



# Female forward

## Nutrition for women's health

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For the last decade, the beauty market has grown steadily worldwide. The global skin care products market generated revenue of about US\$136 million in 2016, and is expected to reach \$194 million by 2024. Skin care supplements are anticipated to dominate the market in terms of revenue in the coming years. Growing interest from younger consumers eager to preserve their natural youth is a major driver of the category's growth. Andie Long identifies why astaxanthin is well-positioned to support the beauty from within market.

## 8 Addressing the challenges of polycystic ovary syndrome

In women with fertility problems, the incidence of PCOS is greater than 25% and constitutes the most frequent cause of anovulation and sterility in women of reproductive age. Studies assessing the impact of inositol supplementation have revealed significant results. **Dr Carmin Martín Blanco** talks us through the study designs and key learnings.

## 12 Developing complete and stable pregnancy supplements

Prenatal supplementation is one of the most established areas within women's supplements, yet product development is one of the more challenging due to several factors. In fact, the market is highly competitive in both the price-driven and high-quality segments and differentiation is not easily achieved. **Maja Orešnik** discusses why stability of main ingredients in finished products is the main challenge of pregnancy supplements and should be the key focus of new product development.

## 15 Takeaways



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# Future of female health

**The nutraceutical world** around us is driven by consumer demand for personalised solutions—whether those come in the form of edibles, drinkables or wearables. Beyond the usual biomarkers that are applicable to men and women, women are speaking up and driving demand for products tailored specifically for them.

Brands can't ignore the fact that women are different—biologically, anatomically and biochemically—and naturally, they have different needs and demands. Although the industry continues to focus on personalised nutrition solutions, there's a gap for further development of the women's health sector. It's up to brands and manufacturers to drive new research and focus on women's unique nutritional needs. Arguably, the greatest area for businesses to tap into is female sports nutrition. Sports nutrition is still heavily inclined toward men, with little research centered on the female athlete and few offerings on the market that cater to their needs.

A market that continues to grow, however, is healthy ageing. The beauty from within, or nutricosmetics, market grows year-on-year, with the global skin products market expected to be worth \$194 million by 2024. Alongside the ageing population, millennial consumers are increasingly interested in preserving their natural youth—and they're educated enough to know that it's what you put on the inside that promotes beauty on the outside. Astaxanthin remains at the heart of the healthy ageing market, as **Andie Long** highlights, but there is a need to differentiate in this competitive market.

While the healthy ageing market targets men and women, women have a reproductive system that's entirely their own. Female-centric conditions, such as polycystic ovary syndrome (PCOS), are commonly pharmaceutically treated. However, **Dr Carmin Martín Blanco** identifies the opportunity for nutraceuticals and walks us through studies that support the potential for inositol supplementation in addressing PCOS.

While not all women experience fertility challenges, those who manage to fall pregnant realise the importance of additional supplementation to maintain adequate nutrition levels through their term. However, **Maja Orešnik** says stability of the main ingredients in pregnancy supplementation remains a challenging area, and one that is crucial to overcome in order to deliver at the high-quality standard that is so heavily demanded from pregnancy supplements.

The more research that is carried out on women's nutritional needs, the better the chance for improved product development, and the healthier the women! There's certainly an industry opportunity to unlock the further potential of the women's health market.



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## Ageing well starts young

Thanks to the powerful antioxidant astaxanthin, product developers can effectively target the growing beauty market

by *Andie Long*

**A**s we get older, the skin ages and loses elasticity. It becomes thinner, and wrinkles and age spots develop. Ultraviolet (UV) light and smoke propel the formation of free radicals that trigger the breakdown of collagen fibrils. These fibrils are essential for the skin's health and elasticity. Poor diet and lifestyle habits contribute to an acceleration of the visible signs of ageing. To combat free radicals, the body produces several endogenous antioxidants and enzymes, but it can also benefit from additional antioxidants obtained through diet.

### Market domination for skincare supplements

For the last decade, the beauty market has grown steadily worldwide. The global skin care products market generated revenue of about US\$136 million in 2016, and is expected to reach \$194 million by 2024.<sup>1</sup> According to an industry report released in April 2017 by Credence Research, changing lifestyles and increasing consumer incomes have led to growth in the usage of supplements. In 2015, skin care supplements accounted for the largest share of more than 30 percent of the total global beauty supplements market by value. Skin care supplements are anticipated to dominate the market in terms of revenue in the coming years. Growing interest from younger consumers eager to preserve their natural youth is a major driver of the category's growth.

