

Glossary of clinical or scientific terms in *L. casei* Shirota papers

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Synopsis Glossary This list is compiled from terms used in the synopses and research papers. Please contact us for any amendments or additions.

A

AAD	See antibiotic-associated diarrhoea .
Adjuvant	A substance that, when administered with an antigen, makes the antigen more immunogenic (i.e. enhances its immune response). Important for improving the efficacy of vaccinations.
AFB ₁	See aflatoxin B₁ .
Affluent	A fluid/substance that flows towards something (<i>cf.</i> effluent).
Aflatoxin B ₁ (AFB ₁)	Aflatoxins are fungal metabolites that can contaminate a range of food, including grains, peanuts, tree nuts and beans, due to the growth of certain <i>Aspergillus</i> spp. AFB ₁ is considered a potent carcinogen.
Anal atresia	A condition where there is an absence of an opening at the bottom of the gastrointestinal tract. Usually requires surgical treatment.
Antibiotic-associated diarrhoea (AAD)	Diarrhoea that can occur during and for several weeks after a course of antibiotics, due to disruption of the intestinal microbiota. Reported rates vary from 5% - 30%, depending on the antibiotic used. Often caused by <i>Clostridium difficile</i> .
Antibody	Proteins (immunoglobulins) made by plasma cells that bind specifically to antigens and mediate humoral immunity .
Antigen	A molecule that generates an immune response. Can generate antibodies .
Antigen-presenting cell (APC)	Includes dendritic cells (DCs) , macrophages and B cells . These present antigen peptides, via the MHC complex on their surface, to activate naïve T cells into effector T cells .
APC	See antigen-presenting cell .
Atopy	An allergic state in which sufferers have an increased tendency towards a hypersensitivity reaction (usually mediated with IgE) to usually innocuous substances. e.g. asthma, hayfever, eczema.

B

B cells	A lymphocyte that comes from the bone marrow (<i>cf.</i> T cells) that are important in antibody -mediated immunity. Part of the acquired immune system and therefore have a memory. Express CD19, CD20, CD22 among others.
Bacterial vaginosis	Mild bacterial infection of the female lower genital tract.
BbY	<i>Bifidobacterium breve</i> Yakult . A probiotic strain belonging to Yakult. Not used in the fermented milk drink Yakult.
BCW	Bacterial cell wall fragments produced for research purposes (see Hernandez-Mendoza et al. 2009).
Biolactis Powder	A powder produced commercially by Yakult in Japan and used in several research studies. Contains the probiotic strain <i>Lactobacillus casei</i> Shirota.
Bovine serum albumin (BSA)	A protein that is widely used in biochemistry and immunology.
BPcat	Bacteria that have been treated with polycation (a molecule with many positively charged ions), which disrupts their surface. This is an experimental technique (see Hernandez-Mendoza et al. 2009).

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Bristol Stool Scale	A seven-point scale used to grade the appearance and consistency of faeces. Type 1 (separate hard lumps like nuts and difficult to pass) indicates stools that have spent the longest time in the colon. Type 7 (entirely liquid) indicates stools that have spent the least time in the colon. (www.loveyourgut.com ; http://thewvsr.com/bristolstoolchart.htm).
BSA	See bovine serum albumin .
β-glucuronidase	A bacterial enzyme associated with microbial metabolism in the gut and detectable in faecal samples; cleaves bonds between glucuronic acid and other substances; capable of generating potentially carcinogenic metabolites in the colon. This enzyme has been extensively investigated as a marker of colorectal cancer risk.
β-glucosidase	A bacterial enzyme associated with microbial metabolism in the gut and detectable in faecal samples; breaks bonds between 2 glucoses or glucose substituted molecules; capable of generating potentially carcinogenic metabolites in the colon.

