

SELENIUM, ZINC, CADMIUM AND COPPER CONTENT IN FOODS CONSUMED IN AN ITALIAN COMMUNITY

*Silvia Cilloni¹, Marcella Malavolti¹, Carlotta Malagoli¹, Federica Violi¹,
Tommaso Filippini¹, Luciano Vescovi², Marco Vinceti¹*

¹Environmental, Genetic and Nutritional Research Center (CREAGEN) - Department of Biomedical, Metabolic and Neural Sciences, University of Modena and Reggio Emilia, Modena, Italy

²Laboratory of Environmental Chemistry - IREN, Reggio Emilia, Italy

Introduction

Trace elements are essential to the proper functioning of the body; they are very important for cell functions at biological, chemical and molecular levels. On the other side it is important to point out that trace elements, even essential ones, may become toxic to concentrations above the level necessary to perform their biological function. This study aimed to determine the concentrations of selenium, zinc, cadmium and copper in foods generally composing the diet of Northern Italy population in order to implement a database of the quantitative content for each of the four trace elements, according to food category intake. This will allow us to collect information about the quantitative difference of trace elements, about the eating habits of a group of individuals and food safety in terms of concentration of metals and metalloid.

Methods

The selection of typical foods from the Northern Italy diet was elaborated on the results of food frequency questionnaire like EPIC (Figure 1). The EPIC (European Prospective Investigation into Cancer and Nutrition) questionnaire was designed to be self-administered and was checked by trained personnel after compilation. Participants were asked to respond to 248 questions about 188 different food items, including seasonal foodstuffs, and to indicate the number of times a given item was consumed (per day, week, month, or year), from which the absolute frequency of consumption of each item was calculated. The quantity of food consumed was generally assessed by selecting an image of a food portion or selection of a predefined standard portion when no image was available. Food samples were collected from (small to large) distribution markets in triplicates and trace elements determination was performed with ICP-MS (inductively coupled plasma mass spectrometer) after sample mineralization. All the analyzed foods were then grouped into ten macro categories.



Results

We found the highest levels of **selenium** in meat (202 µg/Kg), fish and seafood (489 µg/Kg), dry fruit (314 µg/Kg) and legumes (220 µg/Kg). The level of **cadmium** was higher in sweets (60.33 µg/Kg), dry fruit (µg/Kg) and fish and seafood (29.37 µg/Kg). The level of **zinc** was higher in cereal products (11.7 mg/Kg), meat (28.4 mg/Kg), dairy products (18.8 mg/Kg), legumes (21.2 mg/Kg) and dry fruits (37.8 mg/Kg). Finally, the highest concentration of **copper** was found in dry fruit (14.9 mg/Kg), legumes (6.2 µg/Kg), sweets (4.1 µg/Kg) and meat (3.7 µg/Kg). Fruits has the lowest level of selenium (3 µg/Kg), cadmium (1.08 µg/Kg), zinc (1.19 mg/Kg) and copper (1.0 mg/Kg) of any other category of products. (Table 1)

	SELENIUM (µg/Kg)	CADMIUM (µg/Kg)	ZINC (mg/Kg)	COPPER (mg/Kg)
CEREALS	130	22.19	11.7	2.4
MEAT	202	4.91	28.4	3.7
FISH AND SEAFOOD	489	29.37	78.7	1.2
DAIRY PRODUCTS	113	0.51	18.8	1.3
VEGETABLES	17	10.59	3.2	2.3
FRUITS	3	1.08	1.19	1.0
LEGUMES	220	9.54	21.2	6.2
DRY FRUIT	314	59.58	37.7	14.9
SWEETS	66	60.33	9.1	4.1
POTATOES	42	15.86	3.9	1.2

Table 1. Concentration of selenium, cadmium, zinc and copper in ten category of food.

