

## Consumption of Se-enriched eggs improved Se status of human volunteers

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### Introduction

Selenium deficiency is widespread across the globe. There are several solutions for this problem including consumption of selenium in tablet form, production of bread enriched with selenium, growth of vegetables enriched with selenium and production of animal-derived products enriched with selenium.

The aim of the present work was to evaluate Se-enriched eggs as a source of Se for human consumption.

### Materials and Methods

Student volunteer were stratified by age and sex and then randomly allocated to groups designated to consume either two designer or two commercial table eggs per day for eight weeks in a double-blind trial. The study protocol was approved by the National Agricultural University Ethics Committee (Ukraine). Sixty volunteers (30 in control and 30 in experimental group) successfully finished the trial. Eggs consumed in the control group contained 7-9 µg Se/egg and experimental eggs were enriched with selenium (28-32 µg Se/egg). Blood was collected before the beginning and at the end of experimental period and Se was determined in plasma by hydride generation atomic absorption spectrometry with fluorometric detection (Surai *et al.*, 1997). Total cholesterol was determined by a fully enzymatic colourimetric assay (Randox Laboratories Ltd). Statistical analysis was performed using ANOVA.

### Results and Discussion

The level of selenium in plasma of volunteers living in the Kiev area of Ukraine (0.055-0.081 µg/ml) was on the low side of the physiological range and was somehow lower than we reported earlier in volunteers in Scotland (Surai *et al.*, 2000). Consumption of commercially available eggs for eight weeks only slightly increased Se in plasma, which reached physiological level (0.075-0.085 µg/ml). In contrast, consumption of two eggs daily, which together delivered the daily requirement of 55-65 µg Se, for eight weeks was associated with a significant increase in Se concentration in plasma (Figure 1). Plasma Se reached 0.09- 0.14 µg/ml, indicating improving Se status of volunteers. This is the first clinical trial to prove that selenium-enriched eggs could be used as an important vector to improve selenium status in countries with low Se consumption like Scotland or Ukraine. It is important to mention that total cholesterol level did not differ significantly either between the treatments or from the beginning to the end of the study (Figure 2).

In addition, it is possible to produce eggs simultaneously enriched with several antioxidants including selenium, vitamin E and carotenoids. This kind of egg could be especially useful in areas with increased pollution such as the Chernobyl area in Ukraine. After the successful clinical trial with Se-enriched eggs in Ukraine, the production of such eggs, enriched with Se and vitamin E, started commercially and now the eggs called "Basket of life" can be found in the supermarkets in Ukraine. This development is very important for this region. From the one hand Se deficiency was documented in people working in Chernobyl area

(Tutelian *et al.*, 2002; Golubkina *et al.*, 2002). On the other hand selenium and other antioxidants can be especially beneficial for people living in radionuclide-contaminated areas of the Ukraine.

Figure 1. Effect of consumption of Se-enriched eggs on Se level in plasma,  $\mu\text{g}/\text{ml}$

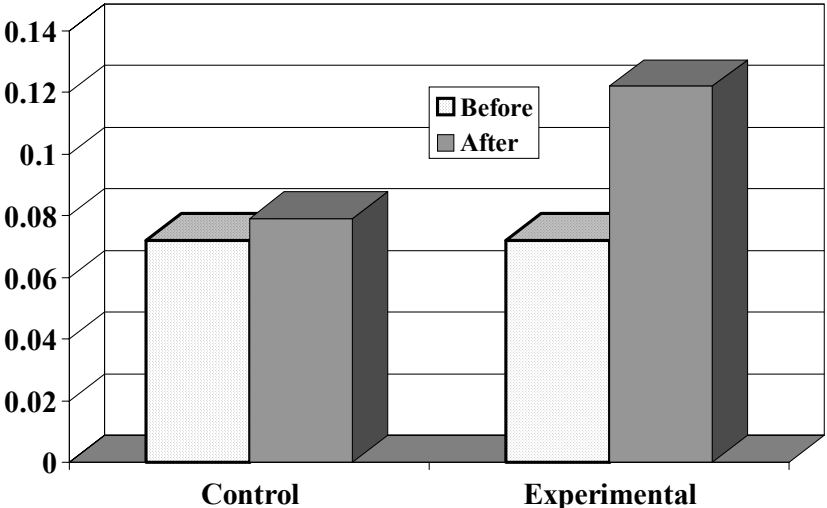
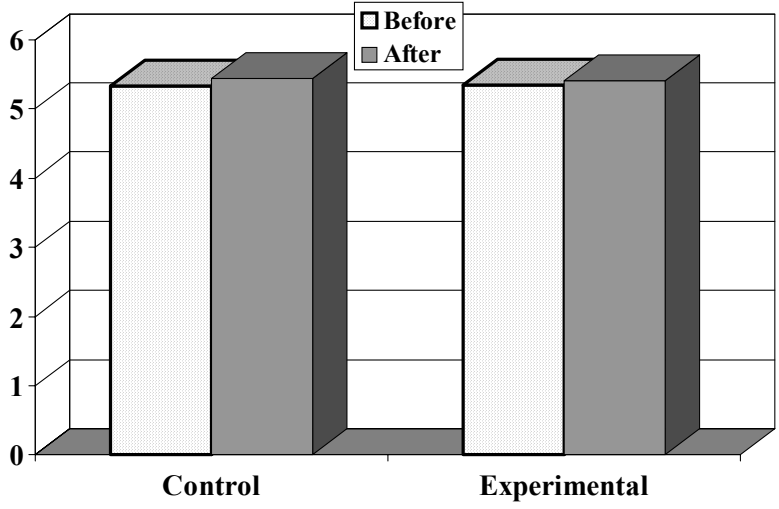


Figure 2. Total plasma cholesterol of the control and experimental groups,  $\text{nmol}/\text{L}$



### **Conclusion**

This clinical study clearly showed that consumption of Se-enriched eggs could improve Se-status of human populations in areas with low Se-consumption. Furthermore, consumption of 2 eggs per day for 8 weeks by healthy volunteers did not affect total cholesterol level in plasma. Indeed, in such areas as Chernobyl zone in Ukraine this kind of eggs could be an important option to improve human health.

### **References**

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