



3rd International Conference and Exhibition on
Probiotics, Functional and Baby Foods

September 23-25, 2014 Hotel Royal Continental, Naples, Italy

Potential Clinical Applications of Probiotics

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Probiotics - the Science

Microbial ecosystem and mucosal immunity

- ✓ The intestine contains extensive microbiota (10^{10} bacteria cells), located mainly in the colon
- ✓ The small intestine has a larger bacterial load that consists of facultative anaerobes such as *Lactobacilli*, *Streptococci* and *Enterobacteria* as well as anaerobes such as *Bifidobacterium*, *Bacteroides* and *Clostridium* at levels of 10^4 - 10^8 cells/gm of contents

- ✓ The intestine is the body's most important immune function-related organ
- ✓ 60% of the body's immune cells are present in the intestinal mucosa
- ✓ The immune system controls immune responses against:
 - Dietary proteins
 - Prevention of food allergies
 - Pathogenic microorganisms
 - Viruses (*Rotavirus, Poliovirus*)
 - Bacteria (*Salmonella, Listeria, Clostridium* etc.)
 - Parasites (*Toxoplasma*)

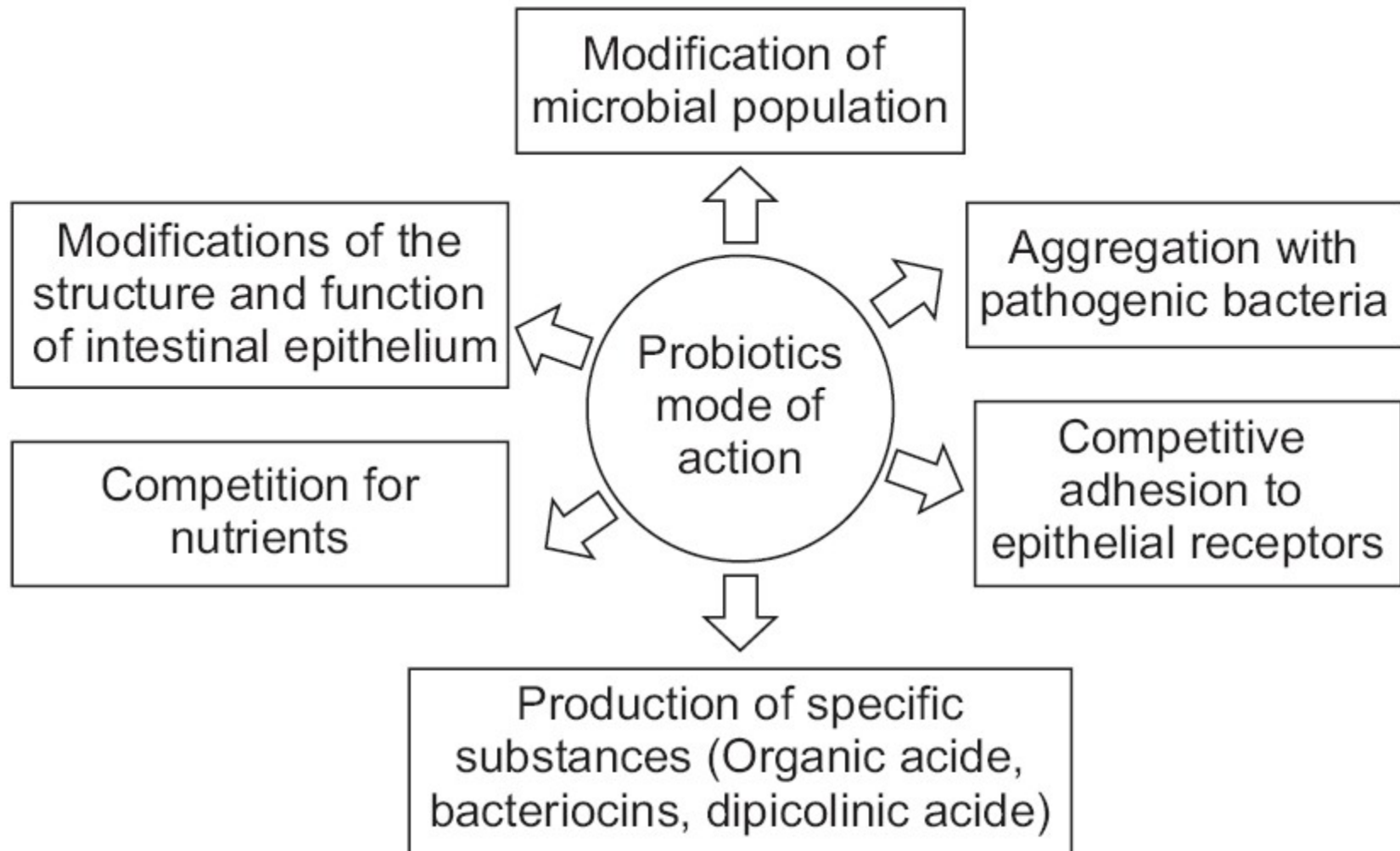
Probiotics - Health Concept

- ❖ Probiotics health effects exerted by live and viable microorganisms
- ❖ Probiotics application is independent of the site of action and route of administration
- ❖ Probiotics application include sites such as the oral cavity, the intestine, the vagina and the skin
- ❖ In case of probiotic foods, the health effect is usually based on alteration of the gastrointestinal micro flora and therefore based on survival during gastrointestinal transit

Beneficial Effects of Probiotics

- ✓ Promote lactose digestion
- ✓ Build resistance to enteric pathogens
- ✓ Digest food and compete for nutrients with pathogens
- ✓ Produce bacteriocins to inhibit pathogens
- ✓ Modulate immune system
- ✓ Decrease blood lipids and aid in heart diseases
- ✓ Enhance intestinal barrier function
- ✓ Stimulate epithelial mucin production
- ✓ Scavenge superoxide radicals