Ageing well starts young. The demographic for healthy ageing products is, to some extent, unlimited. This means that products that may have traditionally been targeted towards an older population group may now be appealing to a younger audience. More than ever, consumers are interested in beauty that starts from within: if you provide your body with the right nutrients and create a healthy internal environment, it will show on the outside."

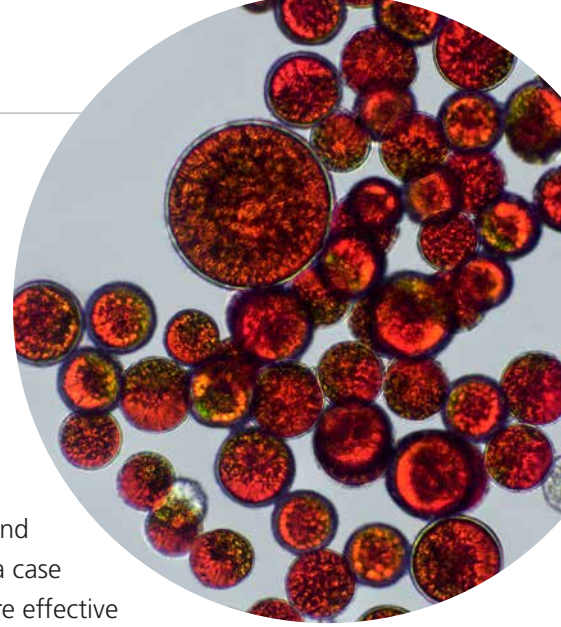
Similarly, the ever-growing ageing population wants to retain a youthful appearance into later life, thus contributing to the demand for high-quality beauty ingredients. This creates an opportunity for natural ingredients to help improve the skin's repair process and antioxidant network through nutritional supplementation.



“ Products that may have traditionally been targeted towards an older population group may now be appealing to a younger audience.

## Antioxidant power of astaxanthin

As shown in more than 500 peer-reviewed studies, natural astaxanthin from the microalga *Haematococcus pluvialis* is one of the most powerful antioxidants known to science. Research shows astaxanthin is effectively absorbed by the skin following supplementation, and provides superior protection to the cells compared to other carotenoids.<sup>2</sup> Owing to its unique molecular structure, astaxanthin is able to span the cell membrane's hydrophilic and hydrophobic layers, thus quenching free radicals and protecting the cell's interior and exterior from oxidative stress. As a case in point, natural astaxanthin has been shown to be 550 times more effective than vitamin E.<sup>3</sup> In addition, it has anti-inflammatory properties.<sup>4</sup>



Astaxanthin's popularity is increasing quickly—not only because of its antioxidant potential, but also because it offers clinically validated benefits that consumers can feel working in their bodies. AstaReal® astaxanthin, for example, can be used in many different formulas targeted at sports and recovery, skin, eye and brain health, cardiovascular support and immunity. Close to 90% of current natural astaxanthin use is in supplements. But besides tablets and capsules, innovative product formats are possible too, such as gummies and effervescent tablets.

## Beauty from the inside out

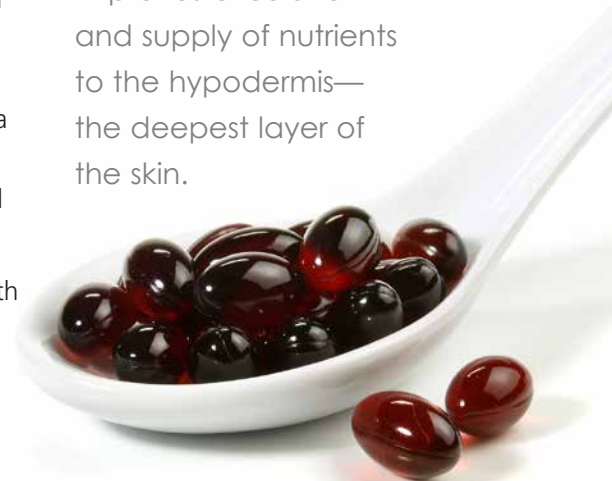
Topical applications, like serums and creams, reach the surface of the skin but can't penetrate the deeper dermis layers that contribute to skin's elasticity and nourishment. Oral consumption of astaxanthin promotes healthy skin from the inside out. Astaxanthin improves circulation and supply of nutrients to the hypodermis—the deepest layer of the skin. It also protects collagen integrity in the dermis, neutralises UV-induced free radicals causing skin damage in the epidermis, and prevents roughness by improving moisture retention in the outermost skin layer.

