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“Can people with celiac disease eat products containing TG?”

For celiac disease to occur, gliadin peptides must be produced and deamidated in the intestinal tract. Patients with celiac disease should avoid foods containing gluten, regardless of whether or not they contain TG. If, for example, a non-wheat food is ingested, specifically a food in which AJI-TG was used but that does not contain gluten, the absence of gluten means that gliadin peptide will not be produced in the intestinal tract, so there is no need to be concerned with deamidation by AJI-TG.

Humans have been eating steak tartare, carpaccio, sashimi and other such raw foods for a long time. Eight types of endogenous TG are present in living organisms, including coagulation factor XIII, and raw foods containing these contain active TG. Patients with celiac disease are restricted from eating wheat-related food, and no cases of problems have been reported from ingestion of active TG as long as wheat-related foods are avoided.

In addition, dehydration/condensation reactions that form cross-links are known to occur during the processes of heating and cooking food ingredients such as fish and meat. Cross-links also form during the cooking process due to the presence of endogenous TG and processed foods (e.g., fish cake, foie gras, stews, etc.) contain natural crosslinks. Consumption of non-wheat processed food by patients with celiac disease can be seen as similar to ingesting naturally occurring cross-linked substances, which humans have done for a long time with no reported problems.

Moreover, patients with celiac disease have been ingesting active TG through consumption of oysters and carpaccio. A variety of cross-linked substances produced in the cooking process are also being ingested. Consequently, provided wheat-related foods are avoided, there is no need to be concerned about the effects of added TG.

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Glossary

1. Celiac disease: Celiac disease is a maladaptation in which the ingestion of wheat gluten (specifically gliadin) causes inflammation of the intestinal mucosa from peptides produced as gliadin is digested in the body. This results in symptoms such as diarrhea, bloating and malnutrition. Celiac disease is said to be genetically inherited. A gluten-free diet is recommended to prevent the disease. Celiac disease corresponds to an elevation in the activity of tissue transglutaminase (tTG) in intestinal epithelial cells and production of tTG autoantibodies (IgA) is checked to confirm this diagnosis. A strong connection has been indicated between occurrence of celiac disease and the modification (deamidation) of wheat digesta by tTG.

2. Tissue TG (tTG): Eight types of TG are present in living organisms, comprising TG1-7 and coagulation factor XIII. Together, these are called isozymes, displaying the same function for catalyzing cross-linking reactions, but differing in organ distributions, high-order structure and reaction characteristics (calcium dependence, substrate specificity, etc.). For example, coagulation factor XIII serves as the matrix for fibrin and strengthens scabs formed when injury occurs. tTG, also known as TG2, is calcium-dependent and is associated with natural cell death. In patients with celiac disease, tTG present in intestinal epithelial cells deamidates the carboxamide side chain of the glutamine residue in gliadin peptide produced when wheat is ingested, inducing inflammation as a result.

3. Ajinomoto TG (AJI-TG): AJI-TG is microbially produced TG and is related to the 8 enzymes and isozymes described above. AJI-TG is not calcium-dependent and differs from tTG in many respects, including molecular weight and high-order structure. The deamidating capacity is also lower than that of tTG. AJI-TG reportedly deamidates gliadin peptide, the trigger for celiac disease, at a low level. Moreover, no cases of celiac disease occurring with ingestion of AJI-TG have been reported.



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