This is provisional English translation of an excerpt from the original full report.

Risk Assessment Report

Hydrogen peroxide

(Food Additives)

Food Safety Commission of Japan (FSCJ)
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ABSTRACT

Hydrogen peroxide（H_2O_2, CAS No. 7722-84-1) is an additive used as a disinfectant and bleach.
FSCJ conducted a risk assessment of this additive using data of various studies described below.
The data used in the assessment include, genotoxicity, repeated dose toxicity, carcinogenicity, reproductive and developmental toxicity, in experimental animals.

In December 2015, FSCJ conducted an assessment of peracetic acid preparation and its chemical compositions as additives. The food safety evaluation of hydrogen peroxide is also included in the assessment.
The applicant, who requests this amendment of the standards, offered new data on the estimated daily intake (EDI) of hydrogen peroxide in whitebait (edible juvenile fish) processed food. The safety information was not included in the data.
Therefore FSCJ has assessed the risk based on the previously published risk assessment report “Peracetic acid preparation and its chemical composition” (2015) and newly submitted data on the estimated daily intake.

1. Safety and pharmacokinetics
   According to the reports from JECFA and FSANZ, hydrogen peroxide is rapidly decomposed into water and molecular oxygen in foods with a half-life of a few minutes.
   Pharmacokinetics suggest that hydrogen peroxide is metabolized promptly by enzymes including catalase. Hydrogen peroxide is also decomposed into water and molecular oxygen in the presence of metal ions or at high temperature. The degradation is also considered to occur on food surfaces.
   Species and inter-individual differences are known for catalase activity, and human acatalasemia is also reported. The residual amounts of hydrogen peroxide derived from foods eaten is, however, considered to be decomposed at the oral cavity.

2. Toxicity
   Hydrogen peroxide is considered to have no genotoxicity relevant to human health as long as it is ingested as an additive in normal use owing to the rapid metabolism and decomposition, despite the fact that hydrogen peroxide shows genotoxicity without metabolic activatation in the test system.
   From the results of acute toxicity, repeated dose toxicity, and reproductive and developmental toxicity studies, FSCJ judged 30 mg/kg bw per day as the NOAEL of hydrogen peroxide which was obtained in a 100 days

gavage administration study in rats.

On the carcinogenicity of hydrogen peroxide, the currently available data are insufficient and thus not allowed to verify its potential. Duodenal carcinomas were detected in mice with low catalase activity, after hydro peroxide feeding. The result was unlikely to extrapolate into human with normal catalase activity. No carcinogenicity was, however, observed in an 18-month oral exposure test in rats through drinking water. On the basis of these results, FSCJ concluded that hydrogen peroxide is of no carcinogenic concern in human with normal catalase activity.

3. Estimated Daily Intake (EDI)

(1) The EDI of hydrogen peroxide used as an additive in relation to the use of peracetic acid products.

FSCJ is recognizing 0.105 mg/person per day (0.0019 mg/kg bw per day) as the EDI for hydrogen peroxide used as an additive in relation to the use of peracetic acid products. This EDI, however, is a value calculated from the detection limit in residue analyses. Meat and poultry meat are mostly heated during the processing and/or the cooking, and vegetables or fruits are also often processed for cooking. FSCJ thus concluded that, if its stability and pharmacokinetics are considered, the actual intake of hydrogen peroxide is much lower than the EDI estimated as described above.

Besides, standards for use of hydrogen peroxide are established, in the control measures for use of peracetic acid products, as “Hydrogen peroxide used shall be decomposed or removed before the completion of the final food”. FSCJ therefore concluded that hydrogen peroxide derived from peracetic acids products hardly remains in the final food products as long as the appropriate risk management measures.

(2) The EDI of hydrogen peroxide after the amendment of standard for its use to whitebait (edible juvenile fish) processed food.

FSCJ determined the EDI of hydrogen peroxide after the amendment of standard for its use to whitebait (edible juvenile fish) processed food in Japan to be 0.115 mg/person per day (0.0021 mg/kg bw per day), as the sum of 0.105 mg/person per day (0.0019 mg/kg bw per day) which is the EDI of hydrogen peroxide derived from the use of peracetic acid products and 0.0096 mg/person per day (0.00017 mg/kg bw per day) which is the EDI of hydrogen peroxide after the amendment of standard for its use.

The applicant for this amendment submitted the data on feeding study on hydrogen peroxide used for processing whitebait (edible juvenile fish) processed food. According to the document, amounts of hydrogen peroxide in whitebait (edible juvenile fish) processed foods with or without hydrogen peroxide processing were 0.2 ~ 2.4 μg/g and 0.2 ~ 3.2 μg/g, respectively, indicating no-differences in the residue amounts.

FSCJ concluded that the actual intake of hydrogen peroxide is much lower than the EDI described above from its stability and pharmacokinetics.

4. Safety evaluation

The amount of hydrogen peroxide in whitebait (edible juvenile fish) processed food was not altered before and after in the processing in the residue analyses, although the EDI of hydrogen peroxide after the amendment of standard for its use to whitebait (edible juvenile fish) processed food was slightly increased from that of

hydrogen peroxide derived from the use of peracetic acid products. In consistent with the previously published risk assessment report “Peracetic acid preparation and its chemical composition” (2015), the toxicity study in this assessment provided a NOAEL for hydrogen peroxide. Despite these results, FSCJ evaluated that hydrogen peroxide is of no safety concern as long as it is appropriately used as an additive, taking into consideration the stability, mechanism of pharmacokinetics, actual intake and risk management measures of hydrogen peroxide. FSCJ thus concluded it unnecessary to specify the ADI.

As was mentioned above, duodenal carcinomas were observed in mice with low catalase activity after hydrogen peroxide feeding. The actual intake of hydrogen peroxide in human is, however, extremely low as was mentioned. In addition, ingested hydrogen peroxide is metabolized by enzymes such as peroxidase excreted in human saliva other than catalase. Therefore, FSCJ judged that hydrogen peroxide is of no safety concern also for peoples with diminished catalase activity as long as it is appropriately used as an additive.