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# POLYCAN

- ✓ Patented Strain: *A.pullulans* SM-2001
- ✓  $\beta$ -1,3/1,6-glucan
- ✓ 40+ test data
- ✓ 12+ domestic and international patents
- ✓ 7+ Clinical trials



# What is 'Polycan'?

- ▶ Polycan is a water-soluble complex polysaccharide, with  $\beta$ -1,3/1,6-glucan as its primary component, produced by the thorough cultivation of the patented strain *Aureobasidium pullulans* SM-2001.
- ▶ Produced without the utilization of using chemical solvents, Polycan is a natural ingredient that has been scientifically proven to enhance bone/joint health, muscle strength, and intestinal health.
- ▶ It is beneficial in preventing 'Locomotive syndrome', "Locomotive syndrome," a condition marked by a decline in muscle strength and bone/joint health prevalent among the elderly, and aids in the improvement of intestinal microorganisms.



## Why Choose Black Yeast-Derived Beta-Glucan?

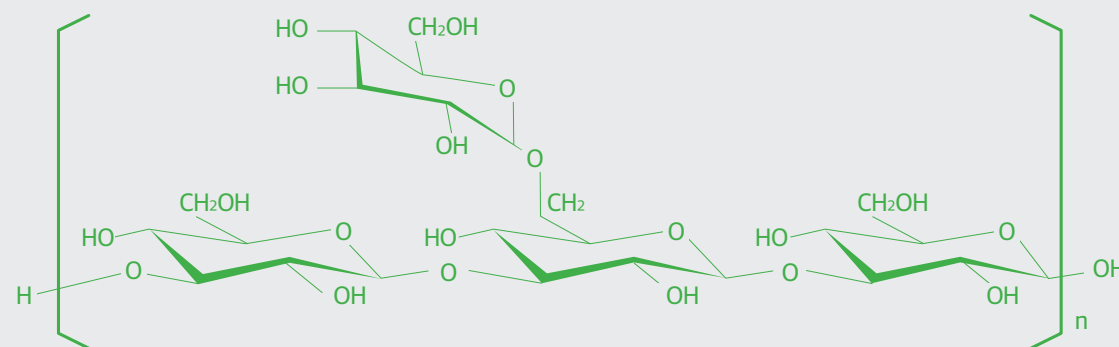


### Source of $\beta$ -glucan

| Glucan's black yeas | ○ | ○ | ○ | ○ |
|---------------------|---|---|---|---|
| Common yeast        | × | × | × | ○ |
| Mushrooms           | × | × | × | ○ |
| Oats                | × | × | ○ | ○ |
| Barley              | × | × | ○ | ○ |

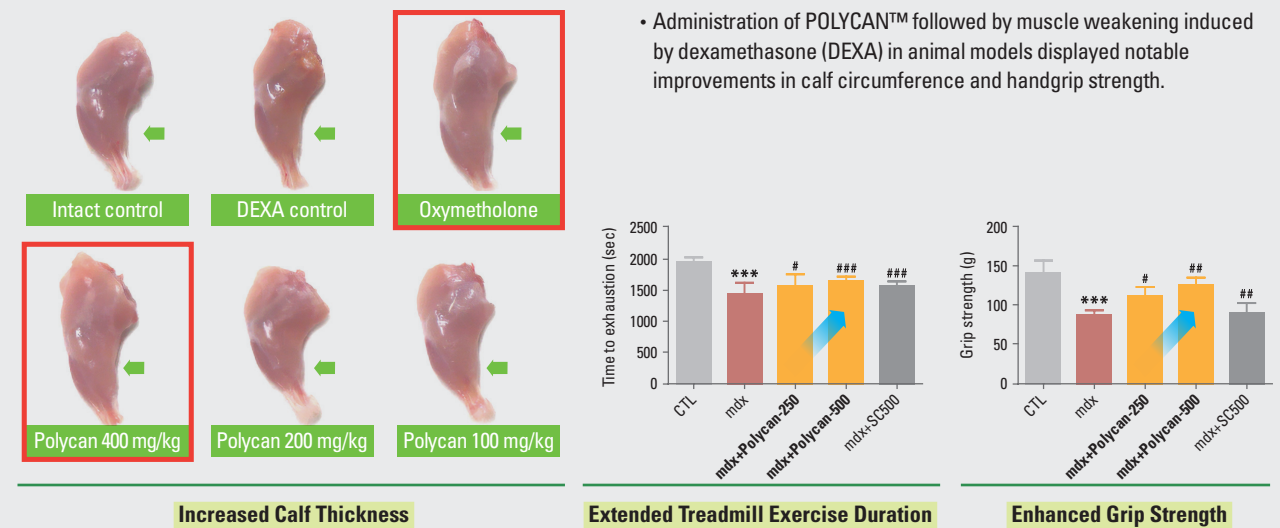
- ▶ Beta-glucan ( $\beta$ -glucan) is widely recognized as an immune-boosting compound naturally found in yeast cell walls, mushrooms, and cereals.
- ▶ Our patented strain of black yeast, *Aureobasidium pullulans* SM-2001, secretes a unique form of  $\beta$ -1,3/1,6 glucan. Unlike other beta-glucans that lack branching, ours possesses both  $\beta$ -1,3 and  $\beta$ -1,6 linkages, offering superior physiological activity due to its unique structure.