C

¹³C-urea	A safe, radioactive-labelled carbon atom that is used in breath tests to detect and diagnose <i>Helicobacter pylori</i> infection. Urea is involved in the metabolism of nitrogen-containing compounds.
CAC	See colitis-associated cancer .
CD	See either cluster of differentiation or Crohn's disease .
CD4⁺ cells	T-helper cells (Th cells) important in cell-mediated immunity . Secrete cytokines , activate macrophages and help B cells make antibodies (part of the acquired immune system). Differentiate into Th1 and Th2 effector cells.
CD8⁺ cells	Cytotoxic T cells (Tc cells). Can recognise and kill tumour cells and cells infected with viruses.
Cell-mediated immunity	The adaptive immune response involving antigen-specific T cells .
CFU	See colony forming unit .
Chemokine	Small chemotactic cytokines that stimulate the migration and activation of cells, particularly phagocytes and lymphocytes . Important in an inflammatory response.
Chemotactic	The adjective of chemotaxis. The movement or orientation of a cell or organism along a concentration gradient either toward or away from a chemical stimulus.
Clostridium difficile	A Gram-positive , spore forming pathogen that can cause diarrhoea and more serious illness in patients during and after an antibiotic course. A particular problem for elderly people in hospital.
Cluster of differentiation (CD)	A nomenclature used to designate cell surface molecules important in cell-mediated immunity and other biological processes. Over 200 CD antigens have been identified. Some CDs have been explained further in this glossary because of their relevance to LcS research. Cells expressing CDs are often shown as CD ⁺ .
Colitis	Inflammation of the colon.
Colitis-associated cancer (CAC)	Patients with inflammatory bowel conditions (IBD), particularly ulcerative colitis , are at a higher risk of developing CAC.
Colony forming unit	A term used in microbiology to describe the number of microorganisms that can form colonies in culture dilution methods used to estimate the number of viable microorganisms in a sample.
Colony stimulating factor (CSF)	A cytokine that induces the production and release of white blood cells from bone marrow.

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Commensal	The word ' <i>commensal</i> ' means to share a table. Used to describe the indigenous microbes that live in and on various body surfaces. The host provides food and shelter to the microbes; the commensal microbiota benefits the host in a variety of ways including defence against infection and disease.
ConA	See concanavalin A .
Concanavalin A	A lectin used as a polyclonal activator of T cells during <i>in vitro</i> immunology investigations.
C-reactive protein (CRP)	A blood protein measured in a routine diagnostic test. A high or increasing amount of CRP in the blood suggests that there may be acute infection or inflammation.
Crohn's disease (CD)	A chronic disease where inflammation affects any part of the gut, from the mouth to the anus, but most often the ileum (part of the small intestine) and colon. Inflammation can extend through all layers of the gut wall (i.e. is transmural) and is characteristically patchy in distribution with areas of normal tissue between. Symptoms include abdominal pain, diarrhoea, fever, blood and mucus in the stools. A relapsing and remitting condition; it can often recur after surgery.
CRP	See C-reactive protein .
CSF	See colony stimulating factor . (Can also be used for cerebral spinal fluid).
c-Src	Cytokine signalling-related protein. A protein involved in transmitting signals inside the cell to regulate DCs and macrophages among other cells.
Cytochalasin D	A phagocyte inhibitor. It is an inhibitor of actin filament polymerization, it also affects mitosis.
Cytokine	Proteins made by immune cells that affect the behaviour of other cells. Cytokines made by lymphocytes are called interleukins .
Cytotoxicity	A measurement of how toxic a substance/material is to cells.

D

DC	See dendritic cells .
Defensins	Cationic small peptides made by neutrophils and Paneth cells in the gut, which can kill pathogenic bacteria.
Dendritic cells (DC)	A phagocytic cell derived from the bone marrow, mainly found within tissues and with large numbers present in lymphoid tissues. Presents fragments of antigens to T cells to stimulate appropriate immune response.
Dextran sulphate sodium (DSS)	A substance used to induce acute bowel inflammation in experimental models of IBD .
DSS	See dextran sulphate sodium .
Dysbiosis	A microbial imbalance: a disruption or shift in the relative abundance of microbial taxa in a microbiota compared to the profile observed in healthy hosts.

