



Symphony®

NATURAL HEALTH

# Femmenessence® (Maca-GO®)

The Science, Publications, and Clinical  
Applications for Hormone Health

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Modified from previous publication by Ron Carter, MD

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# Introduction

Up to 85% of women in peri- and post-menopause experience a variety of symptoms, ranging from hot flashes and night sweats to sleep disturbances, mood disturbances, loss of libido, weight gain, and vaginal dryness.<sup>1</sup>

Hormone replacement therapy (HRT), which includes using estrogen or a combination of estrogen and progestin, became popular in the 1960s, after the release of the book, “Feminine Forever” and was the therapy of choice for relieving menopause-related symptoms in Western cultures for many decades.<sup>2</sup> Into the 1980s and 1990s, other late onset diseases or conditions, such as osteoporosis, cardiovascular events, and neurological decline were connected to the loss of hormones and therefore guidelines were enacted for the use of HRT as a preventative therapy for these chronic diseases.<sup>3</sup> As a result, the movement had now shifted from “feminine forever” to “healthy forever”.<sup>3</sup> By 2001, 42% of American women (ages 50–75) were taking HRT, not just for hormones, but for the prevention of chronic disease.<sup>2</sup>

However, this trend shifted when the results of the Women’s Health Initiative (WHI) study was ended early reporting that women who used combination HRT (estrogen and progesterone) were at increased risk for developing breast cancer and coronary heart disease while those using estrogen only therapy were at increased risk for stroke.<sup>2,3</sup> Sales of Premarin and Prempro, two common forms of HRT, dropped drastically due from 2002-2003 to the WHI findings (33% and 66%, respectively).<sup>2</sup>

HRT (including bioidentical hormone replacement therapy) are exogenous forms of hormones introduced to the body rather than hormones being produced by the body. Often, medically prescribed hormones are given in large amounts and once during the day in oral form, topically, or as a pellet under the skin. This approach contradicts the body’s mechanism of secreting hormones in adequate (low) amounts as they are needed throughout the day and in proper amounts based on a women’s stage of life. The use of HRT, BHRT, and hormonal contraceptives can also, over time, further reduce the body’s already low hormone production further exacerbating the original symptoms when stopped and importantly does little to correct or address the underlying root cause(s).<sup>4-8</sup>



These strategies might be effective for some in managing reproductive or menopausal symptoms, and may have been the best options women and clinicians had at the time, however recent and emerging research provides a more effective, safe option that addresses the root cause of the plethora of symptoms women experience relating to reproductive hormones.

# Addressing the Root Cause of Hormone Imbalance

No dietary supplement had ever shown in published clinical trials statistically significant improvements in hormone levels in peri- and post-menopausal women. However, that changed in 2005 with the publication of clinical research into a novel ingredient called Maca-GO<sup>®</sup> commercially known as **Femmenessence<sup>®</sup>**.<sup>9-12</sup>

Instead of introducing hormones into the body in various amounts, through one or more delivery systems, or introducing a drug to reduce a hormone's production, **Femmenessence<sup>®</sup>** favorably modulates the hypothalamus-pituitary-thyroid-adrenal-ovarian (HPTAO) axis to support the body's own hormone production<sup>™</sup>. This process can include increasing **and** decreasing the production of different hormones based on individualized needs.

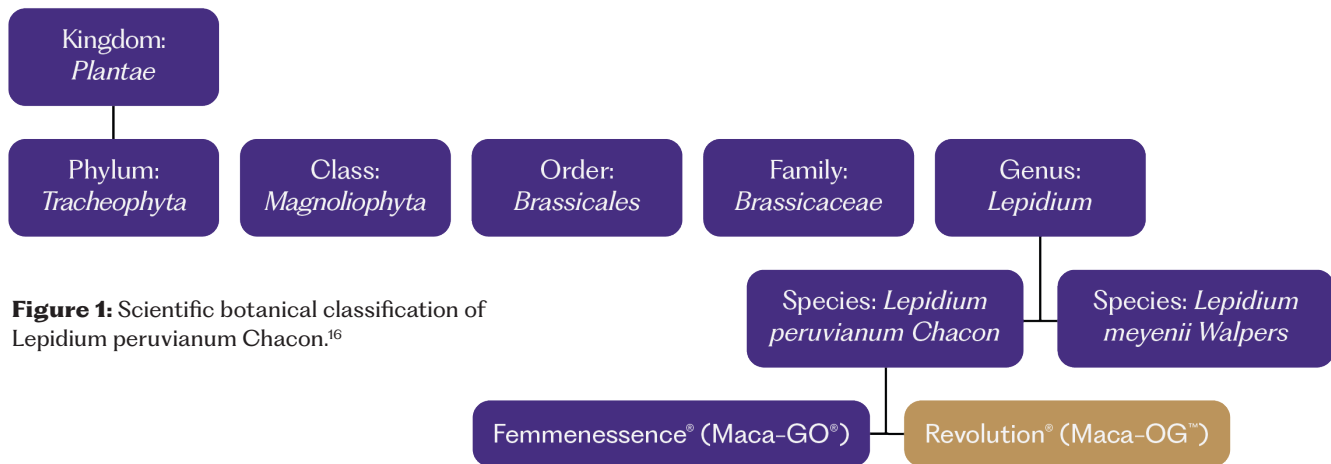
Because of these groundbreaking published results, an abstract of the research was republished in *Menopause*, the medical journal of the North American Menopause Society (the largest organization of its kind in the world).<sup>13</sup> Additionally, Symphony Natural Health, the company responsible for bringing **Femmenessence<sup>®</sup>** to the market, was the first natural product company allowed to exhibit at the American College of Obstetricians and Gynecologists (ACOG) and the first recommended by the American Menopause Foundation.

## Aim

The purpose of this paper is to provide scientific background to Femmenessence<sup>®</sup> (Maca-GO<sup>®</sup>) and to report the key findings of the preclinical, pharmacology and human clinical trials using a concentrated, bio-available *Lepidium peruvianum* formulation (Maca-GO<sup>®</sup>) for peri-and post-menopausal women. We propose the use of Maca-GO<sup>®</sup> as a natural option that truly addresses the root cause of the menopause transition, to manage symptoms, and support heart, bone and mental health.

# Lepidium

*Lepidium*, commonly known as the peppergrasses or pepperworts, is a genus of plants in the mustard family *Brassicaceae*. In 2023, the World Flora Online (WFO) reports that there are 249 species of *Lepidium*.<sup>14</sup> *Lepidium meyenii* (Walpers) is one of the species that was first identified in 1843 and is native to northwest Argentina, Bolivia, Peru and north Chile.<sup>15</sup> In 1990, Gloria Chacon de Popovici, PhD, a Peruvian botanist, was responsible for bringing the recognition of *Lepidium peruvianum* (Chacon)<sup>16,17</sup> to the botanical world after years of researching *Lepidium meyenii*,<sup>18</sup> clarifying that *Lepidium meyenii* was a wild growing maca plant, whereas *Lepidium peruvianum* is a cultivated maca plant, native to Peru, that originates with its Incas origin.<sup>19</sup>



In 2005, to foster a culture of respect for scientific investigation and legitimacy, an authoritative plant taxonomy specialists' work group that included the Peruvian government, La Molina University, and San Marcos University officially and by consensus recognized the true species denominated with the common name "maca" with the scientific name *Lepidium peruvianum* Chacon ("*Lepidium peruvianum*" in this document), in accordance with the rules of the International Code of Botanical Nomenclature.<sup>20</sup>

Today, the two names (*Lepidium peruvianum* Chacon and *Lepidium meyenii* Walpers) populate the scientific literature and are commonly referred to as "maca". However, as noted by Meissner, et al.

"All the internationally published research on Maca, which followed the work of Chacon, was conducted on cultivated Peruvian Maca."<sup>10</sup>

Of note, many scientific papers erroneously have used and continue to use the name *Lepidium meyenii* to represent the cultivated maca of Peru.<sup>10</sup> The source of maca has become increasingly complicated by the large-scale commercial growing of maca in various parts of China, and the adulteration of Peruvian maca with wild sources from Bolivia and other parts of South America, further emphasizing the need for the correct nomenclature.

