



Mineral Logic Scientific Collaborations with the University of Lodz

Mineral Logic is collaborating with the scientific team at the University of Lodz* to research the biological effects of fulvic acid containing MLG-50 and AGT-50 formulations *in vitro* (in cells) and *in vivo* (in mammals).

Study I: MLG-50 and AGT-L50 were tested *in vitro* to determine whether fulvic acid modulates the inflammatory response.

Results: *In vitro* tests confirmed that MLG-50 and AGT-L50 preparations significantly inhibit the activation of the NFκB pathway in monocytic macrophage cells, which also translates into reduced production of pro-inflammatory cytokines TNF and IL-6 by these cells.

Conclusions: The study confirms that the active constituents of fulvic acid have the potential to regulate inflammation, which may alleviate its adverse effects on the body, especially in cases of chronic inflammation.

Inflammation can be a normal part of the body's healing process, but if it becomes chronic, it can also lead to disease.

Type of inflammation	Description
Acute	A sudden and temporary response to an injury or illness, such as redness, warmth, swelling, and pain
Chronic	Can last for months or years, and can lead to disease

When inflammation is harmful, it can lead to several serious diseases, including:

- Cardiovascular disease
- Cancer
- Alzheimer's disease
- Obesity
- Diabetes
- Autoimmune diseases like rheumatoid arthritis and lupus
- Inflammatory bowel diseases like Crohn's disease or ulcerative colitis

Inflammation can also cause other symptoms, such as:

- Frequent infections
- Weight changes
- Gastrointestinal problems
- Depression or anxiety
- Long-lasting fatigue



- Insomnia
- Body pain

Study II: Probiotic Stimulating Properties of Fulvic Acid Containing MLG-50 and AGT-50 Formulations *in vitro*.

Purpose: To test the effects of MLG-50 and AGT-L50 formulations on whether they promote, inhibit, or have no effect on the growth of bacteria associated with a healthy microbiome and to determine whether they promote, inhibit, or have no effect on the growth of pathogenic bacteria associated with an unhealthy microbiome *in vitro*.

Results: The AGT-50, AGT-L50, and MLG-50 upregulated the growth and metabolic activity of Probiotic (healthy) bacteria (especially *L. rhamnosus*, *B. animalis*) in a wide range of concentrations. Even the highest dilutions of all preparations containing fulvic acid stimulated the growth of probiotic bacteria (assessed by CFU). They inhibited (or did not affect) the growth of pathogenic bacteria (*E. coli* and *S. Paratyphi*).

Conclusions: The *in vitro* assays demonstrate that fulvic acid-containing formulations promote the growth of bacteria associated with a healthy microbiome and inhibit the growth of some pathogenic bacteria associated with an unhealthy microbiome.

Study III: Microbiome Profiling of Guinea Pigs (*Cavia porcellus*) Following a 21-Day Supplementation with MLG-50 and MLG-A50 Preparations Reveals Reduction in Pro-Inflammatory Gut Bacteria

Results: We observed a reduction in the number of bacteria known for their pro-inflammatory propensity in the gut microbiota of guinea pigs supplemented with MLG-50 and MLG-A50 preparations. Notably, there was a significant decrease in bacteria from the order *Campylobacterales*, which includes common pathogens such as *Helicobacter pylori* and *Campylobacter jejuni*.

Conclusions: Supplementation with MLG-50 and MLG-A50 formulations demonstrates the potential for regulating gut microbiota communities, particularly by reducing pro-inflammatory bacteria, in *Cavia porcellus* animal models.

A healthy microbiome can provide many health benefits, including:

- Digestion: The gut microbiome produces enzymes that help break down carbohydrates, and the gut absorbs 90% of nutrients when food leaves the small intestine.
- Immune system: The gut microbiome helps train the immune system to identify beneficial microbes and distinguish them from harmful pathogens.



- Short-chain fatty acids: Gut bacteria produce short-chain fatty acids, which help maintain the gut barrier and reduce inflammation.
- Vitamin synthesis: The gut microbiome can synthesize vitamins like B.
- Heart health: A study of 1,500 people found that the gut microbiome promotes healthy cholesterol levels.
- Healthy aging: The gut microbiome may play a role in healthy aging and longevity.

** The scientific collaborators that designed, executed, and implemented the experiments include Professor Karolina Rudnicka, Professor Agnieszka Krupa, Professor Przemyslaw Plocinski, Dr. Aleksandra Szwed-Georgiou and Dr. Marcin Włodarczyk from Department of Immunology and Biology at Faculty of Biology and Environmental Protection, University of Lodz and Dr. Mark Williams, CSO at Mineral Logic/AgTonik provided scientific input and guidance on the formulations tested and certain details of the experiments.*

Disclaimer

Rigorous scientific methods and standards were carried out throughout these studies, and the data and interpretation are currently in preparation for publication in a peer-reviewed scientific journal. However, the data presented here has not yet been peer-reviewed as it is a work in progress. Once the manuscript has been prepared and accepted for publication, this website will be updated to include the link to the published studies.

Stay tuned for updates on this groundbreaking research by registering your [contact information](#) so we can notify you when these publications become available. We're committed to advancing our understanding of fulvic acid's potential benefits through rigorous scientific investigation.

The FDA has not evaluated any of the claims made here. MLG-50 dietary supplement products are not intended to diagnose, treat, cure, or prevent any disease.