E

EAE	See experimental autoimmune encephalomyelitis .
Effluent	A fluid/substance that flows away from something (<i>cf.</i> affluent).
ELISA	See enzyme-linked immunosorbent assay .
Endoscopy/endoscopic	Visual examination of internal parts of the body (such as the gut) by using a small tube with an attached camera.

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Endotoxin	A heat-stable toxin released from bacteria when they lyse (<i>cf.</i> exotoxin). Lipopolysaccharides , from the cell wall of Gram-negative bacteria, are an important endotoxin. High levels of endotoxin are associated with a range of symptoms such as fever and inflammation.
Enteral nutrition	A method of nutritional support where nutrients are administered directly into the stomach, duodenum or jejunum.
Enzyme-linked immunosorbent assay (ELISA)	A common serological technique used to detect the presence of an antibody or antigen in a sample.
Eosinophil	Polymorphic white blood cells important for defence against parasites. Associated with Ig-E mediated hypersensitivity. Levels can increase in atopic individuals, causing eosinophilia (an abnormally high level in the blood).
Epithelium	A tissue consisting of one or more layers of cells that line the surface structures throughout the body. In the gut, the epithelium includes enterocytes and mucus-secreting goblet cells among other cell types.
EPS	See exopolysaccharide .
ERBHAL	Early rise in breath hydrogen after lactulose. A technique in which subjects ingest lactulose (a non-absorbable carbohydrate digested in the colon), followed by tests to detect the presence of hydrogen in their breath. It can be used to measure gut transit time and bacterial fermentation, and to diagnose conditions such as small intestinal bowel overgrowth (see lactulose).
ERK	See extracellular signal-related kinase .
ex vivo	An experiment that takes place outside of a living organism, for example, a laboratory test using blood or tissue samples.
Exopolysaccharide (EPS)	A high-molecular-weight polymer composed of sugar residues that are produced and secreted by a microorganism into the surrounding environment.
Experimental autoimmune encephalomyelitis (EAE)	An animal model of human multiple sclerosis.
Extracellular signal-regulated kinase (ERK)	A type of MAPK which is involved in regulating the balance of IL-10 and IL-12 production and other biological processes by relaying a variety of signals to the nucleus.

F

FACS	Fluorescent-activated cell sorter. A machine that characterises and separates cells by passing them in a stream past photodetectors, based on their size, granularity and fluorescence due to bound fluorescent antibodies.
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G

Gut-associated lymphoid tissue (GALT)	Cells and tissues associated with the immune system located in the gut. Includes tonsils, adenoids, appendix, Peyer's patches and intraepithelial lymphocytes.
GALT	See gut-associated lymphoid tissue .
Gastrostomy	An artificial opening into the stomach, often to allow for nutritional support.
Germ-free	Describing animals that lack a microbiome, which are born and raised under sterile conditions for research purposes (gnotobiotic).

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Gingivitis	Inflammation of the gums.
GI tract	Gastrointestinal tract. A term used to describe the digestive tract.
Gram stain	An important microbiology technique developed by Christian Gram in 1884, which is used to separate bacteria into two groups based on differences in the structure of their cell walls (peptidoglycan content). Involves staining a heat-fixed smear of bacteria, first with crystal violet then, after decolourising and rinsing steps, counterstaining usually with a red dye. Gram-positive bacteria retain the first dye (contain more peptidoglycan), and thus stain purple. Gram-negative bacteria do not, and are thus able to stain red from the second stain.
Gram-negative bacteria	Examples of Gram-negative bacteria: <i>Escherichia coli</i> , <i>Helicobacter pylori</i> , <i>Pseudomonas</i> , <i>Salmonella</i> , <i>Shigella</i> , <i>Vibrio</i> .
Gram-positive bacteria	Examples of Gram-positive bacteria: <i>Bacillus</i> , <i>Bifidobacterium</i> , <i>Clostridium</i> , <i>Lactobacillus</i> , other lactic acid bacteria, <i>Staphylococcus</i> , <i>Streptococcus</i> . Most (not all) probiotics are Gram-positive.

