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Probiotics and Prebiotics as Nutraceuticals

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A B S T R A C T

Its miles predicted that 500–1,000 species of micro organism live in the human body [Sears 2005]{1} Bacterial cells are a whole lot smaller than human cells and there are at least 10 instances as many microorganisms as human cells within the frame (about 1014 versus 1013[1013 = 1 trillion]) [Savage 1977; Berg 1996]even though everyday plant life is found on all surfaces uncovered to the environment (on the pores and skin and eyes, in the mouth, nostril, small intestine, and colon), the large majority of microorganisms stay inside the big intestine. The phrases intestinal "Microflora" or "microbiota" discuss the microbial surroundings colonizing the GI tract. 90-nine percent of the bacteria isolated from human fecal specimens will no longer develop in the presence of atmospheric oxygen [Savage 1977). Bacteria make up most of the flowers in the colon [University of Glasgow, 2005]4 and 60% of the dry mass of feces [Guarner and Malagelada 2003]. This makes feces an ideal source for testing intestinal plant life

INTRODUCTION

The Large Intestine is the primary site of microbial colonization due to gradual turnover and is characterized by huge numbers of bacteria (1010–1011/g or ml content), low redox capacity, and comparatively high short-chain fatty acid (SCFA) concentrations. Similar to the increasing gradient of indigenous microbes from the belly to the colon, there are also functional spatial distributions of organisms inside each intestinal compartment. At least four microhabitats have been described: the intestinal lumen, the unstirred mucus layer or gel that covers the epithelium of the complete tract, the deep mucus layer in intestinal crypts, and the floor of mucosal epithelial cells [Lee 1984; Berg 1996]. The methods worried with the status quo of microbial populations are complex, concerning microbial succession as well as microbial and host interactions and finally ensuing in dense, solid populations inhabiting specific areas of the intestine. toddlers are born without a bacterial presence and are nearly sterile. Microbes that originate from the environment and the mother set up themselves over time. Escherichia coli from the mother's feces begins to contaminate the little in vaginal shipping. The length of the shipping process is an essential contributing factor [Bettelheim et al. 1974; Brook et al. 1979]. The microorganism from the mom's cervix also colonizes the alimentary canal of the child. The nasopharynx of an infant receives bacteria from its mother's vagina [MacGregor and Tunnesseen 1973]. In cesarean shipping, the child's first exposure to microbes comes from the air; the nursing workforce and other surgical systems act as vectors in this case [Bettelheim et al. 1974; Lennox-King et al. 1976a,b]. The transmission of microbes from era to technology is ensured using human expressions of neonatal care, along with kissing, touching, and sucking [Tannock, 1994).

There is an obvious difference in exposure and acquisition of bacteria in babies born in a developing country. Enterobacteria and streptococci were the first group groups to be established in most cases. E. coli is established within 48 h after contamination [Mata and Urrutia 1971].Infants in developing countries are exposed to environmental alteration, regardless of the mode of delivery, compared those to in developed countries. This explains the absence of certain groups of intestinal bacteria in babies born in Western countries. After exposure to breast milk, the gut is continuously acquiring new microbes [Moughan et al. 1992].

The staphylococci, streptococci, corynebacteria, lactobacilli, micrococci, propionibacteria, and bifidobacteria all originate from the nipple of the mother, surrounding skin, and milk ducts [Asquith and Harrod 1979; West, Hewitt, and Murphy 1979].In formula-fed infants, exposure to bacteria originates from the dried powder, water, and equipment used in the manufacturing process.

Cooperstock and Zedd [1983]divide the development of intestinal bacteria between infants into four different stages. Phase one is the initial acquisition phase lasting over the first two weeks. The breastfeeding period was phase two. The weaning and introduction of supplements were in phase three. Phase four starts after weaning was complete. The initial colonization of large numbers of E. coli was later responsible for the establishment of the anaerobic genera Bacteroides, Bifidobacterium, and Clostridium. This occurs over four to seven

days. Bifido bacteria dominate breastfed infants. These changes occur once dietary supplementation begins in breastfed infants, and Bifi bacteria are no longer the prominent genera.

By the second year of life, with the introduction of solid food almost complete, the fecal microbiota of the baby resembles the adult fecal microbiota [Stark and Lee 1982; Copperstock and Zedd 1983].In phases 3 and 4, other bacterial groups, including eubacteria, legionella, staphylococci, propionibacteria, bacilli, fusobacteria, and yeast, establish themselves along with the Bacteroides and anaerobic gram-positive cocci [Conway 1997].

Antimicrobial and antibiotic agents have a significant influence on the microflora for infants [Bennet et al. 1982, 1986; Bennet and Nord 1989] A specific component of the microbiota becomes more vulnerable than others because of this exposure. Mutations in the microbiota can be seen after finishing the drug treatment. The effects of the drug, regimen can be persistent [Finegold, Mathisen, and George 1983]. Diet is the most powerful tool for influencing intestinal microbiota. The targeted ingredients in the formula, such as oligosaccharides, affect colon fermentation [Knol et al. 2005]. Breast milk itself has antimicrobial activity, which stimulates the development and maturation of the intestinal mucosa. This phenomenon further promotes stability and decreases intestinal disturbances [Palmer et al. 2007].

LITERATURE REVIEW

Probiotics

The word probiotic comes from a pro, meaning "for," and bios, which means "existence." So probiotics mean "for life." The term probiotic is used to describe nutritional dietary supplements and other products that contain staying bacteria. There are hundreds of probiotic supplements to be had to shop for. even though all of them promise to help restore and top off our gut microflora, many are so defi consumer in-dwelling or feasible microorganisms that the package deal they arrived in has an extra price than what is inside [Dekker et al. 2007].