A double-blind, placebo-controlled study with 23 healthy individuals has shown that astaxanthin seems to protect against UV-induced skin deterioration.<sup>5</sup> Participants either received a capsule containing 4 mg of astaxanthin or a placebo daily for a duration of nine weeks. To assess the protective role of astaxanthin, the researchers determined the minimal erythema dose (MED) and analysed UV-induced changes of moisture and transepidermal water loss (TEWL) at baseline and after nine weeks of supplementation. The astaxanthin group showed increased MED and a reduced loss of skin moisture in the irradiated area compared with placebo. Subjective skin conditions for "improvement of rough skin" and "texture" in non-irradiated areas were significantly improved by astaxanthin.

Another study<sup>6</sup> in which 28 women were supplemented with 6 mg/d natural astaxanthin for eight weeks in combination with topical treatment showed similar results with regards to improved moisture. Mean depth and width of the wrinkles

## Astaxanthin

improves circulation and supply of nutrients to the hypodermis—the deepest layer of the skin.



around the eye region were reduced compared to the measurements before the treatment.

## Healthy skin in every season

Recent clinical trials conducted in Japan showed that 6 or 12 mg natural astaxanthin (as AstaReal) per day prevented skin deterioration throughout the seasonal changes between August and December, when environmental factors such as UV light and dryness tend to exacerbate skin health.<sup>7</sup> While wrinkles and dryness worsened in the control group, the astaxanthin group was more resilient and maintained their healthy skin throughout the seasons. This result suggests that long-term prophylactic astaxanthin supplementation may inhibit age-related skin deterioration, and maintain skin conditions associated with environmentally induced damage thanks to its anti-inflammatory effect.

## Prevention is better than cure

Healthy ageing concerns must be addressed throughout life. Today, more people are aware of what constitutes a healthy diet. They are making an effort to educate themselves about what goes into making their foods or dietary supplements and understand the benefits of preventing rather than curing disease. As a functional ingredient, astaxanthin is very appealing to food and nutraceutical manufacturers that are seeking to expand product lines and excite consumers—especially those focused on the beauty from within category.

Driven by consumer demand for health and wellness products, astaxanthin is experiencing huge growth in the European and Asian market. A report from 2018 forecasted that the global market for natural astaxanthin from the microalga *Haematococcus pluvialis* would grow at a CAGR of approximately 13% to reach \$770 million by 2024.<sup>8</sup> ●

*Andie Long is marketing and sales manager at AstaReal. The AstaReal Group is a well-known player in the cultivation and research of the algae from which this valuable antioxidant is derived. AstaReal is also the most studied brand of natural astaxanthin, with a portfolio of over 60 human trials and more than 1,800 participants.*

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# Addressing the challenges of polycystic ovary syndrome

## The role and potential of supplementation in fertility issues

by Dr Carmin Martín Blanco



**P**olycystic Ovary Syndrome (PCOS) is a syndrome—as the name suggests—and not a disease, meaning it is a set of signs and symptoms with no known, specific aetiology. Its origin is likely genetic, being influenced later by environmental factors. It is one of the most frequent endocrine pathologies encountered in women of reproductive age and it is the principal cause of sterility and anovulation.

### Prevalence

In women with fertility problems, the incidence of PCOS is greater than 25% and constitutes the most frequent cause of anovulation and sterility in women of reproductive age. Regarding prevalence, PCOS differs according to race. In a study,<sup>1</sup> caucasian women presented a prevalence of 4.8%, African-American women had a prevalence of 8.0%, and Hispanic women had a prevalence of 12.8%.

Three principal alterations present in these patients have been described in the literature:

- 1** Neuroendocrine dysfunction with hypersecretion of luteinising hormone (LH).
- 2** Metabolic disorder with insulin resistance and hyperinsulinemia.
- 3** Steroidogenesis and ovarian folliculogenesis dysfunction.

The presence of this syndrome is more frequent in families of patients with PCOS than in the general population. Also observed in relatives of patients with PCOS are higher rates of hyperandrogenism and insulin resistance.

Steroidogenesis dysfunction is a fundamental pillar of PCOS. The increased production of androgens by the ovary and suprarenal glands is determined by the increase in activity of the enzyme cytochrome P450c17.

