DETERMINATION AND EVALUATION
OF SOME TRACE ELEMENTS IN CHINESE FOODSTUFFS

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The concentrations of trace elements As, Br, Cd, Cr, Cu, Hg, Pb, Sb, Se and Zn in Chinese foodstuffs were determined by instrumental or radiochemical neutron activation analysis or atomic absorption spectrometric methods. 1198 samples including 20–25 kinds of main foodstuffs were analyzed. The results are given and the daily intake of the trace elements for population groups concerned have been calculated.

Introduction

It is well known that the trace elements As, Br, Cd, Cr, Cu, Hg, Pb, Sb, Se and Zn are very important to human health. Some of them, for instance Cu and Zn, are essential elements. Some of them, such as As, Br, Cd, Hg, Pb and Sb are toxic. Others, e.g. Cr and Se, sometimes are necessary to the human body, but sometimes are considered a potential health hazard. The main pathway for trace elements to reach the human body is the food chain. So it is necessary to develop suitable methods for determining the elements and monitor their concentrations in foodstuffs. Under the help and support of the International Atomic Energy Agency, our research program on Nuclear Techniques for Toxic Elements in Chinese Foodstuffs was put into effect in 1986. The main objectives are: (1) to develop nuclear methods to determine the trace elements in Chinese food items. They should be suitable to our concrete conditions; (2) to establish analytical quality control services and to provide validation support for food monitoring programs using conventional non-nuclear techniques; (3) to carry out small-scale pilot investigations and estimate whether the concentrations of toxic elements in individual food items approach or exceed the maximum permissible levels specified in our national legislation or international guidelines; if so, try to find the reason and treatment methods; and (4) to provide the information on the daily intakes of those trace elements for the population groups concerned.
By now, this program has been finished. A great deal of work has been done. Some results about the trace elements are reported here.

Materials and methods

Sample collection and preparation

1198 samples were collected and prepared from 10 cities and 4 countrysides. The cities are Beijing (in the North of China), Wuhan (South), Guangzhou (South), Kunming (Southwest), Shenyang (Northeast), Harbin (Northeast) and Shanghai (East). The 4 countrysides are located in Neimenggu, Henan, Guangxi and Fujian Provinces. The sampling places are representative of various types and located in different areas (Fig. 1).

More than 20 kinds of foodstuffs were collected in each place. The food items analyzed are rice, wheat flour, corn, vegetables (cabbage, Chinese cabbage, tomato, potato, turnip, etc.), fruits (apple, pear, banana, orange etc.), milk, eggs meats (pork, beef, mutton, etc.), chicken, fishes and other main local foods. Those foodstuffs comprise together more than 80% of average daily intake.

According to the recommendation of the research protocol issued by the IAEA for the coordination research program on Nuclear Techniques for Toxic Elements in Foodstuffs; our procedure of sample collection and preparation was to purchase