S1-1

Isolation and characterization of a novel cold-adapted esterase, MtEst45, from *Microbulbifer thermotolerans* DAU221

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A novel esterase, MtEst45, was isolated from a fosmid genomic library of *Microbulbifer thermotolerans* DAU221. The encoding gene is predicted to have a mass of 45,564 Da and encodes 495 amino acids, excluding a 21 amino acid signal peptide. MtEst45 showed a low amino acid identity (approximately 23–24%) compared with other lipolytic enzymes belonging to Family III, a closely related bacterial lipolytic enzyme family. MtEst45 also showed a conserved GXSXG motif, $G_{131}IS_{133}YG_{135}$, which was reported as active site of known lipolytic enzymes, and the putative catalytic triad composed of D_{237} and H_{265}. Because these mutants of MtEst45, which was $S_{133}A$, $D_{237}N$, and $H_{265}L$, had no activity, these catalytic triad is deemed essential for the enzyme catalysis. MtEst45 was overexpressed in *Escherichia coli* BL21 (DE3) and purified via His-tag affinity chromatography. The optimal pH and temperature of MtEst45 were estimated to be 8.17 and 46.27°C by response surface methodology, respectively. Additionally, MtEst45 was also active between 1–15°C. The optimal hydrolysis substrate for MtEst45 among *p*-nitrophenyl esters (C_2–C_{18}) was *p*-nitrophenyl butyrate, and the K_m and V_{max} values were 0.0998 mM and 550 μmol/min/mg of protein, respectively. MtEst45 was strongly inhibited by Hg^{2+}, Zn^{2+}, and Cu^{2+} ions; by phenylmethanesulfonyl fluoride; and by β-mercaptoethanol. Ca^{2+} did not affect the enzyme's activity. These biochemical properties, sequence identity, and phylogenetic analysis suggest that MtEst45 represents a novel and valuable bacterial lipolytic enzyme family and is useful for biotechnological applications.

S1-2

Targeting of cathepsin C enhances the efficacy of chemotherapy on colorectal cancer cells

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Curcumin a major component of *Curcuma longa* has chemo preventive activity and inhibits the growth of various carcinoma cells. Curcumin can regulate various signaling mechanism, however, its exact anticancer mechanism yet to predict. Cathepsins (CTSs) are lysosomal acid hydrolases which play a distinct role in tumor progression through the regulation of tumor proliferation, invasion, metastasis, and angiogenesis. Amongst CTS, CTSC is overexpressed in various cancers but very limited information is available regarding its involvement in cancer regulation. In the present study, we investigated the role of CTSC in curcumin-mediated cancer regulation. Results revealed that CTSC silencing induced ER stress and autophagy regulation which enhanced the curcumin mediated cell cytotoxicity. Moreover, downregulation of cytotoxicity in the presence of NAC suggested the involvement of ROS in combined treatment mediated cytotoxicity. From these results, we concluded that CTSC plays a significant role in stress management during cancer cell growth and proliferation. Thus, cathepsin targeting in combination with conventional anticancer agents would be an effective approach to treat colorectal carcinomas.

S1-3

Vitexin curbs acrylamide-induced neuroinflammation in zebrafish larvae

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The pathological hallmark of neuroinflammation is characterized by the interaction of activated microglial cells with neuronal-astrocytes, causes accumulation of inclusion bodies (amyloid beta (Aβ), neurofibrillary tangle formation and neuronal loss) in neurons, which in turn contributes to the progression of neurodegenerative diseases. Several pieces of evidence stressed that neuroinflammation and oxidative stress are vital mechanisms underlying the pathogenesis of Alzheimer's and Parkinson's disease. To overcome this psychiatric condition, selectively inhibiting or bypassing capacity of the anti-neuroinflammatory drugs is eagerly required. In this study, we investigated the anti-neuroinflammatory effect of vitexin (VIT) on acrylamide (ACR)-induced neuroinflammation and oxidative stress in zebrafish larvae. Our results corroborate that VIT exhibited excellent anti-neuroinflammation effects (LC_{50}=20μM) against ACR (2μM for 36 h) induced zebrafish larvae as evidenced by morphological, alcian blue and intracellular ROS levels. Specifically, VIT inhibited the MAPK kinase signaling through the inhibition of p38 and JNK mediated signaling, along with the production of inflammatory mediators (iNOS, nNOS, COX-2). Interestingly, VIT strongly up-regulated autophagic (Akt and mTOR) and Nrf2-dependent cellular defence mechanism (SOD, GR, CAT), by inhibiting ACR-mediated neurotoxicity in zebrafish larvae. The implications of our findings contributes to the understanding the mechanisms of VIT effect on ACR-directed neuroinflammation in zebrafish larvae model systems.

