of all cancers has been doubling since the late 19th century. Breast, prostate, and colorectal cancer are especially on the rise and have been linked with a Westernization of lifestyle. Scientists predict 21.6 million new cancer cases in 2030—a 53% increase from 2012! (You & Henneberg, 2018; Bray & Soerjomataram, 2015).

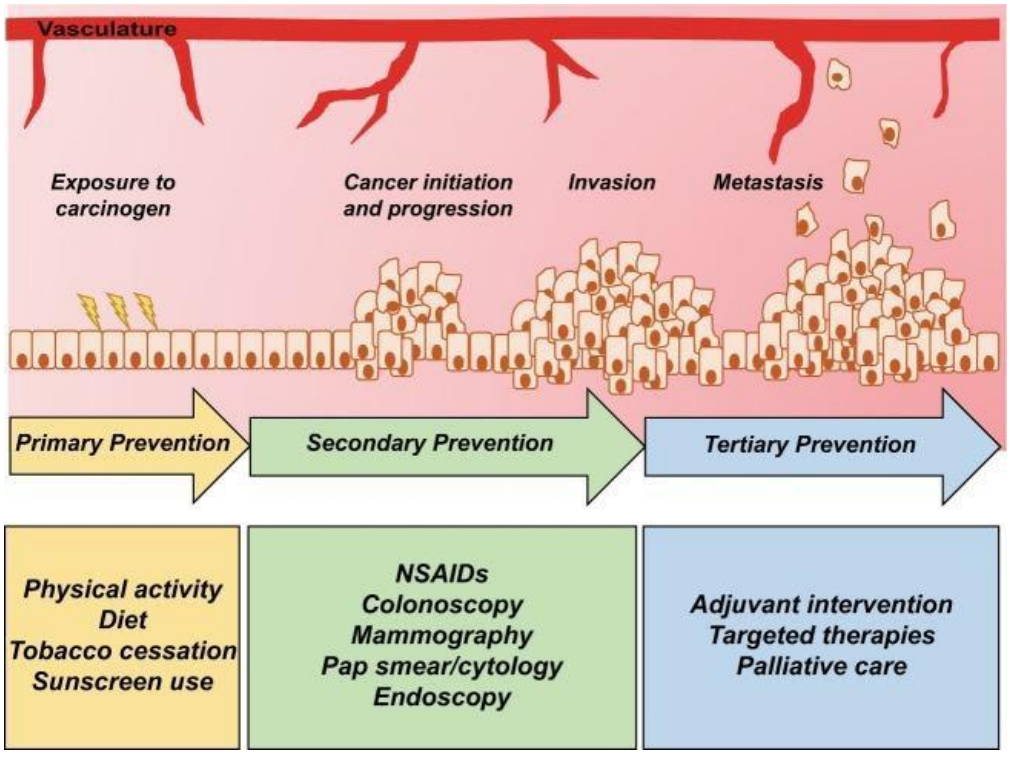


Image taken from Kropp & Umar, 2019.

Carcinogens on the rise

There are 62 known human carcinogens according to the U.S. National Toxicology Program (NTP). The European International Agency for Research on Cancer (IARC) lists over 100 carcinogens (Smith et al., 2016).

But is that all? The number of carcinogens has been increasing with environmental pollution and a more toxic lifestyle.

Since the 19070s, over 87,000 chemicals have been approved for commercial use. Only over one thousand have been formally examined and graded for their carcinogenic potential. Many more continue to be used with unknown health consequences, including heavy metals and environmental toxins that cause hormonal, immune, and neurological disruption (Cohen & Jefferies, 2019).

10 characteristics of a carcinogen

Scientists have described 10 characteristics that make carcinogens so destructive. To sum it up, carcinogens (Smith et al., 2016):

1) Gravitate toward DNA. Carcinogens attract negative ions either directly or after metabolic activation (i.e. they are *electrophiles*). This creates a pull, magnetizing them toward DNA and vital proteins

2) Damage DNA (are *genotoxic*). This means that they can cause DNA damage, insert new information into DNA, trigger gene mutations, and lead to aberrations in the genetic material

3) Disrupt DNA repair or cause genomic instability

4) Induce harmful epigenetic changes (including DNA methylation, histone modification, microRNA expression)

5) Trigger oxidative stress, causing oxidative damage

6) Cause chronic inflammation

7) Suppress the immune system

8) Manipulate the activity of cellular receptors. This can affect normal cellular division, metabolism, detoxification enzymes, hormonal signaling, and more

9) Make cancerous cells immortal (blocking programmed cell death and cellular aging or *senescence*)

10) Cause cells to uncontrollably divide, alter their supply of energy and nutrients, and trigger the formation of new blood vessels in tumors (angiogenesis)

Neither of these steps is enough to cause cancer on its own. The whole cascade needs to repeat many times before a tumor finally forms. In fact, most precancerous cells are destroyed before they can cause any damage. Prevention usually happens at this step (Peters & Gonzalez, 2018).

"Cancer prevention" is often banalized in the popular press. People may interpret it as stopping smoking and eating more vegetables. However, cancer prevention and the pathways it impacts are a lot more complex.

In the next section, we'll explore how Essiac may affect these pathways as a candidate preventive formula.

Essiac and Cancer Prevention

So, we know that carcinogens and environmental toxins are on the rise. We are aware that cancer rates are doubling. Estimates say that over a third of cancer deaths could be prevented.

Meanwhile, one in three Essiac users takes the tonic believing it may prevent disease. Does the evidence support them? This section dives into the science of cancer prevention and how the herbs in Essiac might play in.

Who Uses Essiac for Cancer Prevention?

Primary cancer prevention

About 38% of adults in the U.S. use some form of complementary and alternative medicine (CAM), according to a nationwide survey.

Essiac users don't fit under one profile, but most are cancer patients or survivors. Only a small subset of Essiac users report supplementing with the tonic desiring to stay healthy and prevent cancer or other chronic diseases. Taking measures to prevent cancer from ever developing in the body is called primary cancer prevention (Dy et al., 2004; Richardson et al., 2000).

The fact that Essiac isn't commonly used by healthy people for disease prevention isn't surprising. Research reveals that people with existing illnesses turn to complementary therapies to fill a gap left by conventional medicine. Reasons include wanting to reduce the side effects of prescribed medications or cope with illnesses that they feel can't be satisfactorily treated by conventional medicine (Tangkiatkumjai et al., 2020).

The main perceived benefits of taking Essiac for cancer prevention include antioxidant support and maintaining a healthy immune system and anti-inflammatory response.

It's important to note that although various dietary, supplement, and lifestyle changes may support general health, none have been proven to prevent cancer—Essiac included. The use of

CAM for cancer prevention is still an active area of research we'll dive into below (Jain et al., 2021).

Cancer recurrence prevention

Another group of Essiac users includes cancer survivors who wish to stay cancer-free and turn to Essiac wanting to prevent cancer recurrence. A large subset of Essiac users who are also cancer survivors are women with breast cancer, according to survey studies (Zick et al., 2006; Richardson et al., 2000).

Also, cancer recurrence prevention may mean the person is still taking chemotherapy or undergoing certain treatments. Drug interactions are possible. For example, many breast cancer survivors may be taking prescribed prophylactic hormone therapy (e.g., tamoxifen and raloxifene) (Deli et al., 2020).

Secondary and tertiary prevention in cancer patients

In a North American survey published by the American Botanical Council, only 35.4% of the participants reported taking Flor-Essence or Essiac to prevent disease. Out of all users, 38.9% were cancer survivors who reported having no evidence of disease at the time of participating in the study. In 40.6%, the last check-up confirmed no evidence of disease (Richardson et al., 2000).

On the other hand, 62.4% of the participants in this study reported using the tonic primarily to treat a medical condition (cancer or other). Some of these participants may describe their use of Essiac as secondary or tertiary cancer prevention (Richardson et al., 2000).

In secondary prevention, cancer is detected early on. The patient is usually still asymptomatic, the cancer is treated, and attempts are made to improve outcomes. Diagnosed in the next stage, tertiary prevention aims to reduce further cancer growth and spread in the body (Kropp & Umar, 2019)

Essiac Cancer Prevention Research

This section goes over the scientific research on the potential cancer-preventive effects of Essiac and its individual constituents. Most studies have been carried out in animals or cells. These studies are considered insufficient evidence to make claims about health effects in humans. Proper clinical studies are needed to determine whether Essiac affects the parameters of cancer prevention in humans.

Oxidative & DNA Defense

According to estimates, nearly one-third of all cancer deaths in the U.S. could be prevented through appropriate dietary changes. Dietary changes include the use of antioxidant-rich plants (Khan et al., 2008).

The original Essiac formula contains antioxidant herbs that act in synergy. In one study, high concentrations of antioxidants in Essiac helped protect against DNA damage in test tubes (Leonard et al., 2006).

In another study, both Essiac and Flor-Essence increased antioxidant defense and reduced inflammation in mouse cells. Essiac seemed to have a stronger and more widespread effect than Flor-Essence in this study (Cheung et al., 2005).

A 2021 study reported the recommended dosage of the original Essiac liquid extract increased the overall lifespan of *C. elegans* roundworms. It increased the worms' ability to withstand dying from high levels of oxidative stress. Scientists use *C. elegans* to experimentally assess lifespan, oxidative stress, and innate immunity (Ruiz et al., 2021).

Burdock, the dominant herb in Essiac, is high in antioxidants. Its lignans, caffeoylquinic acids, and polyphenols are potent free radical scavengers in test tubes. Burdock also contains luteolin, a yellow-colored antioxidant that carries anti-inflammatory and immune-balancing potential (Wang et al., 2019).

Alcoholic burdock root extract showed strong free radical scavenging activity in cells. A specific burdock extract also had selective antiproliferative activity against several human cancer cell lines (Predes et al., 2011; Theoharides et al., 2015).

Sheep sorrel, the second most dominant Essiac constituent, is among plants with the highest quercetin content. It's also a great source of vitamin C (Bhagwat et al., USDA; Atanassova et al., 2018).

Quercetin is a strong antioxidant, anti-inflammatory, and antihistamine. It also supports immune health and is being researched for preventing cancer in cellular experiments (Shoskes et al., 1999; Zahedi et al., 2013; Kowalski et al., 2005).

Slippery elm contains antioxidants and anti-inflammatory compounds as well. These include tannins, flavonoids, organic acids, and fatty acids. However, its main active compound is mucilage (Watts, 2012; Anderson et al., 1996).

A reason to be cautious with high-dose antioxidants

Most scientists believe that dietary antioxidants play a role in cancer prevention, but their clinical significance and safety remain uncertain.

According to the most recent theory, antioxidants can either protect from cancer or *promote* it. For example, antioxidants N-acetylcysteine and vitamin E accelerated lung cancer in mice. Beta-carotene supplementation increased the risk of lung cancer in smokers (Mendelsohn & Larrick, 2014; Midha et al., 2019).

Antioxidant pathways protect against cancer by neutralizing potentially carcinogenic reactive molecules. At the same time, they can promote cancer progression by shielding possibly present precancerous cells via their antioxidant action. The net effect may be guided by a person's genetics, lifestyle, and other factors (Mendelsohn & Larrick, 2014).

This might also, in part, explain the conflicting results of Essiac on breast and prostate cancer cells (Ulbricht et al., 2009; Kulp et al., 2006; Ottenweller et al., 2004; Eberding et al., 2007; Tai et al., 2004.

Therefore, antioxidants can have paradoxical effects. More research on their safety is needed before they can be recommended to everyone for cancer prevention.

All in all, clinical trials have yet to determine whether antioxidants in Essiac can play a role in cancer prevention.

Programmed Cell Death (Apoptosis)

Apoptosis—sometimes called "cellular suicide"—is when healthy cells undergo programmed self-destruction. Cancer cells bypass apoptosis, which allows them to survive longer, become more invasive, and resist chemotherapy (Pfeffer & Singh, 2018).

Burdock root has been researched for inducing apoptosis in cells and animals. Arctigenin from burdock induces apoptosis by activating the mitochondria. Cancer cells hijack mitochondria to evade death. Arctigenin also reduces the activity of a gene that blocks apoptosis (Bcl-2). Injected arctigenin reduced tumor growth in mice by increasing apoptosis (He et al., 2018).

Sheep sorrel extract also triggered apoptosis in leukemia cells (Wegiera et al., 2012).

On the other hand, a recent study on worms and cancer cells hypothesizes that the overall antiproliferative potential of Essiac may rely on mechanisms other than apoptosis (Ruiz et al., 2021).

Mitochondrial damage

Some active compounds in Essiac seem to protect only healthy mitochondria while attacking the mitochondria of cancerous cells. This theory hasn't been tested in humans, however (Lee et al., 2020).

In test tubes, arctigenin killed prostate cancer cells by triggering mitochondrial damage. Mitochondria become dysfunctional, which causes deadly levels of inflammation in cancer

cells. Arctigenin has this effect only in an environment high in lactic acid, as in tumor tissue (Lee et al., 2020).

Emodin might act in a similar way. It decreases energy levels in cancer cells and suppresses their proliferation by targeting their mitochondria. Emodin seems to block only the overactive mitochondria of cancer cells, without harming healthy cells (Sugiyama et al., 2019).

Cancer cell division

Studies on deadly glioma cells reveal that arctigenin from burdock may block cancer cells from dividing by causing early cell cycle arrest. Artigenin also increased the expression of cancer-fighting proteins (p21, retinoblastoma, and p53) and decreased the expression of proteins associated with cancer development (cyclin D1 and CDK4) (Wang et al., 2019).

In another cell-based study, arctigenin stopped lung, liver, and stomach cancer cells from dividing (Susanti et al., 2013).

Emodin from sheep sorrel root stopped four tumor cell lines from dividing and mutating in another study (Lee et al., 2005).

Cancer signaling

Abnormal protein kinase (MAPK) signaling in cells may lead to uncontrolled proliferation and altered energy dynamics—the hallmarks of cancer. The hyperactivation of this pathway is responsible for over 40% of human cancer cases, according to research (Yuan et al., 2020).

Aside from blocking apoptosis, disrupted protein kinase signaling also changes energy balance in the cell. It enables cancer cells to tolerate extreme conditions, overcoming metabolic stress and starvation (Yuan et al., 2020).

