MicroActive® Ingredients

MicroActive® products are well-researched active ingredients that are micronized and encapsulated to uniformly improve absorption and provide a sustained-release profile.

MicroActive® CoQ10
MicroActive® Curcumin
MicroActive® Resveratrol
MicroPQQ®
MicroActive® Melatonin
MicroActive® Astaxanthin
MicroActive® Oligonol®
MicroActive® AHCC®
MicroActive® Technology

MicroActive® ingredients demonstrate superior uniform absorption and are supported by over 10 clinical studies. Ingredients are micronized and encapsulated by design using natural starches or polymers to fit the individual characteristic of each ingredient. The micronization phase produces a period of rapid efficient exposure followed by the encapsulation phase, which produces a lengthy extended release.

Absorption is further enhanced with carriers that assist the active to move through the intestinal wall.

By comparison:

- Does not contain absorption enhancers that might over time increase the absorption of unwanted compounds such as carcinogens
- Superior sustained release as compared with the most popular advanced formulations on the market

The final result is a free-flowing powder with the following benefits:

- High cost-effective payload, normally 25% to 50%
- Applicable to hydrophobic, hydrophilic, and partially hydrophilic ingredients
- Can be formulated with other actives
- Applicable for hard capsules and softgels
- Water-dispersible for foods, juices, or effervescent applications
- Clinically proven in oral-care products

Have an ingredient that you want to make more bioavailable?

We are willing to test and apply the MicroActive® Technology to other ingredients. Please contact a Maypro representative for more details.
CoQ10 is a vitamin-like, fat-soluble substance found in the mitochondria of almost all the cells in the body. It is used in the electron transport chain, a process of aerobic cellular respiration that generates 90–95% of the energy used by the body. It is also a powerful antioxidant.

As a dietary supplement, crystalline CoQ10 is poorly absorbed. In fact, on average, only 3% of the consumed dose is actually absorbed. As a result, numerous forms of CoQ10 claiming enhanced bioavailability have been introduced to the market. However, how well they are absorbed varies wildly from person to person. Some subjects will absorb these enhanced forms well while others will absorb only small quantities — uniform bioavailability is not guaranteed.

The patented MicroActive® process complexes each CoQ10 molecule with two β-cyclodextrin molecules in a water media. One side of the molecule is fat-soluble and holds the CoQ10, while the other side is water-soluble and makes for efficient transport through the digestive system.

When the micronized MicroActive® complex arrives at a cell, it comes apart, depositing a single CoQ10 molecule for efficient absorption.

**Absorption Performance MicroActive® vs. Oil-Solubilized CoQ10 Softgel**

**Individual Subject’s CoQ10 Absorption After Single Oral Dose**
Supported by four human clinical studies, MicroActive® CoQ10 Complex is a 26% CoQ10 free-flowing powder, clinically proven to offer:

- Uniformly enhanced absorption in all users
- 24 hour time release
- 3.7x more bioavailable than crystalline CoQ10
- Blending various ratios of MicroActive® complex to crystalline CoQ10 does not affect the bioavailability of the complex
- If taken at higher doses, claims for heart and circulatory health benefits can be made, and can provide assurance of doubling CoQ10 levels in three weeks

Four clinical studies compared MicroActive® CoQ10 with crystalline and solubilized products. The results demonstrate the clear advantages of MicroActive®.

MicroActive® CoQ10

Product Specifications:

- CoQ10 complexed with cyclodextrin
- Light-yellow free-flowing 60-mesh powder
- 26% CoQ10 concentration
- Stable at room temperature
- Water-dispersible
- Suitable for tablets, capsules, softgels & functional beverages

Minimum Required Dosage: 120 mg (31 mg CoQ10)
**Curcumin** is one of the most promising ingredients for promoting balance between excitatory and inhibitory cytokines.* As a result, it promotes joint comfort, supports heart health, and provides antioxidant protection.*

However, curcumin is very difficult for the human body to absorb and what little is absorbed is quickly excreted. Large doses have therefore been used therapeutically in treating heart diseases or rheumatoid arthritis, often resulting in such unwanted side effects as stomach upset.

**MicroActive® Curcumin** was developed to address this issue through a micronized, sustained-release technology that allows for better and more uniform absorption and retention.

