STELLAR BIOTICS
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Global Congress on
Healthcare & Patient Safety

April 10 & 11 2023

Rome, Italy

Probiotic Lysates as a Source for Postbiotic and Metabiotic Biotherapeutics

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CONTENT

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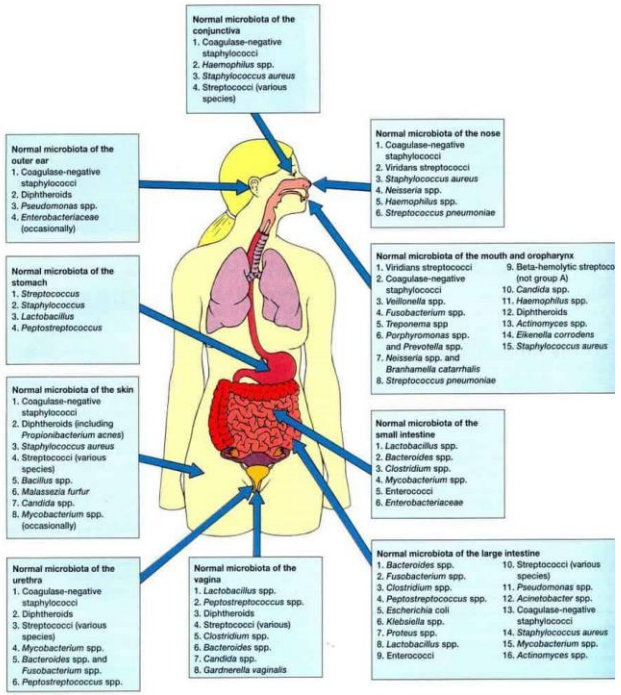

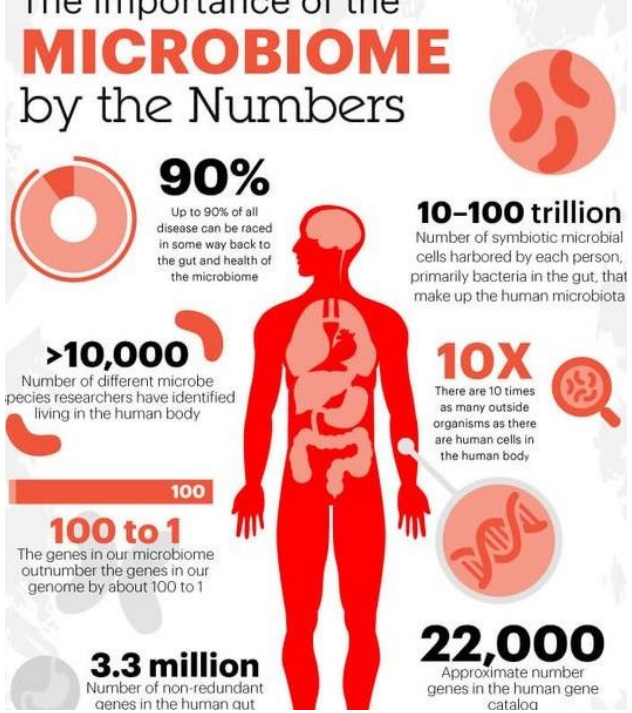

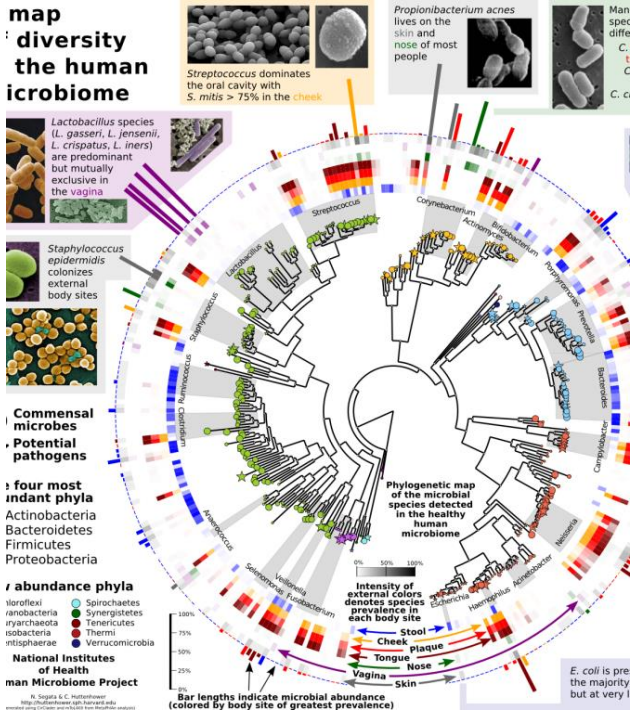

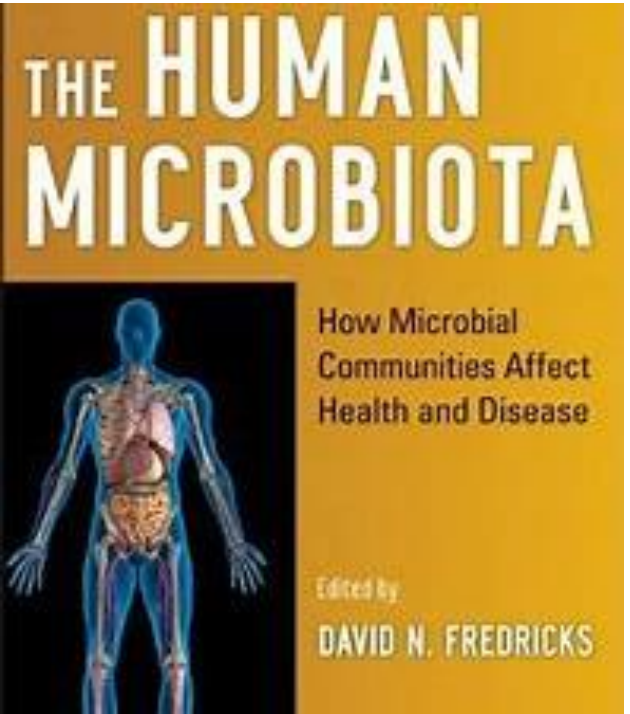

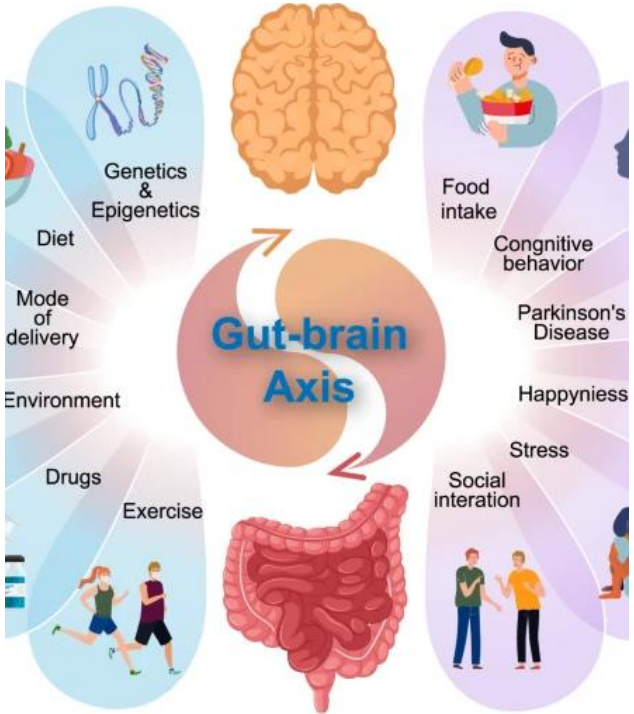

MICROBIOTA

Our Microbiome provides us with genetic and metabolic capacities formerly absent in our genome, thus allowing us to skip some evolutionary steps

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IMBALANCE OF THE MICROBIOTA, AGING AND INFLAMMATION

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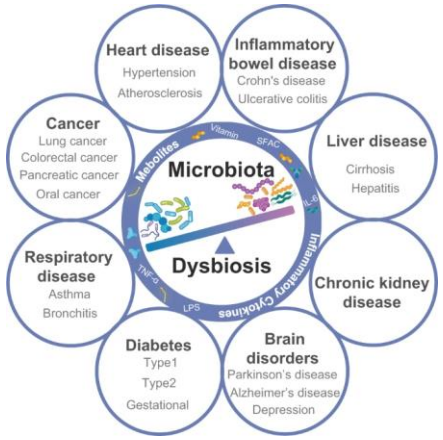
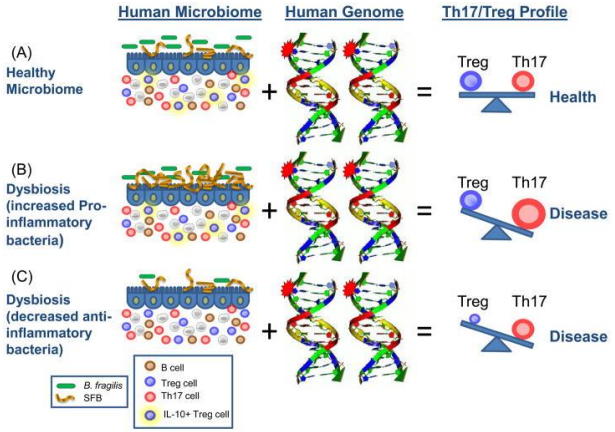
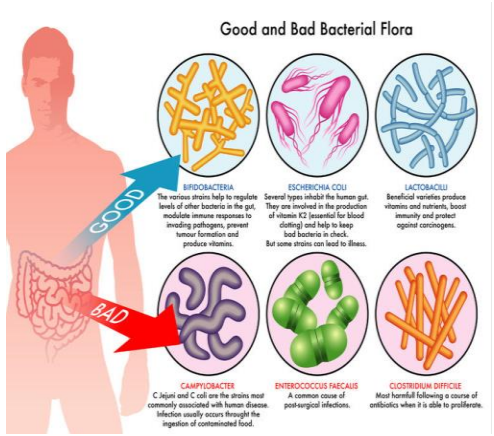
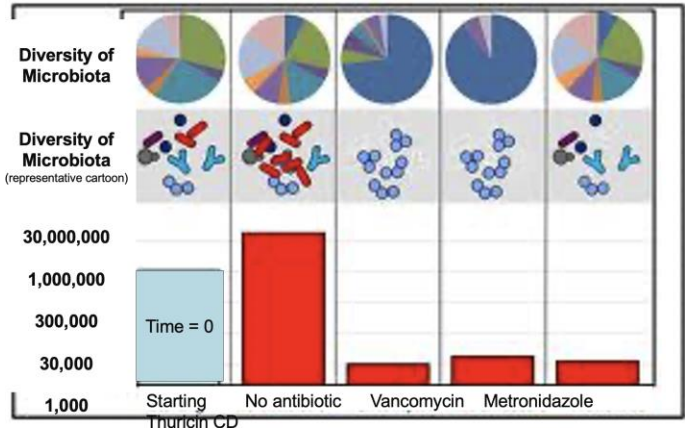
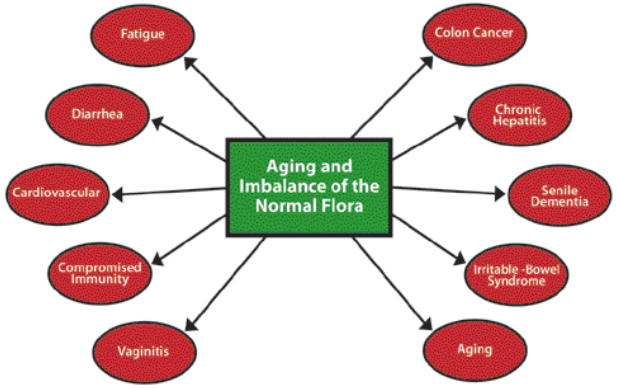
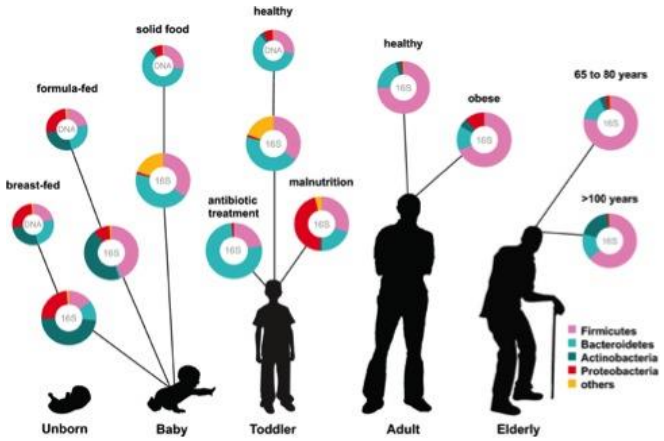


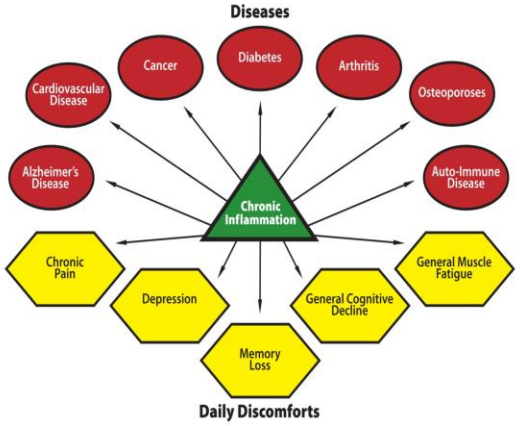




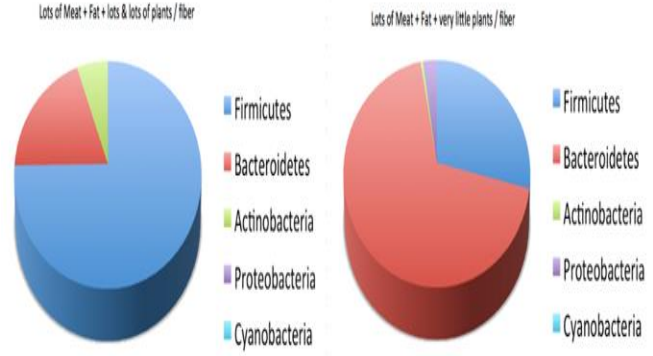








A 10-DAY EXPERIMENT CONDUCTED BY AMERICAN GUT/HUMAN FOOD PROJECT FOUNDER JEFF LEACH



MICROBIOTA BEYOND THE GUT

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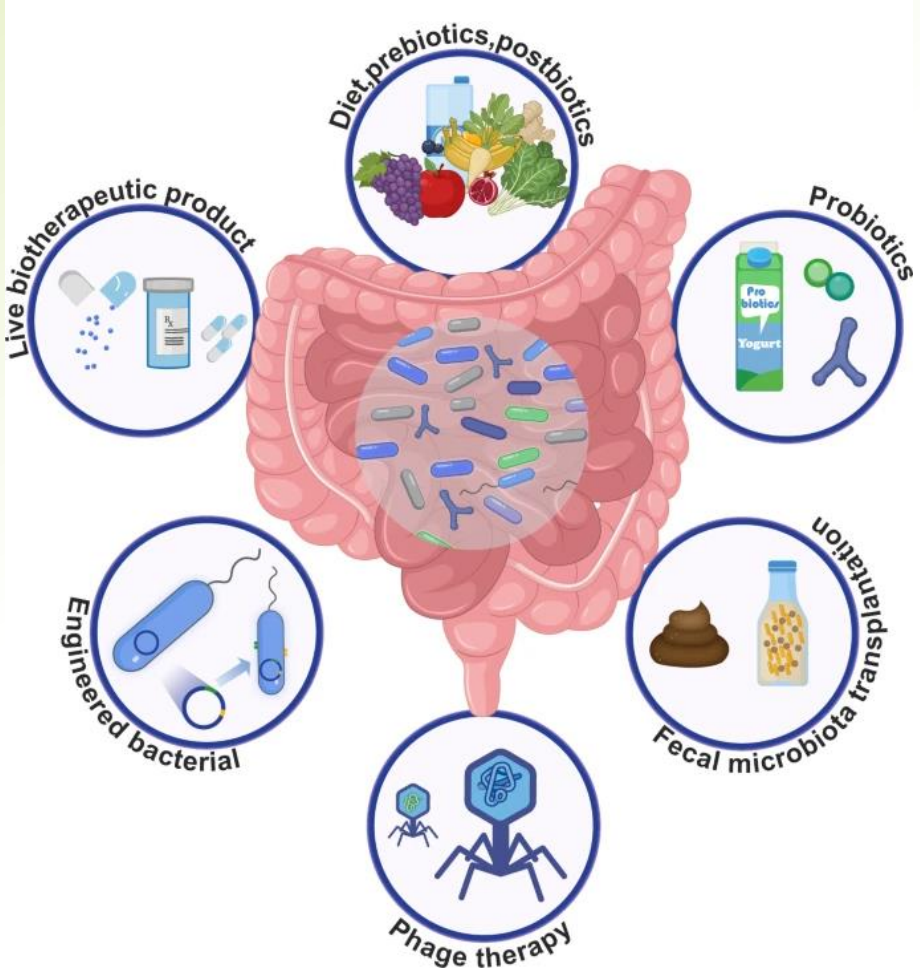
Future strategies to modify gut microbiota for disease treatment
Probiotic's derivatives :
Probiotic lysates, Postbiotics, Metabiotics for Bio-therapeutics

