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ECZEMA, TOPICAL STEROIDS, AND DIABETES: A VICIOUS CIRCLE

The risks of long-term steroid treatment, with nutritional guidelines for managing eczema and insulin resistance

by Nina Birnbaum

SUMMARY

Overuse of topical steroids for eczema control may lead to insulin resistance or diabetes, while having no effect on the underlying biochemical causes of eczema. A simple program of nutritional support addresses a root cause of both eczema and insulin resistance and offers a safe alternative for controlling them.

INTRODUCTION

If you are reading this page, you or your child has probably been diagnosed with eczema. You have a lot of company: According to the National Institutes of Health, up to 20 percent of infants and young children experience symptoms of eczema and about 60 percent of these children go on to have eczema as adults. About 15 million adults in the United States suffer from eczema.(1)

A Google search for "eczema" brings up nearly *8.5 million* pages. The Wikipedia page actually provides a pretty good overview. Here are two sites that in my opinion offer some of the best information available:

DermNet NZ (New Zealand). An overview of eczema can be found [here](http://dermnetnz.org/dermatitis/atopic-causes.html):
(link: <http://dermnetnz.org/dermatitis/atopic-causes.html>)

A more detailed guide to different types of eczema and dermatitis, including pictures of eczema, can be found at DermNet NZ ([link: http://dermnetnz.org/dermatitis/](http://dermnetnz.org/dermatitis/))

An informative page from the National Institutes of Health can be downloaded as a pdf: ([link: www.niams.nih.gov/Health_Info/Atopic_Dermatitis/default.asp#link_b](http://www.niams.nih.gov/Health_Info/Atopic_Dermatitis/default.asp#link_b))

Eczema is commonly treated with topical ointments or creams containing steroid hormones known as corticosteroids or glucocorticoids. These medications reduce the symptoms of eczema—the inflammation and itching—by mimicking natural inflammation-reducing hormones produced in the body by the adrenal glands. However, steroids absorbed through the skin can cause both immediate and long-term changes in the functioning of the adrenal glands, leading to insulin resistance and possibly steroid-induced diabetes.(2, 3)

While topical steroids are generally quite effective at reducing the *signs* and *symptoms* of eczema, they do not cure its underlying causes.

WHAT CAUSES ECZEMA?

A healthy body produces natural oils that form a skin barrier that keeps skin soft and slightly acidic (pH between 4.5 and 6, depending on age, with an optimum at around 5.5), helping skin to resist infection by disease-causing bacteria. When the body is unable to produce these natural oils, the skin becomes very dry and the skin barrier is damaged, exposing the skin to infection.(4) To make matters worse, the body's immune system may overreact to common substances, causing inflammation and further damaging the skin.(5)

Current research focuses on why the body is unable to produce these natural oils. Central to this research is an enzyme called *delta-6-dehydrogenase* (D6D), which converts the *linoleic acid* in dietary vegetable fats into

gamma linolenic acid (GLA), an essential fatty acid necessary for maintaining healthy skin.(6) (More on D6D and GLA later.) In both eczema and diabetes, the D6D enzyme may be impaired--it may not function properly.(7, 8) Levels of the specific vitamins and minerals required for D6D to function are often very low in people with eczema or diabetes.(9-15) Nutritional supplementation to increase the levels of these nutrients may reduce or eliminate the symptoms of eczema and help stabilize insulin and glucose metabolism.(15-21)

CONTACT ECZEMA

Contact eczema (also called contact dermatitis or allergic dermatitis) is not the same thing as atopic eczema. Contact eczema is caused by external factors such as dust, metals, fabrics, or chemicals. It can usually be cleared up with a short course of a steroid ointment. Further breakouts can be prevented by avoiding—if possible—the offending substance. However, many people with atopic dermatitis are also prone to contact eczema. (1, 21)

INFANT AND CHILDHOOD ECZEMA

A zinc deficiency may be misdiagnosed as eczema

When a breast-fed baby develops eczema, the mother's diet is often suspected as the cause. However, the eczema may have nothing to do with food. Breast milk is often low in zinc,(22) and a sign of zinc deficiency is dry, irritated skin.(23) Low levels of magnesium may contribute to dry skin as well.(24) Providing zinc and magnesium supplements to mother or baby may solve the problem.(25) *Be sure to talk to your baby's doctor about correct dosing before giving your baby a vitamin supplement.*

Formula-fed babies may also be deficient in vitamins or in essential fatty acids.(25-27) Some babies may not be able to utilize the vitamins and fats in baby formula, or the formula itself may not provide enough of them. Before exposing your baby to steroid drugs, talk to your doctor or a knowledgeable nutritionist about supplementing safe levels of vitamins and essential fatty acids—especially *docosahexaenoic acid* (DHA) and GLA.

