

IMMUNE ENHANCING PROPERTIES OF IMMULINA - A CONSISTENT AND STANDARDIZED EXTRACT



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Hygiene Hypothesis

Increased hygiene and a lack of exposure to various microorganisms may be affecting the immune systems of many populations - particularly in highly developed countries.

The result may be that individuals are losing their ability to fight off certain diseases because of lifestyle and environmental changes that have made us too "clean" for our own good.

In the past, exposure to microbes in the food we ate, the water we drank and the air we breathed may have given our immune systems the exercise it needed to stay healthy.

Swiss Chard stem	>1000
Red leaf lettuce	>1000
Carrot	>1000
Iceberg lettuce	>1000
Green bean	>1000
Spinach leaf	>1000
Celery stem	>1000
Swiss Chard leaf	>1000
Broccoli floret	NA
Cabbage leaf	NA
Tomato	NA
Green bell pepper	NA
Green pea	NA
White jasmine rice	NA
Red Potato	NA
Asparagus	NA
Butternut squash	NA
Yellow corn kernel	NA

Immulina	0.025
Amer. ginseng (<i>Panax quinquefolius</i>)	1.0
Black Walnut hulls (<i>Juglans nigra</i>)	1.0
Green Tea (<i>Camellia sinensis</i>)	1.0
<i>Parthenium integrifolium</i> root	1.0
Korean Ginseng root (<i>Panax ginseng</i>)	1.0
Alfalfa sprouts (<i>Medicago sativa</i>)	1.0
Ginger root (<i>Zingiber officinalis</i>)	1.0
<i>Echinacea angustifolia</i> leaf	1.0
<i>Echinacea purpurea</i> root	1.0
Goldenseal (<i>Hydrastis canadensis</i>)	2.7
Red Clover (<i>Trifolium pretense</i>)	3.0
<i>Parthenium integrifolium</i> leaf	3.2
Dandelion (<i>Taraxacum officinale</i>)	3.2
Black cohosh root (<i>Actea racemosa</i>)	3.2
Licorice root (<i>Glycyrrhiza glabra</i>)	3.5
Chamomile flower (<i>Matricaria recuita</i>)	4.0
Milk Thistle seeds (<i>S. marianum</i>)	4.4
<i>Echinacea pallida</i> root	5.0

In 2001 we published a paper describing an extract from Spirulina (Immulina) that was extremely potent in its ability to activate certain immune cells (monocytes/macrophages). These cells are part of our innate immune system, the first line of defense against invading pathogens.

Pugh N, Ross SA, ElSohly HN, ElSohly MA, Pasco DS.

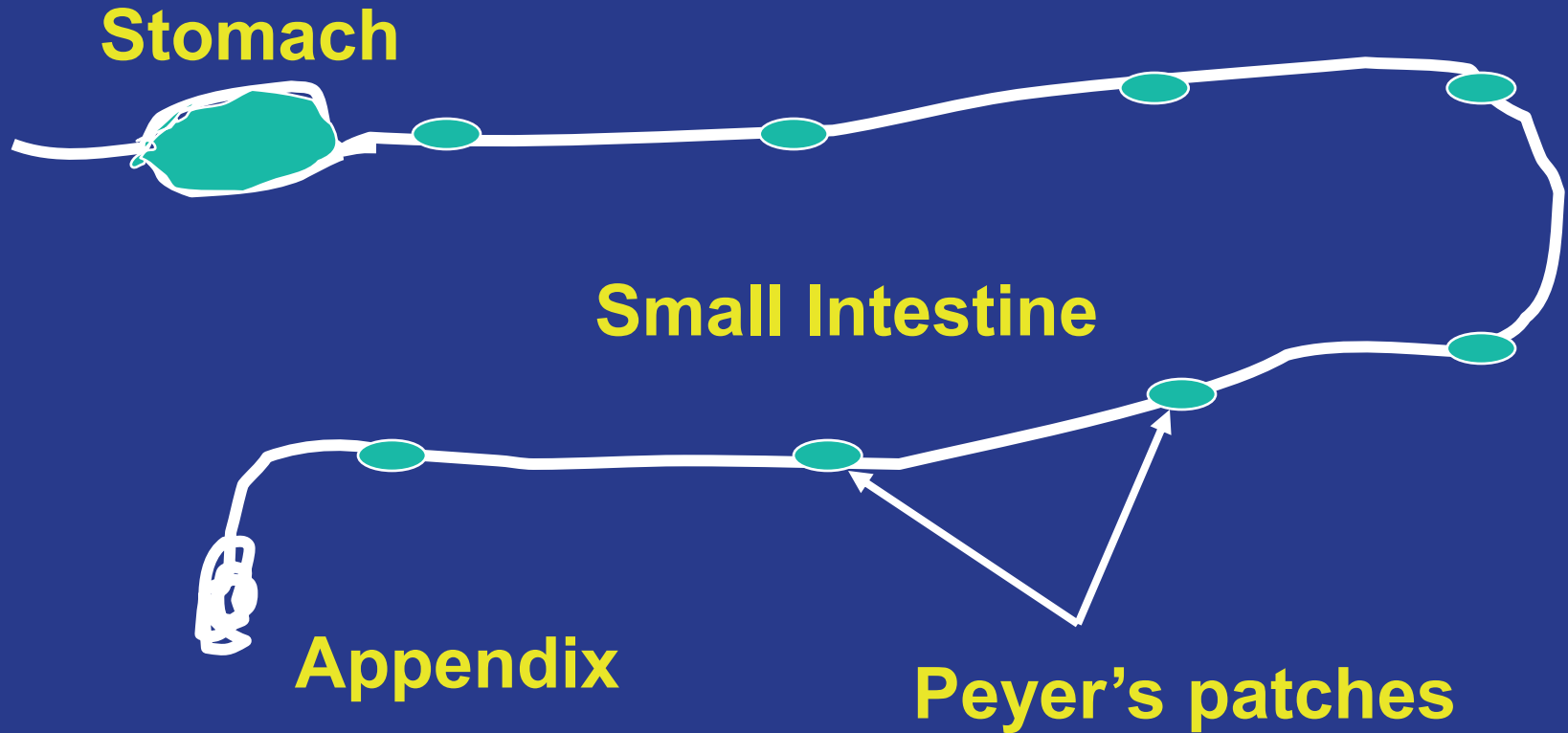
Planta Med. 2001 Nov;67(8):737-42.

