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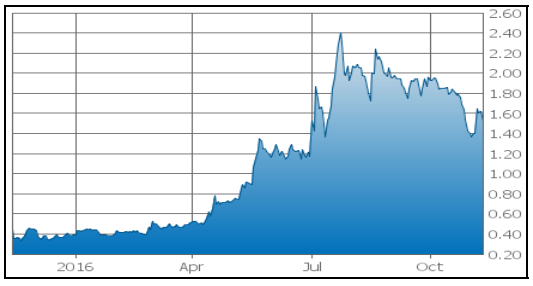
Ticker (Exchange)	CZO (TSX.V)
Recent Price (11/11/2016)	C$1.52
52-week Range	C$0.33 – C$2.47
Shares Outstanding*	~72.6 million
Market Capitalization	~C$110.4 million
Average Volume	194,548
Insider Ownership + >5%	~8.0%
Institutional Ownership	~13.0%
EPS (Qtr. ended 06/30/2016)	C$0.02
Employees	30

** As of October 21, 2016*

Ceapro's One-Year Stock Chart



Selected Products Using Ceapro's Bioactive Ingredients

Company Description

Ceapro Inc. ("Ceapro" or "the Company") is a revenue-generating Canadian biotechnology company involved in the production and commercialization of botanically derived, biologically active compounds—termed **bioactives†**—for human and animal healthcare markets. The Company's product portfolio is largely based on two oat compounds: **beta glucan (β-glucan)** and **avenanthramides**. To date, Ceapro's bioactives have been used as ingredients in multiple household products in the personal care and cosmetics industries, including in products from Aveeno®, Burt's Bees®, Nexxus®, RoC®, and Neutrogena®. Ceapro also markets veterinary therapeutic products in Asia through agreements with Daisen Sangyo Co. Ltd. Going forward, the Company plans to leverage its proprietary manufacturing processes and technology platform—Pressurized Gas eXpanded Liquid Technology (PGX)—into its own product pipeline for the **nutraceutical** and pharmaceutical markets. This work, which augments Ceapro's profitable **cosmeceutical** operations, seeks to capitalize on the therapeutic properties of β-glucan and avenanthramides for a cholesterol reducer, a **functional drink**, and the treatment of exercise-induced inflammation, among other areas. On September 28, 2016, Ceapro announced the opening of a new, 30,000 sq. ft. manufacturing and research facility in Edmonton, and expects to complete the transfer of all manufacturing operations by the first quarter 2017.

Key Points

- Ceapro reported record financial performance in 2015, with revenues of C$10.7 million (+20% vs. 2014) and income from operations of C$3.6 million (+81.5% vs. 2014). This was followed by record first and second quarters in 2016, resulting in cumulative revenues of C$8.2 million (+98% over the first six months of 2015) and cumulative income from operations of C$4.4 million vs. C$0.6 million for the first six months of 2015.
- According to Ceapro, its financial performance is a direct result of a three-year focus on maximizing revenues, maintaining favorable profit margins through manufacturing efficiencies and low overhead, and securing multiple research grants and financial contributions through partnerships.
- The Company is working to advance both its nutraceutical and pharmaceutical development projects into the clinical stage, which includes initiating a pilot study and a safety study to develop β-glucan as a cholesterol reducer during 2016.
- The Company believes that its revenue-generating cosmeceutical business in conjunction with its value-driven expansion into nutraceuticals and pharmaceuticals provides a low-risk model.
- As of June 30, 2016, Ceapro reported C$0.9 million in cash and cash equivalents. The Company subsequently closed a private placement for gross proceeds of C$10 million in July 2016.

Note: All $ are presented in Canadian dollars (C$), except where noted as U.S. dollars (US$). As of November 11, 2016, C$1.00 ≈ US$0.74.

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Investment Highlights

All $ are presented in Canadian dollars (C$), except where noted as U.S. (US$). As of November 11, 2016, C$1.00 ≈ US$0.74.

- Ceapro is a biotechnology company involved in the identification, extraction, bioprocessing, and commercialization of functionally bioactive compounds from botanical and other renewable plant resources. The Company's focus is on the production and commercialization of its proprietary active ingredients for the cosmeceutical, nutraceutical, and pharmaceutical markets.

- The global market for botanical and plant-derived drugs was valued at US$25.6 billion in 2015 and is expected to reach US$35.4 billion by 2020. Growth drivers include drug companies increasingly adopting a business model that includes development of botanical and plant-derived compounds and rising consumer interest in natural health remedies.

- Ceapro's products are primarily based on two bioactive compounds derived from oat: β-glucan and avenanthramides. The common oat is a species of cereal grain mainly grown for its use in oatmeal (for human consumption) as well as for livestock feed. Oat has always been regarded as a health-promoting food and has been used for more than 4,000 years in traditional medicine.

    - β-glucan is found in oats, barley, certain mushrooms, yeasts, seaweed, and algae. Importantly, oat-derived β-glucan is believed to be the only type that is water soluble, which makes it particularly useful in the development of therapeutic and bioactive agents. Consumption of β-glucan helps to reduce an individual's risk of heart disease by lowering cholesterol. It is also good for skin care, as the compound is a moisturizer, has antioxidant activity, and reduces the impact of wrinkles and ultraviolet (UV) light.

    - Avenanthramides are a group of **phenolic alkaloids** found mainly in oats that are known for their anti-inflammatory, antioxidant, anti-itch, and many other beneficial health impacts.

- In addition to Ceapro's oat-based β-glucan and avenanthramide bioactives, the Company markets several other plant-derived oils, flours, and peptides. All of these products are currently employed as the active botanical ingredients in personal care products sold by major players in the cosmetics/cosmeceuticals industry, including Aveeno®, Burt's Bees®, Nexxus®, RoC®, and Neutrogena®.

- Cosmeceuticals—cosmetic products with medicinal benefits that can be purchased over-the-counter—are expected to be the fastest growth segment in the personal care industry, with a global value of US$61 billion by 2020. The growth is driven by technological innovations, the emergence of new ingredients, and increasing consumer confidence in new products. This market is roughly 62% skin care products and 15% hair care.

    - Partly as a result of its "Better for Heart Health" labeling approved by the FDA, EMEA, and Health Canada, global demand for β-glucan specifically may be US$321 million in 2016, up from US$282 million in 2014. Growth is forecasted at over 6% annually between 2015 and 2025. Oat-derived β-glucan accounts for 69.3% of this market.

- Ceapro has developed a vertically integrated value chain whereby the Company controls its operations from field to formulation to market. The process combines Ceapro's ability to isolate and purify specific molecules from a wide range of botanical sources with its bioprocessing expertise as well as its proprietary plant extraction-based manufacturing process and drying technology—all of which is intended to enable Ceapro to drive product development from concept to commercialization in a relatively short time period.

- While generating revenue through the sale of its cosmeceutical ingredients, Ceapro is simultaneously advancing the development of its bioactives in novel nutraceutical and pharmaceutical preparations—a move intended to broaden the Company's customer base to include these additional large healthcare markets.

- One of the Company's core competitive advantages is its use of a proprietary enabling technology for processing water-soluble **biopolymers**, such as oat β-glucan. The platform—called Pressurized Gas eXpanded Liquid Technology (PGX)—is an innovative method of **spray drying** that enables the Company to produce a wide range of morphologies, including granular powder, aerogels, and highly porous materials.
    - Using PGX, Ceapro has produced a highly pure, powder form of its β-glucan to facilitate entry into the nutraceutical market. In addition, PGX allows for the production of ultra-light, porous polymer structures that can be impregnated or coated with other active compounds in order to generate new ingredients for use in cosmetic, nutraceutical, or pharmaceutical products. This capability is at the center of the Company's ability to expand beyond the cosmetic industry.
- In the fourth quarter 2016, the Company plans to initiate a 12-month pilot study to develop β-glucan as a cholesterol reducer. At the same time, Ceapro also plans to conduct a 10-month safety study to analyze the side effect profile of highly pure, oral β-glucan.
- Ceapro has also initiated a study with the University of Alberta to develop a prototype formulation for a functional drink, which the Company anticipates to be completed by the end of 2016. This product prototype is based on Ceapro's ability to impregnate PGX-processed β-glucan with **coenzyme Q10 (CoQ10)**, a substance in the body responsible for converting food to energy.
- Ceapro's pharmaceutical development of avenanthramides is initially focused on treating exercise-induced inflammation. Ceapro provided material for a **bioavailability** study that was recently completed at the University of Minnesota's Laboratory of Physiological Hygiene and Exercise Science to examine the health impacts of long-term dietary supplementation using an oat flour cookie rich in avenanthramides. This research builds upon prior studies and support Ceapro's start of a bio-efficacy study with avenanthramides as an anti-inflammatory compound during the fourth quarter 2016**.**
- The Company has strategic relationships with the Food Processing Development Centre (FPDC), the National Research Council of Canada's (NRC) Institute of Nutrisciences and Health (NRC-INH), and the Food Technology Centre (FTC), as well as has a research partnership with McMaster University, and has received grants and financing from Alberta Innovates Bio Solutions (AIBio) and the NRC-Industrial Research Assistance Program.
- As well, Ceapro is led by individuals with expertise in natural product chemistry, microbiology, biochemistry, immunology, and process engineering. Isolating and purifying botanical bioactives (especially oat β-glucan) is extremely challenging but also vital, as the therapeutic properties and health benefits associated with such compounds are often defined by the isolation and preparation method. Ceapro's team has developed proprietary manufacturing and processing techniques, protected by global intellectual property.
    - To Ceapro's knowledge, its scientists were the first to discover the link between the traditional use of colloidal oatmeal for alleviating red, itchy, and inflamed skin and naturally occurring avenanthramides in oats. To date, the Company remains the only commercial manufacturer of natural, pure avenanthramides and the sole producer of avenanthramide extracts at Ceapro's high concentrations.
- As of June 30, 2016, the Company reported C$0.9 million in cash and cash equivalents, followed by a July 2016 brokered private placement for gross proceeds of C$10 million. For the six-month period ended June 30, 2016, the Company reported record revenues of C$8.2 million (+98% over the first six months of 2015) and operating income of C$4.4 million vs. C$0.6 million in the year-ago period. This follows the Company's 2015 record revenue (C$10.7 million, +20% vs. 2014) and operating income (C$3.6 million income, +81.5% vs. 2014). Ceapro's 2016 financial statements as of June 30, 2016, are provided on pages 50-52.
- On September 28, 2016, Ceapro announced the opening of a new, 30,000 sq. ft. manufacturing and research facility in Edmonton, Canada. This facility provides the Company with the ability to move from batch-to-batch production into semi-continuous production, potentially increasing manufacturing capabilities ten-fold. Production operations are expected to be maintained in parallel until the end of the first quarter 2017 to secure a smooth transition and ensure that product specifications are replicated.