- ✓ Compete for adhesion with pathogens
- ✓ Modify pathogen-derived toxins

Probiotics - Mode of Action



Tiwari et al, 2012

Probiotics - Clinical Applications

- ✓ Diarrhea
- ✓ Colon cancer
- ✓ Cardiovascular diseases
- ✓ Prevention of *Helicobacter pylori* infection
- ✓ Allergy
- ✓ Hepatic encephalopathy
- ✓ Inflammatory bowel disease (IBD)
- ✓ Irritable bowel syndrome (IBS)
- ✓ Lactose malabsorption
- ✓ Urogenital infections

Meet the Healthy Microbes

These microorganisms have been shown to boost health in published scientific studies.

STRAIN	BENEFITS	PRODUCTS
<i>Bifidobacterium animalis</i> DN-173 010 (Bifidis regularis)	Gut health and faster digestion	Dannon Activia yogurt
<i>Bifidobacterium infantis</i> 35624 (Bifantis)	Digestive health; Alleviates symptoms of irritable bowel syndrome	Procter & Gamble's Align dietary supplement
<i>Bifidobacterium lactis</i> Bb-12	Helps immune system and digestive health	Yoplait Yoplus yogurt
<i>Lactobacillus casei</i> DN-114 001 (<i>L. casei</i> Immunitas)	Helps immune system; lessens duration of colds and flus in older people; eases diarrhea in children and people taking antibiotics	Dannon DanActive dairy drink
<i>Lactobacillus casei</i> Shirota	Helps immune system and digestive health	Yakult fermented dairy drink
<i>Lactobacillus rhamnosus</i> GG	Digestive health, infant diarrhea	Culturelle dietary supplement
<i>Lactobacillus rhamnosus</i> GR-1 in combination with <i>Lactobacillus reuteri</i>	Improved vaginal health; helps eradicate vaginal infections	RepHresh Pro-B and Fem-Dophilus , both dietary supplements
<i>Lactobacillus reuteri</i> DSM 17938	Eases infant colic; helps immune system; lessens antibiotic-associated diarrhea. When blended with another strain, helps treat bleeding gums	BioGaia chewable tablets, drops, and lozenges
<i>Saccharomyces boulardii</i> yeast	Helps prevent and treat antibiotic-associated diarrhea	Florastor dietary supplement

Johannes, 2012

Top 3 Immunity Benefits of Probiotics



Other Amazing Benefits of Using Probiotics Include:

