

GUIDE TO MANAGING ECZEMA IN CHILDREN

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LEARN**SKIN**[™]



ABOUT LEARNSKIN

LearnSkin was developed by leading dermatologists and integrative medicine practitioners to support integrative dermatological education throughout the healthcare community. With skin being the number one driver of doctor's visits, the goal is to share the latest in scientific research and treatment options in dermatology for both Western and Eastern medicine to meet the growing demand for responsible, high-quality, evidence-based education that bridges conventional and complementary medical approaches.

A NOTE FROM THE EDITORS

“

We are thrilled to offer this state-of-the-art guide to support parents, caregivers, and their children with eczema.

”

- Vivian Shi, MD and Raja Sivamani, MD, MS, AP

A WORD FOR THE READER



Atopic Dermatitis is a terrible disease with significant suffering for both patients and their families. After generations of stagnation, there are finally treatments emerging that are beginning to hone in on the root causes.

Better than any treatment and even better than a cure, to prevent it from happening in the first place would change the lives of millions of patients and that of their families. Until that day, however, we must leverage all of our skills and knowledge to soothe the inflammation, calm the itch, and heal the skin.

This book distills these techniques and approaches in a practical and friendly manner, empowering families to get the eczema under control—and keep it there! Some of the material may be familiar, but rarely has it been presented so clearly and with such a broad perspective. There is something for everyone here, from those working through a new diagnosis of atopic dermatitis to weathered eczema warriors.

I wish you good health and calm skin!

Peter Lio, MD

*Founding Director of the Chicago Integrative Eczema Center,
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Dr. Vivian Shi is a board-certified dermatologist and an Assistant Professor of Medicine in Dermatology at the University of Arizona where she directs the Eczema and Skin Barrier Specialty Clinic. She has extensive clinical and research experience in eczema and repair of the skin's natural protective barrier. She also specializes in medical and surgical treatments for patients with hidradenitis suppurativa. Vivian has published and presented her research in international journals and conferences. She works in outreach for remote and underserved regions of the United States, Vietnam, China, Nepal, and India. She is fluent in Chinese, both in Mandarin and Cantonese. Her approach to health practice is to provide care with compassion and disseminate knowledge through education.



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Dr. Smita Awasthi is a triple board-certified (Dermatology, Pediatrics, and Pediatric Dermatology) dermatologist and is the Director of Pediatric Dermatology at University of California, Davis. Although she has a wide range of clinical experience in the diagnosis and management of skin disorders, her areas of interest include atopic dermatitis (eczema), acne, neonatal skin, and genetic disorders.

She is an active member of the Society for Pediatric Dermatology and the Pediatric Dermatology Research Alliance and has published in several journals. She is committed to improving the health and well-being of our diverse community through compassion in patient care, research, and education.



Kristin Blake, LAc

Kristin Blake is currently a medical student at the University of Wisconsin School of Medicine and Public Health. Prior to going back to school, Kristin received her Master of Oriental Medicine degree and trained as a birth doula in Minneapolis. She then worked in private practice as a licensed acupuncturist and Chinese medicine practitioner. She has been involved in research on the antimicrobial properties of Chinese herbs, and she looks forward to being back in practice with a larger toolbox of treatments available for her patients. Kristin is passionate about patient education and hopes to help patients transform their health using ancient wisdom that is supported and informed by modern knowledge of science and medicine.



**Jennifer Ornelas,
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Dr. Jennifer Ornelas is a dermatology resident at University of California, Davis. She conducted translational research investigating botanical extracts as novel treatment options for acne and earned a master's in clinical and translational research. She is passionate about working with children and hopes to sub-specialize in pediatric dermatology. She is committed to serving the medically underserved populations of the region and hopes to provide culturally competent specialist care in her future practice.



Alexander Arrington

Alexander Arrington is a 3rd year medical student at the National University of Natural Medicine in Portland, Oregon. Holding a Bachelor of Science degree in microbiology, Alexander has a propensity for studying the effects of human microflora on health. Alexander believes that health is dependent upon the maintenance of a strong connection to nature and that the achievement of optimal health is reflected in healthy skin. Alexander was born on a farm in the foothills of Appalachia, and from this early environment, he established strong roots tethering him to the natural world. Combining a variety of strategies, he intends to take a comprehensive approach to helping his future patients work toward living their healthiest lives.



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Megan O'Connor is an MD candidate at Eastern Virginia Medical School (EVMS) in Norfolk, VA. She earned a Bachelors of Arts degree in Biology in 2015, at St. Olaf College in Northfield, Minnesota.

Prior to medical school, she worked as a medical assistant in a dermatology practice specializing in medical, cosmetic, and surgical dermatology. While at EVMS, she developed an interest in integrative medicine as well as practicing yoga on a consistent basis. During the spring of her first year, she studied the integration of gross anatomy with the practice of yoga. Her research interest includes integrative medicine within dermatology and the cutaneous presentation of complex diseases.



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Rebecca Quinonez is a medical student at the Universidad Autonoma de Guadalajara. She graduated from the University of Florida with a Bachelors of Science in Food Science and Human Nutrition with an emphasis in Dietetics. She has a passion for Dermatology and loves bridging the importance of proper nutrition, mental wellness, and a healthy lifestyle with the skin. She is an avid meditator, enjoys a great workout, and loves cooking. As an individual who struggled with atopic dermatitis and acne throughout her adolescence, she knows the importance of integrating different forms of medicine for a proper outcome. Her goals as a future physician are to cater quality care in the form of individualized regimens to her patients.



Elizabeth Usedom

Elizabeth Usedom is a 4th year medical student at Drexel University, expected to graduate in May 2018. She graduated from University of California at Santa Barbara in 2010 with a degree in molecular, cellular and developmental biology. She went on to complete a master's in medical science at Drexel University in 2014. Elizabeth is passionate about dermatology and believes the environment has a strong impact on skin health through infectious disease, nutrition, exercise and stress. Over the last 2 years, Elizabeth has discovered a passion for infectious disease as it relates to skin health through the study of common viruses and bacteria. She has worked directly with underserved communities to better their skin and overall health. She believes patient care is best achieved with an open ear, an individualized plan, and effective education on diagnoses and treatments.



Alexandra Vaughn

Alexandra Vaughn is a 4th year medical student at Drexel University. She graduated from Brigham Young University in 2013 with a degree in Exercise Science. Alexandra has great passion for dermatology and believes healthy skin is a reflection of internal health and harmony. She has been a personal trainer and lifestyle coach for the past 8 years and believes systemic diseases can be prevented and reversed through a plant-based diet and proper exercise. Over the past 3 years, she has found a special niche in her research as she has studied the effects of plants and foods on skin health. Alexandra's goal as a future physician is to help others achieve optimum skin health and overall well-being through a plant-based lifestyle and individualized skin care routines.