In one cellular study, arctigenin from burdock altered MAPK and rendered tumor cells susceptible to effects of nutrient deprivation. Artigenin was 100% cytotoxic to tumor cells under nutrient deprivation and barely cytotoxic in a nutrient-rich environment (Awale et al., 2006).

Researchers hypothesize that arctigenin may also block a pathway (Akt) that makes cancer cells tolerant to glucose starvation. More research is needed to confirm this (Awale et al., 2006).

Additionally, studies are investigating whether a type of arctigenin-rich burdock extract (GBS-01) may also reduce the tolerance of cancer cells to glucose deprivation. In theory, this might make cancer cells die off quicker if starved of sugar. Yet, this hypothesis also remains unproven (Ikeda et al., 2016).

Carcinogen & Toxin Exposure

Long-term exposure to high levels of different carcinogens and environmental toxins has been implicated in most cancers, along with these other factors (Cohen & Jefferies, 2019).

Burdock reduced inflammation from cigarette smoke exposure and liver-damaging chemicals in animals. It also protected the liver against the heavy metal cadmium, acetaminophen, a toxic Chinese herb, and a diet high in unhealthy fats (Possebon et al., 2018; Lin et al., 1996; Predes et al., 2014; El-Kott et al., 2015; Zhou et al., 2020; Romualdo et al., 2020).

Sheep sorrel extract protected against liver-toxic chemicals and reduced damage to other organs in rats (Alkushi, 2017).

According to 12 small studies on nearly 900 people, rhubarb may aid detoxification and reduce the symptoms and toxic effects of pesticide and herbicide poisoning (Wang & Pan, 2015; Wang et al., 2015; Yu et al., 2012)."

Detoxification Pathways

Carcinogens aren't that harmful left alone. They become highly destructive once they get activated by the liver's cytochrome P450 (CYP450) enzymes as part of phase I detoxification. CYP450 enzymes help clear drugs and foreign substances from the body, but they need to work in balance with phase II detoxification (Peters & Gonzalez, 2018; Wilkinson & Clapper, 1997; Liska 1998)

Phase II detoxification involves the body's most powerful enzymes (like glutathione-S-transferases) that further process carcinogens and drugs. Phase II renders carcinogens harmless and makes them soluble in water. As such, they don't stick around in the body and get flushed with urine (Liska 1998).

Cancerous mutations become more likely if phase I is overactive and phase II underactive (Liska 1998).

Essiac has variable effects on phase I detox enzymes, but its net effect is inhibitory. For example, quercetin from burdock root is a known potent inhibitor of the CYP450 enzyme CYP3A. Rhubarb root may activate CYP3A, but it's unlikely to change the direction of effect since it's present in tiny amounts in the original Essiac formula (Cassileth, 2011).

Catechins and polyphenols in Essiac may induce the phase II enzymes. This may support the detoxification of carcinogens and aid cancer prevention, according to some scientists. It also might explain the health-preserving effect of many herbs, fruits, and vegetables (Pandey & Rizvi, 2009; Surh et al., 2008, Wilkinson & Clapper, 1997).

While blocking phase I and inducing phase II enzymes might theoretically be helpful for cancer prevention, it's also a source of potentially dangerous drug interactions. Read about Essiac's interactions with oncology drugs in Chapter 5 ("Essiac and Chemotherapy").

Radiation Protection

Leukemia and most solid cancers have been linked to radiation exposure. Early life exposure

especially increases the risks for many cancers throughout life (Gilbert, 2010).

In a mice study, tea made from an eight-herb formula similar to Flor-Essence reduced DNA damage from X-ray radiation. Animals who underwent radiation and drank the tea were in similar health as animals not exposed to radiation. Animals in the control group suffered radiation damage (Marignac et al., 2020).

This doesn't mean that Essiac can protect against cancer-causing radiation but warrants further research.

Blood Vessel Growth

Vascular endothelial growth factor (VEGF) plays a large role in cancer development and progression. It disrupts immunity, triggers cancer pathways, and increases blood vessel growth or *angiogenesis* in cancerous tissue (Parveen et al., 2019).

Arctigenin from burdock reduces the expression of VEGF in cells. Emodin, found in sheep sorrel and rhubarb, also blocks VEGF (Parveen et al., 2019).

Anti-inflammatory Effects

Essiac was a moderate anti-inflammatory in cellular studies. Sponsor-initiated animal studies of Flor-Essence also report the prevention of chemically induced inflammation. However, sponsor-led studies are not publicly available and did not undergo peer review (Seely et al., 2007; Richardson et al., 2000)

Burdock root, the main herb in Essiac, has been clinically researched in patients with inflammation. It reduced markers of inflammation and oxidative stress (CRP, IL-6, MDA) in a small clinical trial of patients with knee osteoarthritis. It also reduced symptom recurrence in another trial including patients with colon inflammation (Maghsoumi-Norouzabad et al., 2014; Mizuki et al., 2019)

In animals, burdock root suppressed allergic and autoimmune inflammation. In mice, burdock hydroalcoholic extract injection reduced inflammatory mediators and neutrophils after exposure to a toxin (LPS) and carcinogens. It also reduced melanoma tumor growth and enhanced mice survival. In cells, burdock blocked histamine and other inflammatory compounds (Yang et al., 2016; Nascimento et al., 2019; Li et al., 2016).

Compounds in burdock extract likely reduce inflammation by blocking the cyclooxygenase-2 (COX-2) enzyme. Non-steroidal anti-inflammatory drugs like Aspirin act on the same mechanism. Blocking COX-2 reduces many inflammatory cytokines (including TNF-α and IL-6) (Wang et al., 2019).

Proponents claim that Essiac may help offset cytokine storms thanks to its anti-inflammatory potential. This remains to be tested.

Cytokine storms have been implicated in COVID-19 complications. Interestingly, cytokine storms can also happen in cancer patients undergoing chemotherapy. However, it's unknown whether burdock or Essiac can help prevent cytokine storms or affect the outcomes (Ye et al., 2020; Filippou & Karagiannis, 2020; Turnquist et al., 2020).

Sheep sorrel and slippery elm also have anti-inflammatory potential. Quercetin from sheep sorrel may lower inflammatory histamine, leukotrienes, and prostaglandins. Slippery elm may reduce the production of an inflammatory cytokine called interleukin 8 (IL-8), which has been linked with cancer (Anand David et al., 2016; Townsend & Emala Sr, 2013; Mlcek et al., 2016).

Cytotoxic Properties

Essiac and arctigenin from burdock showed cancer-specific cytotoxic ("cancer-fighting") properties in cells (Seely et al., 2007; Susanti et al., 2012).

Anthraquinones from sheep sorrel and Turkish rhubarb also have cytotoxic properties and block pathways associated with cancer progression in cells (Dy et al., 2004; Li et al., 2016).

Psychological Effects

A controversial Canadian survey study of 510 women with breast cancer did not find a link between Essiac use and quality of life or mood (read more about the problems with this study here). Yet, Essiac users reported beneficial effects (Zick et al., 2006).

Aside from the mechanistic biochemical pathways mentioned above, psychological effects may also play a role in prevention. Psychological factors may influence a person's decision to try complementary and alternative medicine (CAM) like Essiac in the first place.

Herbal supplements are the most popular CAM modality. Users perceive supplements as safe and beneficial. Also, about 37% of CAM users are dissatisfied with conventional medicine and are looking for ways to take their health into their own hands. CAM users also realize that many factors contribute to health and well-being (Tangkiatkumjai et al., 2020; Ventola, 2010).

One study notes that some breast cancer survivors attribute prevention of breast cancer recurrence to factors like a positive attitude, complementary medicine, diet, healthy lifestyle, and stress reduction. Most women believed they could control cancer recurrence. The authors concluded that women's *perceptions* about the prevention and control of cancer recurrence are important (Alwhaibi et al., 2019).

Integrative human studies have yet to explore the potential psychological effects of Essiac use on cancer prevention.

Essiac Research in Cancer Patients

Scientific Review

A scientific review of the published research concluded that high-quality clinical trials are lacking to back up Essiac's traditional uses. One incomplete clinical trial and one review of reports on cancer patients who took Essiac have been published (Ulbricht et al., 2009).

Evidence from case reports, lab, and animal studies is inconclusive but warrants discussing Essiac's use for cancer. Interpreting the data is challenging since different Essiac preparations are noted in the literature (Ulbricht et al., 2009).

Small Human Studies

Cancer Patients General Survey

One study sent out a survey to North American Flor-Essence consumers in 1998 and 1999. Out of 5051 users, 1,577 were cancer patients included in the study; 85.3% took and 36.8% were currently taking conventional medicine for breast, prostate, or lung cancer (Richardson et al., 2000).

Over half of cancer patients reported symptom improvement. Most used the tonic long term (~44% for over a year, ~16% for 6 to 12 months).

About 71% of cancer patients rated the benefits as very good/excellent, while 27% found them okay. Less than 3% rated the perceived benefits of the tonic as poor.

Patients who reported positive effects said they experienced the following:

- Feeling better (53.2%)
- No cancer progression (40.6%)
- Able to carry out daily activities (34.0%)
- More energy/less fatigue (30-31.5%)
- Coping better with the disease (26.3%)
- Improved cancer symptoms (22.3%)
- Perceived cancer cure (16.2%)
- Improved appetite (15.0%)
- Less nausea (8.4%) and vomiting (4.1%)
- Less pain (11.6%)

Around 6.6% of patients experienced adverse events. These included the following:

- Diarrhea (1.9%)
- Constipation (1.2%)
- Nausea (1.1%)
- Fatigue (0.9%).

Although the majority mentioned using the tonic with their physicians, about a tenth exceeded the recommended dose.

All in all, most cancer patients expected the tonic to support their immune system and improve survival and quality of life. Since the majority subjectively felt better from the tonic but scientific evidence to support its use is lacking, further controlled clinical trials are critical.

Breast cancer: Canadian survey finds no link, received with criticism

A Canadian survey study of 510 women with breast cancer did not find a link between the use of Essiac and improvements in quality of life or mood. Essiac users reported beneficial effects and only two women reported minor adverse events (Zick et al., 2006).

About 8% of women diagnosed with breast cancer used Essiac. Surveyed women took Essiac wanting to feel better, reduce the side effects of conventional breast cancer treatment, and stay healthy as cancer survivors. Few side effects were reported (Zick et al., 2006).

Yet, this study has seen a fair amount of critique.

For one, Essiac nonusers had less developed cancer (44% were stage I) than Essiac users (only 29% were stage I—see table below).

Also, most Essiac nonusers didn't yet undergo chemotherapy, unlike Essiac users with more advanced disease.

That means that these two groups likely couldn't have been properly compared to start with. Also, only 41 out of 510 patients were Essiac users, making statistical analysis somewhat unreliable.

Stage at diagnosis, no. (%)[c]		
Stage I	207 (44)	12 (29)
Stage II	109 (23)	15 (37)
Stage III	57 (12)	6 (15)
Stage IV	5 (1)	2 (5)
Treatments for breast cancer, no. (%)		
Surgery	429 (91)	36 (88)
Radiation	312 (67)	31 (76)
Tamoxifen	245 (52)	19 (46)
Chemotherapy[b]	198 (42)	28 (68)

Table excerpt taken from Zick et al., 2006

In response to the study's design, Suzanne Diamond of the American Botanical Council commented the following (American Botanical Council, HerbClip News, 2007):

"Comparing women with early stage cancer who had not undergone chemotherapy with late stage cancer patients who were suffering the devastating effects of their late stage cancer compounded by their harsh chemotherapy cancer treatments and then noting that ESSIAC doesn't improve HR-QOL or mood states based on comparisons between these two disparate groups is very misleading."

Therefore, we are yet to see unbiased, well-designed Essiac studies in cancer patients.

Cellular study showed breast cancer growth, implications for humans unknown

Both Flor-Essence and Essiac stimulated the growth of breast cancer cells isolated from human breast tumors in one test-tube study. The formulations had the same unwanted effect on both estrogen receptor (ER) negative and positive cells. However, Flor-Essence had a stronger estrogen-like effect than Essiac (Kulp et al., 2006).

Let's take a closer look at this study's design and results.

"Low" concentrations (1% to 8% Essiac) increased the growth of breast cancer cells 1.2- to 2.1-fold after 24 hours. A "medium" concentration of 4% had the same effect after 24 hours.

An interesting finding is that 72 hours after Essiac treatment, most breast cancer cells seemed to shrink closer to their pretreatment number. We don't know what would've happened to these cells with more time and treatment.

Also, high doses (16%) didn't have a significant effect on cancer cell growth, while mega doses (32%) were toxic to all cells.

There are no reports of Essiac worsening breast cancer in humans or animals.

What are the limitations of this cellular study to have in mind?

Dosage: Researchers used 1-32% concentrations of the tonics directly on cells. It's unknown how these concentrations would translate to human doses. It's equally unknown how exposing cells to a mixture once can be compared to long-term use in humans.

Time: In cellular-study language, 72 hours is considered "chronic exposure." Yet, we know that most cancer patients use Essiac for years. We know that often cancer takes years to develop, and it often takes months (if not years) to see the results of any cancer treatment.

Human metabolism: Let's also remember that Essiac likely goes through some enzymatic and metabolic changes in the human body (as all herbs, supplements, and medications do). These metabolic changes could activate or deactivate certain active compounds, which may be relevant to breast cancer.

Target tissues: A certain active compound may be able to penetrate into one type of tissue in the live human body and not into another. Active compounds may concentrate in some tissues and move through others.

All the factors above are specific to living beings and can't be observed in cells.

Replicability: This study has not yet been replicated. Replicated findings are a sign of robust findings in science.

2021 study

A 2021 study discovered that exposure to higher concentrations of Essiac liquid extract exposure was associated with reduced cell proliferation in breast, prostate, myeloma, lymphoma, and leukemia cancer cells (Ruiz et al., 2021).

The study used three different models to assess the effects of Essiac on cancer cell survival and division. Exposure to 24% Essiac over 48 hours reduced the division of all five cancer cell lines. This antiproliferative effect was maintained over a 72-hour exposure period (Ruiz et al., 2021).

To sum it up, we don't know whether Essiac has positive or negative effects on breast cancer based on the existing findings. Controlled human studies are needed.

