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Reduction of radiocesium load: supplementation of Cs versus it's depletion by enterosorbents

Letter to the Editor

Sergei V. Jargin

Peoples' Friendship University of Russia, Moscow, Russia

Correspondence:
Sergei V. Jargin,
Peoples' Friendship University of Russia
Clementovski per 6-82
Moscow
Russia
sjargin@mail.ru

In a recently published letter [1], it was noticed that in volume 1181 of The Annals of the New York Academy of Sciences (2009), dedicated to the Chernobyl accident, references to non-professional publications (mass media, websites of unclear affiliation, etc.) were used to back up scientific views. Another theme which was commented on in the letter [1] was the reduction of radiocesium levels in organisms by means of apple pectin used as an enterosorbent. The significant ^{137}Cs-lowering effect of apple pectin in children from radiocontaminated areas, reported by Prof. Nesterenko and co-workers in [2–4], is not immediately understandable because in the studies [3, 4] the children received two teaspoons of diluted pectin-containing apple extract daily, and therefore, consumption of apples and some other fruit and vegetables should have been monitored to render a comparison with the placebo-cohort informative. Pectin is present in many plants (carrots, apricots and others), and is used as a food additive E440 (http://en.wikipedia.org/wiki/Pectin). In the authors' response an objection was presented: "Taking into account that the quantity of pectin in two teaspoons of powder is equal to the quantity of pectin in 1,500 grams of apples, one should do all his/her best for a piece of apple or pear eaten accidentally and every day for 24 days, to have a significant influence on the objectivity of the experiment." [5] It should be noted that apple-extract, containing 15–16% of pectin, was given to the children in a daily dose of 10 g [3]. It can be calculated that the concentration of pectin in fresh apples would be, in such case, around 0.1%, whereas according to Wikipedia, a typical level of pectin in fresh apples is 1–1.5% (http://en.wikipedia.org/wiki/Pectin). Moreover, the use of pectin for "decorporation" [2] of ^{137}Cs can be effective only if the level of radiocesium in foodstuff or drinking water is elevated. In the studies [3–4], the children in the sanatorium received only "clean" food. Under such circumstances, an enterosorbent can have an opposite action: if pectin indeed absorbs Cs so efficiently that its level in an organism declines, it might induce compensatory retention by the organism of the whole Cs, including ^{137}Cs accumulated previously when its contents in the environment and foodstuffs was higher (all children came from the contaminated areas). Even if the level of radiocesium in food is elevated but slowly decreasing (like in contaminated areas following a radioactive fallout), reasons for the use of enterosorbents should be questioned, because theoretically it can induce retention of Cs by the organism, including ^{137}Cs accumulated previously (biological half-life of Cs in the human organism is around 60 days [6]). Obviously, it depends on the degree of saturation of the organism with Cs and probably also on potassium, which has similar metabolic pathways [7–9]. Therefore, it is recommended to researchers studying pectin-containing enterosorbents, to verify a hypothesis, according to which Cs supplementation (e.g., by oral intake of cesium chloride [10]) might be more efficient for the purpose of radiocesium washout from the organism than its depletion by enterosorbents: an organism saturated with stable Cs would discharge it together with previously accumulated ^{137}Cs. Considering metabolic similarities between Cs and potassium [7–9], supplementation of the latter for the same purpose could also be evaluated. Effectiveness of either method can be controlled by whole-body dosimetry. A dosimeter must have adequate dose sensitivity throughout the dose range measured [11]. Electrolyte monitoring in blood and urine can be useful as well. When planning such a study, the possible adverse effects of the Cs supplementation [10] should be taken into account.

Reply to this Letter to the Editor:
http://www.smw.ch/content/smw-2011-13164/

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