NUTRINED

COVID-19

Vaccine & innate immunity: it takes two to tango

Efficient vaccination requires innate immune response and gut microbial metabolites

The goal of vaccination is the ability to induce a durable production of protective pathogen-specific antibodies by plasma and memory B-cells. Vaccines will therefore programme the adaptive immune system.

However, if we want to put our best foot forward in the battle against COVID-19, it will be a good idea to also invite more partners to the dance: **we will also consider how to support the innate immune response** (as recent discoveries have revealed its function in vaccination) **and optimize gut microbial metabolites.**

Just as the fight against COVID-19 hinges on our two immune systems, Nutrined will put the spotlight on two products to support immunity in vaccination.

After all, it does take two to tango!

Innate vs adaptive immune system

The immune system is divided into an innate and adaptive part, where both influence each other.

Innate immune system	Adaptive immune system
NK-cells, macrophages and dendritic cells	T-cells and B-cells
Primary reaction	Secondary reaction
Host defense during first day of infection	Requires several days for developing
Nonspecific – not trained immunity	Specific - trained immunity
Non-memory? > well, this turns out not to be entirely true	Memory

→ The adaptive characteristics of the innate immunity, enabling it to respond with an enhanced efficiency during a reinfection, are evident in vertebrates. **Memory Natural Killer Cells have recently been discovered**, the fast reaction in a reinfection.

Conclusion

Innate immunity expresses a memory function to diverse pathogens. The innate immune response has adaptive characteristics. The discovery of memory NK-cells has blurred the lines between innate and adaptive immunity.

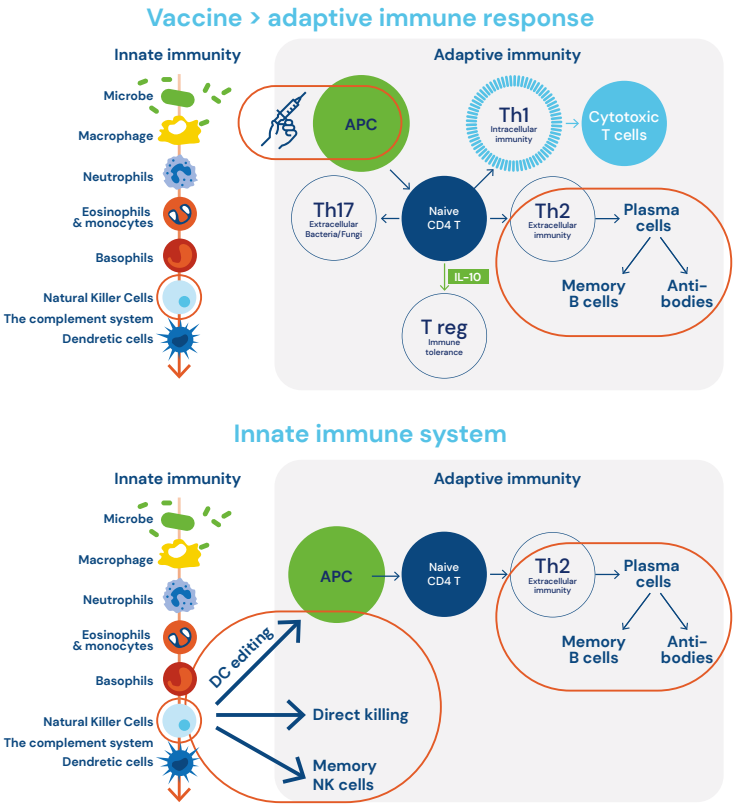
NK-cells appear to support the development of humoral immunity and can enhance the efficacy of next generation vaccines.

This conclusion was taken into account when vaccines were developped.

Alum, the most frequently used vaccine adjuvant, enhances the antigen persistence at the injection site and increases recruitment and activation of antigen presenting cells (APCs). Alum causes a stronger humoral and cellular immune response.

The vaccines used for COVID-19 do not contain any alum, Thiomersal, Th2 stimulating adjuvants or APC stimulating component.

Therefore, supportive measures to generate an efficient immune response with the vaccine are needed.



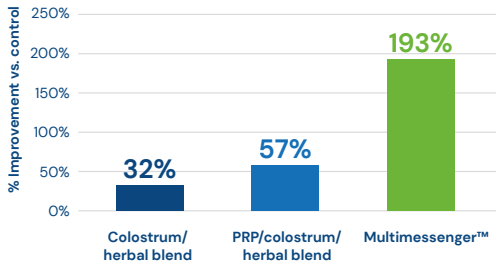
A bidirectional cooperation between innate and adaptive immune function is the basis of an efficient immune response.