Executive Overview

All $ are presented in Canadian dollars (C$), except where noted as U.S. (US$). As of November 11, 2016, C$1.00 ≈ US$0.74.

Ceapro Inc. ("Ceapro" or "the Company") is a commercial-stage biotechnology company involved in the production and commercialization of biologically active compounds ("bioactives") from botanical and natural sources for the human and animal healthcare markets. Through the use of proprietary technology and renewable and sustainable resources, Ceapro focuses on the identification, isolation, bioprocessing, and commercialization of proprietary functionally active compounds that have health benefits as supported by science and that have clinical evidence for the cosmeceutical, nutraceutical, and pharmaceutical markets. Currently, Ceapro generates revenue through its operations in the cosmeceutical industry and is pursuing an expansion into nutraceuticals and pharmaceuticals.

The Company's product portfolio and pipeline is primarily based around two oat-derived compounds—beta glucan (β-glucan) and avenanthramides—which make up the core of Ceapro's product base and act as the Company's flagship products and value drivers, as shown in Figure 1. In addition, Ceapro markets a commercial line of natural active ingredients, such as oat powder and oat oil, to customers in the personal care, cosmetic, medical, and animal health industries. The Company sells its active compounds to other businesses that utilize Ceapro's compounds in the creation of their own formulations and products. Ceapro's bioactives and natural products are currently used in multiple household products in the personal care and cosmetics industries, including in well-known, branded products such as Aveeno®, Burt's Bees®, and Nexxus®. Ceapro also markets veterinary therapeutic products, such as an oat shampoo, an ear cleanser, and a dermal conditioner, to veterinarians in Japan and other parts of Asia through agreements with Daisen Sangyo Co. Ltd.

Figure 1

MAIN PRODUCT OFFERINGS

Product	Therapeutic Indications
CP Oat Beta Glucan Liquid	Anti-aging Moisturization Wound Healing Delivery Systems
CP Oat Avenanthramides Extract	Anti-inflammatory Antihistamine Anti-redness/itch Eczema

Source: Ceapro, Inc.

Ceapro plans to capitalize on its active and profitable personal care business by continuing to assess the therapeutic properties and applications of its key value driver ingredients—β-glucan and avenanthramides—with the intent of developing these bioactives into nutraceutical and pharmaceutical products.

The Company's product pipeline and future expansion in the nutraceutical and pharmaceutical arena is supported by its vertically integrated value chain, through which Ceapro controls its operations from field to formulation to market. The process includes the Company's ability to isolate and purify specific molecules from a wide range of botanical sources, its bioprocessing expertise, its proprietary plant extraction-based manufacturing process, and its proprietary processing technology—Pressurized Gas eXpanded Liquid Technology (PGX) (detailed on pages 24-30)—to allow Ceapro to drive the product development process from concept to commercialization in a relatively short period of time. The Company believes that its revenue-generating cosmeceutical business in conjunction with its focused, value-driven expansion into the nutraceutical and pharmaceutical markets provides a low-risk model with added benefits due to Ceapro's expertise in natural product chemistry, microbiology, biochemistry, immunology, and process engineering.

Ceapro's β-glucan Products and Development Plan

Beta glucan (β-glucan) is a glucose polymer found in the cell walls of some cereals (e.g., oats and barley), certain types of mushrooms, yeasts, seaweed, and algae. The physicochemical properties of β-glucan vary greatly depending on the source, with differences in molecular mass, solubility, viscosity, branching structure, and gelation properties. For example, according to Ceapro, oat-derived β-glucan is the only type that is water soluble, which provides additional benefits and properties that are useful in the development of therapeutic and bioactive agents.

Ever since the health-promoting effects of β-glucan were reported, several studies have been carried out to assess the effects of this natural compound on various health problems. Results of these studies have shown oat β-glucan to be a good agent in the lowering of total and **LDL cholesterol**, with health claims of reduced risk of heart disease for β-glucan-containing foods allowed by the FDA and the European Food Safety Authority. In addition, β-glucan has shown skin regenerative properties—antioxidant activity, anti-wrinkle activity, anti-ultraviolet light, and a moisturizing effect—and has been used to treat a variety of skin conditions. Details of the scientific literature supporting the widespread use of oat β-glucan are provided on pages 32-35.

Ceapro's proprietary extraction and formulation technologies have enabled the Company to produce a liquid β-glucan product—CP Oat β-glucan—that is currently being used in the personal care and cosmeceutical markets, including in branded products from RoC® and Neutrogena. The patented process yields a cosmetic- and pharmaceutical-grade β-glucan formulation that is water soluble and nearly clear and odorless.

The Company believes that its CP Oat β-glucan is the only high-molecular-weight, oat-based β-glucan solution that has been shown to effectively penetrate into the skin. Ceapro's research has demonstrated the ability of its β-glucan product to penetrate into the deep layers of the skin. The skin absorption properties of CP Oat β-glucan, combined with β-glucan's natural health benefits, are applicable to a variety of applications in the cosmetic industry, including the skin care and hair care segments.

β-glucan's Nutraceutical Development

The Company's initial efforts to penetrate the nutraceutical market are based on β-glucan's therapeutic properties. Ceapro has utilized its proprietary PGX technology to create a highly purified dry formulation of β-glucan, developed according to pharmaceutical standards. Ceapro plans to initially utilize this dry, pure β-glucan product to generate its first two nutraceutical products: a cholesterol reducer and a component in a functional drink.

Ceapro is planning to capitalize on β-glucan's properties as a cholesterol-lowering agent and a regulator of glucose metabolism to create a cholesterol-lowering nutraceutical product. The Company plans to initiate a 12-month pilot clinical study for this indication in the fourth quarter 2016. Ceapro also plans to conduct a 10-month safety study to analyze the side effect profile of high-purity, oral β-glucan, which is expected to take place at the same time as the clinical study.

The Company's PGX-generated β-glucan product displays a low density that allows for the encapsulation or impregnation of additional bioactive compounds into the β-glucan matrix, which then allows the use of CP Oat β-glucan as a delivery system, combining the therapeutic effects of both β-glucan and the impregnated bioactive compound. Ceapro recently successfully achieved such a compound by impregnating β-glucan with Coenzyme Q10 (CoQ10). According to the Company, this proprietary β-glucan drug delivery platform has piqued interest from multiple parties who seek to improve the delivery of their existing therapeutic products.

Ceapro has initiated a study with the University of Alberta for the development of a prototype formulation for a functional drink, which the Company anticipates could be completed by the end of 2016. This product prototype is based on Ceapro's ability to impregnate PGX-processed β-glucan with CoQ10, and is to be used as a key ingredient in an energy booster functional drink.

Ceapro's Avenanthramide Products and Development Plan

Avenanthramides are a group of phenolic alkaloids found mainly in oats. These compounds (found predominantly in the oat's bran) are **anti-pathogens** produced by the plant to defend it against plant pathogens such as fungi. Avenanthramides have been the focus of intense research because of their anti-inflammatory, antioxidant, anti-itch, anti-irritant, and **antiatherogenic** qualities (Source: *Journal of Drugs in Dermatology*, Vol. 14[1], 2015).

To Ceapro's knowledge, it is the only commercial manufacturer of natural, pure avenanthramides, and the only producer of the specific avenanthramides used for its products. Given the challenge to find oats with adequate concentrations of avenanthramides, the Company has entered into two agreements with Agriculture and Agri Food Canada (AAFC). The first agreement allows Ceapro to access a new variety of oat—Value Added Oat (VAO 22)—with the potential to mechanically extract a higher content of avenanthramides, while the second is a license for the exclusive use of an innovative malting technology which allows for an increase in the concentration of avenanthramides in oats. Combining these enabling technologies, the Company has been able to produce a liquid product that contains avenanthramide concentrations of up to 200 ppm in the new VAO 22 variety.

Ceapro's CP Oat Avenanthramides Extract, characterized by a high level of avenanthramides, offers the following benefits: (1) reduces **erythema** in both ultraviolet (UV) and chemical irritations; (2) reduces inflammation and swelling (allergenic and non-allergenic activators); (3) reduces itching; and (4) protects cellular components of the skin from oxidative damage. These benefits and therapeutic properties of the Company's CP Oat Avenanthramides Extract may enable a wide range of applications, including products for sensitive skin, anti-inflammation/antihistamine formulations, pre- and post-sun care formulations, moisturizing creams and lotions, products for moderate to severe skin conditions (e.g., eczema, psoriasis), and insect bite-alleviating products. CP Oat Avenanthramides Extract is currently being used in Aveeno® and Lubriderm®-branded goods.

Avenanthramides' Pharmaceutical Development

Going forward, Ceapro's objective is to enter the pharmaceutical market. The Company's pharmaceutical development efforts are based on avenanthramides' therapeutic qualities, specifically the anti-inflammatory effects. Following the recent completion of a bioavailability study, the Company plans to continue to investigate avenanthramides' antioxidant and anti-inflammatory functions through a bio-efficacy study to be conducted at the University of Minnesota's Laboratory of Physiological Hygiene and Exercise Science. The aim of the study is to examine whether long-term dietary supplementation of an oat flour cookie rich in avenanthramides could enhance blood antioxidant capacity and reduce blood inflammatory markers after a downhill running protocol among human subjects.

The Company expects the bio-efficacy study to further demonstrate the efficacy of avenanthramides in alleviating exercise-induced inflammation based on the results of previous studies. If additional positive trends are observed, Ceapro expects to commence its clinical program with avenanthramides as an anti-inflammatory compound by the second quarter 2017.

The Company believes that if the bio-efficacy of avenanthramides is confirmed, this trial could not only provide evidence as to the protective benefits of avenanthramides in the sports science field, but also stimulate the development of oat-derived, value-added products in additional market segments and therapeutic applications. One such alternative that the Company is evaluating is the application of avenanthramides' anti-inflammatory qualities for the treatment of inflammation based diseases of the digestive tract, such as **inflammatory bowel disease (IBD)**.

Pressurized Gas eXpanded Liquid Technology (PGX)

Ceapro intends to utilize its PGX technology to develop dry powder formulations of its liquid active ingredients used in cosmetics in order to enable the transition of its products into the nutraceutical and pharmaceutical markets.

PGX is an enabling spray drying technology platform that uses a highly tunable, pressurized gas, expanded liquid as drying fluid, which consists of carbon dioxide and **anhydrous ethanol** as co-solvents. PGX, which mixes these drying agents with the liquid product in a spray chamber using a specially designed nozzle, can produce a very high purity, dry product in fractions of seconds, leading to short drying times and small drying equipment.