H

H ₂ O ₂	Hydrogen peroxide. A powerful bleaching agent with strong oxidising properties.
HAMP/TSP	See HTLV-1 associated myelopathy/tropical spastic paraparesis .
<i>Helicobacter pylori</i>	A Gram-negative bacterial pathogen that is able to colonise the mucosa of the stomach. It can cause inflammation of the stomach lining and has been associated with the development of duodenal and gastric ulcers.
hGH	Human growth hormone.
Histopathological	The study of tissue changes that result from disease states.
HTLV-1	See human T-cell lymphotropic virus type 1 .
HTLV-1 associated myelopathy/tropical spastic paraparesis (HAMP/TSP)	An incurable viral infection of the spinal cord that causes weakness in motor or sensory function of the lower extremities. It is found primarily in the tropical regions, including southwestern Japan.
Human T-cell lymphotropic virus type 1 (HTLV-1)	A virus that causes abnormalities within T-cell populations such as T-cell leukaemia and T-cell lymphoma. Implicated in diseases such as HTLV-1 myelopathy or tropical spastic paraparesis, where the spinal cord is infected resulting in weakness of the legs.
Humoral immunity	The antibody -mediated specific immunity. B-cells are important in this process. So-called because body fluids used to be called 'humors'.

I

IBD	See inflammatory bowel disease .
IC	See inhibitory concentration .
ICW	Intact cell wall.
IFN- γ	Interferon-gamma. Cytokine made by Th1 , Tc and NK cells . Has antiviral activity. Activates macrophages and increases expression of MHC class II molecules on APCs and epithelial cells.
Ig	Immunoglobulin or antibody .
IgA	The major antibody produced at mucosal surfaces, such as in the gut.
IgE	Present in trace amounts in serum. Involved in allergic reactions; binds to mast cells and stimulates the release of histamine. Also, involved in the protection against parasitic worms.

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IgG	The major antibody present in serum. It is thought to play a protective role against invading pathogens (virus, bacteria, fungi, etc).
IL	Interleukin. A cytokine produced by lymphocytes which act on other immune cells. [<i>-inter</i> relates to 'communication between', <i>-leukin</i> relates to the 'white blood cells'].
IL-1	A cytokine produced mainly by activated macrophages . Important in helping T cells initiate an immune response; also a mediator of inflammation and fever. Promotes B cell proliferation and stimulates release of TNF-α , IL-6 , and CSF . Raises body temperature to aid pathogen elimination.
IL-2	A pro-inflammatory cytokine produced mainly by T-helper (CD4⁺) cells . Stimulates T and B-cell proliferation, stimulates release of IFN-λ and stimulates NK cell proliferation and activity.
IL-5	A cytokine made by Th2 cells , eosinophils and mast cells . An important eosinophil growth factor and chemoattractant. In B cells it induces differentiation and IgA production.
IL-6	A cytokine produced by activated T-helper cells, fibroblasts and macrophages . Promotes B cell differentiation into plasma cells to increase antibody production and enhance inflammation and the acute phase response.
IL-10	A cytokine produced by Th2 and some Th1 cells among others. An anti-inflammatory cytokine which inhibits synthesis of pro-inflammatory cytokines . Also inhibits Th1 differentiation; stimulates growth of B cells and mast cells.
IL-12	A cytokine produced by macrophages , dendritic cells , and other immune cells. Activates NK cells and stimulates Th1 cell development.
IL-12 p40	A subunit of the IL-12 molecule.
Ileocolonic resection	Surgical removal of part of the gastrointestinal tract from the ileum to the colon.
<i>in vitro</i>	A procedure performed outside of a living organism and in controlled, laboratory conditions. [<i>Vitro</i> means glass]
<i>in vivo</i>	An experiment that occurs within a living organism.
Inflammatory bowel disease	A collection of inflammatory bowel conditions that usually affect the large and small intestines. Includes Crohn's disease and ulcerative colitis .
Inhibitory concentration (IC)	Concentration of a substance that inhibits the growth of the subject.
Innate immunity	The primary immune defences of the body include physical/chemical barriers as mucus layers, stomach acid, lysozyme, as well as cells like neutrophils , dendritic and NK cells . The innate immune response is present at all times, but does not increase with repeated exposure to a pathogen (i.e. has no memory). Can discriminate between groups of similar pathogens.