### Structure of $\beta$ -1,3/1,6-glucan



# Functional Benefits Improved Muscle Strength

## Effect of POLYCAN™ on Muscle Atrophy Inhibition and Muscle Strength Enhancement [Animal Study]



- ▶ Treatment with POLYCAN™ demonstrated muscle preservation effects akin to those seen with the therapeutic agent oxymetholone, highlighting its benefit in supporting muscle health.

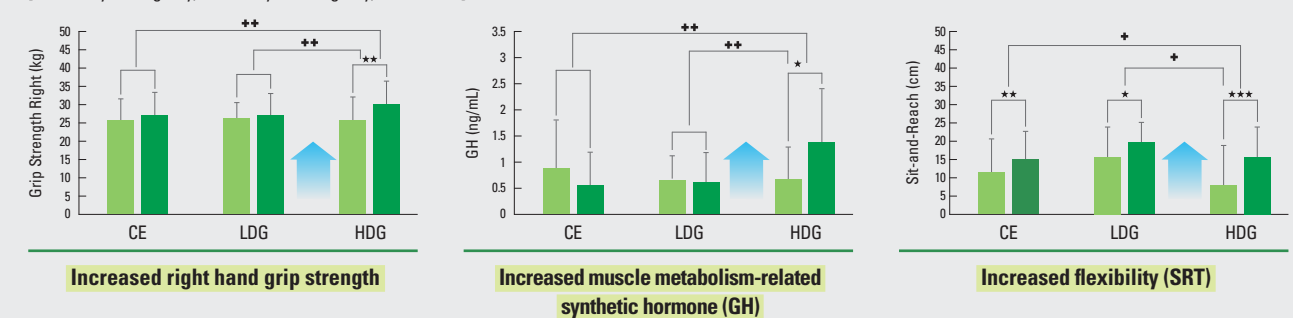
## Effects of POLYCAN™ on Muscle Strength Improvement [Human Clinical Trials]

- After consuming POLYCAN™, there were increases in quadriceps muscle strength, grip strength, muscle metabolism-related synthetic hormones, Sit and Reach Test (SRT) performance, and a decrease in the time taken to walk 400 m

