

The role of food in **NICKEL ALLERGY**

explained by Janice Joneja PhD, RD

Food allergy caused by nickel was first suspected when dermatologists noticed that some people exhibited symptoms of dermatitis on skin surfaces that were not in contact with any known allergen. These dermatologists suspected that the allergenic source might be in something ingested and looked for sources of known contact allergens, such as nickel, in commonly eaten foods. Nickel occurs naturally in many foods and may be introduced during food processing—for example, from metal containers or cooking utensils.

Nickel is a well-known cause of contact dermatitis in nickel-sensitive people, inducing a reaction wherever it is in close contact with the skin or mucous membrane for a period of time. This response is known as a cell-mediated delayed (previously type IV) hypersensitivity reaction. The nickel induces



local T-cell lymphocytes to produce cytotoxic cytokines that cause the itching, reddening and scaling of contact dermatitis.

The relationship between nickel and food as a cause of allergic reaction is less well understood.

Symptoms

Nickel-contact dermatitis develops in areas in direct contact with nickel-containing objects such as jewellery, metal studs and watchbands and in occupations where metal contact is frequent. Ingested dietary nickel may trigger reactions in the skin in individuals who react to systemically to nickel. Eczema, especially on the hands, may develop as a secondary response to nickel

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sensitization. The eczematous rash may later spread to other body surfaces. This may be a reaction to nickel in foods in individuals primarily sensitized by direct nickel contact. Occasionally, cases of erythema multiforme and vasculitis after ingestion of nickel in food have been reported.

Diagnosis

Contact allergy to nickel is diagnosed by a patch test. The nickel allergen (usually in the form of nickel sulphate) within the patch is placed on the skin and left in place for up to 72 hours. The area under the skin is usually observed after 48 hours.

Because type IV hypersensitivity is a delayed response, the reaction takes two or three days to become visible. In a positive reaction, the area of skin under the patch will turn red and possibly itch and blister if the reaction is severe. A similar dermatological patch test is used for any suspected contact allergy.

Dermatitis due to ingested nickel is usually suspected when a chronic dermatitis

persists without obvious contact with nickel-containing objects. Elimination and challenge is at present the only method to identify this cause of a chronic dermatitis. A low-nickel diet is followed for a period of four weeks. If the rash subsides, a challenge with foods with high nickel content will usually indicate that ingested nickel is a trigger for the reaction.

Because all foods contain some level of nickel, a nickel-free diet is not possible. However, some foods are much higher in their nickel content than others.

Level of nickel in food

The level of nickel in foods varies with the variety of the plant species and with the nickel content of the soil in which the plant was grown or, in the case of seafood, of the aquatic environment. In addition, different laboratories employ a variety of tests to detect nickel in food, so frequently data from one source can disagree markedly with that from another. In most studies, the richest sources of dietary

nickel are found in nuts, dried peas and beans, whole grains, and chocolate).

Foods high in nickel include:

Canned fruit
Pears
Bananas
Oatmeal
Oats
Buckwheat
Soy proteins
Walnuts
Peanuts
Cocoa
Dark chocolate
Fin fish & shell fish
Fish pastes
Kidney (ox. lamb)
Green lentils
Soya beans
Chick peas
Flax seed
Yellow peas, dried

Consumer facts sheets giving more detailed lists can be purchased online from www.eatright.org/shop the online store of the Academy of Nutrition and Dietetics, Chicago.

In addition, processing a food can increase its nickel content. For example, minute traces of nickel from metal

grinders used in milling flour can increase the nickel in flour considerably, and stainless-steel cookware will increase the level of nickel in the food cooked in it.

The relationship between nickel and iron

Most ingested nickel remains unabsorbed and is excreted in the faeces. Usually less than 10% of the nickel in food is absorbed but this amount increases in people with iron-deficiencies and lactating mothers. Nickel and iron use the same transport system to cross the intestinal mucosa, so if iron is being transported, nickel is excluded.

Accordingly, individuals who are sensitive to nickel should include iron-rich foods in their diet.

Oral exposure to nickel

The most common cause of nickel dermatitis is direct contact with nickel-containing objects. People who have tested positive for nickel using a patch test (on the skin of the forearm or back) should avoid contact with all objects containing the metal.

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An increasing number of studies are indicating that reducing the severity of contact dermatitis related to nickel or preventing symptoms can be achieved by oral exposure to nickel. According to other studies, oral exposure to nickel can worsen established nickel contact dermatitis initially, but prolonged exposure can reduce the clinical symptoms.

The subject of nickel-contact dermatitis, nickel allergy, and achievement of tolerance is confusing from a practical point of view because of the extremely complex series of events that occur in the immune system. Nickel contact dermatitis is part of a cell-mediated (type IV) hypersensitivity reaction; nickel allergy is possibly an IgE-mediated (type I) hypersensitivity and the precise mechanism that allows the immune system to achieve tolerance, especially to foods, is unclear at present.

Food management of symptoms

Clinical studies suggest that some nickel-sensitive people

benefit from avoiding foods with high amounts of nickel. However, opinions differ on what constitutes a nickel-restricted diet. In one research study, an oral dose of nickel (as nickel sulphate) as low as 0.6 mg produced a positive reaction in some nickel-sensitive people. Another report indicated that 2.5 mg was required to induce a flare-up. Because the levels of nickel required to induce a reaction have varied widely in different studies, it is difficult to determine a "safe level" of dietary nickel for nickel-sensitive people.

However, dietary nickel often is not the sole cause of the dermatitis. In these cases, avoiding nickel in the diet may improve the situation but does not entirely eradicate the symptoms. If symptoms have resolved on the diet, challenge with foods with high nickel content should lead to a flare-up of skin reactions if a person is indeed allergic to dietary nickel.

Note: The author's references for this article are available on request. □