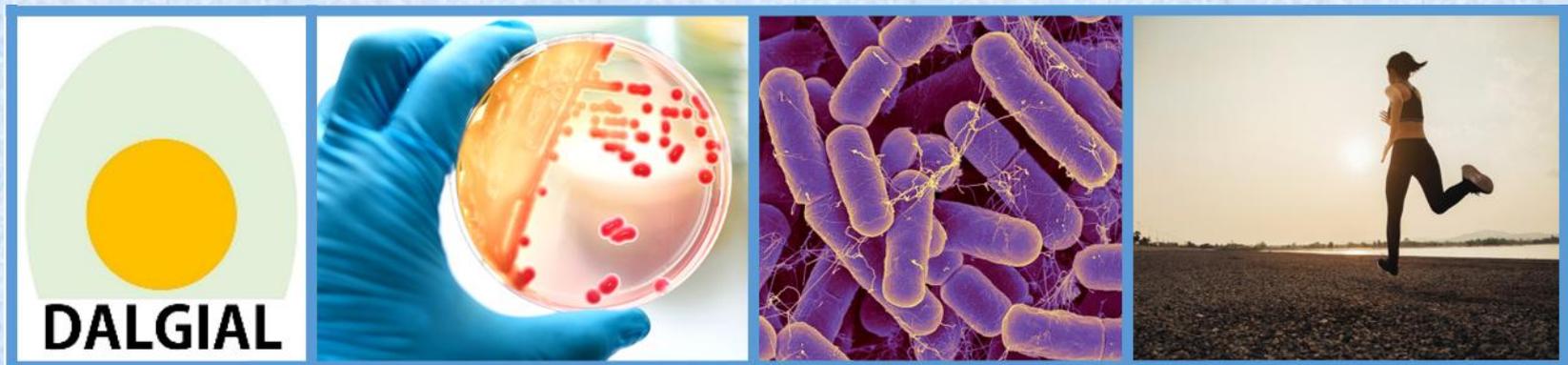


# GIANT BIOTECH 健特生物

## *Sexy Bacillus*

提供新功能的新Bacillus

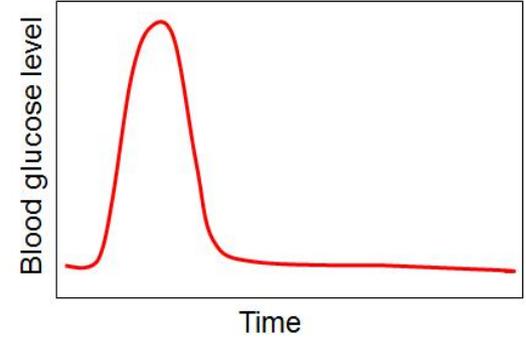
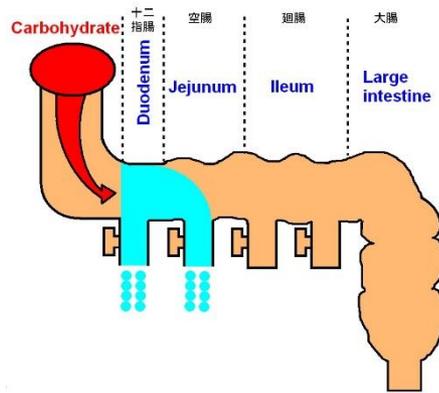


## 糖质吸收抑制剂

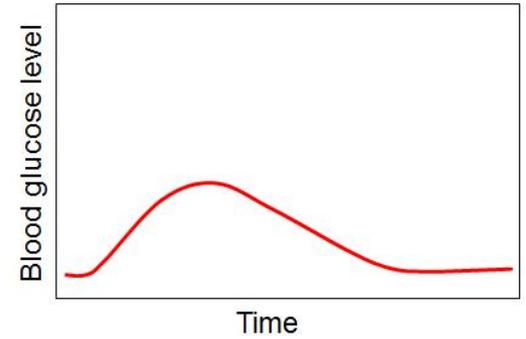
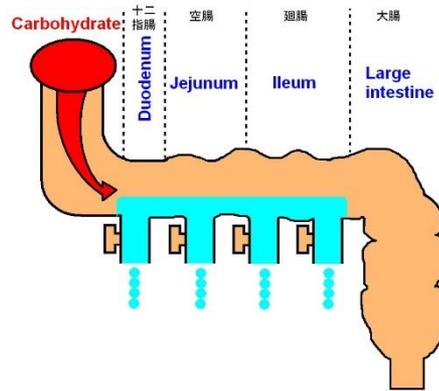
- 以抑制糖质吸收为目标的医药品是以抑制饭后高血糖为目的开发的，树种正在上市销售。
  - Acarbose(商品名 Glucobay, Bayer)
  - Voglibose(商品名 Basin, 武田)
- 通过在小肠内阻碍 $\alpha$ -通过阻碍glucosidase的活性，使糖质的吸收在包括十二指肠在内的工厂上部受到阻碍，并通过工厂下部及回肠被吸收，从而抑制餐后的过血糖。
- $\alpha$ -Glucosidase阻碍物质会降低碳水化合物的消化吸收率，因此可以用于预防和治疗糖尿病、肥胖症、高糖症等成人病的预防和治疗目的。