In 1905, Dr. Elie Metchnikoff, a Russian scientist working at the well-known Institute Pasteur in Paris was the first to write about the health advantages of probiotics. Dr. Metchnikoff, who later gained a Nobel Prize for his research on the immune machine, wrote that Bulgarian peasants who fed on massive quantities of yogurt lived lengthy and healthy lives. An examination of yogurt by Dr. Metchnikoff brought about his discovery of a unique lactic-acid-producing microorganism that helped digestion and improved the immune system [Dekker et al. 2007]. The ancient association of probiotics with fermented dairy products brought about considerable research validating Dr.Metchnikoff early observations. Investigations in the past several years have established numerous health-supportive houses of probiotics on human health [Isolauri 2001; Goossens et al. 2003; Porth 2004; The United States Probiotics Organization 2007].

Structurally, the GI or digestive tract is a hole tube that runs from the mouth to the anus. Mastication (chewing of food), peristalsis (motion of meals), enzymes, and belly fluids damage meals into small, absorbable molecules. In the lining of the small intestine, specialized cells act as barriers, isolating the required

nutrients from the molecules. As food leaves the small intestine and enters the colon, all nutrients in the food can enter the bloodstream [Berg 1996]. In addition to digestion, the GI tract is involved in numerous critical immune reaction sports. A large number of white blood cells (lymphocytes) live under the tonsils and inside the appendix. Clumps of lymphocytes and lymphatic tissues make up the Payer's patches and immune system structures located inside the small gut. In the partitions of the massive intestine, large numbers of immune device modulators and regulators are present [Goossens et al. 2003; Guyton and Hall 2005]. Proof has confirmed that the health reputation of the tonsils, appendix, and small and huge intestines affect the health of the immune device. several strains of intestine microflora reside in tremendous numbers in the small intestine (106−108/g of small intestinal contents) and even more numbers inside the colon (1011−1012/g of colon contents) or huge intestine. The microflora of the massive intestine performs numerous activities beneficial to human health, including helping wholesome digestion through fermentation, promoting healthy bacterial and yeast balance, and stimulating positive immune device additives [Goossens et al. 2003].

Probiotics, as described by the American Probiotics Enterprise, are "stay microorganisms administered in ok amounts that confer a beneficial fitness impact at the host' [Guyton and Hall 2005]. Probiotic bacteria are regularly, but not constantly, selected from bacteria that normally inhabit people's GI devices. Lactobacillus acidophilus (la) and Bifidobacterium longum (regular inhabitants of the healthy intestine) are the most clinically tested probiotic lines [Kailasapathy and Chin 2000; Goossens et al. 2003; Porth 2004; The United States Probiotics Organization 2007]. Scientific have a look at has shown again and again that two-pressure probiotics supplements containing L. acidophilus and B. longum are relatively powerful in the following

- assisting normal human health [Bai and Ouyang 2006; Quigley and Flourie 2007]
- Responding to small, daily demanding situations [Gopal et al. 2001; Reid et al. 2001; Marelli, Papaleo, and Ferrari 2004]

When humans experience increased physical, emotional, or intellectual stress, changes often occur within the GI environment [Kailasapathy and Chin, 2000]. Examples of these changes include slowed secretory responses, increased formation of reactive oxygen species, increased transit times of fecal material, disruption of mucosal cells, and altered epithelium tissues. These changes often result in occasional gas, bloating, and constipation and may interfere with probiotics functionality [Dong and Kaunitz 2006; Miyake, Tanaka, and McNeil 2006; Davidson, Kritas, and Butler 2007].

The effectiveness of all probiotics is dependent on the ability of the organisms to reach the large intestine in a viable state and adhere to the intestinal wall. Only then Can microflora colonization succeed? Researchers have discovered recently that certain broad-spectrum probiotic combinations can function well within altered GI environments [Miyake, Tanaka, & McNeil, 2006]. To date, the probiotic combination of L. acidophilus, L. rhamnosus, B. bifi dum, B. breve, B. longum, and B. lactis shows great promise in the following

- Supporting long-term colon care
- Providing deep intestinal support
- Helping the body respond during times of increased physical, emotional, or mental stress [Karimi and Pena 2003; Collado,Meriluoto,and Salminen 2007a] The probiotic supplement should be proven to function in vivo, tolerate harsh intestinal environment, and successfully adheres to the intestinal wall. Table 14.1 gives the list of the strains useful in probiotics formulations, and Table 14.2 describes applications under various disease conditions.

Prebiotics

Gibson and Burford [1995] define prebiotics as "non-digestible meals substances that beneficially affect the host by selectively stimulating the increase and/or activity of one or a restrained variety of micro organism inside the colon, and for that reason improve host health." Prebiotics are the "food" for useful bacteria.Prebiotics modify the stability of the intestinal microbiota by way of stimulating the hobby of useful bacteria, along with Lactobacilli and Bifidobacteria [Gibson and Roberfroid 1995; Collins and Gibson 1999]. there may be now big evidence that manipulation of the gut microbiota with the aid of prebiotics can gain cially impact the fitness of the host [Gibson and Roberfroid 1995; Roberfroid 1999; Delzenne and Kok 2001; Sartor 2004; Rastall et al. 2006; Parracho, McCartney, and Gibson 2007]. In particular, many tries had been made to control serum triacylglycerol concentrations thru the amendment of nutritional behavior approximately the intake of prebiotics and probiotics [Delzenne and Kok 2001; Parracho, McCartney, and Gibson 2007].

