



Probiotics Prebiotics

prebiotics probiotics 15

20% , 33 가 (Hilliam, 2000).
 nutraceuticals, designer foods, medicinal foods, therapeutic foods,
 superfoods, foodiceuticals medifoods
 (Berner O'Donnell,
 1998). phytochemicals, bioactive peptides, -3 ,
 probiotics prebiotics 가
 (Berner O'Donnell, 1998)(1).

Lactobacillus acidophilus bifidobacteria probiotic
 . Probiotic ,
 (Fuller, 1992). , probiotics
 , , , ,
 frozen desserts bifidus acidophilus 70
 , probiotic 53
 . Probiotics 가 ,
 (Hilliam, 2000).

1. Probiotic Cultures

probiotic
 , *Lactobacillus delbrueckii* , *L. acidophilus* bifidobacteria
 ssp. *bulgaricus* *Streptococcus thermophilus* . probiotic
 “ AB ”
 가 , *Lactobacillus casei*가 가 “ ABC ”
 가

L. acidophilus

bifidobacteria

probiotic

bifidobacteria

Lactobacillus 56

bifidobacteria 29

probiotic

1. How foods are modified to become functional foods. Adapted from Berner and O'Donnell(1998)

Food modification	Examples of possible functionality
Addition of phytochemicals (as plant ingredients or extracts)	Antioxidant, lower risk of CHD, lower risk of cancer, lower blood pressure
Addition of bioactive peptides	Enhanced immune function, enhanced bioavailability of minerals, hypotensive
Addition of dietary fiber	prevention of constipation, lower risk of colon cancer, lowering of blood cholesterol
Addition of w-3 poly-unsaturated fatty acids	Lower risk of heart attack, lower risk of some cancers, enhanced immune system
Addition of probiotics	Improved gastrointestinal function, enhanced immune system, lower risk of colon cancer
Addition of prebiotics	Improved gastrointestinal function, enhanced immune system, lower risk of colon cancer

2. Bacterial species primarily used as probiotic cultures. Adapted from Krishnakumar and Gordon(2001)

Species	Straubs
<i>Lactobacillus acidophilus</i>	La2, La5 (also known as La1), Johnsonii (La1;also known as Lj1), NCFM, DDS- 1 SBT- 2062
<i>L.bulgaricus</i>	Lb12
<i>L.lactis</i>	La1
<i>L.plantarum</i>	299v, Lp01
<i>L.rhamnosus</i>	GG, GR- 1, 271, LB21
<i>L.reuteri</i>	SD2112(also known as MM2)
<i>L.casei</i>	Shirota, Immunitass, 744,01
<i>L.paracasei</i>	CRL 431
<i>L.fermentum</i>	RC- 14
<i>L.helveticus</i>	B02
<i>Bifidobacterium adolescentis</i>	-
<i>B.longum</i>	B536, SBT - 2928
<i>B.breve</i>	Yakult
<i>B.bifidus</i>	Bb- 11
<i>B.essensis</i>	Danone (Bio Activia)
<i>B.lactis</i>	Bb-02
<i>B.infantis</i>	Shirota, Immunitass, 744, 01
<i>B.laterosporus</i>	CRL 431
<i>B.subtilis</i>	-

2 . Probiotic
L. casei, bifidobacteria *L. acidophilus* (Krishnakumar Gordon, 2001). 1.3
 Probiotic *L. acidophilus* ,
L. acidophilus bifidobacteria, *L. casei*, bifidobacteria *L. acidophilus* bifidobacteria
 2 가 3:1 가
 , Probiotic 5 probiotic citric acid hippuric acid
 probiotic , diacetyl, bacteriocin
 Probiotic
 probiotic (

1.1 Probiotic
 probiotic
 10^6 cfu/g
) bacteriocin (Dave Shah, 1997).
L. acidophilus *L. delbrueckii* ssp. *bulgaricus*,
Lactobacillus helveticus, *Lactobacillus jugurti*
L. casei bacteriocin
 group

1.2
 Probiotic
 pH 1.5 가
 가 ,
 . Lan-
 kaputhra Shah(1995) *L. acidophilus* *Bi-*
fidobacterium spp. 1.4
 , probiotic 가
 . Probiotic
 , probiotic
 . Clark (1993),
 Lankaputhra Shah(1995) *Bifidobacter-*
ium longum 4% 가
 .
Bifidobacterium animalis (*Bifidobacterium la-*
ctis) ,
 probiotic ,
 (Bernet , 1993; Coconnier , 1992).
 , *Lac-*
tobacillus , *Lactobacillus gasseri* ADH, *L.*
acidophilus BG2FO4 *L. casei* GG

Bifidobacteria *Bifidobacterium breve*,
B. longum, *Bifidobacterium bifidum* *Bifido-*
*bacterium infantis*가 (Bernet ,
 1993). , probiotic
 . Bifidobacteria

. Bifidobacteria
 Caco2 Ht-29
 . *L. acidophilus*
 bifidobacteria , colon
 . Lankaputhra Shah
 6 *L. acidophilus* 가, 9
 bifidobacteria 2 가
 . *L. acidophilus*
Bifidobacterium , *B. infantis*
B. longum .