Since then research in our laboratory has shown that the main active components in Immulina are detected by immune cells using the same receptors (sensors) used to detect bacteria, fungi and some viruses.

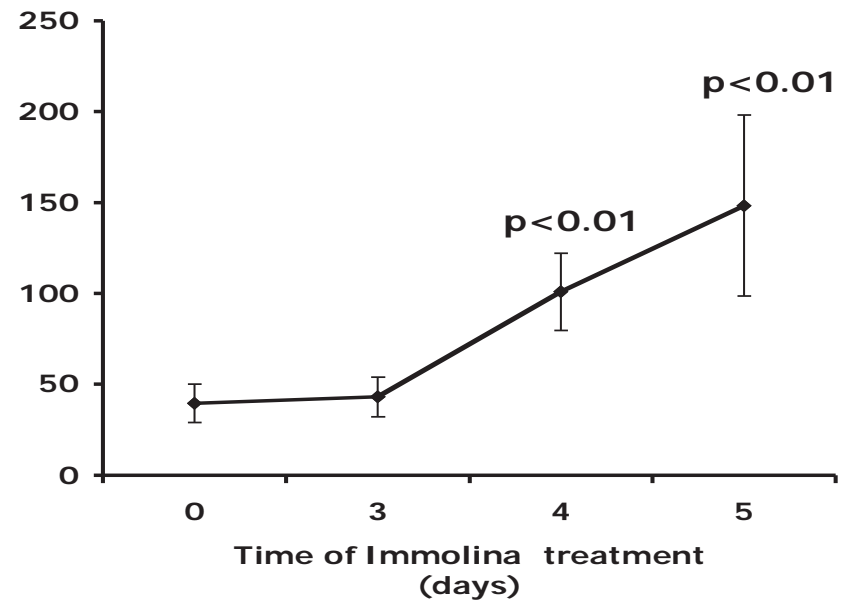
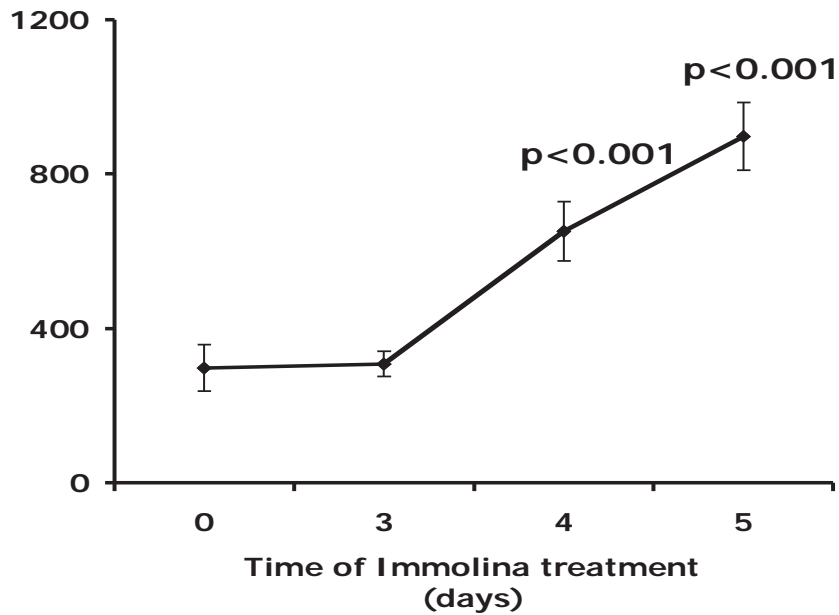
Our hypothesis is that daily consumption of Immulina may exercise our immune system in the same way that daily exposure of microbes did at a time before our present day “sterile environment”.

