



## Short Communication

# Anti-oxidant vitamin status of Russian children and elderly

M van Dusseldorp<sup>1</sup>, EJ Poortvliet<sup>2</sup>, FG de Waart<sup>3</sup>, FJ Kok<sup>3</sup>, AA Alexandrov<sup>4</sup>, V Mazaev<sup>4</sup> and MB Katan<sup>1</sup>

<sup>1</sup> Department of Human Nutrition, Agricultural University Wageningen, PO Box 8129, 6700 EV Wageningen, The Netherlands;

<sup>2</sup> World Health Organization, Regional Office for Europe, Nutrition Unit, Copenhagen, Denmark;

<sup>3</sup> Department of Epidemiology and Public Health, Agricultural University Wageningen, Wageningen, The Netherlands; and

<sup>4</sup> National Centre for Preventive Medicine: Institute of Preventive Cardiology, Ministry of Health of Russian Federation, Moscow

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The average daily intake of vegetables and fruits (potatoes excluded) among poor Russians was 146 g in 1991 (Popkin, 1992) which is very low compared to the WHO guideline of 400 g/day. A low intake of anti-oxidant vitamins might promote oxidation of LDL and might help to explain the reported high prevalence of coronary heart disease in the Soviet Union (Deev & Oganov, 1989; Lopez, 1990). We assessed the anti-oxidant vitamin status in a sample of Russian children and elderly because these age groups are especially vulnerable to vitamin deficiency.

A letter was sent to the parents of 50 healthy 8–9 year old children who attended a middle class school in Moscow. Response was low because of concerns over HIV infection. In the end eight boys and five girls, all aged nine, participated. Furthermore, blood was sampled from 22 elderly hospitalized in the Centre of Preventive Medicine with the diagnosis of certain or possible cardiovascular disease (9 females, 13 males; age mean  $\pm$  SD, 69  $\pm$  4.5). No vitamin supplements were used by the subjects.

Fasting blood was sampled in December 1992 using 10-ml heparinized evacuated tubes. The blood was cen-

trifuged within 1 h and the plasma was immediately stored at  $-20^{\circ}\text{C}$ . Directly after centrifugation of the blood 0.5 ml plasma was added to 4.5 ml of 5% metaphosphoric acid (HPO<sub>3</sub>) solution in order to stabilize vitamin C. Plasma samples were dispatched in dry ice to Hoffmann-La Roche (Basel) for analyses of vitamins (Hess *et al*, 1991; Brubacher *et al*, 1974) and to the Agricultural University of Wageningen for analysis of total cholesterol. Surprisingly, the cholesterol levels of the elderly were only slightly above the desired level and the vitamin status of the children and elderly was satisfactory according to US reference levels (Table 1) (Shils & Young, 1988). Two children and four elderly had marginal vitamin C levels, and five elderly ran a high risk of being vitamin C deficient (plasma level  $< 1.94$  mg/L), but low vitamin C levels occur in 2–50% of noninstitutionalized elderly in affluent Western countries as well (Russell & Suter, 1993). Plasma levels of vitamin E, A and C of the Russian children were quite similar to those of healthy children from Austria (Marktl *et al*, 1982) assayed in the same laboratory. Healthy adults (47–88 years) in Germany have  $\beta$ -carotene levels of 0.23 mg/L (Stalh *et al*, 1992), similar to the value of 0.21 mg/L found here in elderly Moscovites. The small number of subjects makes it difficult to draw conclusions from our data, but they may still be relevant in view of the scarcity of reliable data on nutrient

Correspondence: M van Dusseldorp.

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**Table 1** Plasma total cholesterol (mg/dl) and vitamin levels (mg/L) of 13 healthy school children aged nine and 22 hospitalized elderly aged 65–83 living in Moscow in December 1992

	Children		Elderly		Adequate status <sup>1</sup>
	Mean $\pm$ SD	Range	Mean $\pm$ SD	Range	
Total cholesterol	147 $\pm$ 23	112–190	213 $\pm$ 39	147–302	<200
			mg/dl		
Vitamin E			mg/L		
( $\alpha$ -tocopherol)	9.5 $\pm$ 1.5	7.0–11.7	15.9 $\pm$ 3.4	10.2–21.3	>5.0
Vit E/chol $\times 10^{-3}$	5.9 $\pm$ 0.7	4.7–7.0	6.8 $\pm$ 1.2	5.0–9.8	>2.5
Vitamin C	10.3 $\pm$ 3.1	4.8–15.2	5.0 $\pm$ 4.0	1.3–15.2	>6.0*, 4.0†
Vitamin A (retinol)	0.36 $\pm$ 0.05	0.28–0.48	0.73 $\pm$ 0.19	0.50–1.39	>0.2*, 0.3†
$\beta$ -carotene	0.22 $\pm$ 0.12	0.07–0.52	0.21 $\pm$ 0.12	0.04–0.45	
$\alpha$ -carotene	0.06 $\pm$ 0.06	0.01–0.22	0.06 $\pm$ 0.03	0.02–0.12	

<sup>1</sup> Shils & Young, 1988; \* children, † adults.



intake in Russia. Our results are consistent with food consumption data of 312 Russian children of the same age as those of the present study which show a normal intake of vitamin A and carotene and a low intake of vitamin C of 41 mg/day (AA Alexandrov, National Centre for Preventive Medicine, Moscow, unpublished data). Our findings suggest that the antioxidant vitamin status of Moscovites might not be markedly worse than that in other European countries. This impression is strengthened by the finding of high adipose tissue concentrations of  $\alpha$ -tocopherol and  $\beta$ -carotene in healthy men from Moscow (Kardinaal *et al*, 1993).

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