### Influencing characteristics

The clinical manifestations of this syndrome are polymorphous (occurring at different stages) and vary according to the age and characteristics of each patient. Included in the range of characteristics:

- Hyperandrogenism
- Hirsutism
- Acne
- Alopecia
- Menstrual alterations
- Ovary alterations
- Obesity
- Hyperinsulinemia and insulin resistance
- Dyslipidemia
- Hyperprolactinemia
- Endometrial hyperplasia & endometrial carcinoma
- Cardiovascular risk
- Obstetric pathology
- Psychological disorders



Experts of the Androgen Excess Society (AES) conclude that PCOS is a disorder caused by an excess production and secretion of androgens in women and that its diagnosis cannot be made without clinical or biochemical evidence of the presence of hyperandrogenism. Treatment for patients with PCOS is focused on correcting the different menstrual and ovulatory disorders, the hyperandrogenism, and the associated metabolic alterations.

### Insulin sensitising agents

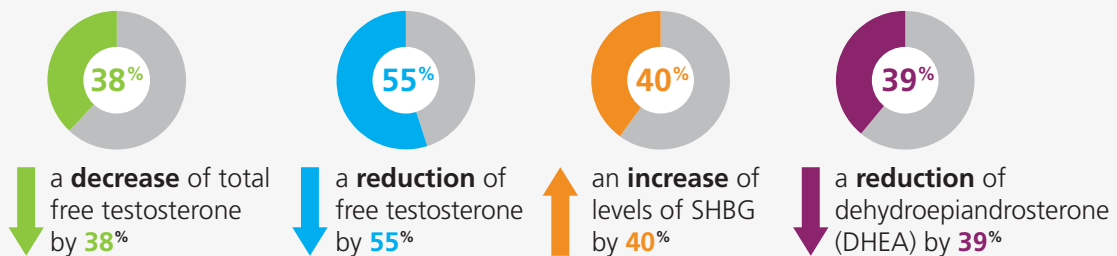
Recent studies have focused on the action of another group of insulin sensitising agents known as inositols. These compounds are derived from vitamin B8 and act as post receptor mediators or second messengers of insulin action in cells, favouring their action and collaborating in oocyte and follicle development by controlling intracellular calcium.

Inositols are organic compounds—the most frequent of which are myo-inositol (MI) and D-chiro-inositol (DCI). In the ovary, inositols have been detected in follicular liquid and appear to intervene in oocyte meiosis.

MI and DCI act by increasing the cell's insulin sensitivity by activating the enzymes that control glucose metabolism. DCI intervenes in the enzymatic activation that controls the metabolism of glucose.

Supplementation with DCI in PCOS patients appears to improve levels of progesterone by 35%, increase the ovulation rate by three times versus a placebo,<sup>2</sup> and regulate cycles in 64% of patients after six cycles of DCI.<sup>3</sup> DCI supplements reduce levels of LH by 55% and improves the FSH/LH ration by 44% in patients with PCOS. They also appear to reduce oxidative stress within the ovarian follicles.

Supplementation with DCI against a placebo<sup>3</sup> has demonstrated the following:



This translates to a decrease in hirsutism by 12%, and an improvement in acne by 25%. As for the glycemic profile, DCI has been shown to decrease hyperinsulinemia by lowering levels in blood and improving resistance by 48%.<sup>2</sup> It seems to improve cell sensitivity to insulin by 71% and the glucose/insulin ration by 43%.<sup>4</sup>

### Investigating the impact of MI/DCI on PCOS

The objective when treating these patients is to correct the metabolic defects associated with hyperandrogenism and resistance to insulin. To this end, insulin sensitising compounds, such as metformin, thiazolidones, or inositols have shown improvements in insulin resistance.

For women with PCOS undergoing assisted reproductive technology (ART), improvements have been reported in spontaneous ovulations as well as the quality of oocytes and embryos through the use of drugs such as metformin or inositol in different forms, combinations or doses. However, myo-inositol (MYO) supplementation is not enough to improve the oocyte quality, embryo quality or pregnancy rate.



The aim of this study was to evaluate the effect of two doses of DCI in combination with MYO in women with PCOS who undergo ICSI.

The deficit of DCI content can contribute to the development of, or increase, insulin resistance. More recent studies recommend treatment with DCI and MI combination for patients with PCOS, as it appears to be more effective than treatment with MI alone. The proportion of DCI proposed is very low (40:1) and is based on the proportion found in the body. Given that there is a systemic DCI deficit in PCOS, the objective of this study is to evaluate if supplementation with a DCI/MI combination with a larger proportion of DCI can improve fertility in women with this syndrome.

