
## Lactobacillus Plantarum isolated from Kimchi

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| Product name | CIB001 |
| Species | *Lactobacillus plantarum* |
| Korean generic name | 락토바실러스 플란타룸 |
| Effects | 1. The proliferation of beneficial lactic acid bacteria (Health functional food labeled)<br>2. The inhibition of intestinal harmful microorganisms (Health functional food labeled)<br>3. Smooth bowel movement (Health functional food labeled)<br>4. Strong acid and bile resistance<br>5. The effect of immunity improvement with beta-glucan coating<br>6. The effect of cholesterol level reduction<br>7. The effect of inflammation inhibition<br>8. The effect of intestinal cell protection<br>9. The maintenance of immune balance<br>10. The change in the flora of intestinal microorganisms |

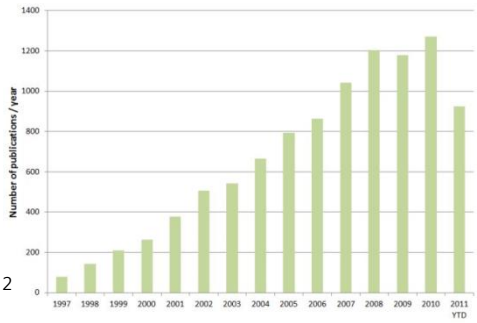
### Lactobacillus Plantarum isolated from Kimchi CIB001

The strains of *Lactobacillus plantarum* CIB001 isolated from Kimchi that is a representative of the traditional Korean fermented foods that has been eaten as GRAS(Generally Recognized As Safe) include excellent bile acid deconjugation activity, so they are excellent in acid resistance and bile acid activity. They also functions as probiotics in our body effectively, so they could represent a profitable activity in the human body. The powder and technology of CIB001 lactic acid bacteria currently provides as a major strains of bacteria for the production of the health functional foods.

# Evidence Report

## 1. What are Probiotics?

Probiotics are live bacteria that are safe and have a good effect on health. These is known to play a beneficial effect on intestinal environment and to give the effect of enhancing and improving of immunity and reducing the risk of for a particular disease such as colon caner etc. Lots of probiotics are contained in fermented dairy products such as yogurt etc. and kimchi that was selected as the worlds' fifth health food. Interests in probiotics is growing year by year and about 1,000 cases of research findings are being reported every year.

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*1_ Korean Kimchi, Japanese beans, Spanish Olive oil, Greek Yogurt, and Indian lentils in the 'Health magazine' that is the US health professional monthly magazine
Photo : IFFE2015 (Jeonju International fermented foods EXPO)
*2_ Reference: The explosion in probiotic research, learnaboutprobiotics.org, October 10th, 2011

## 2. Health food Kimchi

It says that Korean eat Kimchi of average 18kg per one person per one year and 'there's no obese man due to Kimchi'. Kimchi contains a lot of bacteria good for health including low-fat fiber, minerals such as calcium, phosphorus, vitamin A, B, and C and lactic acid bacteria. Some research findings. Some research findings have reported that Kimchi helps in suppression of cancer cell as well as digestion.

## 3. Lactic Acid Bacteria called *Lactobacillus plantarum (L. plantarum )*

Lactic acid bacteria is mostly being used as probiotics in the current market. *3 Lactic acid bacteria is known to have useful effects such as 1) the effects on the intestine such as the improvement of diarrhea and constipation etc. 2) the improvement of allergy symptoms, 3) the enhancement of immunity, 4) the prevention of cancer or gastric ulcer, and 5) the inhibition of perori infection and the removal of virus etc. However, there are more than thousands of different types of lactic acid bacteria, so each of the effect vary. CIB001 that is lactic acid bacteria isolated from kimchi belongs to L. plantarum. It has been reported that this (lactic acid bacteria) prevents allergy by controlling the immune system and has several effects *4 such as the improvement of irritable bowel syndrome cause by stress, the mitigation of Crohn's disease and helping in the treatment of colitis etc. Especially, It is knows that it gives a good impact on pregnant woman, newborns, autism and ADD *5 / ADHD *6 patients. *4

*3_ Bacillus bifidus, Bacillus natto Bacillus Mesentericus Toa, and butyric acid bacteria etc.
*4_ Lactobacillus Plantarum: The Key Benefits of this "Superstar" Probiotic & How to Get It In Your Diet, BODYECOLOGY
*5_ Attention Deficit Disorder(ADD) *6_Attention Deficit Hyperactivity Disorder(ADHD)