**MicroActive® Curcumin** provides a marked improvement over standard curcumin and turmeric powders and supplements with the following features:

- 10x more bioavailability than unformulated 95% curcumin
- Quick maximization of curcumin blood levels
- Sustained release over 12 hours
- Delivers measurable amounts of desmethoxycurcumin and bisdemethoxycurcumin, both found in native turmeric

The dissolution profile showed a superior sustained release profile as compared with the control and other formulations. After 2 hours, 10% of the dose obtained with MicroActive® Curcumin was released in the gastric fluid. By 12 hours, ~88% of the dose was in solution in a micronized form (<10 μm particle size). When combined with sustained release, this reduced particle size seeks to enhance incorporation into mixed micelles and facilitates overall uptake of elemental curcumin. Other brands showed lower dissolution at acidic pH (0–4% of the dose) and 13–50% dissolution by 12 hours.

In a 10-subject study, MicroActive® Curcumin showed a $T_{max}$ of 4 hours followed by sustained release till 12 hours. Plasma levels remained high at 12 hours, indicating additional sustained release beyond that point. The results demonstrate the superior bioavailability of MicroActive® Curcumin, a reduction in time to reach maximum blood levels ($T_{max}$), and sustained release for > 12 hours. MicroActive® Curcumin administration also resulted in detectable amounts of bisdemethoxycurcumin and demethoxycurcumin after a single dose.
MicroActive® Curcumin

Product Specifications:

- 25% curcumin concentration
- Made with organic curcumin
- Curcumin powder in a micronized sustained-release matrix
- 95% total curcuminoids (curcumin, demethoxycurcumin and bisdemethoxycurcumin)
- No Class A solvent residue
- Improved physical characteristics that allow for easier processing into finished product
- Shelf life of 3 years when stored at room temperature

Minimum Required Dosage: 500 mg (125 mg elemental curcumin)

MicroActive® Curcumin is available only in certain markets. Please contact your Maypro representative for further details.

*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
Resveratrol is an antioxidant polyphenol with great promise for supporting healthy metabolism, normal insulin sensitivity, and optimal blood flow — all of which may have cardiovascular, brain, and healthy aging benefits.

However, resveratrol, while reasonably well-absorbed, has a very short half-life. Because it does not stay in the bloodstream very long, its benefits can be difficult to reap. After oral administration, the amount of free resveratrol in plasma accounts for less than 2% of total resveratrol. In some instances, it isn’t even detected.

MicroActive® Resveratrol was developed to address this issue through a micronized, sustained-release technology that allows for better absorption and retention.

MicroActive® Resveratrol is superior to standard resveratrol because it offers:

- 12-hours sustained release
- Increased systemic exposure
- Effective at low doses
- 2.5x more bioavailability than regular resveratrol

MicroActive® Resveratrol was compared with 99% resveratrol powder in a dissolution study that approximated transport through both the gastric and intestinal environments. Compared with resveratrol powder, MicroActive® Resveratrol dissolved slowly and demonstrated sustained release over a longer period. The resveratrol powder showed complete dissolution (100%) in 4 hours. The MicroActive® formula showed sustained release over 12 hours, with 97% of the dose released.

In a pilot study, resveratrol powder showed a rapid absorption with a sharp peak at $T_{max}$ of 2 hours postdose. After 2 hours, the plasma levels of total resveratrol declined rapidly with a small increase at 9 hours. MicroActive® resveratrol also showed a $T_{max}$ at 2 hours and lower $C_{max}$ (max. concentration at $T_{max}$) with a broader peak and higher plasma levels compared with the control. Sustained release continued for > 9 hours. This implies that while 98% resveratrol powder is rapidly absorbed and excreted, MicroActive® resveratrol continues to remain in circulation for a long time.
MicroActive® Resveratrol
Product Specifications:

- 30% Resveratrol concentration
- Resveratrol in a sustained-release matrix
- Off-white granular powder
- Store between 4–10°C, protected from light, heat, and moisture
- Shelf life of 4 years
- Suitable for capsules, powders, tablets, liquids (water dispersible), softgel capsules

Minimum Required Dosage: 60 mg
(18 mg elemental resveratrol)
An organic molecule naturally occurring in the food supply, **PQQ** is considered by some to be the first new vitamin discovered since 1948. It supports the health of the mitochondria, which generate the energy human cells need to function efficiently.