According to Ceapro, PGX is a novel technology with several key advantages over conventional drying and purification approaches, specifically in terms of economics and purity of the end product. One key advantage is that PGX technology operates at lower temperatures than conventional spray drying, allowing the incorporation of thermosensitive bioactives as well as preventing the heat degradation issues of traditional drying technologies.

One of the Company's first successful uses of the PGX technology was the creation of a highly pure dry formulation of β-glucan. A dry formulation, as opposed to the liquid formulation used in cosmetics, allows the Company to exploit the well-established health claim of β-glucan in the large nutraceutical and functional food/drink markets.

PGX allows for the processing of water-soluble biopolymers—such as oat β-glucan—utilizing the special properties of PGX for the modification of the physicochemical properties of the resulting materials. The PGX platform can produce a wide range of novel morphologies, including granular powder, aerogels, and highly porous materials. In particular, PGX can be used to generate biopolymers with large surface areas and nano-sized morphologies. These ultra-light, highly porous biopolymers can then be impregnated with other active ingredients, creating novel, functional bio-nanocomposites.

Following the successful generation of its powder β-glucan product, Ceapro used the highly porous and low density nature of the resulting mix to impregnate the β-glucan matrix with CoQ10, the key component in its nutraceutical functional drink project. Furthermore, the Company continued to assess the potential uses of PGX in other polymers within, as well as outside, of the main targets of the nutraceutical and pharmaceutical markets, including in the following studies: (1) generating a low-density, corn starch product; (2) impregnating PGX-processed **gum arabica** with **beta-carotene**; and (3) processing cellulose for the creation of PGX-Cellulose Nanocrystals (CNC) aerogel, with applications in the forest and paper industry.

Ceapro plans to initially use the PGX technology to develop and expand its own product pipeline through the processing of β-glucan as well as other biopolymers. Ceapro is further planning to utilize its PGX processing excess capacity to capitalize on new market opportunities. The Company can use its excess capacity to process samples for third parties in-house or license the use of its technology to other companies, with the contract manufacturing and processing still performed by Ceapro in-house. In addition, Ceapro is evaluating the possibility of fully licensing the technology to parties that (1) require large volumes that the Company cannot process and (2) have the financial capacity to establish a PGX production line.

Corporate History and Employees

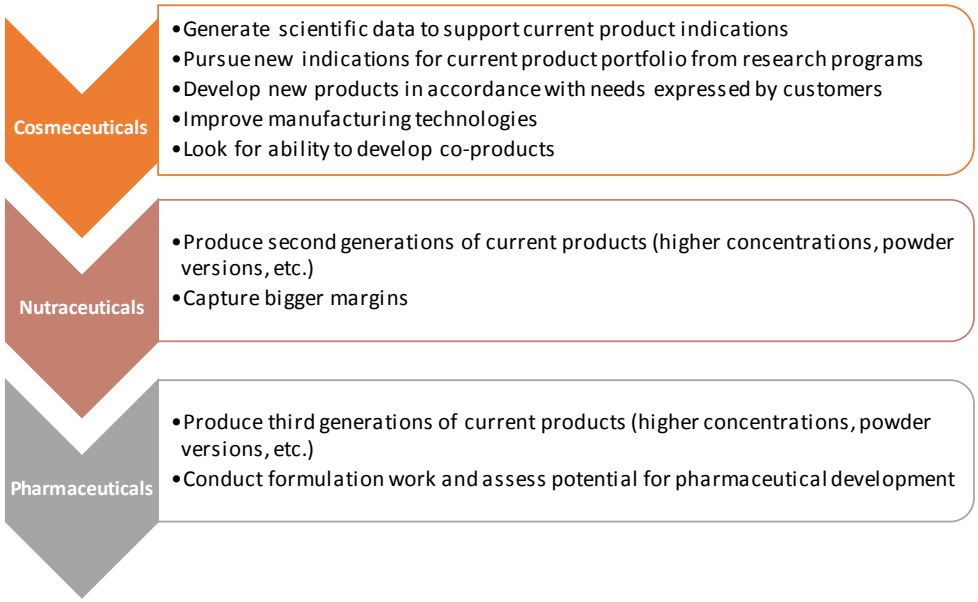
Ceapro is a Canadian biotechnology company with headquarters in Edmonton, Alberta. The Company is incorporated under the Canada Business Corporations Act and is listed on the TSX Venture Exchange (TSX.V) under the symbol "CZO." Ceapro conducts operations through the activities of its wholly owned subsidiaries: Ceapro Technology Inc., Ceapro Active Ingredients Inc., Ceapro BioEnergy Inc., Ceapro (P.E.I.) Inc., and Ceapro USA Inc.

While the Company still operates a 4,000 sq. ft. manufacturing facility in Leduc, Alberta (which has a capacity of four metric tons or 4,000 Kg per week), Ceapro is in the process of transitioning to a new, 30,000 sq. ft. manufacturing facility in Edmonton, which is designed to handle commercial production as well as R&D, bio-processing, and extraction operations. As announced on September 28, 2016, the facility is intended to allow the Company to move from batch-to-batch production into semi-continuous, thereby increasing production capabilities ten-fold. Manufacturing operations are expected to be fully transferred into the new facility by the first quarter 2017, following a six-month period of parallel production required by major customers to ensure exact reproduction of product specifications.

Growth Strategies

Ceapro's product development strategy follows a three-step process, as illustrated in Figure 2. In the short term, the Company plans to grow its customer base and presence in the personal care and cosmeceutical market. This step not only involves expanding both its product portfolio and distribution network, but also conducting additional clinical research into the properties of its different bioactives. The Company plans to use the resulting scientific data to support the creation of new products for the cosmeceutical market as well as to validate the potential of its key bioactives in the nutraceutical and pharmaceutical markets.

Figure 2
PRODUCT DEVELOPMENT STRATEGY



Source: Ceapro, Inc.

On a mid- to long-term basis, Ceapro expects to use its understanding of the properties of its bioactives to develop new formulations that can be used to transition into the large nutraceutical and pharmaceutical markets. Ceapro plans to capitalize on its bioactive selection and isolation expertise and expansion of its proprietary bioprocessing platform to conduct formulation work and assess the potential for nutraceutical and pharmaceutical product development.

The Company believes that its revenue-generating cosmeceutical business and its focused, value-driven expansion into the nutraceutical and pharmaceutical industry provides a low-risk model, facilitating its transition into higher-margin sectors while operating and expanding a profitable base business.

Personal Care Market

Ceapro's cosmetic applications represent its base business, which is characterized by a short path to regulatory approval. Ceapro plans to continue to increase market share and profit margins of its base business through the implementation of the strategies outlined below and on page 10.

- Improve manufacturing efficiency by achieving operational excellence

- Increase existing product sales volume via a two-pronged approach:
  - expand its distributor and customer network
  - expand the use of its products to new product lines of current customers
- Develop new products through three different alternatives:
  - validate new indications for current active ingredients
  - create new formulations for current active ingredients
  - develop new products and active ingredients, both in-house and via alliances

While Ceapro continues to grow its presence in the personal care market, the Company aims to identify and clinically validate new indications and applications for its value drivers—avenanthramides and β-glucan—and at the same time identify and develop new botanical compounds that have potential healthcare benefits.

Pressurized Gas eXpanded Liquid Technology (PGX)

A key factor in the Company's expansion into the nutraceutical and pharmaceutical markets is the development of a second generation of its current products, including powder versions of its β-glucan product, at much higher concentrations. One of the key technologies that the Company uses to supports its pipeline development is its proprietary active compounds processing technology—Pressurized Gas eXpanded Liquid Technology (PGX). PGX allows Ceapro to produce a highly pure, powder form of its β-glucan products and achieve the impregnation of the newly formed, β-glucan matrix with additional bioactives, expanding the possible applications of its products. Both the PGX technology as well as the different tests conducted are detailed on pages 24-30.

Ceapro plans to initially use the PGX technology for the development and expansion of its own product pipeline. However, Ceapro also sees the PGX technology as a possible independent business unit, planning to utilize its PGX technology to capitalize on new market opportunities.

The Company can use its excess capacity to process samples for third parties in-house or license the use of its technology to other companies, with the contract manufacturing and processing still performed by Ceapro in-house. In addition, Ceapro is evaluating the possibility of fully licensing the technology to parties that (1) require large volumes that the Company cannot process and (2) have the financial capacity to set up a PGX production line under Ceapro's guidance. According to the Company, several multinational organizations in a variety of different industries have already executed confidentiality agreements with Ceapro to assess their material with the proprietary PGX technology. The Company might also consider providing services, such as PGX Unit Design (**skid engineering)**, installation, and commissioning as part of the business model.

Ceapro has plans to conduct the two steps below to aid in the commercialization of its PGX technology.

(1) Promote the technology at selected events and conferences in order to communicate to the biomaterial community the benefits of PGX and the unique nanomaterials it can offer with the intent of securing new potential evaluation projects, customers, and license partners.

(2) Provide resources to undertake initial evaluation projects. According to the Company, initial steps in the lab are quick and inexpensive. If the initial steps are successful and there is a desire to expand the scope of the project, consideration can be made for requesting financial contributions.

Nutraceuticals

The Company's initial efforts to penetrate the nutraceutical market are based on a PGX-derived dry formulation of the β-glucan product to generate two nutraceutical products:

(1) a cholesterol reducer based on oat β-glucan's reduction of cardiovascular and heart disease risk through a decrease in LDL and total cholesterol; and

(2) a component in a functional drink based on Ceapro's ability to impregnate PGX-processed β-glucan with CoQ10, which is to be used as the key ingredient in an energy booster functional drink.

Pharmaceuticals

Ceapro's long-term catalyst is for pharmaceutical applications, where the strategy is to fund drug development with profits from cosmetics and functional foods, as well as partnerships. Considering the high level of investment required to penetrate the pharmaceutical market, Ceapro intends to conduct preclinical studies to assess the products and achieve proof of concept. The Company then plans to enter into partnership agreements with pharmaceutical or biotechnology companies—either on a geographic basis with many partners or on a global basis with one multinational partner—which would be able to conduct all stages of clinical studies up to approval and commercialization.

Ceapro plans to target non-dilutive funding sources, such as government grants and contracts from large pharmaceutical collaborations, including local organizations like Alberta Innovations and Alberta Enterprise and Advanced Education, to obtain the funds required for the development of the novel pharmaceutical compounds and products.

The Company's pharmaceutical development is based on avenanthramides' therapeutic qualities and is initially focused on treatment of exercise-induced inflammation. Long term, the Company is evaluating the application of avenanthramides' anti-inflammatory qualities to treat inflammation disease(s) of the intestinal tract.

Milestones

In the past 18 months, the Company has achieved significant milestones as listed below, and aims to accomplish additional key milestones in the near term (as outlined on page 13).