# $\alpha$ -Glucosidase阻滯剂的作用

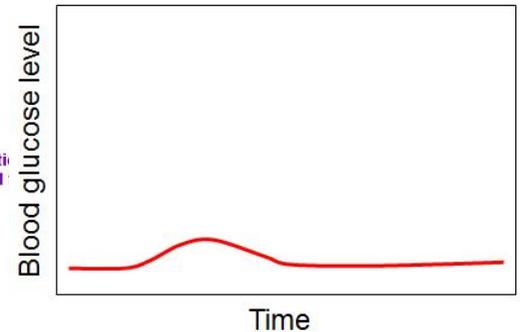
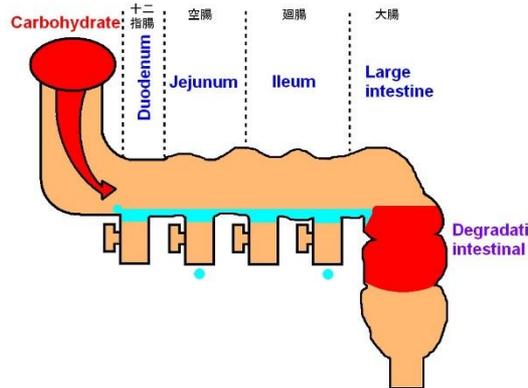
碳水化合物的正常吸收模式