Your microbiota are now known to be important to overall health:

- Gastrointestinal health
- Immune health
- Emotional & Mental health
- ENT health
- Hormones health
- Bone &Joints health
- Skin health

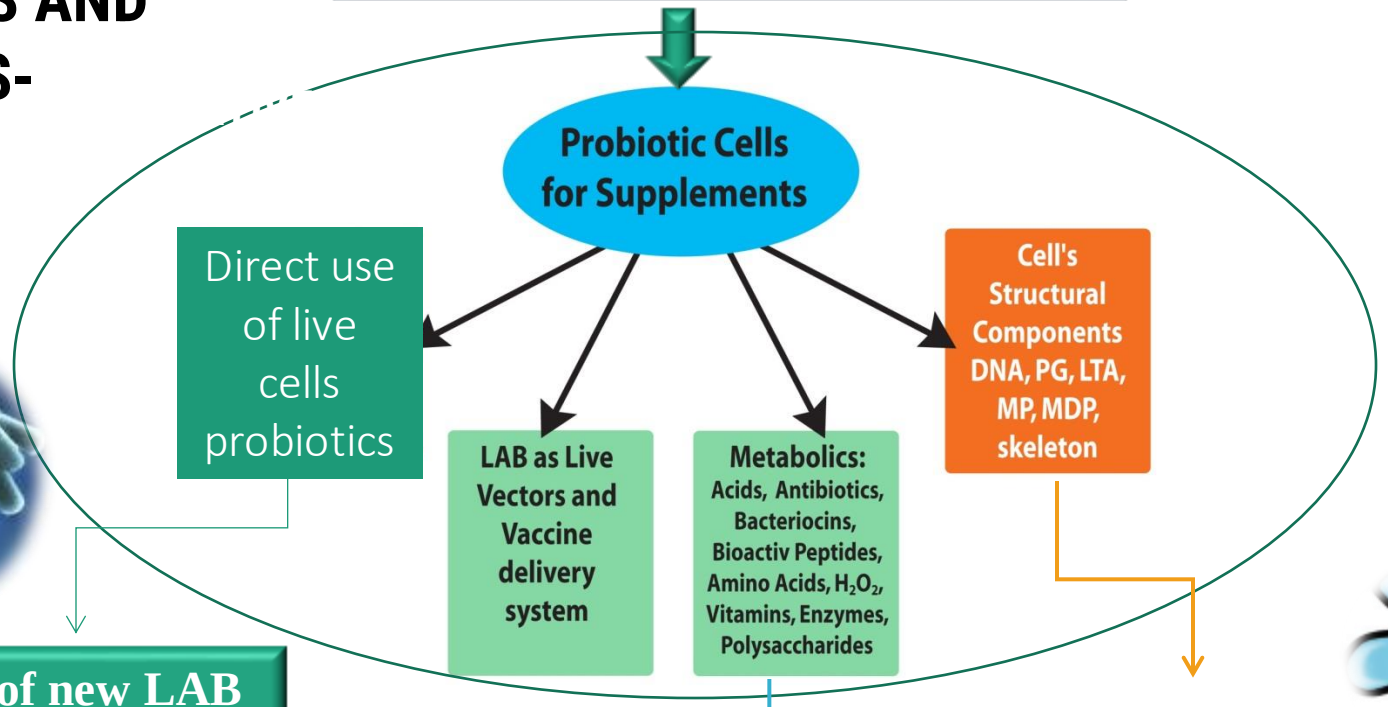
When your immune system, digestive system, and emotional health are in tune, your overall feeling of well-being improves



Extracted from: Hou, K., Wu, ZX., Chen, XY. et al. Microbiota in health and diseases. Sig Transduct Target Ther 7, 135 (2022). https://doi.org/10.1038/s41392-022-00974-4

PROBIOTIC LYSATES AND THESE DERIVATIVES- POSTBIOTICS & METABIOTICS

THE CHAMPION – LAB STRAIN



P

- Isolation of new LAB strains from different habitats
- Collection of identified LAB strains according to polyphasic taxonomy
- Characterization of probiotic potential, functionality and metabolic activity

M

- Production of LA and other short chain organic acids
- Bacteriocins production, characterization, mode of action
- Bio-active peptides

L

LAB Cells- derived lysates/ cell fragments:

- Heat treatment
- Mechanical treatment
- Physical treatment
- Enzymes treatment

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SUGGESTED DEFINITIONS FOR PROBIOTIC'S DERIVATIVES AS A SOURCE FOR FUTURE BIO-THERAPEUTICS

Probiotic lysate

Substances, released from probiotic cells after fragmentation treatment and include metabolites, cell surface molecules, minimal quantity dead and live cells

Metabiotic

Probiotic cell's structural components -peptidoglycans fragments, muramyl peptides, teichoic acids, cell surface proteins, DNA motifs, that obtained after cells separation from fermentation media using fragmentation treatment by physical, chemical or enzymatic technology

Postbiotic

Metabolites that were delivered into fermentation media during fermentation process and isolated/ concentrated from the media (in my experience was used multi-steps ultrafiltration process).

SCHEMATIC REPRESENTATION OF AUTOPHAGY PATHWAY

Autophagy as a self-eating, recycling and road to rejuvenation-Life ‘s circular dance ***(Roberta A. Gottlieb)***

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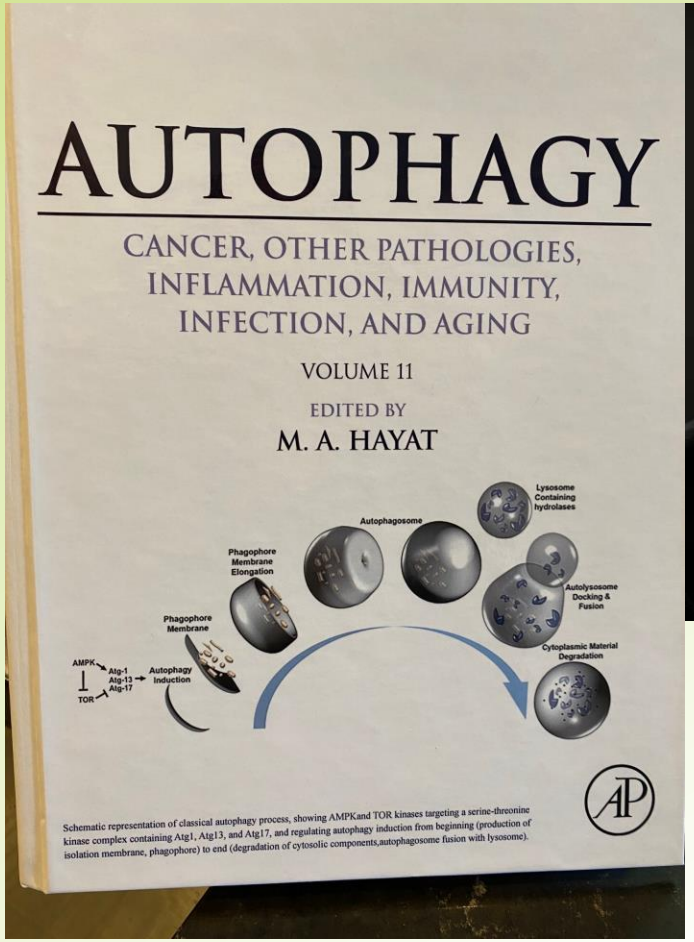
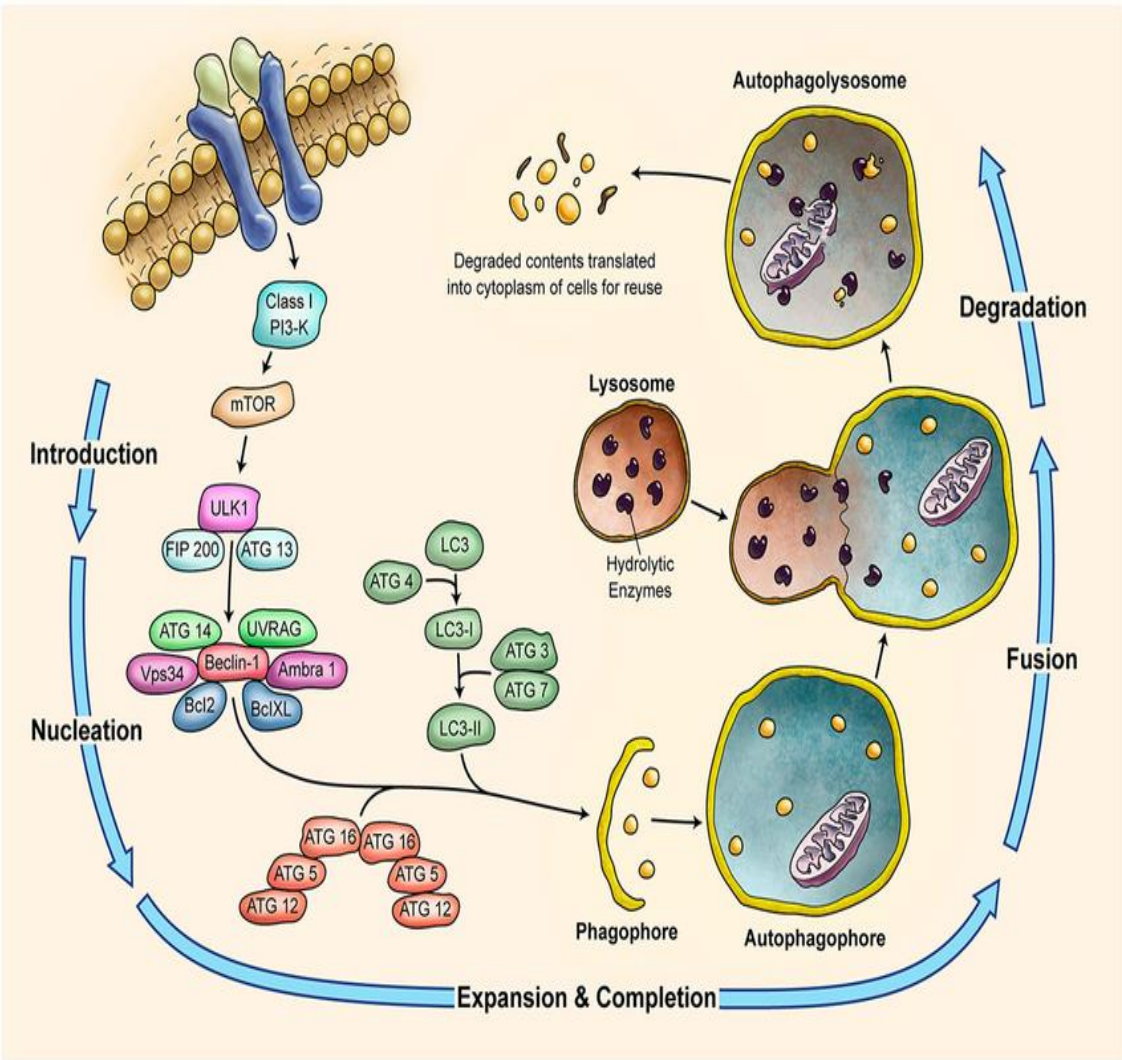


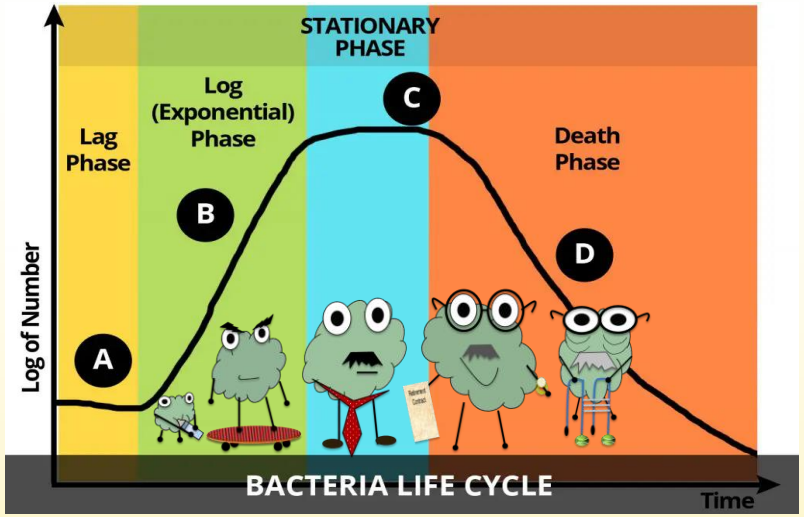
The Nobel Prize in Physiology or Medicine 2016 was awarded to Yoshinori Ohsumi "for his discoveries of mechanisms for autophagy"

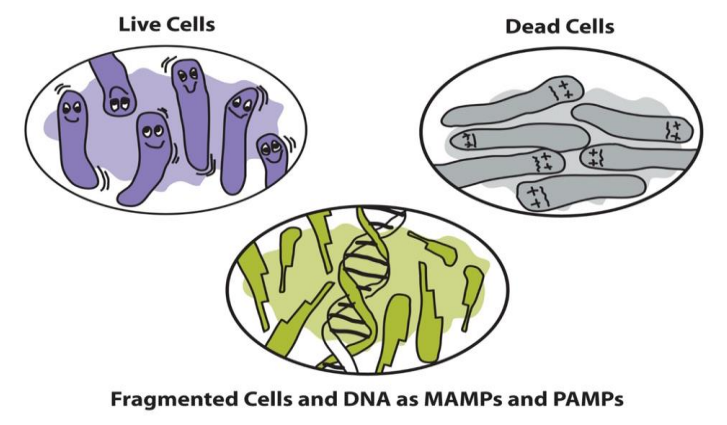


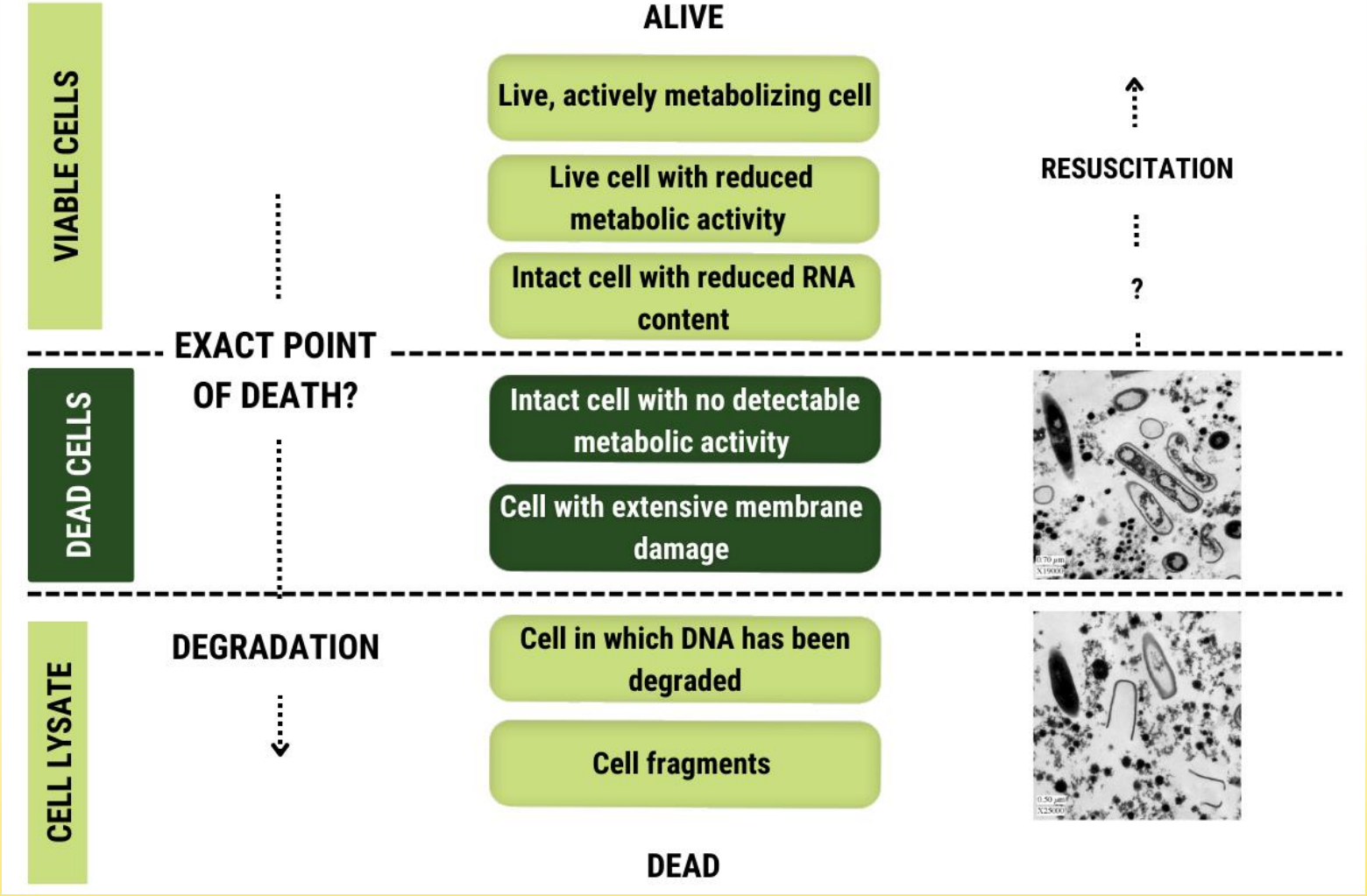
Adopted from Front.Cell.Neurosci.12 January 2015, V8, Art.450