Recent Milestones

- Delivered the best financial performance in Company's history—showing record revenues, net profit, and cash flows
- Achieved pilot scale-up of the PGX dry powder technology platform, and utilized PGX to obtain favorable laboratory-scale results from biopolymer samples provided by numerous sources
- Received issuance of a U.S. patent for the PGX technology covering proprietary methods and use of micro- and nano-sized particles generated by applying PGX supercritical fluid technology
- Expanded the PGX License Agreement with the University of Alberta to include worldwide rights to develop and commercialize the processing technology in all industrial fields
- Entered into a Research Agreement with McMaster University for testing materials using the PGX technology
- Secured the license for a new variety of oat—Value Added Oat (VAO 22)—with the potential for a high content of avenanthramides
- Secured rights for an enabling technology for the production of a high avenanthramides concentration product from Agriculture Canada, and then utilized this technology to produce the first three batches of the next generation of avenanthramides—increasing concentration from 22 ppm to over 200 ppm
- Initiated a research program with the University of Alberta to develop a prototype functional drink using PGX-processed, dried β-glucan formulation impregnated with CoQ10
- Conducted a bioavailability study using Ceapro's high avenanthramide product to assess dose regimen and further demonstrate the efficacy of avenanthramides in alleviating exercise-induced inflammation
- Completed the construction of a new, 30,000 sq. ft. bio-processing, extraction, and manufacturing facility in Edmonton, Alberta
- Explored potential strategic alliances with multinational companies related to its technology, including the development of β-glucan as a nutraceutical and the use of its PGX technology in industrial applications
- Continued to expand its distribution network, including the renewal of a major distribution agreement with long-time partner, Symrise AG
- Secured several commercial and institutional financing activities, research grants, and loan agreements, including a brokered private placement, which resulted in gross proceeds of C$10 million in July 2016
- Entered into a multi-partners' project through Alberta-Germany Collaboration Fund for product development and commercialization of PGX Technology
- Awarded the 2016 BioAlberta Achievement Award for Company of the Year at the BioAlberta's 17th Annual AGM and Awards Gala

Potential Milestones

Going forward, the Company aims to achieve the potential milestones outlined below.

- Initiate a pilot clinical study and a safety study to develop β-glucan as a nutraceutical cholesterol reducer (fourth quarter 2016)
- Complete the development of the prototype for a functional drink using β-glucan impregnated with CoQ10 as an energy booster (end of 2016)
- Initiate a bio-efficacy study with avenanthramides in exercise-induced inflammation (end of 2016)
- Publish the 12-week bioavailability and pharmacokinetic study assessing avenanthramides' efficacy in alleviating exercise-induced inflammation (first quarter 2017)
- Transition all production into the new manufacturing facility (first quarter 2017)
- Commence a clinical program with avenanthramides as an anti-inflammatory compound (second quarter 2017)

Intellectual Property

As summarized in Figure 3 (page 15), Ceapro holds a number of patents and patent applications around the world that relate to the composition of matter, extraction process, method of use, and indications for the Company's products and technologies. Ceapro's core technologies are protected by process patents, and its active ingredients, therapeutic products, and diagnostic products are covered by composition and method of use patents and patent applications.

Specifically, Ceapro's intellectual property (IP) has jurisdiction in the U.S., Canada, Japan, Australia, Europe, and China, with multiple applications filed under the Patent Cooperation Treaty (PCT). The PCT entails a unified procedure for simultaneously filing the same patent application in up to 151 countries. Under the PCT structure, the single international patent application is examined for its patentability, which includes a search of other published documents that might affect the patentability of the application. The PCT application is published by the International Bureau of the World Intellectual Property Organization (WIPO), after which examination and issuance procedures are handled by the relevant national or regional authorities. The PCT process greatly facilitates filing patent applications in multiple jurisdictions worldwide; however, it does not grant an "international patent," which does not exist.

Ceapro believes that its IP position combined with the skill set and experience of its leadership and staff provides the Company with key competitive advantages, particularly as it relates to its extraction technology and processes; applied technology, formulation skills, and clinical expertise; and market data and entry strategies.

Figure 3

INTELLECTUAL PROPERTY SNAPSHOT

Application/Patent Title	Application/Patent Numbers	
Oral Cereal Beta Glucan Compositions	US60/477,048	EP04730426.6
	PCT/CA2004/000661	AU2004244677
	CA2,527,029	JP4570618
	US10/560,115	
Cereal Beta Glucan Compositions, Methods of Preparation and Uses Thereof	US60/338,649	DE60222802.6-08
	CA2,467,378	ES1453909
	EP1453909	IT1453909
	AU2002347165	GB1453909
	AU2008207405	FR1453909
Pharmaceutical Compositions Cereal Beta (1-3) Beta (1-4) Glucan	US60/477,048	AU20042334192
	PCT/CA2004/000662	JP4892337
	EP1622627	US10/554,290
	CA2,522,739	US12/826,178
Improved Extraction and Purification Method for Cereal Beta (1-3) Beta (1-4) Glucan	PCT/CA2004/000666	AU2004233913
	EP1620469	JP4700601
	US10/554,228	EP2517717
	CA2,523,021	
Oat Extracts: Refining, Compositions and Method of Use	EP99108965.7	US6,818,232
	PCT/EP2000/004046	US7,887,823
	AU767424	EP1522304
	CA2,368,218	DE60042567.3-08
	EP1185241	ES2327121
	FR1185241	FR1522304
	GB1185241	GB1522304
	DE6017392.5-08	US8,512,719
	ES2233394	US13/958,269
	JP4868646	
Compositions Containing Avenanthramides from Extracts of Oats	EP1,522,304	
Avenanthramide-Containing Compositions	US60/986,476	PCT/CA2008/002008
Cereal Beta Glucan Compositions and Methods	US60/086,955	DE69924489.7-08
	PCT/CA1999/000486	FR1087999
	CA2,306,537	GB1087999
	EP1087999	US6,284,886
	CH1087999	JP4405672
Cereal Beta Glucan – Probiotic Compositions	US60/285,248	CA2,383,021
Methods for Extracting Cereal B-Glucans	US5,518,710	
Supercritical Fluid Treatment of High Molecular Weight Biopolymer	US9,249,266 B2	PCT/WO2011/120155

Source: Ceapro.

In addition, on September 13, 2016, Ceapro announced that the Company received allowance from the Canadian Patent Office for Canadian Patent Application Serial No. 2,794,960 entitled, "Supercritical Fluid Treatment of High Molecular Weight Biopolymers." Upon issuance, this patent will likely provide intellectual property protection through 2036.

Leadership

Figure 4 summarizes Ceapro's executive management and Board of Directors, followed by brief biographies.

Figure 4
MANAGEMENT AND BOARD OF DIRECTORS

MANAGEMENT	
Gilles Gagnon, M.Sc., MBA	President and Chief Executive Officer
Stacy Prefontaine, CA	Chief Financial Officer

BOARD OF DIRECTORS	
Glenn R. Rourke, MBA	Chair of the Board
Gilles Gagnon, M.Sc., MBA	President and CEO
Don Oborowsky	Director
John Zupancic	Director and Chair Audit Committee
William W. Li, M.D.	Director
Ulrich Kosciessa, Ph.D.	Director

Source: Ceapro, Inc.

For the past three years, the management group has been able to turn the Company around and achieved record financial performance by conducting business operations under the following principles: (1) maximizing revenues from the commercialization and development of novel product offerings; (2) maintaining profit margins through manufacturing efficiencies and low overhead; and (3) ramping up its partnership and collaboration efforts to secure multiple research grants and financial contributions for the development of its technology and products.

Gilles Gagnon, M.Sc., MBA, President and Chief Executive Officer

Mr. Gilles Gagnon is the president and chief executive officer (CEO) of Ceapro Inc. He has also been president of Prodev Pharma Inc. since May 2007. Prior to that, he was president and CEO of Aeterna Zentaris Inc. (AEZS-NASDAQ). During the past 35 years, Mr. Gagnon has worked at several management levels within the field of health, especially in the hospital environment and pharmaceutical industry. Before going to Aeterna Zentaris in 1999, Mr. Gagnon was vice president, external affairs for Novartis Pharma Canada Inc. (NVS-NYSE) from 1996 to 1999. Prior to that, from 1989 to 1996, Mr. Gagnon held various positions including executive director, corporate planning and business development, senior director, strategic alliances, general manager, government affairs and access to market and director of professional services at Sandoz Pharmaceuticals Inc. Throughout his career in the pharmaceutical industry, Mr. Gagnon was especially involved in corporate development, alliance management, as well as marketing functions where he participated in the launch of nine innovative pharmaceutical products in addition to his general management functions.

Mr. Gagnon has participated in several international committees and strategic advisory boards. He recently completed his third mandate on the board of directors of Canada's Research-Based Pharmaceutical Companies (Rx&D) where he represented for nine years members from the biopharmaceutical sector and pioneered the Rx&D's Canadian bio partnering initiative. He also served on various boards in the life sciences industry, including Bio Quebec (Chairman) and Montreal In Vivo. Mr. Gagnon holds a Master's in pharmacology (M.Sc.), a Master's in Business Administration (MBA) from Sherbrooke University, a certificate in general management from the London Business School, and an ICD.D certification for completing the Directors Education Program at the Rothman School of Management of the University of Toronto. He is a member of the Canadian Institute of Corporate Directors.

Stacy Prefontaine, CA, Chief Financial Officer

Ms. Stacy Prefontaine is a global finance and accounting executive with close to two decades of experience in public company external financial reporting, corporate tax compliance and planning, and accounting practices and controls. She has led assurance and accounting services for numerous private and public companies, assisting with their successful fundraising ventures, including offering memorandums and initial public offerings (IPOs), and with their adoption of International Financial Reporting Standards. Prior to joining Ceapro, Ms. Prefontaine was a principal at Grant Thornton LLP, one of the world's leading organizations of independent audit, tax, and advisory firms, where she led assurance services for a variety of public and private organizations for four years. She joined Grant Thornton in 2011, when it acquired Stout & Company LLP, an Edmonton accounting and advisory firm, where Ms. Prefontaine was a partner. Previously, she was a manager with increasing responsibility in client service accounting for over five years at Collins Barrow Calgary LLP, one of Canada's largest associations of chartered accounting firms. Ms. Prefontaine earned a Bachelor's of Commerce from the University of Alberta, Edmonton, Alberta, and the designation as Chartered Accountant from the Institute of Chartered Accountants of Alberta.