Case Studies

Case studies are considered weak scientific evidence. They can be useful to clinicians and health enthusiasts for keeping track of unusual cases that may otherwise pass unnoticed. However, case studies can't be used to assess the health benefits and side effects of any supplement.

Pancreatic cancer

Pancreatic adenocarcinoma is considered deadly. Most patients live under 2 years past diagnosis, while the 5-year survival rate is less than 5% (Gralow et al., 2018).

One case report describes a 73-year-old man in Utah who was diagnosed with advanced-stage pancreatic adenocarcinoma. The patient wasn't a candidate for surgery. He started conventional radiation and chemotherapy but withdrew after 7 months because he couldn't tolerate the side effects (Smiley et al., 2016).

He then turned to self-medication with herbal remedies. Shortly after withdrawing from the chemotherapy trial, he began long-term daily supplementation with Protandim and Essiac Tea. Protandim is an antioxidant herbal dietary supplement.

Doctors checked up on him for 3 years, after which he was lost to follow-up. Unexpectedly, he appeared at the facility with abdominal pain 8 years after his initial diagnosis. That's when the doctors did a CT scan and found no evidence of pancreatic cancer.

This man is considered to be the longest-known pancreatic cancer survivor who didn't undergo surgery to have cancer removed.

The authors point out that caution should be exercised in drawing conclusions about the efficacy of Essiac tea based on this case study but that clinical trials are warranted.

Prostate cancer

One Canadian report describes the case of a 64-year-old man whose hormone-refractory prostate cancer responded well to Essiac tea (Al-Sukhni, 2005).

The patient was diagnosed with prostate cancer in 1999 and treated conventionally with Casodex, a drug that blocks male hormones.

His prostate-specific antigen levels (PSA—a tumor marker) went down after 4 months, but the patient stopped responding to the treatment soon after. His cancer grew. After 21 months of treatment, his PSA tumor marker levels also went up significantly (to 87.19 ng/mL).

At that point, he began to drink Essiac tea (2 oz, once or twice daily) and experienced a rapid drop in PSA (to 0.12 ng/mL). His results are presented in the figure below. In July 2002, his PSA level rose a bit (to 3.21) and doctors decided to take him off drug treatment. His PSA dropped. In 2005, he remained in good health with low PSA levels.

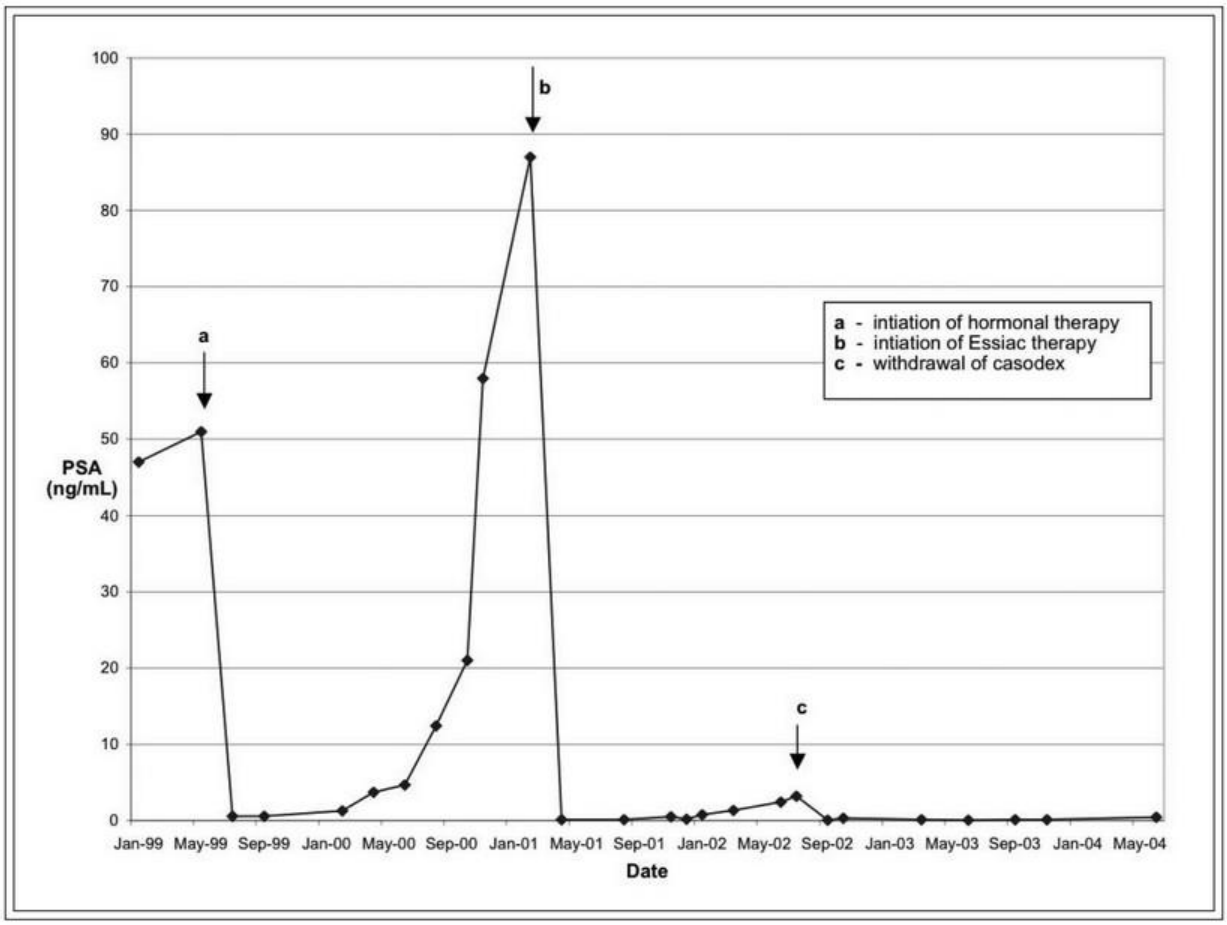


Figure 1. PSA trend over time.

Figure taken from Al-Sukhni, 2005

The author didn't want to jump to any conclusions based on this case but stresses that clinical studies would be essential.

Studies on prostate cancer cells yielded conflicting results. In one cell-based study, Essiac tea extracts blocked prostate tumor cell growth while enhancing the immune response. Yet, in another study, Essiac has no effect on prostate tumor progression in cells or mice compared to standard chemotherapy (paclitaxel) (Ottenweller et al., 2004; Eberding et al., 2007).

The most recent study once again suggests cancer-fighting effects of Essiac on prostate cancer cells (Ruiz et al., 2021).

All in all, there's not enough evidence to say whether Essiac can be helpful for prostate cancer patients.

Lung Cancer

One case report describes spontaneous regression in an 84-year-old woman with advanced non-small cell lung cancer and early-stage breast cancer. The patient was diagnosed in 2009 and told that no treatment is indicated for her progressive condition (Gladwish et al., 2010).

She continued to show up for routine follow-ups and the doctors were surprised to observe a spontaneous reduction in lung tumor size. The patient then started taking Essiac tea. Her tumor continued to shrink. As her lung cancer greatly improved, doctors started her on breast cancer chemotherapy in 2010 (Arimidex).

The patient continues to take one serving (4 oz) of Essiac daily.

It's uncertain what contributed in this case, since the patient's tumor already started shrinking in June 2009, while she started taking Essiac in September 2009.

Preclinical Studies (Animals & Cells)

Clinical evidence is lacking to support the use of Essiac for any of the conditions listed below. The existing animal and cell-based research is outlined to direct future research but cannot be interpreted as supportive of any health benefit.

Leukemia & Other

In one cellular study, both Essiac and Flor-Essence stopped human cancer cells from dividing, but only at high doses. Essiac had somewhat of a stronger effect than Flor-Essence at the same concentrations. The authors concluded that further research in animals and humans is needed (Tai et al., 2004).

In a recent study on mice with leukemia, a water extract containing the four Essiac herbs (with sorrel leaves, *not* roots) recovered weight loss and normal blood markers. Essiac improved total white blood cell (WBC), lymphocyte and neutrophil counts. It had a stronger effect than a neutral carrier. The mixture also decreased abnormal leukemia blood cells by two-thirds (Kabeel et al., 2018).

Essiac liquid extract reduced the proliferation of myeloma, lymphoma, and leukemia cancer cells in the most recent cellular experiment. These cancers are classified as "non-adherent" since they can grow without being attached to a surface. This was the first study to explore the effects of Essiac on myeloma and leukemia cells (B-cell myeloma and Chronic Myeloid Leukemia) (Ruiz et al., 2021).

People have also reported giving Essiac to pets with lymphoma, but further studies are lacking to support them.

According to cell-based experiments, high concentrations of Essiac contain antioxidants that protect against DNA damage (Leonard et al., 2006).

Antioxidants support general wellness and may play a role in cancer and chronic disease prevention. Antioxidant and DNA-protective activity is common to natural anti-cancer agents, but human studies are lacking to confirm the clinical benefits (Willcox et al., 2004).

Essiac is also being investigated for balancing and strengthening the immune response in cells (Seely et al., 2007).

Essiac and Chemotherapy

Common Chemotherapy Side Effects

The side effects mentioned in this section are not exhaustive. There are main types of chemotherapy drugs. The specific side effects a person may experience will depend on the exact drug regimen and dosage. Please remember to consult your oncologist or pharmacist about any medication-related concerns you may have.

Many cancer patients use Essiac expecting the tonic to reduce the side effects of chemotherapy.

Common side effects of chemotherapy include (Pearce et al., 2017; Henry et al., 2008; Kalathil & Thanavala, 2016):

- Fatigue
- Diarrhea
- Constipation
- Mouth and gut sores (mucositis)
- Shortness of breath (dyspnea)
- Rash
- Pain
- Nausea/vomiting
- Chest pain
- Immunosuppression

Less common side effects also include (Nurgali et al., 2018)

- Kidney damage (nephrotoxicity)
- Muscle wasting
- Cognitive impairment (neurotoxicity)
- Depression, ataxia, insomnia (chemotherapy-induced peripheral neuropathy)

In an Australian study of 449 cancer patients, 86% reported at least one side effect. Older people were less likely to report side effects in this study. For over 60% of people, this will include a serious side effect (Pearce et al., 2017).

Similarly, a large US study reported that 88% of the 814 respondents experienced at least one side effect during their cancer treatment. In this study, being female, younger, and unemployed patients, and suffering from anxiety and depression increased the risk of fatigue (Henry et al., 2008).

Most Cancer Patients Use Essiac Alongside Chemotherapy

Studies indicate that up to 9% of cancer patients use Essiac, mostly alongside chemotherapy. Patients may be afraid to bring this up with their oncologists, while oncologists may not feel comfortable discussing complementary and alternative therapies. This section aims to fill that gap and provide an up-to-date, evidence-based overview of the possible interactions between Essiac and chemo.

Most patients who take Essiac have advanced disease and received or are still receiving chemo. Others turn to Essiac or other CAM modalities in end-stage disease because their condition is considered incurable (Dy et al., 2004).

A controversial Canadian study revealed that 8% of women diagnosed with breast cancer use Essiac. The main reported reasons for use include desiring to feel better and reduce the side effects of conventional breast cancer treatment. Breast cancer survivors took the tonic wishing to maintain cancer-free status (Zick et al., 2006).

In a North American survey published by the American Botanical Council, cancer patients took Essiac or Flor-Essence mostly to support their immune system. Some users hoped the tonic would improve their survival and quality of life, based on anecdotal reports. The majority reported symptom improvement after supplementation (Richardson et al., 2000).

In the above study, 85.3% took and 36.8% were currently taking conventional medicine for breast, prostate, or lung cancer (Richardson et al., 2000).

It's clear that most cancer patients who take Essiac do so alongside conventional chemo and radiotherapy. Yet, very little is known about the interactions between Essiac and chemotherapeutic drugs.

For example, only one case report mentions the successful use of Essiac with conventional breast cancer chemotherapy (Arimidex), although this combination is clinically common (Gladwish et al., 2010).

Some websites that sell Essiac irresponsibly advise against chemotherapy and other conventional treatments when using the tea "to help it work effectively." Other websites might promote Essiac as a "proven cancer cure." Such recommendations can be dangerous, and they have no basis in science. No reputable scientific cancer organization supports them.

On the other end of the spectrum are websites that strictly advise against taking Essiac while on chemotherapy. Most authoritative, trusted resources claim that Essiac tea may negatively interact with chemotherapy. They mention that many experts caution against combining essiac tea and chemotherapy.

Science-Based Approach to Essiac Use Alongside Chemotherapy

Given that most cancer patients use complementary therapies like Essiac alongside chemotherapy without major side effects, advising against their combined use may *not* be the most effective solution (Richardson et al., 2000).

So, what *is* the solution?

A US study found that just 41% of oncologists discussed the use of herbs and supplements with their patients. Only 26% of discussions were initiated by the oncologist. Many oncologists indicated a lack of knowledge and education as a barrier to such discussions. This can make patients hesitant to openly speak about the herbs and supplements they plan on taking (Lee et al., 2014).

It's clear that both patients and healthcare professionals are in need of evidence-based information about using Essiac with chemotherapy to enable discussion and individualized care.

The next section takes a deep dive into the scientific literature to fill that gap for both cancer patients and their healthcare providers.

The Effects of Essiac on Chemo Side Effects

Cancer patients using Essiac report less fatigue, better disease coping, improved symptoms, improved appetite, less nausea and vomiting, and less pain as some of the perceived benefits of Essiac (Richardson et al., 2000).

Essiac had immune-balancing effects in cells, helping to strengthen immune defense against bacteria and viruses and improving tumor surveillance. Human studies have yet to test these potential immune benefits (Seely et al., 2007).

In mice, Flor-Essence increased the survival of weakened immune cells due to treatment with the cancer drug cyclophosphamide. It also increased the debris-clearing activity of macrophages and helped NK immune cells get rid of more leukemia cells (Wu et al., 2020).

Scientists explain that further research should test if Essiac or Flor-Essence can prevent immune damage caused by cyclophosphamide and other chemotherapeutic drugs in humans (Wu et al., 2020).