BEYOND ALIVE PROBIOTIC CELLS

What is wrong with dead probiotic cells? Gain from loss!
Valentina Tavernini, Simone Guglielmetti. Genes Nutr.2011, 6:261-274
"The immunomodulatory properties of probiotic microorganisms beyond their viability (ghost probiotics: proposal of paraprobiotic concept"

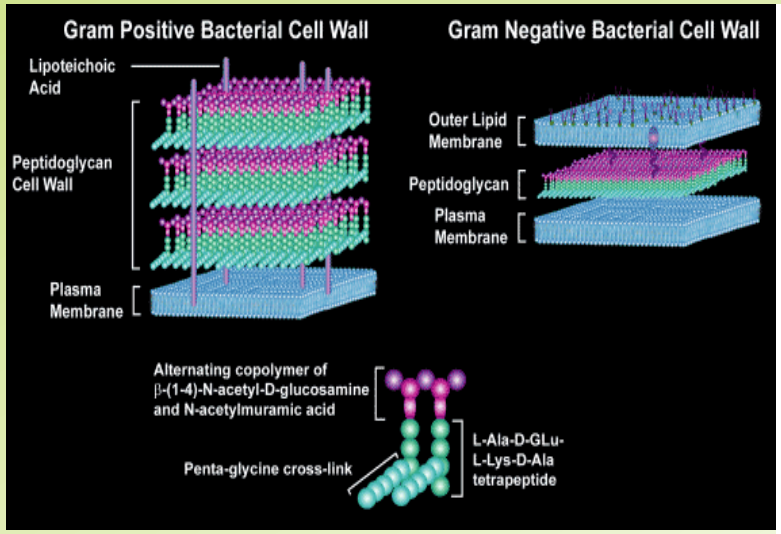


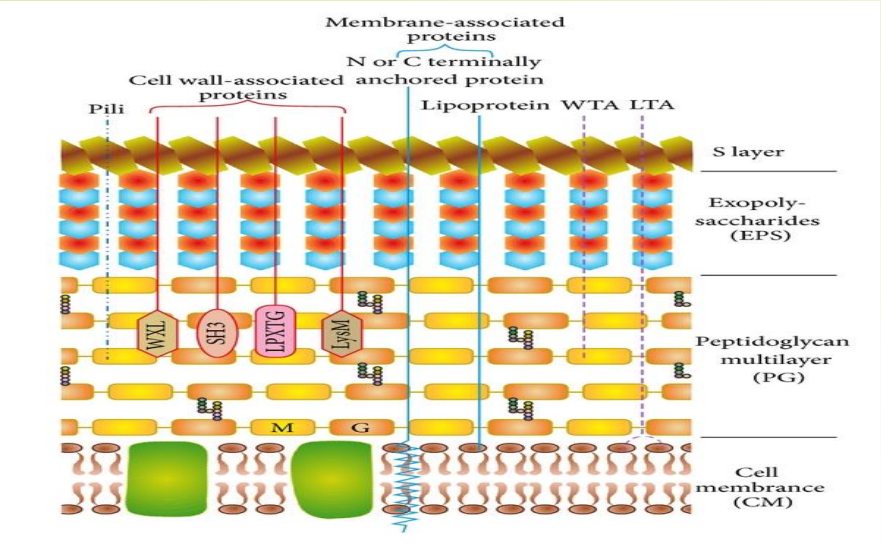


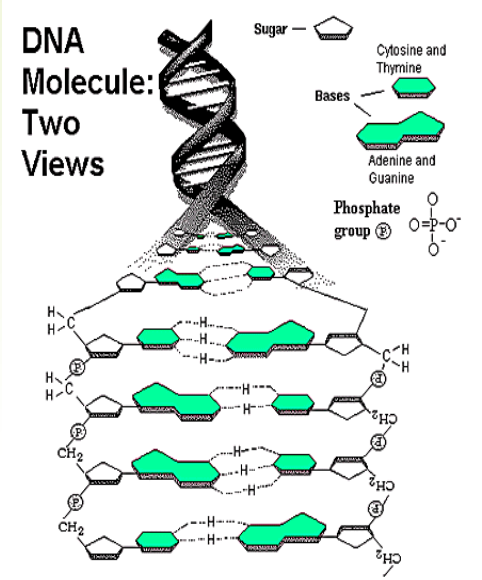


Vinderola, G., Ouwehand, A., Salminen, S., & von Wright, A. (Eds.). (2019). Lactic Acid Bacteria: Microbiological and Functional Aspects (5th ed.). CRC Press. https://doi.org/10.1201/9780429057465

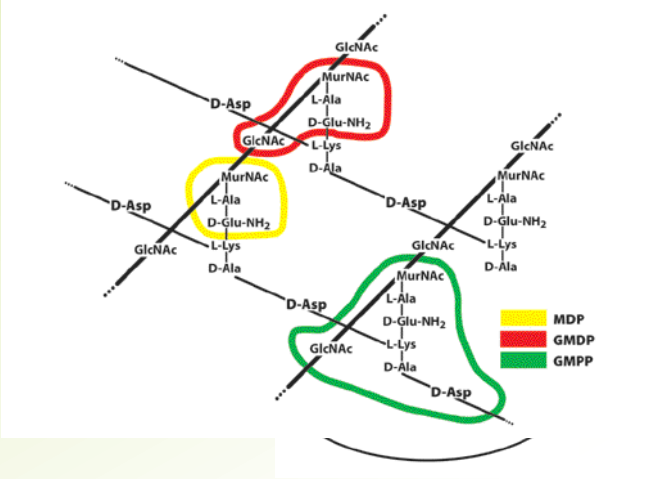
CELL FRAGMENT TECHNOLOGY

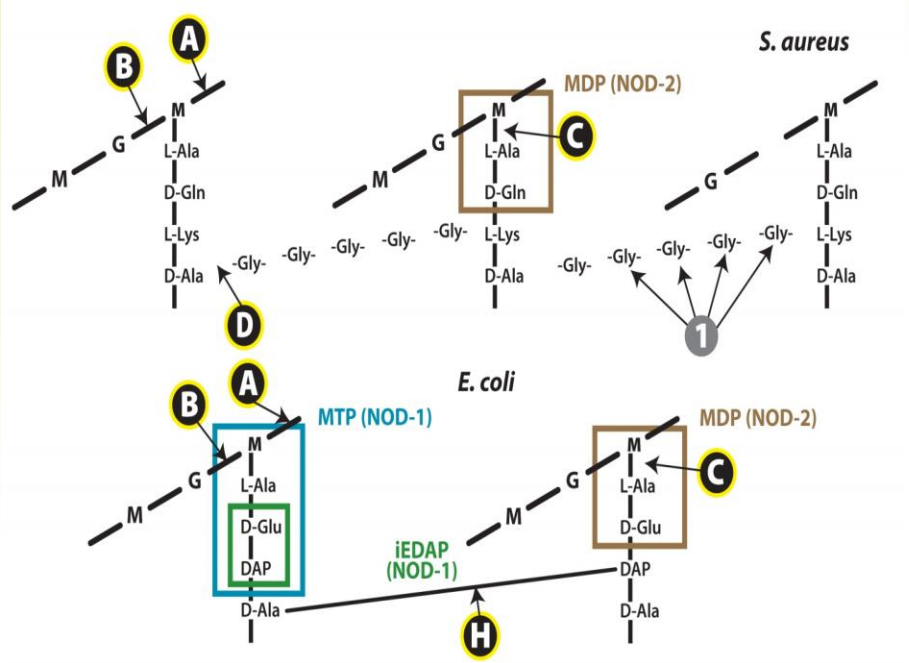






A-acetylmuramidase;
B-acetylglucosaminidase;
C-acetylmuramyl-L-alanine amidase
D,H and I –cross-bridge-splitting enzymes (adopts from J.Strominger, 2007)





Lactobacillus		Peptidoglycan type
L. acidophilus	A	Lys – D - Asp -
L. casei	B	Lys – D – Asp -
L. paracasei	B	Lys – D – Asp -
L. delbrueckii	A	Lys – D – Asp -
L. plantarum	B	M-DAP - ; Lys – D – Asp -
L. rhamnosus	B	Lys – D – Asp –
L. fermentum	C	Orn – D – Asp -
L.salivarius	A	DAP, L-Lys – D – Asp; Lys –L-Ser-
L. reuteri	C	L- Orn – D – Asp; mDAP;
A – homo-fermentative B- facultative hetero -fermentative C - obligatory hetero-fermentative		Adopted from" Lactobacillus Molecular Biology", 2009, Caister AP

CYTOKINE RESPONSE OF HUMAN PBMC TO STIMULATION
With *L. plantarum* NCIMB8826 WT and the Dlt mutant

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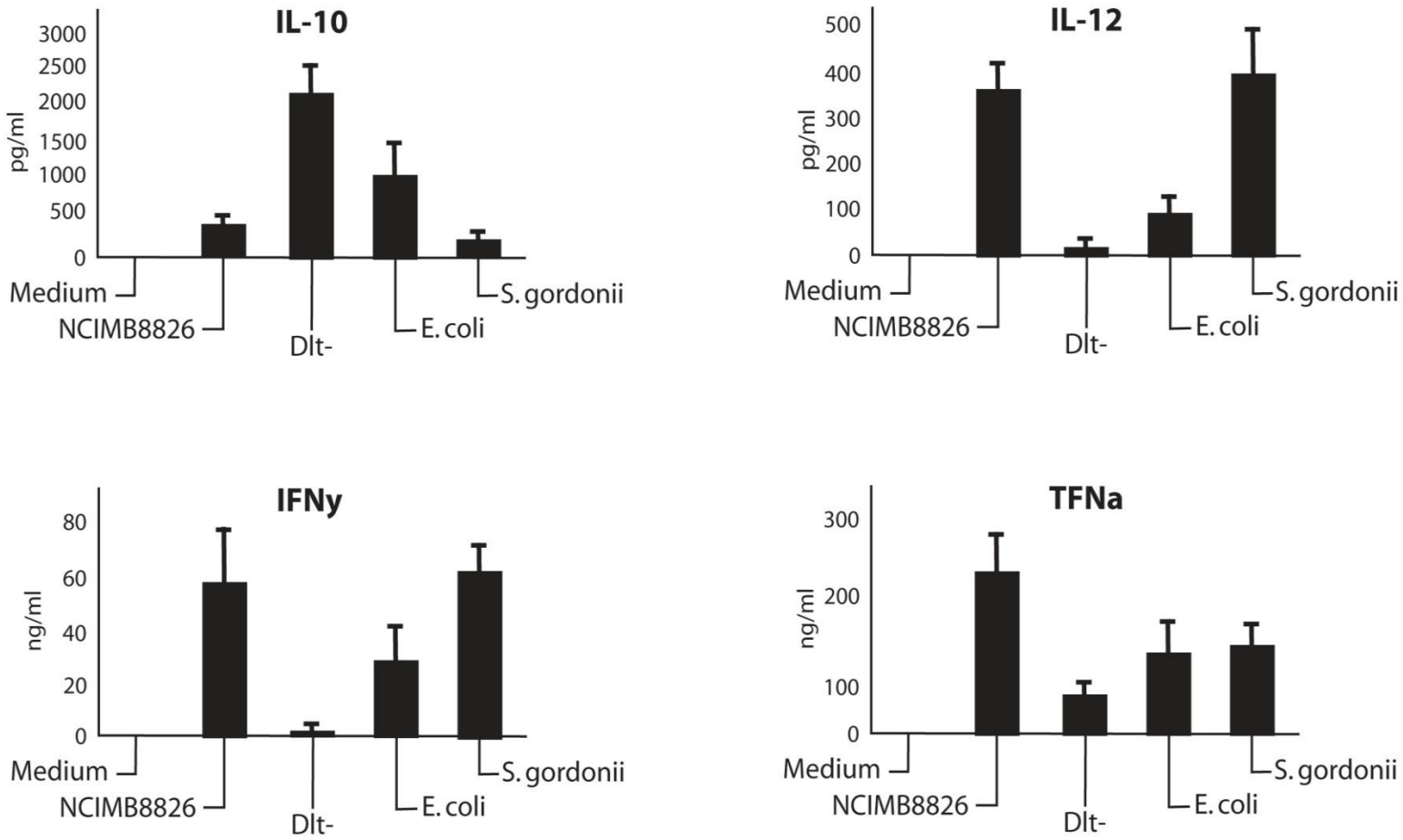
L. plantarum DLT – mutant has much less D-Ala in its TAs



(Grangetter C, Nutten E, Morath S. Proc Natl Acad Sci USA, 2005 Aug 2; 102 (31): 10763-4) S, Palumbo

LYTIC ENZYMES

MECHANISM OF ACTIVITY
MOLECULAR PATHWAYS FOR MICROBIOTA/PROBIOTICS INVOLVEMENT IN INFLAMMATION

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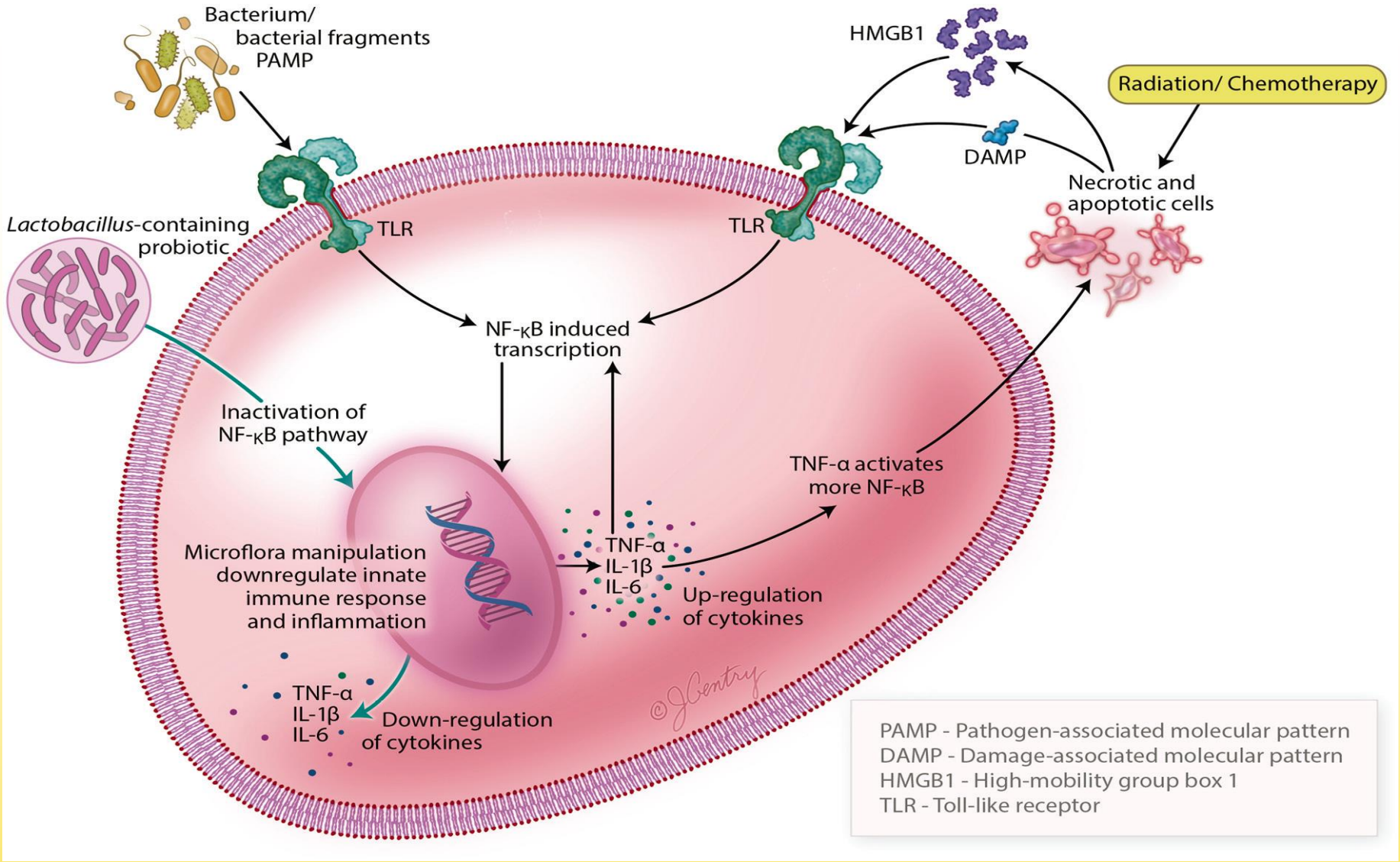