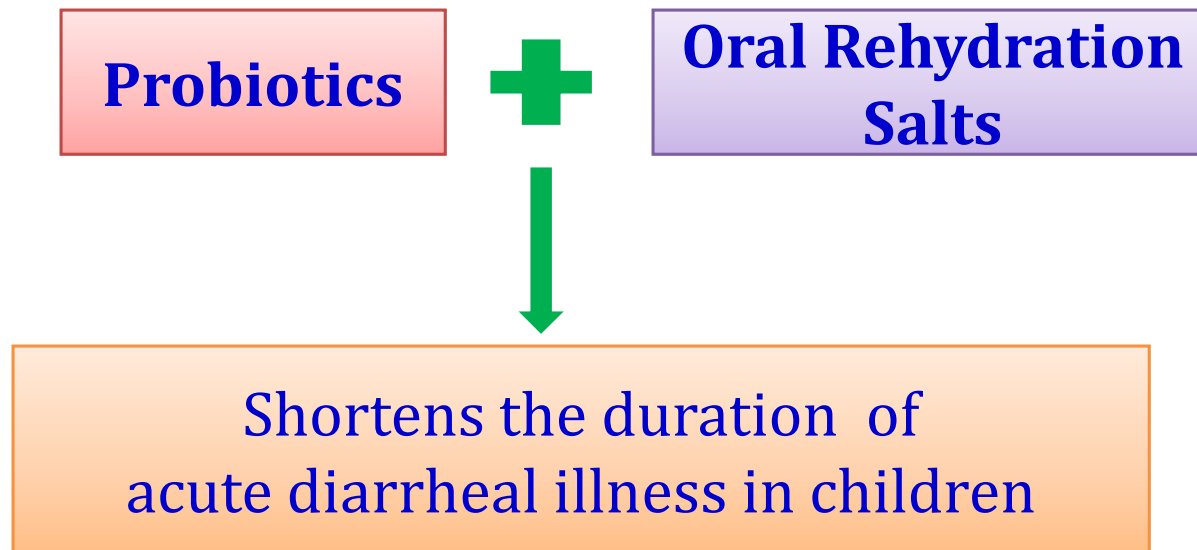
- Aid in digestion
- Improve resistance to allergies
- Fight yeast & fungal infections
- Prevent constipation & diarrhea
- Help fight urinary tract infections
- Improve liver function
- Improve absorption of nutrients
- Alleviate bloating & heartburn
- Prevent skin problems
- Reduce accumulation of cholesterol & plaque in the arteries
- Improve lactose digestion
- Improve tolerance to antibiotics
- Maintain a balanced pH level
- Help maintain hormone balance
- Assist detoxification
- Enhance mental clarity
- Help regulate activity of the bowels
- Inhibit formation of tumors
- Enhance calcium metabolism, helping to prevent osteoporosis

+ *Many More*

URL: <http://fermentingsolutions.files.wordpress.com/2014/03/probiotics-benefits.png?w=361&h=356>

Probiotics against Diarrhea

Probiotic strains *Lactobacillus reuteri*, *L. rhamnosus* GG, *L. casei* and *Saccharomyces cerevisiae (boulardii)* significantly decreases the duration of diarrhea in children