$\alpha$ -Glucosidase阻滯剂的  
适量注射时



$\alpha$ -Glucosidase阻滯剂的  
过量注射时

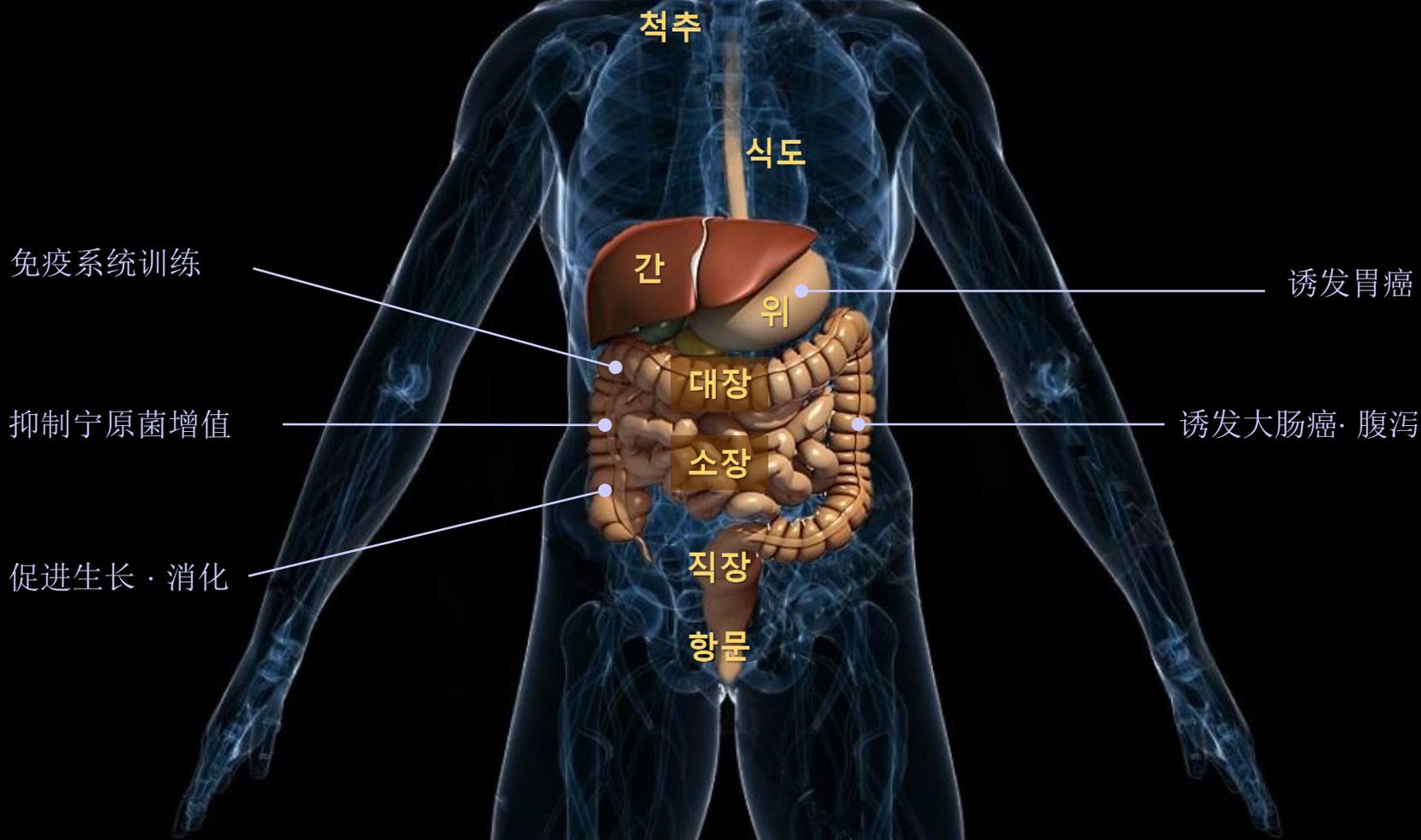


## 微生物起源 $\alpha$ -glucosidase inhibitor(AGI)

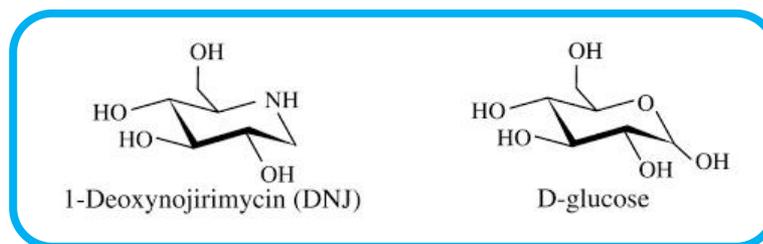
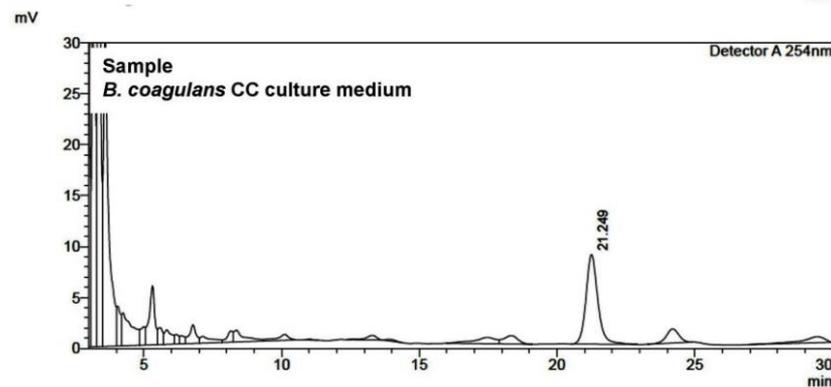
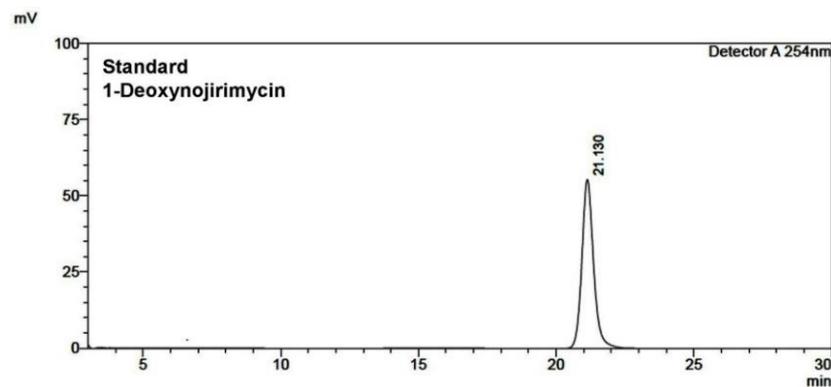
- Bacillus subtilis的 $\alpha$ -通过探索glucosidase inhibitor，将活性最高的菌株命名为DC-15。
- 用DC-15菌制作纳豆的结果很高 $\alpha$ -显示glucosidase inhibitor活性。
- DC-15菌纳豆是收藏的 $\alpha$ -有效阻碍小肠的 $\alpha$ -glucosidase活性，抑制淀粉分解为葡萄糖，抑制餐后血糖值升高。
- 还可以期待减肥的效果。
- 因此，不从培养物中提取有效成分，可以直接作为功能性食品使用。
- 目前在日本上市的纳豆中没有出现这种生理活性的例子。