Table 1. Commonly Used Strain in Probiotics Products

Probiotic	Structure/Function Claim	Reference
Lactobacillus acidophilus	Helps alleviate occasional gas, constipation, and lactose intolerance symptoms in children	Salazar-Lindo et al. 2007
	Supports healthy bowel movements while traveling	McFarland 2007
	Works with the body's own ability to modulate occasional intestinal discomfort	Rousseaux et al. 2007
Lactobacillus plantrum	Used postoperative immune stimulation	Sanders 2007
Lactobacillus reuteri	Immune stimulation against diarrhea	Sanders 2007
Lactobacillus rhamnosus	Immune stimulation, alleviates atopic eczema	Sanders 2007
Lactobacillus salivarius	Positive effects with intestinal ulcers and inflammation	Sanders 2007
Lactobacillus rhamnosus	Supports healthy balance of enterococci	Manley et al. 2007
	May support healthy skin integrity	Sawada et al. 2007
	Relieves occasional abdominal discomfort in school children	Gawroriska et al. 2007
Lactobacillus casei	Reduces symptoms of lactose intolerance, prevents bacterial overgrowth in small intestine	Sanders 2007
Lactobacillus johnsonii	Immune stimulation and active against *Helicobacter pylori*	Sanders 2007
Bifidobacterium bifidum	Supports healthy immune system responses	DeSimone et al. 1992
	Prevents occasional loose stools	Saavedra et al. 1994
Bifidobacterium lactis	Supports healthy intestinal colonization	Sanders 2006
	Restores healthy immune responses in the elderly	Gill et al. 2001
Bifidobacterium breve	Maintains healthy gut microflora colonies	Wang et al 2007; Li et al. 2004
Bifidobacterium longum	Supports healthy liver enzyme activity	Malaguarnera 2007
	Supports healthy bowel movements in adults	Amenta et al. 2006
	Supports the body's natural anti-inflammatory response	Xiao et al. 2007
	In laboratory research, *Bifidobacterium longum* removed lead and cadmium from water	Halttunen et al. 2007
	Supports healthy development of cells	Xu et al. 2007
Bifidobacterium animalis	Stabilizes intestinal passage, immune stimulation, improves phagocytic activity, alleviates atopic eczema, prevents diarrhea in children and traveler's diarrhea	Sanders 2007
Bifidobacterium lactis	Immune stimulation	
Escherichia coli	Immune stimulation	

Table 2. Common Applications of Probiotics Products in Different Disease Conditions

Disease	Probiotics	Research Results	Reference
Colon cancer	*Lactobacillus rhamnosus* and *Bifidobacterium longum*	In a small but well-designed Irish study, 80 people who had either colon cancer or benign polyps were randomly assigned to receive either a probiotic or a placebo to determine the effects on their tumors, growths, and intestines. The probiotic contained two types of bacteria, *Lactobacillus rhamnosus* and *Bifidobacterium longum*; the placebo was an inactive pill. After 12 weeks, the patients who received the probiotics showed decreased DNA damage in the lining of the colon and decreased growth and reproduction of colon cells.	Rafter et al. 2007
Antibiotic-induced diarrhea	*Lactobacillus acidophilus*	To see whether probiotics could prevent or reduce the diarrhea that often occurs during treatment with antibiotics, researchers randomized 135 hospitalized patients to receive either a probiotic drink (57 patients) containing *Lactobacillus* or a placebo (56 patients) twice a day while being treated with antibiotics and for one week after the course finished. Only seven patients (12%) in the probiotic group developed diarrhea compared with 19 patients (34%) in the placebo group.	Hickson et al. 2007
Chemotherapy-induced diarrhea	*Lactobacillus rhamnosus*	For most, diarrhea is an uncomfortable and embarrassing problem that almost always resolves after two to three days. For people being treated with chemotherapy, however, diarrhea can be deadly. It can lead to dehydration, hospitalization, and, if severe enough, discontinuation of the chemo drugs. In a Swedish study, colon cancer patients were randomly assigned to receive daily supplements of *Lactobacillus rhamnosus* during chemotherapy or a placebo. Those who received the probiotic *Lactobacillus* supplements had significantly less severe diarrhea (grades 3 and 4) than those who did not: 22 versus 37%. They also had less abdominal pain, were hospitalized less often, and needed fewer chemo dose reductions attributable to bowel problems.	Osterlund et al. 2007

Disease	Probiotics	Research Results	Reference
Traveler's diarrhea	*Lactobacillus acidophilus* and *Bifidobacterium bifidum*	Traveler's diarrhea is most often caused by a bacterial infection, such as *Escherichia coli*, *Campylobacter*, *Shigella*, or *Salmonella* and is transmitted in undercooked or raw foods, contaminated food, contaminated water, or contaminated ice cubes. In a review of 12 clinical studies, a mixture of *Lactobacillus acidophilus* and *Bifidobacterium bifidum* worked the best to prevent and reduce the severity of traveler's diarrhea. No serious adverse reactions to the probiotics were reported in the trials.	McFarland 2007
Crohn's disease	*Bifidobacterium* and *Lactobacillus*	Ten active Crohn's outpatients with diarrhea and abdominal pain were enrolled into a probiotic study. All 10 had received prescription drugs to reduce their symptoms, but they remained painful. They took probiotics containing *Bifidobacterium* and *Lactobacillus* for four months. By the end of therapy, seven patients had improved clinical symptoms after combined probiotics and prebiotic therapy. Six patients had a complete response.	Fujimori et al. 2007
Ulcerative colitis	*Lactobacillus acidophilus*	To determine how effective *L. acidophilus* alone or in combination with mesalazine, an ulcerative colitis medication, is in achieving remission. A total of 187 ulcerative colitis patients were randomized to receive *L. acidophilus* (65 patients), mesalazine alone (60 patients), or *L. acidophilus* with mesalazine (62 patients). After 12 months, treatment with *L. acidophilus* was more effective than standard treatment with mesalazine in prolonging the relapse-free time.	Zocco et al. 2006
Stomach pain in children	*Lactobacillus acidophilus*	A total of 104 children who complained of "idiopathic tummy aches," or stomach pain without any identifiable cause, were enrolled in a double-blind, randomized controlled trial in which they received *L. acidophilus* (n = 52) or placebo (n = 52) for four weeks. The results showed that the children in the probiotics group were more likely to have no pain than those in the placebo group (25 versus 9.6%).	Gawrońska et al. 2007