Stephanie Wong

Stephanie Wong is a 2nd-year medical student at Western University of Health Sciences, College of Osteopathic Medicine. She graduated from UCLA in 2014 with a degree in Psychobiology. Stephanie has a strong interest in dermatology and believes there are many factors to consider when taking care of the skin. She recognizes the importance of educating others on how environmental factors, behavior, and supplements may affect the skin and further affect overall health. Stephanie has been involved over the past few years in working directly with the underserved communities in Southern California. She provides patient care and patient education in clinics, outreach, and health fairs. Stephanie's goal as a future physician is to care for her patients and to teach them to care for themselves especially in proactive ways to help prevent skin damage. By helping patients achieve the best skin health possible, it can greatly contribute to an overall healthy body.

TABLE OF CONTENTS

- 09** **CHAPTER 1**
Can You Prevent Eczema?
Risks and How to Minimize Them
- 18** **CHAPTER 2**
Eczema Bathing
Bathing Additives and Dilute Bleach Baths
- 27** **CHAPTER 3**
Approach to Basic Skin Care in Eczema
Moisturizing
- 36** **CHAPTER 4**
Inflammatory, Itchy Eczema
What? Why? When? How to Treat it?
- 52** **CHAPTER 5**
Food, Environment, and Products
Finding and Managing Triggers

Content reviewed by the National Eczema Association





CHAPTER 1:

Can You Prevent Eczema? Risks and How to Minimize Them

Jennifer Ornelas, MD and Smita Awasthi, MD

Eczema, otherwise known as atopic dermatitis, is a common skin condition that causes the skin to become red, dry, scaly, and itchy. Infants and toddlers tend to get eczema on the face, especially on the cheeks and around the mouth, as well as the elbows and knees. Eczema often improves through childhood but can continue through adulthood. It is estimated that about 20% of children worldwide suffer from eczema.¹

As the prevalence of eczema continues to rise, especially in developed countries, many parents wonder if there are any steps they can take to prevent their child from developing eczema.² In this chapter, we delve into the roles that genetics and the environment play in eczema and what strategies parents can follow to help lessen the risk and severity of eczema in their child.



The Role of Genetics

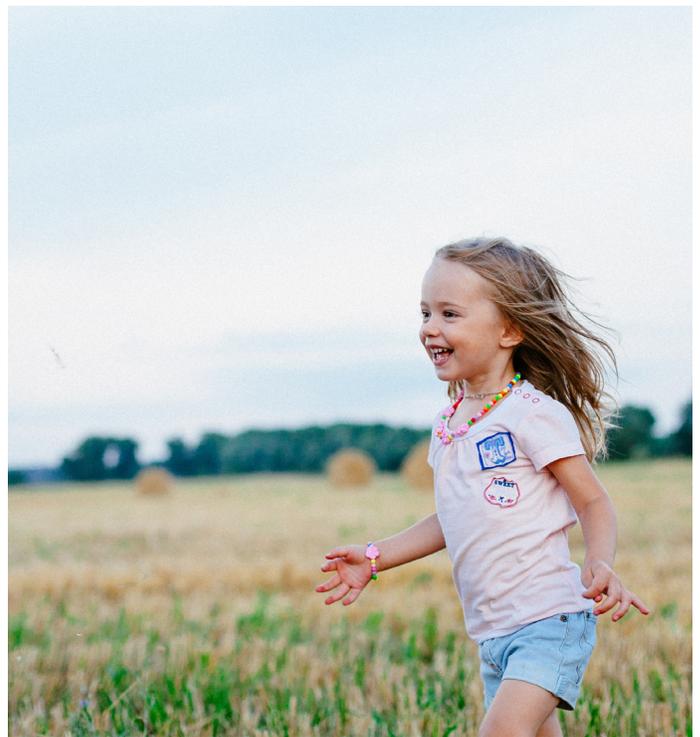
Research studies show that genetics play an important role in the development of eczema. For starters, children with at least one parent with eczema have a higher risk of developing eczema.³ Similarly, children with at least one parent with asthma or allergic rhinitis (also known as hay fever) have a higher risk of eczema.⁴ Taking a closer look, we know the skin acts as a watertight barrier, protecting our body from the outside world.

Certain mutations in our genes can lead to alterations and breakdowns of this natural skin barrier. This can then lead to water loss, introduction of harmful bacteria, inflammation in the skin, and, ultimately, eczema. More specifically, filaggrin is a protein that is normally found in the skin and plays an important role in creating and maintaining our natural skin barrier. Mutations in the gene that makes filaggrin have been found in many individuals who suffer from eczema.^{5,6}

Nature vs. Nurture

Epigenetics refers to the role that our environment plays in influencing whether or not our body expresses different genes that lead to certain diseases. The genes children inherit from their parents may predispose them to developing eczema, but environmental factors can influence the actual development of eczema.

Consequently, there are many other factors outside of our genetic makeup that play a role in whether or not a child will develop eczema. Some risk factors start before a child is even born. Studies have shown that a mother's own sensitizations or exposures during pregnancy can play a role.⁷ For instance, if a mother has certain environmental or food allergies in addition to having a filaggrin gene defect, her child's risk of developing eczema is greater.⁸



Tobacco and alcohol exposure during pregnancy are not recommended for many reasons, one of which is the increased risk of eczema for children.^{9,10} Though there is a lot of interest in the role of a woman's diet during pregnancy, we currently do not have enough evidence to suggest that avoiding certain foods offers any benefit in preventing eczema in children.¹¹ There is also conflicting evidence as to whether breastfeeding is protective or not.¹¹

Food Allergies and Eczema

Children with eczema have higher rates of food allergies. Consequently, many parents eliminate certain foods from their child's diet in the hopes of preventing food allergies. However, recent evidence shows that children who are introduced to varied foods early in life actually have lower rates of eczema.¹²⁻¹⁴

A recent study found that children with eczema who are introduced to peanuts between the ages of four and eleven months have a lower rate of developing a peanut allergy compared to those children who avoided peanuts altogether.¹⁵

This shows that even children who already have eczema can benefit from early exposure to different foods.¹⁵ Early food exposure allows an infant's immune system to identify the food allergen as non-threatening, and thus build immune tolerance to it, which prevents an allergic reaction when they are exposed to the same allergen later on.¹⁵ Early food introduction is, of course, limited by when an infant is developmentally ready to eat solid foods.