In animals and cells, the three main Essiac herbs—burdock root, sheep sorrel, and slippery elm—helped protect the stomach lining from ulcers and inflammation, a common side effect of chemo. Clinical studies are needed to support these findings too (Bae et al., 2012; Dos Santos et al., 2008; Bae et al., 2012; Newall et al., 1996).

The mucilage in burdock root and slippery elm can form a protective layer in the esophagus and gut. Allegedly, this may improve appetite by sustaining the esophageal and stomach lining in people undergoing chemotherapy. However, studies have not yet tested these claims either (de Almeida et al., 2013).

Sheep sorrel might reduce nausea by relaxing smooth muscles in the gut, based on tissue studies. When too tight, these muscles can cause pain and cramping (Hussain et al., 2015).

Ways Essiac May Interact with Chemotherapy & Other Oncology Drugs

Herbal supplements like Essiac may change the way the body absorbs, uses, or eliminates chemotherapeutic drugs. This may alter the required dose of chemotherapy, effectiveness, or side effects profile. Possible mechanisms are covered in this section.

The main constituents of Essiac expected to contribute to drug interactions are the dominant herbs: burdock (76%) and sheep sorrel (15%). The effects of slippery elm (6%) are possible, while the contribution of rhubarb root (3%) to interactions is highly unlikely.

Phase I Drug Detoxification

Cytochrome P450 (CYP450) are powerful liver enzymes that break down and clear all drugs and foreign substances from the body. They are our body's first-pass detox mechanism and are part of phase I detoxification (Wilkinson & Clapper, 1997; Liska 1998).

Most drug interactions are a result of increased or decreased activity of specific CYP450 enzymes. Many drugs, herbs, and nutrients can stimulate or inhibit CYP450 enzymes.

CYP450 enzymes include CYP1A1, CYP1A2, CYP3A4, CYP2A6, CYP2C19, and CYP2E1.

Essiac may block CYP450 enzymes and raise the levels of certain drugs. In one case report, reduced clearance of an experimental chemotherapy drug (DX-8951f) was described in a patient taking Essiac (Cassileth, 2011).

Many drugs used in oncology are metabolized by CYP450 enzymes, including warfarin, benzodiazepines, etoposide (3A4, 1A2, 2E1), vincristine, vinblastine, taxanes, anthracyclines,

quinazoline epidermal growth factor receptor tyrosine kinase inhibitors (CYP3A4/A5), estradiol (1A2), and tamoxifen (CYP2E1, CYP3A family substrate) (Dy et al., 2004).

Burdock root, the main ingredient in Essiac, contains polyphenols and flavonoids that have variable effects on CYP450 activity.

Quercetin from burdock root is a known potent inhibitor of CYP3A. This means it may theoretically raise the levels of drugs metabolized by CYP3A to higher than expected levels (Dy et al., 2004).

In contrast, rhubarb root may activate CYP3A. But since it's present in tiny amounts in the original Essiac formula, it's highly unlikely to contribute to interactions (Yu et al., 2016).

Phase II Drug Detoxification

Burdock root may contain catechins, though levels are higher when the root is roasted. The herbs in Essiac also contain various polyphenols (Lee & Kim, 2017).

Catechins and polyphenols in Essiac may induce phase II drug-metabolizing enzymes (including glutathione S-transferase and quinone reductase) (Pandey & Rizvi, 2009).

High levels of these detoxifying enzymes are one possible mechanism of resistance to certain chemotherapy drugs such as nitrogen mustards, nitrosoureas, and other DNA-damaging agents (Dy et al., 2004).

On the flip side, scientists think that boosting phase II activity may support the detoxification of carcinogens and aid cancer prevention. This might explain, at least in part, the health-boosting effect of many herbs, fruits, and vegetables (Surh et al., 2008, Wilkinson & Clapper, 1997).

Also, phase I detox can trigger oxidative stress and can make toxic substances more destructive. This may be a wanted effect of chemotherapy, but it may also cause unwanted effects on healthy cells. Supporting phase II detoxification enzymes helps ensure the removal of toxic waste products. Human studies are needed to support this approach, though (Sak, 2012).

Drug Absorption

Essiac may reduce the absorption of some chemotherapeutic drugs. Burdock and slippery elm inner bark contain mucilage, which can entrap drugs and prevent their absorption. It's usually recommended to take mucilage-rich herbs at least 2 hours away from medication (Wynn & Fougère, 2007).

Herbs in Essiac, including burdock root, rhubarb, and slippery elm, also have the potential to cause either increased or decreased bowel movement.

Both diarrhea and constipation have been reported as possible side effects of Essiac and Flor-Essence. Diarrhea can decrease the intestinal absorption of oral chemotherapeutic drugs.

Drug Resistance

P-glycoprotein (Pgp) is a small protein that has large implications for cancer treatment. It sits on the gut lumen and membrane of virtually all cancer cells and stubbornly prevents many drugs from being absorbed. Pgp has been called the "permeability glycoprotein" and its overactivity is involved in chemotherapy drug resistance (Callaghan et al., 2014).

Scientists are currently searching for effective and safe Pgp inhibitors.

Quercetin, high in burdock root, is an inhibitor of Pgp. However, its effects on chemotherapy resistance haven't yet been researched in humans (Choi et al., 2011).

In one rat study, quercetin increased the bioavailability and blood levels of the chemotherapy drug doxorubicin given by mouth. Intravenous doxorubicin was not affected. The scientists explained this by quercetin's potential to increase doxorubicin absorption by blocking Pgp in the gastrointestinal tract and CYP3A in the small intestine and liver (Choi et al., 2011).

Drug Transporters

Sheep sorrel inhibits a transporter called the organic anion-transporting polypeptide 1A2 (OATP1A2). Similar to Pgp, these transporters (OATP) are found in the small intestine and liver. Their job is to enable the absorption of drugs. Inhibiting these transporters may reduce the bioavailability of some oral drugs (Ahn et al., 2020).

Therefore, Essiac may reduce the levels of oncology drugs that OATP transports. These drugs include Bosentan (Tracleer, add-on for some melanomas), Celiprolol (Celicard, others), etoposide (VePesid), fexofenadine (Allegra), fluoroquinolone antibiotics, glyburide (Micronase, Diabeta), irinotecan (Camptosar), methotrexate, nadolol (Corgard), paclitaxel (Taxol), saquinavir (Fortovase, Invirase), rifampin, statins, talinolol, torsemide (Demadex), troglitazone, and valsartan (Diovan).

Blood Clotting

Burdock root and sheep sorrel might slow blood clotting (burdock inhibits platelet-activating factor while sheep sorrel inhibits collagen-induced platelet aggregation) (Iwakami et al., 1992; Jeong et al., 2020).

Similarly, rhubarb root may interact with blood-thinning medication and slow blood clotting due to its vitamin K content (Ge et al., 2014).

Anticoagulant or antiplatelet drugs are commonly prescribed to cancer patients to manage possible complications like stroke or thromboembolism (Leader et al., 2020).

Therefore, taking Essiac with the following drugs might theoretically increase the risk of bleeding: Aspirin, clopidogrel (Plavix), diclofenac (Voltaren, Cataflam, others), ibuprofen (Advil, Motrin, others), naproxen (Anaprox, Naprosyn, others), dalteparin (Fragmin), enoxaparin (Lovenox), heparin, and warfarin (Coumadin).

Avoiding any blood-clotting interactions is especially important before surgery. Your doctor will go over your medications and supplement regimen in detail if you have an upcoming surgery.

Cytotoxic Interactions

Quercetin, found in burdock root, had synergistic cytotoxic ("cancer-fighting") effects with certain chemotherapeutic drugs like cisplatin in some experiments (Dy et al., 2004).

Anthraquinones found in both sheep sorrel and Turkish rhubarb like emodin also have cytotoxic and immunosuppressive properties. In cells, emodin blocked pathways associated with cancer progression. It also acted in synergy with chemo drugs like cisplatin, doxorubicin, and etoposide to stop tumor cells from dividing (Dy et al., 2004; Li et al., 2016).

L-asparagine from burdock increased the effects of cyclophosphamide chemotherapy in animals with cancer (Urazova et al., 2011).

Researchers point out that none of these interactions have been confirmed in humans. Clinical studies are needed to test if Essiac or its constituent herbs may increase the cancer-fighting effects of chemotherapy.

Other Interactions

Rhubarb root may cause potassium loss at high doses. The overuse of rhubarb may increase corticosteroid-induced potassium loss. Corticosteroids are often prescribed to cancer patients to manage disease and medication complications (Blumenthal, 1998).

Potassium loss is not a reported or expected side effect of Essiac since the original formula contains rhubarb in tiny amounts (2%).

Other Herbs/Supplements

Concomitant use of Essiac with herbs and supplements that slow blood clotting could theoretically increase the risk of bleeding.

Some herbs that may also slow blood clotting include angelica, clove, danshen, garlic, ginger, ginkgo, Panax ginseng, and others. Cancer patients report using several of these herbs for supporting the immune system, improving energy levels, or as general health tonics.

Oxalates in sheep sorrel leaves may also reduce the absorption of some minerals like zinc, calcium, iron, and others. However, the amount of oxalates in Essiac is low and this interaction is unlikely to be significant.

List of Essiac Interactions with Oncology Drugs

To summarize, here is a list of possible interactions between Essiac and drugs commonly prescribed to cancer patients*:

- Experimental drug DX-8951f (↑)
- Warfarin (↑)
- Benzodiazepines (↑)
- Etoposide (↑)
- Vincristine (↑)
- Vinblastine (↑)
- Taxanes (↑)
- Anthracyclines (↑)
- Quinazoline (↑)
- Epidermal growth factor receptor tyrosine kinase inhibitors (↑)
- Estradiol (↑)
- Tamoxifen (↑)
- Doxorubicin (↑)
- Cisplatin (↑)
- Cyclophosphamide (↑)
- Aspirin (↑)
- Clopidogrel (↑)
- Diclofenac (↑)
- Ibuprofen (↑)
- Naproxen (↑)
- Dalteparin (↑)
- Enoxaparin (↑)
- Heparin (↑)
- Corticosteroids (↑)
- Etoposide (⇅)
- Bosentan (↓)
- Celiprolol (↓)
- Nadolol (↓)
- Fexofenadine (↓)
- Fluoroquinolone antibiotics (↓)
- Glyburide (↓)
- Irinotecan (↓)
- Methotrexate (↓)
- Paclitaxel (↓)
- Saquinavir (↓)
- Rifampin (↓)
- Statins (↓)
- Talinolol (↓)
- Torsemide (↓)
- Troglitazone (↓)
- Valsartan (↓)

*Arrows indicate whether Essiac may increase (↑) or decrease (↓) the levels, toxicity, or effects of the drug. An up-down arrow (⇅) means that both effects are possible. The theoretical effects in this section are based on findings from the scientific literature and have not been confirmed in clinical studies.

Questions to Ask Your Oncologist/Oncology Pharmacist

Fewer than one-half of oncologists initiate discussions about the use of dietary supplements with their patients. As a patient, coming to the doctor's office prepared can help start the discussion.

As an oncologist, gaining more evidence-based knowledge and education can make these important discussions welcome.

Oncology pharmacists are also key members of the cancer care team. They are knowledgeable about cancer treatment and drug interactions.

Here are some questions you may want to ask your oncologist or oncology pharmacist if you are curious about using Essiac or other dietary supplements with chemotherapy:

- Does my chemotherapy interact with the supplements I want to take?
- Does my chemotherapy interact with any foods or drinks, such as grapefruit juice or milk?
- What herbal supplements, vitamins, or over-the-counter medications can I take safely with my medications?
- What is the best schedule for me to follow? Should I take herbal supplements at a different time of the day than my medications?

The Bottom Line

Although most patients who use Essiac also undergo conventional cancer treatment, there is a lack of quality information about the potential interactions and safety of this combination.

One of the reasons cancer patients use Essiac is to reduce the side effects of chemotherapy and prevent a decline in immune function. Survey-based studies reveal good outcomes. Yet, no clinical studies back up this perceived benefit.

Essiac might interact with some chemotherapeutic and oncology drugs, especially with drugs taken by mouth. It may alter their absorption, activity, or elimination from the body. In some cases, this can raise the blood levels of these drugs to dangerously high levels.

If you plan on using Essiac with chemotherapy, it's important to discuss your plans with your care provider first. Come prepared, ask questions, and be sure to mention all medications, supplements, and OTC medications that you're already taking.

Takeaway

Despite its long history of use, many questions about Essiac tea and cancer remain unanswered.

Several case reports and animal experiments show promise. Cell-based research reports conflicting findings. Unpublished research remains unclear and biased. And, above all, no proper clinical trials in people with cancer have yet been carried out.

To sum it up, there is not yet enough evidence to recommend Essiac tea to cancer patients. Limited data suggest that Essiac may have positive psychological effects and support general health.

A minority of Essiac users take the tonic for purported cancer prevention.

Animal and cell-based studies point to anti-inflammatory, antioxidant, detoxifying, and immune-supportive effects of Essiac's constituent herbs. Research is still in the early phases, and clinical studies are lacking.