### Clinical Trial 1

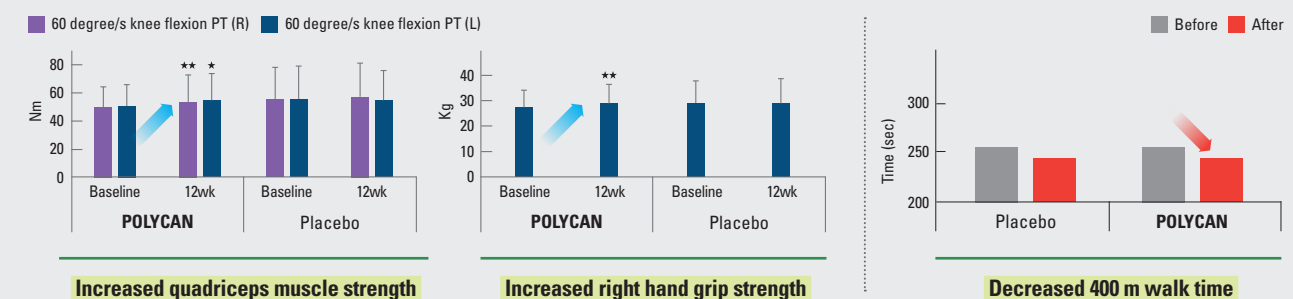
Participants: Men & women aged between 60-70, total 45 individuals, Duration: 12 weeks, Control Group (CE): 15 participants, POLYCAN™ Low Dosage Group (LDG): 15 participants, POLYCAN™ High Dosage Group (HDG): 15 participants

[HDG: Polycan 1 g/day, LDG: Polycan 0.5 g/day, CE: Control]



### Clinical Trial 2

Participants: Men & women aged 50 and above, total 80 individuals, Duration: 12 weeks Control Group: 40 participants, POLYCAN™ Intake Group: 40 participants



- ▶ Consuming POLYCAN contributes to enhancing muscle strength

# Functional Benefits Bone/Joint Health

POLYCAN

## Enhanced Bone Metabolism

Encourages the activity of osteoblasts  
Osteocalcin, Bone ALP, Serum (Ca, P)  
Reduces the activity of osteoclasts  
DPYR, CTX, NTX, Urine (Ca, P)

## Improved Bone Density

Enhances Bone Mineral Density(BMD)

## Boosts absorption of Ca/P

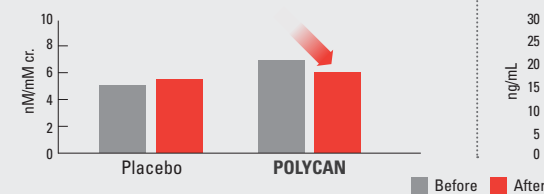
Boosts absorption of Ca/P and minimizes their excretion

Increased Bone Strength

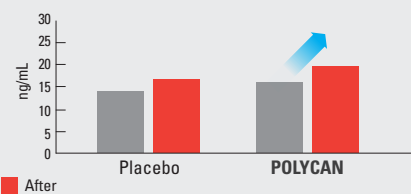
## Effects of POLYCAN™ on Osteoporosis [Clinical Trial]

Participants: 58 middle-aged women, Duration: 12 weeks

### Changes in Bone Resorption Biomarkers (Deoxypyridinoline, DPD)



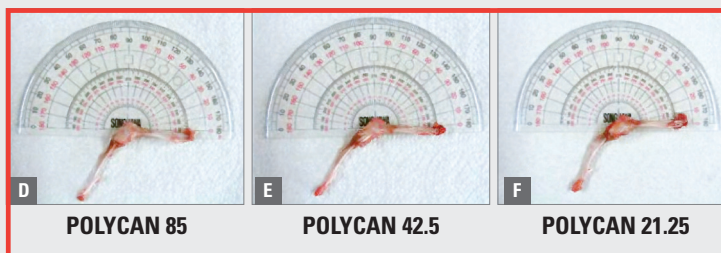
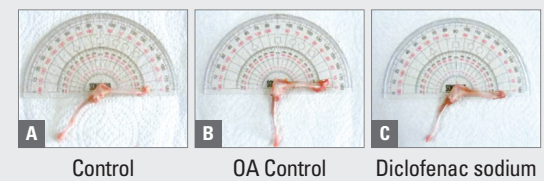
### Changes in Bone Formation Biomarkers (Osteocalcin, OSC)



► After 12 weeks of consuming POLYCAN™ (150 mg/day), there was a significant reduction in bone resorption biomarkers (DPD) and a significant increase in bone formation biomarkers (OSC), compared to the placebo group.