The Skin Microbiome

Another important factor in the development of eczema that has recently received a lot of attention is the skin microbiome. This is the collection of naturally occurring harmless bacteria that live on our skin. They perform a wide variety of important jobs, including helping fight off harmful bacteria and helping keep our immune system in check, to avoid developing eczema.¹⁶⁻¹⁸

Interestingly, studies have shown that children with eczema have different bacteria that make up their skin microbiome.^{19,20} Scientists speculate that this factor is partially responsible for developing eczema.²¹

As a result, probiotics have recently been proposed as a tool to reduce the risk of developing eczema. Early evidence shows that mothers who take lactobacilli probiotics during pregnancy can help prevent eczema in their infants, and that infants and children who take lactobacilli probiotics may have lower rates of eczema.^{22,23}

Probiotics may help prevent eczema by changing the microbiome of the gut which, in turn, alters the gut barrier. Since different food allergens cross the altered gut barrier, infants and mothers become exposed to different allergens which may modify the immune system and risk of eczema.²³ However, further studies are needed before probiotics can be recommended for preventing eczema.



Conclusion

Fortunately, there are steps you can take as a parent to help protect your child and minimize his or her risk of developing eczema. One important step in preventing eczema is the regular use of emollients, or moisturizing creams, for infants. Evidence shows that infants who were at a high risk for developing eczema, but whose parents regularly applied moisturizers in the first few months of life, had a lower rate of eczema compared to those infants who did not have moisturizer applied.²⁴ Using moisturizers even before eczema appears can help repair breaks in the skin barrier that are found in eczema early on before any symptoms such as redness, dry skin, or itching develop.^{24,25} For further information about using moisturizers to prevent eczema, please refer to chapter 3.

In summary, though we currently do not have ways to eliminate eczema development in children, there are steps we can take to decrease the risk of developing eczema.

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CHAPTER 2:

Eczema Bathing Additives and Dilute Bleach Baths

Kristin Blake, LAc, Alexander Arrington, and Vivian Shi, MD

Daily bathing can be a beneficial practice for eczema sufferers by helping to hydrate the skin and remove allergens, dead skin cells, and irritants.¹ One question that comes up with bathing is if there are any benefits to including an additive into one's daily bathing routine.

Bathing Additives

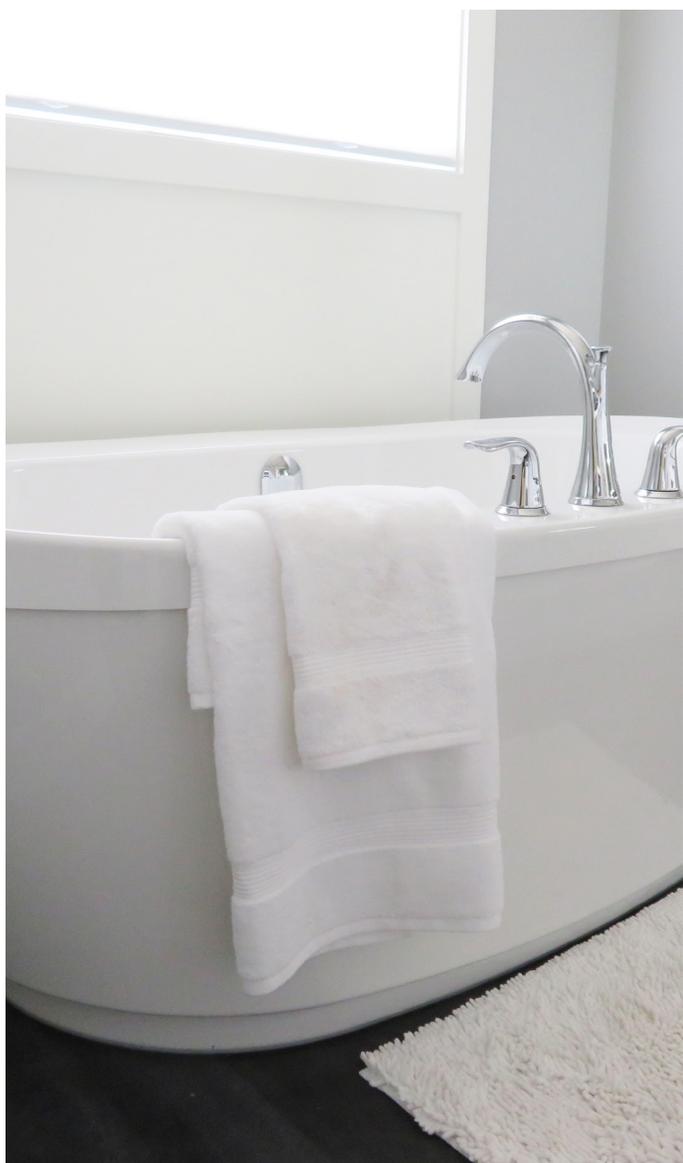
There are a few commonly recommended bathing additives, all with varying degrees of data to support their use. Commonly used additives include bleach (sodium hypochlorite), oatmeal, mineral salts, vinegar, and bath oils.²

Benefits seen by using these additives can generally fall into one of three categories:

- 1 **Anti-inflammatory** to help reduce symptoms such as itching
- 2 **Antibacterial** to shorten the length of eczema flare-ups
- 3 **Adding moisture** to limit damage to the skin's natural barrier after bathing



MAKING A DILUTE BLEACH BATH



Dilute Bleach Baths

Dilute bleach bath is found to have a direct effect on the bad bacteria (such as *Staphylococcus aureus*) on the skin and helps shorten flare-ups, while increasing the diversity of the bacteria on the skin.³ It is especially helpful in patients who are prone to recurrent skin infections due to their eczema.

- The recommended dilution for bleach baths is $\frac{1}{2}$ cup of regular household bleach into a standard 40-gallon bathtub. This dilution of bleach is recommended because it has been shown to not only provide antimicrobial benefits, but it also does so without any evidence of damage to the skin or skin irritation.⁴
- It is recommended to take a bleach bath 2-3 times per week for 5-10 minutes at a time followed by rinsing with tap water.⁵ These baths have been shown to not only reduce the severity of eczema symptoms, but can also decrease the frequency of skin infections.
- While it may seem counterintuitive that this potential irritant can actually be beneficial, bleach baths have been shown to be “well tolerated, safe and pose no negative effects.”⁴



Special Note on Bleach Baths

Among the bathing additives for eczema, the evidence for taking regular dilute bleach baths is the strongest. While the research on the role of the microbial communities on the skin in atopic dermatitis is new and remains incomplete, there is some initial evidence suggesting that increasing the diversity of the bacteria in the affected areas of the skin during a flare-up can reduce time spent in the flare-up stage and decrease disease severity overall.³

In addition to anti-microbial effects, there are early studies in animals showing that bleach has anti-inflammatory and anti-itch effects.⁶ However, a systematic review and meta-analysis study has shown that although bleach baths are helpful in decreasing eczema severity, they do not appear to be more effective than water baths alone.⁷ At this time, we can only say that larger, more well-designed clinical studies are needed to confirm the benefit of bleach bath and understand the mechanisms that make it beneficial for eczema patients.