Furthermore, unlike probiotics, prebiotics isn't always a situation to organic viability troubles and as a consequence can be included right into a huge variety of alimentary products (inclusive of milk, yogurt, and little one system), and they target organisms that can be herbal citizens of the gut microbiota [Gibson and Roberfrodi 1995]. for instance, oligosaccharides had been advised to represent the most essential prebiotic nutritional component in human milk, selling the improvement of useful intestinal microbiota [Bode 2006]{50}.whilst oligosaccharides are fed, the undigested element serves as food for the intestinal microflora. common supplemental sources are Fructo- oligosaccharides (FOS)

and inulin. FOS, which can be located in many vegetables, includes quick chains of fructose molecules. Inulin has a miles higher diploma of polymerization than FOS and is a polysaccharide. FOS and inulin are found in Jerusalem artichokes, burdock's, chicories, leeks, onions, and asparagus. The FOS merchandise is derived from chicory roots that incorporate large portions of inulin. Inulin is taken into consideration as a soluble fiber. As a soluble nutritional fiber, inulin also shortens fecal transit time, slightly will increase fecal bulk, reduces constipation, has been shown to reduce both serum and hepatic cholesterol and triglycerides, and may provide stepped forward absorption of minerals inclusive of calcium, magnesium, iron, and phosphate. furthermore, unlike FOS,

The longer chain length of inulin makes it effortlessly tolerated by using the human intestinal gadget [Tokunaga, Oku, and Hosoya 1986]. Different benefits cited with FOS or inulin supplementation include expanded manufacturing of useful SCFAs. Regarding SCFAs, about 60 g of carbohydrate is fermented by bacteria every day to SCFAs, which are rapidly absorbed. The SCFAs produced include acetic acid, propionic acid, and butyric acid. These acids undergo critical movements inside the colon and frame as a whole. Acetic acid is an electricity source for the frame and a substrate for fat synthesis within the liver. Propionic acid is a power supply for the liver, is gluconeogenic (i.e., can be used to make glucose), and may reduce LDL cholesterol synthesis. Butyric acid is the primary gas for colonic cells and has been shown to stimulate differentiation and programmed cell loss of life of most cancer cells. SCFA enemas have been used efficaciously for the treatment of ulcerative colitis. SCFAs are produced during colon growth and cell proliferation throughout the intestine. SCFAs are vital because they sell water and prevent osmotic diarrhea. SCFAs inhibit the boom of pathogenic microorganisms [University of Glasgow 2005]. another supportive element within the modulation of healthy microbiota is lactoferrin. studies indicate that supplemental lactoferrin modulates the discharge of messenger proteins called essential nutrients, trypsin, and protease inhibitors that defend it from destruction in the GI tract [Orsi 2004]. it is also rich in antioxidants, and its receptors had been observed in most immune cells, including lymphocytes, monocytes macrophages, and platelets [Orsi 2004]. Its presence in neutrophils indicates that lactoferrin is also involved in phagocytic immune responses [Lonnerdal and Iyer, 1995]. Due to its iron-binding properties, lactoferrin has been proposed to play a role in iron uptake through the intestinal mucosa [Legrand et al. 2005].because it strongly binds iron, lactoferrin helps in healthy modulation of intestine microflora and assists the attachment of useful microorganisms to the intestinal wall [Legrand et al. 2005]. Lactoferrin may also help the health improvement and differentiation of T lymphocytes. preliminary research indicates that it supports the healthful manufacturing of cytokines and lymphokines, inclusive of TNF-α and IL-6 [Ward, Paz, and Conneely 2005]. extra currently, lactoferrin receptors had been located in a spread of immune gadget cells, along with herbal killer cells, and intestinal tissue [Legrand et al. 2005; Ward, Paz, & Conneely 2005]. This discovery demonstrates that supplemental lactoferrin might have a profound impact on immune health. to be effective, however, supplemental lactoferrin must be digested in the small intestine. Breast

milk has a multitude of biological activities that benefit newborns. To reach the small intestine (in which nutrients are digested and released into the infant's bloodstream), nutrients must be able to withstand exposure to stomach fluids. Although the pH of an infant's stomach fluids rarely drops below 4–5 for the first six months of life, the pH of an adult's gastric fluid ranges between 1 and 2. This high acidity is lethal for lactoferrin. Therefore, just as probiotics need protection to survive the normal GI fluids of the stomach, so do lactoferrins [Orsi 2004]