## POLYCAN™'s Efficacy in Inhibiting Osteoarthritis [Animal Study]

### Maximum Knee Extension Angle



► In comparison to the osteoarthritis-induced control group (OA control), the group treated with POLYCAN™ showed expanded range of motion in the knee joint and a protective effect on the joint.

## Effects of POLYCAN™ on Patients with Osteoarthritis [Human Clinical Trial]

- **Control** Glucosamine intake of 1,500 mg/day (24 participants)
- **Group A** Glucosamine 750 mg/day + POLYCAN™ 50 mg/day (31 participants)
- **Group B** Glucosamine 1,500 mg/day + POLYCAN™ 50 mg/day (27 participants)

\* Duration: 12 weeks  
\* Evaluation Method: Comparison of Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores and the monthly average use of non-steroidal anti-inflammatory drugs (NSAIDs)

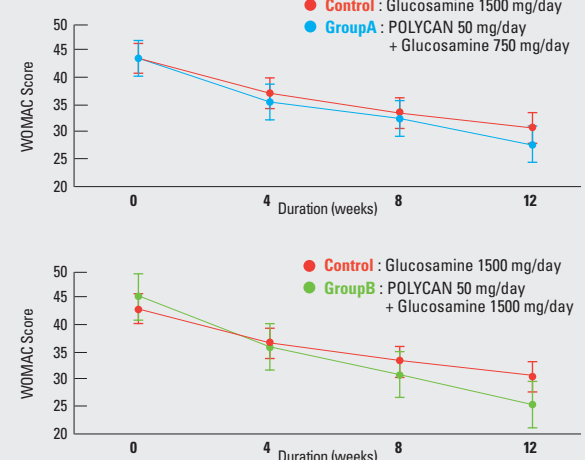
Table 1 Number of NSAIDs Administered by Group

|                       | Glucosamine 750 mg + POLYCAN™ 50 mg/day | Glucosamine 1500 mg + POLYCAN™ 50 mg/day | Glucosamine 1500 mg/day |
|-----------------------|-----------------------------------------|------------------------------------------|-------------------------|
| Average (times/month) | 1.4 <sup>b</sup>                        | 1.6 <sup>a</sup>                         | 3.1                     |

a:P<0.002 vs control, b:P<0.001 vs control

► Participants in the POLYCAN™ and glucosamine combination groups showed a greater decrease in WOMAC scores and a reduction in the use of non-steroidal anti-inflammatory drugs compared to the group consuming only glucosamine (1,500 mg/day), indicating a synergistic effect between glucosamine and POLYCAN™.