Since the degradation of mitochondria is a key contributing factor to physiological aging, MicroPQQ® may slow the aging process and increase energy levels.* Scientific research has shown that PQQ:

- Protects nerve cells*
- Improves cognitive function*
- Alleviates occasional stress and sleeplessness*
- Double-blind, placebo-controlled human studies have also found PQQ improves spatial awareness, short-term memory, and concentration.*

MicroPQQ® delivers the natural brand of PQQ in a special micronized, sustained-release matrix. Because the PQQ is released over time, it stays in the blood longer — and is therefore active longer — than regular PQQ. The results of a dissolution study and a pilot clinical study found that MicroPQQ® demonstrated:

- Sustained release for over 9 hours
- Multistage release in the stomach and small intestine
- Increased residence time
- 2.2x more bioavailability than regular PQQ

In a dissolution test, the dissolution profile shows a sustained release of PQQ from the MicroActive® formulation. By 121 minutes, 95% of the dose was in solution in a micronized form, with less than a 10-micron particle size. With the control PQQ powder, 100% of the dose was in solution by 360 minutes. The MicroActive® formulation may enhance the beneficial effects *in vivo* by enabling the serum levels to be maintained for a longer time.
In a bioavailability clinical study, the uptake of PQQ from MicroPQQ® reached a maximum blood level at 2 hours, followed by sustained release for up to 9 hours. The plasma levels remained high at 9 hours, indicating a sustained release longer than 9 hours. In contrast, the control PQQ powder showed a maximum blood level at 2 hours and the plasma level was back to baseline by 9 hours. The average area under the curve for MicroPQQ® was 69.66, whereas the control PQQ was less than half as much, with a value of 31.41. The ratio of the area under the curve (sustained plasma concentrations) of MicroActive® to the control PQQ was 2.2 times higher.

MicroPQQ® Product Specifications:

- 50% PQQ
- PQQ in a sustained-release matrix
- Reddish-brown granular powder
- Store in the dark at room temperature, protected from air and moisture
- Shelf life of 2 years
- Suitable for capsules and tablets

Minimum Required Dosage: 10 mg (5 mg elemental PQQ)
**Melatonin** is a hormone naturally produced by the body that regulates the sleep-wake cycle. Many things can interfere with melatonin production, such as excessive light in the evening, jet lag, and shift work. In addition, the less melatonin is manufactured with age. Scientific research shows that melatonin:

- Regulates sleep cycles
- Aids in securing a full night’s sleep
- Supplements the body’s natural production that has been shown to decrease with age

Ordinary melatonin supplements leave the body after 4 hours, so while they may aid in falling asleep, they are not effective for those who have difficulty staying asleep or waking too early. **MicroActive® Melatonin** was developed to address this issue through a micronized, sustained-release technology that ensures the melatonin is gradually released over 7 hours. Additionally, while ordinary melatonin supplements expose the body to an unusually high spike of melatonin upon consumption, **MicroActive® Melatonin**’s sustained release technology allows a consistent dose over a long period of time in order to better support sleep.*

**MicroActive® Melatonin provides:**

- 7-hour sustained release
- Initial rapid release and then slower sustained release
- Free-flowing powder — sustained release not achieved through compression of the active ingredient
- SR claim is supported by dissolution studies
- Two-stage release
- Initial rapid release to help fall asleep faster*
- Slower sustained release that helps maintain sleep overnight*
- Effective for all insomnia patterns*
MicroActive® Melatonin: The Right Time-Released Dose

Dissolution studies show that MicroActive® Melatonin delivers 40% of the dose at 1 hour, a gradual release of 50% of the remaining dose over the next 5 hours, and 10% after 7 hours. This makes it perfect for falling asleep, staying asleep, and preventing early awakening.*

By comparison, unformulated melatonin was shown to have an initial release of 90% of the dose, and released the remaining 10% over the next 3 hours. Competing Brand 1 had an initial release of 64% of the dose, followed by 36% over the next 2 hours. Competing Brand 2 had an initial dosage release of 20% followed by 30% more over the next 5 hours; the remaining 50% was not fully released over the normal sleep period.