### Study design

This study was a double-blind, two-arm, multi-centre randomised clinical trial. Sixty women between 18-40 years old with PCOS according to the Rotterdam criteria with BMI <30 were randomised to receive either oral 550 mg of MYO + 150 mg of DCI twice daily (3.6: 1) (Study group –SG-) or 550 mg of MYO +13.8 mg of DCI twice daily (40:1) (Control group –CG-) over 12 weeks. The primary outcome was the pregnancy rate, and the secondary outcomes were oocyte quality, embryo quality, testosterone levels and insulin sensitivity.

### Learnings

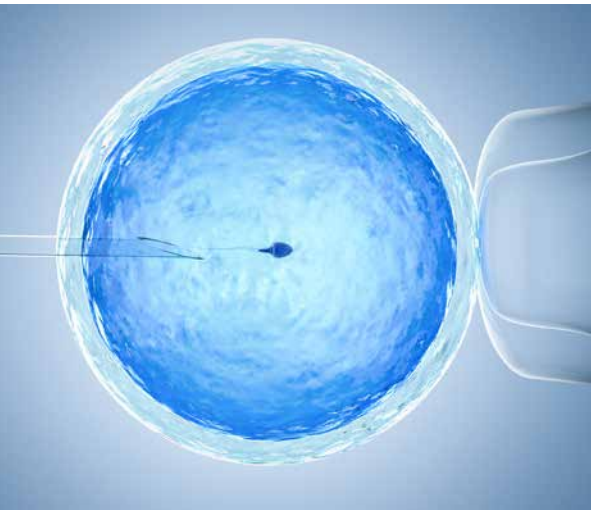
At the end of study, the duration of ovarian stimulation was similar in both groups. Likewise, the total testosterone, glucose and insulin levels, HOMA, number of MII oocytes, and percentage of good-quality embryos were also similar in both groups.

There is a significant effect of treatment in the pregnancy results, being those women in the SG more likely to get pregnant than those in the CG. In particular, the odds of pregnancy are 5.43 times higher in SG than in CG.

Current studies have focused on identifying substances that improve embryo quality, and it seems that both MYO and DCI are molecules that can improve embryo quality.

The main strength of this study is that it is the first RCT in which two different concentrations of ICD are compared in women with PCOS undergoing ICSI. Another strength is that the pregnancy rates are high for the DCI regardless of how it is measured.





There are also more pregnancies in women who achieve ET. There are also more evolutionary pregnancies and livebirth rates, which could involve the DCI in early embryonic implantation and development.

It is significant to note that the improvement observed in the percentage of pregnancies of women who received the highest dose of DCI in the study was not accompanied by improvements in intermediate parameters, such as oocyte or embryo quality. Taken together, these findings suggest that DCI can affect other variables of oocyte or embryo quality that go unnoticed in the classifications that are made in a generalised manner. In this sense, it appears oocyte quality depends on the percentage of mature oocytes.

In addition, the same doses of MYO were administered to all patients, and the CG OHSS rates were similar to those described for women with PCOS. This finding reinforces the conclusions of a previous meta-analysis that showed that MYO alone did not seem to influence the results of the stimulation cycle, but that DCI supplementation could prevent it.

At the end of the study, the number of MII oocytes and percentage of good-quality embryos were similar in both groups. However, the pregnancy and live birth rates were significantly higher in the SG than in the CG (65.5 vs 25.9). In addition, pregnancies after embryo transfer (ET) were higher in the SG than in the CG (68% vs 31.6%).

With respect to testosterone and insulin sensitivity, a significant improvement was found from baseline to end of the study in both groups.

*In conclusion, the combination of MYO-DCI at high doses of DCI improves the live-birth rate (and all other rates) with respect to its physiological concentration. This same combination reduces a risk of OHSS. These results highlight the importance of DCI supplementation in women with PCOS undergoing ICSI. ●*

*Dr Carmin Martín Blanco is gynaecologist and obstetrician at Hospital Universitario Ramón y Cajal, Madrid.*

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# Maternal health

## Developing complete and stable pregnancy supplements

by Maja Orešnik



**Prenatal supplementation** is one of the most established areas within women's supplements, yet product development is one of the more challenging due to several factors. First, the market is highly competitive in both the price-driven and high-quality segments and differentiation is not easily achieved. Second, the target group is sensitive and demanding in terms of product form and user-experience. Finally, the nutritional requirements and supplementation recommendations for pregnant women are many and complex.