1.5

, *Streptococcus*
thermophilus *L. delbrueckii* ssp. *bulgaricus*
 . *L. delbrueckii* ssp. *bulgaricus*
 , *L.*
delbrueckii ssp. *bulgaricus* *S. thermophilus*
 가
 가
 , *L. acidophilus* bifidobacteria

, probiotic
 가 . Probiotic
 24 ,
 4 (Dave
 Shah, 1997).

probiotic

L. delbrueckii ssp. *bulgaricus* *S. thermo-*

*philus*가 probiotic

L. acidophilus bifidobacteria
 , (Dave Shah,
 1998). *L. acidophilus* 7 1
 bifidobacteria 14 1 가

casein oligopeptide ,
 oligopeptide peptidase peptide
 , *L.*
acidophilus bifidobacteria
 peptide .

1.6 β -D-Galactosidase

probiotic
 -D-galactosidase (Shah Jelen,
 1990; Shah, 1994).

-D-galactosidase ‘
 probiotic

가?’ ‘
 probiotic
 가?’ .

2. Probiotic

bifidobacteria 가
 가
 가 probiotic

2.1

probiotic

(Ayebo, 1982). Probiotic

Probiotic bacteriocin 90% citric, hippuric, (Orrhage, 1994).

orotic uric Lankaputhra Shah(1998b) Ames *Salmonella* test 8

(Lankaputhra Shah, 1998a). pH promutagen, pyruvic butyric acid

pyruvic acid, butyric acid

probiotic *Salmonella typhimurium* *Escherichia coli* promutagen spectrum

Staphylococcus aureus 가 bytyric acid (DNA)

Clostridium pefringens 가 (Smith, 1995).

Lankaputhra Shah(1998b)

(Lankaputhra Shah, 1998b). Probiotic

, L(+) D(-) promutagen

, *L. delbrueckii*

ssp. *bulgaricus* *Lactococcus lactis* D(-) di-methyl sulfoxide

, *L. casei* L(+) promutagen

, *L. helveticus* *L. acidophilus* L(+) probiotic

D(-) 가 L(+)

D(-) D2-hydroxy acid dehydrogenase가 pyruvic acid 2.3

, acidosis

, bifidobacteria *L. casei*

(Shah, 1999). (Mitsuoka, 1989). *B. longum* *B. infantis*

2.2 pH . *L. acidophilus*

Goldin Gorbach(1977, 1984)

procarcinogen

4-nitroquinoline-N'-oxide, 2-nitrofluorene -glucurodase, azoreductase ni-

benzopyrene troreductase 가 . *L. acidophilus*

bifidobacteria procarcinogen

Probiotic nitrosamine procarcinogen bifidus, acidophilus 가 (Onwulata, 1989).

procarcinogen . *B. breve* 2.5

2.4 Lactose

probiotic 가 (10^9 /g) ,

3.0 g/L 1.5 g/L (Homma, 1988).

lactose glucose ga- bifidobacteria

-D- galactosidase lactose Mann Spoerry(1974) *Lactobacillus*

(Onwulata , 1989). *L. delbrueckii* ssp. *bulgaricus* *S. thermophilus*

-D- galactosidase , hydroxymethyl- glutaryl- CoA reductase

hydroxymethyl glutarate Rao

probiotic (1981) orotic acid

lactose 가 , Japers (1984) uric acid가 orotic acid

hydroxymethyl glutamic acid가

가 intra bifidobacteria

lactose 가 , Klaver Meer

lactose (1993) *L. acidophilus*

가 *L. acidophilus* deconjugation

deconjugate conjugate

philus acidophilus

L. acidophilus bifidobacteria

(Shah , 1992). Gilliland

(1985) *L. acidophilus* 가

bifidobacteria

'bifidogenic factors'

lactose

lactulose, lactitol galactooligosaccharide, fructooligosaccharide oligosaccharide

2.6

L. acidophilus bifidobacteria
(Schiffrin, 1995)

(O'Sullivan, 1996). Resistant starch non-starch oligosaccharide (colonic foods)

Payer's patches M

prebiotics (O'Sullivan, 1996).
Djouzi Andrieux (1997)

probiotic

3

cytokine (Solis Lemonnier, 1996)

Fructooligosaccharide galactooligosaccharide

macrophage (Marteau, 1997)

bifidobacteria 2 가

probiotic prebiotics

3. Prebiotics Synbiotics

'synbiotics'

probiotic prebiotic

bifidobacteria

, probiotics

가

prebiotics

. Probiotics

(Gibson

Roberfroid, 1995). Bifidus

< : Food Technology, 55(11), 46, 2001>

prebiotics probiotic