Sources of Probiotics

There are many sources available from food to dietary supplement liquids and pills. Bacteria must be viable for storage and delivery to the intestines. To date, scientists have shown that, as a result of manufacturing processes, storage environment, and inhibition through the digestive tract, many products are not delivering label claims. Probiotic supplements need to be protected from the environment. They cannot be exposed to air, sunshine, artificial light, or moisture [Centers for Disease Control, 2008]. In addition, probiotic bacteria must be protected from digestive juices and enzymes in the stomach [Collado et al., 2007b]. Research has shown as much as 90% of a supplemented probiotic is destroyed in stomach gastric secretions and/or 50%loss in exposure to the environment in storage

Enteric Coating of Probiotics

The enteric coating of probiotics is intended to allow the passage of a tablet or capsule through the gastric fluids of the stomach to prevent the release of product content before it reaches the intestines. However, because of the complexities involved in applying an enteric coating on a tablet or capsule, some enteric coatings do not entirely inhibit stomach acid from entering encapsulation. As a result, stomach acids can interact with sensitive bacteria, leading to a significant decrease in viability. In addition, the enteric coating manufacturing process frequently uses solvents such as methacrylate co-polymers. Tablets and capsules were sprayed with these solvents at high temperatures to create an enteric coating. This type of application further exposes microbes to conditions that can dramatically reduce the shelf-life of the product. There is a new technology used to protect viable ingredients, which is a patented encapsulation technique known as True Delivery TM Technology, which results in a product that is stable at room temperature for up to 18 months. Additionally, the unique coating protects the bacteria from harsh stomach acid so that they can be released live and intact in the intestines, where they need to arrive in the live form to perform their beneficial function. Research has shown that other methods support viability. For example, combining strains with specific fibers to buffer the probiotic from stomach acidity has shown some results. However, patented encapsulation demonstrated the best effects on stability and protection.

The important factors related to probiotic stability are as follows:

- Stable: guaranteed to deliver live, intact probiotics throughout product shelf-life,
- not just at the time of manufacture
- Protected: protects the probiotics from harsh stomach acid

- Effective: contains clinically studied probiotics bacteria and has been shown to colonize in the intestines

Other Types of Probiotics

Probiotics are defined as live microorganisms that confer a health benefits on the host. Although most probiotics are bacteria, one strain of yeast, Saccharomyces boulardii is an effective probiotic in double-blind clinical studies. Studies in areas of antibiotics include diarrhea, traveler's diarrhea, acute diarrhea in Children, recurrent Clostridium difficile-associated diseases, and IBDs. S. boulardii does not colonize in the intestines but will be eliminated in stool within five to seven days after the use was discontinued. Because this is a noncolonizinginteracts strain that is not naturally present in human gut flora, questions are highlighted regarding the long-term safety of this or any other nonhuman strain of bacteria being introduced to the human gut flora. S. boulardii is administrated to patients in a lyophilized form, and the treatment was well tolerated. However, some rare cases of S. boulardii Fungemia has been reported in patients with an indwelling central venous catheter [Kotowska, Albrecht, and Szajewska 2005; Llanos et al. 2006]. The origin of Fungemia is thought to be either a digestive tract translocation or contamination of the central venous line by the colonized hands of health workers [Kotowska, Albrecht, and Szajewska 2005]. This raises the question of the risk-benefit ratio of S. boulardii in critically ill or immuno compromised patients. Thus, administration of S. boulardii should be contraindicated for patients of fragile health, as well as for patients with central venous catheters [Herbrecht and Nivoix 2006]

Some Interesting Clinical Applications Of Probiotics

Probiotics, Infection, and Immunity A review by Macfarlane et al. [2002] summarizes the most recent contributions to this rapidly developing area. Probiotic bacteria, mainly Bifi do bacteria and Historically, lactobacilli can prevent or ameliorate some diseases. Many empirical studies have been done, but work to develop the ideal characteristics of probiotics lags. Current literature covers the survival of probiotics in the gut, mucosal adherence, antibacterial/pathogen mechanisms, effects on immune function, and clinical studies. Probiotic bacteria effectively prevent and reduce the severity of acute diarrhea in children. They are also useful in antibiotic-associated used to save urogenital tract infections with advantage and, possibly more intriguingly, to reduce atopy in youngsters. Probiotics do not forever paint, and they have a look at mechanisms that are urgently needed

METHODOLOGY

The method used in this research is a quantitative method where this method displays the results of the numbers obtained in the research and these numbers become the determining results of the research carried out by the author

RESEARCH RESULT

The Capability Function of Probiotics in Pediatric Urology

The research paper by Reid [2002] studied the potential function of probiotic therapy may additionally have in pediatric urology. Many youngsters around the sector die of sicknesses, including GI contamination and HIV, while many have urinary tract infections that eventually recur regularly in adulthood. Currently, the function of intestinal and urogenital (vaginal, urethral, and perineal) microflora in fitness and disorders has received scant attention. The statistics to be had in the literature on this subject matter have been examined, and a personal standpoint is presented on how they are related to urology. There is mounting evidence that certain lines of Lactobacilli and Bifidobacteria have a major role in the renovation and healing of fitness in children and adults. Implications for pediatric urology include a decreased threat of infection and stone ailments, as well as feasible superb effects on stopping and dealing with inflammatory and a few carcinogenic diseases.

