

KOUCHAKOFF 2.0

by Rich Mihalik, Director of Innovation and Product Development.

National Enzyme Company was founded by Dr. Edward Howell to bring the benefits of his work with digestive enzymes to the masses. Much of his work was influenced by the digestive leukocytosis work of his contemporary, Dr. Paul Kouchakoff. In the tradition of Dr. Howell and Dr. Kouchakoff, NEC is attempting to update Dr. Kouchakoff's pioneering work in the context of modern scientific techniques and study designs.

Digestive leukocytosis was first reported by Donders in 1846 and subsequently confirmed by others. Digestive leukocytosis is the term applied to an elevation in white blood cell counts after ingestion of food. In 1876 Grancher demonstrated that digestive leukocytosis does not always occur after a meal. Several other authors did similar work with digestive leukocytosis, but most of the work involved small sample sizes and limited experimental controls.

Dr. Kouchakoff first began researching digestive leukocytosis in 1912 while serving as doctor and expedition chief of the Arctic expeditions sponsored by the Russian Academy of Science in Petrograd. Unfortunately all materials related to the expedition were lost during the Russian Revolution. Fortunately the knowledge of the findings survived with Dr. Kouchakoff, and the work was revisited in 1928 and 1930 in France and Switzerland respectively in collaborations with Dr. Kouchakoff. The work is summarized by Dr. Kouchakoff in a 1937 French publication titled "Nouvelles lois de l'alimentation humaine basées sur la leucocytose digestive" which translates to "New laws of human digestion based on digestive leukocytosis".

The work performed by Dr. Kouchakoff's colleagues in 1928 and 1930 was both rigorous and well controlled for the time involving careful controls of what was ingested, and involving thousands of blood draws. The experimenters divided food into 3 categories for study based on the diet consumed at that time:

- 1) Natural foods: Foods that have suffered no changes whatsoever, raw foods.
- 2) Cooked foods: Natural foods that have been heated.
- 3) Factory foods: Foods modified by heating, but also by other agents.

The researchers found that when leukocytosis occurs, it is observable as early as 3-5 minutes, typically peaks at about 30 minutes, and returns to normal by 90 minutes. Over this time the ratios of neutrophils to lymphocytes changed continually, and the amount of eosinophils remained relatively constant. In addition, they demonstrated that a food chewed, but not swallowed does not trigger digestive leukocytosis.

The investigations also demonstrated that a raw food introduced directly into the stomach produces a transient leukocytosis that lasts only about 10 minutes, but cooked food introduced in the same manner produces a more significant and lasting reaction.

Interestingly, they also found that if food is ingested every half hour, the levels did not return to normal and built upon the previously experienced levels.

(KOUCHAKOFF 2.0 cont.)

When the categories of food were examined, the researchers found that the ingestion of natural foods did not result in leukocytosis, while ingestion of cooked foods elevated the counts. They further observed that pressure cooked foods resulted in increased leukocytosis. When the factory foods were examined, especially wine, sugar and vinegar, increased leukocytosis also occurred, along with a change in the differential count.

The researchers went on to demonstrate that the reaction is not dependent on the quantity of food ingested. They then went on to determine the critical temperature at which a variety of foods must be cooked to trigger digestive leukocytosis.

Leukocytosis is significant because it is often just one indicator of an inflammatory response. At the time, cytokines as markers of inflammation were unknown, and thus uninvestigated. As a physician, Dr. Howell and others were alarmed at the rise in white blood cells, as they recognized that an increase in white blood cells was a symptom of numerous diseases.

Based on the work of Kouchakoff and his own observations, Dr. Howell hypothesized that it was the lack of natural food enzymes in cooked food that resulted in leukocytosis. He further hypothesized that replacement of the enzymes lost in cooking can alleviate some or all of the alteration of white blood cells, moderating or averting many of the negative consequences of eating cooked or processed foods.

National Enzyme Company is actively involved in reassessing this work in relation to today's Western diet using modern methods of investigation. We are also investigating how cytokines and certain other markers of inflammation may be affected by raw vs. cooked vs. processed foods.

