Development of functional agricultural products and use of a new health claim system in Japan

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160914 14:00-14:30
Today’s topics

◆ Novel functional labeling system

◆ Development of agricultural products with function claims in NARO
Japanese Prime Minister Abe published the new economic policies and growth strategies that are referred to as “Abenomics” in June, 2013.

These policies require review of the novel labeling system for health foods from the viewpoint of convenience for consumers and manufacturers.

Novel labeling system (2015.4~) “Foods with function claims” (FFC)
“Food with function claims” is notified food that a manufacturer can label it as the functional food on the package at its own risk.
Notified foods with function claims (FFC)

- The CAA launched a new food labeling system for functional foods in April 2015. Under this system, companies and agricultural producers can evaluate and describe scientific evidence of health food benefits and functional properties independently to promote self-medication.

- FFCs are foods that are described to the Secretary-General of the CAA as products whose labels bear function claims based on scientific evidence, as assessed by food business operators.

- Hence, it is advisable to check warnings on product labels and the information disclosed on the website of the CAA carefully before purchasing and consuming FFCs. As of September 11, 2016, 421 FFCs had been notified and received.
Requirements of FFC system

- The distributor is responsible for providing scientific evidence of functionality (prior notification system).
- The functional ingredient has been identified using a validated method.
- The mechanisms of action have been characterized using *in vitro* and *in vivo* tests and in human clinical trials.
- Scientific evidence has been acquired from human clinical trials, or research reviews of functional ingredients from the end product.
- Functionalities contribute to maintenance and improvement of health.
- Experience of consumption and safety is sufficient in the Japanese population.
- Notice is given to the CAA within 60 days of sale and is displayed on the packaging.
- The adequate daily intake is an appropriate volume to eat.
### Foods with function claims (FFC) (A1-A310, B1-B110)

<table>
<thead>
<tr>
<th>Health claims</th>
<th>Functional ingredients</th>
<th>Scientific evidence</th>
<th>Fresh foods</th>
<th>Processed foods</th>
<th>Supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps to reduce visceral fat and high BMI</td>
<td>Lactoferrin, chitoglucan, isoflavone from Ludzu flower, Licorice glabridin, Acetate, Lactobacillus gasseri sp, EGCG, procyanidin, CP1563</td>
<td>RCT:8, SR:60</td>
<td>0</td>
<td>41</td>
<td>27</td>
</tr>
<tr>
<td>Slows elevation of postprandial serum triglyceride levels by inhibiting dietary fat absorption</td>
<td>Indigestible dextrin, β-glucan, wheat albulmin, salacinol, 5-aminolevulinic acid, chitosan, gymnemic acid, mulberry leaf, procyanidinB1</td>
<td>RCT:3, SR:49</td>
<td>0</td>
<td>43</td>
<td>9</td>
</tr>
<tr>
<td>Decreases serum triglyceride and LDL cholesterol levels</td>
<td>Monoglycosyl hesperidin, EPA/DHA, Indigestible dextrin, procyanidin B1, lycopene, polydextrose, chitosan, Terminalia bellirica polyphenol; α-linoleic acid</td>
<td>RCT:5, SR:56</td>
<td>0</td>
<td>43</td>
<td>18</td>
</tr>
<tr>
<td>Helps to maintain normal blood pressure in relatively hypertensive individuals</td>
<td>Lactotripeptide, Valyl-leucine, γ-glutamyl-S-allylcysteine, cacao flavanol, α-linoleic acid, GABA, wakame seaweed peptide, acetate, piperine, lycopene</td>
<td>RCT:5, SR:34</td>
<td>0</td>
<td>29</td>
<td>10</td>
</tr>
<tr>
<td>Improves a bowel movement by providing intestinal flora</td>
<td>Bifidobacterium longum, Bifidobacterium bifidum BifiX, indigestible dextrin, genkwanan glycoside, gasseri sp</td>
<td>RCT:1, SR:39</td>
<td>0</td>
<td>33</td>
<td>7</td>
</tr>
<tr>
<td>Helps to moisturize skin and alleviate drying</td>
<td>Sodium hyaluronate, Rice glucosylceramide, N-acetylglucosamine</td>
<td>RCT:0, SR:26</td>
<td>0</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Supports focus adjustment functions and conditions of eyes</td>
<td>Lutein, astaxanthin, cyanidin-3-glucose, berberry anthocyanin, crocetin</td>
<td>RCT:1, SR:37</td>
<td>0</td>
<td>3</td>
<td>35</td>
</tr>
<tr>
<td>Decreases the sense of tension from work, supports healthy sleeping at night</td>
<td>theanine, glycine, L-serine, sake yeast GSP6</td>
<td>RCT:2, SR:10</td>
<td>0</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>
Foods with function claims (FFC) (A1-A310,B1-B110)