Board of Directors

Glenn R. Rourke, MBA, Chair of the Board

Mr. Glenn Rourke is a native of Quebec City with degrees from Queen's University and a MBA from the University of Western Ontario. In 2006, he completed the Director's Education Program of the Institute for Corporate Directors (ICD) and subsequently received the ICD.D certification. Retired since January 2006, Mr. Rourke worked with BMO Financial Group from 1970. He has lived and worked in Tokyo, Singapore, and Hong Kong, and was involved in many aspects of international banking, culminating with overall responsibility for the Bank's business in Hong Kong and the People's Republic of China. In 1981, he moved to Toronto as vice president of World Corporate Banking, and then in 1985, was relocated to Montreal as a senior vice president and head of corporate banking for Eastern Canada. Subsequent to the merger of Bank of Montreal Corporate Banking and Nesbitt Burns Investment Banking, he also assumed direct responsibility for a number of major Quebec-based banking relationships, with overall responsibility for corporate lending and coordination of a wide array of banking products for clients and prospective clients. Mr. Rourke holds numerous past and current directorships.

Gilles Gagnon, M.Sc., MBA, President and CEO

Biography on page 16.

Don Oborowsky, Director

Mr. Don Oborowsky is an accomplished entrepreneur. He has been president and CEO of Waiward Capital since 2014. Prior to that, he has been president and owner of Waiward Steel Fabricators Ltd. since 1972. Prior to co-founding Waiward Steel Fabricators, he spent five years in construction trades in Edmonton, as a carpenter with Mod Contracting, a steel fitter with Collins Steel Products, and as a steel fitter/erector with General Contracting. He is also part owner and president of three other Edmonton-based businesses: Waiward Excavators, Hustle Holdings, and Characters Fine Dining.

John Zupancic, Director and Chair Audit Committee

Mr. John Zupancic is a professional engineer, having received an engineering degree from the University of Toronto in 1960. Mr. Zupancic was employed by Imperial Oil in various capacities, including manager of supply and technical services for the Strathcona Refinery. In 1986, while still employed by Imperial Oil, Mr. Zupancic undertook a **secondment** with the University of Alberta as the president of the Alberta Microelectronic Centre (AMC). AMC was a technology transfer company owned by the University of Alberta, focused on providing researchers from both the University of Alberta and the University of Calgary access to advanced microelectronic tools while undergoing the transfer of advanced electronic technology to the private sector.

William W. Li, M.D., Director

Dr. William Li is the president, medical director, and co-founder of the Angiogenesis Foundation, and leads a worldwide revolution in diet and disease prevention based on emerging clinical research and technological advances. Through his work at the Angiogenesis Foundation, he has developed a social enterprise model based on international collaborations with medical academic centers, biopharmaceutical companies, and government agencies, including the U.S. National Institutes of Health (NIH), National Cancer Institute (NCI), and Food and Drug Administration (FDA). Dr. Li's expertise extends across numerous medical specialties including oncology, hematology, cardiology, diabetes, ophthalmology, dermatology, and wound care, along with a diverse category of other disease areas and health conditions. Dr. Li's work has been published in *Science*, *The New England Journal of Medicine*, *Nature Reviews Clinical Oncology*, *The Lancet*, and other peer-reviewed medical journals. He is a highly sought international lecturer and advisor, and has been recognized by *O Magazine*, the *Atlantic*, *USA Today*, the *New York Times*, *TIME Magazine*, *Wall Street Journal*, and *CNN*, as well as the Bill and Melinda Gates Foundation and the Clinton Global Initiative. Additionally, Dr. Li's diet and disease prevention expertise has been featured on "The Doctor Oz Show," including his recent Eat to Defeat Cancer initiative, a healthy eating campaign in over 130 countries. Dr. Li received an A.B. with honors from Harvard College and an M.D. from the University of Pittsburgh School of Medicine, Pennsylvania. He completed his clinical training in general internal medicine at the Massachusetts General Hospital in Boston. Dr. Li has held appointments on the clinical faculties of Harvard Medical School, Tufts University, and Dartmouth Medical School. He is an Honorary Fellow of the American College of Wound Care Specialists, and has served as advisor and consultant to global public and private companies.

Ulrich Kosciessa, Ph.D., Director

Dr. Ulrich Kosciessa is a member of the executive management board of Medac GmbH, a global pharmaceutical company with operations in 70 countries, managing director of Medac International, and chairman of the board of Medac Pharma Inc., a U.S.-based subsidiary of Medac GmbH focused on specialty pharmaceuticals for autoimmune diseases and cancer. Throughout his successful management career at Medac, Dr. Kosciessa has formed several subsidiaries and affiliates as well as established a network of global partners, growing the company's international business more than 50% since 2005. In addition, since 2006, Dr. Kosciessa has also served as CEO of Photonamic, a subsidiary of Medac GmbH focused on research and development of photodynamic therapy and diagnostics. He has successfully developed two Photonamic products currently marketed in Europe, South America, the Asia-Pacific region, and Australia. From 2006 to 2008, Dr. Kosciessa also served as CEO at Immune Laboratory of Hannover, a research-based organization focused on autologous dendritic cell-based tumor vaccines. Prior to joining Medac GmbH, Dr. Kosciessa was a postdoctoral researcher at the neuroscience/neurodegenerative diseases division of Schering AG, a multinational pharmaceutical company. He received a B.S. in biology and a Ph.D. in molecular biology from Georg-August University of Göttingen, Germany.

Core Story

All $ are presented in Canadian dollars (C$), except where noted as U.S. (US$). As of November 11, 2016, C$1.00 ≈ US$0.74.

Ceapro Inc. ("Ceapro" or the "Company") is a commercial-stage biotechnology company involved in the identification, extraction, bioprocessing, and commercialization of functional, biologically active compounds ("bioactives") from botanical and other renewable plant resources. The Company's focus is on the production and commercialization of its proprietary botanical ingredients for the cosmeceutical, nutraceutical, and pharmaceutical markets.

Ceapro's product portfolio and pipeline is based mostly around two oat-derived compounds: beta glucan (β-glucan) and avenanthramides. In addition, Ceapro markets a commercial line of natural active ingredients. Ceapro's bioactives and natural ingredients are currently used in multiple household product lines in the personal care and cosmetics industries, including in a number of well-known branded products, such as Aveeno®, Burt's Bees®, and Nexxus®, as shown in Figure 5. The Company believes that the use of its bioactives by major companies validates its products and technologies. Currently, Ceapro generates revenues through operations in the cosmeceutical industry, with the potential to expand into nutraceutical and pharmaceutical markets.

Figure 5

PRODUCTS THAT USE CEAPRO'S BIOACTIVE INGREDIENTS

Source: Ceapro, Inc.

The Company's core knowledge includes the following:

- bioprocessing expertise;
- an ability to isolate and purify specific molecules from a wide range of botanical sources;
- bioprocessing capabilities that allow for prototype extracts to be prepared for bio-screening or *in vivo* testing;
- a novel, heat-free drying technology for sensitive compounds; and
- an ability to go from concept to commercialization in a relatively short period of time.

The Company supports its operations and product development through the use of enabling technologies like its proprietary processing technology—Pressurized Gas eXpanded Liquid Technology (PGX) (detailed on pages 24-30)—as well as a proprietary plant extraction-based manufacturing process for the generation of active ingredients for the personal and healthcare industries.

CORPORATE STRUCTURE

Ceapro divides its operations into three areas, as depicted in Figure 6: Personal Care (existing cosmeceutical business), Healthcare (nutraceuticals and pharmaceuticals), and Enabling Technologies.

Figure 6
AREAS OF OPERATION

Personal Care	Healthcare	Enabling Technologies
Cosmeceutical business • Anti-Inflammation • Anti-Aging	Nutraceutical products Pharmaceutical products	Extraction/Fractioning Malting Chromatography Pressurized Gas eXpansion (PGX) Platform

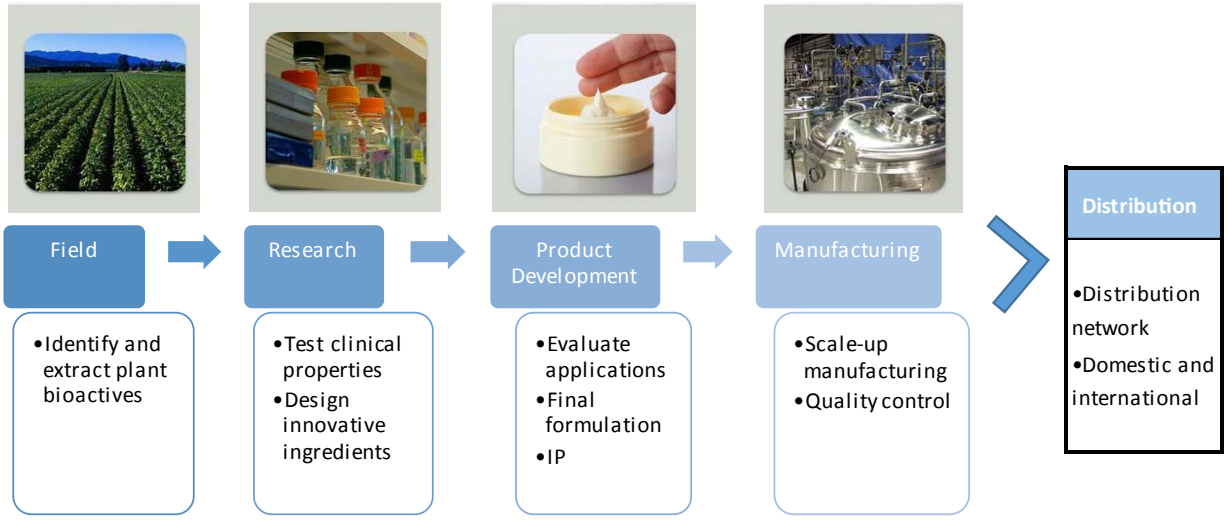
Source: Ceapro, Inc.

The Company believes that its revenue-generating cosmeceutical business and its focused, value-driven expansion into the nutraceutical and pharmaceutical industry provides a low-risk model: facilitating a transition into higher-margin sectors while still operating and expanding a profitable base business.

PRODUCT DEVELOPMENT STRATEGY

Ceapro has developed a vertically integrated value chain whereby the Company controls its operations from field to formulation to market, as illustrated in Figure 7. The process uses the Company's ability to isolate and purify specific molecules from a wide range of botanical sources, its bioprocessing expertise, and its proprietary plant extraction-based manufacturing process and drying technology, which allow Ceapro to drive the product development process from concept to commercialization in a relatively short period of time.

Figure 7
"FIELD TO FORMULATION" STRATEGY



Source: Ceapro, Inc.

MANUFACTURING

While Ceapro still operates a 4,000 sq. ft. manufacturing facility in Leduc, Alberta (which has a capacity of four metric tons or 4,000 Kg per week), the Company is also in the process of transitioning to a new, 30,000 sq. ft. manufacturing facility in Edmonton, which is designed to handle commercial production as well as R&D, bio-processing, and extraction operations. As announced on September 28, 2016, the facility (shown in Figure 8) is intended to allow the Company to move from batch-to-batch production into semi-continuous, thereby increasing production capabilities ten-fold.