**STUDIES IN MICE INDICATED THAT ORAL
CONSUMPTION OF IMMULINA ENHANCED
CERTAIN ASPECTS OF IMMUNE FUNCTION**

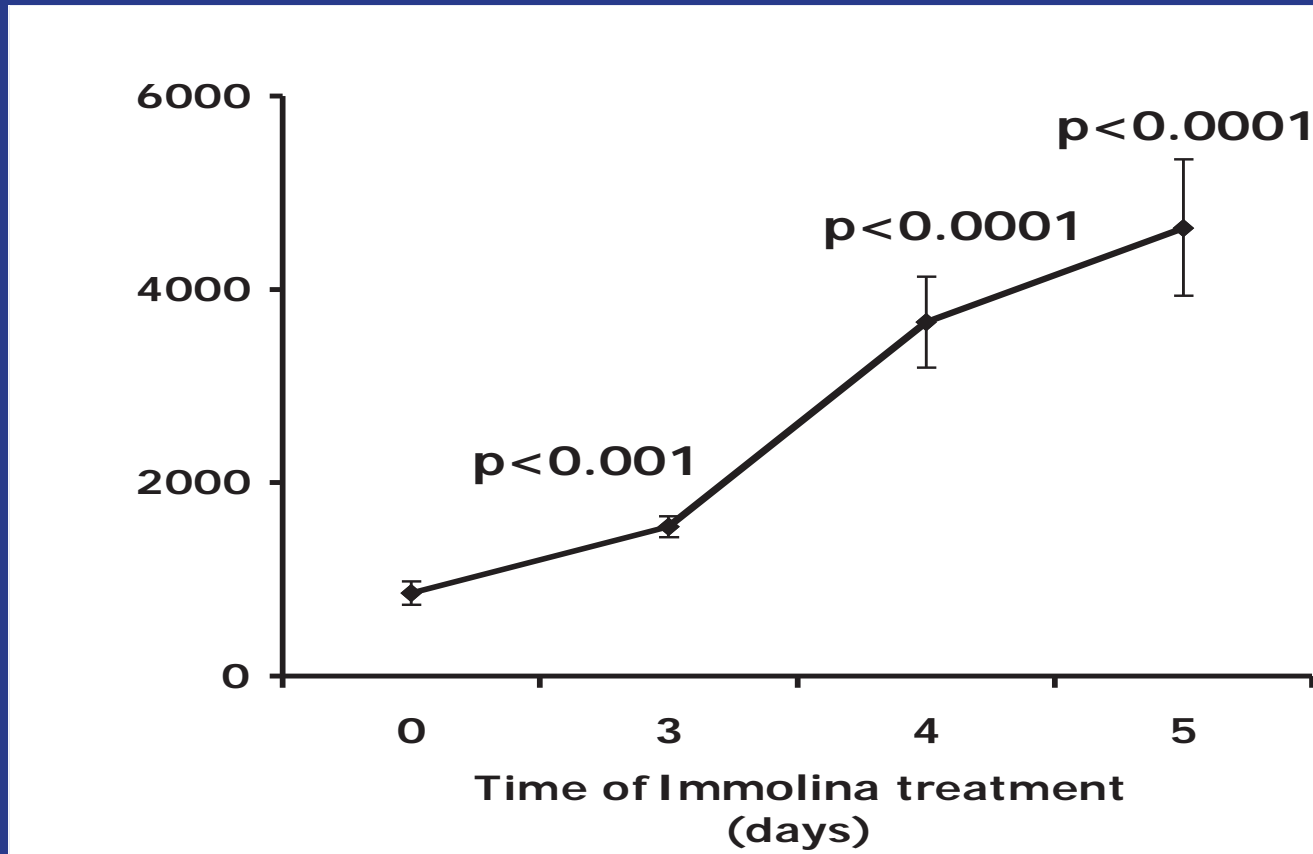
Mouse mucosal immune system relevant to oral ingestion.



MORE THAN THREE DAYS OF FEEDING ARE REQUIRED TO ENHANCE IgA AND 1L-6 PRODUCTION FROM PEYER'S PATCH CELLS



MORE THAN THREE DAYS OF FEEDING ARE REQUIRED TO ENHANCE INTERFERON-GAMMA (ANTI-VIRAL CYTOKINE) PRODUCTION FROM SPLEEN CELLS



PILOT CLINICAL STUDY WITH IMMULINA ON NORMAL VOLUNTEERS

Research design:

The pilot study was a simple pre-post treatment design. Ten normal healthy volunteers (included both men and women) within the age range of 22-57.

Subjects taking prescription medications, botanical or vitamin supplements of any kind, or consumed yogurt were excluded.