“Therefore, instead of referring to Maca as *L. peruvianum* or synonym *L. meyenii*, as in many articles Maca is scientifically referred to, after inspecting depositions of both plants in Herbarium in Lima, followed by a collection and deposition of both specimens in Herbariums of Medicinal plants in Australia and Poland, it is been resolved to adopt in our work the proper term for cultivated Maca as *Lepidium peruvianum Chacon*, being the only plant with historically valid reference and traditionally established grounds to be referred to in scientific work as Peruvian Maca, representing dietary, therapeutic and medical characteristics duly referenced in research literature and reflecting experimental work conducted on this plant to date.”<sup>10</sup>

## *Lepidium peruvianum*

*Lepidium peruvianum* is one of about 29 identified *Lepidium* species that grows in the Andes.<sup>21</sup> It has been well known for its fertility-enhancing properties, energizing effects, and high nutritional value.<sup>22,23</sup> Reported medicinal properties and energizing effects of *Lepidium peruvianum* are linked to the unique composition of this plant cultivated exclusively in the central Peruvian Andes at 12-14,000 feet, under harsh natural conditions, exposed to the full spectrum of solar radiation, low humidity, and extreme temperature changes.<sup>10</sup>

Beneficial properties were first linked to alkaloids identified in the 1960s by Dr. Chacon as she studied *Lepidium meyenii* for her PhD thesis.<sup>18</sup> It was this discovery, in part, that led to the later (and proper) classification of *Lepidium peruvianum* in 1990.<sup>16</sup> In recent years, other groups of active constituents were reported, such as polyunsaturated acids and their amides, plant sterols such as stigmasterol, one of a group of phytosterols that includes campesterol, ergosterol (provitamin D2), and brassicasterol — all biochemically related to

cholesterol and steroid hormones such as estrogen, testosterone and progesterone and aromatic glucosinolates such as benzyl and p-methoxybenzyl glucosinolates, and their derived isothiocyanates.<sup>24-29</sup>

In 1992, 758 batches of *Lepidium peruvianum* were analyzed. These samples came from different growing locations of the Junín region of Peru. As a result of this analysis, the species *Lepidium peruvianum* was confirmed to consist of 13 different phenotypes.<sup>23,30</sup>

The phenotypes were originally classified by their colors, with the most predominant being black, yellow, red, white, gray, and purple.<sup>23</sup> However, research has since identified that each phenotype (color) has variations in their DNA and display varying distribution patterns of active constituents.<sup>26-30</sup> No active constituent alone has been found to be the single functional marker for its claimed benefits.<sup>28</sup> The various phenotypes have shown diverse physiological effects and gender-affinity, therefore suggesting that men and women will benefit differently based on the chosen phenotype(s). Additionally, published research between 2015-2020 has revealed the importance of the location and elevation in which maca is grown.<sup>27,28,30</sup> Significantly higher concentrations of the active constituents are present in maca from Junín and Ancash growing locations in Peru than those cultivated in China.<sup>29</sup> Of note, researchers also found variations in the levels of active constituents based on the altitude and the two different geographic locations crops were grown within Peru, further supporting why there are different phenotypic expressions even within colors (phenotypes) and thus different physiological effects on the body.<sup>29</sup>



**Photo 1:** Dr. Gloria Chacon and Dr. Henry Meissner



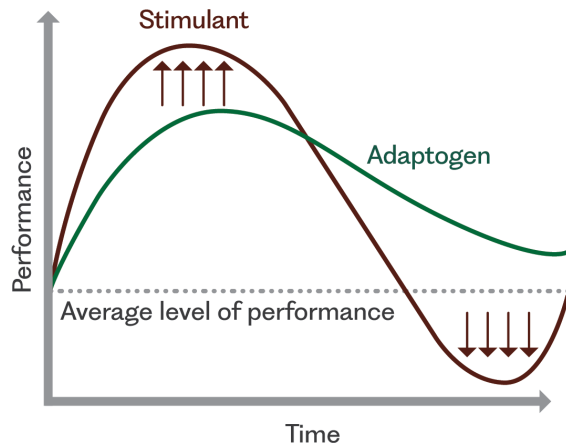
**Photo 2:** The Junín region of Peru



**Photo 3:** Colors (samples) of *Lepidium peruvianum* Chacon from Junín region

## Adaptogens vs. Stimulants

Adaptogens support the body's natural performance rhythm

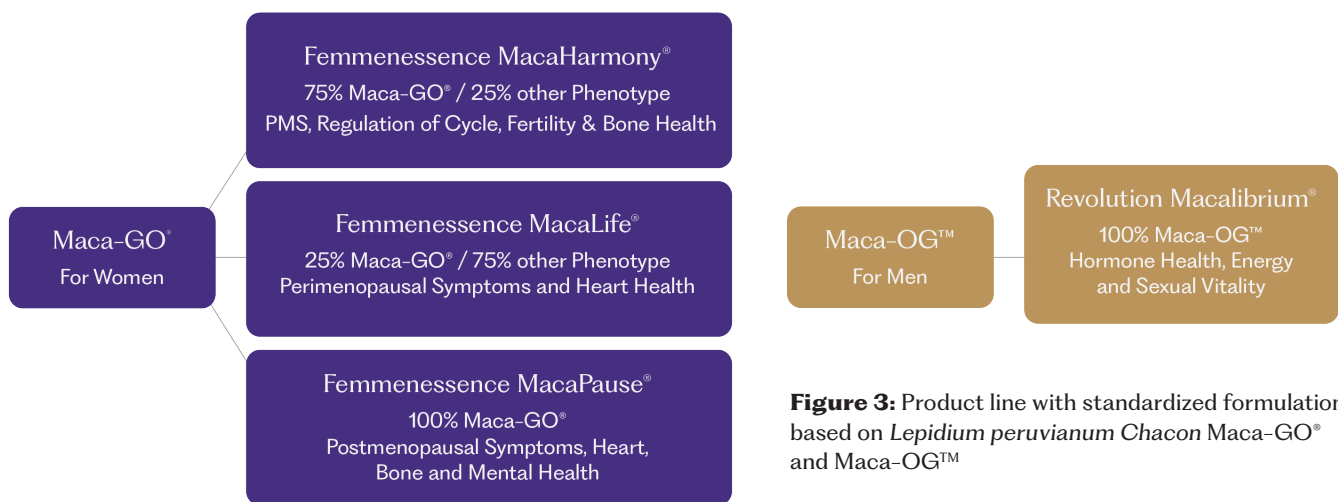


**Figure 2: Illustration purposes only:**  
Difference between adaptogen and stimulant

In addition to the diverse nutritional, phytonutrient, and active constituents' composition, *Lepidium peruvianum* can be regarded as an adaptogen<sup>30</sup> which is a natural compound or extract that supports homeostasis by priming the body to better endure adverse stressors. Adaptogens raise overall nonspecific resistance leading the organism to better adapt to stressful circumstances.<sup>31,32</sup> This adaptation includes reducing or eliminating the exhaustion phase that follows a typical stress response. Unlike stimulants, adaptogens don't boost stamina by draining and/or depleting cellular energy reserves.<sup>31,32</sup> Traditionally used for its medicinal properties and energizing effects by natives of Peru, *Lepidium peruvianum*'s physiological and fertility-enhancing benefits have been reported in publications since 2001.<sup>25</sup> The plant sterols are believed to assist in triggering the body to enhance hormone production.<sup>10</sup> Additionally, its reported effects on sex hormone production, stimulation of body metabolism, increase in energy and vitality, reduction of excess body weight, stress control, antidepressant activity, memory improvement, and the enhancement of sexual drive have also been published.<sup>9-12,33-37</sup>

# Proprietary, Standardized *Lepidium peruvianum* Formulations

Utilizing the deep understanding of the different phenotypes of *Lepidium peruvianum*, four distinctly unique *Lepidium peruvianum* formulations were created (Figure 3):



**Figure 3:** Product line with standardized formulations based on *Lepidium peruvianum* Chacon Maca-GO and Maca-OG

The Femmenessence® line and Revolution® are proprietary formulations made from certified organic *Lepidium peruvianum* phenotypes that go through a proprietary manufacturing process<sup>36,37</sup> that includes pre-gelatinization to achieve optimized, increased concentrations of the plant's known functional constituents, including, fatty acids, imidazole alkaloids, catechins, and most abundantly, glucosinolates.<sup>27</sup>

*Lepidium peruvianum* cultivated for Maca-GO and Maca-OG grows exclusively on land controlled by Symphony Natural Health to ensure that crops grow in their natural habitat, cultivated under strict avoidance of artificial fertilizers and pesticides, and observing 7-year land-rotation practices. We have worked with the same joint venture partners in Peru, for both farming and manufacturing, for over 20 years. This ensures the consistency or quality and standardization of our growing, harvesting, drying, and manufacturing, to ensure sustainability, cultural integrity, local co-ownership, year-round employment, and the creation of a value-adding industry injecting more than double the revenue into the local economy.