<table>
<thead>
<tr>
<th>Health claim</th>
<th>Functional ingredients</th>
<th>Scientific evidence</th>
<th>Fresh foods</th>
<th>Process foods</th>
<th>Suppllement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps bending and stretching of knee joints</td>
<td>collagen peptide, glucosamine hydrochloride, unmodified type II collagen, S-adenosylmethionine, proteoglycan</td>
<td>RCT: 3, SR: 16</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Reduces physical fatigue from normal daily activity, and relieves temporary mental stresses</td>
<td>theanins, GABA, Imidazole peptide, reduced form coenzyme Q10, litchi polyphenol, sesamin</td>
<td>RCT: 2, SR: 22</td>
<td>0</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Alleviates feelings of discomfort in the eyes and/or the nose following exposure to house dust etc.</td>
<td>O-methylated catechin, <em>Bidens pilosa</em> caffeic acid</td>
<td>RCT: 1, SR: 5</td>
<td>0</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Maintains bone health by facilitating bone metabolism</td>
<td>β-cryptoxanthin, isoflavone</td>
<td>RCT: 1, SR: 14</td>
<td>4</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Increases the accuracy of memory as a component of cognitive function</td>
<td>Gingko leaf flavonoid glycoside, gingko leaf terpene lactone, DHA</td>
<td>RCT: 0, SR: 7</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Maintains peripheral temperature</td>
<td>Monoglycosylhesperidin, 6-gingerol</td>
<td>RCT: 0, SR: 6</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Maintains healthy liver function</td>
<td>curcumin</td>
<td>RCT: 1, SR: 0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Helps to maintain muscle during aging</td>
<td>leucine</td>
<td>RCT: 0, SR: 2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Helps to maintain walking ability in the elderly</td>
<td>Black ginger 5, 7-dimethoxyflavone</td>
<td>RCT: 0, SR: 1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**By Sep 5, 2016, CAA website**

**RCT; randomized clinical trial, SE; systematic review**
Fresh food as FFC (soybean sprout (A206))

This food contains isoflavone, which reportedly maintains bone health

Isoflavone; 56 mg/day
This food contains β-glucan, which reportedly decreases serum LDL cholesterol levels and improves bowel movement. β-glucan; 3g (38g)/day
This food contains γ(gamma)-aminobutyric acid (GABA), which reportedly maintains blood pressure at normal levels in people with relative hypertension.
FFC (tomato freshly squeezed juice(A106))

This food contains lycopene, which reportedly increase HDL cholesterol level.

Lycopene 22mg/day
Today’s topics

◆ Novel functional labeling system

◆ Development of agricultural products with function claims in NARO
Research project on the development of agricultural products and food with health-promoting benefits (NARO)

- Project period: July 2013–March 2016
- Total budget: 2 billion yen
- Number of project: 18 studies
- Concept
  1. to develop agricultural products that are helpful in reducing risks of diseases
  2. to create a database on agricultural products with health-promoting benefits
  3. to develop a system offering a recipe and health-promoting boxed lunch (O-Bento) depending on the personal health condition
Development of functional agricultural products in NARO project

- High amylose rice; decreases postprandial glucose levels
- Brown rice that abraded the surface; reduces visceral fat
- β-glucan rich barley; decreases postprandial glucose levels
- Rutin rich tartary buckwheat; maintains normal serum cholesterol levels.
- β-conglycinin rich soybean; maintains serum triglyceride levels and reduces free fatty acid levels.
- Quercetin rich onion; prevents cognitive degeneration
- Lycopene rich carrot; maintains normal serum cholesterol levels.
- β-cryptoxanthin rich satsuma mandarin; improves hepatic function disorder
- O-methylated catechin rich green tea; decreases serum oxidized LDL cholesterol levels
High serum β-cryptoxanthin associated with lower risk of bone loss and osteoporosis in postmenopausal Japanese female subjects: Mikkabi prospective cohort study


Satsuma mandarin rich in β-cryptoxanthin may reduce the incidence of osteoporosis in postmenopausal female subjects.

Risk of osteoporosis according to tertiles of baseline serum β-cryptoxanthin concentration

Age, weight, height, years since menopause, current tobacco use, regular alcohol intake, exercise habits, supplement use, and total energy intake were adjusted.
Maintains bone health by facilitating bone metabolism

骨の健康に役立つβ-クリプトキサンチンが含まれています。

三ヶ日みかん 機能性表示食品（届出番号：〇〇〇）

● 目的称： うんしゅみかん
● 届出表示： 本品には、βークリプトキサンチンが含まれています。

βークリプトキサンチンは骨代謝の早急を助けることにより、
骨の健康に役立つことが報告されています。

● 本品は、疾病の診断、治療、予防を目的としたものではありません。\n疾病に罹患している場合は医師に、医薬品を服用している場合は\n医師、薬剤師に相談してください。

● 食生活は、主食、野菜、副菜を基本に、食事のバランスを。

● 事業者名：三ヶ日町農業協同組合
連絡先：浜松市北区三ヶ日町三ヶ日885 電話：053-525-1016

栄養成分表示（可食部270g当たり）（推定値）
エネルギー 124kcal、たんぱく質 1.9g、脂質 0.3g、炭水化物 32.4g、食塩相当量 0.007g

機能性成分（可食部270g当たり）： βークリプトキサンチン 3mg
This food contains β-cryptoxanthin, which reportedly maintains bone health.
Anti-allergic action of O-methylate catechin

O-methylated catechin (EGCG3”Me) in Benifuuki was the highest among the tea cultivars.