NF- κB KEY ROLE IN CONTROL OF IMMUNE RESPONSES

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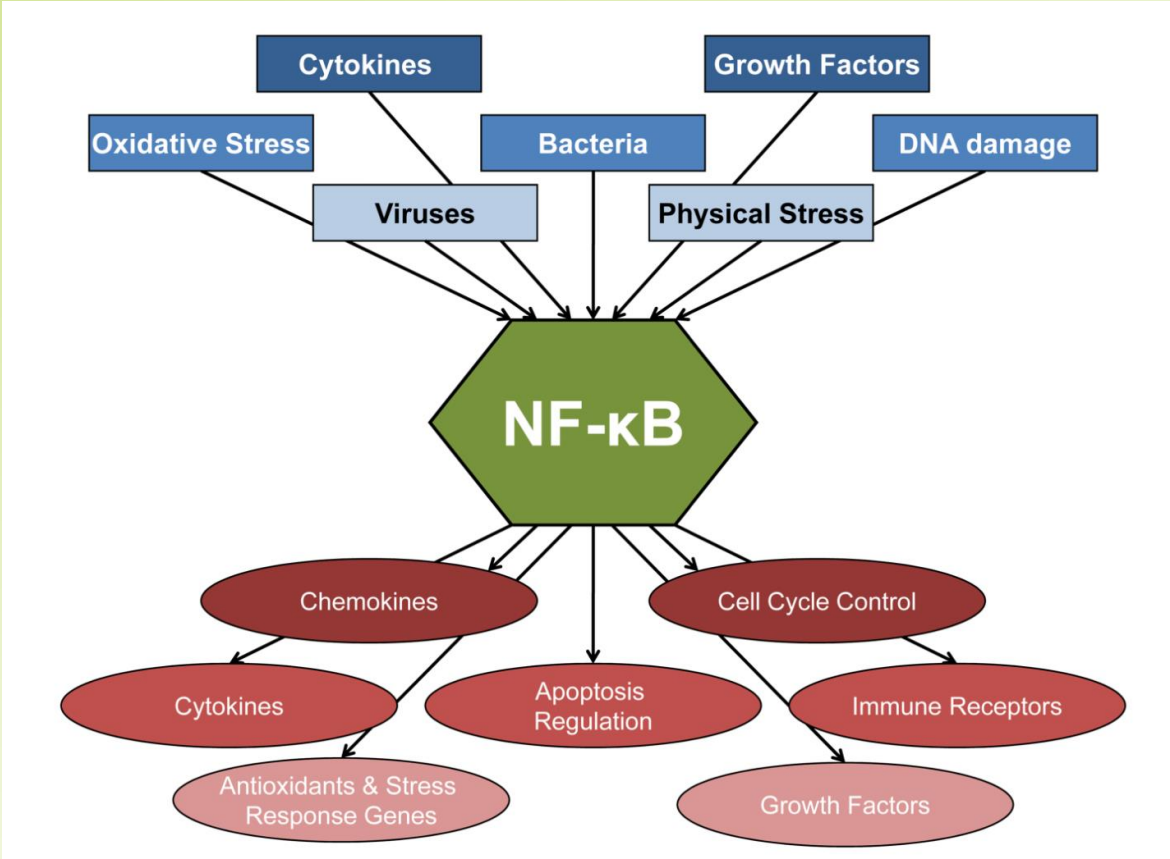
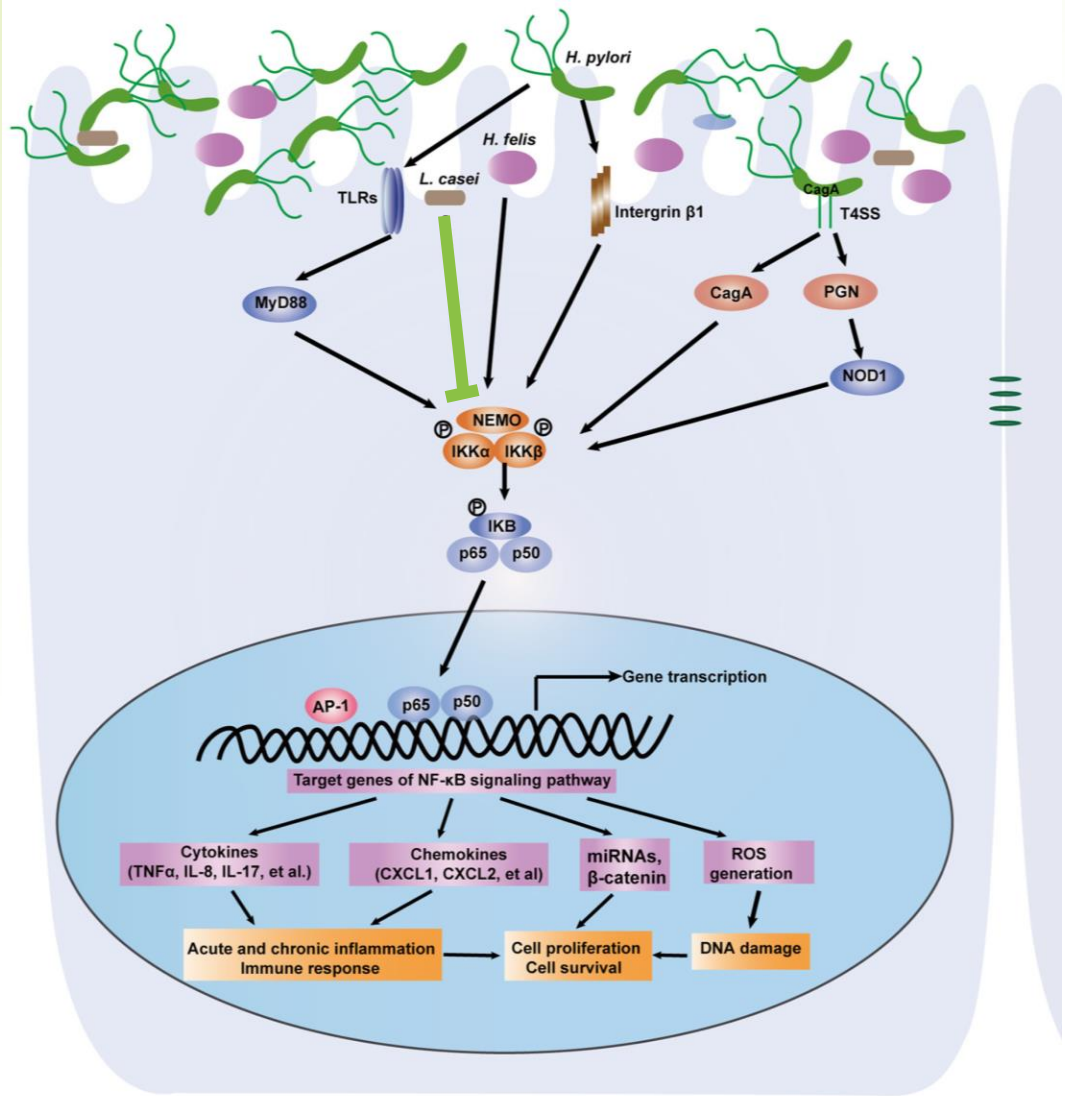
Activation of nuclear factor κB



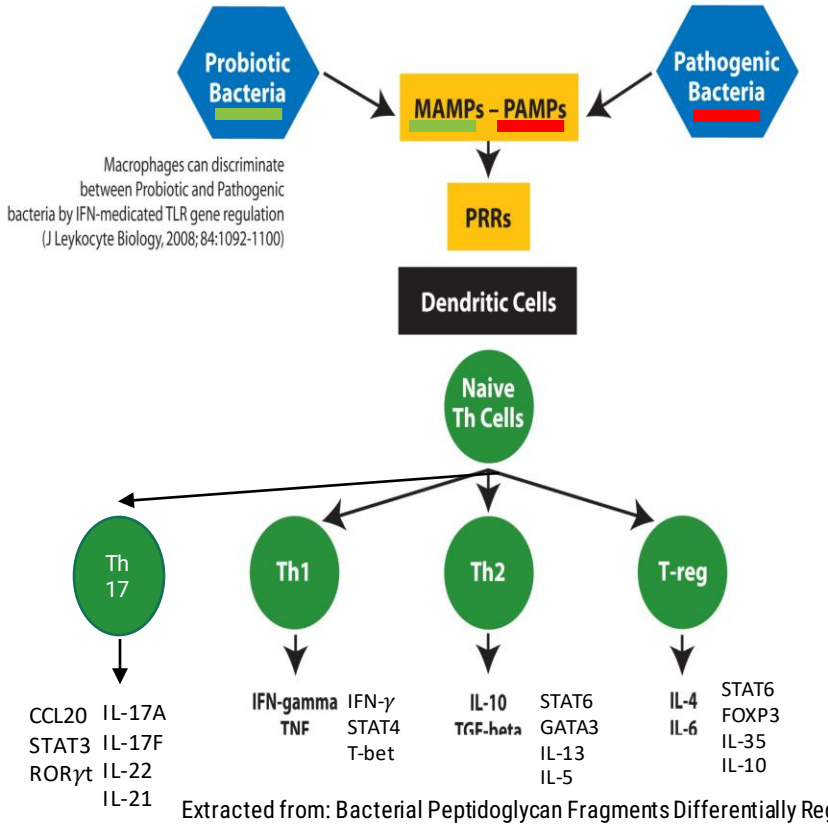
Genes under NF-κB transcriptional control

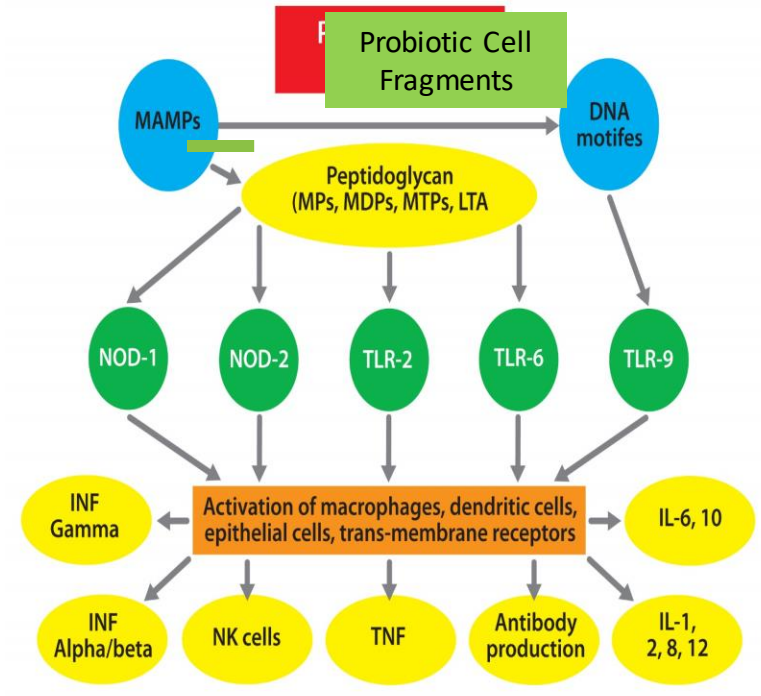


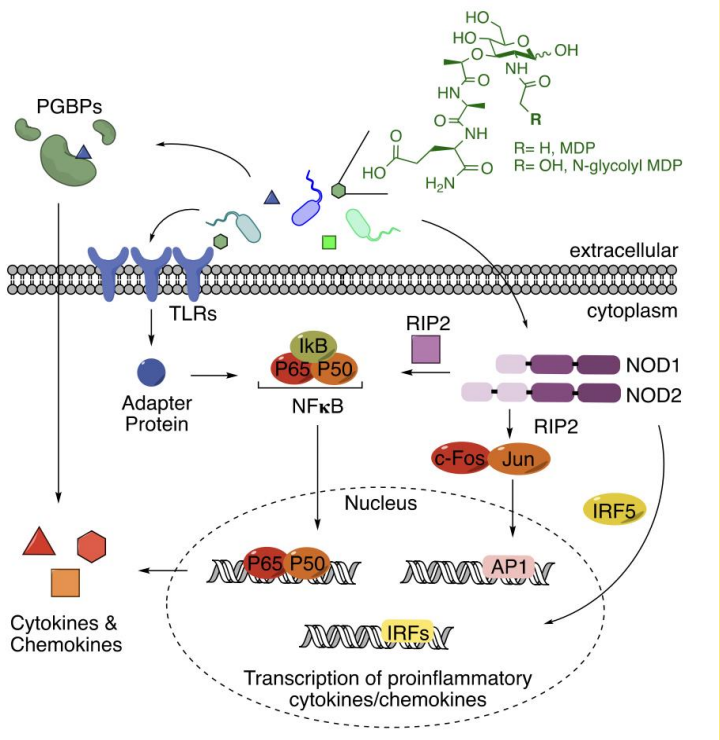
Peng C, Ouyang Y, Lu N, Li N. The NF-κB Signaling Pathway, the Microbiota, and Gastrointestinal Tumorigenesis: Recent Advances. Front Immunol. 2020 Jun 30;11:1387. doi: 10.3389/fimmu.2020.01387. PMID: 32695120; PMCID: PMC7338561.

Tilstra JS, Clauson CL, Niedernhofer LJ, Robbins PD. NF-κB in Aging and Disease. Aging Dis. 2011 Dec;2(6):449-65. Epub 2011 Dec 2. PMID: 22396894; PMCID: PMC3295063.