Symphony Natural Health’s proprietary process includes quality-enhancement procedures starting with careful selection of soil and growing locations, seed selection, cultivation, and harvest methods.<sup>27,30</sup> Low temperature, controlled pressure and moisture (as opposed to radiation, solvents, and high heat) are used in the proprietary process to sterilize and pre-gelatinize *Lepidium peruvianum*, increasing water solubility from 68% in raw maca to 99% in our finished products.<sup>36,37</sup> This process removes the harder to digest starches that are present in raw maca, reducing or eliminating digestive discomfort and concentrates *Lepidium peruvianum*’s entire spectrum of active constituents in the gender-specific ratios defined for Maca-GO® and Maca-OG™. Further, our products have been independently third-party tested and found to be low FODMAPs.



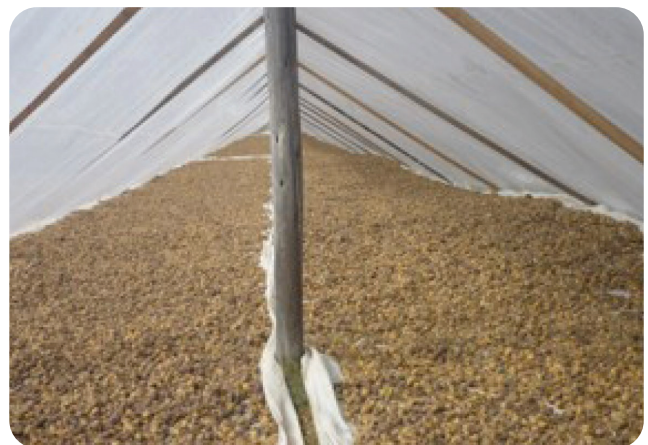
**Photo 4:** James Frame, CEO (left) and Dr. Henry Meissner (right) on Maca Farm in Peru



**Photo 5:** Harvested bunch of *Lepidium peruvianum Chacon*

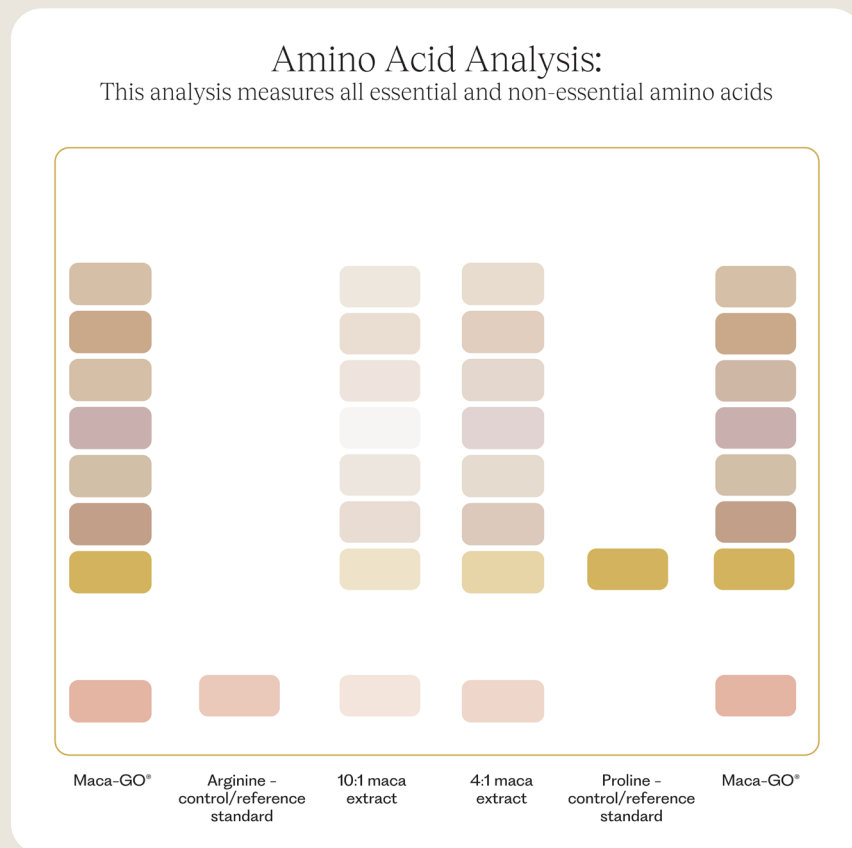


**Photo 6:** Traditional drying methods (daytime) of *Lepidium peruvianum Chacon*



**Photo 7:** Traditional drying methods (nighttime) of *Lepidium peruvianum Chacon*

To demonstrate the potency, Maca-GO® was compared to a 10:1 concentration maca extract from the U.S. and a 4:1 maca extract from Europe, both of which supersede raw maca powder and gelatinized maca. (Figures 4 and 5)



**Figure 4:** Amino acid concentration of different *Lepidium peruvianum* samples, including Maca-GO® a 10:1 concentrated product, and a 4:1 concentrated product.<sup>38</sup>

**Amino Acids:** This analysis measures all essential and non-essential amino acids. Arginine (sample number 2) and proline (sample number 5) were used as controls (reference standards). The results show there is a higher concentration of every amino acid in Maca-GO® (sample number 1 and 6) when compared to the two standardized extracts.

**Amino Acid Analysis:**

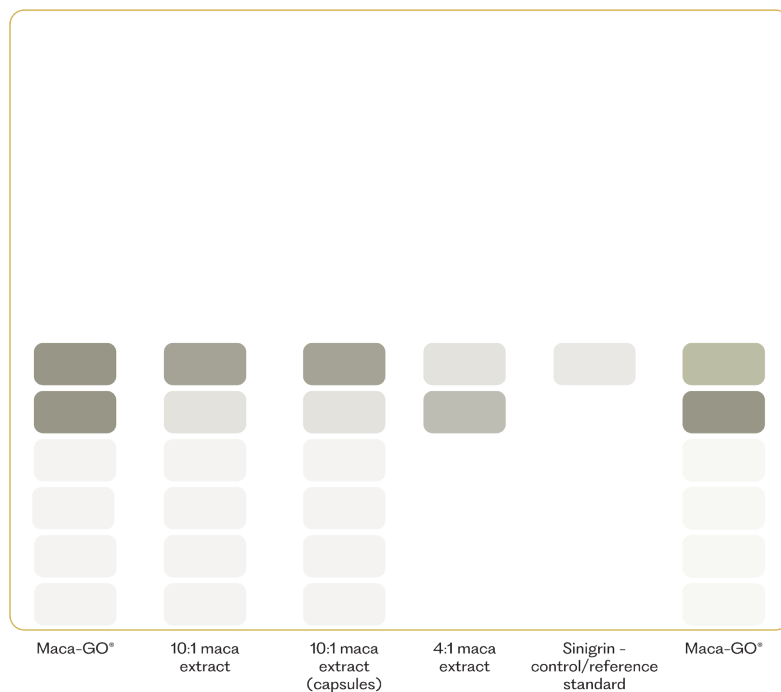
1. Maca-GO®
2. Arginine — standard
3. 10:1 maca extract
4. 4:1 maca extract
5. Proline — standard
6. Maca-GO®

**Glucosinolates:** Glucosinolates in *Lepidium peruvianum* are reported to be the biochemical active compound responsible for inducing energizing and fertility-enhancing effects and stimulating gender-specific reproductive functions.<sup>9,27</sup> There are 9 glucosinolates that have been identified in *Lepidium peruvianum*.<sup>26</sup>

In this analysis, sinigrin (number 5), used as a control, is a glucosinolate found in all plants of the *Brassicaceae* family, in various amounts.<sup>39</sup> Generally, testing only measures the total levels based on grouping the glucosinolates into two primary groups as seen by the two (dark green) marker results for Maca-GO<sup>®</sup> (sample numbers 1 and 6). The 10:1 maca extract concentrates to primarily one group of glucosinolates (sample numbers 2 and 3) while the 4:1 maca extract concentrates the other group of glucosinolates (sample number 4). Maca-GO<sup>®</sup> has higher levels of both groups of glucosinolates (sample numbers 1 and 6).