# 肠道微生物

40~100兆我们体内的微生物  
95%的肠道微生物比例  
微生物占体重的比例为1~3%  
50%大变形分量中的比重

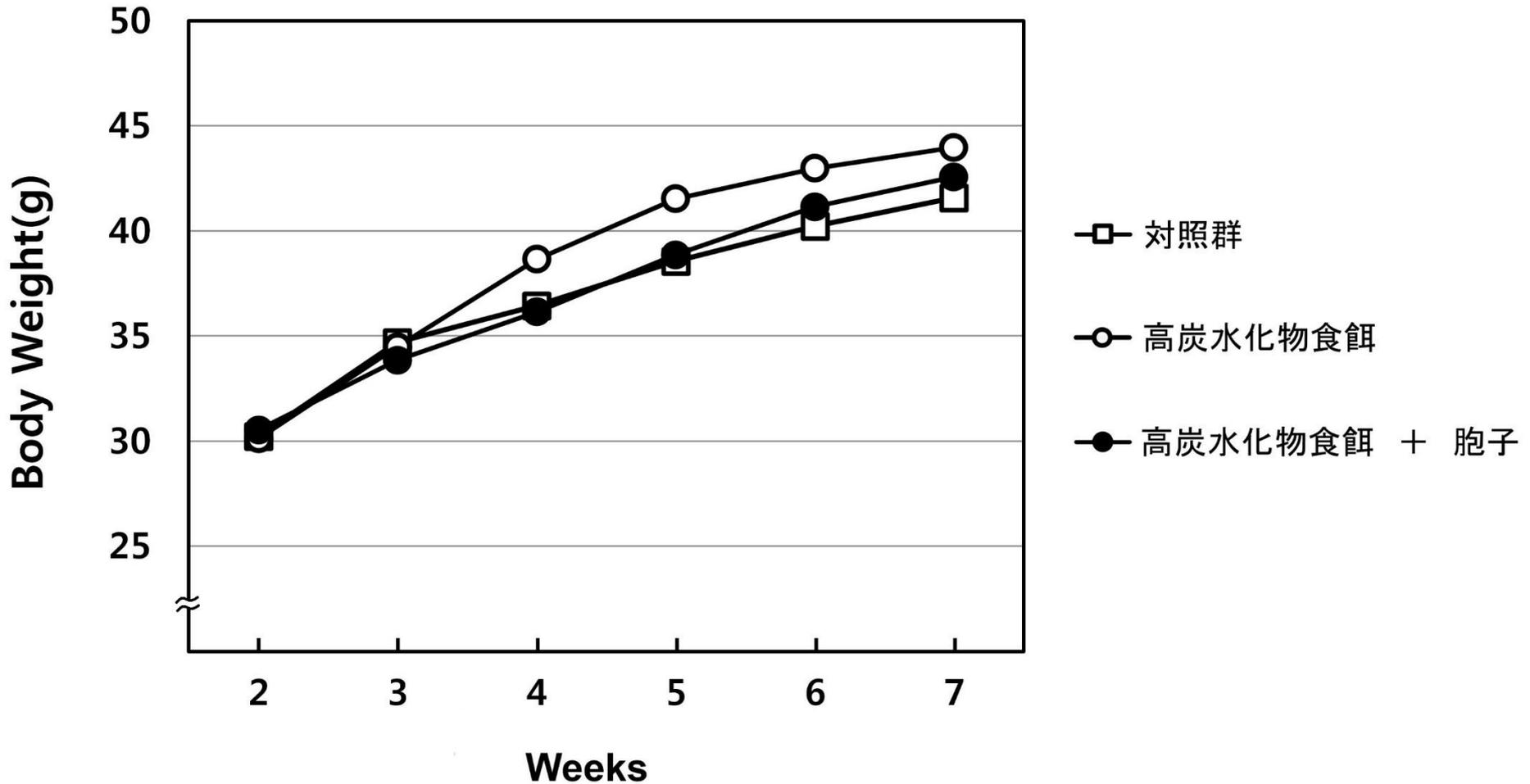


## $\alpha$ -Glucosidase inhibitor (AGI) 活性成分的分析

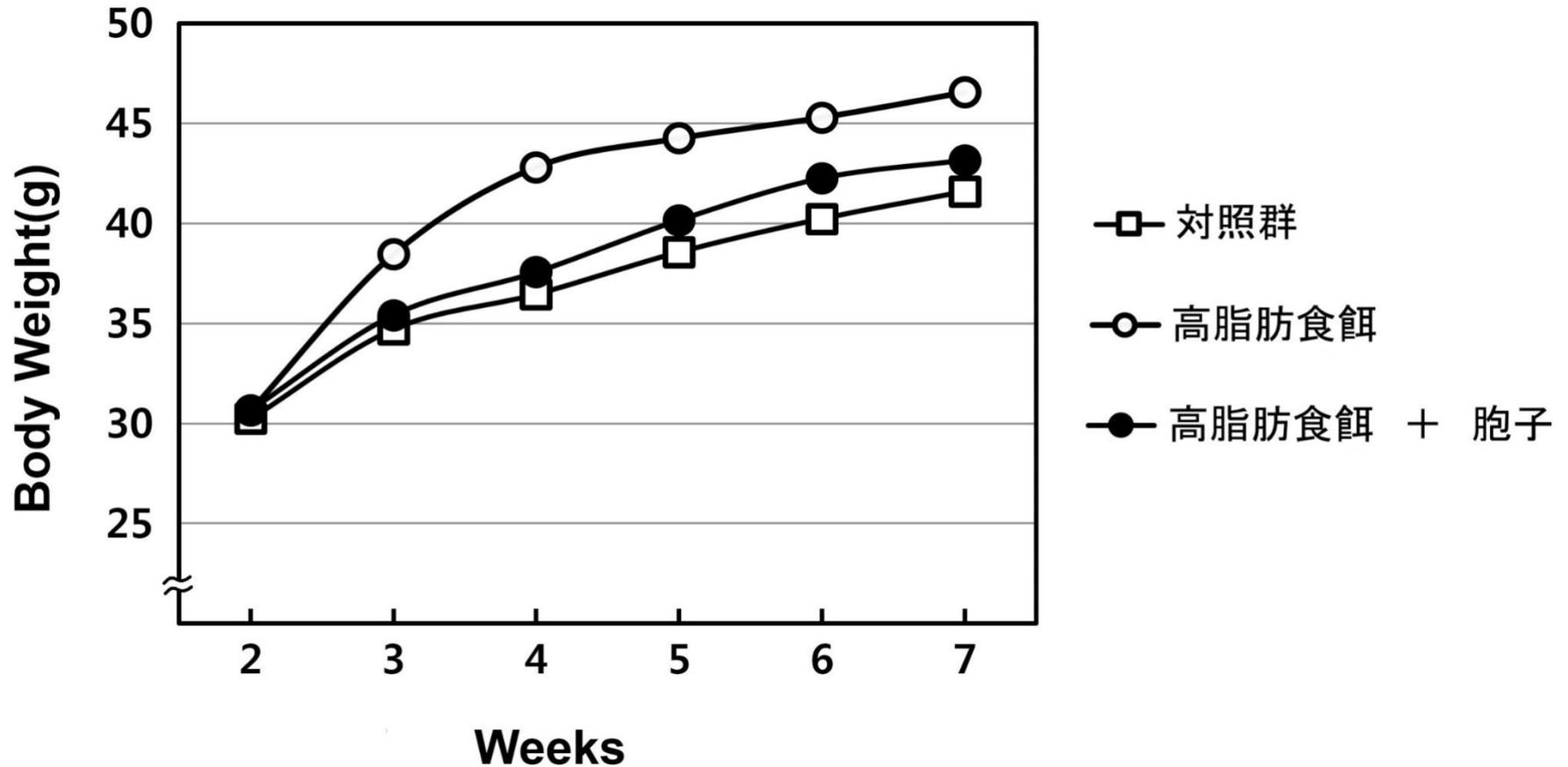


1-Deoxynojirimycin (左)：用形状与葡萄糖(右)相似的Azasugar 强大 $\alpha$ -作用于Glucosidase，使糖的吸收具有抑制的功效。