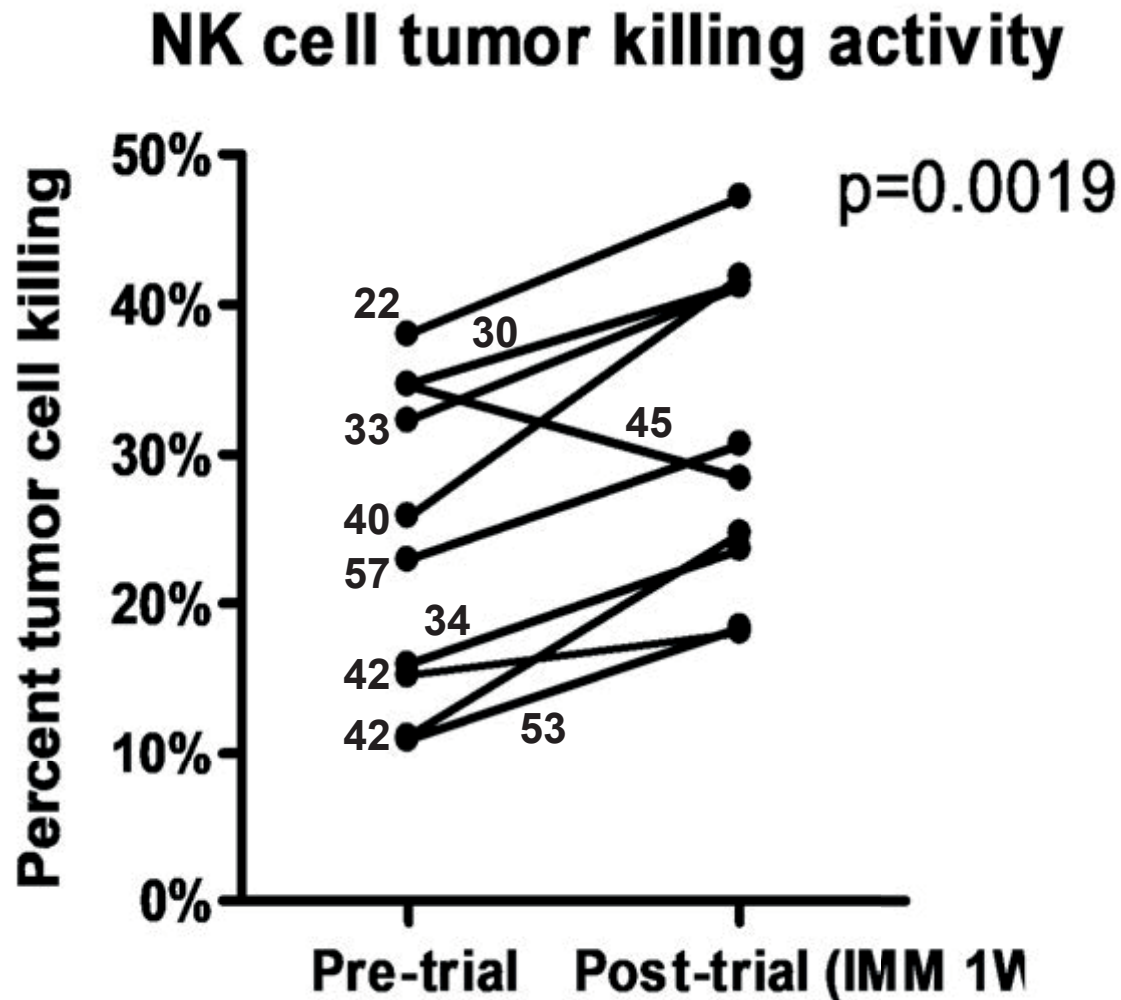
Immulina 2 times a day with meals in the form of capsules (200 mg per capsule) for the period of 7 days.