High Dose Oral bacteria therapy for Chronic Nonspecific Diarrhea in InfancyBalli et al. [1992] evaluate the effectiveness of oral bacteriotherapy in the usage of an aggregate of anaerobe fecal Lactobacilli for continual, nonspecific diarrhea in infancy. A double-blind study was performed on 40 young adults treated with low and high doses of microorganisms. The outcomes verify the importance of fecal plant life in this ailment and help the hypothesis that oral bacteriotherapy can improve clinical and laboratory presentation, especially whilst given at excessive doses. Bifido micro organism and Lactobacilli in Human Fitness

The gastrointestinal microflora is a complex ecological gadget, generally characterized using flexible equilibrium [Orrhage and Nord 2000]. The maximum essential position of the microflora, from the perspective of the host, might be responsible for colonization resistance against exogenous, potentially pathogenic microorganisms. Bifi is microorganisms, and lactobacilli are gram-negative, lactic-acid-generating bacteria that constitute a primary part of the intestinal microflora in humans and other mammals. The management of antimicrobial sellers might also cause disturbances in the ecological stability of GI microflora, with several unwanted consequences, including colonization by potential pathogens. To keep or reestablish the balance in the flowers, dietary supplements of intestinal microorganisms, specifically Bifidobacteria and Lactobacilli, sometimes known as probiotics, have been efficiently used. this newsletter critiques the role of

Bifidobacteria and lactobacilli in human health.

Live Probiotics Protect Intestinal Epithelial Cells from the effects of contamination with Enteroinvasive Escherichia coliThe colonic epithelium keeps a lifelong, reciprocally beneficial interplay in the colonic microbiota. Disruption

is associated with mucosal harm. Resta and Barret [2003] proposed that probiotics may additionally restrict epithelial damage caused by enteroinvasive pathogens and cell restitution. Human intestinal epithelial mobile strains (HT29/cl.19A and Caco-2) have been exposed to enteroinvasive E. coli (EIEC 029:NM) and/or probiotics (Streptococcus thermophilus [ST], ATCC19258, and l. a.ATCC4356). Inflamed cells and controls have been assessed for trans epithelial resistance, chloride secretory responses, alterations in cytoskeletal and tight junctional proteins, and responses to epidermal boom aspect stimulation. publicity of mobile mono layers to live ST/la, but now not to heat-inactivated ST/Los Angeles, significantly constrained adhesion, invasion, and physiological dysfunction triggered by using EIEC. Antibiotics killed ST/la reduced adhesion extremely but have been much less powerful in restricting the consequences of EIEC invasion of cell monolayers. moreover, staying ST/la by myself extended trans epithelial resistance, contrasting markedly with the autumn in resistance evoked by way of EIEC contamination, which may additionally be blocked via live ST/Los Angeles. The impact of ST/Los Angeles on resistance turned followed by way of preservation (actin, zona occludens-1) beautifying (actinin, occludin) of cytoskeletal and tight junctional protein phosphorylation. ST/l. a. had no impact on chloride secretion by themselves but reversed the boom in basal secretion evoked by EIEC. EIEC also reduced the potential of epidermal growth factor to activate its receptor, which changed into reversed using ST/Los Angeles. stay ST/Los Angeles interacts with intestinal epithelial cells to protect them from the deleterious effect of EIEC via mechanisms that consist of, but aren't limited to, interference with pathogen adhesion and invasion. Probiotics may also decorate the barrier features of naive epithelial cells that are no longer uncovered by any pathogen.

Breakdown of Lactose

Lactose is an important sugar that is converted to lactic acid by lactic-acid-producing bacteria, such as Lactobacillus acidophilus and Bifidobacterium longum [Marteau, Vesa and Rambaud, 1997]. Impaired conversion of lactose to lactic acid can result in symptoms, such as occasional gas, bloating, and indigestion, which are attributable to the accumulation of non-absorbed lactose in the GI tract [DeSimone et al. 1992; Garman, Coolbear, and Smart 1996 et al]. Lactic acid bacteria can help metabolize non-absorbed lactose in the GI tract, thereby reducing the symptoms of lactose intolerance. In a randomized, controlled clinical trial, Bifidobacterium longum was shown to support the breakdown of lactose and reduce flatulence [Lactose 2008]

Immune System Support

Although normal microflora is associated with good health, changes in intestinal health are associated with altered immune function. A well-functioning GI immune system mediates immune responsiveness at mucosal sites and throughout the entire body via the control of the quality and quantity of foreign substances to gain access to the immune system [Schriffrin et al. 1997]. Lactobacillus acidophilus and Bifidobacterium longum have been shown to possess immuno protective and immunomodulatory properties. These benefits include modulation of cytokine and various IL production, autoimmunity,

natural killer cell cytotoxicity, lymphocyte proliferation, and antibody production. In an open, randomized, controlled trial, Lactobacillus acidophilus and Bifidobacterium bifidum were supportive of colon health in older adults. In addition, B cell (important antibody-producing immune cells) levels increased compared with the untreated group. The probiotics were very well tolerated, with no significant side effects or variations in clinical chemistry or hematologic parameters [Gibson et al. 1997].

Decrease Occasional Constipation

Constipation is defined as infrequent or difficult defecation that can result from decreased motility of the intestines. It is a common problem, particularly in older adults. When the feces remain in the large intestine for prolonged periods, there is excessive water absorption, making the feces dry and hard [Garman, Coolbear, and Smart 1996].

Lactobacillus acidophilus and Bifidobacterium longum promote regular bowel movements by contributing to the reestablishment of healthy intestinal flora and stimulation of intestinal peristalsis via lactic acid production [Bennet and Eley 1976].

Support of Putrefactive Processes

When unbalanced conditions are present in the intestines (i.e., unbalanced diet, high acidity, and/or low levels of lactic acid bacteria), organic matter may be putrified (decomposed or rotting) by certain bacteria and produce undesirable compounds[Gibson et al. 1997]. Probiotics promote homeostasis (balance) in both the intestine and the vagina [Hilton et al. 1992; Witsell et al. 1995]. These activities are carried out via support of direct production of antibodies, competition with adhesion to intestinal cells, or indirect modulation of the immune system. Probiotics also support a healthy yeast balance [On-line Medical Dictionary 2000]

Support Digestion

The normal microflora of the large intestine help support and complete digestion via fermentation [Wagner et al. 1997]. Oral ingestion of probiotics produces a stabilizing effect on the gut flora.

