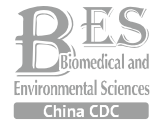


Policy Forum



The Revision of Aluminum-containing Food Additive Provisions in China

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The aim of this study was to revise the provisions for aluminum-containing food additives in GB 2760-2011 (The National Food Safety Standard for Use of Food Additives), in order to reduce aluminum exposure among the Chinese population. According to the latest risk assessment results of JECFA and China on aluminum and the actual use of aluminum-containing food additives in certain products, the aluminum-containing food additive-related provisions in GB 2760-2011 were revised. Those revisions included narrowing down the applicable food categories and adjusting the maximum use level of aluminum potassium sulfate and aluminum ammonium sulfate, repealing nine aluminum-containing food additives in puffed food and repealing the use of sodium aluminum phosphate, sodium aluminosilicate and starch aluminum octenylsuccinate in all food. After revision of the use of aluminum food additive provisions, the weekly dietary intake of aluminum in the Chinese population can be reduced to a safe level.

Aluminum is the third most abundant element and a major constituent of the earth's crust^[1], which can be released into the environment both by natural processes and from anthropogenic sources. On the one hand, it is naturally present in varying amounts in most foodstuffs and may concentrate in food crops in some regions. On the other hand, a number of aluminum salts are used as food additives. In general, the foods that contain the highest concentration of aluminum are those that contain aluminum additives^[1].

Various aluminum compounds were evaluated by the Joint FAO/WHO Expert Committee on Food Additives (JECFA). The committee evaluated aluminum as a contaminant at its 33rd meeting held in 1988 and established a Provisional Tolerable Weekly Intake (PTWI) of 0-7.0 mg/kg bw for aluminum. The committee concluded that there was no need to set a separate acceptable daily intake

(ADI) for the aluminum-containing food additives because the PTWI included aluminum exposure arising from food additive uses. At its 67th meeting held in 2006, the committee reevaluated aluminum use in food additives and other sources and established a PTWI of 1 mg/kg bw, the new PTWI applied to all aluminum compounds in food, including food additives, and the previous PTWI was withdrawn. Finally, at its 74th meeting held in 2011, the committee established a PTWI of 2 mg/kg bw and the previous PTWI of 1 mg/kg bw was withdrawn^[1].

In China, aluminum-containing food additives are listed in GB 2760 (*The Standard for Use of Food Additives*) and are commonly used in wheat flour and its product, puffed food and jelly fish, to aid dough fermentation or act as preservatives^[2]. According to GB 2760-2011^[2], aluminum-containing food additives included 14 food additives, which were listed as aluminum potassium sulfate, aluminum ammonium sulfate, sodium aluminum phosphate, sodium aluminosilicate, starch aluminum octenylsuccinate, and the aluminum lake of erythrosine, tartrazine, sunset yellow, allura red, brilliant blue, ponceau 4R, new red, indigotine, and amaranth. For these additives' usage level, reference is made to the PTWI of 7.0 mg/kg bw for aluminum established in 1988 by the JECFA Committee. As the new PTWI of 2 mg/kg bw was established by JECFA, it is necessary to reevaluate and revise the provisions of aluminum-containing food additives in China.

Data Resources

Risk assessment for aluminum based on the PTWI of 2 mg/kg bw was conducted by the China National Center for Food Safety Risk Assessment (CFSA) in 2011^[3]. The risk assessment result showed that China's current aluminum residue limit (100 mg/kg) would lead to aluminum intake more than the PTWI among 39.7% of the population under current food consumption patterns. Food

consumption data from the Nutrition and Health Survey of Chinese Residents in 2002 and the Nutrition and Health Monitoring of Chinese Residents in 2009 were used in this risk assessment to calculate the aluminum dietary intake. Table 1 listed the aluminum intake through different foods, which indicated that food categories 06.03.01 *Wheat flour*, 06.03.02 *Wheat flour products*, 16.06 *Puffed food* and 06.05.02 *Starch products* contributed the most to aluminum intake.

According to the assessment, the average dietary intake of aluminum was 1.795 mg/kg bw, which was lower than the PTWI of 2 mg/kg bw. But for children under 14 years old or people in north China or high consumption consumers, the exposure to aluminum was found to be higher than the PTWI. The conclusion of the risk assessment suggested that certain measures should be taken to reduce the intake of aluminum among people in China. Moreover, it is estimated that 75% of aluminum dietary sources among Chinese people were aluminum-containing food additives. Since the aluminum-containing food additives are the main contribution of aluminum intake, it is crucial to restrict the use of these additives to reduce aluminum exposure^[3].

An industrial survey was conducted to collect the actual use data on aluminum-containing food additives, including usage level, the food categories in which aluminum-containing food additives were used, and technological necessity. According to the survey results, some additives, such as sodium

aluminum phosphate, sodium aluminosilicate, and starch aluminum octenylsuccinate, were not unique in their function and could be replaced, while others were irreplaceable in certain food categories, such as aluminum potassium sulfate and aluminum ammonium sulfate used for jellyfish products.

Laboratory tests and field research were used to obtain the aluminum content and the actual processing technology of certain food. These data were used to verify the industrial survey results and provide reference to the formulation of aluminum residue restrictions.

Revision Principle

The revision of aluminum-containing food additives was based on the scientific risk assessment, while other factors, such as industry status, consumption patterns, technological necessity, and public acceptance, were also taken into account. The risk assessment data of aluminum exposure in the Chinese population and industrial survey results were used for the revision. CFSA's aluminum risk assessment suggested that the use of aluminum-containing food additives should be restricted to ensure that the Chinese population's intake of aluminum is lower than the PTWI^[3]. Therefore, additives with no technological necessity should be removed, while those with substitutes should be restricted.

International standards have important referential value in the establishment of control measures. The use of aluminum-containing food additives in the Codex General Standard for Use of Food Additives (GSFA)^[4], EU food additives regulations^[5], Code of Federal Regulations of the USA^[6], and food additive standards of Japan^[7] and Australia^[8] were referenced in the study.

Expert advice, public comments, and relevant ministries' opinions were also important during the revision. Academic seminars, survey forms and official letters were used to collect opinions from different groups. All of these opinions were considered and analyzed to protect the essential interests of all stakeholders.

Aluminum Potassium Sulfate and Aluminum Ammonium Sulfate

Aluminum potassium sulfate and aluminum ammonium sulfate were traditional food additives, and were commonly used in wheat flour products, puffed food, and aquatic products as a leavening agent and stabilizer. According to GB 2760-2011^[2],

Table 1. Aluminum Intake through Different Foods in the Total Population (mg/kg bw·w)*

Food Categories	Aluminum Intake	
	Average Value	P97.5
Wheat flour	0.787	4.835
Fried bread stick	0.184	2.572
Steamed bread	0.424	3.948
Noodle	0.133	0.859
Jellyfish product	0.022	0
Vermicelli	0.053	0.631
Fried dough cake	0.037	0
Bread	0.007	0.112
Fried dough twist	0.003	0
Fried cake	0.001	0
Puffed food	0.076	0.799
Other wheat flour product	0.074	0.811
In total	1.795	7.660

Note.*Source: Risk assessment of dietary exposure to aluminum in Chinese Population, 2011.

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