J

J774.1 cells	A murine macrophage cell line.
Jejunal-reactal anastomosis	Surgical joining of the jejunum to the rectum.
Jejunostomy	A surgical opening at the jejunum, often to allow for nutritional support.
JNK	Jun N-terminal kinase. A type of MAPK which is involved in IL-10 production and other biological processes.

K

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L

Lactose	The sugar naturally found in milk. A disaccharide consisting of galactose and glucose.
Lactulose	A synthetic sugar that is broken down by intestinal bacteria in the colon. It is used in the ERBHAL test for SIBO , because an early rise in hydrogen in the breath of volunteers after consuming lactulose indicates the sugar has been digested in the small intestine, not the colon.
Lamina propria	A layer of connective tissue below the epithelium cells lining the gastrointestinal tract (and other tubes in the body). It contains many blood and lymph capillaries, lymphatic nodules and immune cells. Lymphocytes and plasma cells access the lamina propria across the epithelial membrane and protect the tissue against bacteria that cross the epithelial membrane. The plasma cells produce IgA .
LcS	<i>Lactobacillus casei</i> Shirota . A unique strain of probiotic bacteria discovered in 1930, and used to make the fermented milk drink Yakult.
Leukocytes	White blood cell. Includes lymphocytes , polymorphonuclear leukocytes (granulocytes) and monocytes .
Lipopolysaccharide (LPS)	A molecular cell wall component of Gram-negative bacteria containing lipid and polysaccharide moieties. Can elicit a strong immune response due to recognition via the TLR-4 . An endotoxin .
LPMC	Lamina propria mononuclear cells .
LPS	See lipopolysaccharide .
Lymphocytes	A class of white blood cells that carry variable cell-surface receptors for antigens on their surface. Can be either B cells (humoral immunity) or T cells (cell-mediated immunity).
Lysozyme	A family of enzymes that can damage bacterial cell walls, causing bacteria to lyse (burst). Produced in tears, saliva, human milk, mucus and the Paneth cells in the gut. Part of the innate immune system and anti-bacterial.

M

Macrophage	A phagocytic white blood cell (derived from a monocyte) which acts as an antigen-presenting cell to initiate the acquired immune response.
Major histocompatibility complex (MHC)	A cluster of genes on human chromosome 6 that encode a set of membrane glycoproteins called the MHC molecules. MHC class I can bind small peptides for presentation to CD8⁺ T cells . MHC class II present peptides to CD4⁺ T cells .
MAPK	See mitogen-activated protein kinase .
MBP	See myelin basic protein .
MHC	See major histocompatibility complex .
Microflora; microbiota	The population of commensal microorganisms that live in the human body, e.g. intestinal microbiota.
Microbiome	The complete set of genes within a microbiota
Mitogen	A substance that stimulates the rapid division (proliferation) of leukocytes and other types of cells .
Mitogen-activated protein kinase (MAPK)	A protein kinase (type of enzyme) that forms part of an intracellular signalling cascade that regulates various processes (e.g. cell differentiation, gene expression, mitosis) as a response to stimuli.
Monocyte	A white blood cell with phagocytic properties that stimulates the acquired immune response. Precursor of macrophage .
MRS broth	de Man, Rogosa and Sharpe broth: a bacterial growth medium used for culture of lactobacilli.