Additional Benefits

The benefits of probiotics extend beyond digestion support and immune support. Lactobacillus acidophilus and Bifidobacterium longum also help support better utilization and bioavailability of nutrients, including vitamins, minerals, proteins, fats, and carbohydrates [Witsell et al. 1995].

CONCLUSIONS AND RECOMMENDATIONS

The market for probiotic and prebiotic merchandise will continue to grow with our expertise in intestine Microflora and its function in maintaining health and advances in sickness resistance. food producers will want a way to commercialize merchandise that maintains possible microorganisms up to shelf life and in many cases will even want to provide encapsulation or different defensive mechanisms for live microorganisms of their products to be able to transmit microorganisms to the precise website of action within the GI tract

REFERENCES

Asquith, M. T., and J. R. Harrod. 1979. Reduction in bacterial contamination in banked human milk. J. Pediatr. 95:993–994.

Bai, A. P. and Q. Ouyang. 2006. Probiotics and inflammatory bowel diseases. Postgrad. Med. J. 82:376–382.

Bennet, R., M. Eriksson, C. E. Nord, and R. Zetterström. 1982. Suppression of aerobic and anaerobic fecal flora in newborns receiving parenteral gentamicin and ampicillin. Acta. Paediatr. Scand. 71:559–562

Bennet, R., M. Eriksson, C. E. Nord, and R. Zetterström. 1986. Fecal bacterial microflora of newborn infants during intensive care management and treatment with five antibiotic regimens. Pediatr. Infect. Dis. 5:533–539.

Bennet22 Bennet, R. and C. E. Nord. 1989. The intestinal microflora during the first week of life: Normal development and changes induced by cesarean section, preterm birth, and antimicrobial treatment. In The Regulatory and Protective Role of the Normal Microflora. Edited by Grubb R., T. Midtvedt, and E. Norin. London, UK: Macmillan Press, pp. 19–34.

Berg, R. 1996. The indigenous gastrointestinal microflora. Trends Microbiol. 4: 430.

Bettelheim, K. A., A. Breardon, M. C. Faiers, and S. M. O'Farrell. 1974. The origin of O serotypes of Escherichia coli in babies after normal delivery. J. Hyg. (Lond.) 72:67–70.

Bode, L. 2006. Recent advances in structure, metabolism, and function of human milk oligosaccharide. Int. J. Probiotics Prebiotics 1:19–26, 71.f the global commun

Brook, I., C. Barett, C. Brinkman, W. Martin, and S. Finegold. 1979. Aerobic and anaerobic bacterial flora of the maternal cervix and newborn gastric fluid and conjunctiva: A prospective study. Pediatrics 63:451–455

Collado, M. C., J. Meriluoto, and S. Salminen. 2007a. Development of new probiotics by strain combinations: Is it possible to improve the adhesion to intestinal mucus? J. Dairy Sci. 90:2710–2716.

Collins, M. D. and G. R. Gibson. 1999. Probiotics, prebiotics, and synbiotics: Approaches for modulating the microbial ecology of the gut. Am. J. Clin. Nutr. 69:1052–1057.

Colonization of cesarean section babies by Escherichia coli. Infection 4:134–138.

Conway, P. 1997. Development of intestinal microbiota. In Gastrointestinal Microbiology. Volume 3. Edited by Mackie, R. I., B. A. White, and R. E. Isaacson. New York, NY: Chapman & Hall, pp. 3–38.

Cooperstock, M. S. and A. J. Zedd. 1983.The intestinal flora of infants. In: Human Intestinal Microflora in Health and Disease. Edited by Hentges, D. J. New York, NY: Academic Press, pp. 79–99.

Davidson, G., S. Kritas, and R. Butler. 2007. Stressed mucosa. Nestle Nutr. Workshop SerPediatr. Program 59:133–142.

Dekker, J., M. Collett, J. Prasad, and P. Gopal. 2007. The functionality of probiotics: Potential for product development. Forum Nutr. 60:196–208.

Delzenne, N. M. and N. Kok. 2001. Effects of fructans-type prebiotics on lipid metabolism. Am. J. Clin. Nutr. 73:456–458.

Dong, M. H. and J. D. Kaunitz. 2006. Gastroduodenal mucosal defense. Curr. Opin. Gastroenterol. 22:599–606.

Finegold, S. M., G. E. Mathisen, and W. L. George. 1983. Changes in human intestinal flora related to the administration of antimicrobial agents. In Human Intestinal Microflora in Health and Disease. Edited by Hentges, D. J. New York, NY: Academic Press, pp. 356–446.

Gibson, G. R., and M. B. Roberfroid. 1995. Dietary modulation of the human colonic microbiodatmicrobiotaa: Introducing the concept of probiotics. J. Nutr. 125:1401–1412.

Gibson, G. R., and M. B. Roberfroid. 1995. Dietary modulation of the human colonic microbiota: Introducing the concept of probiotics. J. Nutr. 125:1401–1412.

Goossens, D., D. Jonkers, E. Stobberingh, A. van den Bogaard, M. Russel, and R. Stockbrugger. 2003. Probiotics in Gastroenterology: Indications and future perspectives. Scand. J. Gastroenterol. Suppl. 2003:15–23

Gopal, P. K., J. Prasad, J. Smart, and H. S. Gill. 2001. In vitro adherence properties of Lactobacillus rhamnosus DR20 and Bifidobacterium lactis DR10 strains and their antagonistic activity against an enterotoxigenic Escherichia coli. Int. J. Food Microbiol. 67:207–216.