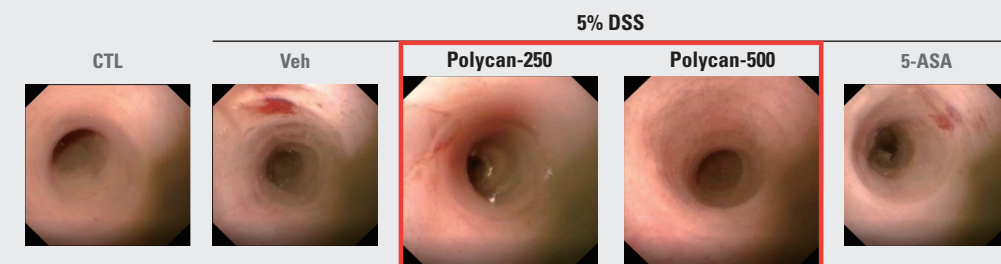
### WOMAC Total Score



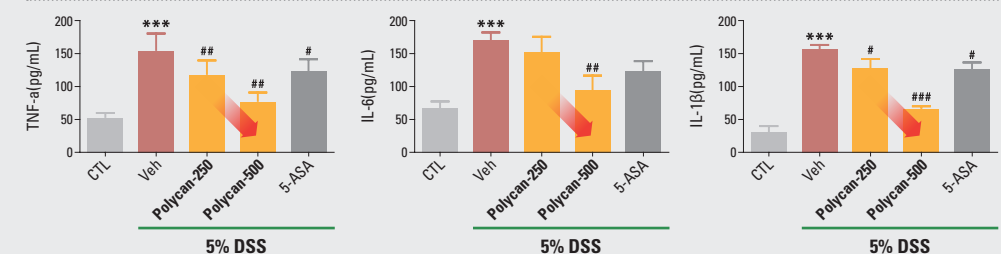
# Functional Benefits Gut Health

POLYCAN

## POLYCAN™ Intestinal Immune Regulation [Animal Study]



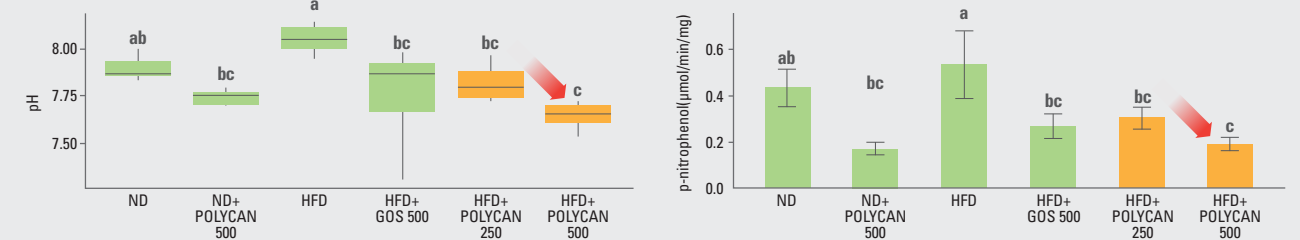
• Observations of the colon mucosa in POLYCAN™-treated groups showed reduced mucosal swelling and bleeding.



• In mice induced with colitis, there was a decrease in inflammatory cytokines in the blood (TNF-α, IL-6, IL-1β).

► Administration of POLYCAN™ was found to alleviate intestinal inflammation, demonstrating its effectiveness in preventing intestinal diseases.

## POLYCAN™ Reduction of Harmful Intestinal Bacteria [Animal Study]



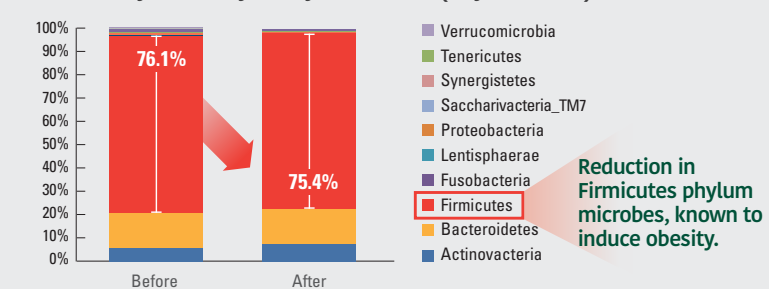
Increased production of short-chain fatty acids, acting as an energy source for intestinal cells, led to a decrease in fecal pH.

A decrease in the activity of β-Glucuronidase enzymes produced by harmful bacteria (such as Clostridium species).

► POLYCAN™ administration confirmed reduction and inhibition of harmful intestinal bacteria settlement.

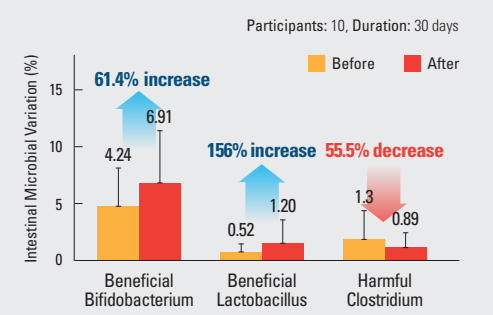
## POLYCAN™ Effects on Gut Health [Human Clinical Trial]

### Community Diversity Analysis Results (Phylum level)



Reduction in Firmicutes phylum microbes, known to induce obesity.

► Intake of POLYCAN™ helped maintain intestinal microbial balance, contributing to gut health.



Increase in beneficial bacteria and decrease in harmful bacteria.