S2-1

Artificial humification of lignin architecture: agriculture paves the way for lignin valorization in the plant biomass refinery

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Fermentative use of polysaccharides in the lignocellulosic biomass produces lignin as a by-product. Since the quantity of lignin reaches up to 40% dry weight in the biomass, a promising lignin valorization strategy is necessarily required to maximize the cost-effectiveness of the whole biorefinery processes. Multiple product streams with lignin transformation have been suggested in a field of chemical and material engineering, but the requirement of extensive purification procedures and cascade reactions owing to complexity of lignin architecture is a major hurdle to overcome. Here I introduce one-step and one-pot tuning ways of lignin architecture allowing it to mimic commercial humic substances for agricultural applications. Bottom-up and top-down humification strategies through well-defined oxidative reactions of lignin-derived small phenols and industrial lignins are further detailed. In addition, molecular structure-function relationship to account for effects of the humic analogues on accelerated germination and enhanced abiotic stress resistance of plants is discussed. The fact that action mechanism of the humic-like variants to stimulate plant species is based on collective properties of their diverse structures is emphasized. Finally I rationalize why agriculture will be a promising area for lignin valorization.

S2-2

Anti-plant Viral Constituents from Natural Resources against Pepper Mottle Virus

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Plant viruses cause diseases in many agricultural corps. Pepper mottle virus (PepMoV) belonging to the genus of *Potyvirus* in the family of Potyviridae, is one of the major plant viruses infecting pepper (*Capsicum* sp.). In a search to discover an anti-plant viral agent against PepMoV from natural resources, anti-plant viral assay using green fluorescent protein (GFP)-tagged PepMoV (PepMoV-GFP) was developed, including PepMoV-GFP based leaf-disk method and systemic host method. A total number of 800 plant and fungal extracts were screened for anti-PepMoV activity using PepMoV-GFP based leaf-disk method, and extract of *Brucea javanica*, *Trichoderma albolutescens* culture medium, and *Penicillium expansum* culture medium showed anti-PepMoV activities. The anti-PepMoV constituents of these extracts were investigated through a bioassay-guided isolation by PepMoV-GFP leaf-disk method, resulting in the isolation of some compounds. The structures were determined by spectroscopic methods including NMR, MS, and vibrational circular dichroism. All isolated compounds were evaluated for their ant-PepMoV activities using PepMoV-GFP based systemic host method, and some compounds showed inactivation effects and protective effects against PepMoV.

S2-3

Discovery of bioactive natural products from the dried bark of *Magnolia obovate* using the molecular networking tool

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Dereplication enables the rapid identification of known secondary metabolites early on during phytochemical research process. Molecular networking, one of the recent bioinformatics approaches, is a technique that estimates structural similarity by comparing MS/MS data and is a powerful tool superior to traditional dereplication strategies. Molecular networking enables the detection of related analogues as well as the dereplication of known molecules from complex mixtures. Using this tool, we can identify potential analogues and prioritize secondary metabolites for isolation according to the aims of researchers.
Cholesterol is an essential substance to cell membranes; however, excess levels of it are associated with heart-related diseases. High levels of plasma total cholesterol and plasma low-density lipoprotein cholesterol (LDL-C) are major risk factors for cardiovascular diseases (CVDs). Proprotein convertase subtilisin/kexin type 9 (PCSK9) is known to bind LDL receptors (LDL-R) and to decrease LDL-R expression on cell surfaces, which results in high levels of LDL-C in the plasma. Inhibition of PCSK9 would increase the LDL-R expression, and down-regulate LDL-C.