MicroActive® Melatonin®
Product Specifications:

- 3% melatonin
- Melatonin in a sustained-release matrix
- White granular powder
- Store in the dark, avoid high temperature and high humidity
- Shelf life of 3 years
- Suitable for capsules and tablets

Minimum Required Dosage: 34 mg
(1 mg elemental melatonin)

* THESE STATEMENTS HAVE NOT BEEN EVALUATED BY THE FOOD AND DRUG ADMINISTRATION. THIS PRODUCT IS NOT INTENDED TO DIAGNOSE, TREAT, CURE, OR PREVENT ANY DISEASE.
**Astaxanthin** is an antioxidant carotenoid found in algae, yeast, salmon, shrimp, krill, and other kinds of fish and crustaceans. A brightly colored pigment, it gives salmon, cooked lobster, and flamingos their distinctive pink coloring. It is a powerful antioxidant with the unique ability to traverse the blood-brain barrier. Clinical trials indicate that astaxanthin improves the condition of the skin (including fine lines, wrinkles, elasticity, and moisture content), enhances recovery from exercise, relieves occasional indigestion, supports gastric health, helps maintain cholesterol levels already within a healthy range, enhances immune response, promotes healthy vision, and supports the male reproductive system.*

Astaxanthin is fat-soluble and is difficult to transport through the aqueous environment of the digestive system compared with molecules that are water-soluble. In fact, in vitro studies have shown that astaxanthin is virtually insoluble in gastric and intestinal fluids. Even in solubilized formulas, it quickly precipitates out once the saturation point is reached, making it hard for the body to absorb and utilize.

With its two-stage release of micronized particles, **MicroActive® Astaxanthin** is absorbed better and stays in the bloodstream longer — so it is active longer than regular astaxanthin, thereby significantly increasing its bioavailability.

**MicroActive® Astaxanthin** provides 10% elemental astaxanthin and is clinically proven to offer:

- High initial absorption
- Higher continued absorption over time
- 3.6x higher absorption than regular astaxanthin
- 24-hour enhanced sustained release
- Convenient one-a-day dosing while achieving maximum benefit

Researchers found that while regular astaxanthin was almost completely insoluble in simulated gastric and intestinal fluid, **MicroActive® Astaxanthin** showed sustained

**A comparison of Dissolution Profiles of Astaxanthin**
release over the course of the 12-hour experiment. Nearly 50% of the dose was released at 2 hours. By 12 hours, 100% was in solution, in micronized form.

A two-person human study comparing 10% astaxanthin in oil with MicroActive® Astaxanthin found that when subjects took a single dose of 60 mg of elemental astaxanthin, uptake was 3.6 times better for MicroActive® Astaxanthin when compared with control and that MicroActive® Astaxanthin remained in the blood plasma for approximately twice as long.

A Comparison of Uptake of Astaxanthin by Individual Subjects

MicroActive® Astaxanthin
Product Specifications:

- 10% astaxanthin concentration, from Haematococcus pluvialis (alga)
- Astaxanthin in a sustained-release matrix
- Dark-red viscous dispersion
- Store in original packaging between 10 and 25 degrees C, protected from light, heat, and moisture
- Suitable for softgel formulations

MicroActive® Astaxanthin is available only in certain markets. Please contact a Maypro representative for further details.
Supported by 30 human clinical trials, **Oligonol®** is a patented, low-molecular-weight polyphenolic extract derived from lychee fruit (85%) and green tea (15%) with excellent absorption and multiple anti-aging benefits.* It addresses the three major causes of aging: poor blood circulation, cell oxidation, and inflammation.*

**Oligonol® has been clinically shown to:**

- Support healthy postmeal blood glucose and lipid levels*
- Reduce visceral fat*
- Lessen skin wrinkles and brown spots*
- Help decrease fatigue and improve endurance*

**MicroActive® Oligonol®** is a new, micronized form of **Oligonol®** that has demonstrated significant sustained release activity in dissolution studies and increased residence time and absorption in a human study. The results of this research indicate **MicroActive® Oligonol®**:

- Has 2.39 times greater bioavailability than regular **Oligonol®**
- Enables reduction of cost due to lower dosing requirement
- Has a 12-hour sustained release

The dissolution profile shows a sustained release of **Oligonol®** from the **MicroActive®** formulation. By 12 hours, ~95% of the dose was in solution in a micronized form, less than 10-micron particle size. With the control **Oligonol®** powder, nearly 95% of the dose was in solution by 4 hours.