CAUTION

If your child has a bleach sensitivity or allergic asthma that might be aggravated by chlorine fumes, consult your child's health care provider before starting bleach bath therapy.

More Bathing Additives



OATMEAL

Adding oatmeal to baths can help relieve itching associated with eczema flare-ups. Oatmeal in particular has been shown to reduce inflammation and histamine release, alleviating itching during a flare-up.⁸



VINEGAR

Adding vinegar to the bath is thought to provide antibacterial benefits and decrease skin pH levels, both of which are thought to improve eczema. However, currently there is no published research data to show that it is effective for eczema, but early data shows that the implementation of topical bleach and vinegar treatments may be associated with decreased need for antibiotic use.⁹



RICE STARCH

The use of rice starch as a bathing additive has not been widely studied. Two small studies have shown promising results when adding rice starch, or rice bran broth, to baths.^{10,11} These results show an increase in the healing capacity of the skin as well as an increase in the skin barrier function of those with atopic dermatitis.¹¹

It is theorized that in addition to an increase in flow to the skin, the small molecules in the rice bran may be able to penetrate the upper layers of the skin and form a protective barrier that can decrease the invasion of the skin by allergens.¹⁰ More research is needed, but these initial results are encouraging.



MINERALS AND DEAD SEA SALT

When taking regular baths during a flare-up, plain or hard water can be uncomfortable or even painful, as the water can sting the skin. On the other hand, bathing in a diluted Dead Sea salt solution has been shown to benefit the skin without causing additional irritation.¹²

Dead Sea salt-water solutions contain a relatively high amount of magnesium ions, as well as calcium, potassium, and bromine. Early research suggests that the high level of magnesium in Dead Sea salts impact the skin favorably and help to reduce inflammation.^{13,14} Magnesium ions, especially when combined in solution with calcium,¹⁴ decrease the body's inflammatory response, increase the skin's hydration, and decrease the roughness associated with dry skin.^{12,13}

BATH OILS

Bath oils might make intuitive sense that they would be a useful addition to baths. However, there is limited data showing any benefits of adding them to baths for those suffering from eczema. There is also higher risk of falls in the bath due to increasing the slipperiness of the tub.¹

That said, natural coconut and sunflower seed oils, when used as a leave-on moisturizer, have been shown to be helpful in eczema as they have anti-microbial¹⁵ and anti-inflammatory properties,^{16,17} respectively.

Additionally, a new study shows promising results that refined soybean oil, when used as a bath additive, can help improve the skin barrier for those suffering from mild dry skin.¹⁸ Since the improvement of the skin barrier is a measure often used to identify effective treatments for eczema, this new study is encouraging.



The Verdict on Bath Additives

Overall, the current data available on bathing additives shows promising antimicrobial benefits of adding small amounts of bleach (sodium hypochlorite) to water baths. Other commonly used additives, such as vinegar, oatmeal, mineral salts, rice starch, and certain bath oils may provide some temporary relief of acute symptoms by decreasing itching and inflammation, but have not been shown to provide any long term or antimicrobial benefits to those suffering with eczema. The verdict is out on what is the best bathing additives for eczema. More research is needed to help better understand how these bathing additives work mechanistically to decrease inflammation, infection, itching, and how they affect the skin's natural barrier integrity and function in order to help eczema.

Additive	How Does it Work?	Quality of Available Evidence (1 - Good evidence, 2 - Some evidence, 3 - No evidence)
Bleach (sodium hypochlorite)	Reduce disease severity (antibacterial)	1
Oatmeal	Relieve itching (anti-inflammatory)	1
Rice Starch	Increase blood flow and protect skin	2
Dead Sea Salt	Certain mineral salts in Dead Sea salt, such as magnesium, have been shown to have anti-inflammatory properties	2
Bath Oils	Added emollient effect of protecting the skin and limiting water loss Some oils may contain anti-inflammatory or antibacterial effects	2
Vinegar	Possible antibacterial effect	3

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CHAPTER 3:

Approach to Basic Skin Care in Eczema: Moisturizing

Rebecca Quinonez and Vivian Shi, MD

Eczema is an inflammatory condition where the skin's protective barrier is disrupted. Filaggrin is a protein whose role is to maintain the skin's structure and preserve its integrity via its water holding capacity.¹ In eczema patients, filaggrin is deficient and thus limits the skin's ability to retain water. This leads to damage in the skin and an opportunity for water and fatty content loss, so the skin becomes "leaky." As a result, the skin becomes exposed to direct contact with allergens and microbial organisms, and inflammatory reactions take place. Overtime, this gives eczema its characteristics of dry, itchy, and inflamed skin.

Importance of Moisturizing

Moisturizers are a mainstay for eczema management.² It allows the skin to retain, restore, and redistribute water locally. It helps the skin to repair any damaged layers and also acts as a coat to the skin by keeping bacteria and environmental allergens from penetrating into the skin.³ Proper moisturizing provides the skin with oils that improve its protective barrier and can help soften the skin's appearance.

Moisturizers come in various forms and delivery methods, such as oils, gels, ointments, and lotions, each having its very own beneficial properties and methods for reducing the eczema. Consistency, texture, fragrance, and ease of spreading are all equally important factors for positive treatment outcomes.² Ultimately, it is up to patients and/or their caregivers to determine which formulation they favor the most, as this influences treatment adherence.



Ingredients to Look For

There are a number of ingredients found in moisturizers that are helpful for eczema. These are a few to be aware of when choosing a moisturizer:²

Use of Natural Oils for Moisturizing



Humectants are known for their ability to increase hydration of the skin. Some humectants to look for are glycerin, alpha hydroxyl acids, hyaluronic acid, and urea.



Occlusives support the skin by acting as a barrier to decrease the amount of water loss. Examples are carnauba wax, lanolin, shea butter, zinc oxide, and petroleum, to name a few.



Other compounds work by filling in the unevenness and small cracks on the skin and aid in giving the skin a smooth texture. Some commonly used compounds are stearic acid, collagen, and colloidal oatmeal.