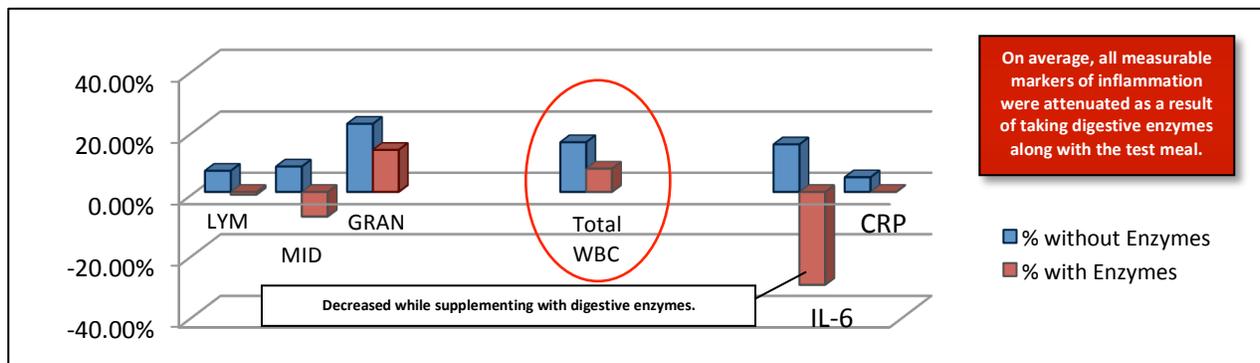
The modern meal selected for the study was processed chili, cheese, crackers and water which is fairly representative of the processed foods typically consumed in a modern Western diet. It was conducted with 10 healthy volunteers from Logan Chiropractic College. The pilot study was a double blinded, placebo controlled study. Five participants received 2 proprietary blend digestive enzyme capsules and the remaining five received 2 placebo capsules. Blood was taken from all 10 participants immediately prior to eating and 45 minutes after beginning to eat the meal.

The blood samples were successfully analyzed for total white blood cell counts (WBC), lymphocytes (LYM), monocytes (MID), granulocytes (GRAN), interleukin-6 (IL-6), and c-reactive protein (CRP). This was not surprising due to the small sample size of this pilot study. However, some intriguing effects were noted.

For the placebo group average WBC increased with the meal, This is consistent with Kouchakoff's findings (see Table 1). Average GRAN increased more than average LYM or MID, which is consistent with the altered white cell profiles reported by Kouchakoff when processed factory food is ingested. The common markers of inflammation IL-6 and CRP both had elevated averages as a result of ingesting the meal.

For the enzymes group average WBC also increased, but the increase was attenuated to about half of the placebo average (see Table 2). GRAN increased more than LYM or MID. This was seen with the placebo, but it was also attenuated relative to the placebo. LYM stayed relatively constant as with the placebo, while MID actually decreased by 8% on average. The inflammatory markers IL-6 and CRP both surprisingly decreased on average with ingestion of the meal and the enzymes.

TABLE 1 PLACEBO RESULTS		TABLE 2 DIGESTIVE ENZYME RESULTS	
Blood Marker	Average % Difference	Blood Marker	Average % Difference
WBC	+16%	WBC	+8%
LYM	+7%	LYM	-1%
MID	+8%	MID	-8%
GRAN	+22%	GRAN	+14%
IL-6	+16%	IL-6	-30%
CRP	+5%	CRP	-5%



Acronym	Name	Definition
LYM	Lymphocytes	A type of white blood cell in the vertebrate immune system.
MID/MIC	Monocytes	Type of white blood cell that are a part of all mammals (including humans) innate immune system of vertebrates. Monocytes play a role in responding to inflammation signals.
GRAN	Granulocytes	Granulocytes are a category of white blood cells characterized by the presence of granules in their cytoplasm.
WBC	White blood cell count	Cells of the immune system involved in defending the body against both infectious disease and foreign materials.
IL-6	Interleukin 6	Protein in the body that acts as both a pro-inflammatory and an anti-inflammatory.
CRP	C-Reaction	Protein in the human blood that serves as a marker of inflammation.

A larger study (150 participants) is planned for 2012. If statistical significance can be achieved with these markers, the results will demonstrate that the pioneering works of Dr. Kouchakoff and Dr. Howell are still relevant today. Inflammation is at the core of our modern understanding of numerous diseases from cancer to heart disease. It is even a major consideration in anti-aging research. A successful outcome will have a significant and fundamental impact on our understanding of diet and health in a modern context. ●

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