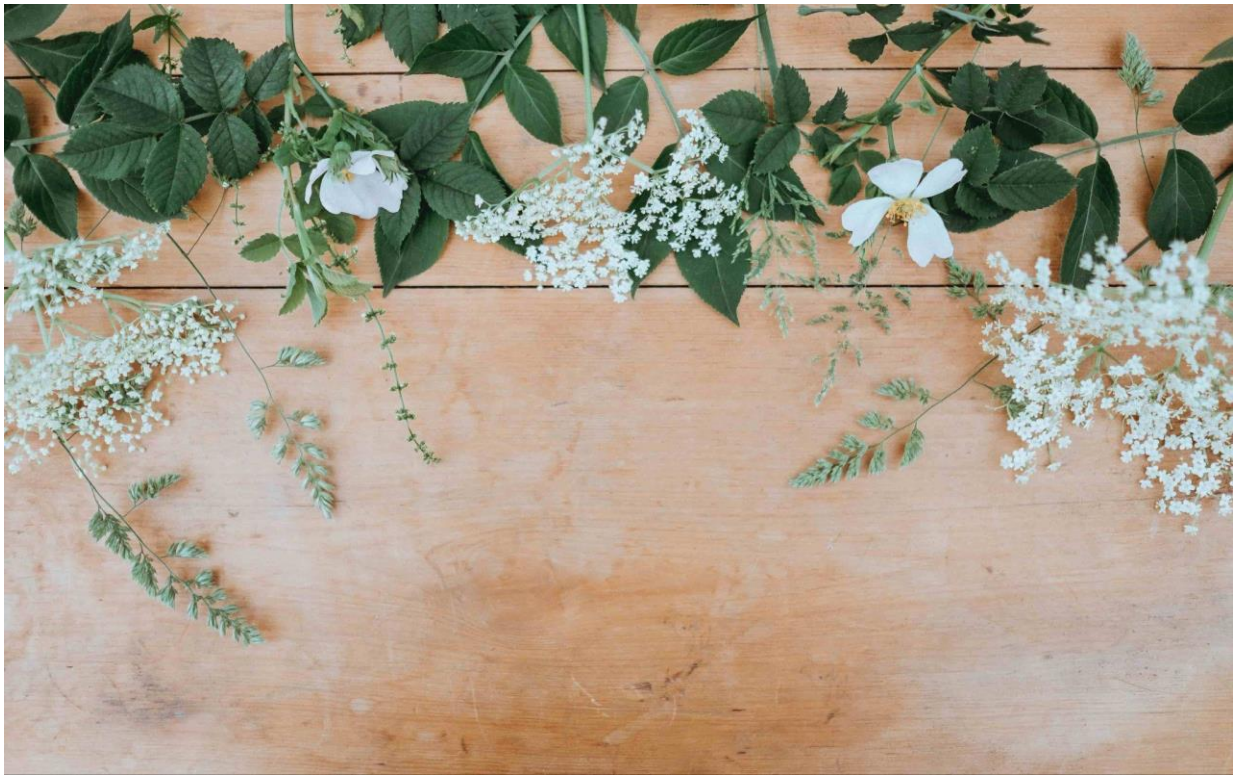
Therefore, there's currently not enough evidence to recommend Essiac for cancer prevention. However, it's reasonable to support the use of Essiac for maintaining good health.

Essiac is likely safe if used alongside conventional therapy under medical supervision, but drug interactions are possible.

Chapter 6

Other Essiac Uses

The Conventional Medicine Gap



While the use of Essiac among cancer patients remains controversial, anecdotal claims about other uncommon uses continue to come up.

People report using Essiac in addition to conventional therapy for conditions such as fibromyalgia, chronic fatigue syndrome, lupus, low thyroid, chronic candida, chronic Lyme disease, chemical sensitivities, “brain fog,” and others.

Many of the diseases Essiac is sometimes used for are considered “fringe”—they are not accepted or well-understood by conventional medicine.

These conditions are likely to leave patients dissatisfied with conventional care, which is often the first step to considering complementary and alternative medicine (CAM). According to some estimates, 40% of adults in the U.S. use some form of CAM, including dietary supplements. Most have chronic, recurrent, or serious illnesses (Ventola, 2010).

Also, the use of dietary supplements was at an all-time high in 2020. According to analyses, this was mainly due to people looking to support their immune function amid the COVID-19 pandemic (Lordan, 2021).

Each patient frustrated with conventional care or looking to improve their health holistically is a potential CAM user. This means that, unofficially, the list of uncommon Essiac uses grows every day.

Healthcare professionals often lack the knowledge and communication skills to properly counsel patients about CAM treatments like Essiac. As a consequence, patients are hesitant to even mention that they plan on using "alternative" therapies, deepening the gap (Ventola, 2010).

One study revealed that two-thirds of chronically ill patients use dietary supplements, but only 30% will bring this up with their physicians. In another survey, 72% of patients did *not* report their use of alternative therapies to their healthcare providers (Boyer, 2015; Kroll, 2004).

There is an absence of quality, evidence-based information for patients wanting to use supplements like Essiac. Lacking better sources, people are turning to Facebook groups, online forums, unverified websites, and untested vendors trying to figure out whether taking Essiac for their specific condition makes any sense.

To bridge the gap, we've created this independent, up-to-date, science-based section about uncommon, anecdotal Essiac uses.

Essiac and Parasites

Parasitic infections tend to go unnoticed for years until they cause severe health problems. The symptoms are often neglected and the treatment options are limited. But can parasites actually cause cancer? And can herbs in Essiac help combat parasitic infection?

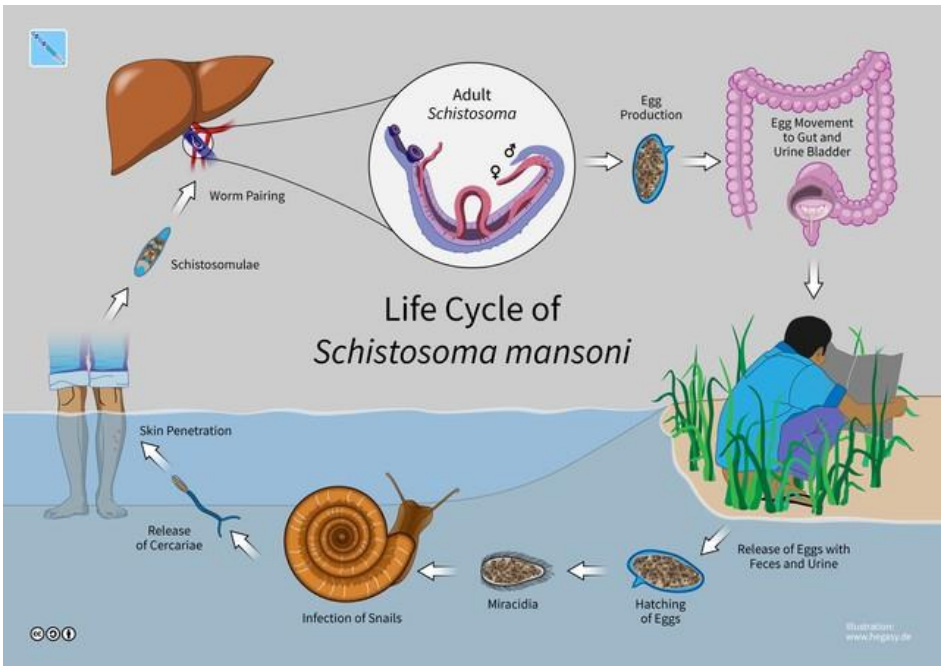
Schistosomiasis

Sources of infection & symptoms

Schistosomiasis is an illness from infection with parasitic worms called schistosomes (usually *Schistosoma mansoni, S. haematobium,* and *S. japonicum*).

According to the CDC, schistosomiasis is the second most devastating parasitic disease, right after malaria. It is spread by contaminated fresh water in which certain types of snails that carry the parasite live.

Schistosomiasis infects over 200 million people per year, mostly in the Middle East, Africa, and Asia. This tropical disease is considered neglected by the World Health Organization. It seems to slip through the cracks of modern medicine, and only a few drugs are available to treat it.



The infection starts silently. A flatworm finds its way through the skin of someone who comes in contact with contaminated water. The parasites may keep on penetrating the skin or lie dormant for years before a person starts feeling sick.

Fatigue, fever, headache, and mild acute symptoms may progress to chronic infection. The eggs of adult worms travel to the intestine, liver, lungs, or bladder. There, they cause circulation problems, inflammation, or scarring. In rare cases, the eggs are found in the brain or spinal cord and can cause seizures, paralysis, or spinal cord inflammation (Nelwan, 2019).

Treatment & complementary herbal preparations

The only drug available to treat schistosomiasis is praziquantel.

Herbs used in traditional medicine, such as wormwood and myrrh, are also being investigated. Some herbs that are found in Essiac have gone through limited, preliminary studies (Mravčáková et al., 2020; Yakoot, 2010).

All herbal remedies for parasitic infections are typically used alongside conventional treatment based on anecdotal data. There is not enough clinical evidence to determine their safety and efficacy.

With parasites, the main goal is to remove the source of infection and create more hygienic living conditions.

Cleansing parasites with medicine (conventional or alternative) won't solve anything if the person still comes into contact with contaminated water or food on a daily basis.

If you think you have parasites, consult your care provider to get adequate diagnosis and treatment.

The Link Between Parasites & Cancer

Certain parasitic worms can raise the risk of developing cancer. They are classified as definite biological agents that cause cancer (Hatta, 2021).

It's important to point out that not all parasites cause cancer, although all parasites are detrimental to health. Also, claims that all cancers are parasitic or that everyone has parasites have no basis in evidence.

Over time, infection with some parasites may lead to excessive oxidative stress and inflammation. As the parasites spread throughout the body, they can cause widespread injury to organs and tissues. They also secrete toxins that disrupt cellular and immune health, weakening the body's innate defenses (Hatta, 2021).

Schistosomiasis and bladder cancer

Schistosomiasis has been linked to bladder cancer. Links to other types of cancer are being studied as well.

The parasite causing schistosomiasis releases cancer-causing toxins into the body (N-nitroso compounds). In chronic stages of the disease, it also decreases the activity of carcinogen-detoxing enzymes (Mostafa et al., 1999).

Since the body can't cleanse toxins, carcinogenic compounds build up. Inflammation becomes rampant and oxygen radicals increase, causing DNA damage. All these mechanisms contribute to an increased risk of bladder cancer in patients with schistosomiasis (Mostafa et al., 1999; Hatta et al., 2021).

Other parasites

Opisthorchis viverrini and *Clonorchis sinensis* are liver flukes (a type of flatworm) that have been linked to an increased risk of developing cancer of the bile ducts. People get infected by eating raw or undercooked freshwater fish, mostly in East Asia.

Eating raw, contaminated fish frees these parasites into the body. They travel toward bile ducts, trigger inflammation, damage DNA, and cause gene mutations that can eventually lead to

cancer. The risk increases in combination with other carcinogenic factors such as dietary nitrosamines (found in salted or fermented fish, a common dish in southeast Asia) (Hatta et al., 2021).

Other types of common parasites that can cause health problems include roundworms, hookworms, pinworms, whipworms, and more. These, however, haven't been specifically linked to cancer.

The Evidence on Using Essiac for Parasites (Schistosomiasis)

Not many plants have been studied against schistosomiasis and other parasites. A couple of studies investigated the two dominant constituent plants in Essiac: burdock root and sheep sorrel herb.

Burdock

Scientists think that active compounds in burdock root and fruit may show potential as new antiparasitic drugs.

In one study, the main active compound from burdock root—arctiin—killed schistosomes (*S. mansoni*) in culture, damaging their outer protective surface. In infected mice, high-dose arctiin injections (but not lower-dose oral use) reduced the parasitic liver burden, possibly by lowering inflammation (Saco et al., 2017).

In another cellular study, alcoholic burdock fruit extract killed 100% of *S. mansoni* worms. The scientists suspect that arctiin and arctigenin from burdock were responsible for the antiparasitic effect (Dias et al., 2017).

One research team proved that active compounds from burdock fruit can kill a parasite called *Dactylogyrus intermedius* in goldfish. These parasites mostly infect farmed fish. The same team used gold nanoparticles to trace how arctigenin kills parasites by entering deep into their nucleus or mitochondria. Yet, only the chloroform extract had antiparasitic activity (Tu et al., 2018; Tu et al., 2020).

Arctigenin derivatives were also active against the parasite that causes toxoplasmosis (*Toxoplasma gondii*) in cells and in mice (Zhang et al., 2018).

Also, the whole burdock plant can be given as organic parasite control for farmed poultry and rabbits (Lans and Turner, 2011).

Sheep sorrel

Sheep sorrel is also considered to be an anti-parasitic herb. It's used to combat parasites in traditional Iranian and Middle Eastern folk medicine. Nordic farmers also give sorrel species to livestock to combat internal parasites (Amiri et al., 2014; Waller et al., 2011).

Sheep sorrel is exceptionally high in the antioxidant quercetin. Quercetin killed the following parasites in culture: *G. lamblia*, *Haemonchus contortus* larvae, *Leishmania donovani*, *Trypanosoma brucei rhodesiense*, *Trypanosoma cruzi*, and *Encephalitozoon intestinalis* (Calzada et al., 1999; Panda & Lyten, 2018).

Quercetin improved parasitic infections in mice, and some scientists believe it's a potent antiprotozoal agent. Protozoa are a type of single-celled parasite (Calzada et al., 1999; Panda & Lyten, 2018).

Other Essiac active compounds

Many other flavonoids that are found in Essiac are also being researched for their antiparasitic activity (Panda & Lyten, 2018).

Tannins are another class of antiparasitic actives found in all four Essiac constituent herbs, although tannins are most concentrated in sheep sorrel leaves and slippery elm inner bark (Korpelainen & Maria Pietiläinen, 2020; Joo, 2014)

Tannin-rich plant extracts, including sorrel leaf extract, killed the larvae of *Toxocara cati* and *Trichuris vulpis* parasites in one study. These parasites usually affect cats and dogs, but humans can get infected as well (Spiegler et al, 2015).

