Adhesive Labels Cause High Thyroxine Results

To the Editor:

Recently, we identified serum samples from seven patients with no clinical signs of thyroidal illness with borderline to normal thyrotropin (TSH) (0.13–2.14 mU/L; TSH-Ultra, Auto-DELFIA; Wallac, Turku, Finland) and normal free thyroxine (T4) (12–21 pmol/L; FT4-Amerlex MAB; Johnson and Johnson, Amer-}

sham, UK) but implausibly high T4 [339–387 nmol/L; ES700; Boehringer Mannheim (BM), Mannheim, Ger-

many]. The results were confirmed by reanaysis with different lots of T4 kits and by BM’s new Elecsys sys-

ystem. In addition, BM FT4 was also increased (41–129 pmol/L). In con-

trast, these samples yielded normal T3 (70–133 nmol/L) with the IMX (Abbott, Chicago, IL).

After being questioned, the technician explained that the samples had wet the identification labels during

overnight storage in the cold because of some undetected hairline cracks in the ES 700 tubes. The technician had

transferred these samples into new test tubes before analyzing them. Thus, we incubated a serum pool (BM and

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overnight storage in the cold because of some undetected hairline cracks in the ES 700 tubes. The technician had

transferred these samples into new test tubes before analyzing them. Thus, we incubated a serum pool (BM and

IMX: 112 nmol T4/L) with adhesive labels. Neither the IMX T4, Amerlex

MAB-FT4, or DELFIA TSH results were affected by this procedure. But it caused high BM T4 concentrations with nonlinear dilution behavior of 735–908 nmol/L. Strong interferences by labels were also observed in BM triiodothyronine (T3) and BM progesterone assays. No interference was detected with BM FSH or BM PRL assays.

Our labels, with the adhesive, kindly provided by the manufacturer, are made from thermobable paper coated with a water-resistant permanent adhesive based on a sus-

pension of latex, esterified resins, and mineral oil. Further experiments showed that interferences are most likely caused by unidentified compo-

nents of this adhesive after dehydra-

tion with hot air. The identification labels cannot be classified as inert.

Broken blood-collection tubes or test tubes with wet labels are rarely used for analyses, but they may be used in a large routine laboratory if personnel are unaware of the problem. Consequently, we have instructed our technicians to reject all broken tubes, because components of the adhesive labels could influence certain immunologic tests.

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More Information on Phytoestrogens in Breast Milk

To the Editor:

Since writing the editorial “Phytoestrogens in Breast Milk—Another Advantage of Breast-Feeding?” [1] I have uncovered additional research that conflicts with some of the information included in the editorial.

In attempting to compare the isoflavone content of breast milk with soy-containing infant formulas, I referenced an article by Dwyer et al. [2] that concluded that “soy-based specialty formulas” were devoid of isoflavones. These formulas were not infant formulas. Further, the soy in the formulas may have been from soy polysaccharide, not soy protein, which would explain the low con-

centrations of isoflavones found in the soy formulas.

The actual isoflavone content of soy-containing infant formulas has not been well studied. These formula-

ls are manufactured with soy isol-

ates, which contain the isoflavones genistein and daidzein. Setchell and Welsh [3] reported the phytoestrogen content of two soy–milk infant formulas: ProSobee, 17.1 μg/g daid-}

zein and 21.8 μg/g genistein; Isomil, 19.1 μg/g daidzein and 22.6 μg/g genistein. Irvine et al. [4] concluded

that the quantities of soy formula recommended by manufacturers for infant feeding provide an intake of phytoestrogens (per kilogram of body weight) of approximately three to five times more daidzein and genistein than amounts that disrupt the menstrual cycle when fed to pre-

menopausal women [5].

Metabolism of isoflavones in in-

fants is not well studied since ethical considerations make it difficult to conduct metabolic studies on human infants. However, in a study of cho-

lesterol synthesis rates in infants, Cruz et al. [6] found that infants fed soy-containing formula excreted sig-

ificantly higher quantities of ur-

inary isoflavones than infants fed hu-

man milk or cow’s milk-based formulas. Thus, the human infant fed soy-containing formulas absorbs and excretes dietary phytoestrogens. Bio-

availability of isoflavones may vary between soy formula and breast milk since isoflavones are found as gluc-

uronide conjugates in human milk

[7], whereas they are present as gly-

cosidic conjugates in soy milk [8].

Methods to measure isoflavones in foods and biological fluids have evolved as research interest in phy-

toestrogens has increased. Traditionally, gas chromatography–mass spectrometry (GC-MS) has been used to measure soy isoflavones and their metabolites in biological fluids. More recently, HPLC methods have been developed that require fewer steps for sample preparation and less ana-
litical time. As methods have evolved, better information is available on the actual phytoestrogen content of foods and the effects of pro-
cessing on isoflavone content of foods. Although all legumes have been assumed to contain isoflavones, Franke et al. [9] found that the lentils they analyzed did not contain phy-

toestrogens.

Processing is known to affect isoflavone concentration [10]. Our laboratory found that isoflavones in tempeh were more bioavailable than isoflavones in unfermented soy pieces [11]. Alcohol-extracted soy products contain low concentrations of isoflavones, so soy infant formulas could be manufactured with a low

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