PILOT CLINICAL STUDY WITH IMMULINA ON NORMAL VOLUNTEERS

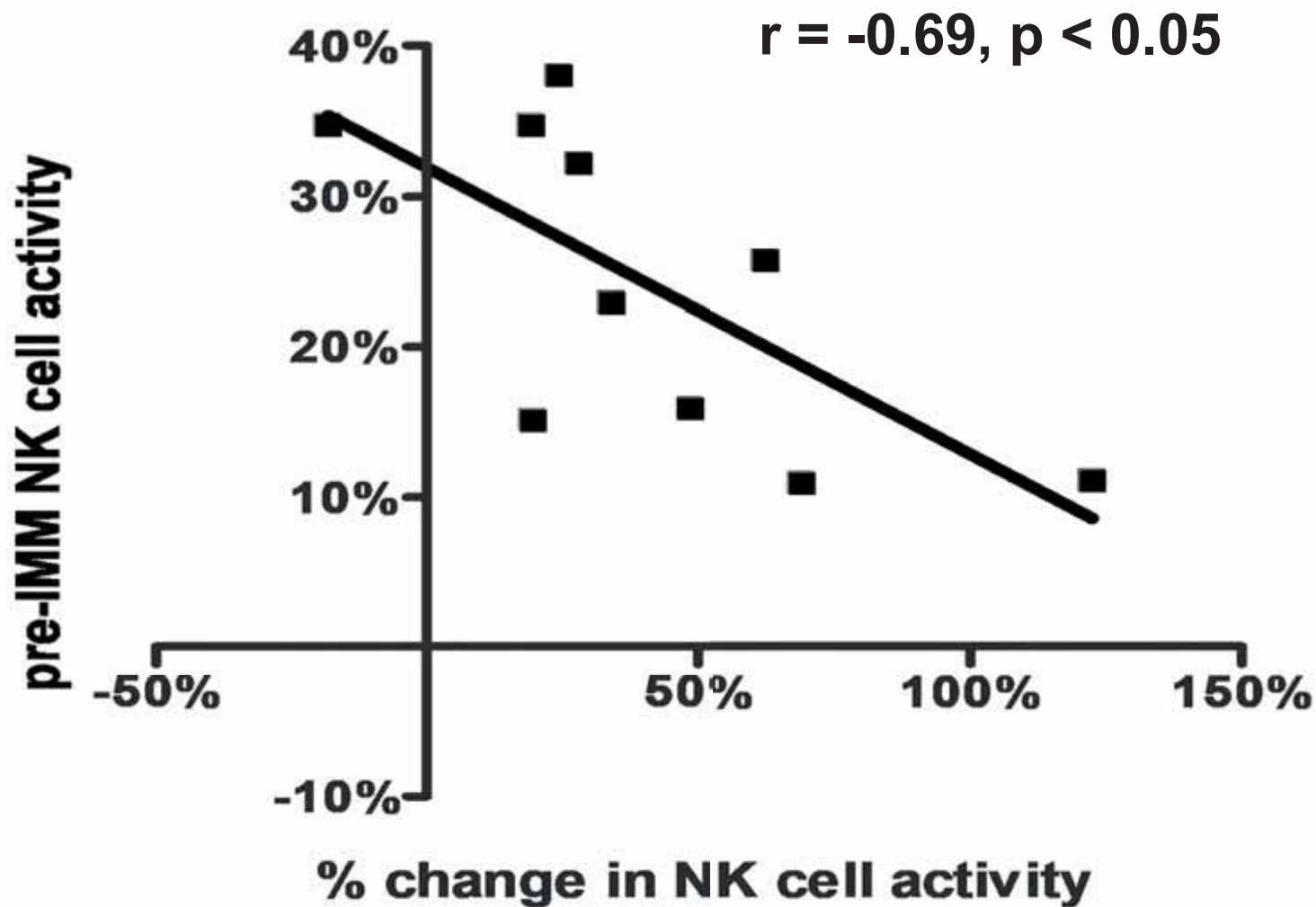
Methods:

Peripheral blood samples were drawn from subjects in the morning before and after 7 days of supplementation. The evaluation of immunostimulatory activity of Immulina was performed by determination of phagocytic activity and natural killer cell activity.

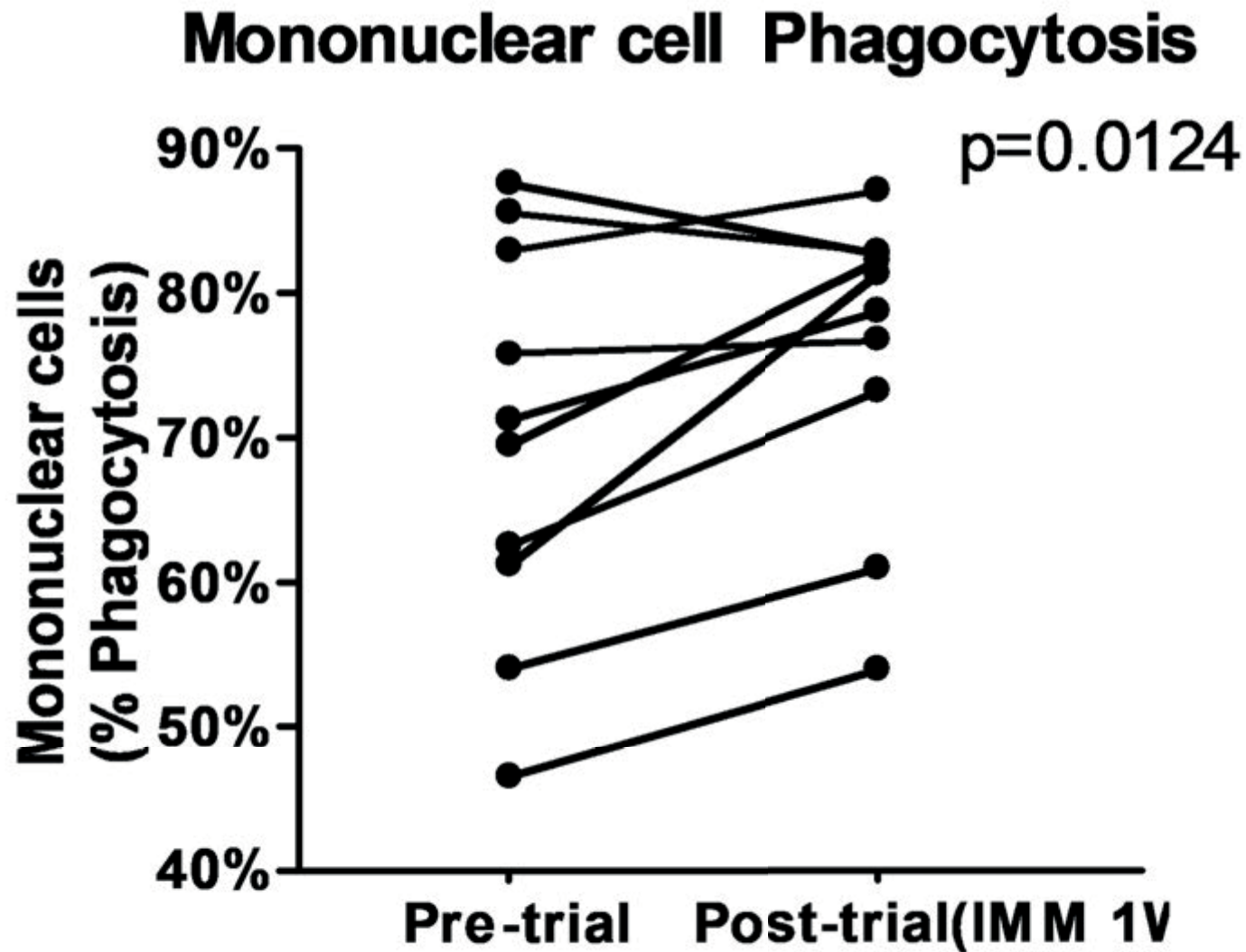
NK CELL KILLING OF CANCER CELLS WAS INCREASED AN AVERAGE OF 40% AFTER 1 WEEK OF IMMULINA INGESTION