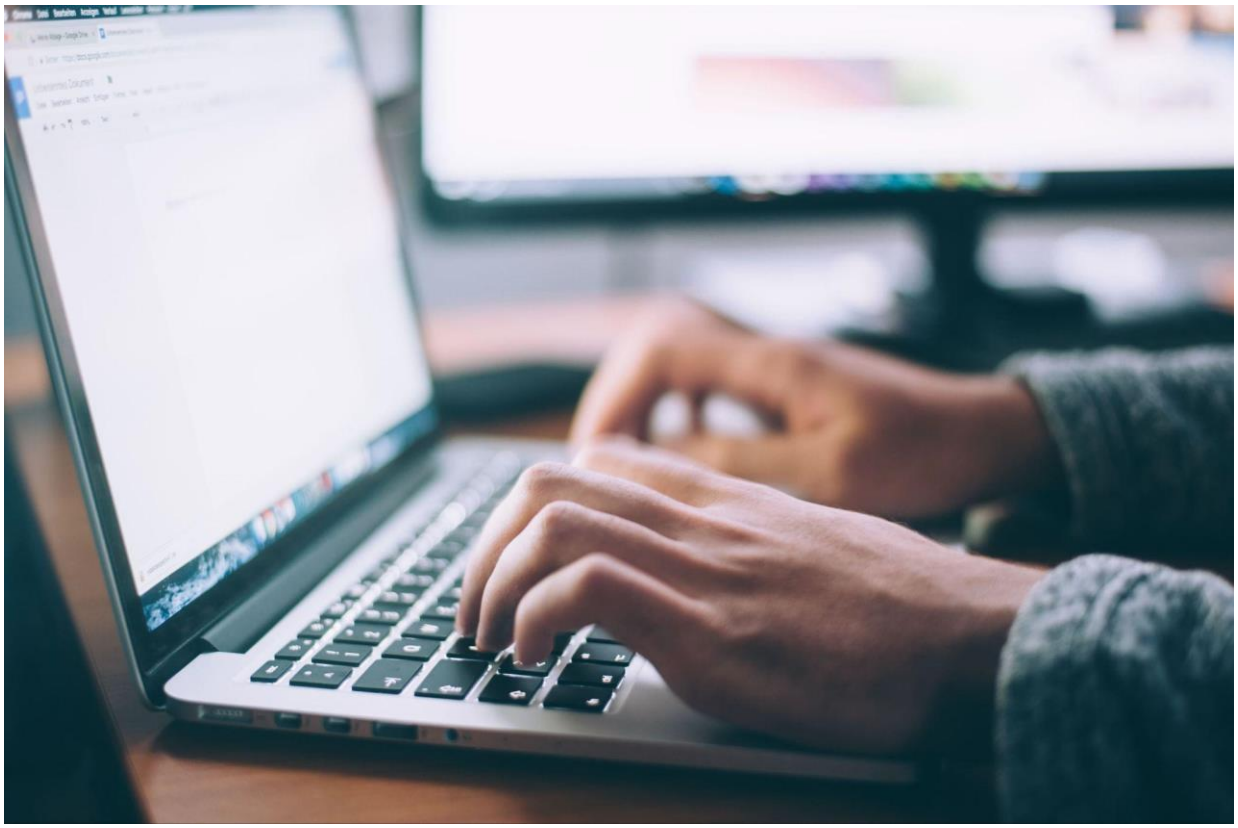
According to some estimates, up to 13% of the US population is infected with *Toxocara* parasites. Toxocariasis is the most neglected infection of poverty in the U.S. (Farmer et al., 2017).

Detox and immune support

In addition to the possible direct antiparasitic activity, Essiac may also help by (Ruiz et al., 2021; Leonard et al., 2006; Cheung et al., 2005; Seely et al., 2007):

- Reducing oxidative stress
- Preventing DNA damage and genetic mutations
- Supporting detox
- Cleansing and soothing inflammation
- Providing immune support

Uncommon Uses (Chronic and Complex Diseases)



Since there aren't many human studies, this section takes on a biohacking approach: it relies on openly sharing the science behind pathways in the body that Essiac and its active compounds may act on (Yetisen, 2018).

Toxins & Heavy Metals Detox

The problem:

Environmental pollution has increased our toxic burden. More and more people are exposed to chemicals and heavy metals like arsenic, aluminum, cadmium, chromium, lead, and mercury. In some cases, chronic exposure to toxins and heavy metals may lead to cancer and other serious health problems. Some natural therapies are being researched for helping detoxify heavy metals from the body (Tchounwou et al., 2012).

Anecdotal claims:

Proponents claim that Essiac may help the body detox chemicals and heavy metals like aluminum, lead, and mercury.

Level of evidence:

Low.

Quality human studies are lacking. Only animal and cell-based studies on plants in Essiac have been published.

Potential mechanism:

Antioxidants (catechins and polyphenols) in Essiac may induce phase II detoxification enzymes. These enzymes are purported to help flush carcinogens from the body and support cancer prevention, but more data are needed (Pandey & Rizvi, 2009; Surh et al., 2008, Wilkinson & Clapper, 1997).

Burdock, sheep sorrel, and rhubarb also improved detoxification in animal studies.

Burdock reduced inflammation from cigarette smoke exposure and protected the liver against cadmium, acetaminophen, a toxic Chinese herb, a diet high in unhealthy fats, and other liver-damaging chemicals (Possebon et al., 2018; Lin et al., 1996; Predes et al., 2014; El-Kott et al., 2015; Zhou et al., 2020; Romualdo et al., 2020).

Sheep sorrel extract protected the liver and other organs against toxic chemicals in rats. Quercetin, which is high in sheep sorrel herb, prevented aluminum from damaging and killing brain cells in rats (Alkushi, 2017; Sharma et al., 2016).

According to 12 small studies on nearly 900 people, rhubarb may aid detoxification and reduce the symptoms and toxic effects of pesticide and herbicide poisoning (Wang & Pan, 2015; Wang et al., 2015; Yu et al., 2012).

MTHFR Mutations

The problem:

MTHFR gene mutations (MTHFR C677T polymorphism) have been linked with heart disease, Alzheimer's disease, neurological diseases, diabetes, psoriasis, adverse pregnancy outcomes, cancer, and others (Liew & Gupta, 2015; Petrone et al., 2021).

The MTHFR enzyme affects a person's folate metabolism and pathways linked to antioxidant status and detoxification. About 35% of the North American population has an MTHFR mutation that reduces enzyme activity. Scientists are searching for nutrients and supplements that may help prevent health complications from MTHFR mutations (Liew & Gupta, 2015, Kim, 2009).

Anecdotal claims:

Proponents say that Essiac may support more optimal detox in people with MTHFR mutations. Some people claim that MTHFR mutations may increase a person's risk of heavy metal poisoning, multiple chemical sensitivities (MCS), and cancer.

Level of evidence:

Very low.

No studies on Essiac or its constituent plants in people with MTHFR mutations have been published. MTHFR mutations do seem to increase the risk of some cancers. The link between MTHFR and sensitivity to toxins and chemicals is unclear.

Potential mechanism:

Essiac may support detoxification. Hypothetically, detoxification may be helpful in some people with MTHFR mutations exposed to toxins and heavy metals.

The impact of MTHFR heavy metals accumulation in the body has only been tested in small studies. In one study, prenatal exposure to cadmium seemed to increase the risk of neural tube defects in fetuses with MTHFR and SOD2 mutations. In another study, MTHFR mutations were linked with hypersensitivity to mercury (Liu et al., 2021; Austin et al., 2014).

One study didn't find a link between MTHFR and multiple chemical sensitivity (McKeown-Eyssen et al., 2004).

Supporting detox may also possibly reduce the side effects of chemotherapy in people with MTHFR mutations. On the downside, activating some detoxifying enzymes may increase the resistance to certain chemotherapy drugs (Pandey & Rizvi, 2009; Surh et al., 2008, Wilkinson & Clapper, 1997; Wu et al., 2020; Dy et al., 2004).

MTHFR may also affect the response and side effects to chemotherapy drugs (like 5-fluorouracil, methotrexate, and anti-inflammatory chemotherapy), but the findings so far have been conflicting (Kim, 2009).

More clinical studies are needed.

Chronic Candida

The problem:

Conventional medicine recognizes the diagnosis of candida infections. However, the concept of chronic and subclinical candida overgrowth—its symptoms and health implications—is controversial. There's also an urgent need for new alternatives since candida is becoming resistant to antifungal drugs (de Oliveira Santos et al., 2018).

Anecdotal claims:

Some users, such as women prone to candida infections due to frequent antibiotic use, claim that Essiac helped with their chronic candida problems. Most take Essiac in addition to anti-fungal herbs.

Level of evidence:

Very low.

Clinical studies are lacking. Burdock root was tested against candida in cells. No studies investigated the effects of Essiac on candida.

Potential mechanism:

Burdock root blocked the growth of candida in test tubes, but its effects on candida in humans aren't known (Gentil et al., 2006).

Candida attacks people with weakened immunity. Essiac supports the immune system and a healthy anti-inflammatory response. This may encourage the body to get rid of candida, when added to conventional drugs and anti-fungal herbs (Ruiz et al., 2021; Wang et al., 2019; Seely et al., 2007).

The mucilage in Essiac may also act as a prebiotic fiber, which boosts gut microbiome health. This might be helpful since microbiome imbalances are known to make people more prone to stubborn, hard-to-treat candida infections (Leonard et al., 2006; Sam et al., 2017).

Toxic Mold Syndrome

The problem:

The diagnosis of "toxic mold syndrome" is not widely accepted. The syndrome is associated with exposure to mold-contaminated environments. Molds can cause allergic immune imbalances. They may trigger asthma, hay fever, lung inflammation, and even life-threatening infections in people with weakened immunity (Edmondson et al., 2005).

Anecdotal claims:

People report using Essiac as a general health tonic while detoxing from mold exposure.

Level of evidence:

Very low.

No studies on Essiac and mold syndrome have been carried out. Essiac may have indirect effects.

Potential mechanism:

Essiac may support general health in people healing from mold exposure. It may also help by balancing the immune system, which may be important in overcoming allergic inflammation triggered by mold exposure. Also, Essiac activates detox pathways that might theoretically help the body cleanse mold-related toxins (Seely et al., 2007; Pandey & Rizvi, 2009; Surh et al., 2008, Wilkinson & Clapper, 1997).

Lymphatic Drainage

The problem:

Lymphatic drainage involves gentle massage, herbal supplements, exercise, or any other holistic treatment that encourages the movement of lymph fluids. Lymph fluids help remove waste and toxins from the body.

Lymphatic drainage is usually done to relieve painful swelling of lymph nodes in the hands, feet, or neck called lymphedema. Lymphedema is a common side effect of cancer interventions including surgery, radiation, and chemotherapy (Thompson et al., 2021).

Other conditions like chronic inflammation, digestive issues, fatigue, and others have been suggested to be connected with poor lymphatic circulation in traditional systems of medicine. This hasn't been proven, but the research is promising (Sheikhi-Mobarakeh et al., 2020).

Anecdotal claims:

Some users claim that Essiac helps stimulate lymph flow and promote lymph health.

Level of evidence:

Low.

No studies have tested Essiac on lymphedema.

Potential mechanism:

Essiac may help support lymphatic health by reducing swelling and inflammation and promoting wound healing. Burdock root, as the main ingredient in Essiac, reduced markers of inflammation and oxidative stress in small clinical trials of osteoarthritis patients. Complex sugars from burdock root also improved blood flow in rats (Maghsoumi-Norouzabad et al., 2016; Qiu et al., 2020).

Autoimmune Disease (incl. Lupus)

The problem:

Treatment options for autoimmune diseases like rheumatoid arthritis, multiple sclerosis (MS), and lupus have limitations. Available treatments can't always keep a person's symptoms under control. Patients often experience flare-ups and seek alternatives to reduce symptoms and manage their health (Taibi & Bourguignon, 2003).

Surveys reveal that over 50% of patients with systemic lupus erythematosus (SLE) and 70% of people with MS have used complementary and alternative medicine (CAM). However, few randomized controlled trials of these therapies have been carried out (Greco et al., 2013; Yadav et al., 2010).

Anecdotal claims:

Experiences are mixed. Some people claim that Essiac worsened the symptoms of their autoimmune disease, while others say it helped.

Level of evidence:

Very low. Caution.

Limited data suggest that burdock root may have anti-inflammatory potential. However, Essiac may worsen autoimmune disease by overstimulating the immune system. Essiac has not been clinically researched in patients with autoimmune disease.

Potential mechanism:

Most supplements used to improve symptoms of autoimmune disease are thought to help by improving blood vessel health and reducing inflammation and oxidative stress. Essiac may also act on these pathways, according to limited data in cells and animals (Greco et al., 2013; Ruiz et al., 2021; Leonard et al., 2006; Cheung et al., 2005; Seely et al., 2007; Wu et al., 2020).

Burdock, the main ingredient in Essiac, reduced markers of inflammation and oxidative stress in small clinical trials on people with osteoarthritis and colon inflammation. Cell-based experiments suggest it may reduce the activity of immune cells (Th1 and Th17) associated with autoimmunity and inflammation (Maghsoumi-Norouzabad et al., 2014; Mizuki et al., 2019; Wu et al., 2015).

Essiac is thought to help balance the immune system. However, the combination of constituent plants it contains may also cause immune stimulation. This can worsen autoimmune diseases by activating immune cells that are already in overdrive (Th1) (Seely et al., 2007; Dardalhon et al., 2008).

Research confirms that immunostimulatory herbal supplements may worsen preexisting autoimmune diseases or trigger autoimmune disease in genetically predisposed persons (Lee & Werth, 2004).

Therefore, caution is advised in people with autoimmune disease to prevent adverse reactions. Clinical research needs to assess the safety of Essiac in people with autoimmune disease.

Myalgic Encephalomyelitis, Chronic Fatigue Syndrome (ME/CFS) & Fibromyalgia (FMS)

The problem:

Myalgic Encephalomyelitis, also known as Chronic Fatigue Syndrome (ME/CFS), is marked by severe fatigue. Fibromyalgia (FMS) is marked by widespread pain, fatigue, and issues with sleep, memory, and mood (CDC).

ME/CFS and fibromyalgia are similar but distinct medical problems. Both are hard to diagnose and the treatment options for both diseases are limited (CDC).

Recent research reveals that the possible culprit behind both of these complex diseases may be nerve, brain, and chronic systemic inflammation (Bäckryd et al., 2017; Nakatomi et al., 2014; Jonsjö et al., 2020).

Anecdotal claims:

Advocates claim that Essiac may support the healing of the myelin sheath around nerves. It's also purported to improve energy levels.

Level of evidence:

Very low.

No studies have tested Essiac on ME/CFS, fibromyalgia, or myelin levels.

Potential mechanism:

In theory, Essiac may help by reducing inflammation that may underlie both chronic fatigue syndrome and fibromyalgia. It might also stimulate pathways associated with improved energy levels and endurance, according to preliminary research (Maghsoumi-Norouzabad et al., 2014; Qiu et al., 2020; Wu et al., 2014).

Read more about this mechanism in Chapter 4 ("Essiac and Your Mitochondria").

Thyroid Imbalances

The problem:

People with thyroid imbalances commonly use complementary and alternative therapies, including herbal supplements and dietary changes. Clinical data to support their efficacy are lacking, though (Benvenga et al., 2019).

Anecdotal claims:

Anecdotally, some people claim that Essiac may help support thyroid function. Reported uses include underactive thyroid, overactive thyroid, and Hashimoto's. Several people with thyroid issues mention being worried about interactions with thyroid medications.