EGCG3”-Me: Epigallocatechin-3-O-(3-O-methyl) gallate

● EGCG3”Me in various cultivars

● Manufacturing method changes EGCG3”Me in Benifuuki leaves

“Benifuuki” registered on 1993

Most popular cultivar for green tea

RCT of the effects of regular green tea consumption on allergic perennial rhinitis

Subjects with mild perennial rhinitis against mite (75 people)
Test drink: Benifuuki green tea drink (350 mL) contains 17-mg O-methylated
Schedule: pre/post-observation period (OP) was 4 weeks

Symptom scores: practice guideline for allergic rhinitis by Japanese Society of Allergyology

Yasue et al., Nippon Shokuhinsozai Kenkyukaishi, 8(2) 65-802005

Benifuuki (38 people); Yabukita (37); ** p < 0.01, * p < 0.05 vs Yabukita; ## p < 0.01, # p < 0.05 vs Pre OP
Over one consecutive month drinking of ‘Benifuuki’ green tea containing 34mg per day of O-methylated EGCG is useful to relieve the symptoms from cedar pollen disease.

Masuda S.; Allergology International, 63,(2), 211-217, 2014
Illustration of inhibitory pathways mediated by *O*-methylated catechin

*O*-methylated catechin

Catechin receptor 67LR

Suppression of FcεRI expression

FcεRI

ERK1/2

MYPT1

Inhibition of degranulation (histamine release)

Mast cell

Myosin light-chain phosphorylation

Ca


Foods with function claims
(Notifications Number A67)

Name of product:
Benifuuki green tea bag

Health claim to be notified:
This food contains O-methylated catechin. 
O-methylated catechin is reported to alleviates the eye and nose discomfort caused by exposure to house dust and cedar pollens.

Warning label: Japanese government does not evaluate the functionality and safety of this product. This product is not intended to diagnose, treat, cure, or prevent any disease.
**Nutrition information Per container (Three tea bags)**

<table>
<thead>
<tr>
<th>Energy</th>
<th>35 kcal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>2.3 g</td>
</tr>
<tr>
<td>Total fat</td>
<td>0.2 g</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>5.9 g</td>
</tr>
<tr>
<td>Sodium</td>
<td>0g</td>
</tr>
</tbody>
</table>

**Recommended consumption per day** : Three tea bags (9 g)

**Content of the functional ingredient per day** : O-methylated catechin (34mg/ 3 tea bags (after infusion))

**Way to intake**: Pour boiling water more than 150 ml per one tea bag and extract well stirring it up and down more than two minutes, and please have it after cooling it enough.

**Warning label**: This food is not aimed at the illness, the treatment, and the prevention. This food is not for a patient, person under age, pregnant, and lactating woman. The person who takes medicines should take this food after consultation with a doctor or a pharmacist. When you felt abnormality in physical condition, you should cancel an intake immediately, and, please talk to a doctor. The balance of the meal is important to the eating habits on the basis of a staple food, a main dishes, and some dishes.

**manufacturer**: JA Kagoshima chagyo

**Contact information**: ○○ ○○ ○○ ○○

**Detailed information about the functionality and the safety**: refer to web site
This food contains O-methylated catechin, which alleviates eye or nose discomforts following exposure to house dust.

Memehanacha (34mg of O-methylated catechin/ 2 bottles)
### Agricultural products with possible FFC

<table>
<thead>
<tr>
<th>Agricultural products (variety)</th>
<th>Possible function claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinach from cold climate cultivars</td>
<td>This food contains lutein, which reportedly increases ocular pigment contents and facilitates health maintenance of eyes</td>
</tr>
<tr>
<td>Barley (Kirarimochi)</td>
<td>This food contains β-glucan, which reportedly controls blood LDL-cholesterol levels and decreases postprandial glucose levels.</td>
</tr>
<tr>
<td>Soybean (nanahomare)</td>
<td>This food contains β-conglycinin, which reportedly helps to maintain serum triglyceride levels and reduces free fatty acid levels.</td>
</tr>
<tr>
<td>Tartary buckwheat (Mantenkirari)</td>
<td>This food contains rutin, which reportedly helped to maintain normal serum cholesterol levels.</td>
</tr>
<tr>
<td>Apple (Rubysweet)</td>
<td>This food contains procyanidin, which reportedly helps to maintain normal serum LDL-cholesterol levels.</td>
</tr>
<tr>
<td>Onion (Quergold)</td>
<td>This food contains quercetin, which reportedly helps to maintain normal cognitive function.</td>
</tr>
</tbody>
</table>
Acknowledgements:
Prof. Hirofumi Tachibana (Kyushu university)
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Dr. Takayasu Hirosawa (NARO)

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