Quality product development strives to satisfy all of them and by doing so creates complex products with many potent ingredients that are highly likely to interact. Stability of main ingredients in finished products is the main challenge of pregnancy supplements and should be the key focus of new product development. This is especially true given the importance of convincing medical professionals of the necessity and quality of pregnancy supplements and earning their recommendation.

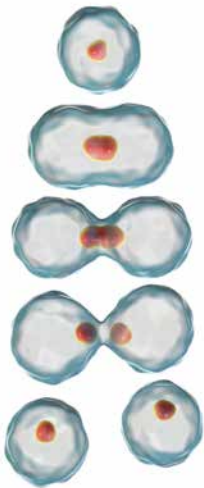
In this article, PharmaLinea's R&D department share insights on the obstacles during development of an ideal pregnancy supplement: one that is stable and covers all key supplementation recommendations.

### The recommended building blocks

Consumption of a balanced and varied diet is essential to ensure both maternal well-being and healthy pregnancy outcomes. However, the risk of inadequate intake of specific micronutrients in pregnancy and lactation is high, even in the most developed countries. Nutrients of concern are docosahexaenoic acid (DHA), iron and folic acid, together with iodine and vitamin D.

DHA is the major polyunsaturated fatty acid contained in the human brain and retinal rods and, thus, is essential for brain and retinal development of the foetus during pregnancy.<sup>1</sup> According to the European Food Safety Authority (EFSA), the DHA requirement increases to 100–200 mg/d during pregnancy and lactation. For pregnant women to obtain adequate omega-3 fatty acids, vegetable oils and low-mercury fish must be consumed in quantities that are not often reached, making additional supplementation necessary.

Folates play a crucial role in cell division and growth processes. They are therefore essential for health: inadequate dietary levels can give rise to anaemia, leukopenia, and thrombocytopenia. The recommended dietary allowance increases by 50% for pregnant women compared to non-pregnant women of childbearing age



**Folates** play a crucial role in cell division and growth processes.



(600 µg/day vs 400 µg/day). Maternal supplementation with folates is widely recommended to all women of childbearing age, especially to reduce the risk of neural tube defects. It is important to note that folates exert their function when in metabolically active form.

Iron deficiency is very common among expectant mothers, affecting almost half of pregnant women worldwide, according to the World Health Organization (WHO). Maternal iron deficiency has been associated with higher risk of preterm delivery, low birth weight and infant iron deficiency, which in turn can permanently affect intelligence, motor and behavioural development of the child. During pregnancy, iron requirements progressively increase until the third month, due to its accumulation in foetal tissues. Iron supplementation in pregnancy is thus recommended by the WHO to improve pregnancy and birth outcomes.

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**“ Maternal iron deficiency** has been associated with higher risk of preterm delivery, low birth weight and infant iron deficiency, which in turn can permanently affect intelligence, motor and behavioural development of the child.

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Additionally, several vitamins and minerals are commonly advised, creating a substantial list of ingredients for a complete pregnancy supplement formulation.

### Challenges of product development

Demand for pregnancy supplements is growing consistently. The prenatal supplement market is expected to reach €601 million by 2025, expanding at a CAGR of 8.5% from 2017 to 2025. Research indicates that prenatal supplements are one of the areas where consumers are most interested in the quality of ingredients and least concerned with the price of the product. However, the market is still flooded by simple multivitamin products with no clear advantage or significant benefit. Supplements that do incorporate one of the three key mentioned nutrients quickly encounter difficulties.

The most commonly used sources of iron are iron salts. These are inferior options for formulation because of their lower absorption and frequent side effects (such as nausea). Additionally, PharmaLinea experts have found that iron salts can greatly decrease the stability of other ingredients. Fe<sup>2+</sup> and Fe<sup>3+</sup> ions from iron salts are well-known agents in oxidation of vitamins and lipids, including unsaturated fatty acids, such as DHA. It is therefore imperative for a user-oriented product to include a superior form of iron.

Adding folate to the equation increases complexity. As mentioned, including a metabolically active folate is key for its function, yet the active form is less stable—especially in the presence of iron. To either increase

stability or save on costs, most supplements provide folate in its synthetic form—folic acid—which is not effectively converted into the metabolically active form. Not only does this not provide the promised benefit to the consumer, but it can even result in unmetabolised folic acid levels building up in the bloodstream.