MECHANISM OF IMMUNE MODULATING ACTIVITY OF PROBIOTICS AND PROBIOTIC CELL FRAGMENTS







Extracted from: Bacterial Peptidoglycan Fragments Differentially Regulate Innate Immune Signaling. Klare L. Bersch, Kristen E. DeMeester, Rachid Zagani, Shuyuan Chen, Kimberly A. Wodzanowski, Shuzhen Liu, Siavash Mashayekh, Hans-Christian Reinecker, and Catherine L. Grimes *ACS Central Science* 2021 *7* (4), 688-696 DOI: 10.1021/acscentsci.1c00200

THERAPEUTICAL ACTIVITY OF MURAMYL PEPTIDES FROM PROBIOTICS

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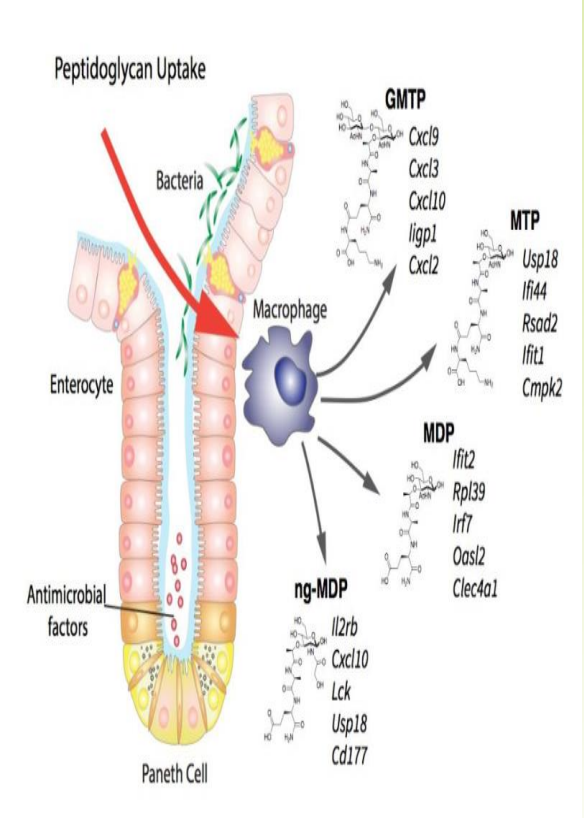


Muramyl peptides

- Detoxification and liver protection
- Treatment for hepatitis and liver cirrhosis
- Anti-inflammatory effect
- Regulation of glucose metabolism
- Improvement of short-wave sleeping
- Immune modulation
- Radioprotection
- Anti-tumor effect
- Septic shock therapy
- Anti-allergic effect
- Vasodilation effect
- Thermoregulation
- Analgesic effect

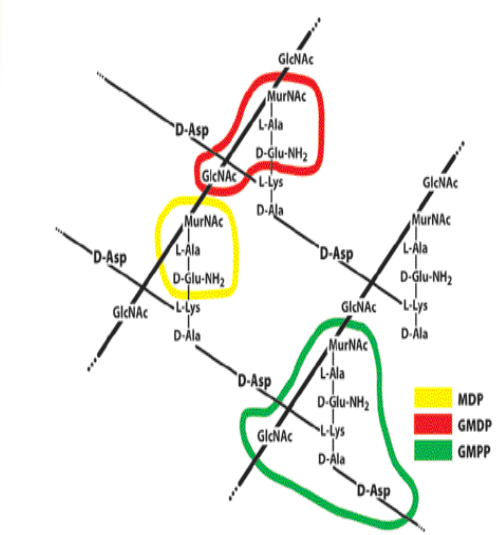
Induction of endogenic production of morphine

Stem cell proliferation

Improvement of lipid metabolism

Hemopoietic cells proliferation

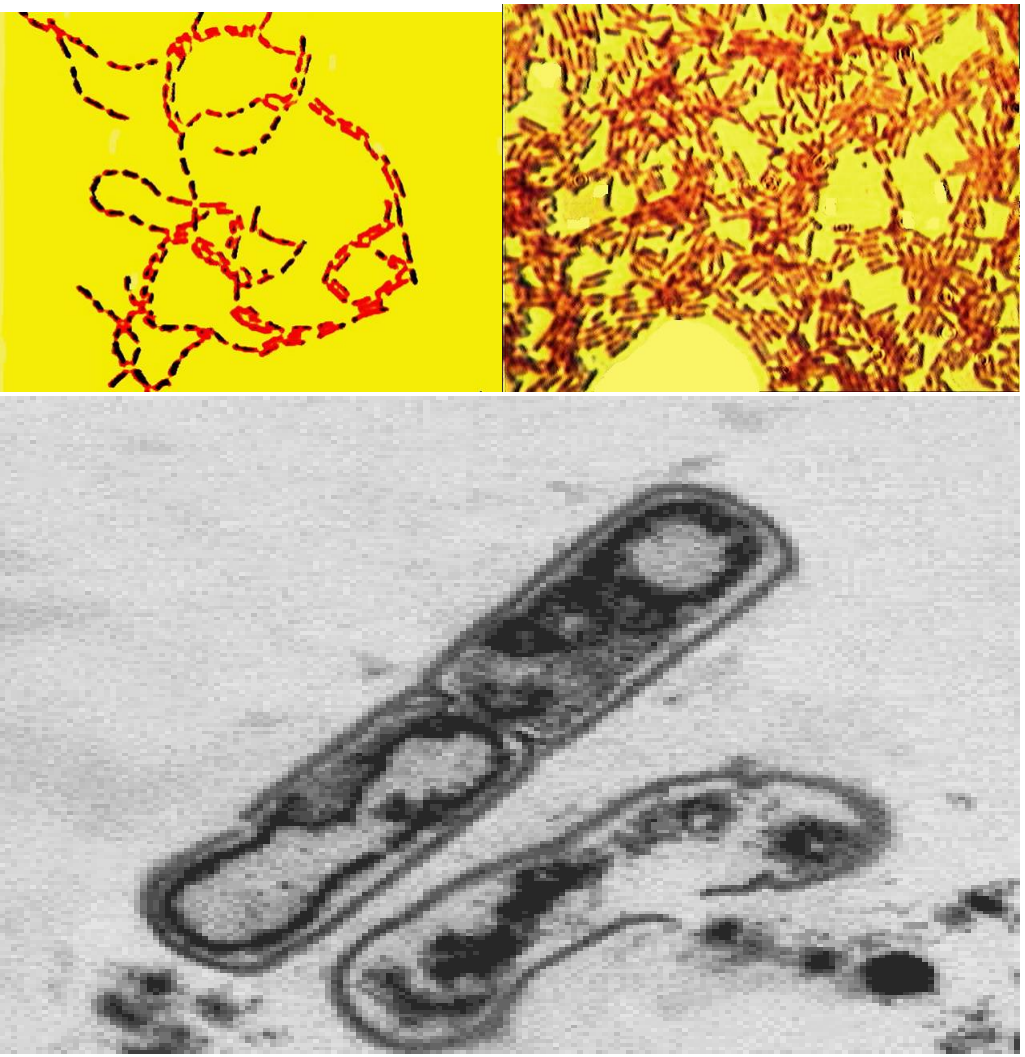
Leukopoiesis protection



Chemical& Pharmaceutical Journal, V30,Issue 12, pp.3-11, 1996, I.Kovalev, N.Shypulina, Microbial muramyl peptides as effective symbiotic adaptogens and potential tools for aging diseases.

CLINICAL STUDY | Del-Immune V®

Unleashing the Power Within Probiotics for future Bio-Therapeutics



Lactobacillus rhamnosus DV
(NRRLB-68023)

Our metabiotics, used in del-IMMUNE V® are derived using Cell Fragment Technology™, a proprietary cell fragmentation process that replicates the natural sequence in the body.

Using enzymes and not heat this process breaks down the cell wall of a unique probiotic strain (Lactobacillus rhamnosus DV - NRRLB-68023) and collects the cell wall fragments and DNA motifs, which account for the composition of a metabiotic.

Del-Immune V by CELL FRAGMENT TECHNOLOGY™

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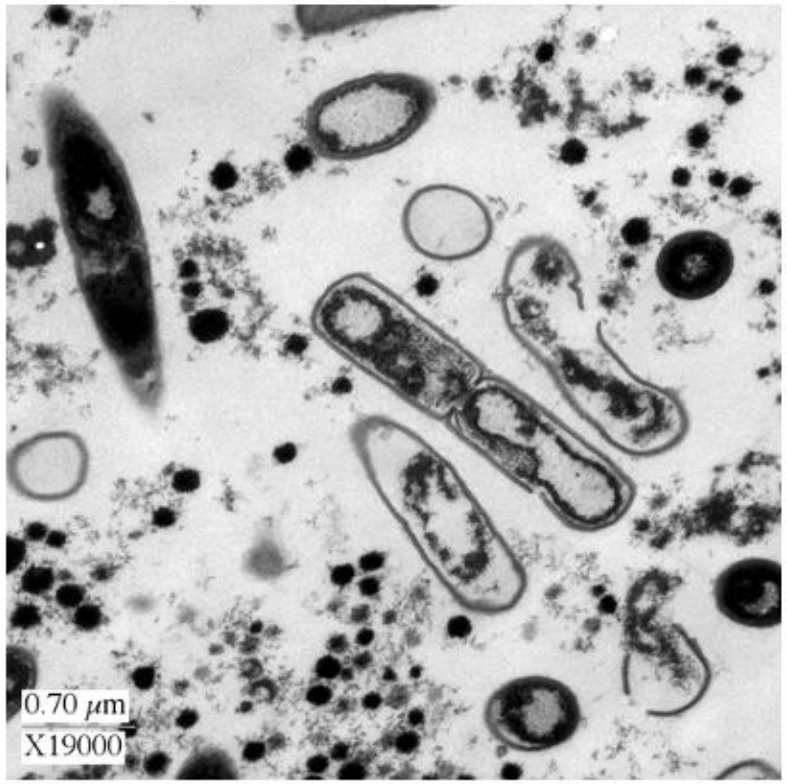
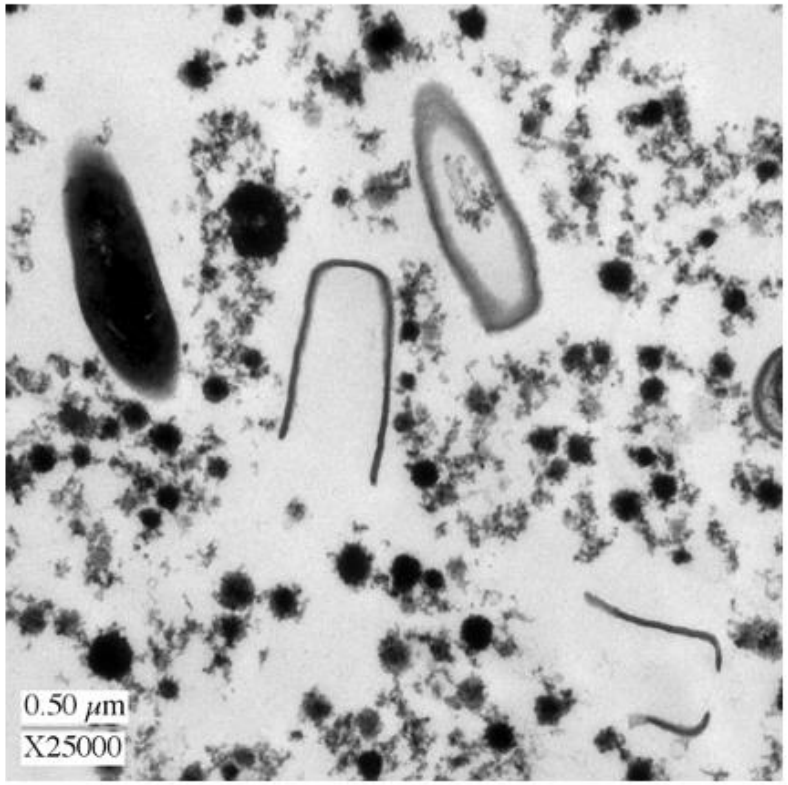
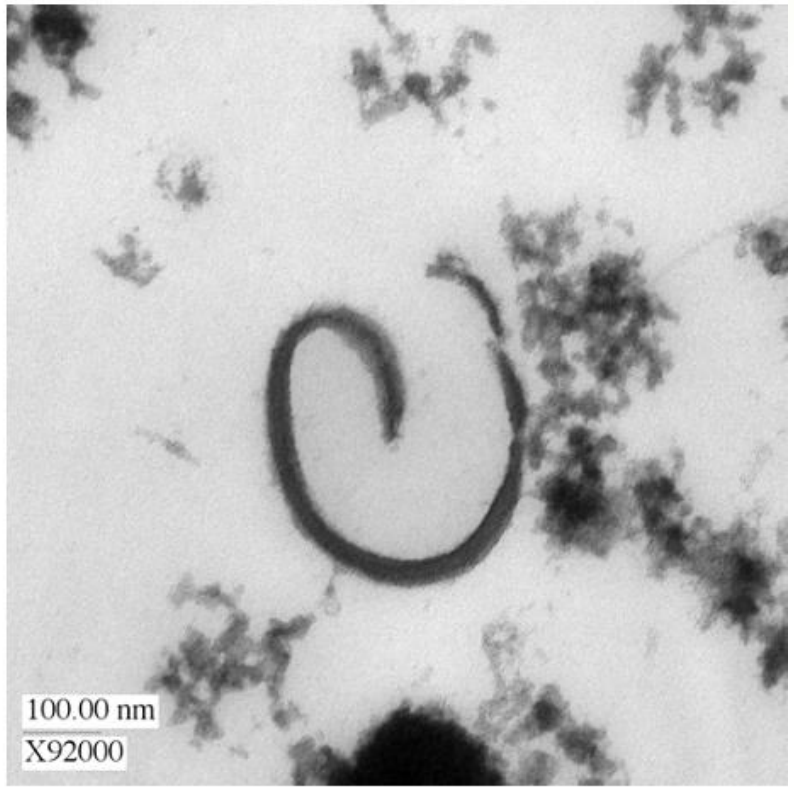


Initial Cell Fracturing (Lysing)



Cell Fragments



Cell Wall Fragments
Micrograph of Cell Wall Fragment
Magnification 92,000 X

DEL-IMMUNE V®

Content: ***L.rhamnosus*** **DV (NRRLB-68023)** lysate lyophilized powder:

Protein 100mg/g;

DNA 118mg/g;

Muramyl Peptides 15.0-18.0 mg/g;
PH of 1% suspension 6.5-7.5;
Moisture (%), no more 5.0.

LD50 according to ISO 10993 >5000 mg/kg
Shelf-life: 3 years without refrigeration

Del-Immune V® is suitable for acute and chronic conditions such as colds and flu, sinusitis, bronchitis, irritable bowel syndrome, fatigue, fibromyalgia, allergies, skin infections (including fungal), hepatitis C.

Del-Immune V® can also provide adjunctive support for cancer patients on chemotherapy or radiotherapy

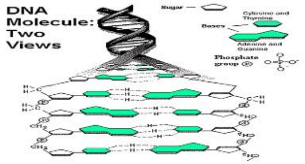
Del-Immune V® stimulates the synthesis of IFNs, TNF- alpha, IL-1,IL-12 and IL-10).

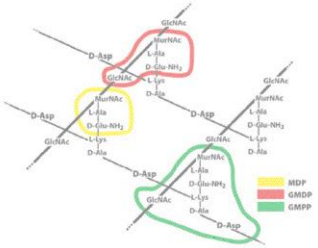
Del-Immune V® activates NK cells , T and B lymphocytes which fight bacteria and other invading pathogens and promotes phagocyte production.

2002

2012

2021





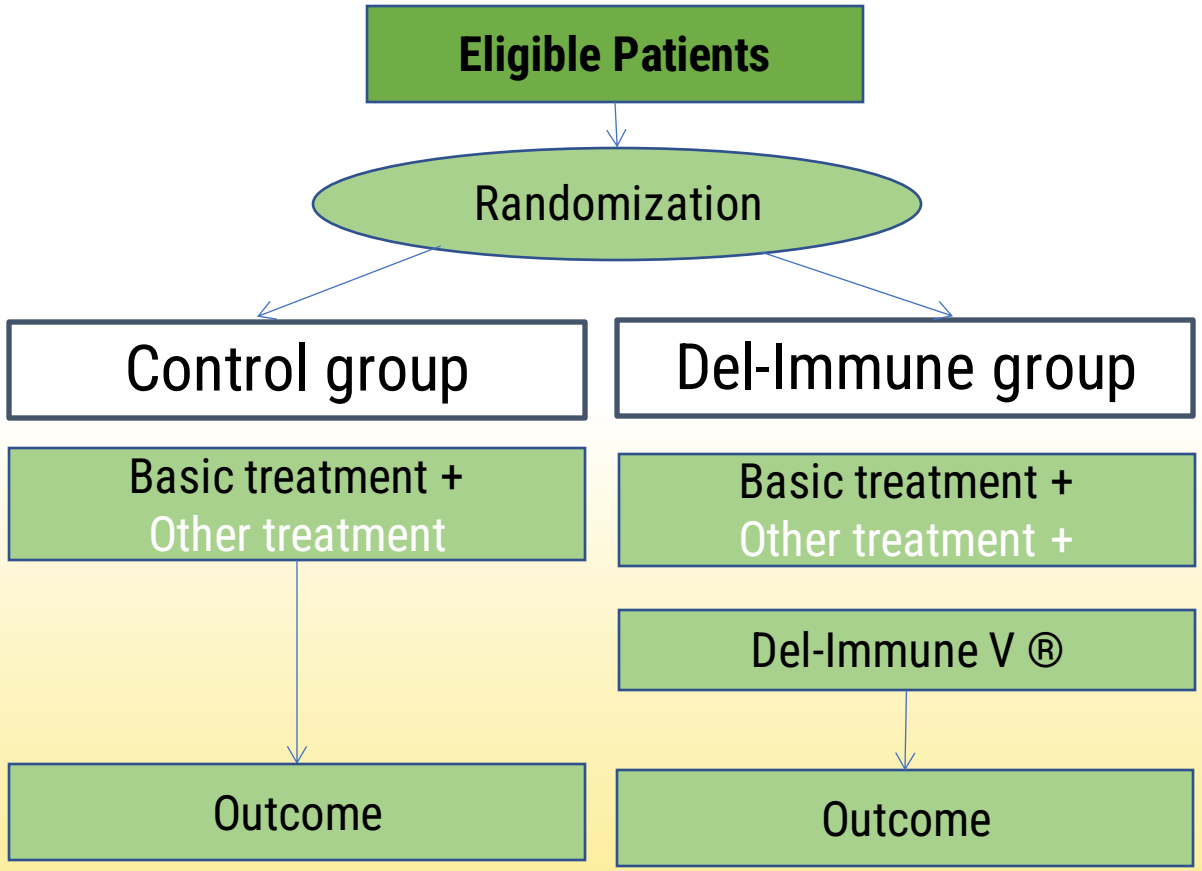
STUDY GOALS

- To evaluate the **safety and potential side effects** of the lysate of Lactobacillus rhamnosus V, (Del-Immune V®) in complex treatment of preschool-age **children with food allergy** and bronchial asthma
- To determine the **effectiveness** of the lysate of Lactobacillus rhamnosus V, (Del-Immune V®) in complex treatment of preschool-age **children with food allergy and bronchial asthma**

Randomized Controlled Clinical Trial Design For Patients With Food Allergy

Evaluation of treatment effect:

1. Determination of the severity and frequency of clinical symptoms;
2. Determination of eosinophil cationic protein (ECP) in sera;
3. Determination of IgA in saliva;
4. Determination of the gut colonization by Bifidobacteria, Lactobacillus ;



TREATMENTS FOR STUDY

Basic treatment

Food allergens elimination diet – 2 months;
Leukotriene receptor antagonist - SINGULAIR® (Montelukast), 3 months;
Histamine-1 receptor antagonist - ALERZIN® (Levocetirizine), 2 weeks;
Digestive enzymes - CREON® (pancrelipase), 2 weeks.