### Glucosinolate Analysis:

This analysis measures glucosinolate concentrations into 2 major groups



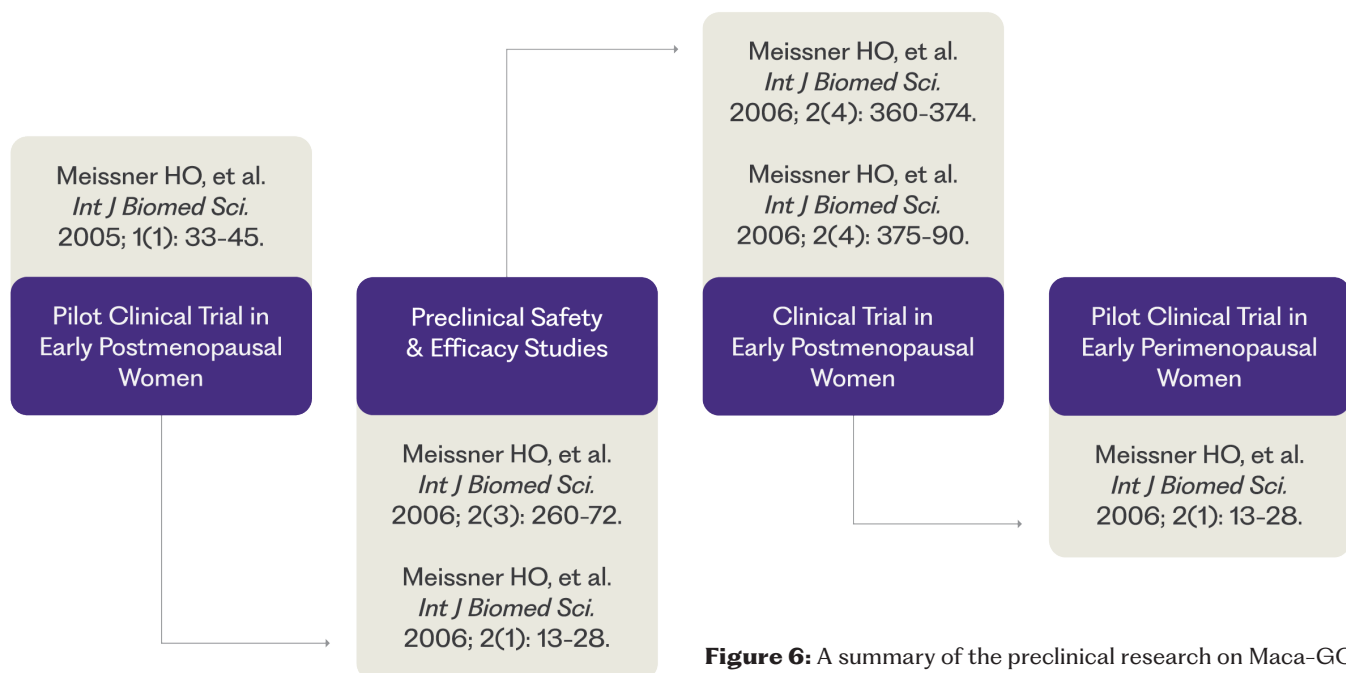
### Glucosinolate Analysis:

1. Maca-GO<sup>®</sup>
2. 10:1 maca extract
3. 10:1 maca extract (capsules)
4. 4:1 maca extract
5. Sinigrin — standard
6. Maca-GO<sup>®</sup>

International, independent, third-party certifying organizations regularly monitor Symphony Natural Health's agricultural and manufacturing practices and supervise the entire production process to meet or exceed USDA, Japanese, and European Union organic, Kosher, and Good Manufacturing Practice (GMP) guidelines.<sup>40,41</sup>

**Figure 5:** Glucosinolate concentrations of different *Lepidium peruvianum* samples, including Maca-GO<sup>®</sup> a 10:1 concentrated product, and a 4:1 concentrated product.<sup>38</sup>

# Femmenessence<sup>®</sup> Maca-GO<sup>®</sup> – The First Standardized *Lepidium peruvianum* Formulation Studied in Menopausal Women



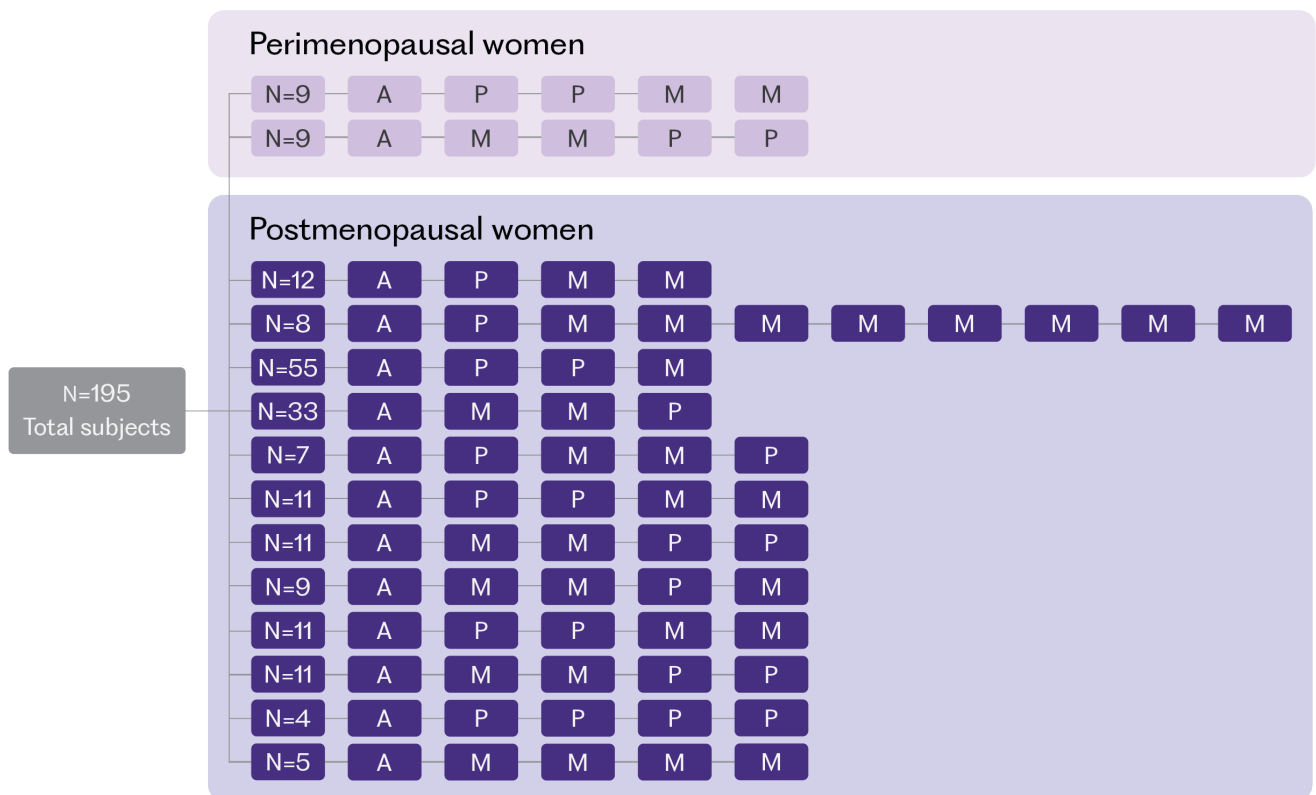
## Supporting Basic Science

Research was conducted using Maca-GO<sup>®</sup> in two animal studies to identify physiological responses and to assess for safety. Safety testing was conducted following the Organization for Economic Cooperation and Development (OECD) protocol for acute toxicity of chemical substances. Maca-GO<sup>®</sup> demonstrated no toxic effects (measured by LD50) when administered up to 15 g/kg of body weight, which is above the 2 g/kg of body weight limit set for dietary supplements. Further, no adverse effects were detected in test animals. Histopathological evaluation of their internal organs (liver, spleen, pancreas, testes, and ovaries) after short-term and extended exposure confirmed Maca-GO<sup>®</sup>'s safety profile. Biochemical

and pharmacodynamic studies in rats were indicative of Maca-GO®'s adaptogenic effects on hormones pertaining to the hypothalamic-pituitary-thyroid-adrenal-ovarian or gonadal system, including desired physiological changes in estradiol, progesterone, TSH, T4, cortisol, and ACTH, as well as displaying normalizing tendencies on blood cholesterol and triglycerides. Additionally, Maca-GO® demonstrated improvements in cognitive function and exhibited anti-depressant like effects.<sup>36,37</sup>