Conclusions

Our results assess levels of selected essential and toxic trace elements in the main foodstuff that are typical of the Italian diet. Our findings will allow to estimate dietary trace elements Northern exposure using the food frequency questionnaires which are useful and frequently implemented in both toxicological and epidemiological studies.

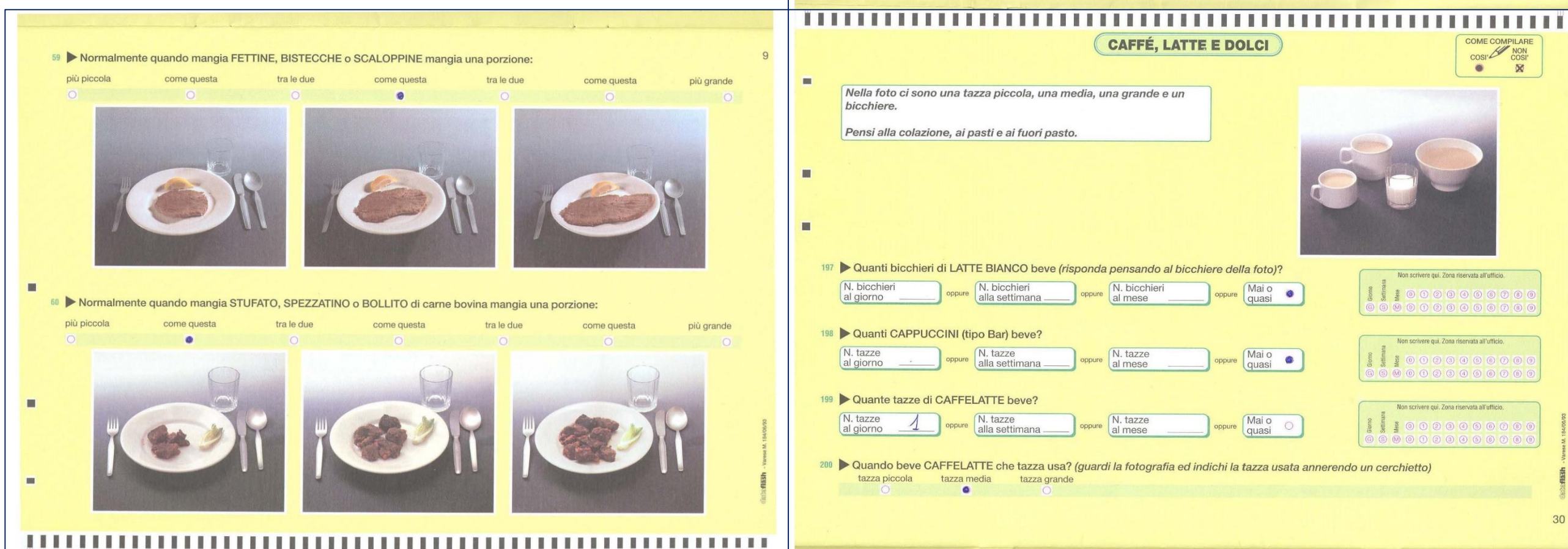
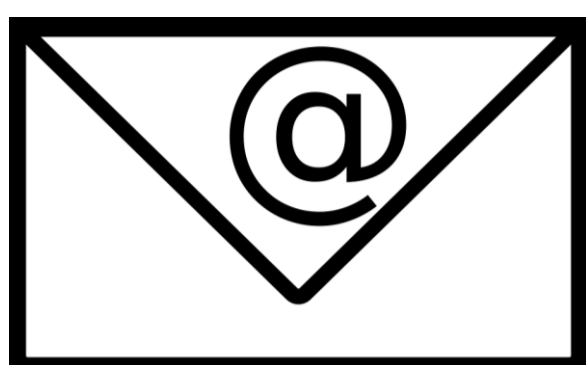


Figure 1. Epic Food Frequency Questionnaire.



Prof. Marco Vinceti – University of Modena and Reggio Emilia, Via Campi 287 – 41125 Modena
marco.vinceti@unimore.it