Figure 8
NEW BIOPROCESSING AND MANUFACTURING FACILITY

Source: Ceapro, Inc.

Ceapro is expected to complete manufacturing validation trials in the fourth quarter 2016, and plans to run both manufacturing sites in parallel for a period of six months. This work is intended to allow the Company to ensure that the specs on the new facility are up to standards and achieve a seamless transfer, with manufacturing operations fully transferred into the new facility by the first quarter 2017. Ceapro is also planning to monetize any excess capacity via contract manufacturing operations for third parties.

Sustainability and Renewability

Ceapro's activities and manufacturing processes are guided by the principles of sustainability and renewability, combining current industry standards as well as future trends in order to make quality products while reducing the environmental impact of operations. The Company is committed to minimizing waste released into the environment by developing lean manufacturing processes that produce eco-friendly products.

The Company works closely with breeders and growers to develop novel varieties of renewable botanicals that produce high concentrations of specific active molecules. This includes the evaluation, development, and commercialization of indigenous plants and cultivated crops, through renewable agricultural practices with a positive impact on regional environments.

Ceapro states that its proprietary processing technologies use only environmentally friendly or "green" solvents and **GRAS (Generally Recognized As Safe)** raw and processed ingredients that are acceptable in all food and cosmetic formulations. In addition, these solvents are efficiently recycled using Ceapro's patented technology to ensure that they are not released into the environment.

Innovative Technologies

The Company continues to develop new manufacturing, commercial extraction, and purification processes to complement its existing platform in order to maintain the integrity of extracted components from natural sources—a key requirement for the successful development of the next generation of products.

Ceapro is able to extract specific classes of molecules from raw material and then purify them to remove unwanted components. The basis of the Company's technology is plant extractions using food-grade ethanol. The technology is considered green, sustainable, and eco-friendly, which is consistent with Ceapro's sustainability and renewability principles.

Quality Control (QC)

The manufacturing process of products based on natural botanical raw material requires continuous in-line monitoring, attention to detail, and a stringent quality control (QC) process so each batch meets precise specifications, as the raw source material differs due to each season's growing and harvest conditions. Ceapro relies on a strict QC operation to ensure that its raw materials, natural active ingredients, and final product meet the specifications required to achieve the desired clinical dose response of the active molecules in final products. The Company validates its internal analytical data by using third-party laboratories on a routine basis.

Ceapro's QC has the ability to measure each of Ceapro's active ingredients as well as a host of other parameters. Microbiological testing is conducted through a third-party laboratory that is accredited by Health Canada using USP-approved methods. With regard to Good Manufacturing Practices (GMP), raw materials are screened prior to being quarantined and before being tested and released to general inventory. In addition, the close proximity of its QC laboratory to the manufacturing area allows real-time monitoring of all aspects of production anticipated to ensure that Ceapro's standards for finished products are met.

Ceapro complements its QC process with custom processing equipment specifically designed to meet the **3A Sanitary Standard** for the dairy industry and eventually the future **P3A Sanitary Standard** for pharmaceutical manufacturing.

PARTNERS AND DISTRIBUTORS

The Company has secured key partnerships and collaborations to support both its research and manufacturing operations, as well as the commercialization and distribution of its products. Ceapro maintains a network of approximately 100 growers, from which the Company can select among multiple raw material samples in order to identify those that provide greater therapeutic potential. In addition, Ceapro has a history of developing successful long-term partnerships and collaborations with research facilities, such as the Edmonton-based Food Processing Development Centre (FPDC). Collaborations with centers like the NRC's Institute of Nutrisciences and Health (NRC-INH) and with the Food Technology Centre (FTC), both located in Charlottetown, Prince Edward Island, Canada, have also resulted in new process developments and in a new laboratory to study the Company's bioactives.

Over the past 18 months, Ceapro has secured partnerships and collaborations in support of its research and manufacturing operations, which has resulted in the following grants and financial contributions: (1) a loan agreement with Agriculture Financial Services Corporation for up to C$900,000; (2) a funding contribution of C$800,000 from Alberta Innovates Bio Solutions for the scale-up of its PGX technology; (3) a research grant from the National Research Council of Canada-Industrial Research Assistance Program (NRC-IRAP) for a non-repayable funding contribution of up to a maximum of C$350,000; (4) a research program in collaboration with McMaster University, which was awarded a C$370,300 research grant from The Natural Sciences and Engineering Research Council of Canada (NSERC); and (5) a non-reimbursable grant contribution of C$250,000 by the German-Canadian Centre for Innovation and Research (GCCIR) for the advancement of Ceapro's PGX technology, as part of a C$1.5 million project involving three German-based organizations along with the University of Alberta.

SALES AND DISTRIBUTION

The Company sells its active compounds to clients that utilize the compounds to create their own formulations and products. Ceapro commercializes its products through a network of distributors in select domestic and international markets. The Company has entered into strategic partnership agreements with worldwide partners that exclusively distribute and/or market Ceapro's products. Key distributors are shown in Figure 9.

Figure 9
DISTRIBUTION PARTNERS

Symrise AG	Ross Organics Specialty Sales	Kah Specialty Products LLC	Oat Services Ltd.

Source: Ceapro, Inc.

In March 2013, the Company entered into a formal distribution agreement with the Germany-based multinational Symrise AG for the distribution and commercialization of Ceapro's active ingredients to key international players in the cosmetics market. The agreement also provided Symrise with exclusivity for selected major international clients. In April 2016, the Company announced a new long-term agreement with Symrise, which includes Symrise providing Ceapro with financial support under the form of a line of credit until January 1, 2019, helping the Company to secure its cash flow operations.

In addition to this agreement, Ceapro is pursuing partnerships with other international distributors and sales organizations as well as large companies with global strengths and contracts. Ceapro also markets veterinary therapeutic products, such as an oat shampoo, an ear cleanser, and a dermal complex/conditioner, to veterinarians in Japan and other parts of Asia through agreements with Daisen Sangyo Co. Ltd.

Pressurized Gas eXpanded Liquid Technology (PGX)

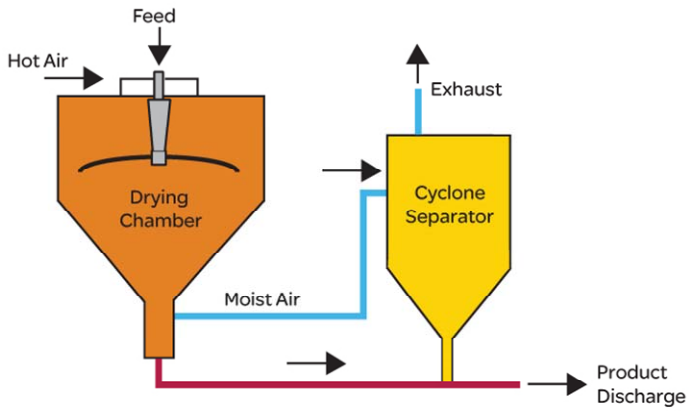
The Company's Pressurized Gas eXpanded Liquid Technology (PGX) is a novel spray drying technique for processing water-soluble biopolymers, including oat β-glucan.

Spray Drying

Spray drying, as illustrated in Figure 10, is a method employed to produce engineered dry powders from a liquid or slurry by rapidly drying with a hot gas in a single step. The basic idea of spray drying is the production of highly dispersed powders from a liquid solution (or emulsion) by evaporating the solvent. The liquid emulsion is atomized into a spray of droplets by passing through a nozzle and into a drying chamber, where it comes in contact with a heated gas. As atomized droplets of the solution come in contact with the hot air or gas, the solvent or moisture content in the droplets evaporates, turning it from a liquid into a dry powder form. The powder particles are then separated from the drying air and collected for use.

Figure 10

SPRAY DRYING



Source: Schneider Electric.

Spray dryers provide a quick and automated method for drying a product compared to other available methods. Thus, a crucial advantage of spray drying is that a mixture can be turned into a dried powder in a single step resulting in not only profit maximization but also process simplification. In addition, the characteristics and properties of the resulting dried powder can be controlled and maintained constant throughout the spray drying operation. The uniform properties of the resulting powder allow spray drying to be used in multiple applications where the production of a free-flowing powder is required. In particular, this process has been used extensively in pharmaceuticals, plant extracts, plastics, polymers and resins, soaps and detergents, and the food and beverage industry. Almost all other methods of drying, including use of ovens, freeze dryers, or rotary evaporators, produce a mass of material requiring further processing (e.g., grinding and filtering), producing particles of irregular size and shape.

Spray Drying in the Pharmaceutical Industry

The spray drying technology is a technique that has a wide range of applications in the pharmaceutical industry due to its manufacturing and particle engineering capabilities. On the manufacturing and production side, spray drying's one-step continuous process provides economic benefits, production efficiency, and process simplifications, as it can be easily automated, which reduces time-to-market (Source: *Research Journal of Pharmaceutical Dosage Forms and Technology*, Vol. 4[2]:74-79, 2011).

On the particle engineering side, spray drying can be successfully used for the modification of the physicochemical properties of the resulting materials by altering the process parameters—such as the temperature and atomization pressure—providing flexible control over powder particle properties such as density, size, flow characteristics, and moisture content.

In the past, spray-dried microparticles were often viewed simply as carriers, usually micronized dry material, without sophisticated attributes. This perspective has changed as more advanced drug delivery strategies have created complex requirements that can only be met by particles that are designed for a range of functions, transforming the microparticles from passive carriers to an essential part of the drug delivery system.

One particular property that can be altered through the use of spray drying that has applications in the pharmaceutical industry is the morphology of the resulting particle. Spray drying can be used to modify the size, crystallinity, and density of particles, allowing the formation of matrix-style morphological compounds of low density. Matrix microcapsules can be incorporated with therapeutic compounds to enhance the solubility and dissolution rate of poorly soluble drugs, resulting in increased bioavailability (Source: *Research Journal of Pharmaceutical Dosage Forms and Technology*, Vol. 4[2]:74-79, 2011).

PGX Technology Overview

PGX is an enabling spray drying technology platform that uses a highly tunable pressurized gas expanded liquid as the drying fluid, which consists of carbon dioxide and anhydrous ethanol (99%+ pure) as co-solvents. PGX, which mixes these drying agents with the liquid product in a spray chamber using a specially designed nozzle, can produce a high-purity, dry product in fractions of seconds, leading to short drying times and small drying equipment needs.

PGX allows for the processing of water-soluble biopolymers, such as oat β-glucan. The PGX platform can produce a range of novel morphologies, including granular powder, aerogels, and highly porous materials, which allows for the application of this technology across many industries, including functional foods, nutraceuticals, cosmeceuticals, and pharmaceuticals.