## 4. Vegetable lactic acid bacteria called L. plantarum CIB001 isolated from Kimchi

**Identification of microorganism and culture optimization**

WiKim 세계김치연구소 World Institute of Kimchi

**The selection *Lactobacillus plantarum* isolated from Kimchi and functional verification**

(주)셀인바이오 CELLINBIO

**Property 1: BSH(Bile Salt Hydrolase) activity**
The effect of cholesterol (level) reduction by BSH activity

**Property 2: Acid resistance[tolerance]**
Survivability in the stomach (pH 3.0 or less) that is poor environment for microorganism[microbes]

**Property 3: Resistance to bile**
Reaching intestines by resistance to bile secreted in the pancreas.

CIB001 is indigenous bacteria isolated from Kimchi that is identified into microorganism[the strain of bacteria in the World Institute of Kimchi. As it can be seen that it is very active in Kimchi, it has greater resistance to acidity, so it is alive in and stomach[gastric] acid and bile acid well reaches intestines. It is expected that CIB001 with excellent BSH activity has the maintenance of immune balance and the effect of inflammatory inhibition etc. as well as the reduction of blood cholesterol levels that is known as the effect of DHA and EPA etc. (that are highly contained in external blue colored fish) with the effect of lactic acid bacteria *L. plantarum.* Furthermore, normal intestinal ecosystem can be fostered by settling (human) intestinal microflora changed by westernized eating habit and excessive stress into the intestine through the intake of CIB001 lactic acid bacteria.
CIB001 is registered as the strains of patent deposit bacteria in the Korean Collection for Type Cultures(KCTC).

* 7_ Bile Salt Hydrolase
* 8_ BSH enzyme degrades bile acid and is not included to intestinal wall. Thus, fat accumulated in the liver is used in order to compensate for the lost bile acid. As a result, blood cholesterol level is reduced.

RECEIPT IN THE CASE OF AN ORIGINAL DEPOSIT

The strains of patent bacteria deposit
: KCTC11717BP

# Evidence Report

## Property 1: Strong Acid Resistance[tolerance] and Bile Resistance[tolerance]


**Lactic Acid acteria having a high survivability in the gastric and bile acid.**

Strong vitality was verified through the comparative experiments with other *Lactobacillus Plantarum* in acid resistance[tolerance] and bile resistance [tolerance] environment.

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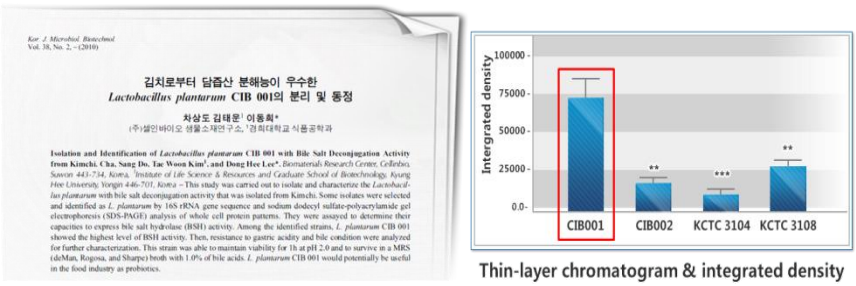
## Property 2: The Effect of Excellent Bile Acid Degradation



Kor. J. Microbiol. Biotechnol.
Vol. 38, No. 2, (2010)

김치로부터 담즙산 분해능이 우수한
*Lactobacillus plantarum* CIB 001의 분리 및 동정

차상도 김태문[1] 이동희*
(주)셀인바이오 생물소재연구소, [1]경희대학교 식품공학과

**Isolation and Identification of *Lactobacillus plantarum* CIB 001 with Bile Salt Deconjugation Activity from Kimchi.** Cha, Sang Do, Tae Woon Kim[1], and Dong Hee Lee*. *Biomaterials Research Center, Cellinbio, Suwon 443-734, Korea, [1]Institute of Life Science & Resources and Graduate School of Biotechnology, Kyung Hee University, Yongin 446-701, Korea* – This study was carried out to isolate and characterize the *Lactobacillus plantarum* with bile salt deconjugation activity that was isolated from Kimchi. Some isolates were selected and identified as *L. plantarum* by 16S rRNA gene sequence and sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) analysis of whole cell protein patterns. They were assayed to determine their capacities to express bile salt hydrolase (BSH) activity. Among the identified strains, *L. plantarum* CIB 001 showed the highest level of BSH activity. Then, resistance to gastric acidity and bile condition were analyzed for further characterization. This strain was able to maintain viability for 1h at pH 2.0 and to survive in a MRS (deMan, Rogosa, and Sharpe) broth with 1.0% of bile acids. *L. plantarum* CIB 001 would potentially be useful in the food industry as probiotics.




