

## The Industry Originated Probiotic Bacteria Role in COVID-19

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### ABSTRACT

Intensive, uncontrolled, long term usage of industry originated *Bifidobacterium animalis* subspecies lactis by humans lead the “Probiotic contamination” of human gut, when unusual, not common for healthy individuals bacterial colonies have being created and dominate for a long time, changing the function of Human Microbiome.

Several strains of *Bifidobacterium animalis* subspecies lactis (produced by few leading world biotechnological manufacturers) colonize human mucosa surfaces, lead the SARS-CoV-2 increased ability to penetrate Air path and gastrointestinal mucosa surfaces, change an innate immunity of individuals, infect human cells and ensure specific complications, as cytokine storm, atypical pneumonia, clotting. SARS-CoV-2 features (as interaction with ACE2 protein, others possible cell-entry points, binding to human cell surface and endocytosis) are enhanced by above bacterial metabolites. Further on, *Bifidobacterium animalis* subspecies lactis or metabolically similar one, provide deregulated release of pro and anti-inflammatory cytokines, lead a severe course of COVID-19.

**Keywords:** Probiotics; COVID-19; Probiotic bacteria; *Bifidobacterium animalis*; Human microbiome

### INTRODUCTION

At the end of the 20<sup>th</sup> century the Great world bacterial revolution begun. The obvious necessity to improve dairy business, agriculture output (corn, vegetables), poultry and meat production require new solutions under overall prohibition of pesticides, world soil problem, water deficit, climate change, gas emission etc.

Pharmaceutical business also demanded products with new properties under antibiotic resistance development and gastrointestinal disorders booming. And the solution was found the bacteria, lately named as Probiotics. Probiotics are defined as live microorganisms, which when administered in adequate amounts, confer a health benefit on the host. Probiotics must be alive at the time of ingestion. Currently mostly used in a food, pharmaceutical industry, agriculture, swine meat production bacteria are belong to the *lactobacillus* and *bifidobacterium* genera.

*Bifidobacterium* is a genus of lactic acid producing, Gram-positive, non-spore forming, non-motile, anaerobic bacteria. *Bifidobacteria*, as such, were first discovered and isolated from the feces of a breast fed infant in 1899. They are common constituents of the indigenous microbiota in the human intestinal tract. Every bacterial strain has its own genetic

structure, metabolic effects, which is not belong to other bacteria, yeast, fungus or even another strain of the same species. One of the widely used and investigated within last 25 years is *Bifidobacterium animalis* subspecies lactis (*BB animalis* ssp. lactis). It is Generally Recognized as safe. At least in one of commercial cell culture bank this bacteria is presented from 80's. *BB animalis* ssp.lactis is a gram-positive, anaerobic, hetero-fermentative with guanine-cytosine content rod-shaped bacterium which can be found in the large intestines of most mammals, it greatly resist gastric acid and bile salt, present in many food products and dietary supplements, widely used in agriculture, animal feeding, food supplement, medicines production, but mostly used in dairy business. As a rule, probiotic bacteria do not have a long term ability to colonize the gut, but in case of long term usage in high concentrations some bacteria may colonize gut and other mucosa covered organs effectively. All bacteria heavily compete for their own place at the Host. The bacterial content of kids gut is significantly differ with adult one. For breast feeding kids *Bifidobacterium bifidum* is prevalent, later on *B. longum*, *B. breve*, *B. Infantis* are prevalent, *BB animalis* ssp.lactis is not a permanent resident of kids gut. For adult age the bacterial variety is much wider, while at the senior life period number of bacterial strains is limited. As for seniors with limited bacterial gut composition,

