

Japanese Functional Food Update Vol. 3 Foods with Function Claims notification as final product: Improving memory accuracy

In today's super-aging society, there has been growing attention on healthy dietary habits for "healthy aging". In this Japanese Functional Food Update, we would like to summarize and review the functional ingredients and functionality evaluation items of products notified as FFC with claims related to "improving memory accuracy".

●Functional ingredients

More than half of the FFC products notified as final product identified plasmalogen, which could be further divided into chicken-derived plasmalogen and ascidian-derived plasmalogen (Figure 1), as the functional ingredient. Besides plasmalogen, curcumin was stated as the functional ingredient in two other notified products. In this issue, the functionalities and efficacies of plasmalogen and curcumin will be discussed.

Plasmalogen (A type of phospholipids)

Plasmalogens are found in tissues with high oxygen consumption, such as the brain, the heart, and skeletal muscles, in mammals. In the brain tissue,

about half of the lipids contained is comprised of phospholipids, and plasmalogens make up 20% of these phospholipids, suggesting their important role to the brain. It has also been found that plasmalogens are low in the brains of the elderly and Alzheimer's patients^{1,2}). The fact that many studies, including *in vitro* studies on brain nerve cells, *in vivo* and clinical researches, on this ingredient have been conducted previously, is one of the probable reasons why it is often used as a functional ingredient in FFC products with "improving memory accuracy" claims.

Although ascidian, scallop and chicken contain plasmalogens, it is difficult to intake effectively from these food sources since plasmalogens are susceptible to degradation by heat during cooking. Therefore, the more effective mean of intake is in the form of supplement. In fact, most of the final products notified with the claim "improving memory accuracy" as FFC were supplements (Except a juice product that contains auraptene as its functional ingredient).

Curcumin (A type of polyphenols contained in turmeric, etc.)

Curcumin is commonly found in turmeric and plants of the ginger family. It is most widely used as a spice and a coloring agent in the food industry. In Japan, it is categorized as an “existing additive” and is known as turmeric dye. Amyloid- β is a well-known substance that is thought to be the cause of Alzheimer-type dementia through aggregation in the brain and causing damages to cranial nerves. Studies up until presently have shown that curcumin is capable of inhibiting this

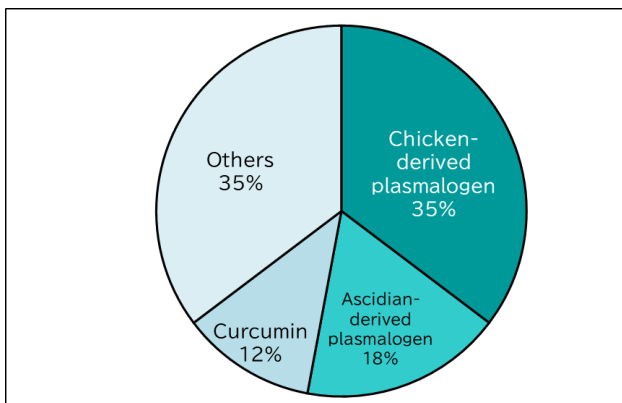


Figure 1: Percentages of notified functional ingredients

※Others (percentages under 10%): Auraptene, ferulic acid, soybean-derived phosphatidylserine, diosgenin, wasabi-derived 6-methylsulfinylhexyl isothiocyanate (6-MSITC), astaxanthin, L-theanine, β -lactolin

aggregation³⁾. In practice, there has been clinical trial on final product where the degree of accumulation of amyloid- β in the hypothalamus has been visually assessed using brain imaging analysis

and then used as a measurement of curcumin’s functionality. (Not shown in Figure 2 since it was used only in one study).

● Evaluation items used for functionality assessment

The Mini-Mental State Examination (MMSE) and the Uchida-Kraepelin Test are found to be the two most common assessment methods used to evaluate cognitive function (Figure 2). Details of each assessment method are shown as follows.