Similarly, there are some ingredients that should be avoided due to possible skin irritation and exacerbation of eczema flares. Some of these ingredients include **certain essential oils, sodium lauryl sulphate, acetyl alcohol, parabens, and fragrances.**²



The wide use of natural oils for eczema has become more recognized in recent years. The two main types of natural oils are fixed oils and essential oils. They are classified based on how they are processed. Fixed oils can be further divided into nonvirgin, virgin, or extra virgin. Nonvirgin oils are the most processed and are refined by the application of heat and chemicals.³ Virgin oils are cold-pressed, and their acidity is slightly increased compared to extra virgin oils, which are also cold-pressed and totally unrefined.

VIRGIN, COLD-PRESSED OILS

- Commonly used as a dilution agent
- Extraction is done without adding heat
- Do not evaporate at room temperature
- No addition of heat or chemicals during extraction

ESSENTIAL OILS

- Commonly mixed with a fixed oil to prevent irritation
- Produced by adding heat³
- Evaporate at room temperature
- May contain fragrances⁴



Fixed Natural Oils

Sunflower seed and coconut oils are two types of fixed natural oils. Sunflower oil has shown to have anti-inflammatory and skin barrier repair properties.^{3,5}

One study demonstrated that sunflower oil had better outcomes on the skin compared to olive oil.⁶ Furthermore, another study with 86 pediatric patients considered sunflower oil to be effective in conjunction with corticosteroid application.⁷

Coconut oil has been widely used in skin care. Monolaurin is a fatty acid found in coconut oil and serves as an antioxidant and antimicrobial agent in patients with eczema.^{3,5}

A double-blinded study done in 117 children with eczema compared the use of coconut oil versus mineral oil (a main constituent of “baby oil”) for 8 weeks.⁸ Although both groups demonstrated improvements, coconut oil was deemed superior than mineral oil when applied all over the body.

Caution with Natural Oils

While there are benefits to using natural oils, it is important to note some factors that may flare eczema. For example, olive oil contains acids that negatively impact the skin barrier. One study compared the use of olive oil versus sunflower oil in 19 volunteers with and without eczema where they were told to apply 6 drops of olive oil on one forearm, and 6 drops of sunflower oil on the other forearm, twice daily for 5 weeks.⁶ It turns out that olive oil application irritated the skin, caused redness, and reduced the integrity of the skin barrier, thus having the potential to cause and worsen eczema. In contrast, sunflower oil preserved skin barrier integrity, did not cause redness, and improved skin hydration in the same volunteers.

PATCH TEST



It is always advised to test a small patch of skin with the oil of interest and wait at least 48 hours to see if it causes irritation or allergy, prior to applying it to a larger area on of the body.



Moisturizing as Prevention

Guidelines have acknowledged the importance of moisturization, not only for eczema patients, but the unaffected population as well. It is recommended that moisturizers be freely applied to the skin every day in a generous amount. For eczema patients, guidelines recommend application of moisturizer right after showering.⁹

The benefits of using moisturizers during an eczema flare and throughout the non-active phase have shown promising outcomes. But can moisturizers decrease the likelihood of eczema before it even begins?



A study was done on 124 high risk newborn babies with a family history of eczema.¹⁰ The parents applied moisturizers to their newborns within the first 3 weeks of birth, daily for the next 6 months.

The use of moisturizers significantly decreased the risk of developing eczema in high-risk newborns by up to 50%.^{10,11}



Conclusion

In summary, moisturizer application to both normal-appearing and flared skin aids in maintaining the skin's hydration and integrity, which in turn prevents water evaporation and entry of irritants, allergens, and infections.¹⁰ Ultimately, the goal of using moisturizers is to decrease the skin's inflammatory response, leading to an overall decrease in the intensity and duration of itching and flares in eczema children.

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CHAPTER 4:

Inflammatory, Itchy Eczema: What? Why? When? How to Treat it?

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What?

Eczema is commonly known as the “itch that rashes” since the itch begins first and is followed by the eczema rash. In the vicious itch-scratch cycle of eczema, itch triggers the need to scratch to temporarily suppresses the unpleasant sensation. Itch stems in part due to the release of an inflammatory molecule, such as histamine, that stimulates nerve receptors, which then sends the signal to the brain.¹ The motor control and motivation parts of the brain respond to the unpleasant itch sensory stimulus with scratching to suppress itch.²

Unfortunately, this brief relief only increases the itch and ensuing urge to scratch.³ Chronic scratching leads to over-activity in the reward pathway of the brain as well in the motor regions of the brain to perpetuate the itch-and-scratch behavior,² irritate the skin, and cause skin breakage. The open, inflamed area is associated with damage in the skin’s natural barrier, allowing entry of irritants, allergens, and infections to cause more skin inflammation and itch.

Why?

Parents can periodically see the tell-tale patches of eczema on the inside of elbows and knees of children and chalk them up as quintessential experiences of childhood. Yet, some children may not easily “grow out” of their eczema, especially individuals who have mutation in the filaggrin gene. Some may have their eczema persist into adulthood.⁴ Filaggrin is a protein that is crucial in maintaining the normal skin barrier.⁵

About 25% of children are affected by eczema,⁶ and about 60% of eczema cases begin within the first year of life at age 3-6 months, with higher incidence rates in children with higher socioeconomic status.^{6,7} A long term follow-up study showed that while between 38% to 60% of children’s eczema improved by the time of puberty, many continued to be afflicted by eczema as adults.⁸

From the 2010 National Health Interview Survey, eczema is prevalent in approximately 10% of adults and about 13% of children aged 0 – 17 years.⁹



Eczema interferes with multiple aspects of daily life, further highlighting the importance of appropriate treatment. In a survey study, approximately 60% of children with eczema suffered from sleep disturbances related to their disease.¹⁰ Lack of sleep can contribute to behavioral problems, leading to decreased school performance, and increased risk of developing attention-deficit hyperactivity disorder.^{6,11}

Children with eczema who have decreased sleep were found to have poorer school performance,¹² and significant deficits in linguistics, perceptual reasoning, and a smaller, but notable decrease in memory. These children may even have a decrease in IQ by about 16 points compared to children without eczema and impaired sleep.¹³



Caregivers of eczema children are also severely affected. They can spend approximately 1.5 to 3 hours a day on their child's eczema treatment.^{16,17} This can strain the family working dynamic and even financial stability as extra time needed to care for a child with eczema can cause parents to miss work or even avoid working altogether.¹⁶

In research looking at mental health, those with eczema had higher levels of anxiety than healthy controls. Relationships with peers as well as teachers can be adversely affected by eczema due to fears of infection, physical appearances, or limitations on sports participation.¹⁴

In addition to the time burden, eczema treatment can create large financial burden as treatments can range in cost from 100 to more than 2,000 U.S. Dollars per patient per year.^{18,19} This evidence strongly suggests the need for early and effective eczema treatment in children, in order to limit the personal, familial, and community burden of eczema.^{19,20}

In a survey study of children and adults with eczema, 47% reported feeling frustrated about their disease often or always, 39% felt often or always embarrassed by their appearance, and 35% felt often or always angry about their appearance.¹⁵





When?