1. Transfer Factors

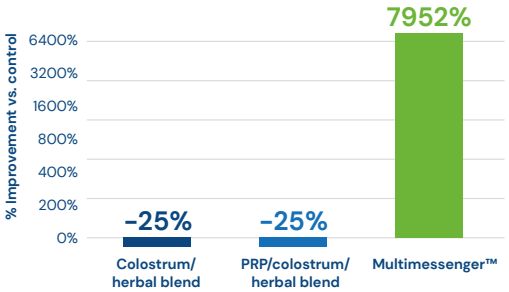
Small proteins with RNA (nucleotide material), made by activated T-helper cells or pure amino acid extracts of colostrum. As shown in the graph, Multimessenger will drastically **enhance innate immune system activation and immune modulation IL-10.**

Natural Killer Cell activation*

Innate immune system activation



Immune modulation IL-10**

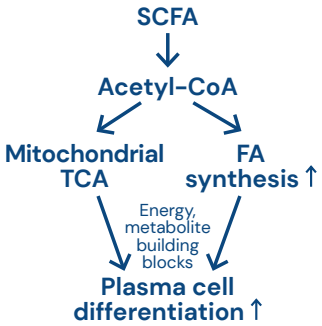


* % improvement in Mean Fluorescent Intensity for CD 69 Receptor on Natural Killer Cells. (CD69 is highly correlated with NK cell activity)
** % improvement In Mean Fluorescent Intensity for IL-10 on Peripheral Blood Mononuclear Cell Cultures (PBMC)

2. Short-chain fatty acids (SCFA)

SCFA support the integrity of the multi-layered intestinal membrane and the generation of regulatory T Cells.

SCFA support antibody response in vaccination: Scientific data establish a significant role of SCFA in regulating both mucosal and systemic antibody response. Mice with low SCFA are defective in antibody response, resulting in greater pathogen susceptibility.



Underlying mechanism responsible for SCFA in adapting our immune response:

1. Butyrate increases cellular metabolism in B Cells. B Cells utilize mitochondrial energy for B Cell differentiation and antibody production.

Mitochondrial levels of Acetyl-CoA in B Cells were significantly increased after administration Butyrate. Acetyl-CoA is used in the Krebs cycle to produce ATP. Butyrate increased the ratio ATP/ADP.

2. Butyrate and SCFA regulate expression of genes, all of which required for successful B Cell differentiation

General: Supportive measures in vaccination

Multimessenger

indication	Natural Killer Cell support Supports T reg
dosage	3 caps per day just before breakfast (acute: 2 x 3) Children aged 6 m - 2 yr: 1 capsule per day Children aged 2 yr - 6 yr: 2 capsules per day +6 years: 3 capsules per day
packaging	90 caps per container

composition (amount per 3 caps)		
	Colostrum (Transfer Factors - pure amino acid sequences)	500 mg
	West american Larch (Larix occidentalis)	333 mg
	Inositol	200 mg
	Beta Glucan	200 mg
	Green tea (Camelia sinensis)	200 mg
	Pomegranate tree (Punica granatum)	200 mg
	Astragale (Astragalus membraneus)	70 mg
	Shiitake (Lentinula edodes)	25 mg
	Dancing mushroom = Maitake (Grifola frondosa)	25 mg
	Zinc (as zinc citrate)	15 mg
	Selenium (as L-Selenomethionine)	70 µg

Please find our referenced version on the professional section of our website.

Butyflam Coated

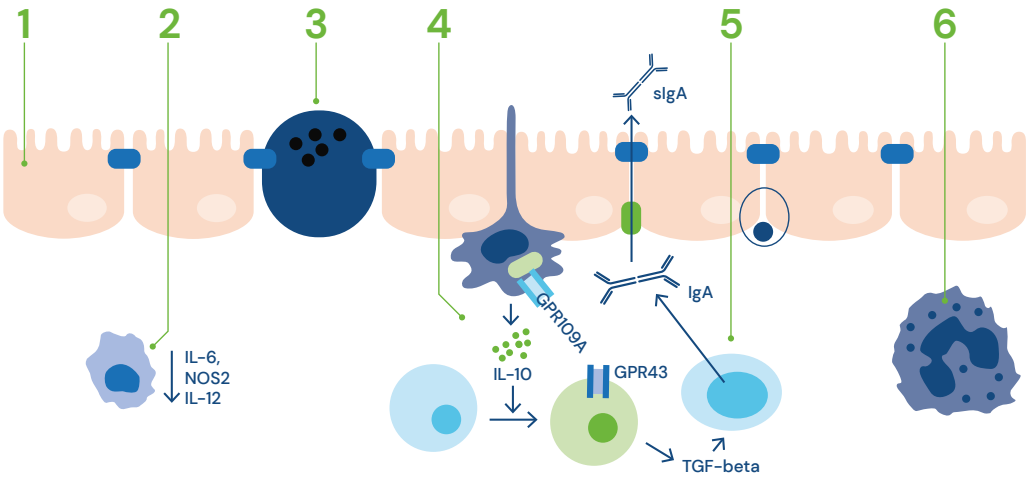
indication	Neuroinflammation Immune modulating (T reg + IL-10 anti-inflammation) Remodeling intestinal barrier function
dosage	3 x 2 caps per day
packaging	180 coated caps per container
composition (amount per 6 caps)	Butyrate - 3000 mg

Supportive treatment starts 1 month prior to the vaccination, until minimum 3 months after the vaccination

Short-chain fatty acids (SCFA)
more information

SCFA support antibody response in vaccination

Scientific data establish a significant role of SCFA in regulating both mucosal and systemic antibody response. Mice with low SCFA are defective in antibody response and result in greater pathogen susceptibility.



1. Fuel to renew **epithelial cells**
2. Macrophages **more tolerant towards commensal bacteria**
3. Goblet Cells release **more mucins**
4. Impact on dendritic cells, **more IL-10 & T regs**
5. B cells synthesize more **s IgAs**
6. Neutrophil **chemotaxis**

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