Liver Health

Human Clinical Study (NAPL)

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>12w or more</td>
<td>14w</td>
</tr>
</tbody>
</table>

Exercise / Diet Control

OPITAC, 300mg/day

Blood Collect CT/ Fibriscan

Results for Major Clinical Parameters and Image-View Observation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre (n=29)</th>
<th>Post (n=29)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT [IU/L]</td>
<td>49.6 ± 36.1</td>
<td>58.0 ± 33.5</td>
<td>0.0455*</td>
</tr>
<tr>
<td>Fornin (mg/dL)</td>
<td>218.8 ± 150.8</td>
<td>163.6 ± 122.0</td>
<td>0.0134*</td>
</tr>
<tr>
<td>Triglyceride (mg/dL)</td>
<td>195.2 ± 139.5</td>
<td>193.5 ± 209.7</td>
<td>0.9271</td>
</tr>
<tr>
<td>Free fatty acid (mg/dL)</td>
<td>45.1 ± 24.25</td>
<td>29.5 ± 44.6</td>
<td>0.0236*</td>
</tr>
<tr>
<td>Fibriscan (based on CAP)</td>
<td>295.7 ± 46.9</td>
<td>290.5 ± 46.9</td>
<td>0.0166*</td>
</tr>
</tbody>
</table>

Sports Nutrition

OPITAC™ Increases Mitochondria Biogenesis

Muscle cell

Glucose

Fat

Fatty acid

Lactate

Pyruvate

AMPK

Transcription

Mitochondria

Expression

Metabolic/ Mitochondrial proteins

OPITAC™ improves mitochondrial function and muscle cell metabolism during exercise, leading to less muscle fatigue.

Beauty from Within

Effect of Melanin inhibition

<table>
<thead>
<tr>
<th>Melanin Production (μg/mL)</th>
<th>0</th>
<th>100</th>
<th>300</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPITAC™ (μg/mL)</td>
<td>*p&lt;0.05</td>
<td>**p&lt;0.01</td>
<td>***p&lt;0.001</td>
<td>(vs. Control)</td>
</tr>
</tbody>
</table>

OPITAC™ can inhibit melanin production dose-dependently (in vitro).

Detox & Antioxidation

Effects of OPITAC™ on Alcohol Detox

Xenobiotic (Food)

Glutathione S-transferase

Effects of Intake of Yeast Extract (100mg as OPITAC™)

<table>
<thead>
<tr>
<th>Breath Alcohol Conc. (mg/dL)</th>
<th>20 min</th>
<th>60 min</th>
<th>120 min</th>
<th>180 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>placebo</td>
<td>0</td>
<td>0.1</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>curcumin</td>
<td>0.6</td>
<td>0.4</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>OPITAC™</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

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.
L-Glutathione Reduced (GSH) is a tripeptide that exists in every cell of the human body. Its function is complex and remains the subject of ongoing research, but in summary, we know that it detoxifies the body and activates liver function, serves as an antioxidant, and removes free radicals from the body. It’s also shown to beautify the skin, and help relieve muscle fatigue. We know as well that as the body ages, as it is exposed to toxins and pollutants from inside and out, and as it is subject to physical illness and immune system deficiency, the volume of Glutathione maintained in the body decreases dramatically.

Effects of the exposure to free radicals and cell oxidation are regarded as leading signs of aging. In a very real sense, Glutathione works against aging throughout life, as it’s been doing throughout human history.

OPITAC™ Glutathione Guide (L-Glutathione Reduced)

- What is OPITAC™ Glutathione?
- Oral Supplementation: Clinically Proven Absorption
- Fitness and Lipid Metabolism
- Beauty from Within
- Detoxification and Antioxidation
- Liver Health (Fatty Liver)

FULL US FDA-GRAS Notified, USP Correspondent, GMP Approved, Kosher, HALAL

What is OPITAC™ Glutathione?

L-Glutathione Reduced (GSH) is a tripeptide that exists in every cell of the human body. Its function is complex and remains the subject of ongoing research, but in sum we know that it detoxifies the body and activates liver function, serves as an antioxidant, and removes free radicals from the body. It’s also shown to beautify the skin, and help relieve muscle fatigue. We know as well that as the body ages, as it is exposed to toxins and pollutants from inside and out, and as it is subject to physical illness and immune system deficiency, the volume of Glutathione maintained in the body decreases dramatically.

Effects of the exposure to free radicals and cell oxidation are regarded as leading signs of aging. In a very real sense, Glutathione works against aging throughout life, as it’s been doing throughout human history.

OPITAC™ Oral Absorption

KOHJIN Life Sciences, a Mitsubishi Corporation Group Company, began its pioneering research on Glutathione nearly 50 years ago, first establishing it as an active pharmaceutical ingredient (API) for acute detoxification in Japan. Although users perceived clear benefits to other health aspects, scientists were unable to link the ingestion of OPITAC™ Glutathione to evidence that it could be increased in content and used by the body when taken orally, even with the analysis of the deproteinized fraction of blood plasma from human subjects.

Where prior research had failed to detect the Glutathione in blood serum, in 2013 KOHJIN researchers, in collaboration with a team from Kyoto Prefectural University and Kyoto University, found Glutathione in the protein-bound fraction of human plasma, and published their findings. In addition, animal models proved the presence of ¹³C-labeled Glutathione in the liver at levels as high as 8-10% or more, in as little as two hours after oral administration.

Glutathione concentration in portal and peripheral blood (rat) after oral administration of ¹³C-Glutathione (¹³C-GSH) and ¹³C-NAC, up to 120 minutes. In both samples ¹³C-GSH was detected, but ¹³C-NAC was not, suggesting that Glutathione was absorbed directly and intact, but NAC was converted by digestion to amino acids, etc.
Fitness and Lipid Metabolism (Mitochondria Biogenesis)

Because such popular sports as distance running and weight training are forms of self-induced stress, it became clear to KOHJIN’s researchers that the same biochemical mechanisms that facilitate improved physical response to stressors would benefit athletes and all who aspire to athletic improvement.