# Bacillus licheniformis FA1菌孢子的抗肥胖效果 (高碳水化合物工资)

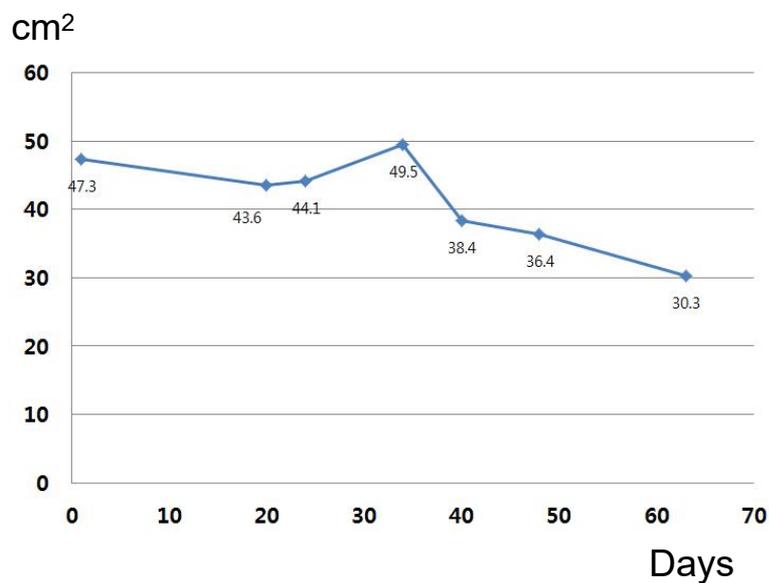


# Bacillus licheniformis FA1菌孢子的抗肥胖效果 (高脂肪工资)



## B.licheniformis FA1菌孢子的注射效果

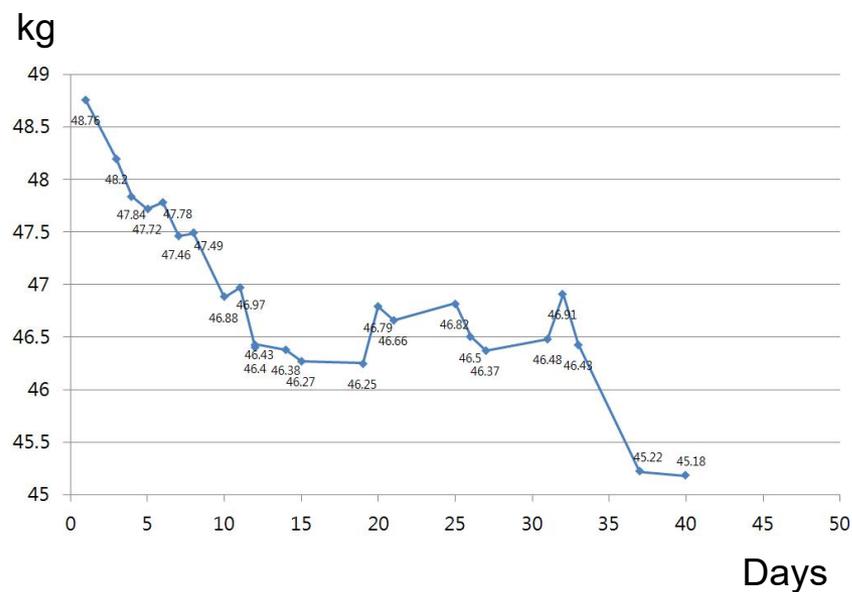
### 内在地方面的变化



24岁，176cm男性

每天摄取0.7g FA1菌发酵物（10<sup>10</sup> cells/g），用体成分分析仪观察身体的变化。

### 体重的变化



26岁女性

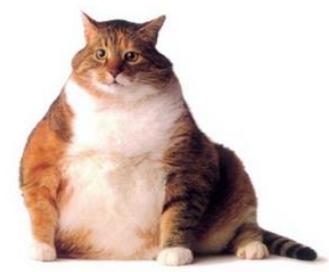
每天摄取0.7g FA1菌发酵物（10<sup>10</sup> cells/g），观察体重变化。

## B.licheniformis FA1菌株的减重效果

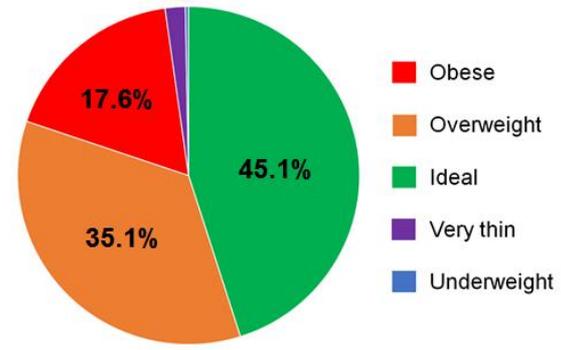
编号	出发体重 (kg) (A)	4周后体重 (kg) (B)	减轻体重 (kg) (A-B=C)	减量费(%) (C/A=D%)	换算减重 60kg(kg) (D%x60)
1	3.5	3.25	0.25	7.1	4.3
2	3.7	3.50	0.2	5.4	3.2
3	3.8	3.48	0.32	3.8	2.3
4	4.0	3.82	0.18	4.5	2.7
5	4.6	4.51	0.09	2.0	1.2
6	5.7	5.70	0.0	0	0
7	7.0	7.1	0.1	1.4	△0.8
8	7.3	6.97	0.35	4.8	2.9
9	7.4	6.8	0.6	8.1	4.9
10	9.2	8.7	0.5	5.4	3.2
11	10.8	9.25	1.55	14.4	8.4
12	33.1	31.3	1.8	5.4	3.2

每天给狗注射一次零食，每公斤体重 $10^8$ （1亿）个孢子，为期4周。

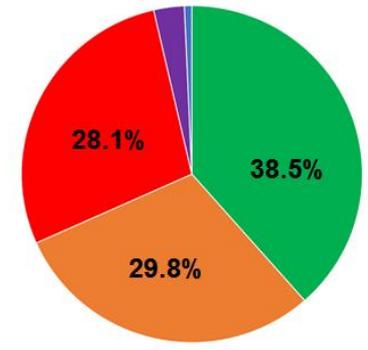
# 狗和猫的肥胖度 (美国2014)



## 52.7%



## 57.9%



### 2016 U.S. Pet Obesity

Association for Pet Obesity Prevention

**54%** Overweight or Obese  
 34.1% Overweight (BCS 4)  
 19.8% Obese (BCS 5)  
 41.9 million dogs

**59%** Overweight or Obese  
 28.0% Overweight (BCS 4)  
 30.9% Obese (BCS 5)  
 50.5 million cats

USA