Guarner, F. and J. R. Malagelada. 2003. Gut flora in health and disease. The Lancet 361:512–519.

Guyton, A. C. and J. E. Hall. 2005. Secretory functions of the alimentary canal. In Textbook of Medical Physiology. 11th edition. Philadelphia, PA: W. B. Saunders Company, p. 738

Isolauri, E. 2001. Probiotics in human disease. Am. J. Clin. Nutr. 73:1142S–1146S.

Kailasapathy, K. and J. Chin. 2000. Survival and therapeutic potential of probiotics oconcerningerence to Lactobacillus acidophilus and Bifidobacterium spp. Immunol. Cell Biol. 78:80–88

Karimi, O. and A. S. Pena. 2003. Probiotics: Isolated bacteria strain or mixtures of different strains? Two different approaches to the use of probiotics as therapeutics. Drugs Today (Barc). 39:565–597.

Lee, A. 1984. Neglected niches: The microbial ecology of the gastrointestinal tract. In Advances in microbial ecology. Edited by Marshall, K. New York, NY: Plenum Press,

Lennox-King, S. M. J., S. M. O'Farrell, K. A. Bettelheim, and R. A. Shooter. 1976a.

Lennox-King, S. M. J., S. M. O'Farrell, K. A. Bettelheim, and R. A. Shooter. 1976b. Escherichia coli isolated from babies delivered by caesarian section and their environment. Infection 4:139–145

MacGregor, R. R. and W. W. Tennessee. 1973. The incidence of pathogenic organisms in the normal flora of the neonate's external ear and nasopharynx. Clin. Pediatr. 12:697–700.

Marelli, G., E. Papaleo, and A. Ferrari. 2004. Lactobacilli for prevention of urogenital infections: A review. Eur. Rev. Med. Pharmacol. Sci. 8:87–95.

Mata, L. J. and J. J. Urrutia. 1971. Intestinal colonization of breastfed children in a rural area of low socioeconomic level. Ann. N.Y. Acad. Sci. 176:93–108.

Miyake, K., T. Tanaka, and P. L. McNeil. 2006. Disruption-induced mucus secretion: Repair and protection. PLoS Biol. 4:e276.

Moughan, P. J., M. J. Birtles, P. D. Cranwell, W. C. Smith, and M. Pedraza. 1992. The piglet is a model animal for studying aspects of digestion and absorption in milk-fed human infants. In Nutritional Triggers for Health and in Disease. Edited by Simopoulos, A. P. Basel, Switzerland: Karger, pp. 40–113.

Palmer, C., E. M. Bik, D. B. DiGiulio, D. A. Relman, and P. O. Brown. 2007. Development of the human infant intestinal microbiota. PLoS Biology 5:e177.

Parracho, H., A. L. McCartney, and G.R. Gibson. 2007. Probiotics and prebiotics in infant nutrition. Proc. Nutr. Soc. 66:405–411.

Porth, C. M. 2004. Gastrointestinal tract function. In Pathophysiology: Concepts of Altered Health States. 7th edition. Philadelphia, PA: Lippincott, pp. 617–622. Pp

Quigley, E. M. and B. Flourie. 2007. Probiotics and irritable bowel syndrome: A rationale for their use and an assessment of the evidence to date. Neurogastroenterol. Motil. 19:166–172.

Rastall, R. A., G. R. Gibson, H. S. Gill, F. Guarner, T. R. Klaenhammer, B. Pot, G. Reid, I. R. Rowland, and M. E. Sanders. 2006. Modulation of the microbial ecology of the human colon by probiotics, prebiotics, and synbiotics to enhance human health: An overview of enabling science and potential applications. FEMS Microbiol. Ecol. 52:145–152.

Reid, G., D. Beuerman, C. Heinemann, and A. W. Bruce. 2001. A Probiotic Lactobacillus dose is required to restore and maintain normal vaginal flora. FEMS Immunol. Med. Microbiol. 32:37–41.

Roberfroid, M. B. 1999. Concepts in functional foods: The case of inulin and oligofructose. J. Nutr. 129:1398–1401.

Sartor, R. 2004. Therapeutic manipulation of the enteric microflora in inflammatory bowel diseases: Antibiotics, probiotics, and prebiotics. Gastroenterology 126:1620–1633

Savage, D. S. 1977. Microbial ecology of the gastrointestinal tract. Ann. Rev. Microbiol. 31:107–133.

Sears, C. L. 2005. A dynamic partnership: Celebrating our gut flora. Anaerobe 11:247–251.

Stark, P. L. and A. Lee. 1982. The microbial ecology of the large bowel of breastfed and formula-fed infants during the first year of life. J. Med. Microbiol. 15:189–203.

Tannock, G. W. 1994. The acquisition of the normal microflora of the gastrointestinal tract. In Human Health: The Contribution of Microorganisms. Edited by Gibson, S. A. W. London, UK: Springer-Verlag, pp. 1–16

United29 United States Probiotics Organization. 2007. What are probiotics? http://www.usprobiotics. org. Accessed August 1, 2007.

University of Glasgow. 2005. The normal gut flora. http://www.gla.ac.uk/departments/ human nutrition/students/resources/made media/Infection. Accessed February 13, 2009

West, P. A., J. H. Hewitt, and O. M. Murphy. 1979. The influence of methods of collection and storage on the bacteriology of human milk. J. Appl. Bacteriol. 46:269–277.