In particular, PGX can be used to generate biopolymers with large surface areas and nano-sized morphologies. These ultra-light, highly porous biopolymers can be impregnated with other active ingredients, creating novel functionalized bio-nanocomposites. Ceapro intends to utilize PGX technology to develop dry powder formulations of its liquid active ingredients used in cosmetics in order to enable the transition to other sectors and industries.

For example, PGX provides Ceapro with the ability to produce a pharmaceutical-grade tablet for its future entry into the nutraceutical and pharmaceutical industries. The Company has been able to produce different morphologies of tablet formulations, complying with pharmaceutical standards (between 100 and 200 nanometers of diameter), as shown in Figure 11.

Figure 11

PGX-ENABLED PHARMACEUTICAL TABLET PRODUCTION

Source: Ceapro, Inc.

The PGX technology was invented by Dr. Feral Temelli from the Department of Agricultural, Food, and Nutritional Science of the University of Alberta, along with Dr. Bernhard Seifried, now senior researcher at Ceapro. On May 20, 2014, Ceapro signed a development and licensing agreement with the University of Alberta for the use of its PGX technology in select large markets such as cosmeceuticals, functional food, nutraceuticals, and pharmaceuticals. Subsequently, on February 11, 2015, Ceapro announced the expansion of its license agreement with the University of Alberta to include worldwide rights to develop and commercialize PGX technology in all fields of use, including emerging industrial opportunities.

Ceapro's patented PGX technology has the ability to perform or enable the following tasks:

- dry agricultural-derived aqueous solutions or biopolymers at mild processing conditions (40°C);
- purify biopolymers by removing contaminants, impurities, and odors during the precipitation and drying process;
- micronize the polymer to a matrix consisting of highly porous fibrils or spherical particles having nano-scale features;
- functionalize the polymer matrix by generating nano-composites of various polymers forming fibers and/or spheres by mixing various aqueous polymer solutions/dispersions prior to PGX processing;
- impregnate the polymer matrix with bioactives and/or hydrophobic modifiers all in the same processing equipment; and
- extract valuable bioactives at mild conditions from fermentation slurries, while drying the residual biomass.

PGX Advantages

Ceapro maintains that PGX is an innovative technology with several key advantages over conventional drying and purification technologies. The Company believes that standard drying methods (like traditional freeze-drying or conventional spray drying) are not the best options when working with oat β-glucan and other water soluble biopolymers because they tend to be quite expensive and are not capable of removing all impurities. Alternatively, PGX is stated to produce biopolymers with morphologies similar to those obtained by freeze-drying but at a fraction of the required time and cost. In addition, use of the PGX technology can lead to the elimination of issues related to surface or interfacial tension that can lead to clumping of biopolymers during the traditional drying processes.

One of the reasons for these advantages is the fact that the technology operates at lower temperatures than conventional spray drying, allowing the incorporation of thermosensitive bioactives, as well as preventing the heat degradation issues of traditional drying technologies that can lead to substandard final dried products. In addition, PGX allows for the processing of material that can be a challenge with traditional methods, such as highly viscous solutions and high molecular weight biopolymers (MW = 600 kDa to 1500 kDa).

Management believes that a major advantage of PGX over traditional spray drying technologies is the capability to generate ultra-light, highly porous polymer structures with an increased surface area. These resulting polymers can then be impregnated or coated with additional bioactives to generate ingredients for functional foods, nutraceuticals, cosmetics, or pharmaceutical delivery systems. As such, this capability is at the center of the Company's efforts to expand beyond the cosmetic industry. Furthermore, according to Ceapro, PGX allows for the manufacturing of these ultra-light, highly porous polymer structures on a continuous basis—something that cannot be achieved using conventional technologies—and which provides economic benefits.

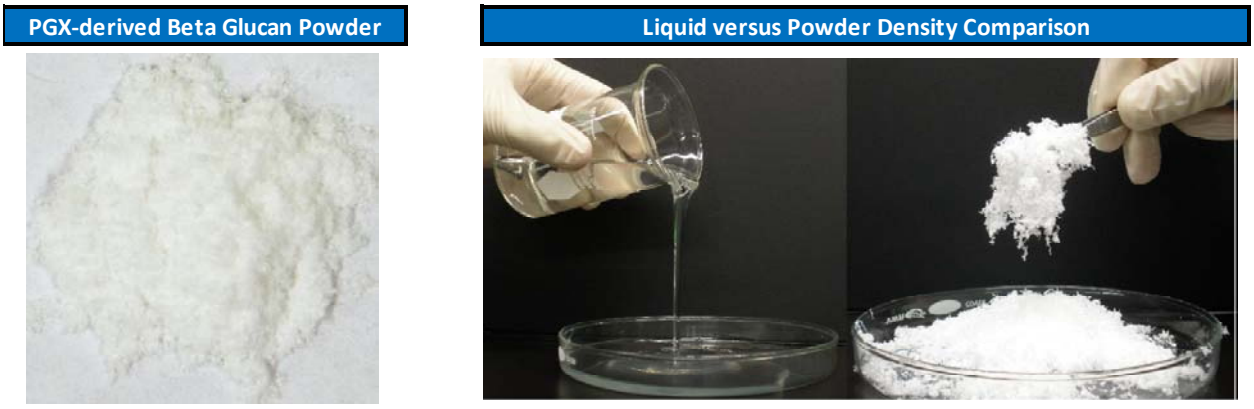
PGX Development and Applications

Ceapro has been scaling up and refining the PGX technology since it began working with it in 2010. The Company believes that PGX's ability to generate highly purified, sterile, porous polymer nanomaterial can be used to generate products targeting the cosmetics, pharmaceuticals, nutraceuticals, and functional foods markets, encompassing a wide range of applications, such as drug delivery, wound healing/scaffolds, and biomedical devices, among others. In the past few years, Ceapro has increased capacity as well as tested the potential of PGX on β-glucan nano-crystalline cellulose, gum arabica (GA), and corn starch.

Oat Beta Glucan (β-glucan)

One of the first goals of the use of PGX technology was the creation of a dry formulation of β-glucan. A dry formulation, as opposed to the liquid formulation used in cosmetics, allows the Company to exploit the well-established health claim of β-glucan for LDL and total cholesterol reduction in the large nutraceutical and functional food/drink markets. Figure 12 shows a picture of pure β-glucan powder (left).

Figure 12
PGX BETA GLUCAN POWDER



Source: Ceapro, Inc.

In addition to generating a pure powder from oat β-glucan, PGX was able to increase the surface area of the solution, as shown in Figure 12 (right side). The picture shows a highly viscous 70 ml of 1% (by weight) β-glucan solution, and the resulting fine PGX-β-glucan microfibrils after processing. Both pictures show the same mass, but the resulting product displays a higher surface area (and thus higher volume). Altering PGX's processing parameters controls the particle size of the resulting products. Figure 13 shows PGX-processed β-glucan powder with a particle size ranging from <100 µm to 2 mm.

Figure 13
PGX BETA GLUCAN POWDER PARTICLE SIZE

Source: Ceapro, Inc.

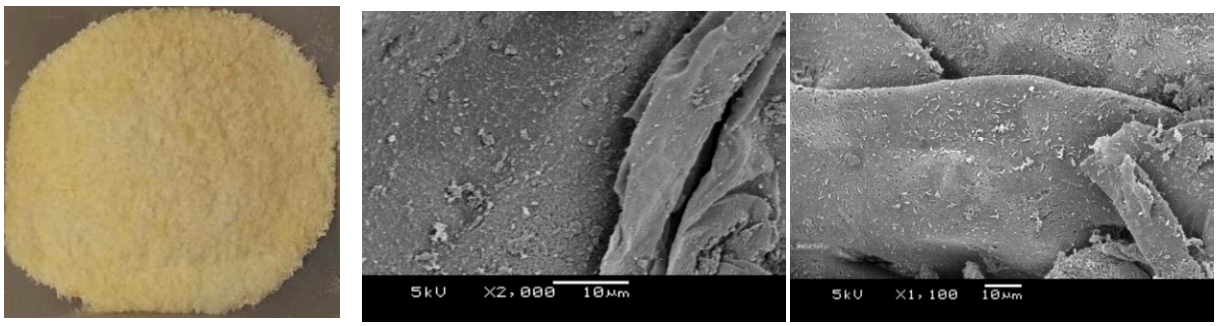
The ability to control particle size and surface area allows for the PGX-processed β-glucan powder to be mixed or impregnated with other bioactives and act as a carrier or drug delivery system, combining β-glucan's own therapeutic qualities with those of the additional bioactive compound. One such example is the Company's work to impregnate β-glucan with the bioactive Coenzyme Q10 (CoQ10).

In December 2014, Ceapro was awarded C$198,000 in funding from Alberta Innovates Bio Solutions (AIBio) for further development of a prototype functional food ingredient for an energy drink. This work uses the Company's β-glucan impregnated with CoQ10. The Company is conducting a study at the University of Alberta (described under "Functional Drink" on pages 44-45), which builds on preliminary data obtained in a 2014 study conducted by Ceapro in partnership with Massachusetts Institute of Technology (MIT).

The Company combined both polymers successfully, as shown in Figure 14 where PGX-β-glucan is homogeneously impregnated with CoQ10. In addition, the right side of Figure 14 shows **SEM** images of PGX-β-glucan before and after impregnation with CoQ10, showing no visible morphology difference between β-glucan and CoQ10-impregnated β-glucan. This suggests that the porous β-glucan structure is not negatively affected by the impregnation step and that CoQ10 is deposited onto the matrix at a submicron scale.

Figure 14

PGX BETA GLUCAN IMPREGNATED WITH CoQ10



Source: Ceapro, Inc.

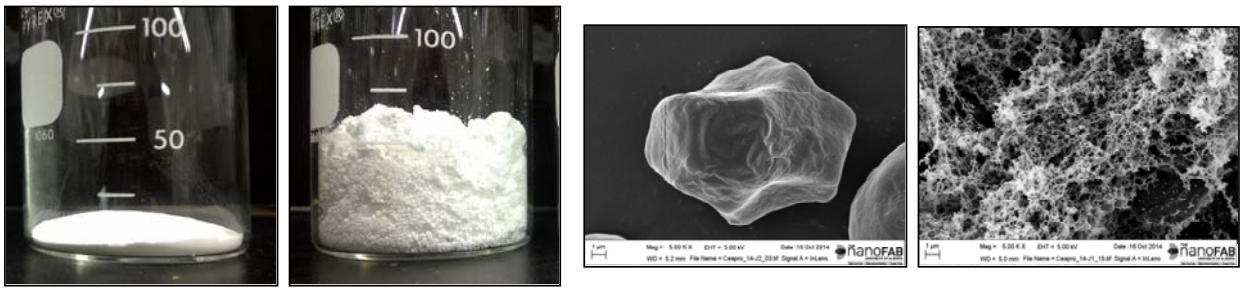
Additional Applications

Following its successful generation of a powder pure β-glucan product, Ceapro continues to assess the possible implementation of PGX into other polymers, such as corn starch and gum arabica. The left side of Figure 15 shows corn starch before and after PGX processing, with the same mass of corn starch in both containers. The right side of Figure 15 shows SEM images of corn starch before and after PGX processing under the same magnification, illustrating the nano-scale structured porous starch network.