Bathing your baby with Epsom salts (magnesium sulfate) or Dead Sea salts is a safe way to reduce inflammation(28) and supplement with magnesium (which is well-absorbed through the skin(29)) at the same time. A special kind of zinc can also be applied as a topical cream for absorption through the skin. Be sure to use a good, fragrance-free baby oil after the bath to hold moisture in the skin.

FOOD ALLERGIES AND ECZEMA

Food allergies may cause eczema in infants and children

About 30% of infants and children with atopic dermatitis test positive for food allergies.(30-32) A baby or child has a much greater chance of developing food allergies if either of the parents have allergies themselves. The most common allergens include cow's milk, soy, egg, wheat, peanuts and shellfish. In breastfed babies, allergens from foods may pass directly to the child through breast milk.(30) Avoiding these foods while breastfeeding may keep the child from developing eczema or other allergic reactions. The La Leche League has an excellent page on [allergies and breastfeeding](http://www.llli.org/NB/NBJulAug98p100.html) (*link: http://www.llli.org/NB/NBJulAug98p100.html*).

In formula-fed babies, changing the formula may eliminate the problem. Special, easy-to-digest *hydrolyzed* formulas (formulas where the proteins are partially broken down) are often recommended for formula-fed babies with food allergies. Adding *probiotics* or *prebiotics*--beneficial bacteria that live in the gut and help digest food--to infant diets helps to reduce or prevent both food allergies and other illnesses.(33-35)

Breastfeeding longer, introducing solid foods late (after 6 months), introducing new foods one at a time, and waiting to introduce allergenic foods until after the baby is about a year old help reduce the risk of allergic reactions. Most babies outgrow early allergies to milk and eggs, although peanut allergy is more likely to persist to adulthood. However, children with food allergies are more likely to develop asthma or other atopic diseases when they grow older.

If you suspect a food allergy in your baby or child, talk to your doctor. *A food elimination diet should only be utilized under a doctor's supervision, to limit the risk of nutrient deficiency.*

THE DANGERS OF STEROID THERAPY FOR ECZEMA CONTROL

Long-term treatment with topical steroids can lead to insulin resistance (pre-diabetes)--and worsened eczema.

Today, the most common treatment for eczema is a topical steroid cream or ointment. These are very cheap—a big tube of Triamcinolone[®], an often-prescribed drug, is about \$10. And, because they are potent anti-inflammatories, they are very effective at clearing up the inflammation. However, because of their side effects, they are only safe for very short-term use. Two newer drugs, Elidel[®] and Protopic[®], are based on a different technology and don't contain steroids. When they were introduced, they were considered "miracle drugs" because they didn't have the side effects of steroids. However, it was soon discovered that they had a whole different set of side effects. In 2006, both Elidel and Protopic were given "black box" warnings—the FDA's strongest warning—about a possible cancer connection.

Despite the risks, topical steroids are often used for the long-term control of eczema, even in young children. This can start a chain of events that eventually leads to diabetes—and, ironically, worsened eczema.

How topical steroids can cause insulin resistance

Glucocorticoids are the class of steroid drugs used to treat eczema. They work by interfering with the chemicals the body uses to signal inflammation. Steroids turn off the inflammation response and cause tiny blood vessels called capillaries to constrict, reducing redness and swelling. Topical steroids also suppress the body's immune system, (36) which is one reason they can lead to an increased susceptibility to fungal or bacterial infections of the skin.

High levels of steroids may be absorbed through the skin during steroid therapy for eczema,(36, 37) which is where the trouble starts. Children absorb proportionately more of the drugs because their skin is thinner and because they have more skin surface area relative to their body mass. (36)

Because the synthetic glucocorticoid hormones used in topical steroid medicines mimic the body's own hormones, long-term use can permanently damage the body's own ability to produce these necessary hormones. (38) Glucocorticoid hormones are essential to regulating the body's ability to convert sugars and fats into the energy needed by every cell in the body. If this regulatory function is impaired, the body is unable to maintain the delicate balance between insulin and glucose, resulting in insulin resistance or diabetes.

Insulin resistance inhibits D6D enzyme activity, leading to eczema

Insulin resistance inhibits D6D enzyme activity.(39) As mentioned above, D6D is responsible for one of the most important chemical reactions in the body: producing the essential fatty acid GLA.