KOHJIN, with assistance from Kyoto Prefectural University and Karolinska Institute, set out to map the mechanism by which OPITAC™ Glutathione led to improved conditioning against fatigue during vigorous physical activity. This breakthrough came with a series of in vivo and human clinical studies that showed, for the first time, evidence of mitochondrial biogenesis resulting from the ingestion of OPITAC™. The study proved that daily oral administration of OPITAC™ resulted in enhancing aerobic metabolism, and Mitochondrial DNA expression in skeletal muscle, accelerating fatty acid utilization. The results made it clear that ingesting OPITAC™ improved lipid metabolism and acidification in muscle during exercise, which leads to increased lipid metabolism and decreased muscle fatigue (US Patent Pub. No. US2016/0158309 A1).

OPITAC™ Increases Mitochondria Biogenesis

Daily oral administration of OPITAC™ resulted in AMP-activated kinase, PGC-1α gene, and Mitochondrial DNA expression, accelerating fatty acid utilization.

OPITAC™ supplementation improved lipid metabolism and acidification in skeletal muscles during exercise, leading to less muscle fatigue.

Beauty from Within

The earliest known property of OPITAC™ Glutathione, the one that brought it to consumer attention, was its ability to make skin brighter, lighter, and generally improve its appearance. We now know that it achieves this by working in concert with the body’s own natural functions. OPITAC™ inhibits the activity of tyrosinase, in turn, suppressing the development of eumelanin. At the same time, it disrupts the synthesis pathway of pheomelanin. This enhances protection against UV damage provided by topical skin care products (supplements and cosmetics) and reduces the appearance of dark areas. OPITAC™ makes skin appear healthier, suppler, and with the body’s own natural functions. OPITAC™ work at the molecular level, neutralizing free radicals in the system, scavenging heavy metals, and defending against environmental pollution. Today we have proof that daily intake of OPITAC™ renews this precious commodity throughout the system to infuse the skin’s appearance with a youthful tone, helping maintain it as we age and our natural supply diminishes.

OPITAC™ can inhibit melanin production concentration-dependently (in vitro).

By adding a small portion of OPITAC™, collagen production by collagen peptide can be enhanced.
Glutathione has long been recognized and used worldwide as an antioxidant supplement. Through enzymatic reaction, OPTAC™ Glutathione scavenges the ROS (Reactive Oxygen Species). While research into its complex function continues, OPTAC™’s main role as an antioxidant has been corroborated, and decreasing Glutathione levels in cells has been shown to increase the risks of disease and toxicity.

It’s known that every cell in the human body is subject to over 10,000 attacks by free radicals daily. Glutathione mediates the oxidation of cells at the mitochondrial level, and as measured using DPH methodology, enhances the effects of other antioxidants synergistically. Oxidation can’t be abated by dietary supplementation alone, but in studies, the antioxidant benefit of Vitamin C, for example, nearly doubles in combinatory effect with OPITAC™ of Vitamin C, for example, nearly doubles in combinatory effect. Oxidation can’t be abated by dietary supplementation alone, but in studies, the antioxidant benefit of Vitamin C, for example, nearly doubles in combinatory effect.

Through enzymatic reaction, Glutathione scavenges the ROS (Reactive Oxygen Species).

Detoxification and Antioxidation

Glutathione is healthy, prolific cell life, resistance to aging, and protection of the “glow of youth” that we seek in our lives, before age takes its effect on Glutathione volumes in the body. Early studies of whether oral ingestion of OPTAC™ helps improve liver condition and promote resistance to cell oxidation were subjectively-based. An in-house panel of male and female subjects imbibed a moderate, proportionate amount of alcohol based on body weight. They were then administrated either a placebo, curcumin (30 mg), or OPTAC™ (100 mg) and questioned at one-, two-, and three-hour intervals. Headache, heavy stomach, sleepiness, dizziness and other indications of lost sobriety appeared to diminish more rapidly and effectively in the OPTAC™ group. Clinical proof arrived in the concentration of alcohol in the subjects' exhalations — vastly lower than the control and curcumin in every measurement.

Liver Health (Fatty Liver)

It’s an unfortunate fact that the morbidity rate due to fatty liver, especially nonalcoholic fatty liver (NAFL), is close to 25% in the Asia-Pacific region, and the number rises to nearly 30% in Europe and North America. NAFL can progress to nonalcoholic steatohepatitis (NASH), and is considered a hepatic manifestation of metabolic syndrome, which is related to obesity, hypertension, and oxidative stresses. No medication exists today to eradicate fatty liver, which makes monitoring liver parameters an especially significant gauge of personal health.

In our study, OPTAC™ Glutathione improved major clinical parameters of liver health (AST, ALT), lipid metabolism (FFA, VO2/VCO2), inflammation (Ferritin), and image-view observation (Fibroscan) significantly, after 16 weeks of OPTAC™ intake. (JPT Patent Pub. No. WO2016140237)

Liver Health (Fatty Liver)

Adding to known proof that Glutathione serves to support the reduction of free radicals, clinical research undertaken by KOH-JIN and Yokohama City University, a member of the Japan Study Group of Nonalcoholic Fatty Liver, proved – for the first time over – that OPTAC™ Glutathione improved major clinical parameters of liver health (AST, ALT), lipid metabolism (FFA, VO2/VCO2), inflammation (Ferritin), and image-view observation (Fibroscan) significantly, after 16 weeks of OPTAC™ intake. (JPT Patent Pub. No. WO2016140237)