Do you think corn is healthy for dogs?	<b>"YES"</b> 6% Pet Owners 48% Veterinary professionals	Do you think organic pet foods are healthier?	<b>"YES"</b> 43% Pet Owners 23% Veterinary professionals
Do you think low- or no-grain diets are healthier for dogs?	<b>"YES"</b> 61% Pet Owners 25% Veterinary professionals	Do you think raw diets are healthier for dogs & cats?	<b>"YES"</b> 35% Pet Owners 15% Veterinary professionals

Source: PetObesityPrevention.org

### 2017 U.S. Pet Obesity

Association for Pet Obesity Prevention

**56%** Overweight or Obese  
 36.4% Overweight (BCS 6-7)  
 19.6% Obese (BCS 8-9)  
 50.2 million dogs  
 56.5 million cats  
 overweight or obese  
 2017-2018 APPA pet population estimates

**60%** Overweight or Obese  
 26.5% Overweight (BCS 6-7)  
 33.5% Obese (BCS 8-9)

Have you ever tried to help your pet(s) lose weight?	<b>"YES"</b> 58% Pet Owners 54% Veterinary professionals	Is commercial pet food better or worse than 10 years ago?	<b>"BETTER"</b> 63% Pet Owners 76% Veterinary professionals
Has your veterinarian made a recommendation about the best routine or maintenance diet to feed your pet?	<b>"NO"</b> 48% Pet Owners "HAD TO ASK" 15% Pet Owners	Do you think organic pet foods are healthier?	<b>"YES"</b> 39% Pet Owners "I DON'T KNOW" 40% Pet Owners

