

# S R T E A P T O U R S T

## **NICKEL PICKUP BY FOOD COOKED IN STAINLESS STEEL UTENSILS**

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### **STUDY RESULTS**

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Results of a recent study by the Laboratory of the Government Chemist, LGC, in the U.K. indicate that nickel pickup by meal-sized portions of real foods cooked in stainless steel utensils at normal domestic cooking temperatures and times was generally below the analytical detectable limits for nickel of 0.01 mg/kg, or 1µg in a 100 g serving of food. Undetectable nickel pickup is considered insignificant with respect to human health effects and reinforces the ongoing use of stainless steel by consumers as the material of choice for cookware.

### **BACKGROUND INFORMATION**

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#### *Nickel in Foodstuffs*

Like many other minerals, nickel is a natural constituent of foods. The concentration of nickel differs between foods and may even differ within the same food item, depending upon where the food is grown. Nickel intake from a normal daily diet generally averages approximately 150 to 200 µg. However, some foods such as beans, lentils, soya products, certain nuts, oatmeal, and cocoa products are particularly rich in nickel. Because of this, vegetarians and "chocoholics" may consume more nickel in their daily diets. Nickel is an essential element for animals and plants and there is a general belief that nickel is likely essential to humans as well.

#### *Media Reports and Health Implications*

While people get most nickel intake from foods that naturally contain nickel, recent studies have focused on additional intake from foods cooked in stainless steel pots. An increasing

number of media references, advising the public against the use of stainless steel pots, is generating growing concern by consumers. These warnings suggest that ingested nickel can cause nickel allergy or other health effects, even cancer. Such warnings are both needlessly alarming and unwarranted. To distinguish between fact and speculation, the facts are:

- There is **no** evidence that nickel ingested in food can cause a person to become sensitized. Ingested nickel may aggravate hand eczema, however, in persons **previously** sensitized to nickel via direct and continuous dermal contact with certain nickel-containing items<sup>(1)</sup>.
- Most dermatologists agree that the quantity of ingested nickel required to induce an allergic reaction in nickel-sensitized individuals is fairly high relative to normal daily intake. In reviewing the many studies done on nickel-sensitive patients, Menné and Maibach<sup>(2)</sup> concluded that only a minority of such patients are likely to react to oral doses below 1,250 µg of nickel. Gawkrödger et al<sup>(3)</sup> have noted that even doses as high as 5,600 µg Ni have “failed to excite reactions more frequently than did a placebo in a double-blind study.” These figures are many times the nickel intake in normal daily diets.
- The general consensus of the regulatory and scientific communities is that nickel does not appear to be an oral carcinogen<sup>(4)</sup>.

Considering this background information and health facts, studies have been conducted with a view to understanding the significance of nickel pickup from stainless steel pots to human health.

## **COOKING REAL FOODS**

The foods tested in the LGC study – lemon marmalade, green tomato chutney, potatoes, rhubarb, and apricots – were purposely selected because their acidity or chloride content make them more likely than other foods to be aggressive against stainless steel. With few exceptions, there was no detectable nickel pickup, even in the preparation of chutney, which involved two hours of simmering in vinegar.

Some detectable nickel pickup did occur, however, with rhubarb and apricots cooked in new pots. This pickup was largely restricted to first use applications of the pots, with nickel pickup dropping substantially in subsequent cooking operations in the same pots. After several uses of the pots, nickel pickup by rhubarb was close to or below the detectable limit but with apricots some pickup persisted, although in small amounts relative to daily nickel intake.

Twelve new pots were tested, three from each of four different manufacturers. All the pots were 304 type stainless steel. Nickel pickup by rhubarb from all 12 new pots was both higher and more variable in the first use of the pots than in subsequent uses, as shown in Table I\*. After just the third cooking operation, the median nickel pickup was only 4 µg in a 100 g portion of rhubarb. By the fifth cooking operation, the pickup decreased to 3 µg in a 100 g portion.

\* The difference in nickel pickup seen between new pots appear to be due, in part, to different finishing operations applied by manufacturers in producing their pots.

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## REFERENCES

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1. Nickel and nickel alloy articles that come into contact with the skin. NiDI STATUS REPORT, September 1992.
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3. Gawkrödger et al. Nickel dermatitis in the reaction to oral nickel challenge. BRITISH J OF DERMATOLOGY, 115, p. 33-38, 1986.
4. California Air Resources Board. Proposed identification of nickel as a toxic air contaminant. Technical Support Document, Part B, June 1991.

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### Note:

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mg/kg = milligrams per kilogram

µg = microgram

g = gram

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