The dried bark of *Magnolia obovata* Thunberg (Magnoliaceae) has been used for the treatment of gastrointestinal disorders, anxiety and allergic diseases in Northeast Asia. It has been reported that *M. obovata* contains various compounds including neolignans, sesquiterpenes, sesquiterpene-neolignans, trineolignans and alkaloids. During an initial bioassay screen to monitor PCSK9 mRNA expression in HepG2 cell lines, the hexane fraction of the dried bark of *M. obovata* was found to inhibit PCSK9 mRNA expression.

This presentation will discuss the LC-MS/MS-based dereplication results using molecular networking for active metabolites from *M. obovata* with inhibitory activity against PCSK9 expression. Massive molecular networks that include bioactivity were used to highlight potential bioactive clusters within the chemical diversity of the hexane-soluble extraction. This workflow enables one to target predicted active metabolites. This approach for natural product drug discovery can speed up and rationalize the isolation of natural products with chemically novelty and bioactivity.

S3-1

Development of an Insecticidal Agent for Control of Green Peach Aphid Using Surfactin Produced by *Bacillus* sp. Y9

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In this study, biosurfactant-producing microbial cultures were formulated and examined in order to develop an insecticidal agent for control of green peach aphid (*Myzus persicae* L.). A microorganism with aphicidal activity was isolated and identified based on 16s rRNA sequence. The isolate showed the sequence similarity of 99.6% to *Bacillus subtilis*, and named *Bacillus* sp. Y9(Y9). When Y9 was incubated in tryptic soy broth, the growth of Y9 was accompanied by a decrease in surface tension values, giving a value 36 mN/m at 8 h. Aphid mortalities were accompanied by Y9 during growth on trypic soy broth, exhibiting the highest mortality after a 96 h-incubation. For identifying insecticidal metabolites produced by Y9, the cell-free supernatants were extracted by an acid-precipitation method and subjected to silica gel column chromatography, following instrumental analyses. Insecticidal metabolites were identified as surfactin isomers consisting of *iso*-C_{14}[Leu_7], *iso*-C_{14}[Val_7] and *anteiso*-C_{15}[Leu_7] surfactins. The LC_{50} values of *iso*-C_{14}[Leu_7], *iso*-C_{14}[Val_7] and *anteiso*-C_{15}[Leu_7] surfactins were estimated to be 22.2, 54.5 and 20.4 mg/L, respectively. Surfactin isomers significantly decreased the surface tension values of water from about 73 mN/M to about 43 mN/m at 20, 30 and 60 μM of *anteiso*-C_{15}[Leu_7], *iso*-C_{14}[Leu_7] and *iso*-C_{14}[Val_7] surfactins, respectively. These suggested that *anteiso*-C_{15}[Leu_7] surfactin was an insecticidal metabolite with the highest insecticidal activity and surface tension activity among the isomers. The formulation of Y9 cultures consisting of the isomers was carried out by mixing them with essential oil of *Cinnamomum camphora*. GC/MS analysis detected camphor, borneol, 4-terpineol, α-terpineol and caryophyllene oxide as major compositions of the oil. Caryophyllene oxide exhibited the highest insecticidal activity with LC_{50} value at 237 mg/L. Camphor lowered the LC_{50} values of caryophyllene oxide and surfactin up to two times, suggesting that camphor would play a role in enhancing the insecticidal activity of the isomers. Y9 cultures were mixed with essential oil and nonionic surfactants such as TSP1008, OP9 and NP10, in the formulation of wettable powder concentrate and soluble liquid concentrate. The formulations were examined to investigate insecticidal activity against *Myzus persicae*, *Aphis gossypii*, *Tetranchus urticae*, *Panonychus citri*, *Panonychus ulmi* and *Thrips palmi karny*. The formulation showed insecticidal activity more than 60% at 250-fold dilution against *Myzus persicae*, *Aphis gossypii*, *Tetranchus urticae*, *Panonychus citri*, *Panonychus ulmi*, while they exhibited the activity more than 60% at 500-fold dilution against *Myzus persicae*, *Aphis gossypii* and *Panonychus citri*. Overall, Y9 cultures containing surfactin isomers were expected as an insecticidal agent that contributes to reduce the use of synthetic insecticide in agriculture.