Source: PetObesityPrevention.org

### 2018 National Pet Obesity Survey

Association for Pet Obesity Prevention

**59.5%** Overweight/Obese (BCS 6 to 9)  
 56 million Cats  
 50 million Dogs

**55.8%** Overweight/Obese (BCS 6 to 9)

**80%** Veterinary Professionals  
**68%** Pet Owners  
 Have tried to help their pet lose weight

**Best pet dietary recommendations**

- Veterinary clinic
- Internet
- Pet store

Methods to help pet lose weight:

- 68% calorie reduction/smaller portions
- 61% increased exercise
- 29% low-calorie/low-fat pet food
- 19% "prescription" weight loss diet

**Pet weight loss effectiveness**

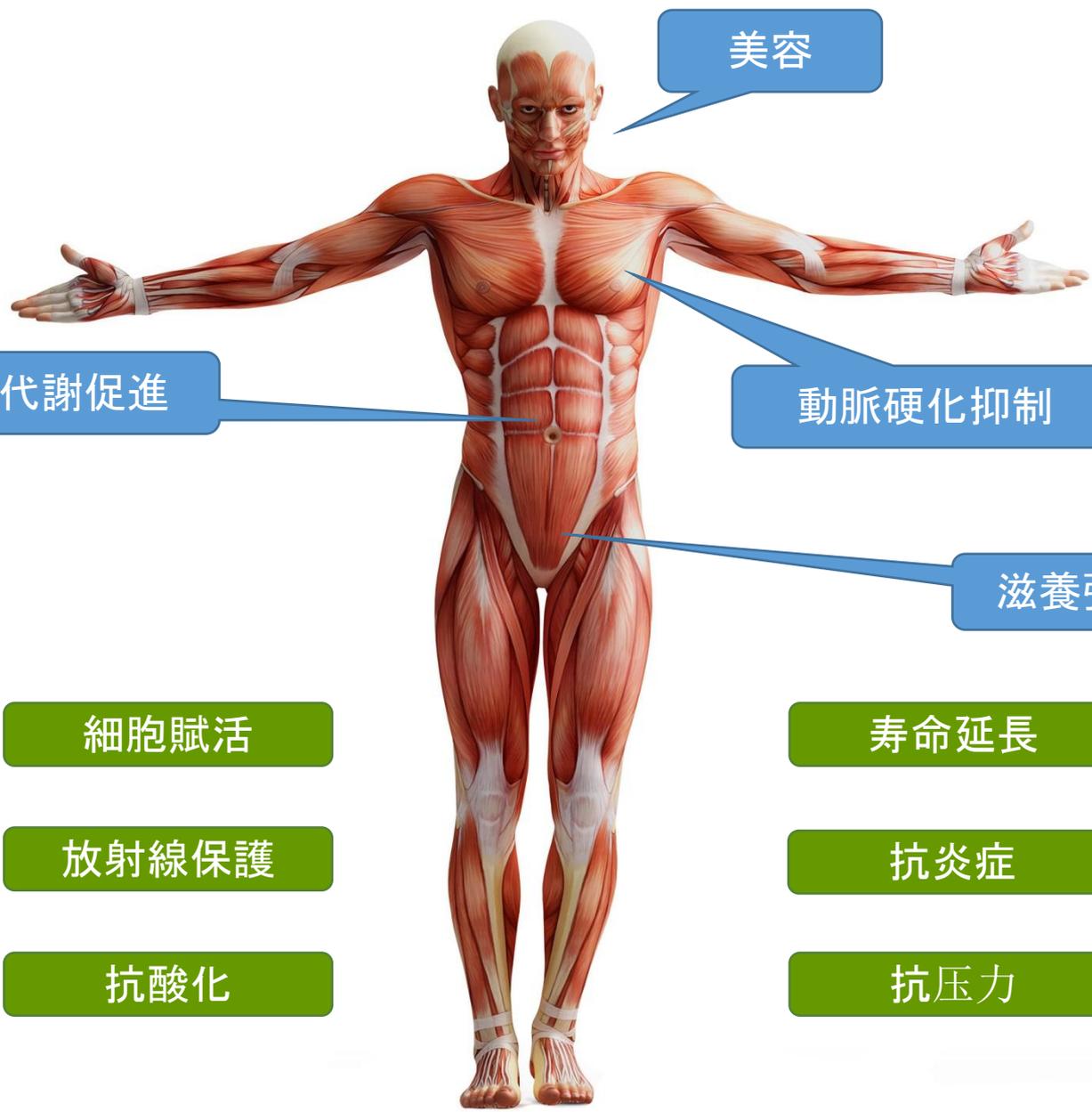
calorie reduction smaller portions	38% "very effective"	33% "somewhat"
increased exercise	36% "very effective"	30% "somewhat"
low-calorie low-fat pet food	26% "very effective"	14% "somewhat"
"prescription" pet food	13% "very effective"	14% "somewhat"