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Mucosa	Mucous membrane. The moist membrane that lines tubes and cavities in the body, including the gastrointestinal tract. Comprises a surface layer of epithelium that contains mucus-secreting glands and the underlying connective tissue (lamina propria) and muscularis mucosae that form the inner boundary.
Multivariate analysis	This refers to any statistical technique used to analyse data that arises from more than one variable.
Murine	Any animal belonging to the genus <i>Muridae</i> , which includes the species rat and mouse.
Myelin basic protein (MBP)	A protein that plays a key role in the myelination of the central nervous system.
Myelopathy	A disease of, or functional problem with the spinal cord.

N

Neutrophils	A major class of white blood cells in human peripheral blood. Phagocyte important for engulfing and killing extracellular pathogens.
NF-κB and IκB	NF-κB is a transcription factor involved in IL-6 production and other cellular processes. IκB is an inhibitor of NF-κB .
NK cells	Natural killer cells. Large granular lymphocytes which have cytolytic activity against a variety of tumour and viral-infected cells. Part of the innate immune system. Express the identifying proteins CD16 and CD56 among other CDs.
NO	Nitric oxide. An important biological messenger molecule which is involved in multiple reactions and pathways in the body. Functions include vasodilation of blood vessel and signalling between cells. Phagocytes produce NO and use it to degrade pathogens
Nod2	A protein found in macrophages which influences the production of cytokines .
Norovirus	Formerly called Norwalk virus, and sometimes called 'winter vomiting virus'. A major cause of epidemics of vomiting and diarrhoea in all ages. Spreads rapidly by faecal-oral route, from contaminated food or water and person-to-person contact.

O

OF-IN	Oligofructose-enriched inulin. A prebiotic.
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P

p38	A type of MAPK which is involved in IL-10 production and other biologic processes.
Pancreatin	A combination of digestive enzymes released by the pancreas, which includes amylase, lipase and protease.
Paneth cells	Specialised epithelial cells located at the base of the crypts in the small intestine, which contain defensins and lysozyme .
Paraparesis	A weakness of the lower limbs.
Parenteral nutrition	A method of nutritional support which administers nutrients directly into the blood stream.
PBMC	See peripheral blood mononuclear cells .
p-cresol	A phenolic compound produced from the breakdown of tyrosine in the colon by bacteria. Used as a biomarker to assess bacterial proteolytic metabolism (putrefaction) in the colon. Putrefactive compounds have been associated with disease, including cancer.
PEC	See peritoneal exudate cells .