S3-2

Anaysis of Pesticide Multi-residues in Crops Using Gas and Liquid Tandem Mass Spectrometry: Important Considerations and Useful Tips

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Given that a new the pesticide management system (positive list system) is enforcing to regulate the pesticide residue in Korea, a rapid and simultaneous multi-residue method is needed for screening the hundreds of pesticides to ensure food safety. The challenge for pesticide multi-residue analysis is due to a wide range of physical and chemical properties in screening analysis along with sample matrix interferences. Tandem mass spectrometry combined with gas and liquid chromatography has become widely adopted technology to detect many pesticides providing a selective and sensitive performance. This study was aimed to develop a rapid, simple, and high-throughput screening method for five hundreds of pesticide residues using gas and liquid chromatography-triple quadrupole mass spectrometer (LC-MS/MS and GC-MS/MS) in representative crops (brown rice, orange, and spinach). For the analysis of GC-MS/MS amenable 360 pesticides, the instrumental parameters including multiple reaction monitoring transitions, pressure pulsed injection, analytical column, priming effect were investigated. In LC-MS/MS analysis (310 compounds), injection volume and mobile phase were optimized to improve the analytical performance. For sample extraction and cleanup, the modified QuEChERS method was used after comparing the extraction solvents and various cleanup absorbents to cover the wide range of GC-amenable and LC-amenable pesticides. The optimized method was successfully validated considering the validation parameters including accuracy, precision, limit of quantitation, linearity, and matrix effects. The method was successfully applied to monitoring of pesticide residues in real sample analysis. On the basis of the validation study, the important considerations and useful tips to acquire reliable data were suggested along with the chemical property of pesticides.

S3-3

Exposure, Risk Assessment and Predictive Exposure Model Development for Agricultural Operators to Pesticide using Whole Body Dosimetry

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Agricultural workers exposed to pesticides can experience adverse health impacts depending on toxicity and exposure amount. Whole body dosimetry (WBD) is the most reliable, practical and realistic method for measuring exposure.

For the whole body dosimetry (WBD) exposure protocol, outer clothing, inner clothing, gauze, and nitrile gloves were examined to measure dermal exposure. In contrast, an IOM (Institute of Occupational Medicine) sampler with a glass fiber filter was used to measure inhalation exposure.

The present study was conducted to evaluate the exposure of various crops (apple, grape, rice, cabbage) for farmers to pesticides. The pesticide was dispensed using a speed sprayer (apple) and a power sprayer (grape, rice, cabbage) with the pesticides, and exposure was assessed following the global and harmonized trend of exposure measurement. To assess dermal exposure by the WBD exposure protocol, the exposure amounts to the whole body (outer clothing and inner clothing), gloves, hands, and head were measured. Pesticide distribution on the body and cloth penetration rates were also investigated. In addition, bio-monitoring of pesticide was performed to measure the comparative internal exposure in urine.

Korea predictive operator exposure model (KO-POEM) has been developed on the basis of new experimental data using the WBD to improve exposure study and risk assessment in Korea.

Key Words: exposure, whole body dosimetry, risk assessment, KO-POEM, bio-monitoring

S4-1

Natural compounds Inhibits the Inflammatory Response and Improves Survival in CLP-Induced Septic Mice

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We investigated its mechanism of action, its inhibitory effects on lipopolysaccharide-induced inflammation in macrophages, and its impact on viability in a cecal ligation and puncture (CLP)-induced mouse model of sepsis. Natural compounds suppressed the expression of the inflammatory mediators, nitric oxide and prostaglandin E2, and the inflammatory cytokines, tumor necrosis factor-alpha (TNF-α) and high-mobility group box 1 (HMGB1), in lipopolysaccharide-stimulated RAW 264.7 cells and peritoneal macrophages. Natural compounds also reduced the activation of the mitogen-activated protein kinases and nuclear factor kappa-light-chain-enhancer of activated B cells (NF-κB) involved in the activation of various inflammatory mediators in activated macrophages. Moreover, Natural compounds administration produced decreased mortality and lung injury in CLP-activated septic mice. Augmented expression of cyclooxygenase (COX)-2 and TNF-α in pulmonary alveolar macrophages of septic mice were attenuated by Natural compounds administration. Natural compounds also suppressed the induction of nitric oxide, prostaglandin E2, TNF-α and HMGB1 in the serum of the septic mice. Overall, Natural compounds exhibited protective effects against inflammation and polymicrobial sepsis by suppressing inflammatory mediators possibly via the inhibition of NF-κB activation and the MAP kinase pathway. These results suggest the possible use of Natural compounds for developing novel therapeutic modalities for sepsis and other inflammatory diseases.