MMSE⁴⁾

This examination method is often used in cases of suspected Alzheimer-type dementia. In the form of a questionnaire on memory, calculation skills, language skills, and orientation with questions such as those related to the current date and the ability to redraw a specified figure, MMSE evaluates symptoms related to dementia by giving a score on the results. A total score of 23 or below indicates mild dementia, 24~27 for mild cognitive impairment (MCI), and 28 or above for normal cognitive function.

Uchida-Kraepelin Test⁵⁾

By asking examinees to perform a series of simple additions, their abilities to continue a task and perform



calculations are evaluated in this test. Personality and behavioral characteristics of the examinees are also appraised.

Cognitrax⁶⁾

This is a computer-based cognitive function test. It is used to assess various ability domains such as language skills, visual memory, and continuous performance. The results are summarized using a score to evaluate cognitive function.

Wechsler Memory Scale-Revised (WMS-R)⁷⁾

This is a worldwide used memory test. Through its 13 subtests, it can be used to calculate the five major qualities, general memory, attention/concentration, verbal memory, visual memory, and delayed recall.

In ORTHOTOMEDICO, detailed review on past findings and related literature are conducted to ensure protocols that

can bring about high-quality clinical trials are proposed. Furthermore, we provide “total support” from clinical trials to post-trial related work such as notification submission and dealing with responses from the CAA. Please feel free to contact us to know more.

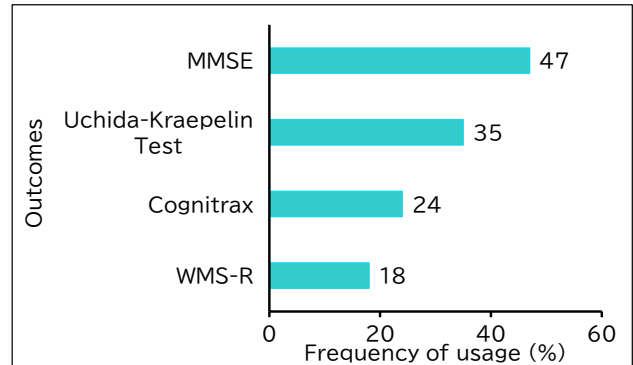


Figure 2. Relative usage percentages of various evaluation items

※1 Multiple evaluation items are used in combination in some clinical trials

※2 Evaluation items with frequency of usage 15% or below are not included in the bar chart

We will continue to provide you with information about the Japanese functional food regulation and market. Looking forward to working with you in the future.

Table 1. List of published clinical trials that studied final product and showed scientific evidence for “Improving memory accuracy” function

FFC Notification No.	Literature	Functional Ingredient(s)	Outcomes used in functionality evaluation
C260	Nakajima M, et al (2016) ⁸⁾	Chicken-derived plasmalogen	MMSE, Uchida-Kraepelin Test
C268			
C280			
D299			
D366			
D596			
D100	Igase M, et al (2018) ⁹⁾	Auraptene	MMSE
D515	Small GW, et al (2018) ¹⁰⁾	Curcumin	Verbal memory (SRT), Visual memory (BVMT-R), FDDNP-PET
E269	Watanabe H, et al (2019) ¹¹⁾	Ascidian-derived plasmalogen	Cognitrax, DASC-21
E396			
E730			
E420	Tohda C, et al (2017) ¹²⁾	Diosgenin	MMSE, RBANS
E709	Kawamoto K, et al (2019) ¹³⁾	Curcumin, ferulic acid, soybean-derived phosphatidylserine	WMS-R (Verbal Paired Associates), Tapping Span (Visual memory), PASAT
E720	Okunishi I, et al (2019) ¹⁴⁾	Wasabi-derived 6-methylsulfinylhexyl isothiocyanate (6-MSITC)	RAVLT, WMS-R, PASAT, G-SCWT
E769	Sekikawa T, et al (2019) ¹⁵⁾	Astaxanthin	Cognitrax
E811	Hidese S, et al (2019) ¹⁶⁾	L-theanine	Trail-Making Test, Stroop Test, BACS
F1	Kita M, et al (2019) ¹⁷⁾	β -lactolin	RBANS, WMS-R, CAT, S-PA, RMT-F

[Reference]

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