# Human Clinical Trials

Four human clinical trials were conducted including peri- and post-menopausal women, two of which included 2 trials within the study. Combined, 195 women participated in the clinical trials. (Figure 7)



**Figure 7:** A summary of the of all human clinical trials using *Lepidium peruvianum* Chacon formulation (Maca-GO®) in early pre- and post-menopausal women, A=Admission, M=Maca-GO®, P=Placebo

# Pilot Studies

Two pilot studies were completed. One included perimenopausal women and the second included early postmenopausal women. The aim of both studies was to assess the use of Maca-GO® for alleviating menopausal symptoms (using Greene's Menopausal Score or Kupperman's Menopausal Index) and its impact on hormones and cardiovascular markers.

## Perimenopausal<sup>9</sup>

Twenty perimenopausal women (ages 41-50) were enrolled, of which 18 completed the 4-month double-blind, crossover, randomized pilot study. Women were assigned to two groups receiving either a) 2 months of placebo (sorbitol & cellulose), followed by 2 months of Maca-GO® (2 g/day) or b) 2 months of Maca-GO® (2 g/day) followed by 2 months of placebo. Blood samples were drawn at admission and each month thereafter. Two months of Maca-GO® resulted in:

### Hormones

- 52% increase in estradiol
- Significant increase in FSH
- 92% in progesterone
- Significant increase in ACTH

### Cardiovascular Markers

- Significant increase in HDL cholesterol
- Significant reduction in body weight
- Reduction in blood pressure and triglycerides

### Menopausal Symptoms

- 82% reported noticeable reductions in menopausal symptoms as assessed by Kupperman's Menopausal Index, with the most improvements noted as reducing hot flashes, night sweats, heart palpitations, nervousness, disrupted sleep, and depression.

## Postmenopausal<sup>10</sup>

This pilot study consisted of two trials. Twenty early menopausal women (ages 45-62) were enrolled in Trial I, in which Maca-GO® was taken for 2 months. Eight women (ages 45-62) were enrolled in Trial II, in which Maca-GO® was taken for 8 months. Both groups began the trial taking 1 month of a placebo. The pilot study established the basis for additional clinical research, with select findings for postmenopausal women summarized below.<sup>10-12</sup>

### Hormones

- Significant increase in progesterone
- Significant increase in LH
- -34% decrease in FSH after 2 months and 8 months of use
- Significant increase in LH after 2 months and 8 months of use
- Significant increase in progesterone after 8 months of use
- 205% increase in estradiol after 2 months and 8 months of use

### Menopausal Symptoms

- 84% reported noticeable reductions in menopausal symptoms, as assessed by Greene's Menopausal Score, with improvements noted as heart, bone, and mental health.

# Clinical Trials<sup>11,12</sup>

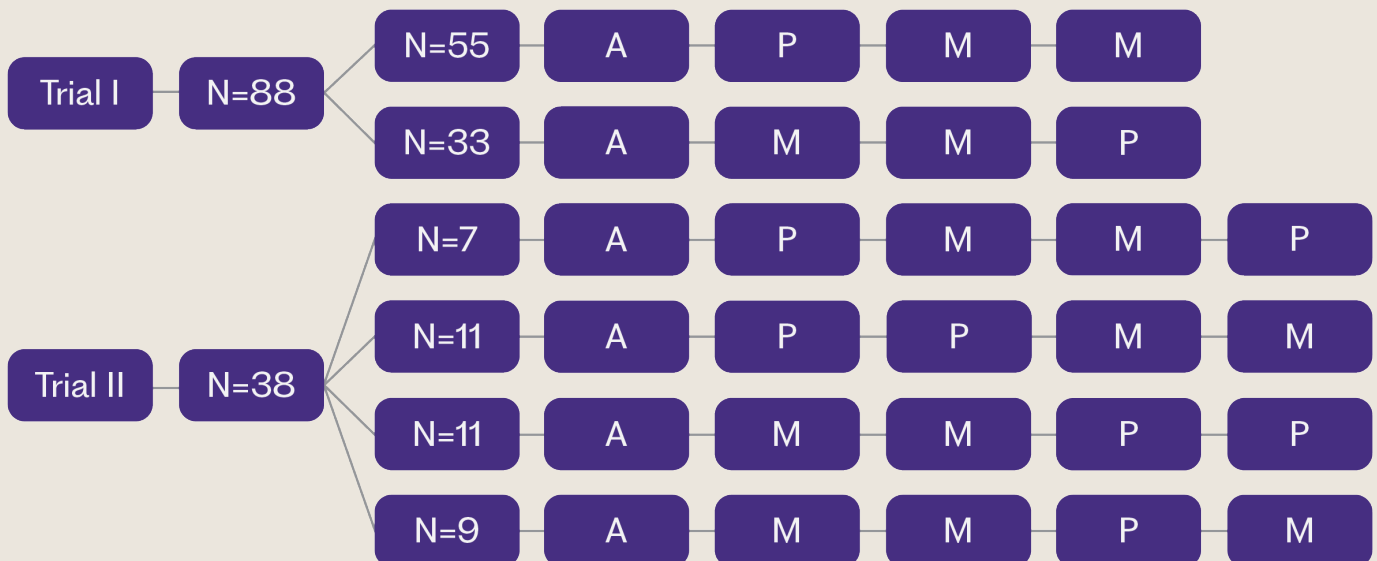
Larger clinical studies were also conducted.

## Multi-Center Trials<sup>11</sup>

The first study included early post-menopausal Caucasian women (ages 49–58 years old) who were enrolled in a European multi-center clinical trial. Patients were recruited in five urban gynecological clinics in two culturally different cities (Poznan and Glogow, Poland), and randomly assigned to the arms of the protocol under adherence to all relevant ethical and Good Clinical Practice standards.<sup>40,41</sup>

This study included two trials, of which 126 women completed the study. The aim of this study was to confirm the results of the pilot studies and to assess biological markers and symptomatic relief from menopausal symptoms when Maca-GO<sup>®</sup> (2 g/day) and placebo were introduced in various sequences and for various lengths of time. (Figure 8)

Blood samples were drawn, and menopausal symptoms assessed on admission (A) and at the end of every month on either Maca-GO<sup>®</sup> (M) or Placebo (P). Participants were randomly allocated to one of several arms of selected sequences of Maca-GO<sup>®</sup> (M) or Placebo (P) that differed in their length (3 or 4 months).



**Figure 8:** Design of a multi-center study of a standardized *Lepidium peruvianum* Chacon formulation (Maca-GO<sup>®</sup>) in early post-menopausal women (n=126). A=Admission, M= Maca-GO<sup>®</sup> P=Placebo

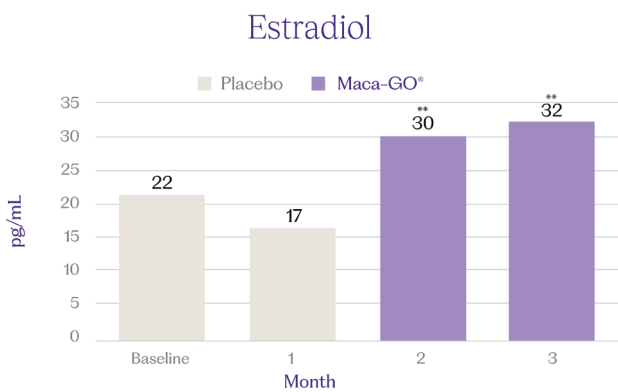
This approach was chosen to generate a broad set of data with the goal of confirming the outcome of the pilot studies, assess residual effects of Maca-GO® when switching to placebo, and to identify placebo effects in symptom relief as well as changes in biological markers under more expanded, diverse, real-world settings.