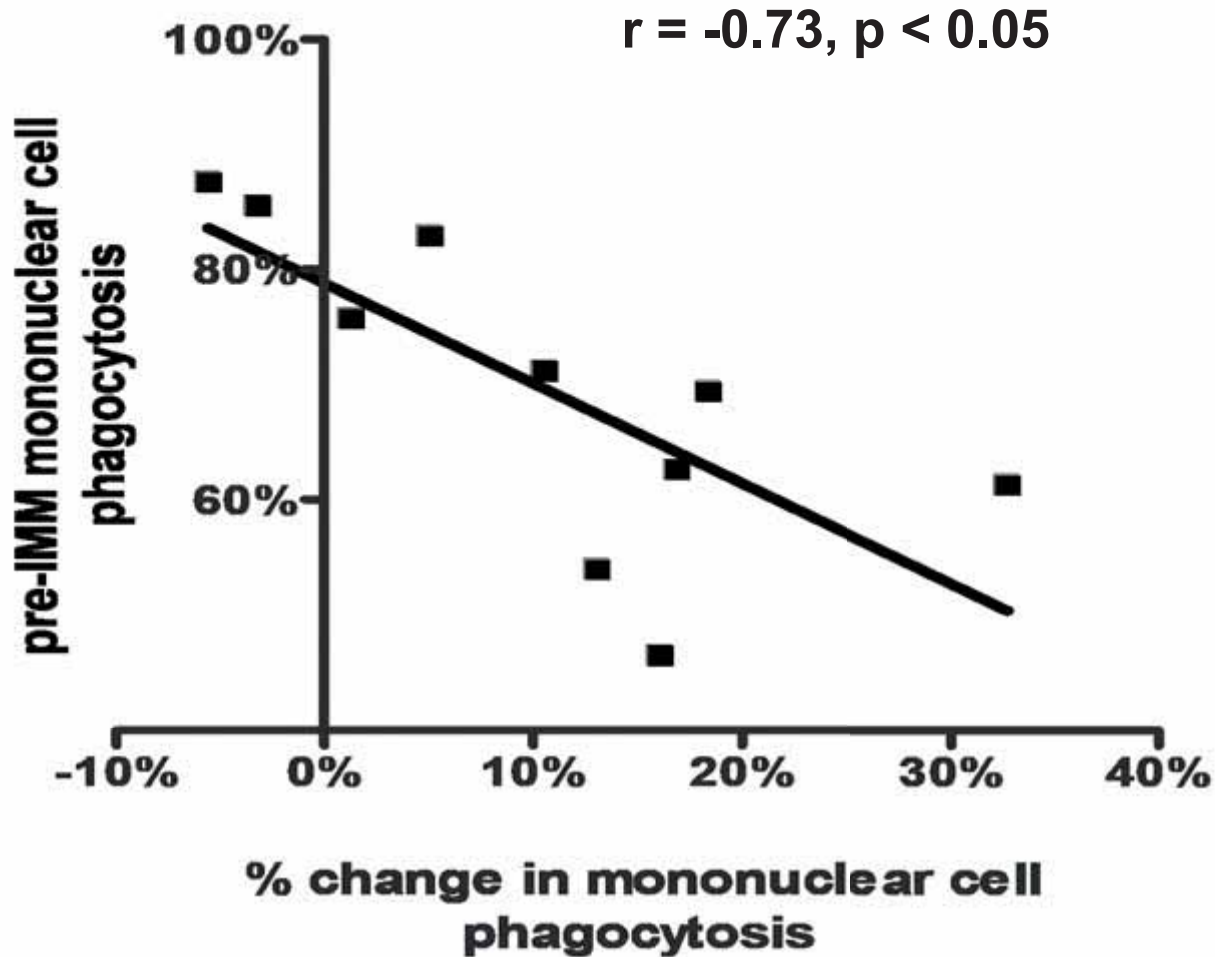
INDIVIDUALS WITH LOWER NK CELL ACTIVITY RESPONDED THE MOST TO THE ENHANCING ACTION OF IMMULINA