DHA is known to be problematic and prone to oxidation, making it commonly either absent from supplements or delivered in a separate dosage form. This 'extra step' naturally results in an unpleasant user-experience, especially for pregnant women with difficulties swallowing or sensitive taste preferences. Even with the employed strategy of separation, most products have no available stability data, reflecting questionable value for the end-user.

### Takeaways

Therefore, even with the inclusion of highly stable, best-quality sources of each key ingredient, extensive R&D expertise is required for the development of a stable product. As it is a repetitive process of trial and error, with many attempts and failures, it is highly unlikely that the necessary investment of time and funds is feasible for companies operating at smaller scale. It is equally questionable for development to be completed in time, before competitors, and while the product trend is still ongoing. This suggests a reasoning behind the majority of available pregnancy supplement manufacturers being unable to provide stability data that supports their products.

While the latter may function in the price-driven product range, many of PharmaLinea's clients with established brands have confirmed that product stability and delivering the promised amounts of main ingredients is key for long-term consumer trust and loyalty. This mindset is further confirmed through the fact that a PharmaLinea product, containing all key ingredients and delivered as a softgel, is in a leading position across several markets. It is believed that in the future, with the rising standards of the industry and the increasing interest of pharmaceutical companies, proven stability of main ingredients will become a must. ●

*Maja Orešnik is Science & Research Director at PharmaLinea Ltd.*

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# Takeaways for your business

The global beauty market continues to grow year-on-year, and in 2015, skin care supplements accounted for over 30 percent of the global beauty supplements market. Astaxanthin remains a popular ingredient within the natural beauty market, praised for its science, antioxidant potential and clinically validated benefits. Beyond skincare, astaxanthin has potential to be further developed and formulated for the sports nutrition, eye health, brain health, cardiovascular support and immune health markets.

Although astaxanthin for skin care is commonly delivered as a cream or serum, it cannot penetrate the deeper dermis layers that contribute to skin elasticity and nourishment. Astaxanthin supplementation in the form of an edible or oral supplement has greater potential to supply nutrients to the hypodermis. In studies detailed by Andie Long, astaxanthin supplementation was shown to reduce loss of skin moisture, improve conditions of rough skin, reduce the depth and width of wrinkles around the eye region. Further clinical trials confirmed that long-term prophylactic astaxanthin supplementation can delay age-related skin deterioration and maintain skin conditions associated with environmentally induced damage thanks to its anti-inflammatory effect. Driven by consumer demand, astaxanthin is experiencing huge growth in the European and Asian market, with a 2018 report forecasting that the global market for natural astaxanthin will grow at a CAGR of approximately 13% to reach \$770 million by 2024.

The skincare markets does not exclude men, but a woman's reproductive system is entirely her own—susceptible to unique conditions and challenges. In women with fertility problems, the incidence of polycystic ovary syndrome (PCOS) constitutes the most frequent cause of anovulation and sterility in women of reproductive age. Experts have concluded that PCOS is a disorder caused by an excess production and secretion of androgens in women and that its diagnosis cannot be made without clinical or biochemical evidence of the presence of hyperandrogenism—a condition that causes a person to produce high levels of hormones. Treatment for patients with PCOS is focused on correcting the different menstrual and ovulatory disorders, the hyperandrogenism, and the associated metabolic alterations. Recent studies have identified the potential for inositol supplementation to correct unbalanced hormone levels. For women with PCOS undergoing assisted reproductive technology, improvements have been reported in spontaneous ovulations as well as the quality of oocytes and embryos through the use of drugs such as metformin or inositol in different forms, combinations or doses.

Women who manage to fall pregnant know the impact that sufficient nutrition has on a strong pregnancy and the delivery of a healthy new-born. The risk of inadequate intake of specific micronutrients in pregnancy is high, even in the most developed countries. The prenatal supplement market is expected to reach €601 million by 2025, expanding at a CAGR of 8.5% from 2017 to 2025. Maja Orešnik highlights that the market is flooded with ineffective products, and a key concern for future product development is the stability of main ingredients such as docosahexaenoic acid, iron and folic acid, iodine and vitamin D. Extensive R&D expertise is of the essence in the development of high-quality pregnancy supplements that are stable and effective in delivering nutritional needs. ●

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