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Pepsin	An enzyme in gastric juices that breaks down food proteins.
Peptidoglycan	A component of the cell wall of both Gram-positive and Gram-negative bacteria: an enormous polymer composed of many identical subunits (sugars and amino acids). The cell wall of Gram-positive bacteria consists of a single thick layer of peptidoglycan, which is recognised by TLR-2 . The more complex cell wall of Gram-negative bacteria consists of a much thinner peptidoglycan layer surrounded by an outer membrane.
Peptidoglycan (PG)	A component of PSPG .
Peptone	A water-soluble protein molecule produced after partial hydrolysis of the original protein. Often used in bacterial culture media.
Perforin	A substance release by NK cells and Tc cells which cause cell lysis and death by forming holes in cell membranes.
Peripheral blood mononuclear cells (PBMC)	Lymphocytes , monocytes and macrophages isolated from blood samples, usually by using centrifugation.
Peritoneal exudate cells (PEC)	Cells taken from the fluid that drains from the peritoneum (series of membranes that form the lining of the abdomen cavity) to areas of inflammation. Experimental method to obtain white blood cells.
Peyer's patch (PP)	A secondary lymphoid organ located primarily in the small intestine. Contains specialised epithelial cells which allow the interaction between luminal contents and immune cells located beneath the PP.
PG	See peptidoglycan .
Phagocytes	White blood cells that engulf and then degrade particulate antigenic matter (e.g. foreign particles, bacteria). Examples: macrophages , neutrophils .
Phenol	A compound produced by the bacterial breakdown of aromatic amino acids. Phenols are compounds consisting of a hydroxyl group (-OH) linked to an aromatic hydrocarbon group. The simplest example is phenol (C ₆ H ₅ OH).
Placebo	A substance used as a control intervention in a human study. If is a dietary intervention, it should have the same taste and appearance as the test product, but without the active test ingredient. Trial subjects should not know which intervention substance they are taking (i.e. are 'blinded'). If both subjects and the researchers administering the intervention do not know which intervention is the test product or the placebo, then the trial design is 'double-blinded, placebo-controlled'.
Polysaccharide peptidoglycan complex (PSPG)	Major soluble component of bacterial cell walls.
POMS	Profile of mood states questionnaires. Questionnaire used to assess subject's mood, often used in quality of life/mood and cognition research.
PP	See Peyer's patch .
Prebiotic	'Prebiotics are non-digestible substances that when consumed provide a beneficial physiological effect on the host by selectively stimulating the favorable growth or activity of a limited number of indigenous bacteria.' <i>Gibson GR & Roberfroid MB (1995)</i> .
Probiotic	'Live microorganisms which, when administered in adequate amounts, confer a health benefit to the host' <i>FAO/WHO 2002</i> .
Prophylactic	A preventative measure. In terms of medical use, treatment given to prevent a condition/disease.
Proteolytic fermentation	The breakdown of proteins and amino acid by bacterial fermentation. The products of this metabolism are considered harmful to health.

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Protoplast	A live (bacterial) cell which has had the cell wall completely removed. It is spherical and osmotically sensitive. Used experimentally to assess the influence of the cell wall in any activity, e.g. in absorption of aflatoxin or stimulation of an immune response.
PS-I and PS-II	Polysaccharide-I and II. Components of PSPG-I and PSPG-II .
PSPG	See polysaccharide peptidoglycan complex .
PSPG-I and PSPG-II	Polysaccharide peptidoglycan-I and II. These are the two components that form the PSPG complex found in the cell wall of <i>L. casei</i> Shirota.
Putrefactive metabolites	Putrefaction (or proteolysis) is a descriptive term for bacterial metabolic activity in the intestines in which proteins are broken down. Some products of this metabolism (i.e. putrefactive metabolites) are considered harmful because they are toxigenic or carcinogenic. Examples include ammonia, phenols and indoles.

Q

R

ROS	Reactive oxygen species. Highly reactive forms of oxygen (molecules or ions). Implicated in oxidative stress and cell damage. Examples: free radicals, superoxide, hydrogen peroxide.
RV	Rotavirus. The most common cause of diarrhoea in infants and children worldwide. Usually transmitted by the faecal-oral route. Infects epithelial cells of the small intestines, resulting in gastroenteritis. Symptoms include severe watery diarrhoea, stomach cramps and dehydration.

S

Saccharolytic fermentation	Bacterial metabolism in the gut that involves the breakdown of carbohydrate. Considered a more favourable fermentation compared to proteolysis due to the metabolites (SCFA) produced: acetate, propionate, butyrate.
Short chain fatty acids (SCFA)	Examples: acetic acid, butyric acid, propionic acid. These are, together with lactic acid, the principal products of saccharolytic fermentation by bacteria in the large intestine. Most are absorbed and metabolised by the host. Generally considered beneficial for gut health and function. Butyric acid is an important energy source for colonocytes and may help protect against tumours.
SCFA	See short chain fatty acids .
Serotonin reuptake inhibitors	A group of anti-depressant drugs that inhibit the normal re-absorption of serotonin (a neurotransmitter) so that a higher concentration is present in the extracellular space.
Small intestinal bacterial overgrowth (SIBO)	An overgrowth of bacteria in the small intestine which has a similar composition of bacteria to that found in the colon.
SIBO	See small intestinal bacterial overgrowth .
Spheroplast	A cell which has been treated so to remove or weaken its cell wall (e.g. by the action of penicillin). The treated cell is usually spherical in shape, and is osmotically sensitive.
Supernatants	The clear fluid layer at the top of a sediment or precipitate. An example from microbiology: bacteria grown in a liquid culture can be removed by centrifuging the suspension to precipitate the bacteria. The top clear layer of the culture medium (the supernatant) can then be removed, either to discard or to test.
Synbiotic	A combination of a prebiotic and a probiotic (not necessarily synergistic).