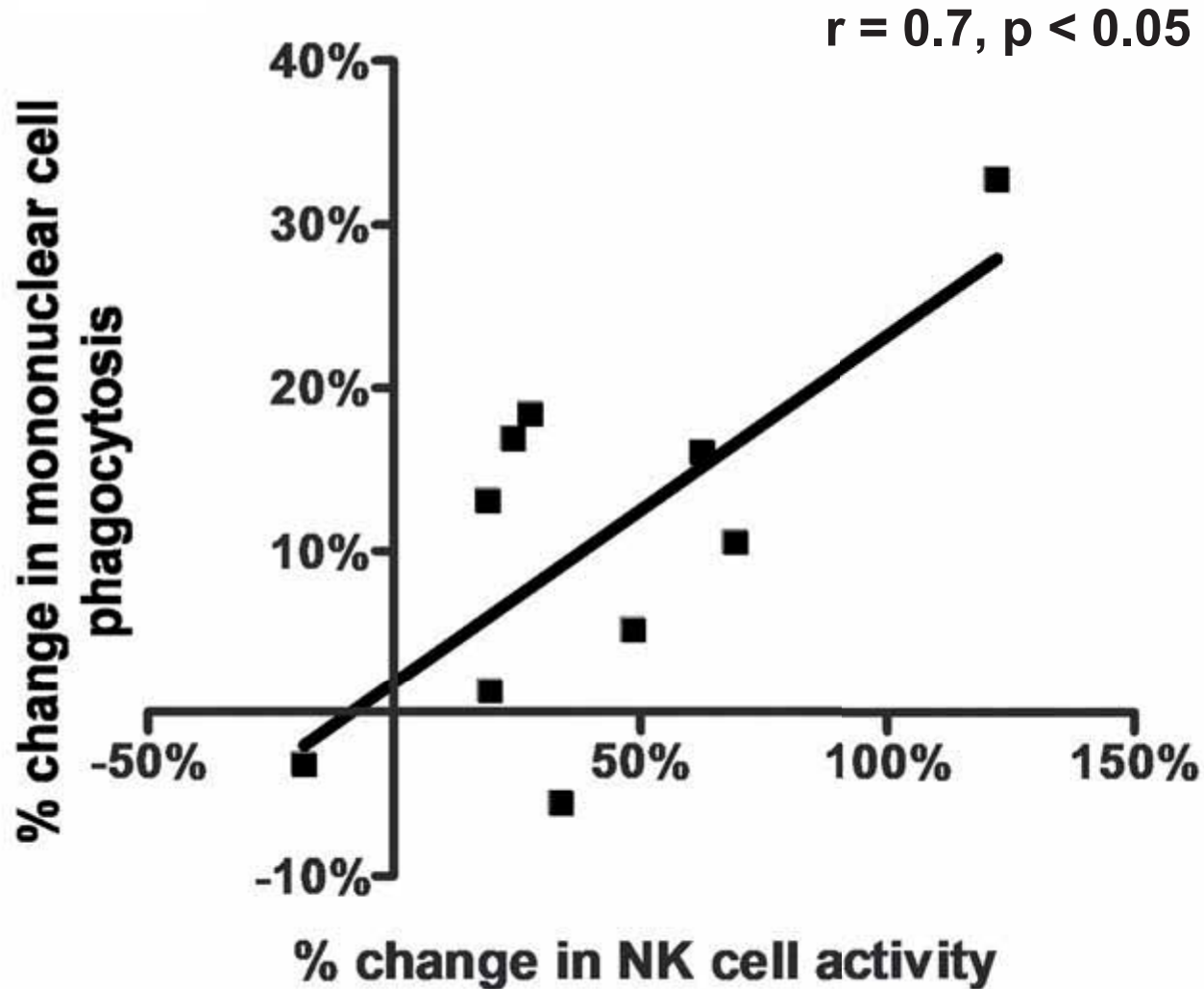
MONONUCLEAR CELL PHAGOCYTOSIS ALSO INCREASED AFTER 1 WK OF IMMULINA



INDIVIDUALS WITH LOWER MONONUCLEAR PHAGOCYTOSIS RESPONDED THE MOST TO THE ENHANCING ACTION OF IMMULINA



INDIVIDUALS RESPONDED SIMILARLY TO IMMULINA WITH RESPECT TO BOTH PARAMETERS



PILOT CLINICAL STUDY WITH IMMULINA ON NORMAL VOLUNTEERS

1. The results demonstrated that supplementation with Immulina for one week in healthy adults enhanced phagocytosis by mononuclear cells and tumor killing by NK cells.
2. Individuals exhibiting lower activities of these two parameters responded the most to the immune enhancing action of Immulina.
3. This suggests that Immulina could have the most benefit to the elderly and other immune suppressed individuals.