Eczema treatment should begin at birth for high-risk infants. High-risk infants are children born to one or both parents with atopy. Atopy includes several conditions: asthma, eczema, and allergic rhinitis (hay fever).²¹ Children born to parents with a history of eczema have the greatest risk of developing eczema; therefore, early intervention with moisturizer use is essential in this group. Infants at risk for eczema (one parent with eczema) had a 50% reduction in risk of developing eczema when daily moisturizers were applied by 3 weeks of age.²²

There is evidence to support the use of early and cost-effective interventions to prevent the onset of eczema. Early moisturizer use beginning at birth can significantly decrease the onset of eczema. A study showed that 32% fewer infants developed eczema when moisturizer was applied daily from birth to 32 weeks.²³ Not only is early moisturizer use a beneficial intervention, it is cost-effective. Applying moisturizer daily during the first 6 months of life can decrease the overall financial burden of eczema later on in life.²⁴



How?

Topical Corticosteroids

Infants are more prone to inflammation as their skin barrier is not fully developed at birth.²⁵ Eczema prevention usually includes daily moisturizer and proper gentle skin care.²⁶ Once eczema becomes apparent on the skin, the mainstay of treatment is often topical corticosteroids to decrease the inflammation in the skin.²⁷

However, more than 80% of patients or caregivers have concerns about prescribed topical steroids, and approximately 1/3 of eczema patients do not use topical steroids due to concerns about potential side effects.²⁸

Using Steroids Safely to Avoid Side Effects

Steroids are often necessary to treat active eczema areas to decrease inflammation, itch, and even infection. Yet many parents harbor concerns about the application of steroids.^{27,29-31} Parents are often concerned about their child becoming addicted or dependent on steroids (“steroid addiction”) as well as the loss of efficacy of the steroids overtime (tachyphylaxis).^{29,32}

The National Eczema Association Task Force published a systematic review in 2015 indicating that we currently do not have a good understanding of topical steroid addiction and withdrawal, so more research is still needed to better understand whether topical steroid withdrawal or addiction happens, how common it is, and what we can do to detect, prevent, and treat it.³²

Concerns

The majority of parental concerns revolve around side effects of steroids: skin thinning, stretch marks (stria), skin color change (discoloration), visible small blood vessels (telangiectasia), and absorption into the blood stream.^{30,33} Fortunately, these side effects are relatively uncommon if topical steroids are used properly under close medical guidance, and typically occur only with improper use of topical steroids.

More sensitive sites on the body such as the face, neck, armpits, and groin are regions more susceptible to skin thinning, therefore your provider should prescribe a milder potency topical steroid or nonsteroidal anti-inflammatory medication for these areas to avoid the side effects.³⁴

Even with long-term use, defined as greater than 12 weeks, research has shown low to moderate potency topical steroids are safe and effective in children with eczema if used properly.³⁵

THE GOAL

The goal of steroid therapy is to decrease inflammation with short bursts of potent topical steroids. Once the inflammation decreases and eczema lesions are improved, providers will decrease the potency of the topical steroid. Caregivers can learn how to scale-up or scale-down their topical medications by discussing and designing an individualized eczema action plan with their providers. An individualized eczema action plan can simplify eczema treatment and give caregivers confidence in managing their child's eczema.³⁶



The Different Types of Topical Steroids

Not every topical steroid is the same, and there are important differences between them. Some are prescribed for different parts of the body. The severity of the eczema and location will also determine which steroid is most suitable.

A more potent topical steroid is preferred on areas with naturally thicker skin, such as the scalp, trunk, hands, and feet, and areas with more severe eczema. A less potent topical steroid is used on areas with naturally thinner skin, such as the face neck, armpits, and groin, and areas with less severe eczema.

There are also different vehicles for applications: ointments, creams, lotions, and gels. The type of vehicle is determined by the site of the body, the severity of the eczema, and the preference of the patient.³⁷



Proper application of most topical steroids should be guided by your provider's instructions. Typically, a thin layer of the topical steroid is applied to the affected area 2 times daily for 2 – 4 weeks. A small break from applying the steroid may be taken every 2 weeks, then resumed at the end of the break if necessary, and directed by your provider.³⁸

Here are examples of some commonly prescribed topical steroids and their relative potencies:

Mild or low potency steroids: desonide 0.05% and hydrocortisone 0.1% - 2.5%³⁴

These are prescribed for mild eczema or sensitive sites on the body (face, neck, armpits, groin). Both desonide and hydrocortisone acetate are relatively safe, as they are the least potent topical steroids.³⁸

Moderate potency steroids: mometasone furoate 0.1%, betamethasone valerate 0.025-0.05%, fluocinolone acetonide 0.01% - 0.025%, triamcinolone 0.025% - 0.1%^{31,34}

These are prescribed for moderate to severe eczema in sensitive regions (face, neck, armpits, groin). For moderate eczema, these steroids can be used up to 4 weeks followed by 1 week without use.³⁴ For sensitive regions with severe eczema, moderate potency steroids should be used for 1-2 weeks (maximum of 2 weeks) with a break in between.³⁸

High potency steroids: clobetasol 0.05%, betamethasone dipropionate 0.05%, and fluocinonide 0.05%³⁴

These are prescribed for severe eczema and for the palms and soles of the feet. This is a very potent steroid that is only prescribed when necessary and should not be used on sensitive regions of the body unless recommended by your doctor.



Your provider should prescribe a topical steroid by considering the site of the eczema and the severity of the eczema. Based on these factors, your doctor will also choose the right potency of steroid along with the vehicle (ointment, cream, lotion, solution, gel, foam, etc.). Typically, ointments are more potent than creams, and creams are more potent than lotions, solutions, gels, and foams.

Ultimately, the topical steroids prescribed will be tailored to your child's eczema. If used as prescribed and used properly, your child should not experience any steroid side effects, dependency or loss of efficacy, and should see improvement of his or her eczema.