Probiotics

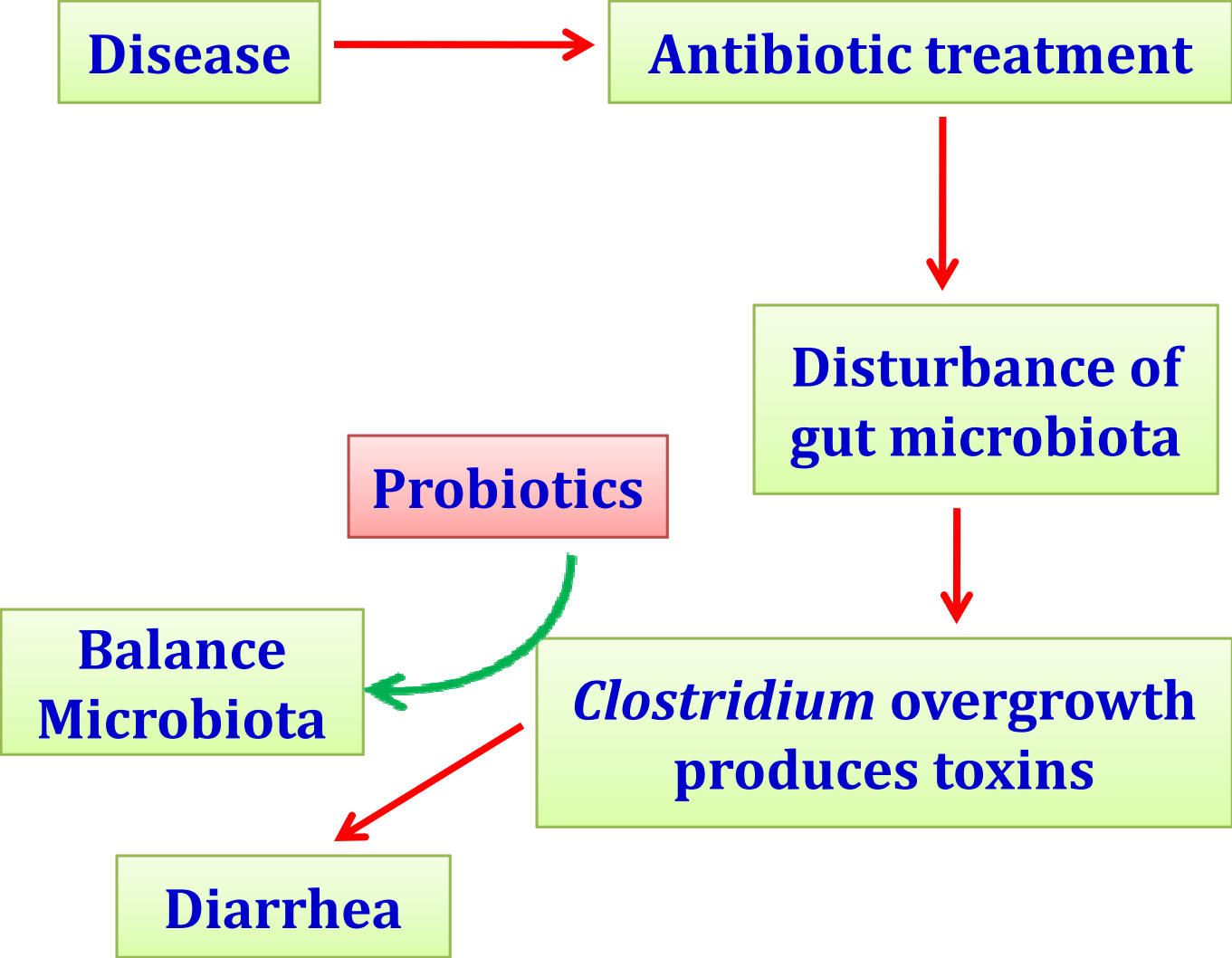


- Modulation of gut microbiota
- Production of antimicrobial substances
- Competition for adhesion sites
- Stimulation of mucus secretion
- Modulation of immune response