ACUTE THERAPEUTIC BENEFITS OF IMMULINA BASED ON SEVERAL HUNDRED CASE STUDIES

- **REDUCTION IN JOINT PAIN (1-3 DAYS).**
- **ERADICATION OF SKIN STAPH FLAREUPS (1-2 DAYS) DUE TO FOOD ALLERGIES.**

LONG TERM THERAPEUTIC BENEFITS OF IMMULINA BASED ON SEVERAL HUNDRED CASE STUDIES AND/OR CLINICAL TRIALS

- DRAMATIC REDUCTION IN COLD SORE OUTBREAKS (HERPES)**
- DECREASED ALLERGY SYMPTOMS**
- INCREASED JOINT STRENGTH**
- DECREASED COLD AND FLU INCIDENCE/SEVERITY**
- IMPROVED SKIN HEALTH**
- DECREASED MUSCLE SORENESS AFTER STRENUOUS EXERCISE**

WHY NOT TAKE SPIRULINA OR OTHER MICRO ALGAE SUPPLEMENTS INSTEAD OF IMMULINA?

**BECAUSE YOU NEVER KNOW THE ACTIVITY OR
CONSISTENCY OF THE PRODUCTS.**

VARIABILITY OF THE ACTIVITY OF VARIOUS SPIRULINA BRANDS/PRODUCTS

SPIRULINA

	<u>PERCENT RECOVERY</u>	<u>ACTIVITY</u>
SOURCE A	12.6%	100 ng/ml
SOURCE B	17.2%	75 ng/ml
SOURCE C	9%	500 ng/ml
SOURCE D	15%	25 ng/ml

VARIABILITY OF THE ACTIVITY OF VARIOUS CHLORELLA BRANDS/PRODUCTS

CHLORELLA

	<u>PERCENT RECOVERY</u>	<u>ACTIVITY</u>
SOURCE A	4.5%	25 ng/ml
SOURCE B	7.0%	25 ng/ml
SOURCE C	4.2%	500 ng/ml
SOURCE D	3.9%	NA

**BEFORE THE PURCHASE OF EVERY BATCH OF
RAW SPIRULINA MATERIAL WE ASSESS ACTIVITY.
ONLY IF THE ACTIVITY IS HIGH DO WE PURCHASE
THAT MATERIAL TO PRODUCE THE IMMULINA
EXTRACT.**

**EVERY BATCH OF IMMULINA EXTRACT
PRODUCED IS ASSESSED FOR ACTIVITY TO
INSURE THAT EVERY CAPSULE CONTAINS AT
LEAST 1,000 UNITS OF IMMUNE ENHANCING
ACTIVITY AS ASSESSED BY OUR MONOCYTE
ACTIVATION ASSAY.**

ACTIVITY OF THE IMMULINA EXTRACT IN TABLETS OR CAPSULES IS EXTREMELY STABLE

FRESH TABLET	35%
6 MONTHS RT	40%
1 YEAR 4 ° C	35%
1 YEAR RT	38%
1.5 YEARS 4 ° C	40%
1.5 YEARS RT	42%
2.0 YEARS 4 ° C	37%
2.0 YEARS RT	40%

OTHER TYPES OF BACTERIAL DERIVED FOOD PRODUCTS ARE NOT STANDARDIZED FOR CONSISTENT ACTIVITY AND IMMUNE EFFECTS MAY VARY SUBSTANTIALLY DEPENDING ON BACTERIAL TYPE AND STRAIN

CONCLUSIONS

1. **BIOLOGICAL ACTIVITY (MONOCYTE ACTIVATION) IS USED TO STANDARDIZE IMMULINA PREPARATIONS TO ASSURE CONSISTENT HIGH POTENCY.**
2. **IMMULINA ACTIVATES CELLS OF THE GUT INNATE IMMUNE SYSTEM BY BINDING TO RECEPTORS USED TO DETECT BACTERIA, FUNGUS AND VIRUSES.**
3. **IMMULINA ENHANCES MUCOSAL IMMUNE PARAMETERS IN MICE (IgA AND IL-6) AND INF-GAMMA PRODUCTION BY SPLEEN CELLS.**
4. **CASE STUDIES SUGGEST THAT IMMULINA INGESTION PRIMES RATHER THAN CHRONICALLY ACTIVATES THE IMMUNE SYSTEM RESULTING IN IMPROVED IMMUNE FUNCTION.**