Inhibitors

One nonsteroidal topical treatment option is a calcineurin inhibitor, which suppresses the activation of inflammatory cells that causes skin inflammation and itch in eczema, such as T cells and mast cells.^{39,40}

Two types of topical calcineurin inhibitors are approved for eczema: protopic ointment and pimecrolimus cream. Since they do not cause skin thinning, calcineurin inhibitors are often recommended by prescribers for areas with thinner skin or when long term continuous treatments are needed.^{41,42}

Topical calcineurin inhibitors have shown improvement in eczema in infants under age 2 as well as older children.⁶ Studies have directly compared topical steroids and calcineurin inhibitors in pediatric eczema. Protopic ointment overall is considered to be just as effective as some low potency topical steroids and may even be beneficial as an alternating treatment with topical steroids.^{43,44}



Another treatment option for eczema is Crisaborole ointment,⁴⁵ which works by inhibiting the release of inflammatory molecules called cytokines.⁴⁶ When studied over the span of 48 weeks, patients using crisaborole had relatively low frequencies of adverse drug effects.⁴⁷

Currently there are no comparative research studies looking at the efficacy between PDE4 inhibitors and topical steroids or calcineurin inhibitors. However, it is likely comparable in potency as a low potency topical steroid and calcineurin inhibitor.

Systemic Treatments

There are a multitude of treatment options available beyond topical anti-inflammatory medications that include anti-microbials, light therapy, and systemic medications. When disease is severe and cannot be satisfactorily managed with topical and adjunctive treatment options, systemic medications may be required.

However, there is currently no FDA approved systemic medication for eczema in children, nevertheless providers often use systemic medications off-label to successfully treat severe eczema in children. Dupilumab is a targeted injectable medication that has been approved to treat adults with moderate to severe eczema, and clinical trials are ongoing to study its effect and safety in children.



How to Start Treating Your Child's Eczema

There are many different eczema treatment options available, and there are very different severities and locations of eczema. For these reasons, it is important to communicate with a provider to design a suitable and individualized plan. Both parents and providers need to learn the needs and expectations of each other for a successful partnership. Researchers are still deciphering the cause of eczema and developing new options for children, but we do know a great deal already. The three most important points are:

- 1 Eczema significantly and negatively impacts the quality of life of the patient, family and community.
- 2 Early treatment with moisturizers is paramount, especially in high-risk children.
- 3 Every patient is different; therefore, it is important to work collaboratively with your provider to design an individualized management approach for your child's eczema. As long as treatment is followed as directed, medication side effects are uncommon.

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CHAPTER 5:

Food, Environment, and Products: Finding and Managing Triggers

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Are Foods and Food Allergies the Root Cause to Eczema?

Many parents are paying closer attention to diet as they seek holistic alternative treatments to manage their childrens' eczema. A current hot topic of debate is whether or not "allergenic" foods can be identified and avoided in children with eczema. A food allergy is defined as a reproducible adverse health effect that always results after eating a certain food and arises from a specific immune system response.¹ Allergy symptoms (ranging from wheezing to deadly anaphylaxis) can either be immediate or occur hours to days after eating the food.

Many doctors and patients feel that specific foods are associated with more severe and more frequent eczema flares. It still remains unclear whether allergies to the foods themselves directly cause or worsen eczema. Eczema develops from multiple factors that include genetic and environmental factors; therefore, it is unlikely that food is the root cause. However, it is true that children with eczema are more likely to have food allergies than children without eczema.

Food Related Triggers May be Possible

Up to 30% of children with eczema have food-related triggers.¹ In eczema, food triggered eczematous rashes are typically delayed up to 2 days later, making it difficult to determine which specific food led to the reaction.² It is important to note that a separate skin disease called systemic allergic contact dermatitis can be caused by food allergies and is easily confused with eczema. Foods that are most often associated with systemic allergic contact dermatitis are high-nickel foods (ex – beans, shellfish) and foods that contain Balsam of Peru (ex – cinnamon, citrus, and tomatoes).³ Although rare, it has also been reported that 2-20% of children with eczema also develop systemic allergic contact dermatitis to a particular food.⁴

Eczema Versus Allergic Contact Dermatitis

	Eczema	Allergic Contact Dermatitis
Cause	Multiple factors including genetics, immune system dysfunction, environmental and lifestyle factors	Exposure to a certain substance causes a delayed reaction
Age	Most often affects young children	Can occur in all ages
Common Triggers	Many factors can trigger eczema rashes (cigarette smoke, climate changes, foods, dander, etc.)	Cosmetics, rubber, dyes, metals (ex – Nickel), adhesives, fragrances
Time to Onset of Rash	Waxing and waning, often following an “itch-scratch-itch” cycle	48-96 hours after exposure to allergen
Symptoms	Skin redness, dry and scaly skin, itching, there may be crusted sores during a flare	Skin redness, oozing blisters, burning, itching, swelling
Rash Locations	Folds of the elbows and wrists, behind the knees, ankles, behind the ears, and cheeks	Occurs in sites of exposure, can be anywhere on the body

In children with moderate or severe eczema who continue to have flares despite consistently using the appropriate topical treatments, a food allergy work-up may be reasonable.⁵ Commonly used allergy blood testing may be unhelpful, since they measure a special immune molecule called IgE, which is produced immediately following an allergic exposure. However, in eczematous rashes caused by food, the reaction is usually not an IgE-mediated response.

On the other hand, skin prick testing and oral food challenges may be helpful options to consider in children with suspected food-triggered eczema exacerbations. Drawbacks to food allergy testing include risk for severe food reactions in response to oral challenges, time-consuming procedures, and a high rate of positive results even if there is actually no allergy (called a “false positive result”).

Parents should not restrict certain foods from their child’s diet without a proven diagnosis of a specific food allergy, and elimination diets should only be carried out under the supervision of a physician.⁶ There have been situations in which children have developed dangerous nutritional deficiencies when food groups were eliminated from their diets.⁷

Most Common Food Triggers in Eczema⁸

Cow’s milk

Hen’s egg

Peanuts

Wheat

Soy

Nuts

Birth pollen-related foods
(ex: apples, carrots, celery, and hazelnut)



Environmental Influences on Eczema

Smoking

Allergic diseases, including eczema, can be highly influenced by early life exposures such as tobacco.⁹ Second-hand tobacco smoke exposure, both before and after birth, can play a role in childhood development of asthma, nasal allergies, and eczema.⁹ Parental smoking throughout infancy is associated with an increased risk of eczema.⁹ Furthermore, the influence of smoke exposure on the development of eczema may even have influence through the adolescent teen years.⁹ Smoking may even be a factor in the development of hand eczema.^{10,11}

Seasons and Climate

Eczema often varies seasonally where flares occur more often in both the winter or summer as compared to other seasons of milder climate.¹² There is significantly higher prevalence and poorly controlled eczema in hot, humid, rainy climates with high sun exposure, whereas lower eczema prevalence is seen in areas with dry, hot, and sunny climates.^{12,13}

One theory is that warm and humid weather leads to increased sweating, causing an irritant effect on skin.¹⁴ The irritation may then promote inflammation. Higher temperatures may promote sweating, causing irritant-dependent flares; however, cold weather may lead to flares too. Exposure to a cold environment may result in irritant skin changes such as dry, scaling skin.¹⁵

There is an inverse relationship between indoor relative humidity and prevalence of eczema in children.¹⁶ In other words, high humidity is associated with lower prevalence of eczema, and low humidity is associated with higher prevalence and increased flares.¹⁷ The weather needs a balance between extremes of temperature and humidity.