Other treatment

Inhaled corticosteroids for treatment severe and moderate asthma - PULMICORT® (budesonide), 1 month;
Topical corticosteroids for treatment atopic eczema - ELOCOM® (mometasone furoate), 1 week;
Diarrhea - SMECTA®, 1 week

Del-Immune V ® treatment

Paraprobiotic – Del-Immune V® 1 caps per day , 2 months

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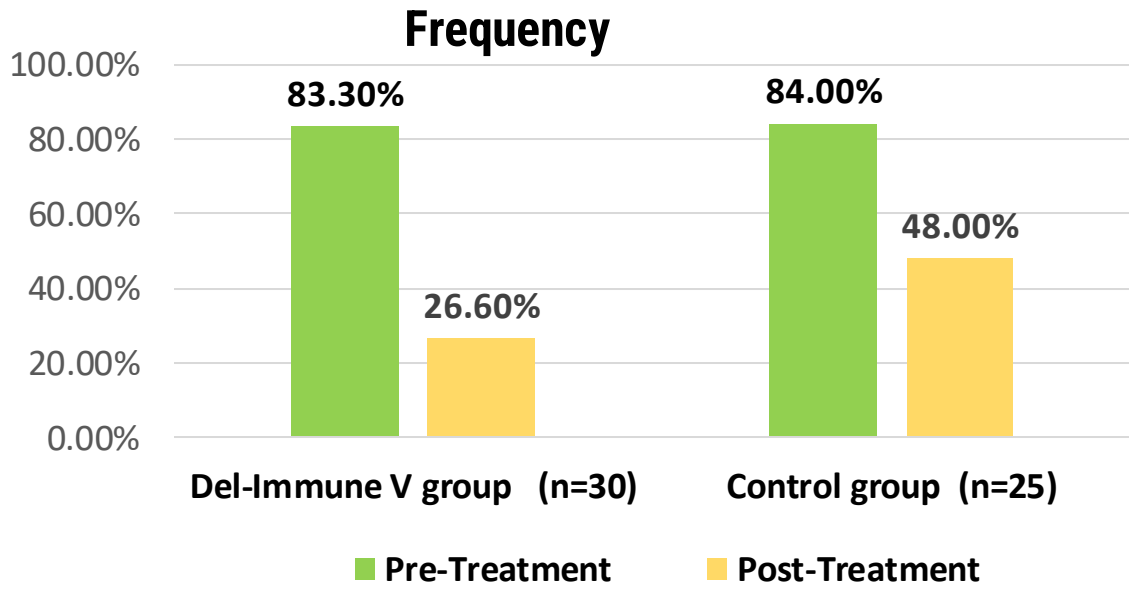
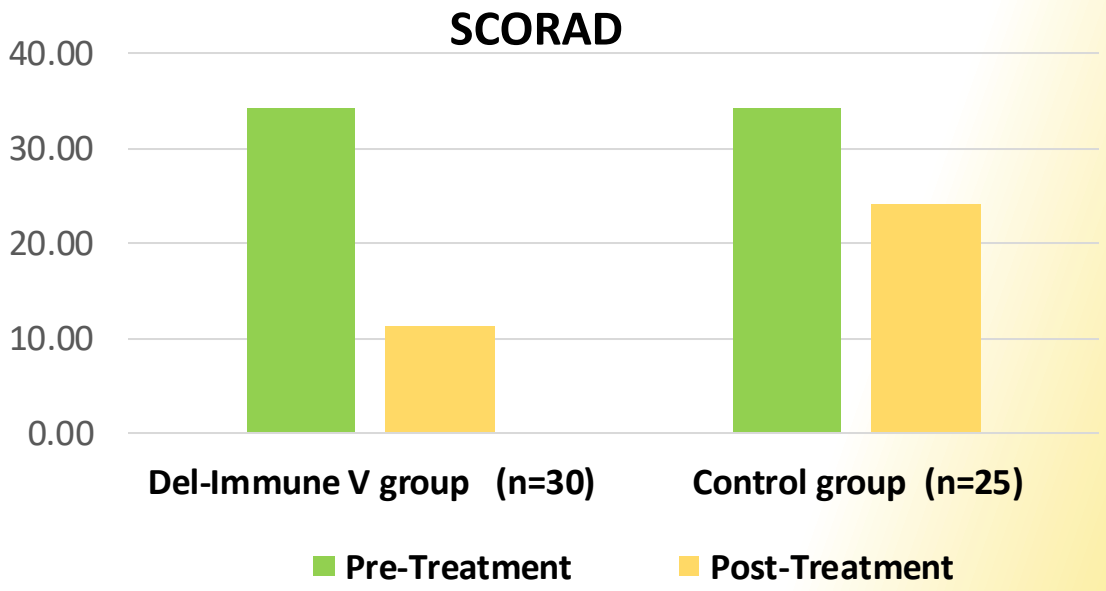
COMMITTED TO SCIENCE

PATIENT CHARACTERISTICS

Characteristics	Del-Immune group (n=30)	Control group (n=25)
Age, years	3.8±0.6 (2-6)	3.6±0.7 (2-6)
Symptoms: Gastrointestinal disturbances	16.7% (5)	16 % (4)
Atopic dermatitis	20% (6)	20% (5)
Asthma + Atopic dermatitis	10% (3)	12% (3)
Gastrointestinal disturbances + Atopic dermatitis	46.7%(14)	44% (11)
Gastrointestinal disturbances + Asthma + Atopic dermatitis	6.7% (2)	8% (2)
Serum total IgE concentration	more than 45 IU/ml	more than 45 IU/ml
IgE antibody to the specific food (cow milk, egg, wheat, rice and buckwheat)	100% (30)	100% (25)
Gut dysbiosis - mild	33.3% (10)	18% (3)
moderate	46.7% (14)	44% (11)
severe	20% (6)	44% (11)

The Treatment Effect On Frequency And Severity Of Atopic Dermatitis In Preschool-age Children

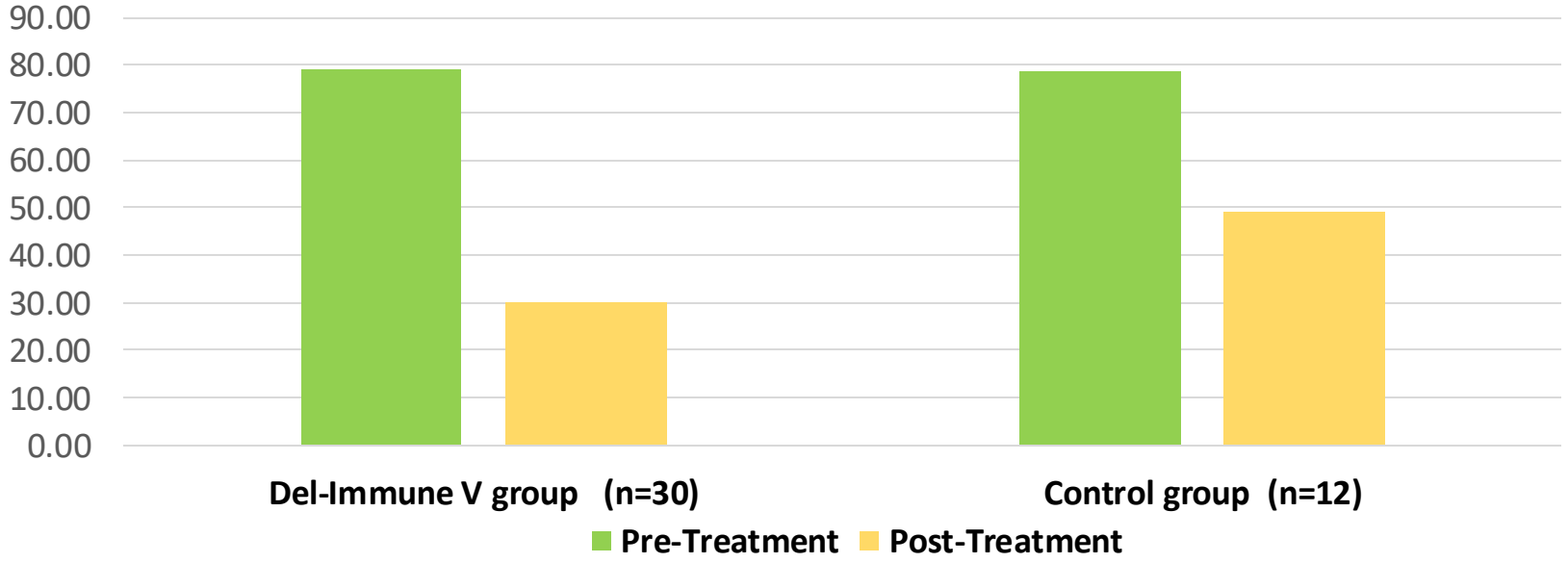




Index	Del-Immune V group (n=30)		Control group (n=25)	
	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Frequency,% (number)	83.3% (25)	26.6% (8)	84% (21)	48% (12)
Severity, average score (SCORAD) ± SE	32±2.3	10±1.2*	32±2.3	22±2.1*^

* - denotes a significant ($p < 0.05$) difference from the pre-treatment in the same group;
^ - denotes a significant ($p < 0.05$) difference Del-Immune from the control group

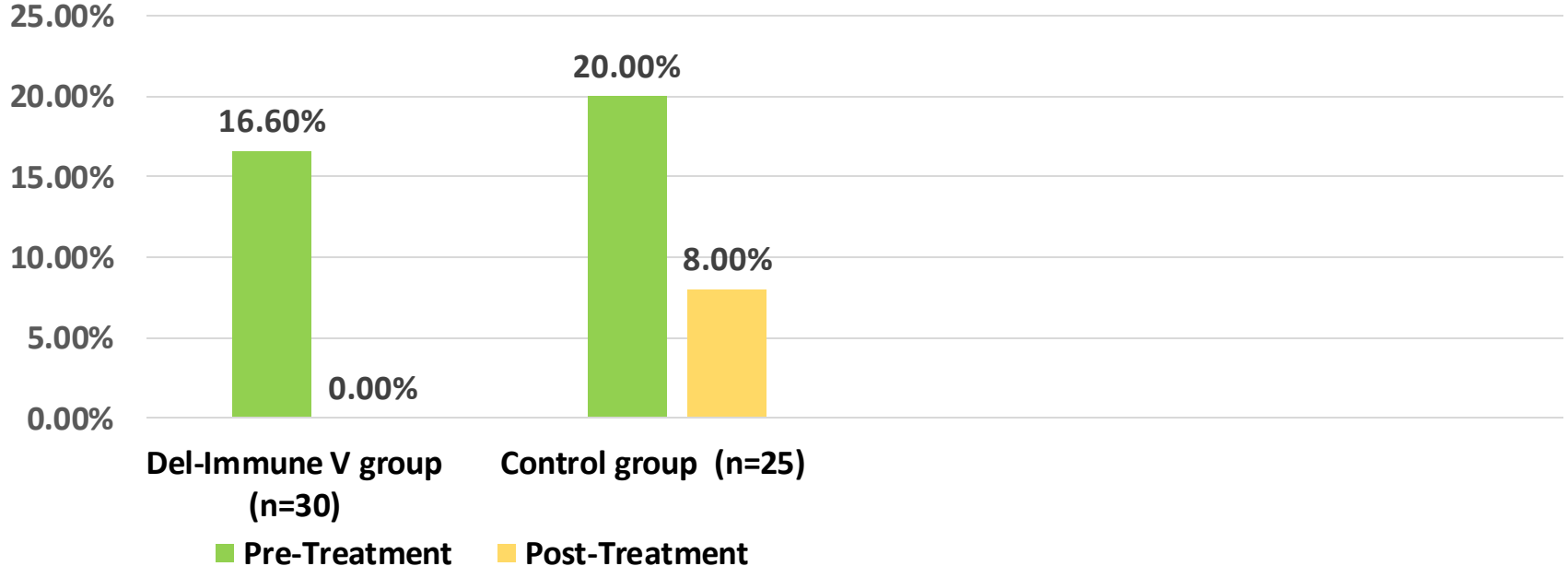
Eosinophil Cationic Protein (ECP) In Sera Of Preschool-age Children With Food Allergy Before And After Treatment



	Del-Immune V group (n=30)		Control group (n=12)	
	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Eosinophil cationic protein (ECP), ng/mL	**78,4±0,6**	**28,6±1,5***	**78,3±0,4**	**46,2±2,8*^**

* - denotes a significant ($p < 0.05$) difference from the pre-treatment in the same group;
^ - denotes a significant ($p < 0.05$) difference Del-Immune from the control group

The Treatment Effect On Frequency Of Asthma Attack



	Del-Immune V group (n=30)		Control group (n=25)	
	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Number of children with asthma	16.6%(5)	0	20%(5)	8%(2)
Frequency of asthma attacks during 2 months per children with asthma	9	0	8	6^

Level Of Iga In Saliva Of Preschool-age Children With Food Allergy Before And After Treatment

Index	Del-Immune V group (n=30)		Control group (n=25)	
	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
IgA, mg/L	**94,6±1,1**	236,2±5,3*	91,3±1,0	148,8±5,1* ^

The treatment effect on frequency and severity of acute respiratory infection preschool-age children during treatment

Index	Del-Immune V group (n=30)	Control group (n=25)
Number of cases	2.3±0.32	4.3±0.54^
The period of sickness, days	4.1±0.15	9.2±0.51^

The Frequency Of Food Allergy Gastrointestinal Symptoms In Preschool-age Children Before And After Treatment

STELLAR BIOTICS
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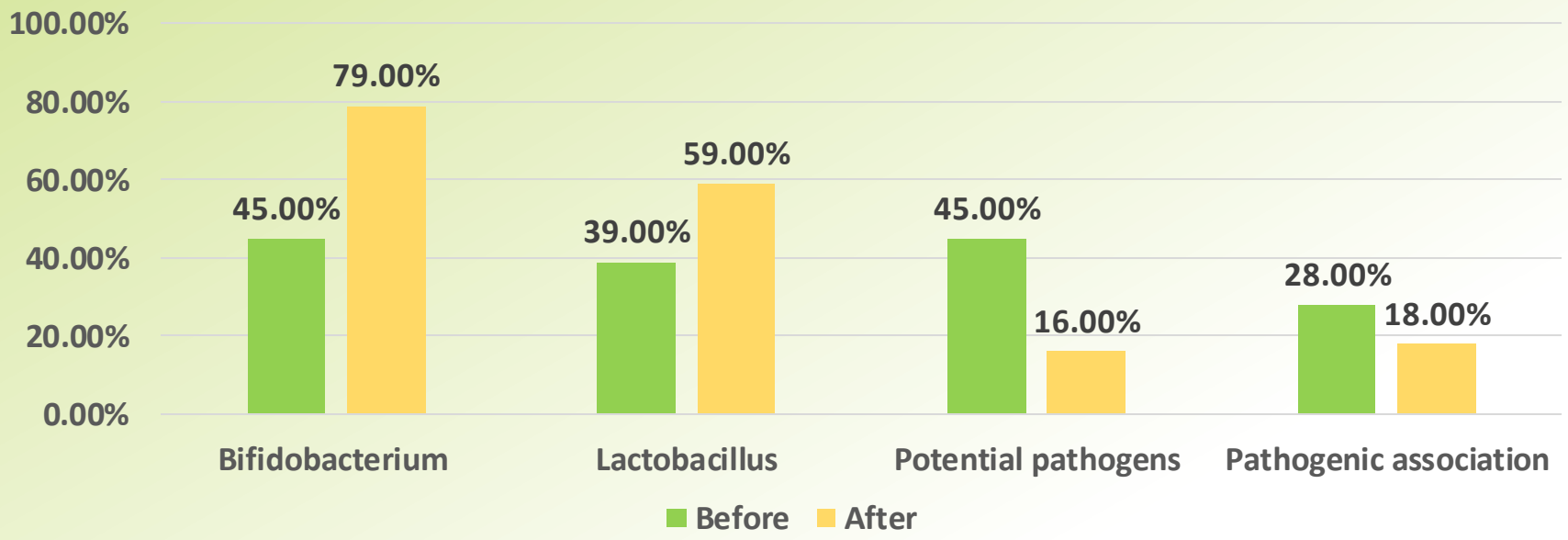
Symptoms	Del-Immune V group (n=30)		Control group (n=25)	
	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
Dis-pepsia	**70%(21)**	**16.7%(5)**	**68%(17)**	**40%(10)^**
Abdominal pain	60%(18)	20%(5)	60%(15)	20%(5)
Vomiting	16.7%(5)	3.3%(1)	16%(4)	0
Feeling uncomfortably full after eating (Flatulence)	46.7%(14)	20%(5)	32%(8)	16%(4)
Loss of appetite	40%(12)	13.3%(4)	44%(11)	12%(3)
Diarrhea	**36.6%(11)**	**6.6%(2)**	**32%(8)**	**16%(4)**
Constipación	13.3%(4)	3.3%(1)	12%(3)	4%(1)
Diarrhea /Constipacion	13.3%(4)	6.6%(2)	16%(4)	4%(1)

Intestinal Microbiota Profile In del-IMMUNE V Group



	Del-Immune V group	
	Pre-Treatment	Post-Treatment
Bifidobacterium	45%	79%
Lactobacillus	39%	59%
Potential pathogens	45%	16%
Pathogenic association	28%	18%

Clinical Results For Food Allergy Treatment With Del-immune V Inclusion

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- Del-Immune V in children aged 2 to 6 years within 2 months V was an effective and safe when used as a part of comprehensive therapy;
- There were no intolerance, any allergic or other adverse reaction;
- Significant reduction in the frequency and severity of gastrointestinal, skin and respiratory syndromes;
- SCORAD index reduced from 32 points to 10 points;
- Concentrations of sIgA increased by 251% versus 163.5%;
- Concentration of serum Eosinophil Cationic Protein (ECP) was dropped on 63.5% versus 41.0%;
- Activation of endogenous immune protective factors, a 2-fold reduction in the frequency and the duration of ARVI episodes;
- Significant increase in Bifidobacteria and Lactobacilli counts and significant reduction of pathogens as Staphylococcus aureus, Candida spp., Citrobacter spp., Proteus spp., Klebsiella spp. and Enterobacter spp.