**A Comparison of Dissolution Profiles of MicroActive® Oligonol® and Oligonol® Powder**
A bioavailability clinical study showed that Oligonol® powder is absorbed rapidly and eliminated by ~8 hours postdose. The results of the study indicate that MicroActive® Oligonol® formulation extends the systemic exposure to higher levels of Oligonol®.

MicroActive® Oligonol®
Product Specifications:

- 62% Oligonol®
- 50% polyphenols
- Oligonol® in a sustained-release matrix
- Brown granular powder
- Store in the dark, avoid high temperature and high humidity
- Suitable for capsules and tablets

Minimum Required Dosage: 80 mg (50 mg elemental Oligonol®)
Japan's top-selling immune support ingredient, AHCC® is a unique, cultured mushroom mycelia extract that is rich in alpha-glucans.* AHCC® is manufactured through a patented, extended liquid culturing process that makes its active components different from other mushroom extract products. While most medicinal mushroom extracts have a molecular weight of more than 200,000 daltons, the presence of acylated alpha-glucans with a molecular weight of around 5,000 daltons is considered one of the attributes of AHCC® that provides it with superior absorption and strong clinical efficacy.*

Human and animal research has demonstrated that AHCC® enhances immunity by increasing:

- Cytokine production, including IFN-γ and TNF-α*

- Natural killer (NK) cell activity by 200–300%*

- Macrophage populations by up to 100%*

- Dendritic (DC) cell numbers*

- T cell numbers and activity*

MicroActive® AHCC® is water soluble and can pass through the GI tract quickly. The sustained-release formula allows AHCC® to attach itself to the mucous surface of the intestinal cells. They are known to increase the duration of attachment of the actives to the intestinal mucous surface and increase the efficacy of the actives such as antibiotics.*

AHCC® stays in the stomach longer and increased exposure time leads to better prospects of absorption.

The dissolution profile shows sustained release of AHCC® from the MicroActive® formulation. With the control AHCC® powder, 100% of the dose was in solution by 3hrs where as in the MicroActive® formula, AHCC® was released over a period of 12 hours.

**A Comparison of Dissolution Profiles of AHCC®**
MicroActive® AHCC®
Product Specifications:

- 12% α-glucan
- AHCC® in a sustained-release matrix
- Brown granular powder
- Store in the dark, avoid high temperature and high humidity
- 2-year shelf life
- Suitable for capsules and tablets

MicroActive® AHCC® is available only in certain markets. Please contact a Maypro representative for further details.

Minimum Required Dosage: 500 mg (300 mg elemental AHCC®)

A Comparison of Dissolution Profiles of AHCC®

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BioActives is a Boston IP development company that has developed, patented, researched, and commercialized highly innovative advanced formulations of carotenoids, botanical extracts, and specialty ingredients, including those based on its proprietary MicroActive® technology.

BioActives develops active nutraceutical ingredients and advanced encapsulation systems. These systems promote improved bioavailability, sustained release, and uniform absorption. Development includes bench-top formulation, absorption simulations, human trials, and scaled-up commercial processes. Product manufacture can then be outsourced to raw material producers and toll processors with whom BioActives has long-standing contractual relations.

Maypro was founded in 1977 with the mission to improve human health and happiness by importing the best-quality nutraceutical ingredients and fine chemicals to the U.S. market from Asia. As the United States started to develop proprietary, patented nutraceutical ingredients in the 1990s, the bridge became two-way, with Maypro pioneering the introduction of several high-profile branded ingredients to the Japanese market. Today, Maypro has grown into one of the largest global suppliers of nutraceutical ingredients and fine chemicals, with six strategically located companies in the U.S., Japan, and China and a global staff of over 50. We have built many global bridges, expanding into Europe and Latin America, and now service hundreds of countries worldwide.