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especially individuals with Alzheimer, Parkinson disease, the possibility to colonize gut by *BB animalis* ssp.lactis seems much easier, than at kid's age. It is expected, that *BB animalis* ssp. lactis may exist even as a major dominating bacterial strain in the gut of seniors with Alzheimer disease. Metabolic wise *BB animalis* ssp. lactis are differ significantly with other Human Microbiome residents. *BB animalis* often used in the industry on parallel with *Lactobacillus*, a Gram positive facultative anaerobic, non-sporulating, guanine-cytosine content, acid tolerant homo or heterofermentative bacteria. *Lactobacillus acidophilus* is widely used in Dairy industry and swine meat business separately or in combination with *Bifidobacteria*. Both bacteria have several similar metabolic effects. Both bacteria are well described scientifically *in Vitro* and *in Vivo*. Their metabolism is well documented in a Milk cultures, animal models and human studies. There are lots of clinical and other safety trials for *BB animalis* ssp.lactis. Major studies are often randomized, placebo-controlled, double blind, parallel dose-response study, but are quite short term (weeks, or Month). Important, *Bifidobacterium animalis* subspecies lactis show highest colony forming abilities, colonizing human gastro-intestinal tract even during a short term intake. Identification and quantification of it show, that this bacteria have been not only survive very well during the passage through the gastrointestinal tract, recovered from the stool of both healthy subjects and patients after ingestion in milk products or yogurt, in capsules, but it also transiently colonizes the colon. Scientific data suggest a dose related recovery of *Bifidobacterium animalis* subsp. lactis. There are investigations of impact of commercial food product consumption supplemented with *Bifidobacterium animalis* subspecies lactis. Results mainly show that probiotic strains supplemented in the form of yoghurt remain active during gut transit and are associated with an increase in beneficial bacteria and a reduction in potentially pathogenic bacteria. So far, the Author could not find any long term clinical trials. Author forecast, that *BB animalis* ssp.lactis may create permanent colonies at Human gut of selected individuals. This shall change a Human innate immunity dramatically. For example, the effectiveness of *BB animalis* ssp.lactis in traditional flu prophylactic is well known. It is evidently low Flu sickness rate within last few years in countries, heavily affected by COVID-19. A coincidence?

Fermented dairy products are one of the most prevalent vehicles for the delivering of probiotic bacteria to the consumer. These products are widely sold, advertised, considered as a healthy food by public and recommended by nutrition and health specialists. Almost all humans consume Yogurts, sour milk, cheese (see GRAS certificates, released for biotechnological companies with permission to sell *Bifidobacterium animalis* subsp. lactis to understand, how wide usage of this bacteria is in conventional food). For example, in United States above bacteria sold under patented trade names by few world leading manufacturers. On author's opinion the wide public at wealthy countries may participate at greatest and longest trial of *BB animalis* ssp.lactis by consuming daily food, made with or by bacterial additives. I speculate that countries, areas, territories, where *Bifidobacterium animalis* subspecies lactis is used most widely and in a long term are affected by SARS-CoV-2 mostly

hard, including infectivity and severity. It happens within one country on a regional level, where the region has, for example, a cheese production (intensive *BB animalis* or *Lactobacillus* usage) or swine farms with centralized slaughterhouses. Countries which do not afford *BB animalis* ssp.lactis from large international manufacturers due ingredient price, for their food production, agriculture process have considerably less COVID-19 case number and mortality. Some countries traditionally use local origin *Bifidobacterium* for a Dairy industry, different to those, sold for US, Europe, Brazil, and Russia. These countries are much less affected by COVID-19; as well have death rates comparative to routine viral infections. Author expect, that intensive, uncontrolled long term usage of *Bifidobacterium animalis* subspecies lactis by humans lead "Probiotic contamination" of human gut, when unusual, not common for healthy individuals bacterial colonies are created and dominate for a long time, changing the function of Human Microbiome. Several strains of *Bifidobacterium animalis* subspecies lactis (by some leading world biotechnological manufacturers) may colonize human mucosa surfaces, change an innate immunity of individuals, lead the SARS-CoV-2 increased ability to infect human cells and ensure specific complications, as cytokine storm, atypical pneumonia, clotting. SARS-CoV-2 features (as interaction with ACE2 protein, binding to human cell surface and endocytosis) are enhanced by bacterial metabolites. Further on, *Bifidobacterium animalis* subspecies lactis or metabolically similar one, provide deregulated release of pro and anti-inflammatory cytokines, lead a severe course of COVID-19.

All major COVID-19 treatment regimens include medicines with antibacterial properties. Antibacterial effect of used drugs ensures elimination or suppression of *BB animalis* ssp.lactis colonies in Human host organism. Therefore, SARS-CoV-2 could not realize its full pathogenicity.

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May 10<sup>th</sup>, 2020 the Author published a Statement, that SARS-CoV-2 affect Human and some of human Microbiome bacterial species-the virus affect Human and its Microbiome simultaneously, acting as a bacteriophage. Until this time no

one disproved this, beside, there are hypothesis, that members of Coronaviridae family virus may show a phage activity.

## DISCLAIMER

The Author has no conflict of interest with any manufacturers, product, brand, patent, trade mark owners, companies, persons, businesses related to the finding below. The statement, hypothesis, suspicions, speculations and ideas below are his solely expressions, based on own literature survey, investigation,

knowledge, understanding and analysis of current COVID-19 pandemic. All reference data are taken from open sources. The Author has no access to microbiological/virology laboratory to confirm the Concept below, therefore should like to preface statements in this publication by words may, could, might, may be etc. The Author kindly ask scientific community, practicing MD, all parties concerned (including world leading manufacturers of probiotic ingredients) to assess his COVID-19 Pandemic Concept.