Level of evidence:

Very low. Caution.

Essiac and its constituent plants have not been researched in patients with any type of thyroid dysfunction. The impact of Essiac on thyroid health is unknown.

No data on interactions with thyroid medications are available. Caution is advised.

Potential mechanism:

Essiac may hypothetically support thyroid health by balancing the immune system. Inflammation is an underlying factor for many thyroid issues. However, caution is advised with autoimmune thyroid conditions like Hashimoto's (please see "Autoimmune Disease" above) (Seely et al., 2007; Dardalhon et al., 2008).

Additionally, people with low thyroid may use Essiac wanting to improve energy levels. According to some scientists, Essiac may contribute to healthy energy levels by supporting the mitochondria (Wu et al., 2014; (de Oliveira et al., 2015).

Encouraging detoxification may also be associated with an improvement in some thyroid issues, but this hasn't been confirmed in clinical trials (Pandey & Rizvi, 2009; Surh et al., 2008, Wilkinson & Clapper, 1997).

Far more data are needed.

The potential causes of and experimental treatments being researched for various thyroid issues are beyond the scope of this guide.

Chronic Epstein Barr Virus (EBV) and chronic viral infections

The problem:

Epstein-Barr Virus (EBV) is a type of herpes virus. About 95% of the healthy population is infected. Some scientists have suggested a link between EBV and cancer, autoimmune diseases, and other chronic health problems (Kuri et al., 2020).

For some people, dormant EBV infection may reactivate and cause chronic symptoms. The diagnosis of chronic EBV infection and its link to various health problems remains controversial (Fujiwara et al., 2020).

Anecdotal claims:

Some users claim Essiac helped with EBV while others say that it had no effect. Several users mentioned a link between their chronic EBV infection and thyroid imbalances. Essiac was usually used in addition to conventional treatment and other remedies in all people suffering from chronic EBV and other chronic viral infections.

Level of evidence:

Very low.

Essiac and its constituent plants have not been researched in people with EBV. The impact of Essiac on chronic viral infections is unknown.

Potential mechanism:

Essiac may support the immune system and aid healthy detoxification. Since EBV and other chronic flare-ups can be caused by declining immune function, natural remedies that support a normal immune response may have a place in holistic management. More research is needed (Yang & Gao, 2020).

Chronic Lyme Disease

The problem:

Medicine struggles to define Chronic Lyme disease (CLD). This disease has been associated with many symptoms and syndromes due to long-term *Borrelia burgdorferi* infection. There is no well-researched treatment, and scientists argue that long courses of antibiotics are not the answer (Shor et al., 2019; Lantos, 2016; Auwaerter, 2007).

Anecdotal claims:

Faced with a diagnosis that's often dismissed and few treatment options, people with chronic Lyme have reported using Essiac to support general health and detox in addition to their other therapies.

Level of evidence:

Very low.

Essiac and its constituent plants have not been researched in people with Chronic Lyme disease.

Potential mechanism:

Hypothetically, Essiac may support detox, immune and lymphatic system health, and normal energy levels (Seely et al., 2007).

Colon Issues & Diverticulitis

The problem:

Diverticulitis is when small pouches (called diverticula) form in the intestines and cause infection or inflammation.

Colorectal (bowel) polyps are small growths on the inner lining of the large intestine (colon) or rectum. Some types of polyps can change into cancer over time, but not all polyps become cancer (Delavari et al., 2014).

Diverticulitis and polyps are two different conditions. However, some people suffer from both. Patients with diverticulosis may have a higher risk of colorectal polyps (Muhammad et al., 2014; Baker et al., 2019).

Anecdotal claims:

Proponents list diverticulitis and colon polyps among less common Essiac uses. Most view Essiac as a preventive measure.

Level of evidence:

Low.

Essiac has not been researched in people with diverticulitis or colon polyps.

One clinical trial tested burdock, the main constituent herb in Essiac, in people with diverticulitis.

Potential mechanism:

Drinking burdock tea three times per day for about 26 months reduced symptom recurrence in patients with colonic diverticulitis in one clinical trial of 161 people. Only 10.6% of those who drank burdock tea experienced recurrence, compared with 31.8% of those not taking the tea. The symptom-free duration increased by 14 months in the burdock tea arm (Mizuki et al., 2019)

Scientists are also investigating whether Essiac may play a role in cancer prevention, which may be important for people with colorectal polyps. Access the research behind Essiac and cancer prevention in Chapter 5 ("Essiac and Cancer Prevention").

Diabetes, Metabolic & Hormonal Imbalances

The problem:

Many people with metabolic and hormonal imbalances try complementary and alternative therapies. More research on their safety and effectiveness is needed.

Anecdotal claims:

People have reported the use of Essiac for a wide range of metabolic and hormonal imbalances. The list includes diseases like diabetes, endometriosis, polycystic ovary syndrome (PCOS), sex hormone imbalances, high estrogen levels, exposure to environmental estrogens, and others.

Level of evidence:

Very low.

Essiac and its constituent herbs have not been properly researched in humans for any of the listed conditions.

Potential mechanism:

Preliminary research in animals and cells hints that Essiac may support metabolic health by activating pathways in the mitochondria and helping to detox the liver. Its effects on other detoxification pathways in the body may also play a role (Huang et al., 2012).

The potential causes of and experimental treatments for various metabolic and hormonal issues are beyond the scope of this guide.

The bottom line

Certain types of parasites have been linked with cancer. Chronic parasitic infection can cause inflammation, oxidative stress, immune imbalance, sluggish detox, and DNA damage. However, not all types of parasites increase the risk of cancer.

The treatment options for most types of parasitic infections are limited. New research is exploring herbal extracts but is still in the early stages. Herbs in Essiac that show the most promise as natural antiparasitic agents are burdock and sheep sorrel.

Despite promising preclinical research, however, clinical studies are needed before Essiac or its constituent herbs can be recommended to people with parasitic infections.

Essiac can be taken to support overall health and immunity, which may help alongside conventional treatment.

Phytoestrogens in Essiac vs. Flor-Essence

Endocrine disruptors or hormone balancers? The mention of phytoestrogens triggers polarizing opinions. Yet, these plant actives are abundant in many foods and herbal mixtures, including Essiac and Flor-Essence.

In this section, you'll uncover what science says about their effects on health, breast cancer risk and treatment, and the pros and cons of Flor-Essence vs. Essiac.

Key points

- Phytoestrogens are found in many plants and foods. They are likely safe when consumed in moderate amounts through diet and supplements
- Most herbs in the original Essiac formula contain phytoestrogens; no obvious safety concerns have been identified
- Most herbs in the eight-herb Flor-Essence formula also contain phytoestrogens; some safety concerns have been linked with red clover and caution is advised in breast cancer patients
- Randomized, placebo-controlled clinical trials are needed to determine the effects of Essiac and Flor-Essence on hormonal balance and breast cancer risk

What Are Phytoestrogens?

Phytoestrogens are plant-based compounds similar to estrogen, the main female sex hormone. Although all phytoestrogens bear some resemblance to estrogen, they can be completely different in their structure and health effects.

Some phytoestrogens mimic estrogen in the body and are thought to soothe menopausal symptoms. Others oppose the effects of estrogen. Some phytoestrogens have negligible hormonal effects and mainly act as antioxidants, anti-inflammatories, or even antimicrobials (Torrens-Mas & Roca, 2020; Landete et al., 2016).

Most people associate phytoestrogens with soy and herbs used for hormonal problems like black cohosh. Yet, did you know that the main class of antioxidants in plants–flavonoids–are phytoestrogens? The fiber found in flaxseed, broccoli, and whole grains is also phytoestrogenic (Mas & Roca, 2020).

Therefore, phytoestrogens are nearly impossible to avoid. However, the *type* and *quantity* of phytoestrogens you consume make a crucial difference.

How estrogen receptors work

To achieve its effects, estrogen has to bind to its receptors on cells. The activity of estrogen receptors affects all systems in the body–including reproductive development and health, bone health, heart health, metabolism, antioxidant status, and behavior in both men and women (Paterni et al., 2014; Mas & Roca, 2020).

There are two main types of estrogen receptors (ER) in the body (Paterni et al., 2014):

- ERa, the "bad" receptors: mostly found in breast tissue and reproductive organs; might cause uncontrolled cell division that can lead to cancer
- ERb, the "good" receptors: found in some reproductive organs and the immune system; might counteract cancerous cell division

As a rule, phytoestrogens bind more to ERb receptors, especially at higher doses (Bilal et al., 2014; Mas & Roca, 2020)

Studies suggest that phytoestrogens in Essiac also mainly target ERa, with little to no binding affinity for ERb (Ruiz et al., 2021).

Food and herb sources

Here are the main classes of phytoestrogens and their food sources (Tanwar et al., 2021):

- Beans, legumes, and soy products (isoflavones)
- Flaxseed, cereals, fruit, vegetables, and seeds (lignans)
- Red wine, berries, and other fruits (stilbenes and flavonoids, including resveratrol)

The following herbs also all contain phytoestrogens (Tanwar et al., 2021):

- Green tea
- Turmeric
- Olive leaves
- Black cohosh
- Chinese skullcap
- Elder
- Licorice
- Hops
- Culinary herbs (like basil, mint, parsley, rosemary, and thyme)
- Lavender
- Red clover
- Most herbs in Essiac and Flor-Essence

Are phytoestrogens beneficial or harmful?

Scientists were first intrigued by the observation that Asian populations, who eat more soy and soy-derived foods, seem to be healthier. They have a lower incidence of breast, ovarian, and prostate cancer. They also have fewer heart and bone-related problems, and women seem to experience a healthier transition to menopause (Mas & Roca, 2020; Tanwar et al., 2021).

The average daily intake of phytoestrogens in the diet of the Asian population is 20-50 mg, whereas in Western countries it is <1 mg. This could be related to a higher intake of various plant-based foods (not just soy) and the widespread use of traditional, herbal medicine (Tanwar et al., 2021).

Yet, research findings are conflicting.

On the one hand, low doses of phytoestrogens can promote the growth of breast cancer cells in test tubes (Rice & Whitehead, 2006).

On the other hand, data from cells might not apply to humans. Most studies suggest that phytoestrogens may have a positive effect on the prevention of menopausal symptoms, type 2 diabetes, heart disease, obesity, and cancer. But, there is still no conclusive evidence to back up a direct link. Higher phytoestrogen intake could simply reflect a healthy diet and lifestyle (Mas & Roca, 2020)

Based on the overall evidence, high dietary intake of phytoestrogens does not seem to increase the risk of breast cancer in the general population, in women with benign breast disorders, in those at risk of breast cancer, and even in cancer survivors (Rice & Whitehead, 2006; Alipour et al., 2020).

However, due to a lack of clinical data, high doses of phytoestrogens are still not recommended. Also, more long-term human studies using lower doses and mixtures of phytoestrogens are needed to determine if and which dietary supplements have beneficial effects on breast cancer (Alipour et al., 2020).

Researchers are also exploring whether phytoestrogens can protect healthy cells, reduce chemotherapy side effects, or interact with chemotherapy drugs in any way (Mas & Roca, 2020).

Some phytoestrogens also hold the potential for reducing damage to healthy cells from cancer radiotherapy. Other phytoestrogens might make cancer cells more sensitive to radiotherapy, but no human studies are available to back up either claim (Mas & Roca, 2020).

Some researchers claim that soy may be endocrine-disrupting, particularly when it's consumed by children, and that more research across all age groups is needed (Patisaul, 2018).

The effects of phytoestrogens may differ from one person to another depending on factors like sex, age, gut microflora, overall health status, and individual variations in metabolism (Mas & Roca, 2020; Bilal et al., 2014; Patisaul, 2018).

Why chemical estrogens are disruptive

Plant estrogens are natural compounds from plants, whereas chemical estrogens are man-made toxins. Industrially grown plants may contain both.

Environmental toxins–including pesticides, fertilizers, and chemicals from plastic, metal food cans, and cleaning products–are endocrine disruptors. They interfere with the body's hormonal balance, causing developmental, reproductive, neurological, and immune health problems (Monneret et al., 2017).

The controversy about the pros and cons of eating soy and other phytoestrogen-rich foods has to take this into account. Soy is nowadays mostly mass-produced with pesticides and GMO crops. According to one animal study, the more processed soy is, the more likely it will stimulate the growth of estrogen-dependent breast cancer tumors (Helferich et al., 2008).

This is something to have in mind when purchasing herbal remedies as well since the way a plant was grown and harvested will impact its level of toxins. Organic, wild-harvested plants are the healthiest choice (Tripathy et al., 2017).

Phytoestrogens in Essiac & their Health Effects

Phytoestrogenic herbs and active compounds in the original four-herb Essiac formula include:

Sheep sorrel herb

Sheep sorrel herb is exceptionally high in the phytoestrogen quercetin, a powerful antioxidant (Mostafa et al., 2011; Bhagwat et al., USDA).

The classification of quercetin as a phytoestrogen is still controversial, but studies have recently revealed that it activates the "good" estrogen receptor alpha (ERa) (Costa et al., 2016).

Emodin is another phytoestrogen in sheep sorrel. It's being researched for its potential anti-cancer, circulation-promoting, bowel cleansing, and virus- and parasite-fighting properties Mostafa et al., 2011; El-Bakry et al., 2012; Gupta & Rai, 2018).

Emodin seemed to be active against estrogen receptor-positive (ER+) breast cancer cells, but human data are lacking (Sakalli-Tecim et al., 2021).

Burdock root

The main active compounds in burdock root, arctigenin and arctiin, are phytoestrogens. They are being researched for their immune-boosting, anti-inflammatory, and potential anti-cancer effects. Artigenin and arctiin belong to the lignans family of phytoestrogens, similar to flaxseed (Moro & Clerici, 2021; Hsieh et al., 2004).

Arctigenin helped kill estrogen receptor-negative (ER-) breast cancer cells in one study by affecting the activity of cancer-related genes. Clinical trials in breast cancer patients haven't been carried out, though (Hsieh et al., 2014).

Burdock root also contains quercetin, but in smaller amounts than sheep sorrel, and many other phytoestrogenic flavonoids (Ferracane et al., 2010).