PetObesityPrevention.org

梦想终会实现的



# 多胺的作用



美容

脂質代謝促進

動脈硬化抑制

滋養強壯

細胞賦活

壽命延長

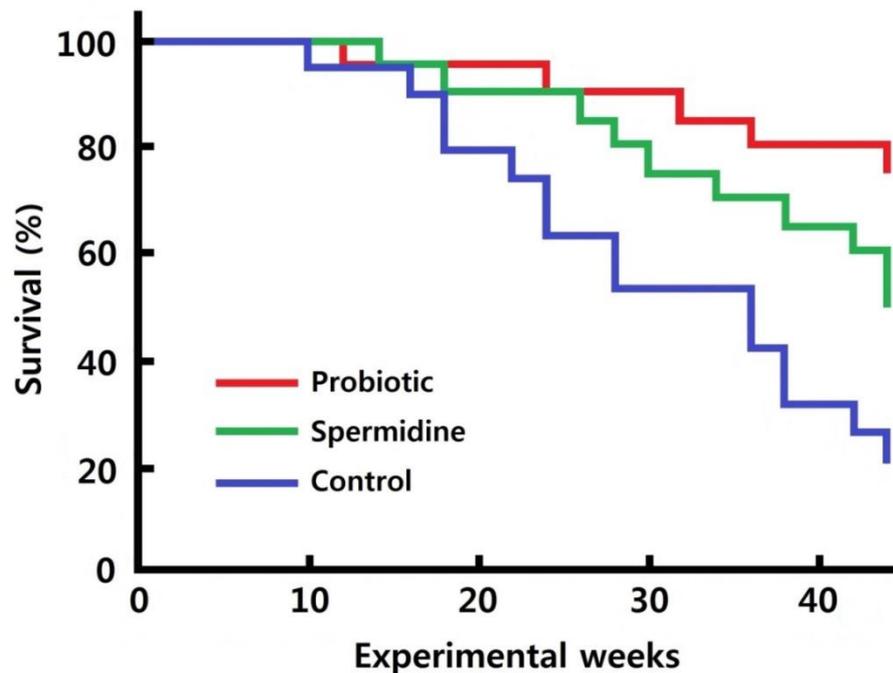
放射線保護

抗炎症

抗酸化

抗壓力

## 多胺对小鼠寿命的影响



Matsumoto M et al., (2011) PLoS ONE 6(8): e23652. doi:10.1371

动物：10周龄雄性鼠标，每笼饲养5只。

Control：标准饲料(0.03mg spermidine/g). n=19

Spermidine：3mg spermidine/kg/dose = approximately 0.15mg/mice/dose. n=20

Probiotic：*Bifidobacterium animalis* subsp. *lactis* LKM512菌을  $10^9$  cfu/kg/dose. n=20

Spermidine和Probiotic群将各自的剂量稀释到10mM PBS中，每周注射3次。  
(体重每克10 $\mu$ L)。



ELSEVIER

Contents lists available at ScienceDirect

## Enzyme and Microbial Technology

journal homepage: [www.elsevier.com/locate/enzmictec](http://www.elsevier.com/locate/enzmictec)

## Production of $\alpha$ -glucosidase inhibitor in the intestines by *Bacillus licheniformis*

Hee-Woong Kim<sup>a</sup>, Deug-Chan Lee<sup>a,b</sup>, Hae-Ik Rhee<sup>a,c,\*</sup><sup>a</sup> Department of Biomedical Technology, Kangwon National University, Kangwondaehakgil 1, Chuncheon, Republic of Korea<sup>b</sup> Institute of Bioscience and Biotechnology, Kangwon National University, Kangwondaehakgil 1, Chuncheon, Republic of Korea<sup>c</sup> DALGIAL, K-cube 101, Kangwon National University, Kangwondaehakgil 1, Chuncheon, Republic of Korea

## ARTICLE INFO

**Keywords:**

Alpha-Glucosidase Inhibitor (AGI)

*Bacillus licheniformis*

Microbiota

Secondary Metabolite, Sporulation

## ABSTRACT

We selected *Bacillus licheniformis* NY1505 by screening a strain capable of producing  $\alpha$ -glucosidase inhibitors in both aerobic and anaerobic environments in vitro and spore formation. To confirm whether this strain proliferates in the intestine and produces  $\alpha$ -glucosidase inhibitor, the spores of this strain were administered to mice orally. As the results, it was confirmed that  $10^7$  cells and about 300 units of  $\alpha$ -glucosidase inhibitor per 1 g feces were excreted in the feces after three weeks of administration as spores. And after two weeks of stopping administration, *Bacillus licheniformis* NY1505 in the intestine are cleared. This means that *Bacillus licheniformis* NY1505 steadily proliferated in the intestine and produced  $\alpha$ -glucosidase inhibitors and excreted in the feces. Also, it has an advantage in its use as it can easily eliminate *Bacillus licheniformis* NY1505 from the intestine. This method of ingesting only microorganisms is a more efficient and new method than the existing method of administering an  $\alpha$ -glucosidase inhibitor that consumes a large amount of purified product. This method shows a process in which microorganisms capable of proliferating in the intestine directly produce and supply specific secondary metabolites in the intestine.