Thin-layer chromatogram & integrated density

**The Effect of Excellent Bile Acid Degradation**

The power[rate] of bile acid degradation that is superior to other *Lactobacillus Plantarum* was verified, which was published to the Journal of the Korean Society for Microbiology and Biotechnology.

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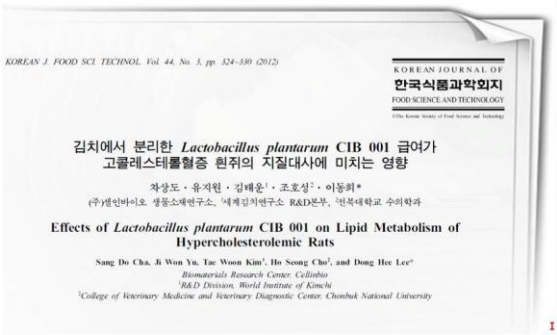
## Property 3: The Effect of Cholesterol Level Reduction



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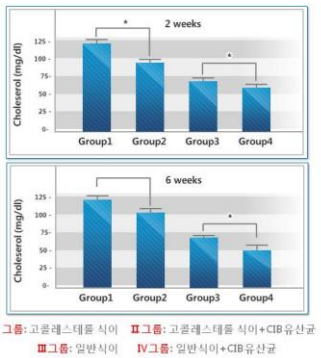
한국식품과학회지
FOOD SCIENCE AND TECHNOLOGY

김치에서 분리한 *Lactobacillus plantarum* CIB 001 급여가
고콜레스테롤혈증 흰쥐의 지질대사에 미치는 영향

차상도 · 유지원 · 김태문[1] · 조호성[2] · 이동희*
(주)셀인바이오 생물소재연구소, [1]세계김치연구소 R&D본부, [2]전북대학교 수의학과

**Effects of *Lactobacillus plantarum* CIB 001 on Lipid Metabolism of Hypercholesterolemic Rats**

Sang Do Cha, Ji Won Yu, Tae Woon Kim[1], Ho Seong Cho[2], and Dong Hee Lee*
*Biomaterials Research Center, Cellinbio*
*[1]R&D Division, World Institute of Kimchi*
*[2]College of Veterinary Medicine and Veterinary Diagnostic Center, Chonbuk National University*

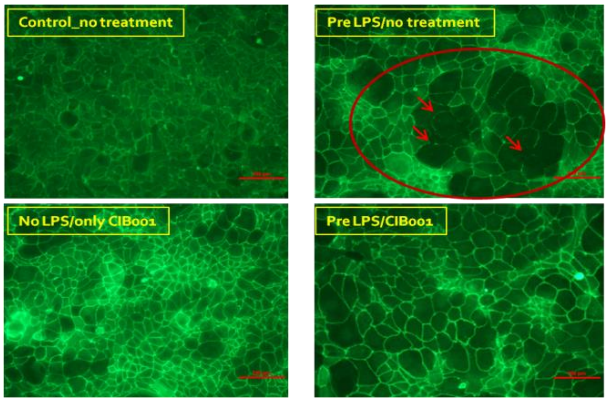



**The Effect of Blood Cholesterol Level Reduction**

The effect of blood cholesterol (level) reduction was verified in the high cholesterol diet animal model, which was published to the Journal of the Korean Society of Food Science and Technology.

# Evidence Report

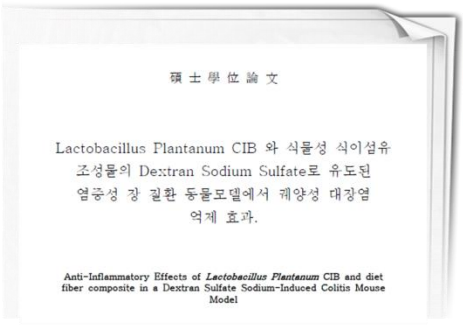
## Property 4: Intestinal Cell Protection Effect




**The Effect of Intestinal Cell Protection**

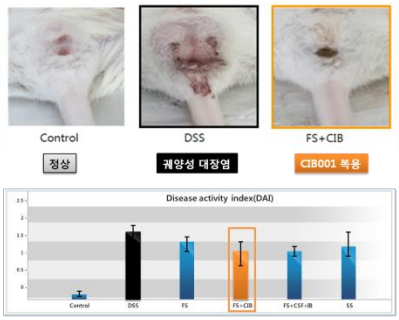
There is an effect of preventing intestinal cell damage caused by LPS(Lipopolysaccharide) toxin releasing harmful bacteria.