Randomized Controlled Clinical Trial Design For Patients With Bronchial Asthma

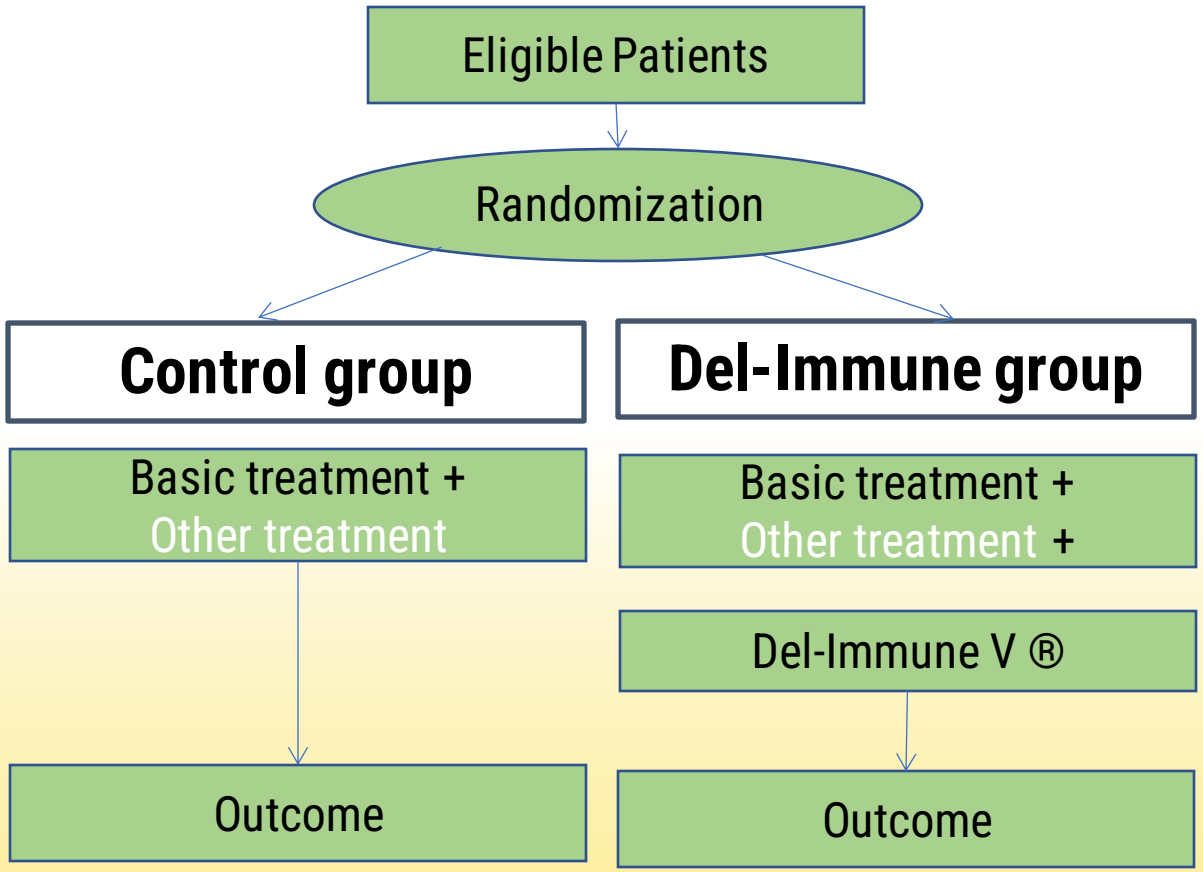
Evaluation of treatment effect:

1. Determination of the severity and frequency of clinical symptoms;

2. Determination of cysteine leukotriens in blood serum;

3. Determination of IgA in saliva;

4. Determination of IFN-gamma in blood serum



Clinical Characteristics Of Examined Children With BA

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Clinical -paraclinical Parameters	Del-Immune group (n = 25)	Control group (n =10)
Age, years	6,8 ± 1,5	7,6 ± 1,7
Boys (%)	11 (44,0)	5 (50,0)
Girls, (%)	14 (56,0)	5 (50,0)
Duration BA, years	2,8 ± 0,7	3,2 ± 1,1
Allergic rhinitis, n (%)	13(52,0)	4 (40,0)
Atopic dermatitis, n (%)	8 (32,0)	3 (30,0)

Etiologic Structure Of ARVI In Children With Exacerbation BA (%)

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Viral antigens	Del-Immune group (n = 25)	Control group (n =10)
Influenza	3(12,0)	1(10,0)
Parainfluenza	2 (8,0)	2 (20,0)
Rhinovirus	11(44,0)	3 (30,0)
MS-Virus	7 (28,0)	4 (40,0)
Adenovirus	2 (8,0)	0 (0,0)

Duration Of Clinical Syndromes, Number Of Days

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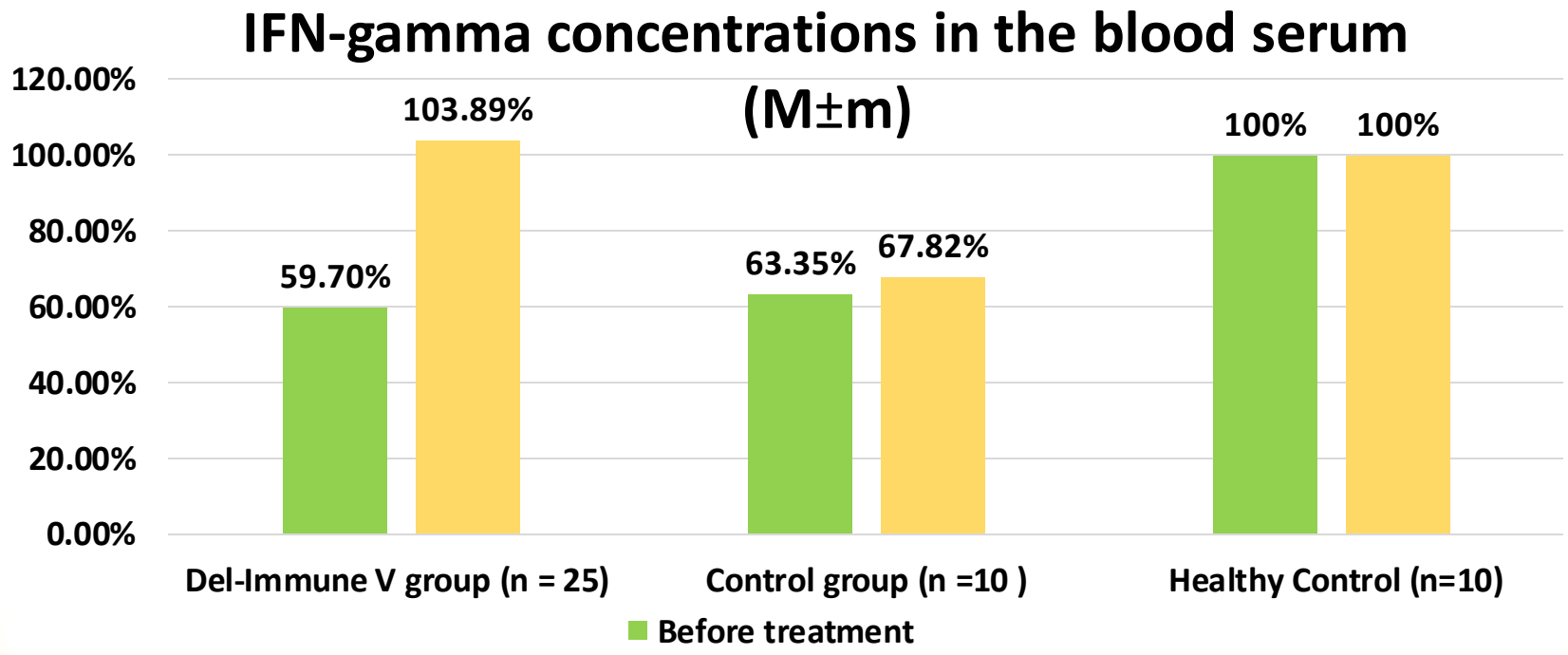
Clinical syndromes	Del-Immune V group (n = 25)	Control group (n =10)
Catarrhal	3,2±1,1	6,1±1,7
Intoxication	2,5±0,3	5,2±2,1
Temperature reaction	2,8±0,5	6,4±2,3
Bronchoobstructive	3,2±1,3*	7,2±1,4*

Note: *-difference is accurate in the main group and the comparison group, $p < 0.05$

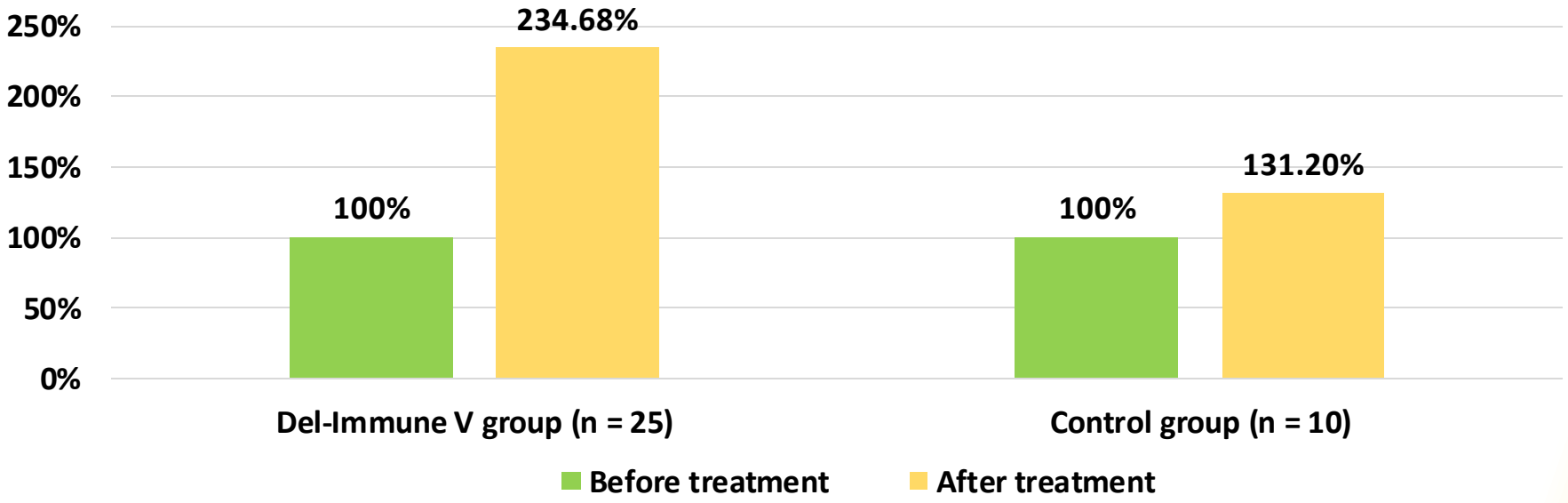
Ifn-gamma Concentrations In The Blood Serum (M±m)



Indicator	Healthy Control (n=10)	Del-Immune V group (n = 25)		Control group (n =10)	
		Before treatment	After treatment	Before treatment	After treatment
IFN-gamma, пg/ml	920,74±207,75^ 100%	549,73±119,05^ 59.7%	956,61±112,5* 103.89%	583,33±114,4^ 63.35%	624,52±112,8* 67.82 %

Note: *-the difference is credible in the main group and the comparison group after treatment, $p < 0.05$

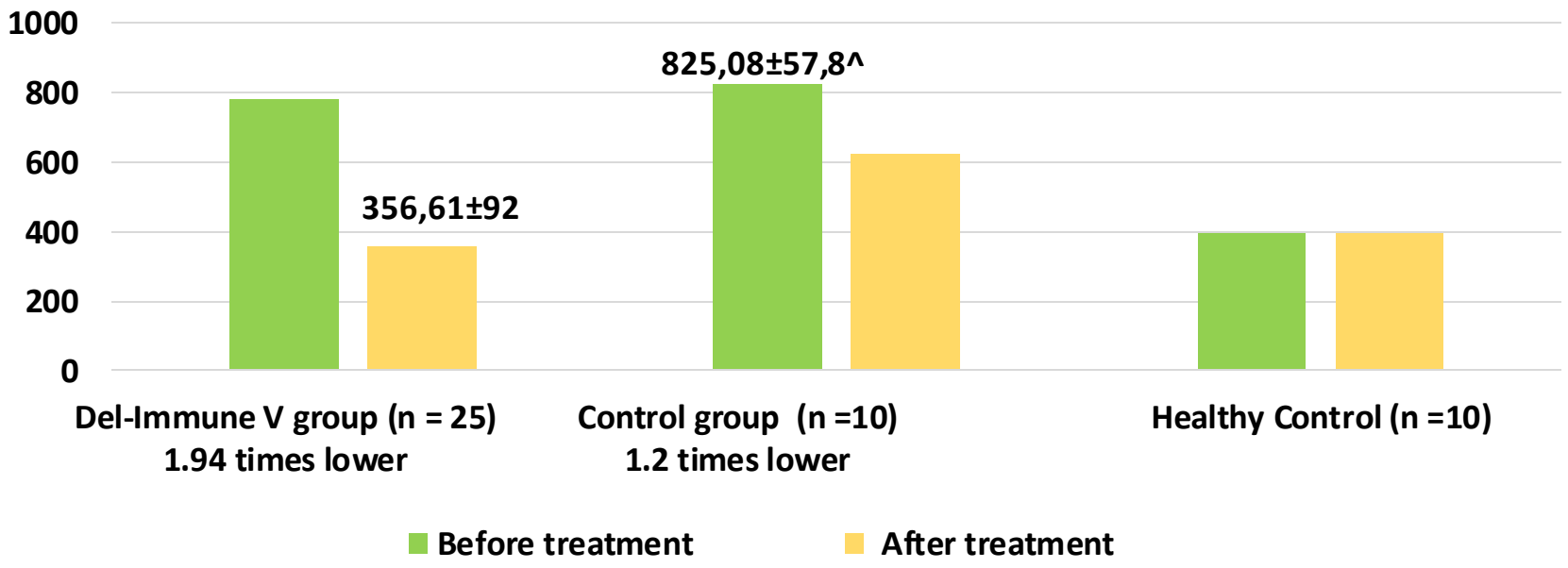
Concentrations Of The Secreted Iga In Patients' Saliva (M±m)



Indicator	Del-Immune V group (n = 25)		Control group (n = 10)	
	Before treatment	After treatment	Before treatment	After treatment
sIg A in saliva, мg/l	83,6±1,6 100%	196,2±5,3* 234.68%	75,3±1,8 100%	98,8±2,1* 131.2%

Note: *-the difference is credible in the main group and the comparison group after treatment, $p < 0.05$

Cysteine Leukotrienes Concentration In The Blood Serum (M±m)



Indicator	Healthy Control (n=10)	Del-Immune V group (n = 25)		Control group (n =10)	
		Before treatment	After treatment	Before treatment	After treatment
Cysteine leukotrienes пg/ml	396,7±47,3^	778,7±92,1^	356,61±92,5*	825,08±57,8^	624,52±112,8*

Clinical Results For Bronchial Asthma Treatment With Del-immune V Inclusion

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- Temperature normalized 2.5 times faster;
- Bronchitis symptoms were eliminated also twice as fast;
- The duration of the bronchial obstruction was almost two times shorter: 3.2 ±1.3 days versus 7.2 ±1.4 days;
- Use of β2-agonists in symptomatic patients significantly decreased with shortened the period of acute asthma exacerbation;
- Del-Immune V® prevented the development of secondary bacterial complications - no patient needed treatment with antibiotic medication;
- The concentration of IFN-γ increased on 22% versus 11% in control;
- The salivary immunoglobulin A (sIgA) concentration increased up to 198.65% vs.144.26%;
- Subjects taking Del-Immune V® had a 2.6-fold reduction in blood serum cysteine leukotrienes versus 1.4-fold reduction;
- Symptomatic patients were followed for an additional two months and children who took Del-Immune V® demonstrated no worsening of the underlying disease symptoms; four children in the comparison group had symptoms of acute respiratory viral infections during the same time.