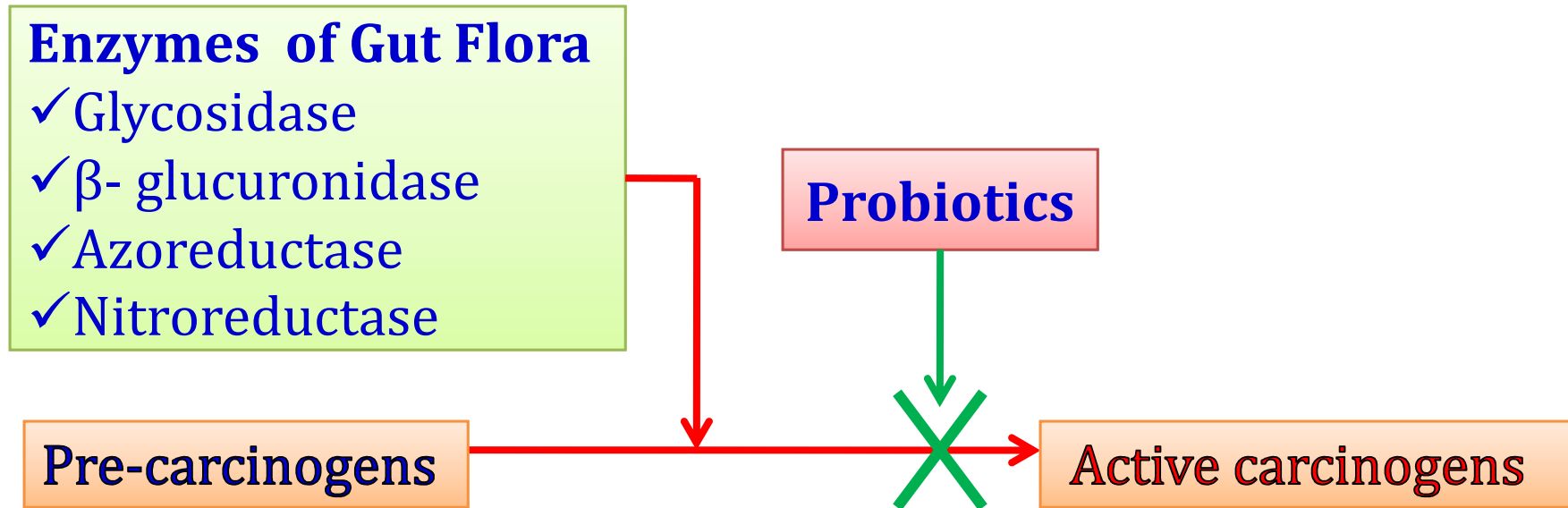


Prevention of Diarrhea

Antibiotic Associated Diarrhea



Probiotics and Cancer



- ❖ Oligofructose plus two probiotic strains (*L. acidophilus* and *L. casei*) supplementation in humans helped to decrease levels of these gut flora enzymes

Probiotics

- Binding/inactivation of mutagenic compounds
- Production of anti-mutagenic compounds
- Suppression of growth of pro-carcinogenic bacteria
- Reduction of the absorption of carcinogens
- Enhancement of immune function
- Influence on bile salt concentrations

Prevents Cancer Growth

Probiotics and Heart Diseases

Probiotics



- Assimilation of cholesterol by bacterial cells
- Deconjugation of bile acids by bacterial acid hydrolases
- Cholesterol-binding to bacterial cell walls
- Reduction of hepatic cholesterol synthesis
- Redistribution of cholesterol from plasma to liver
- Bacterial production of short-chain fatty acids



Reduction of blood cholesterol level

Helicobacter pylori Infection

Probiotics

- Production of antimicrobial substances
- Stimulation of the mucus secretion
- Competition for adhesion sites
- Stimulation of specific and non-specific immune responses

Prevention of *Helicobacter pylori* infection

Probiotics and Allergy

Probiotics



- Reverse increased intestinal permeability
- Enhance gut-specific IgA responses
- Promote gut barrier function
- Modulation of immune response
- Enhance IL-10 and cytokines production that promote production of IgE antibodies



Beneficial in Allergy and
Atopic diseases

Hepatic Encephalopathy

Probiotics



- Decrease portal blood ammonia by reduced bacterial urease activity
- Decrease portal blood pH due to less ammonia absorption
- Decrease inflammation and oxidative stress due to reduced ammonia toxins
- Reduce uptake of other toxins



Prevention of Hepatic
Encephalopathy

Inflammatory Bowel Disease

Probiotics

- Modulation of immune response
- Modulation of gut microbiota

**Beneficial in Inflammatory
Bowel Disease**

Ulcerative colitis

- ✓ The probiotic strain *E. coli* Nissle strain may be equivalent to Mesalazine in maintaining remission of ulcerative colitis
- ✓ Probiotics have shown efficacy to induce and maintain remission in children and adults with mild-to-moderate ulcerative colitis

Irritable Bowel Syndrome

Probiotics

- Reduction of intestinal gas production
- Modulation of gut microbiota

Beneficial in Irritable Bowel Syndrome

- ❖ Probiotic strains *Bifidobacterium Infantis* in addition to *Lactobacillus reuteri* may improve **Colicky** symptoms within one week of treatment

Lactose Malabsorption

Probiotics

Action of bacterial β -galactosidase on lactose

Relief from Lactose Indigestion

- ❖ *Streptococcus thermophilus* and *L. delbrueckii* subsp. *bulgaricus* improve lactose digestion and reduce symptoms related to lactose intolerance

Urogenital Tract Disorders

Probiotics

- Production of antimicrobial substances
- Competition for adhesion sites
- Competitive exclusion of pathogens