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T

T cells	A type of lymphocyte responsible for the cell-mediated immune response of the acquired immune system. These cells account for 60-75% of all lymphocytes in the body which can be found in high concentrations in secondary lymphoid organs (spleen, lymph nodes and GALT).
Tc	Cytotoxic T cell. Account for 15% - 20% of all T cells . Part of the acquired immune response, can recognise and kill tumour cells and cells infected with viruses. Important in host defence against intracellular pathogens and tumours. Express CD8 (i.e. CD8 ⁺).
Th	T-helper cell. A subset of T cells (~60% - 70% of T cells) which can recognise specific antigens and signal other cells of the immune system to mount a response. (cf Th1 and Th2). Express CD4 .
Th1	T-helper cell 1. A subset of T-helper cells. A predominance of these cells result in cell-mediated immunity and elimination of intracellular pathogens. Th1 release IL-2 , TNF-α and IFN-λ which activate macrophages and Tc cells.
Th2	T-helper cell 2. A subset of T-helper cells. A predominance of these results in humoral immune response and is associated with allergic reactions. Release a variety of cytokines (e.g. IL-4) which stimulate B cells to release Igs .
TADB	Teichoic acid-deficient bacteria. Teichoic acids, which are found in the cell walls of Gram-positive bacteria , may be removed for experimental purposes. Example: to investigate the influence of this cell wall component in a bacterial activity.
Teichoic acid	The cell walls of Gram-positive bacteria are primarily formed of peptidoglycan as well as large amounts of (negatively-charged) teichoic acids . This is composed of polymers of glycerol or ribitol joined by phosphates. Important in maintaining the structure of the cell wall. Teichoic acid is not found in Gram-negative bacteria.
TGEV	See transmissible gastroenteritis coronavirus .
TLR	See Toll-like receptors .
Toll-like receptors (TLR)	A family of molecules present on many immune cells, part of the innate immune response. Can recognise bacterial products, which may lead to activation of an immune response. (See TLRs listed below).
TLR-2	An immune receptor that recognises peptidoglycan from Gram-positive bacteria .
TLR-4	An immune receptor that recognises lipopolysaccharide from Gram-negative bacteria .
TLR-9	An immune receptor that recognises certain motifs of bacterial DNA.
TNF-α	Tumour Necrosis Factor-alpha. Produced by monocytes , T and B cells , and NK cells . Increases vascular permeability to increase fluid drainage into lymph nodes, enhances antiviral activity and destruction of tumour cells.
Transcriptome	The set of all RNA molecules, including mRNA, rRNA, tRNA, and other non-coding RNA produced in one or a population of cells.
Transmissible gastroenteritis coronavirus (TGEV)	A type of coronavirus which infects absorptive cells in the small intestine of both pigs and humans resulting in failure to digest and absorb food, and dehydration.

U

Ulcerative colitis (UC)	A long term inflammatory condition causing superficial ulceration of the colon and rectum. Symptoms vary in severity, and include pain and discomfort, diarrhoea, mucus and/or blood in stools. It is a relapsing and remitting condition.
Urease	An enzyme that catalyses the breakdown of urea into carbon dioxide and ammonia. (see ¹³ C-urea).

Glossary of clinical or scientific terms in *L. casei* Shirota papers

Please contact science@yakult.co.uk for additions or corrections

V

W

X

Y

Z