BLASTEN (LIASTEN) UKRAINE FROM 1997
Penta-peptidoglycan of *L. delbrueckii* (95%)

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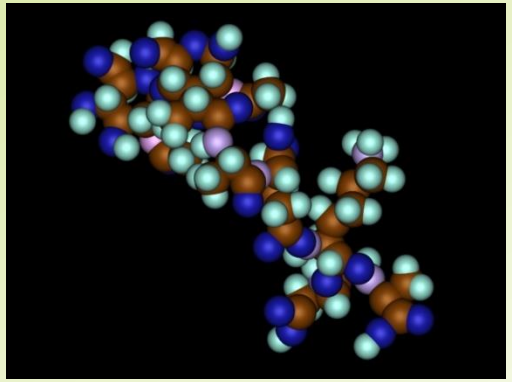
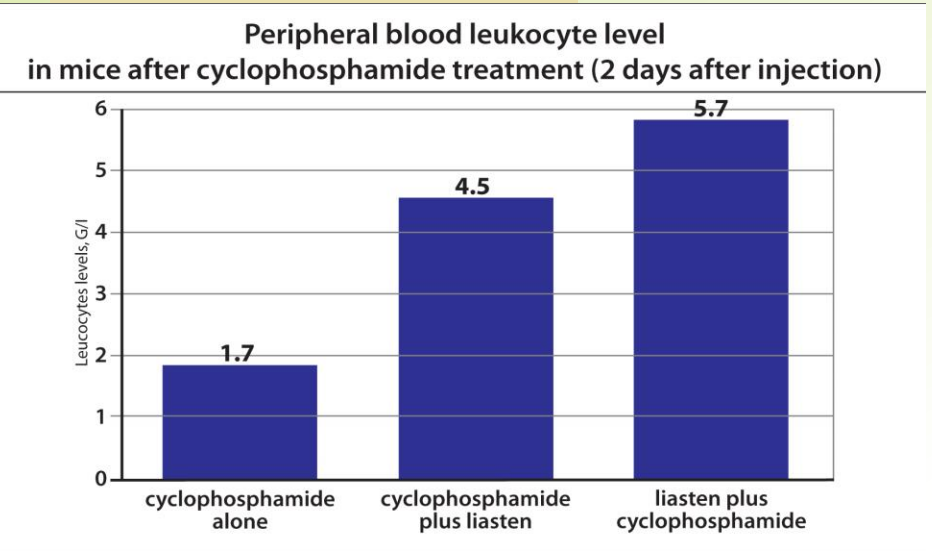
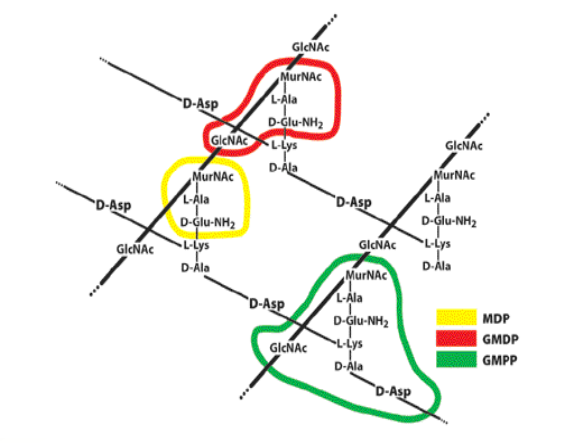
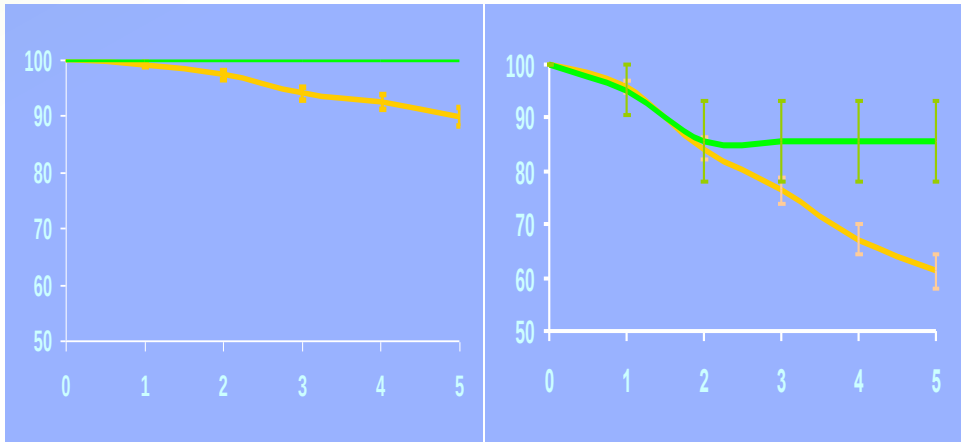


- Significantly increased T-lymphocytes, leucocytes, IgA, Ig G,
- Increased the therapeutic efficacy of cyclophosphamide, protected from leukemia
- Inhibited of the tumor growth and metastasis
- Has immune modulating and anti-radiation properties
- Increase effectiveness of anti-bacterial, anti-viral and anti-inflammatory therapy
- Favorably effected the cell content of peripheral blood
- Increased production of IL-1, IL 2, TNF , NK cells
- Increased the activities of NK cells and phagocytosis







The 5-year overall survival and disease-free survival rate in the groups beast cancer patients that received complex treatment with neo-adjuvant therapy – blasten , – control group

PROBIOTIC LYSATES FOR FUTURE BIOTHERAPEUTICS CONCLUSIONS, RECOMMENDATIONS & FUTURE DIRECTIONS

STELLAR BIOTICS
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- Clinical results of two open trials with pediatric patients demonstrated safety, therapeutic potency and bifidogenic activity of Del-Immune V- a representative of a new bio-therapeutic substances, contains lysate of selected probiotic strain L. rhamnosus V.
- An intense activation of endogenous immune protective factors that significantly increased treatment efficacy were observed.
- Del-Immune V® could be recommend as a part of an integrated therapy for children with gastrointestinal, respiratory and skin manifestations associated with food allergy and for potential prevention and treatment of acute respiratory viral infections and bronchial asthma.
- Probiotic lysates are a new type of bio-therapeutics based on probiotic cell fragments that acting as Microbial Associated Molecular Patterns, could be a new future opportunity unleashed the healing power of Probiotics as a potent and safety tools for health management

ADVANTAGES OF USING PROBIOTIC LYSATE AND THEIR DERIVATIVES METABIOTICS AND POSTBIOTICS

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- Non-toxic, LD50>5000-10000mg/kg, no contradictions, heat resistance, Shelf Life >3 years
- Strain's specific lysate compositions with distinct structure and expected results
- Works via Immune Cell's Receptors directly
- Immune Modulation - Immune Balance
- Anti-inflammation effect
- Anti-mutagenic effect
- Anti-tumor properties
- Anti-radiation benefits
- Anti-viral and anti-bacterial activity
- Anti-toxic effect (drugs, pollutions….)
- Bifidogenic activity
- High level pre-clinical & clinical data , low dose:2-20-50mg
- Possible to use in different final product forms, including nano-technology (in creams, liquids, gels, gummies, powder forms for a functional food, supplements, drugs, cosmetics, pets…)

LYTIC ENZYMES

FINDINGS *IN VITRO* & *IN VIVO* and Clinical ACTIVITIES FOR Lysates of *L. DELBRUECKII 86, L. DELBRUECKII LE, L. RHAMNOSUS LB3, L. RHAMNOSUS DV* & purified cell fragments –potential future Bio-Therapeutics

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- Enhance macrophages activity and increase/regulate spontaneous production of major cytokines –IFNs, TNF, ILs, NK cells, IGs and specific antibodies.
- Mediate cellular anti-inflammation responses inducing secretion of anti-inflammatory IL-10. Significant role in formation anti-inflammation activity play sequences of probiotic DNA also known as CpG motifs. They provide immune activation Th1 adjuvant activity
- Probiotic lysates increase effectiveness of complex anti-viral and anti- bacterial, anti-fungal and anti-inflammatory therapy, protect against chemical and radiation exposure, chemotherapy, antibiotic therapy, and increase vaccination efficacy, decrease side effects of harsh medical treatments
- Activation of the liver macrophage cells and enzymes, stimulation of the regeneration of the liver cells and mucus epithelial cells of the stomach and the small intestine.
- Complete normalization of the liver detoxification function, suppressed protoxidic lipid oxidation
- Interaction with cytochrome P-450 & changing cell bioenergetics and being directly built into membrane structure of new cells,
- Increase contents of P-450 in the microsomal fraction of the rat liver to normal
- Renewed protein and glycogen synthesis
- Reduced membranes permeability disorder, normalized enzymes activity in the chronic hepatitis condition
- Absorption and elimination carcinogens and some heavy metals molecules
- Improvement of the blood micro-circulation
- Stimulation of blood formation of aggregations by 30-70%, especially white cells
- Bone marrow cell defense via TNF alpha, IL-1, IL-6
- Treatment of Chronic Bronchitis showed significantly increased T-lymphocytes, IgA and IgG, decreased B-lymphocytes and IgM as a result of the Cell immunity activation and beginning of immune rehabilitation, normalization of Humoral immunity, decreasing duration of antibiotic therapy and number of complications during next 3 months
- Stimulates the process of reverse development of experimental cholesterol atherosclerosis in rabbit
- Local immune system stimulation , balancing immune state of the skin, stimulation of the microcirculation in the skin capillary,
- To accelerate epithelization, treat chronic diffuse streptodermatitis,
- Anti-mutagenic activities against environment impacts (chemical pollutions, radiation, including sun, food allergy etc.
- Skin cells regeneration, increase mitochondria activity, stimulation tissue growth (collagen) , acceleration recovery of tissue damage (sun, chemicals, infection).
- Bifidogenic activities- positive impact on the Microbiota profile, increasing quantity of Lactobacillus & Bifidobacteria
- Significant reduction on the colonization of pathogens

AREAS FOR PROBIOTIC LYSATES AND THEIR DERIVATIVES – METABIOTICS AND POSTBIOTICS USE

STELLAR BIOTICS
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- Immune Disorders & Dysfunctions
- Viral & bacterial infections
- Radio & Chemotherapy Treatments
- Antibiotic Treatments
- Energy Maintenance & Mitochondrial disorders
- Cardio-Vascular diseases
- Neurological and mental disfunctions
- Chronic Inflammation states
- Allergy Syndromes
- Chronic Fatigue Syndrome
- Autism Syndrome
- Before and Post-Surgical States
- Digestive Health & Food intolerance
- Microbiome management
- Metabolic & Hormonal disfunctions

TAKE HOME MESSAGE

STELLAR BIOTICS
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- **Microbiota and Probiotic cells** are a highly dynamic microbial cells community and are under constant environmental pressure and structural changes – presented by live cells, dead cells and cell fragments & metabolites
- Bacterial cell surface macromolecules –metabiotics are the key factors in host – microbiota crosstalk
- **Microbiota and Probiotics are the MAMPs** suppliers and work as a biological response modifiers responsible for body health and homeostasis
- **Microbiota, Probiotics, and Probiotic Cell Fragments** are a natural scientifically proven way for preventative health care as well as a treatment, working with the causes of the health issues
- To take care of your **MICROBIOME** from your infancy
  Microbiota & Probiotics are the best human's friends
  Be kind to your 100,000,000,000,000 Friends!!!

OUR HISTORY

- Created by microbiologist, Dr. Liubov Sichel, and her husband, pharmacist, John Sichel, to bring all-natural, immune and gut health supplements to the U.S. market that are safe and effective for the entire family (humans and pets).
- Established in 2002, Stellar Biotics has been trusted worldwide for immune and gut health for two decades.
- Most widely known for del-IMMUNE V®, the leading metabiotic supplement backed by clinical research on
- We currently sell in over 72+ countries and have presence in North America, Europe, Australia, and New Zealand.

STELLAR BIOTICS
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2002-2022
20 YEARS

WE SELL WORLDWIDE

STELLAR BIOTICS
COMMITTED TO SCIENCE

United States
United Kingdom
Thailand
Taiwan
Switzerland
Sweden
Spain
South Africa
Slovakia
Singapore
Poland
Pakistan
New Zealand
Netherlands
Mexico
Malaysia
Kyrgyzstan
Kenya
Japan
Italy
Israel
Ireland
Indonesia
Hong Kong
Greece
Germany
France
Finland
Denmark
Czech Republic
China
Canada
Burkina Faso
Bulgaria
Brazil
Bangladesh
Australia

Fiji Monaco Romania Austria Philippines Hungary Tunisia Norway Morocco Czech Republic Luxembourg Saudi Arabia Saint Lucia Papua New Guinea United Arab Emirates Slovenia French Southern Territories Malta Uruguay Maldives Gibraltar Croatia Costa Rica Ukraine Cyprus Sri Lanka Zambia Bangladesh Georgia Lebanon Kazakhstan

STELLAR BIOTICS
COMMITTED TO SCIENCE

OUR TEAM

DR. LIUBOV SICHEL

WILLIAM FARREL

MONICA RUBIO

NICHOLAS CASERMA

BARBARA EARL

CORINNE DUFFY

NEASJAH WHITE

CATHY SGARELLA

OUR MISSION

At Stellar Biotics, Wellness is Our Full-time Job

We put our love, sweat and years (20 years, to be exact) into thoughtfully developing a line of the finest all-natural immune supplements that are proven safe and effective, and made to provide you with the support you need every single day. We believe wellness should be rooted in science, and that's why it informs everything we do.

We also believe that wellness is about more than taking care of yourself; it's also about taking care of others. That's why we pride ourselves on being transparent, responsible and accountable to you, our communities and the planet.

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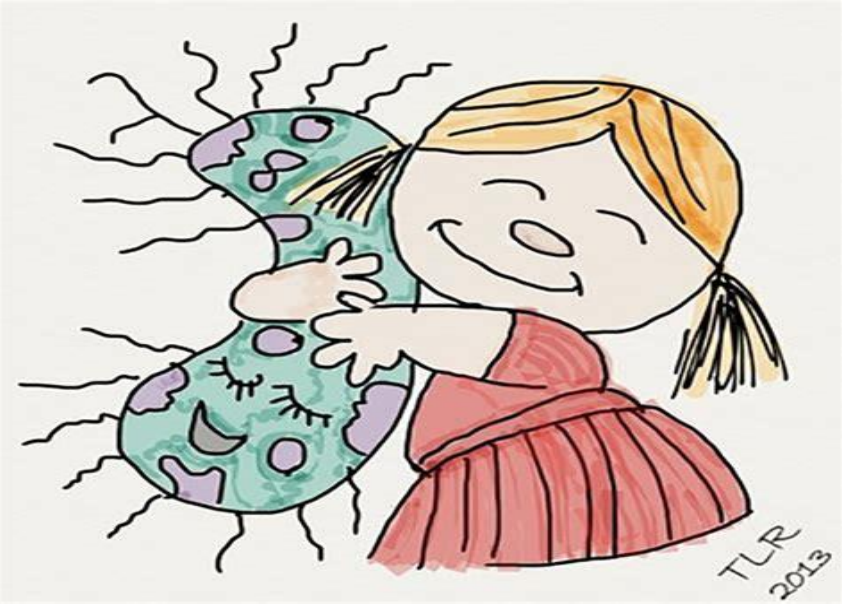

THANK YOU

Feel free to reach out anytime! We're here to help.

FOR SCIENTIFIC INQUIRIES
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