S4-2

Advances in 9th revision Korean Food Composition Table

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Objectives : Korean Food Composition Table (KFCT) has been published since 1970 and updated every five years by Rural Development Administration (RDA). The objective of this study is to introduce the development strategies, features, and challenges of 9th revision KFCT.

Methods : Due to the increasing demands of nutrient database users and generators, in 2013, RDA started new research project to improve data quality and quantity for 9th revision. Over 1,000 food items frequently consumed in Korea were selected as key foods using the results of the Korean National Health and Nutrition Examination Survey. About 200 raw materials and processed food items were collected and analyzed every year. Target nutrients which were analyzed by corporative labs were increased from 22 to 43 such as, sugars, vitamin K, vitamin D, folate, trans-fatty acid, etc. Analytical sample handling procedures and data quality evaluation system also were established in collaboration with 10 contracted labs. Data were evaluated for data quality according to FAO/INFOODS and AOAC guidelines.

Results : This revision contains data on 3,000 food items and also up to 43 and 140 food nutrients for the published book and excel database, respectively. New analytical data for 972 food items were added and data for 512 food items were collected from foreign nutrient database. The rest of data for 1,516 food items were maintained as 8th revision. All values are presented per 100 g edible portion on a fresh weight basis. All compositional data were standardized to this expression according to the FAO/INFOODS Guidelines. FAO/INFOODS component identifies, called tag-names, were used to describe the components.

Conclusions : KFCT is the major source of nutrient data in Korea. It provides the basic infra-structure for food and nutrition policy, research, and dietary practice. The use of KFCT has increased exponentially in the past few years in both public and private sectors. In this regard, more effort should be paid to the preparation, improvement, and maintenance of KFCT.

S4-3

Biogeochemical Transformations and Immobilization Potentials of Radionuclides in Subsurface Sediments

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Biogeochemical activities on radionuclides, uranium and technetium, were investigated to elucidate potentials for the immobilization in the sediments by both direct and indirect redox transformations. Microbial transformations of iron minerals and sulfate ion in the sediment and groundwater conditions were observed to affect solubilities of uranyl ($U^{VI}O_2^{2-}$) and pertechnetate ($Tc^{VII}O_4^-$), and the contributing microbial communities were analyzed as mostly sulfate-reducing bacteria and iron-reducing bacteria. The microbially and/or biogeochemically transformed phases of U and Tc were examined for the identification of the redox species, contributing solids from the sediments, contributing microbes, etc. by using a variety of analytical advances including XAFS, XRM, etc. In addition, lithoautotrophic bacteria harboring the ability of Tc(VII) reduction were found and characterized from the subsurface oxygen/nitrate/hydrogen gradient zone, suggesting maintenance of the redox gradient in the subsurface transition zone and influence on migration of the radionuclide contaminants.

S5-1

Approval procedure and present condition of functional ingredient for health functional food

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In Ministry of Food and Drug Safety, We evaluate standards and specifications, safety, functionality of functional ingredient for health functional food as ingredient or element individually recognized which controlling nutrients for the structure or functions of the human body or providing beneficial effects to health purposes, such as physiological effects.

Approval of Functional ingredient for health functional food is government permission system through functional health foods deliberation committee and evaluation of submitted document related to the standards and specification, safety, functionality based on the 「Regulation on Approval of Functional Ingredient for Health Functional Food」(Ministry of food and drug safety notification No. 2016-141).

Functional ingredients for health functional food are evaluated characteristics of the ingredients, current status of approval and use in domestic or foreign countries, manufacturing methods and related data, specification on marker compound and data on test method, safety and functionality contents included human study and related data. Finally, functional ingredient for health functional food through functional health foods deliberation committee The treatment period necessary for the approval of ingredient shall be within 120 days from the date of receiving.