GLA is one of the most important substances in the body. It is essential for the healthy functioning of the nervous system, the brain, and the heart. GLA helps control inflammation. It also plays an important part in creating a healthy skin barrier between the body and the outside world.

When the D6D enzyme can't produce GLA, diabetes, allergies, asthma--and eczema--(as well as heart disease, eye diseases, rheumatoid arthritis, osteoporosis and cancer) may be the result.(40)

How to recognize steroid-induced insulin resistance

Cushing's syndrome is a group of symptoms caused by too much of the hormone cortisol in the blood and is a well-documented side effect of steroid therapy.(36,41) *Symptoms include weight gain (especially around the stomach and face), insulin resistance, acanthosis nigricans (see below) . . . and eczema.* A complete list of symptoms and information can be found on the web page of the National Adrenal Diseases Foundation. (link: <http://www.nadf.us/diseases/cushings.htm>).

Acanthosis nigricans may be misdiagnosed as eczema

Acanthosis nigricans, a warning sign of insulin resistance, is generally caused by too much insulin in the blood. (Rarely, it may be caused by a tumor.) It appears as dark, thickened skin, most often on the back of the neck. It may also appear on or near the armpits, inner elbows, knees, or hands. Eczema tends to occur in these places as well, explaining why acanthosis nigricans can be confused with eczema. Depending on the degree of insulin resistance, acanthosis nigricans may range from slightly pigmented skin to skin that is very dark, thick, and cracked.

Acanthosis nigricans may be misdiagnosed as eczema, even by experienced dermatologists. Such misdiagnosis is easy to understand when you see a definition of eczema like this one from WebMD:

- Patches of chronically itchy, dry, thickened skin, usually on the hands, neck, face, and legs. In children, the inner creases of the knees and elbows are often involved.
- Skin lesions, patches of redness, scaling, and in dark-skinned people, changes in skin color.

Acanthosis nigricans may be a warning sign of steroid-induced insulin resistance. (My daughter's dermatologist failed to recognize her acanthosis nigricans for years and simply prescribed more hydrocortisone ointment, which may have made the underlying insulin resistance worse.) If your or your child's "eczema" does not respond to topical steroids, suspect acanthosis nigricans and see an endocrinologist immediately.

Nearly every discussion of acanthosis nigricans associates it with obesity, but *anyone* with insulin resistance may develop this condition, whether obese or not! Acanthosis nigricans is more common in people with darker skin.

Good pictures and descriptions of acanthosis nigricans can be found on the VisualDx website (link: <http://www.visualdxhealth.com/adult/acanthosisNigricans-references.htm>). Acanthosis nigricans can also appear on the hand, as shown here on MedlinePlus (link: <http://www.nlm.nih.gov/medlineplus/ency/imagepages/2353.htm>).

Acanthosis nigricans often responds quickly to changes in the body's insulin status. As a result, it may be a useful diagnostic tool for figuring out whether insulin resistance is improving or worsening.

A SAFER WAY TO MANAGE ECZEMA AND SUPPORT HEALTHY INSULIN METABOLISM

Low levels of zinc, magnesium, and selenium often accompany eczema and insulin resistance.(9-15) These nutrients, along with some of the B vitamins (especially B6) are necessary for the D6D enzyme to work properly and produce the essential fatty acid GLA. Recent research shows that Vitamin D is also extremely important in the development and management of both eczema and diabetes.(42-44)

It's interesting that the same group of vitamins and minerals are essential for both optimal D6D function and optimal insulin metabolism. Supplementation with these vitamins and minerals may be a safe way to help manage both eczema and insulin resistance. By following this regimen you may be able to stop or reduce your use of topical steroids or insulin-regulating drugs.

My recommended diet and supplement regimen provides support for D6D enzyme activity as well as a direct source of GLA. Other vitamins and minerals are included to provide balanced nutrition. The amounts listed are within the United States Recommended Dietary Allowances or, if higher, have extensive research to support the higher doses.

Eat a healthy low-carbohydrate, high-protein diet

- Avoid refined sugar, fried foods, white rice, and highly processed foods made with white flour. Eat a variety of whole grains, including brown rice, barley, quinoa, whole oats, and buckwheat. These grains are all high in healthy fiber, magnesium, B vitamins, and protein.
- Limit unhealthy fats in the diet from fried foods and margarine, and replace with healthy fats in olive oil, coconut oil (a good source of medium-chain triglycerides, which may be helpful in controlling weight gain in diabetes(45)), and fish oils (EPA and DHA). For vegetarians, the essential fatty acid *eicosapentaenoic acid* (EPA) in fish oil can be found in flax, hemp, or perilla oils. Algae provide a vegetarian source of the essential fatty acid DHA and can be found in vegetarian DHA supplements.