## Property 5: Inflammation Inhibition Effect


碩士學位論文

Lactobacillus Plantanum CIB 와 식물성 식이섬유 조성물의 Dextran Sodium Sulfate로 유도된 염증성 장 질환 동물모델에서 궤양성 대장염 억제 효과.

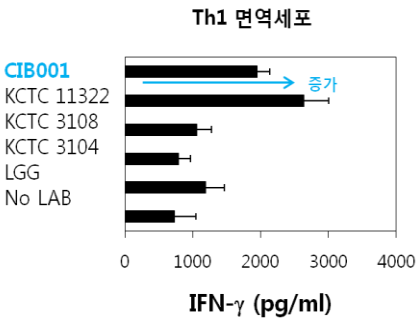
Anti-Inflammatory Effects of *Lactobacillus Plantanum* CIB and diet fiber composite in a Dextran Sulfate Sodium-Induced Colitis Mouse Model

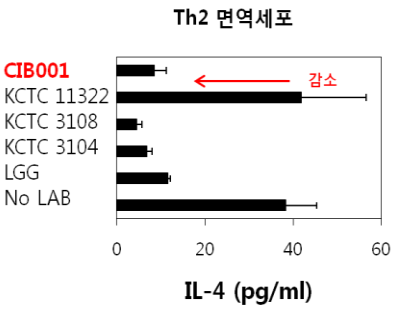



**The Effect of Colitis Inhibition**

Ulcerative colitis inhibition effect was able to be verified in animal model of inflammatory bowel disease with CIB001 and vegetable dietary fiber composition, which was published as a thesis.

## Property 6: Immunity Balance Maintenance Effect



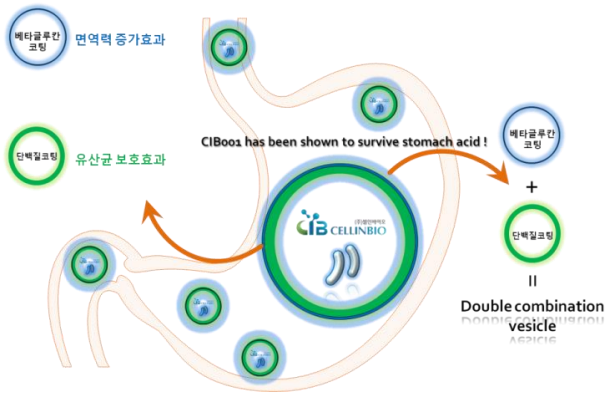




**The Effect of Immunity Balance Maintenance**

The ratio of Th2 immune cell is relatively higher than that of Th1 immune cell in autoimmune diseases such as arthritis and allergies. CIB001 promotes antigen-specific Th1 cytokine secretion by reaction with OVA-sensitized mouse splenocytes and maintains immune balance by suppressing Th2 cytokine secretion.

# Evidence Report

## Property 7: Increasing Immunity Effect




**Increasing Immunity Effect**

β-glucan is food additives approved by GRAS(General Recognized as Safe) of the FDA(Food and Drug Administration) and health functional food listed functional ingredient. Immunity has been increased by double coating this to CIB001.

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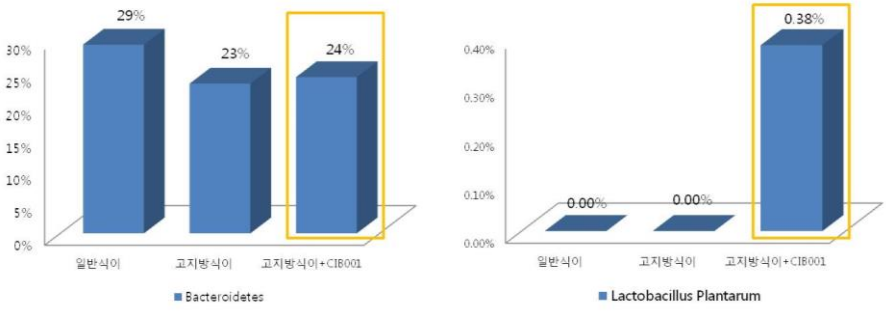
## Property 8: Change in Intestinal Microorganism Flora




**Changes in Intestinal Microorganism Flora**

High fat and high cholesterol diet induces obesity and brings out changes in intestinal microorganism flora. When CIB001 lactic acid bacteria was taken in high fat diet animal model for 10 weeks, the reduced rate of Bacteroidetes was increased and *Lactobacillus Plantarum* isolated from Kimchi was detected.

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## Property 9: Complete[finished] Product Development


**The Development of product**

Complete product that 50 billion of lactic acid bacillus in CIB001 *Lactobacillus plantarum* (lactic acid bacteria) was put.