Furthermore, the temperature, humidity, and sun exposure may affect the skin barrier.¹³ Interestingly, indoor environmental factors including mold, water damage, and mold from humidifiers can increase the risk of eczema.¹⁸





Pollution

While seasonal climate factors can affect the severity, other aspects of the environment, including air pollutants, can also play a role.¹² Pollutants may fluctuate seasonally with climate factors, such as temperature and humidity.¹² Air pollution can affect a variety of health conditions, including major effects on the human skin.^{19,20} As a specific example, residing in areas closer to recycling facilities, where pollution is more prominent, is correlated with experiencing eczema symptoms.¹⁹ Skin serves as the outermost barrier, and air pollutants can damage this barrier by inducing oxidative stress.²⁰

Pets

There seems to be a general misconception of the effects of household animals on childhood eczema. One study found that keeping pets in early life did not increase a child's risk of allergic diseases like eczema.²¹ There is evidence even supporting a protective effect on eczema from pet exposure during the first year of life.²² Symptoms of eczema in those who had exposure to household pets in their first year of life was actually lower as compared to children who were not exposed to pets.²²



Practical and Impractical Interventions for Avoiding Triggers

Potential triggers for eczema may include the following:²³

- ▶ Irritating soaps (including those that break up oil and grease), detergents, fragrances
- ▶ Infections
- ▶ Overheating
- ▶ Psychological stress
- ▶ Air-based allergens: pollens, grass, house dust mites
- ▶ Food based allergens: egg, peanut, and cow's milk

Practical Interventions

Eczema is characterized by periods of flares alternating with good control after treatment.²⁴ A practical approach uses preventative measures as much as possible and reactive measures when the eczema does get out of hand to help bring control back quickly. Eczema is a complex condition requiring multiple approaches.²⁴ Sometimes the eczema will flare despite the best efforts to maintain control. This is not the fault of the parent or caregiver but part of the natural cycle with a chronic condition like eczema.

In alternative medicine, such as Ayurvedic medicine and Traditional Chinese medicine, children or adults with eczema have natural tendencies that can predispose them to a flare, and it is important to realize that in Western, Ayurvedic, or Traditional Chinese medicine, eczema will have periods where it can flare.

A large component in managing a child's eczema is to recognize triggers that can lead to flares. Parents can learn to recognize and avoid triggers that exacerbate flares in order to prevent future recurrences.²⁵ Filling out a symptom diary and noting triggers that intensify itching can help with this process.

It is also important to document potential nutritional triggers for symptom exacerbation.²⁵ The symptom diary should include food information to recognize the roles of nutritional factors. It is then important to take this diary with you during a visit to a health professional or when seeing a physician.





help avoid irritants such as wool, acids, and any clear triggers specific to the child.²⁴ The idea of avoiding house dust mites in avoiding eczema flares is limited in evidence. Using mattress encasings that protect against dust mite allergens is potentially one interventional method.²⁵

Impractical Interventions

Steroids have unfairly developed a bad rap. They can actually be used effectively and safely when they are used correctly. The correct use of steroids is to use them when the eczema is out of hand, and a strong steroid should be used for a short period of time to help get the eczema under control. Otherwise, steroid courses can be prolonged leading to unnecessary extra steroid exposure. The key is to “hit the eczema hard, and hit it fast” when it comes to steroids.

The lack of knowledge of corticosteroids and the labeling of different potency results in corticosteroid phobia.²⁶ Totally avoiding steroids can lead to unnecessary suffering for the child, as the itching and lack of sleep can take a mental toll and can affect a child’s concentration and ability to study if in school.

A proactive method of applying topical corticosteroids two to three times weekly to previously affected sites can decrease the number of flares.²⁴

While food allergies may exist and can act as triggers in a subset of people with eczema, it is not common for food allergies to be the root cause of eczema.²⁴ Food elimination diets need to be performed carefully.²⁴ Elimination diets should not be started solely based on presence of eczema.

Dietary restrictions and long-term dietary avoidance should only be initiated with documented and clinically relevant food allergies after discussion with an experienced health professional or dermatologist.²⁴ Otherwise, excessive restrictive diets in children with eczema can lead to poor nutrition, weight loss, poor growth, calcium deficiency,²⁴ and can even lead to severe health problems that can lead to hospitalization.



Keeping the Skin Under Control to Minimize the Risk of a Flare from Triggers

Foods, environmental factors, and lifestyle factors can all potentially trigger eczema flares in children. Many of these factors are modifiable, and avoidance can greatly minimize the risk for flares. If a child has a known trigger, such as a proven food allergy, it is important to strictly avoid the trigger to minimize flares. Secondhand smoke exposure, both after birth and even before birth, is associated with increased risk for eczema along with increased severity and frequency of flares. Strict avoidance of second-hand smoke is extremely important.⁹

However, it is difficult to avoid all known triggers at all times, making it important to bolster the skin barrier to be as strong as possible. When the skin has been appropriately and consistently moisturized and treated, this may help increase the “irritancy threshold” or make it more difficult for a known trigger to cause a flare. However, when the skin barrier is disrupted, such as when the skin is dry, this can lower the threshold and make it much easier for an exposure to cause a flare.



Hence, it is essential that children with eczema receive daily skin care with moisturizers and topical medications as needed for flares. In addition, it is of utmost importance that measures are taken to reduce stress and ensure adequate sleep in children with eczema. These healthy habits can help to keep the skin barrier strong and less susceptible to known eczema triggers in the event of an exposure.

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ADDITIONAL RESOURCES

National Eczema Association (NEA)

<https://nationaleczema.org/>

American Academy of Dermatology (AAD)

<https://www.aad.org/public/diseases/eczema/atopic-dermatitis>

<https://www.aad.org/public/kids/skin/eczema/what-is-eczema>

National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)

https://www.niams.nih.gov/health_info/atopic_dermatitis/default.asp

Chicago Integrative Eczema Center

<http://www.chicagoezema.com/>

National Eczema Society UK

<http://www.eczema.org/>

The Eczema Society of Canada

<https://eczemahelp.ca/>

Eczema Outreach Scotland

<http://eczemaoutreachscotland.org.uk/>

Eczema Association Australia

<http://www.eczema.org.au/managing-eczema/>

Eczema Guide - Canada

<http://www.eczemaguide.ca/>

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