Functional ingredient for health functional food consists of notified ingredient and individually recognized ingredient. We approved notified ingredient 96, individually recognized ingredient 592 until now. We hold assorted discussion, civil briefing session for technical support and provision of information according to increasing health functional food market in korea.

S5-2

Industrial Status and Market Trend of Health Functional Foods

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An actual output of Health Functional Foods(by the MFDS) had shown the steady increase reaching 2.1260 trillion won in 2016 with 17% rise compared to 1.084 trillion won in 2015, and the amount of export also grew by 20% as being from 90.4 billion won in 2015 to 108.4 billion won in 2016, but the increase was smaller than those of other years.

Not only did the imports for 2016 rise by 14% from 4.412 billion won in 2015 to 5.965 billion won in 2016, which can be explained as it reflected various types of consumer's demand for domestic health functional foods, but the market scale (manufacture + imports - exports) has been also constantly extended to 2.6056 trillion won in 2016 growing by 12% compared to those of 2015, according to the result of market research conducted by the Ministry of Food and Drug Safety.

In terms of the total production rank of each item in 2016, the first one was red ginseng(9.900 billion won) and individually approved ones(2.357 billion won), probiotics(1.903 billion won), vitamins and minerals(1.803 billion won), and milk thistle(1.091 billion won) were followed in the above order, among which probiotic products have been experienced 21% growth whereas vitamin and mineral products decreased by 12%.

In particular, among top 10 items for the total production, manufacture of EPA/DHA and lutein products has increased the most rapidly in 2016 compared to those of 2015, which was 70 and 30.9 billion won with 44% and 51% respectively. Moreover, for individually approved items, the production of those ingredients has been steadily grown, which could be explained by the growth of consumer needs for a variety of functionalities and ingredients, as well as the increased preference of certain products for particular functions

S5-3

Opportunities and Challenges in health function food
– Focused on human intervention study for substantiation of claims –

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Beneficial physiological effects of health functional food may related to the maintenance or improvement of a function. A human intervention studies are crucial for the substantiation of claims because of intervention studies generally provide stronger evidence. However, the physiological changes in healthy general population are well controlled due to homeostasis control system. Moreover, because of wide inter-individual variation, it is very difficult to identify any significant changes in normal or resting state. Consequently, developing a study model and biomarkers appropriate for evaluating the health-promoting effects of health functional food is a big topic in the field of food research. This lecture will focus on examples of different approaches to human intervention studies in health functional foods. Additionally, I would like to think about the opportunities and challenges we face.

S5-4

Development of hepatoprotective functional food using garlic extract fermented with lactic acid bacteria

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Garlic has been reported to have numerous beneficial effects, like antioxidant, anticancer, antibacterial, cholesterol-lowering, antiinflammatory, and antidiabetic properties. One of the well-known processed garlic products, aged black garlic, is produced by an aging process at a condition of high temperature and humidity. Even though there are numerous good effects of aged black garlic, it has the serious defect that the manufacturing process takes more than 30 days.

SK bioland Co., Ltd. has developed products with enhanced functional properties compared to raw garlic, using a short-term manufacturing process. We manufactured fermented garlic extract using *Lactobacillus plantarum* (LAFGE) and it showed an improved garlic-specific pungent taste and aroma. In particular, the manufacturing process of LAFGE requires only 3 days. We reported that garlic-derived organosulfur compounds (OSC) from LAFGE, including cycloalliin, S-allyl cysteine (SAC), S-methyl cysteine (SMC), and S-ethyl cysteine (SEC), were increased during the fermentation compared to non-fermented garlic extract. Furthermore, consistent with the increases of such OSC, the antioxidant activity of LAFGE was enhanced compared to non-fermented garlic extract.

In pararell, the ameliorating effects of LAFGE on non-alcoholic fatty liver were investigated using oleic acid-induced steatotic HepG2 cells. Treatment with 1 mg/mL LAFGE decreased intracellular lipid accumulation approximately 1.5-fold, compared to that achieved with non-fermented garlic extract. LAFGE reduced fatty acid influx into hepatocytes through down-regulation of FAT/CD36 mRNA expression in the steatotic HepG2 cells. LAFGE showed concentration-dependent down-regulation patterns in protein expression of SREBP-1c and FAS, as determined by Western blot. These results suggest that LAFGE treatment improves hepatic steatosis triggered by the imbalance of hepatic lipid metabolism owing to oleic acid treatment.