Relief from Urogenital Infection

Probiotics in Pregnancy

- ❖ **Bacterial vaginosis**, increases the risk of **preterm labour** and **infant mortality**
- ❖ Probiotics decrease the risk of **bacterial vaginosis** and maintain normal *Lactobacilli* vaginal flora
- ❖ *L. rhamnosus* **GG** and *B. lactis* **BB12** can be prevented atopic dermatitis of newborn babies in 50% of cases, if mothers ingest probiotics during pregnancy and newborns ingest them during the first 6 months of life

Probiotics in Skincare Products



- ❖ Probiotic skincare product **NUDE Skincare**® was first introduced in 2007 by **NUDE Brands Ltd.**, UK/USA
- ❖ Probiotics help balance internal digestion and also stabilize microflora on the skin
- ❖ **Yogurt** increases certain probiotic strains in skin that protect skin from environmental stressors, soothes skin and improves moisture retention

Future Trends and Research

The benefits of probiotics go way beyond gut health

Probiotics

↓ Inflammatory cytokines

↑ Neurotransmitter release

Useful in Depression & Anxiety

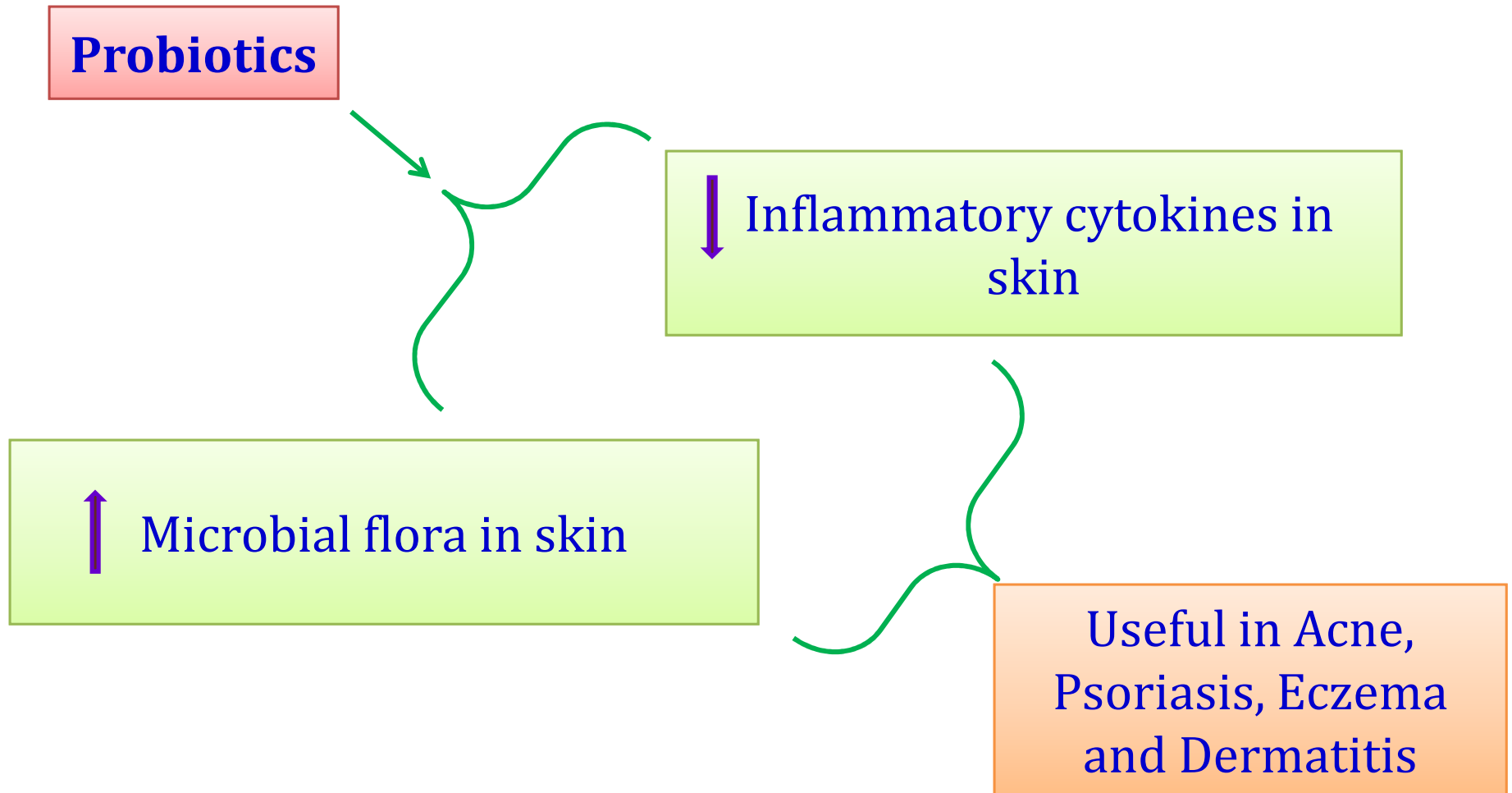
Probiotics

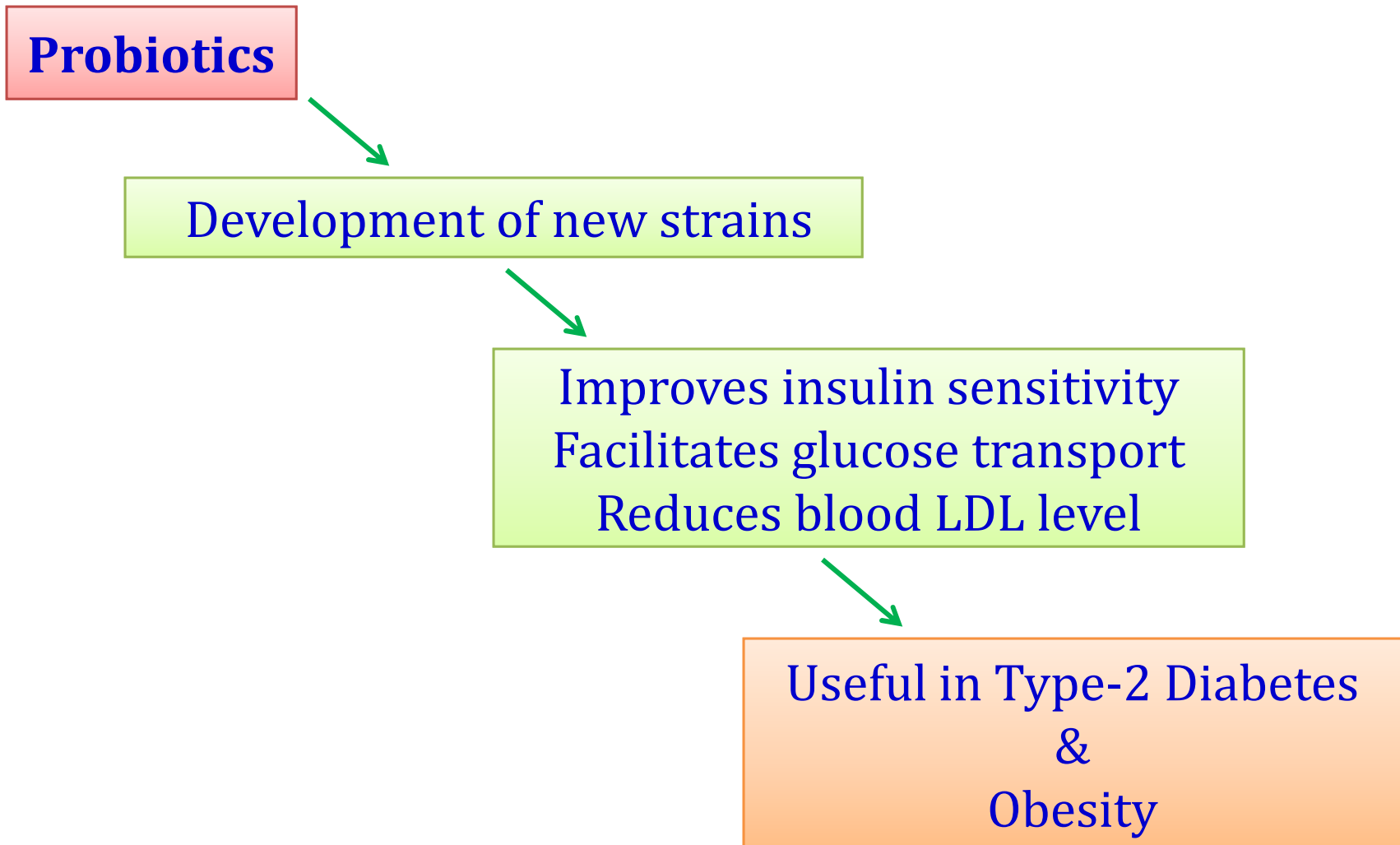


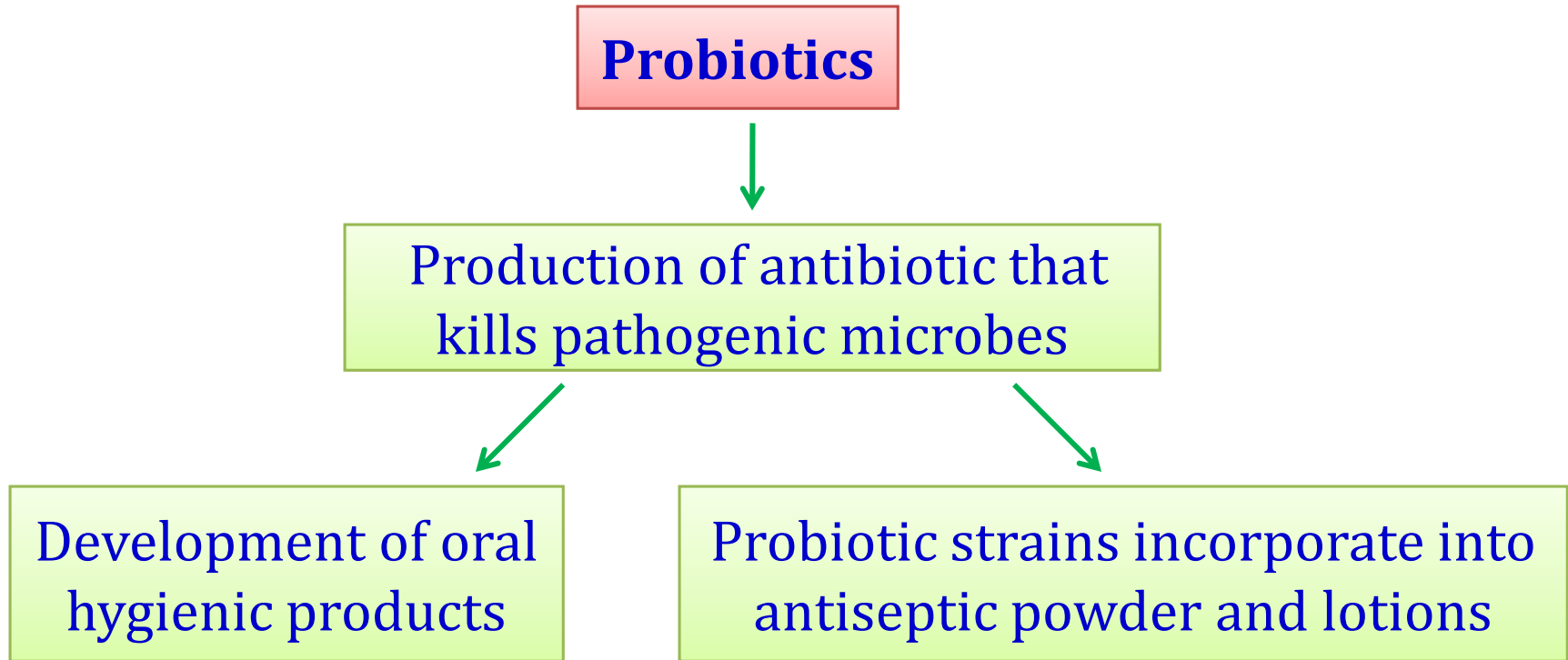
Reduces pathogenic bacteria in the nasal passages
Balances microflora in the nasal cavity



Useful in Nasal Congestion
&
sinusitis







Conclusion

- ❖ Probiotics have clearly established as an adjuvant in the management of lactose malabsorption and acute diarrhea, particularly acute infant diarrhea
- ❖ Probiotic agents appear promising for the management of *C. difficile* colitis, atopic disease, necrotizing enterocolitis and other gut conditions, such as inflammatory bowel disease
- ❖ Further, well-designed clinical trials, involving large numbers of patients, are mandatory to achieve definite evidence of the preventive and curative role of probiotics in medical practice

Thank you

for your attention !