Blood serum hormone levels (FSH, LH, E2, P) and lipid profiles (total cholesterol, TG, HDL-cholesterol, LDL-cholesterol) were drawn from pre- assigned patient subsets and measured each month in internationally certified laboratories — together with an assessment of menopausal symptoms according to the validated questionnaires, Greene’s Menopausal Score (also known as Greene’s Climacteric Score) and Kupperman’s Menopausal Index. Data were collected and analyzed with SPSS according to validated statistical tests.

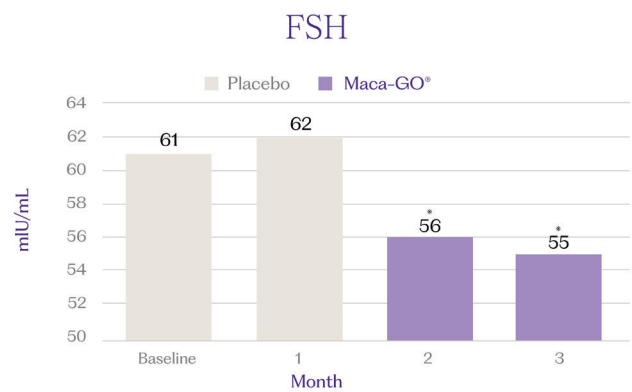
### Key Findings

The following is a selection of the most relevant findings representative of Maca-GO®’s characteristic effects on hormone levels, lipids, and menopausal symptoms. Each graph shows results from an entry measurement taken at the time of admission (Baseline), and then from monthly measurements taken after one month on Placebo (P) or on Maca-GO® (M).

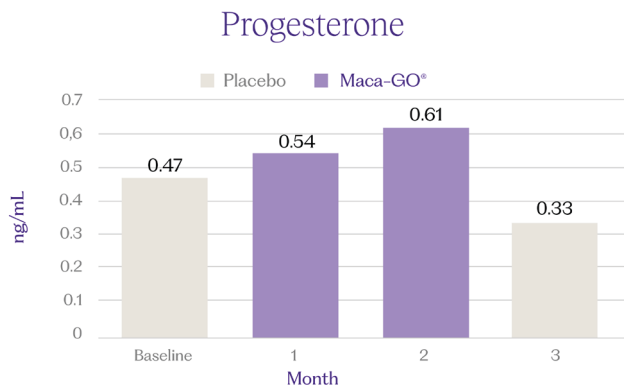
### Hormones



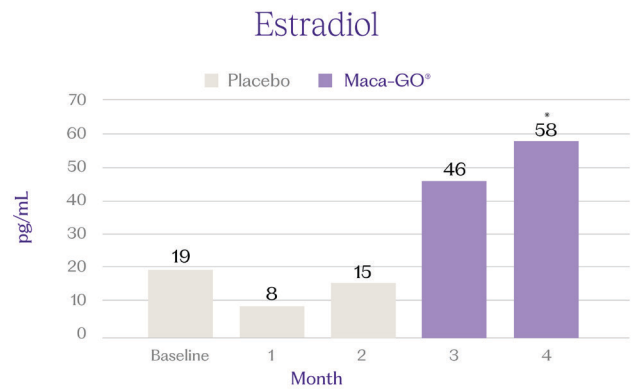
**Figure 9:** Low initial estradiol levels showed a highly significant increase (\*\*p<0.001) after one and two months on Maca-GO®. (N=55)



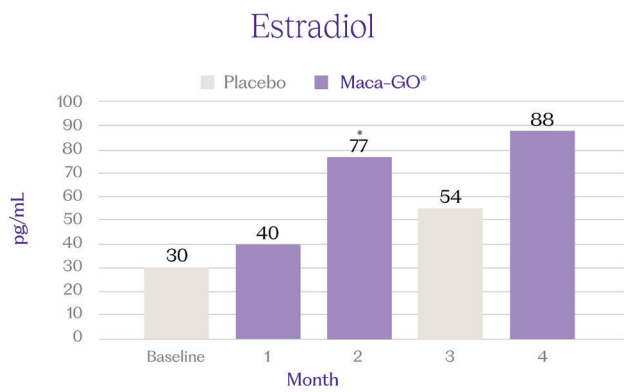
**Figure 10:** FSH levels decrease significantly (\*p<0.05) as estradiol production normalized (see Figure 9) after two consecutive months on Maca-GO®. (N=55)



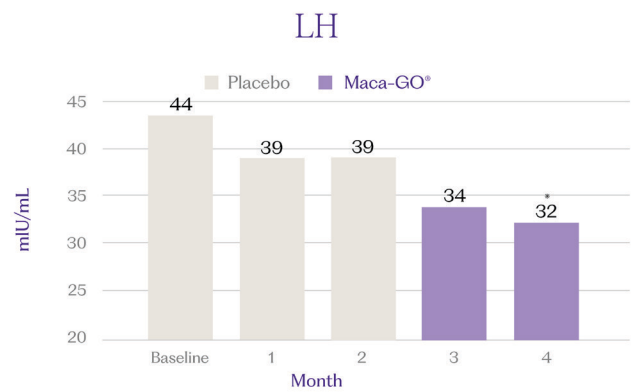
**Figure 11:** Progesterone level changes were indicative of Maca-GO's hormone balancing effect. (N=33)



**Figure 12:** After two months on placebo, two months on Maca-GO® showed a significant increase (\*p<0.05) in estradiol. (N=11)

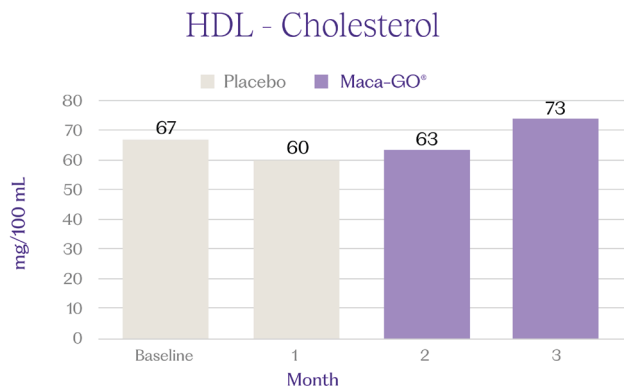


**Figure 13:** Maca-GO® for two months, then a month on placebo, and again one month on Maca-GO® showed significant increase (p\* $<$ 0.05) in estradiol levels. (N=9)

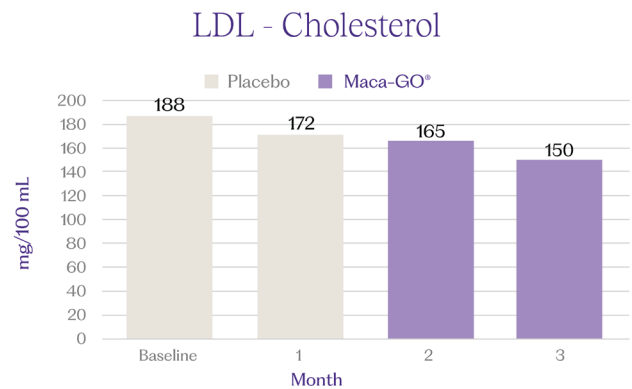


**Figure 14:** After two months on on Maca-GO® a significant decrease (\*p<0.05) in LH was measured. (N=11)

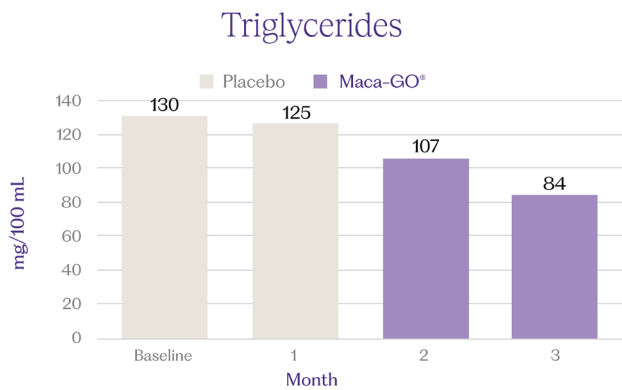
## Cardiovascular markers



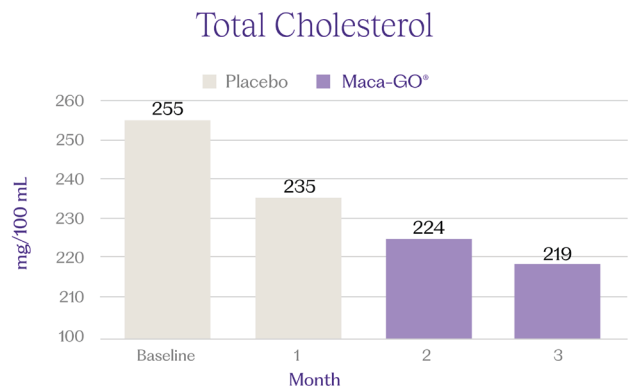
**Figure 15:** A rise in HDL was measured after two months on Maca-GO®. (N=18)