Rhubarb root

Like sheep sorrel, rhubarb root also contains emodin. Other phytoestrogens in rhubarb root include rhaponticin and desoxyrhaponticin, along with several flavonoids and stilbenes (Kazuhiro et al., 2001; Kolodziejczyk-Czepas & Oleksandra Liudvytska, 2020; Chang et al., 2016).

A standardized rhubarb root extract (ERr731®, also known as Estrovera) is used for menopausal symptoms (Chang et al., 2016).

Rhubarb root extract and its active compounds activated only the "good" estrogen receptors (ERb) without affecting the "bad" ERa in experiments on breast and uterine lining tissue (Chang et al., 2016).

Slippery elm bark

Based on the current research, slippery elm bark does not contain any phytoestrogens. It may have weak estrogen-like activity, but this is uncertain.

Slippery elm bark contains lignins, insoluble strong fibers that lend bark its rigidity. Gut bacteria might be able to break down lignins into phytoestrogenic lignans, but this hasn't yet been proven (Watts et al., 2012; Peterson et al., 2010).

Several studies found a link between lignin intake and reduced risk of colorectal, oral, pharyngeal, and esophageal cancers but not with breast, ovarian, and renal cancers. More research is needed (Peterson et al., 2010).

Essiac & breast cancer

A 2021 cell-based study found that high concentrations of Essiac liquid extract reduced cell proliferation in breast cancer cells. Low doses didn't produce a consistent result. However, many sources still caution against using Essiac in hormone-sensitive cancers based on study findings from 2006 (Ruiz et al., 2021; Kulp et al., 2006).

The 2006 study warned against using Essiac in breast cancer, as they found that low Essiac concentrations (1% - 8%) increased proliferation in both estrogen receptor (ER) positive and negative breast cancer cell lines (Kulp et al., 2006).

The warning is based on a belief that phytoestrogens found in the four-herb Essiac mixture may have a negative effect on breast cancer just because they have some estrogenic activity. Yet, the 2006 study did not specify which estrogen receptors were being targeted (Kulp et al., 2006).

New evidence suggests that phytoestrogens in Essiac likely activate the "good" estrogen receptors (ERb) and appear to be safe at the recommended doses (Ruiz et al., 2021).

A note about dosage

Many active compounds have a stimulating effect at low doses and a toxic or blocking effect at high doses. Low-dose stimulation is seen as beneficial and healthy in normal cells. It's been coined *hormesis* and is viewed as adaptive, "good" stress. Adaptogenic herbs act through this mechanism (Panossian et al., 2021).

In cancer cells, hormesis works the other way: low dose stimulation is unwanted and causes cancer growth, while high-dose inhibitory action may help fight cancer (Kafi et al., 2018).

The controversial study on Essiac and Flor-Essence mentioned above fits into this theory (Kulp et al., 2006).

In another cellular study, arctigenin from burdock root followed the same curve: it stimulated cancer growth at low doses and blocked it at high doses (Kafi et al., 2018).

Whether or not different Essiac and Flor-Essence doses have similar effects in cancer patients has yet to be researched.

The bottom line

Although more evidence is needed, phytoestrogens in the four-herb Essiac mixture seem to be safe for most people.

Preliminary research suggests that Essiac phytoestrogens activate pathways that may help prevent breast cancer development. However, their effects on breast cancer need to be determined in clinical studies.

Phytoestrogens in Floressence & their Health Effects

Floressence is a mixture of eight herbal extracts. In addition to those in Essiac, phytoestrogenic herbs and active compounds in Floressence include:

Red clover

Red clover contains a complex mixture of phytoestrogens, including genistein. Genistein belongs to the isoflavone family of phytoestrogens, which are also high in soy (Essiac/Flor Essence PDQ).

Red clover may interfere with hormonal therapy drugs, including breast cancer chemotherapy. More research on potential drug interactions is needed (Tripathi et al., 2014).

In one study on breast cancer cells, red clover activated toxic metabolic pathways and blocked detoxification (Dunlap et al., 2017).

The authors concluded that red clover might be safe in normal breast tissues but potentially toxic in breast cancer. They cautioned that breast cancer patients should avoid red clover and other herbal supplements with isoflavones until more safety data become available.

Other studies have also reported potential harmful effects of red clover phytoestrogens, such as stimulation of breast cancer growth at low concentrations. Genistein increased the growth of breast cancer cells in test tubes and rats (de Lemos, 2001; Hsieh et al., 1998).

Watercress

Watercress contains rutin, a sugar-bound form of the phytoestrogen quercetin (Hyun et al., 2014).

In a cell-based study, watercress extract increased the activity of bone-building cells by mimicking estrogen. Researchers believe watercress might hold potential for supporting bone health in menopausal women (Hyun et al., 2014).

Blessed thistle

Blessed thistle contains **several phytoestrogens** (lignans and flavonoids). It's promoted for increasing breast-milk supply, possibly due to estrogen-like activity. However, no clinical trials support this use (Drugs and Lactation Database).

Kelp

Kelp is a type of brown seaweed that contains phytoestrogenic flavonoids and lignans (Gomez-Zavaglia et al., 2019).

In a study of 15 postmenopausal women, seaweed had beneficial effects on estrogen and phytoestrogen metabolism and gut flora (Teas et al., 2009).

Seaweeds, including kelp, are also being researched for potential anticancer activity, especially against breast cancer, but clinical trials are still lacking (Moussavou et al., 2014).

Floressence & breast cancer

In one study on mice, Flor-Essence did not block estrogen receptor-negative (ER-) breast cancer development. The tonic was given at different life stages, but it didn't seem to influence whether the mice would develop breast cancer or not (Bennet et al., 2011).

In a 2006 study, both Flor-Essence and Essiac stimulated the growth of breast cancer cells in test tubes at low doses. However, Flor-Essence had a stronger estrogen-like effect than Essiac (Kulp et al., 2006).

The bottom line

It's difficult to say for certain whether adding red clover and other herbs to the original Essiac formula was a good idea since no randomized, placebo-controlled clinical studies are available.

However, the existing preliminary evidence suggests that red clover may be problematic, especially in breast cancer patients. Caution is advised due to a lack of human safety data and the potential of this herb to block detoxification in breast cancer cells.

Limitations and Caveats

The available research is extremely limited and should be interpreted with caution. There is not enough evidence to recommend Essiac for any of the uses listed in this section.

The mechanisms discussed in each section are mostly based on experimental animal and cellular data, and as such, are hypothetical and unproven.

Essiac should be used with caution and in addition to conventional treatment and other complementary alternative modalities for most of the conditions listed in this section.

Many of the listed conditions have diverse possible causes and accompanying symptoms. The best approach to managing them is usually individualized and relies on working with a qualified healthcare practitioner to find the underlying cause.

Takeaway

People with various complex and chronic diseases use Essiac based on anecdotal information. Although preclinical studies suggest that Essiac may hold promise for some of these conditions, much more research is needed before it can be recommended.

Both Essiac and Flor-Essence contain phytoestrogens. No randomized, placebo-controlled clinical trials have been carried out on either, so it's impossible to compare their safety and effectiveness.

According to preliminary data, the addition of red clover to Flor-Essence may block detox pathways in breast cancer. These findings warrant further research and suggest that Flor-Essence should be used with caution in breast cancer patients or in those at risk.

Chapter 7

Using Essiac

Taking Essiac

Essiac is available as:

- Powder that you make into a tea
- Liquid extract (with alcohol) that you can mix with water
- Drops (with glycerin) based on the alcohol extract in which alcohol has been replaced with glycerin
- Capsules containing the dried extract

In its original plant parts and ratios, the herbal formulation known as Essiac is trademarked and sold by a Canadian company.

If you skipped over it, be sure to go back and read more about the science behind these different formulations Chapter 3 and learn how to choose the best product for your needs (section "Which Essiac Formulation Is Right for You?").

Since clinical data is lacking, all dosage recommendations are either anecdotal or endorsed by supplement manufacturers.

The following has been recommended for people taking Essiac dry extract capsules:

- 2 capsules twice daily

If taking the powder, it's recommended to mix the contents of the whole bottle with 88 fl oz (fluid ounces) of water, and then take:

- 2 fl oz (60 ml) twice daily for daily use
- 2 fl oz (60 ml) four times daily for other health situations

The following dosing for the liquid extract has been recommended:

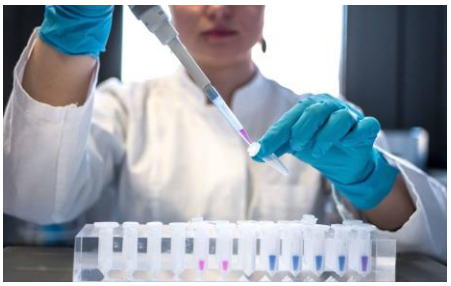
- 2 tsp (10 ml) twice daily

Manufacturers typically advise not eating for one hour before or after taking Essiac.

Quality and Safety

Many web articles state that the original formula of Essiac tea has been kept a secret since the sale of the recipe to a private company. This doesn't appear to be true. The amount and plant parts of each herb that goes into the final product are specified on most Essiac formulas sold in Canada.

Yet, many companies are now claiming that only their formula is the original one. Today, several companies manufacture over 40 different Essiac formulas and sell them worldwide. Some don't specify herbal ratios, hiding the exact ingredients behind a veil of mist that they label as a *proprietary blend*.



Good manufacturing practices (GMP) recommend specifying the amount of each ingredient that goes into the supplement on the label. Declaring the exact quantities of each ingredient present in the product is a must in the European Union, but it's not a requirement in the U.S. and Canada (European GMP guide).

Quality products should also specify how the herbs are grown and sourced, state the country of manufacture, and provide certificates of third-party testing.

It's challenging for consumers to decide whether a product is of good quality or not when the exact ingredients and their ratios aren't listed. In such cases, consumers need to put their trust in the brand without knowing exactly what they're getting.

Do your research before purchasing any Essiac product and look to buy from trusted, high-quality brands.

Side Effects

A review of patients taking Essiac mentions no obvious toxicity (TreatmentUpdate, 1998).

One case report described a 59-year-old woman with symptoms of anorexia, nausea, myalgia, fatigue, and generalized abdominal pain following Essiac tea intake over a 6-month period. Her symptoms resolved after discontinuing the tea (Cassileth, 2011).

The manufacturer of Flor Essence states that users may experience:

- Increased bowel movements
- Frequent urination
- Swollen glands
- Skin blemishes
- Flu-like symptoms
- Slight headaches

In one survey-based study on cancer patients, 6.6% of Flor-Essence users reported adverse effects, including the following (Richardson et al., 2000):

- Diarrhea (1.9%)
- Constipation (1.2%)
- Nausea (1.1%)
- Fatigue (0.9%)

Vomiting has also been reported.

These side effects may not be applicable to the original four-herb Essiac tea. Clinical data are lacking to determine this.

Contraindications

The label on the original four-ingredient Essiac formula sold in Canada states that people with the following conditions should not take the supplement:

- Kidney stones (due to the oxalate content in sheep sorrel leaves)
- Arthritis (possibly also due to oxalates in sheep sorrel)
- Gastrointestinal disorders including intestinal obstruction, appendicitis, abdominal pain, IBS, and Crohn's (possibly a general precaution and due to Essiac's potential laxative effects)
- Allergies to plants of the daisy (*Asteraceae*) family

Pregnant and breastfeeding women and children should also avoid Essiac due to a lack of safety data.

The oxalate content in Essiac tea should be low since high temperatures neutralize oxalic acid from sheep sorrel leaves. It's usually only the fresh leaves that are problematic, but caution is recommended in sensitive groups.

Taking Essiac with Other Medications

Not much is known about the possible drug interactions of Essiac and its individual herbs.

Theoretically, interactions with the following medications are possible:

- Blood-thinning drugs
- Diuretic drugs
- Diabetic drugs
- Birth control pills
- Hormone replacement drugs
- Drugs that affect the kidneys and liver
- Oncology drugs
- DX-8951f (experimental chemotherapy drug)

One case mentions reduced clearance of an experimental chemotherapy drug in a patient taking Essiac. This might be because Essiac seems to block cytochrome P450 enzymes, which break down and clear drugs from the body (Cassileth, 2011).

Essiac interactions with oncology drugs are described in detail in Chapter 5 ("Essiac and Chemotherapy").

Slippery elm, a component of Essiac, may also reduce the absorption of drugs due to its mucilage content.

Please consult your doctor before using Essiac to avoid potentially dangerous drug and disease interactions.

Takeaway

Despite its controversial past, scientific research supports the use of Essiac as a general health tonic. Studies confirm it contains antioxidants, nutrients, and other active compounds that support a healthy immune response and good digestion. Taken at the recommended doses, Essiac is likely safe and causes few side effects.

Clinical studies on Essiac have yet to be carried out. Case reports and animal studies suggest that the use of Essiac for cancer holds promise, but we have no clinical yet to speak about its effectiveness. Future research should focus on randomized controlled trials to examine the health benefits of Essiac across different patient populations.

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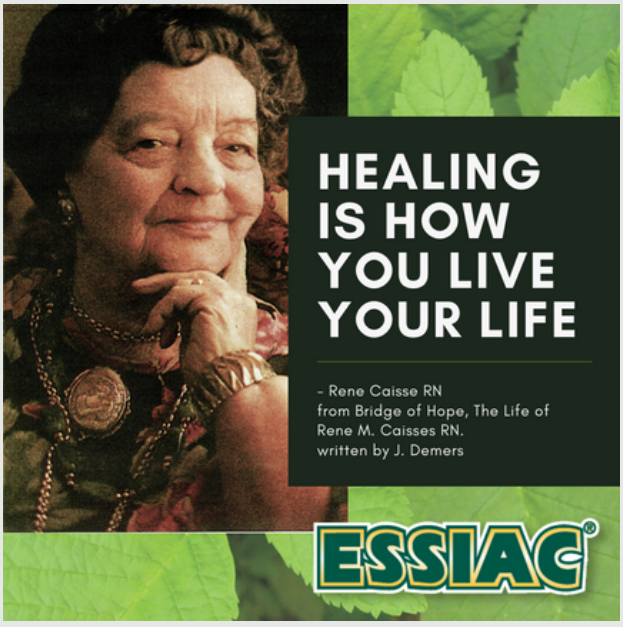

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