Using in vivo animal model, we investigated the hepatoprotective effects of LAFGE on alcohol-induced fatty liver damage. The weight of liver tissue of the LAFGE diet groups decreased in a dose-dependent manner compared to that of the normal diet group. The activities of typical serum enzymes such as ALT, AST, and ALP were low in the LAFGE 200 mg/kg administered group. The LAFGE 200 mg/kg administered group significantly decreased values of TBIL and DBIL, which are an important index of liver damage. LAFGE also ameliorated alcohol-induced hepatic lipid accumulation in histological analysis dose-dependently. In addition, total GSH and reduced GSH levels in LAFGE-treated groups were gradually recovered up to normal levels. Furthermore, a double-blind, randomized, placebo-controlled clinical trial showed that LAFGE improved hepatic function in adults with mild hepatic dysfunction.

The overall results indicated that LAFGE improved unique tastes and odors of raw garlic through lactic acid fermentation technology and thus could be a commercially potential material for hepatoprotective functional foods against non-alcoholic/alcoholic fatty liver.

S5-5

A Successful Example of the Technological Industrialization of ‘Barley Sprouts’ and ‘Wheat Sprouts’

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The following is an introduction to the technological industrialization of ‘Barley Sprouts’ and ‘Wheat Sprouts’ by our corporation; these products were developed by technologies transferred from the National Institute of Crop Science at the Rural Development Administration. The overall system, which includes seed selection, sprout cultivation, production, processing, distribution, and sales of Barley Sprouts and Wheat Sprouts, is explained. Compared to the sales of raw grain (barley), the farm sales of cultivated sprouts produce a higher added value of approximately 6-fold or greater, resulting in steady revenue growth and job creation. Industries can securely purchase sprouts year-round through contract farming, and can subsequently develop various new products as well as health functional food materials. The end-consumer can be reassured to purchase the domestic sprout products, the functionality and safety of which are confirmed. Our corporation is marketing non-heated beverages that have been directly extracted, liquid teas that have been heated and extracted, powders of fresh juices, and beverages at cafés. Our corporation is an example of a body that successfully utilizes technologies from national agencies and encourages the cooperation between industries and farms Future research should focus on practical applications targeted towards industrialization.

S5-6

How to commercialize agricultural technology in Korea

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FACT(Foundation of Agricultural technology Commercialization and Transfer) was established in 2009 in order to enhance the commercialization of agricultural technology in Korea. FACT has transferred a number of agricultural technology into small companies that is willing to do business using the technology. In 2009, the number of technology transfer was just approximately 150 but nowadays it is up to about 1,000. The reason why the technology transfer is rapidly increasing is that FACT operates various supporting programs in order for the small companies to succeed in a competitive business environment. The supporting program consists of 5 sub-programs. First program is to provide consulting services to the small companies in terms of business management and second one is to support development expenses of trial product that costs $80,000 maximally, Third program is to support development expenses of mass production facilities that costs $400,000 maximally, Forth one is to suggest most adequate marketing programs for the small agricultural companies. Finally, FACT gives the small entrepreneurs a great opportunity that is about merchandise export. Likewise, FACT plays an important role in agricultural business success in Korea.

S5-7

Introduction of Foodpolis and Our Vision

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The Korean National Food cluster (Foodpolis) is specialized industrial complex that drives R&D and the export-oriented food industry. Foodpolis advanced technologies and support facilities customized to resident companies. Differences from other industrial complexes is that there is Agency for Korean National Food Cluster (AnFc). The AnFc orchestrates the operation and management of the cluster, including the establishment of the industrial complex, attracting food companies, supporting member companies, and public relations. There are six supporting centers, Functional food evaluation center, Food Quality and Safety center, Food packaging center, Pilot plant, Food venture center(rental factory), and Business center. If you have a good idea and technology of a food business, be interested in the national food cluster.