**Figure 16:** Administration of Maca-GO® for two consecutive months showed a reduction of LDL cholesterol. (N=18)

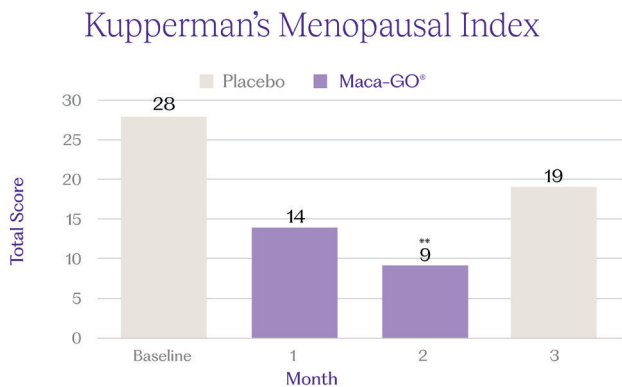


**Figure 17:** Maca-GO® showed reductions in triglycerides after two months. (N=18)

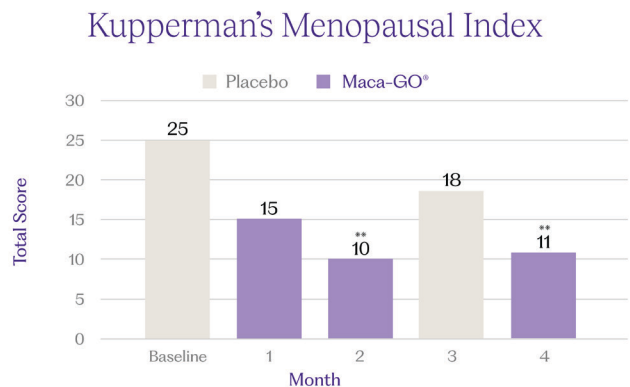


**Figure 18:** A tendency to lower total cholesterol was observed after two consecutive months on Maca-GO®. (N=18)

Menopausal Symptoms



**Figure 19:** Highly significant (\*\*p<0.001) reductions of menopausal symptoms according to the Kupperman's Menopausal Index after two months on Maca-GO®. (N=33)



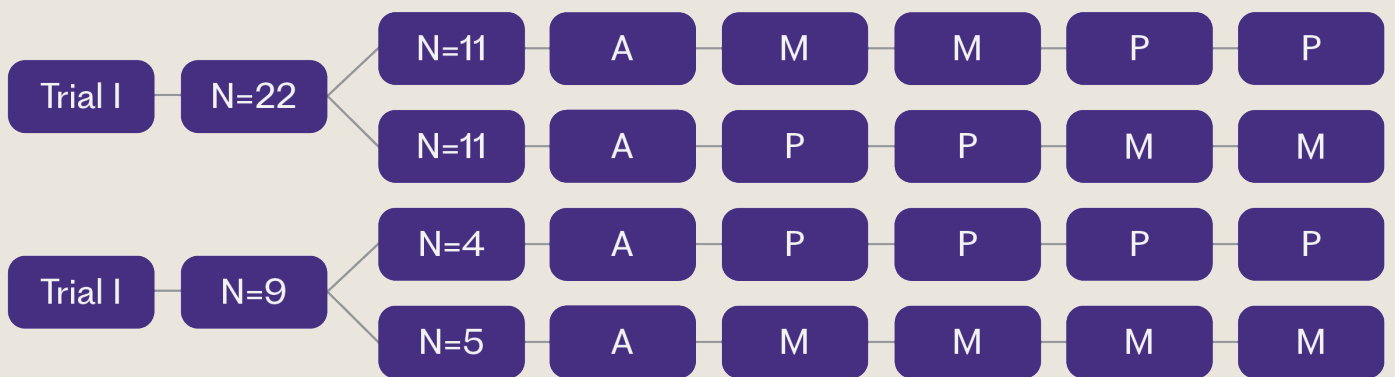
**Figure 20:** After two months on Maca-GO® a highly significant decrease (\*\*p<0.001) in menopausal symptoms was reported, with an increase in symptoms returning after taking placebo for one month, followed by a decrease in symptoms upon resuming use of Maca-GO®. (N=9)

# Concluding Clinical Trials<sup>12</sup>

The second clinical trial included the enrollment of 34 early post-menopausal Caucasian women (ages 49–58 years old) receiving treatment from one clinic in Poland.

This study included two trials, of which 22 women were admitted into the crossover configuration trial and 12 women in a pilot bone density observation, of which 9 women completed. (Figure 21)

Blood samples were drawn and menopausal symptoms assessed on admission (A) and at the end of every month on either Maca-GO® (M) or Placebo (P). Participants were randomly allocated to one of several arms of selected sequences of Maca-GO® (M) or Placebo (P).

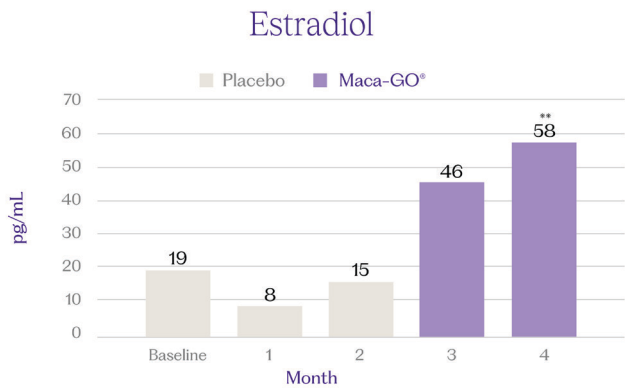


**Figure 21:** Design of a multi-center study of a standardized *Lepidium peruvianum* formulation (Maca-GO®) in early post-menopausal women (n=31). A=Admission, M=Maca-GO®, P=Placebo.

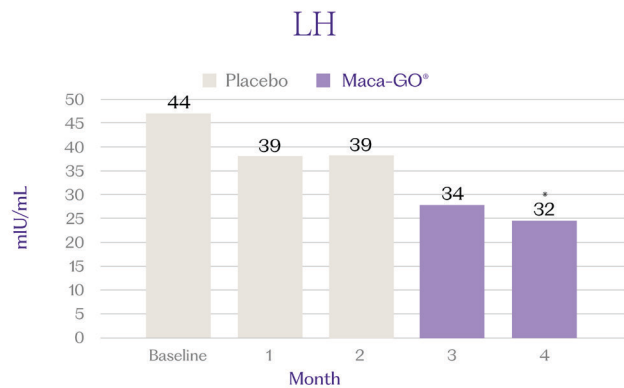
## Key Findings

The following is a selection of the most relevant findings representative of Maca-GO®’s characteristic effects on hormone levels, lipids, and menopausal symptoms. Each graph shows results from an entry measurement taken at the time of admission (Baseline), and then from monthly measurements taken after one month on Placebo (P) or on Maca-GO® (M).