- Eat plenty of vegetables.
- Limit fruit juice, which is mostly sugar, and eat seasonal fruit instead.
- Avoid soft drinks, diet soft drinks, and high-sugar drinks of all kinds. Instead drink tea, water, or, for something sweet, a blend of fruit juice and water.
- Eat foods high in magnesium, zinc, and B vitamins. A list of high-magnesium foods can be found at <http://www.vaughns-1-pagers.com/food/magnesium-foods.htm>
B vitamins and zinc are found mostly in meat, so vegetarians may not get enough in their diet. High levels of B vitamins and zinc are often found together in the same foods: <http://ohioline.osu.edu/hyg-fact/5000/5560.html>

A NUTRITIONAL SUPPLEMENT PROGRAM TO HELP MANAGE ECZEMA AND INSULIN RESISTANCE

Supplement safety guidelines

Notify your doctor before starting on a diet and nutrition program, especially if you are taking any prescription medications. If your doctor refuses to work with you or strongly discourages use of any nutritional supplements, I recommend finding a different doctor! A nutritionist can also help you use drugs and supplements together safely.

Vitamin supplements and drugs may interact with each other, so it's a good idea to check first. An extensive database of drug-vitamin interactions can be found on the [University of Maryland website](http://www.umm.edu/altmed/index.htm) (*link*: <http://www.umm.edu/altmed/index.htm>). An interaction does not necessarily mean that you can't use the supplement; it *does* mean that you should be careful and do so with your doctor's supervision.

A supplement may even reduce your need for certain drugs; for instance, both magnesium and chromium can reduce the need for diabetes and heart medicines. To safely use supplements and drugs together, start with a low dose of the supplement and work up to the full dose. Have your doctor test you and adjust your medication as necessary.

Test, test, test

Testing is important when using drugs or supplements to control a disease or condition. Drugs can raise or lower the levels of key nutrients in your body, and taking drugs and supplements together may affect nutrient levels differently. Supplement dosages need to be adjusted even if you are not on other medication, and testing is the only way to know if you need to be taking more or less.

Baseline testing—testing specific nutrient levels in your body before starting a supplement regimen—lets you know where you're starting from. Continue to test once every six months at first and then at least once a year, to be sure your nutrient levels are where you want them to be, and adjust your supplements and medicines accordingly.

Why not just take a multivitamin?

Although multivitamins supposedly provide a full spectrum of vitamins and minerals, their “one size fits all” formulation may not provide optimum levels of the nutrients *your* body needs. In addition, because some nutrients block the absorption of others, you may not be getting the full amount of everything listed on the label. And multivitamins—even expensive ones!—are not necessarily made with the specific types of vitamins the human body can use most efficiently.

All vitamins are *not* created equal

Vitamins and minerals are available in different chemical compositions. Some are more *bioavailable*—that is, they are in a chemical form that's easy for the body to use—than others. Often the more bioavailable vitamins are also more expensive. The FDA only regulates supplements for safety, not potency, so the old adage *caveat emptor* [let the buyer beware] definitely applies when you're buying vitamins! In the list below, I've included the most bioavailable chemical form of each vitamin and the brands that offer it, so you'll get the most from your supplement regimen.

Disclaimer: I have *no* ties with any of the companies that manufacture or sell the vitamins I recommend.

Excellent information about vitamins and minerals can be found at the website of the U.S. Office of Dietary Supplements (*link*: http://ods.od.nih.gov/Health_Information/Information_About_Individual_Dietary_Supplements.aspx)

and on iHerb's comprehensive supplement database:
<http://healthlibrary.epnet.com/GetContent.aspx?token=e0498803-7f62-4563-8d47-5fe33da65dd4&chunkid=33802>

Some nutrients lose effectiveness when taken together

Some nutrients interfere with the absorption of other nutrients when taken together. For instance, foods high in phytates (chemicals found in plant foods such as whole grains; a full list is here: http://bodyandhealth.canada.com/channel_section_details.asp?text_id=1544&channel_id=10&relation_id=11002) and foods high in calcium block absorption of zinc, a vital part of this nutritional program. So to get the most out of zinc, take it separately from breads, cereals, and dairy products.

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