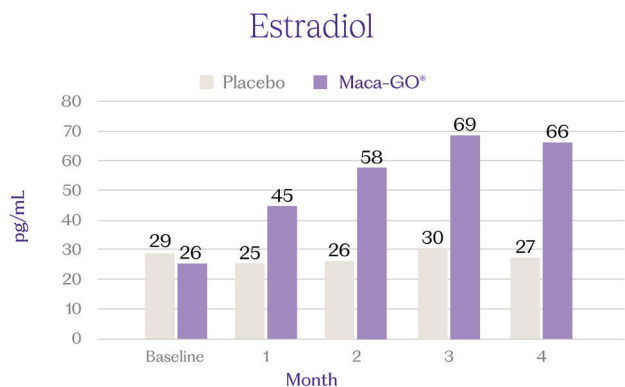
# Hormones



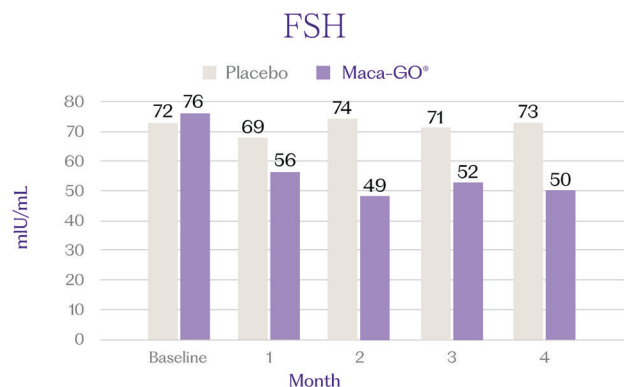
**Figure 22:** Low estradiol levels showed a significant increase (\*p<0.05) after two months on Maca-GO® following two months of placebo. (N=11)



**Figure 23:** Two months of placebo was followed by two months of Maca-GO®, with a significant decrease (\*p<0.05) in LH measured after two months of Maca-GO®. (N=11)



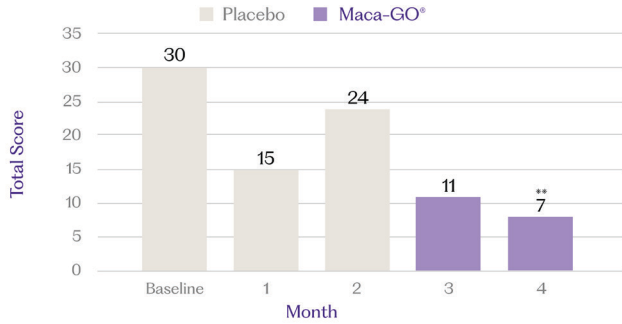
**Figure 24:** Four months of placebo or four months of Maca-GO® was administered with an increase in estradiol levels using Maca-GO®. (Placebo N=4, Maca-GO® N=5)



**Figure 25:** Four months of placebo or four months of Maca-GO® was administered with a decrease and stabilization in FSH levels using Maca-GO®. (Placebo N=4, Maca-GO® N=5)

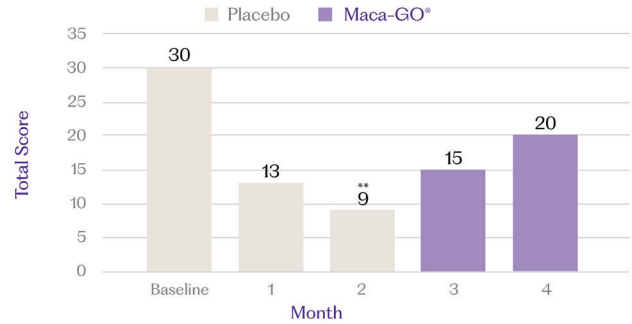
## Menopausal Symptoms

### Kupperman's Menopausal Index



**Figure 26:** Following two months of placebo, two months of Maca-GO<sup>®</sup> resulted in a highly significant decrease ( $p < 0.001$ ) in menopausal symptoms reported on the Kupperman's Menopausal Index. (N=11)

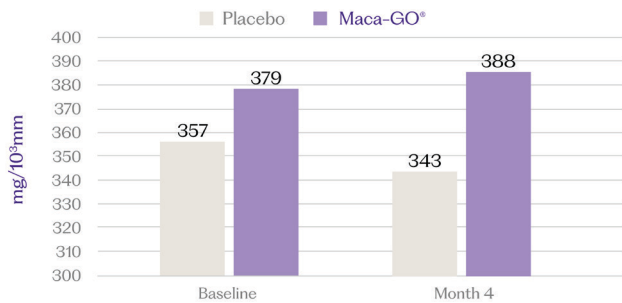
### Kupperman's Menopausal Index



**Figure 27:** After two months on Maca-GO<sup>®</sup> a highly significant decrease (\*\* $p < 0.001$ ) in menopausal symptoms was reported, with an increase in symptoms returning after taking placebo. (N=11)

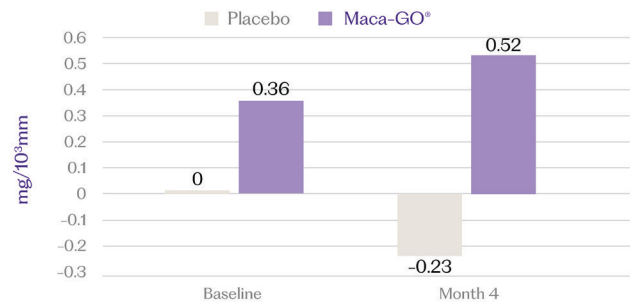
## Total Bone Density

### Total Bone Density



**Figure 28:** Results obtained on selected cases over four months gave an indication of the possible effects of Maca-GO<sup>®</sup> on bone mass. While this is pooled data (average) or before and after, randomly selected from the participants, each participant using placebo experienced lower total bone density after 4 months and each participant using Maca-GO<sup>®</sup> experienced higher total density after 4 months. (Placebo N=4, Maca-GO<sup>®</sup> N=5)

### Total Bone Density



**Figure 29:** Results obtained on selected cases over four months gave an indication of the possible effects of Maca-GO<sup>®</sup> on bone mass. While this is pooled data (average) of before and after, randomly selected from the participants, each participant using placebo experienced lower Z-Scores after 4 months and each participant using Maca-GO<sup>®</sup> experienced higher Z-score after 4 months. (Placebo N=4, Maca-GO<sup>®</sup> N=5)

# Discussion

Maca-GO® is the only standardized *Lepidium peruvianum* formulation to demonstrate statistically significant improvements in hormone levels, cardiovascular markers, and bone health, as well as demonstrating the highest success rate in reducing menopausal symptoms according to Kupperman's and Greene's menopausal assessments.

The mechanism of action for *Lepidium peruvianum* is not fully understood and with the scientific and clinical evidence now proving that the different phenotypes have different physiological effects it is hard to make a blanket statement. It also explains how *Lepidium peruvianum* has been seen to work in multiple ways. For that reason, we can only definitively state what we have seen in the published clinical trials on Maca-GO®, and the respective potential mechanisms of action:

- By supporting the hypothalamus-pituitary-thyroid-adrenal-ovarian (HPTAO) axis<sup>30</sup>
- By serving as a supply of comprehensive nutrients<sup>10</sup>
- Through facilitating the delivery of specialized, active constituents, including glucosinolates<sup>27,30</sup>
- By addressing hormone balance through the application of proper phenotypes of *Lepidium peruvianum*

Maca-GO® does not contain phytoestrogens. Nevertheless, statistically significant changes in hormone levels were found, supporting its adaptogenic effects.

Statistically significant changes were not consistently found throughout all study arms, and Maca-GO®'s effect was most evident when patients took two consecutive months of Maca-GO®. Additionally, continuous intake of Maca-GO® over 2-4 months showed statistically significant results compared to placebo. Trends indicative of metabolic adjustments that may require more than 2-4 months to come to their full expression, such as levels of total cholesterol and bone density were also noted in the studies that lasted a longer length of time.

The presented results of the preclinical studies and clinical trials form a strong basis for further, more prolonged investigations of the effects of Maca-GO® in peri- and post-menopausal women and of Maca-GO® for women in their premenopausal (reproductive) stage of life as well as that of Maca-OG™ in men. At present, case reports have been published or are in process of publication, demonstrating the effectiveness of Maca-GO® for symptoms presenting following a hysterectomy and oophorectomy<sup>35</sup>, PMS, PMDD and primary dysmenorrhea, while tens of thousands of women have used Maca-GO® with for a variety of symptoms and disorders relating to hormonal health.

Maca-GO®'s profile as a natural, reliably safe, organic, standardized, and concentrated formulation of *Lepidium peruvianum* seems to be one of the most promising approaches for symptomatic relief and systems-wide support to date for both peri- and postmenopausal women.

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