Figure 15

PGX CORN STARCH

PGX-derived Corn Starch		SEM Images of PGX-Derived Corn Starch	
Before PGX Processing	After PGX Processing	Before PGX Processing	After PGX Processing



Source: Ceapro, Inc.

The Company was also able to process gum arabica (GA) with PGX, resulting in a final product with a porous nanoparticle network. Ceapro then impregnated the resulting GA with beta-carotene, as shown in Figure 16. Beta-carotene is a pigment found in plant and fruits that converts into vitamin A and acts as an antioxidant. In addition, beta-carotene is believed to have therapeutic properties against asthma, certain types of cancer, heart disease, cataracts, and age-related macular degeneration (AMD) as well as the ability to treat AIDS, alcoholism, Alzheimer's disease, depression, epilepsy, heartburn, high blood pressure, Parkinson's disease, rheumatoid arthritis, schizophrenia, and skin disorders (Source: Medline Plus - U.S. National Library of Medicine).

Figure 16

PGX GA IMPREGNATED WITH BETA-CAROTENE

Source: Ceapro, Inc.

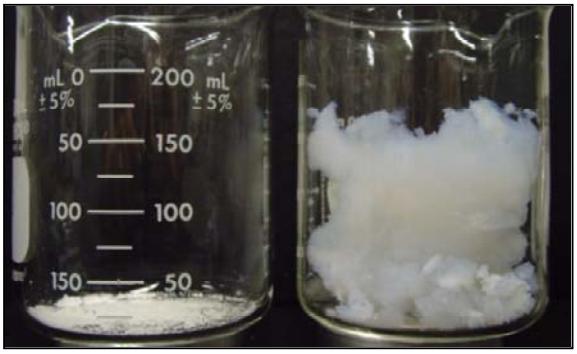
Expansion into Additional Markets

The Company has continued developing the PGX processing technology by assessing applications outside the main targets of the functional foods, nutraceuticals, cosmeceuticals, and pharmaceuticals. To this end, Ceapro processed cellulose through its PGX platform to achieved PGX-Cellulose Nanocrystals (CNC) aerogel. The resulting cellulose nanocrystals are shown in Figure 17. The left side of Figure 17 compares conventional spray-dried CNC, forming compact agglomerated particles, to PGX-dried CNC aerogel. The photos show the same mass of CNC in both beakers. The picture on the right shows a SEM image of the PGX CNC aerogel porous structure, with cellulose nanocrystals of approximately 150 nm length and 20 nm diameter, and a porosity of 99.5%. The porosity and resulting lower density allows for ease of impregnation of the cellulose with other substances or bioactives.

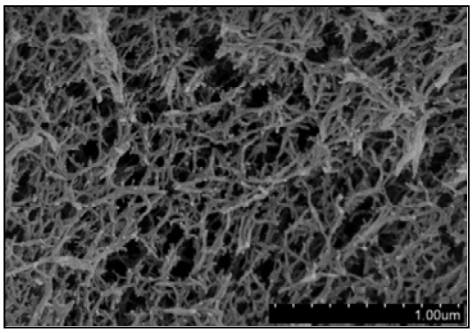
Figure 17

PGX CELLULOSE

Conventional Spray-Dried CNC | **PGX-dried CNC Aerogel**



SEM Image of the PGX CNC Aerogel Open-porous Structure



Source: Ceapro, Inc.

According to Ceapro, PGX-processed cellulose could have many applications in the forest and paper industry, as PGX-dried cellulose may result in a better quality pulp and thus higher quality paper. The Company believes that PGX-processed cellulose could also be involved in producing biodegradable plastics.

PGX Commercialization and Research Partnerships

Ceapro has stated that it has plans to initially use the PGX technology for the development and expansion of its own product pipeline through the processing of β-glucan as well as other biopolymers. In addition, Ceapro is planning to utilize its PGX processing's excess capacity to capitalize on new market opportunities and process samples for third parties in-house. Furthermore, Ceapro is evaluating the possibility of fully licensing the technology to parties that require large volumes that the Company cannot process and that have the financial capacity to establish a PGX production line under Ceapro's guidance.

The Company has stated that several multinational organizations have already executed confidentiality agreements with Ceapro to assess the third-party material with the proprietary PGX technology. The Company has conducted laboratory-scale research with PGX and analyzed biopolymer samples from commercially available starch, pectin, gums, alginate, and other polymers from various multinational companies.

During 2015-2016, Ceapro secured four new partnerships to assess and expand its current and forthcoming applications of the PGX technology. Each of these are described below.

- On November 12, 2015, Ceapro was awarded a research grant from the National Research Council of Canada-Industrial Research Assistance Program (NRC-IRAP) for a non-repayable funding contribution of up to a maximum of C$350,000 for the design, implementation, and testing of a demonstration skid for the PGX platform technology.

- In addition, on March 1, 2016, Ceapro announced a research partnership with McMaster University for testing different materials using the PGX technology. McMaster University was awarded a C$370,300 research grant from the Natural Sciences and Engineering Research Council of Canada (NSERC) to advance Ceapro's application of the PGX technology. Ceapro believes that this partnership could allow the Company to expand and capitalize on new applications for its PGX technology.

- The Company also received a funding contribution of C$800,000 from Alberta Innovates Bio Solutions (AIBio) for the scale-up of the PGX technology at the commercial and demonstration level. This is in addition to the C$198,000 funding from AIBio for the CoQ10-impregnated β-glucan prototype.

- On September 21, 2016, Ceapro was awarded a research grant of up to C$250,000 from the German-Canadian Centre for Innovation and Research Fund for the advancement of Ceapro's PGX technology. The project also aims at making PGX a greener process through the integration of an ethanol recycling system to be made possible through the development of novel retention membranes. This is part of a C$1.5 million project in partnership with German Corporation (A. Junghans GmbH) and two German-based Fraunhofer Research Institutes.

Products and Value Drivers

Ceapro utilizes a proprietary plant extraction-based manufacturing process and bioprocessing expertise to supply active ingredients manufactured from proprietary oat varieties and various natural sources to the personal care and cosmetics industries.

The Company's flagship products and value drivers, β-glucan and avenanthramides, are two oat-derived compounds that make up the core of Ceapro's product base. In addition, Ceapro markets a commercial line of natural active ingredients, such as oat powder and oat oil, to personal care, cosmetic, medical, and animal health industries, as listed in Figure 18. Ceapro's bioactives and natural products are currently used in multiple household products in the personal care and cosmetics industries, including in products from Aveeno®, Burt's Bees®, and Nexxus®.

Figure 18
CEAPRO'S COMMERCIAL PRODUCTS

Segment	Product	Therapeutic Indications	Established Brands/Co.
CORE PRODUCTS	CP Oat Avenanthramides Extract	Anti-inflammatory Antihistamine Anti-redness/itch Eczema	Aveeno Lubriderm
	CP Oat Beta Glucan Liquid	Anti-aging Moisturization Wound Healing Delivery Systems	ROC Neutrogena
OTHER INGREDIENTS	Oat Oil	Emulsifiers Moisturization	Aveeno
	Superfine Flour (SF)	Skin Protection	Burt's Bees
	CP Oat Peptides	Hair Moisturization Hair Repair	Aveeno Shampoo Vet Shampoo
	CP Sweet Blue Lupin Peptides	Hair Color Retention	Aveeno Living Color

Source: Ceapro, Inc.

COSMECEUTICALS

Market Overview

Cosmeceuticals are cosmetic products with medicinal benefits that can be purchased without a doctor's prescription. Discovered as a result of a convergence between personal care and pharmaceutical products, the best cosmeceutical products are believed to rely on genuine, medical peer-reviewed published data to support their claims.

Cosmeceuticals are expected to be the fastest growth segment in the personal care industry, with the global market projected to reach US$61 billion by 2020. The growth is driven by technological innovations, the emergence of new ingredients, and increasing consumer confidence in new products (Source: RNCOS' *Global Cosmeceuticals Market Outlook 2020*, 2015). Within the cosmeceutical market, skin care is the largest application area, with some projections estimating skin care to account for up to 62% of the total market, followed by hair care (15%) (Source: RNCOS' *The Cosmeceutical Market – Current and Future Outlook*, 2013).

AVENA SATIVA

The common oat (**avena sativa**) is a species of cereal grain mainly grown for its use in human consumption oatmeal as well as for livestock feed. Oat has always been regarded as a health-promoting food, having been used for more than 4,000 years in traditional medicine. Oat's usage as a natural therapeutic agent has been documented since at least the 12th century, including numerous times in Roman medical literature as a soothing agent to relieve itch and irritation associated with various dermatoses (Source*: Journal of Drugs in Dermatology*, Vol. 6[2]:167-170, 2007).

Avena sativa has also been used in alternative medicine for the treatment of multiple conditions, including high cholesterol, heart disease, nervous exhaustion, insomnia, anxiety, as well as a variety of skin conditions. Despite a rich history of medicinal use, there are some gaps in the understanding of the exact mechanisms that give **colloidal oatmeal** its clinical benefits, and thus understanding its full potential as a therapeutic agent. As such, avena sativa has been incorporated into conventional medical practice in more recent times, with numerous clinical test reporting oats' potential properties as an immunomodulatory, anticancer, antioxidant, antiatherogenic, and topical anti-inflammatory agent.

The interest in soluble oat fiber increased after studies showed that dietary oats can help decrease blood cholesterol and blood sugar, reducing the risk of coronary heart disease. This resulted in the January 1998 decision by the U.S. Food and Drug Administration (FDA) to allow a health claim of "reduces risk of heart disease" to be made on the labels of foods containing soluble fiber from whole oats (Source: *Comprehensive Reviews in Food Science and Food Safety*, Vol. 11[4]:355–365, 2012).

Oatmeal has also been documented to be effective as a treatment for diabetes, inflammatory bowel disease, asthma, obesity, and celiac disease, as a wound-healing agent, as an essential modulator in cases where inflammation could develop into cancer, and as a protective agent against pre- and post-menopausal breast cancer (Sources*: Critical Reviews in Food Science and Nutrition*, Vol. 53[2]:126-144, 2013; and *Indian Journal of Dermatology, Venereology and Leprology*, Vol. 78[2]:142-145, 2012).

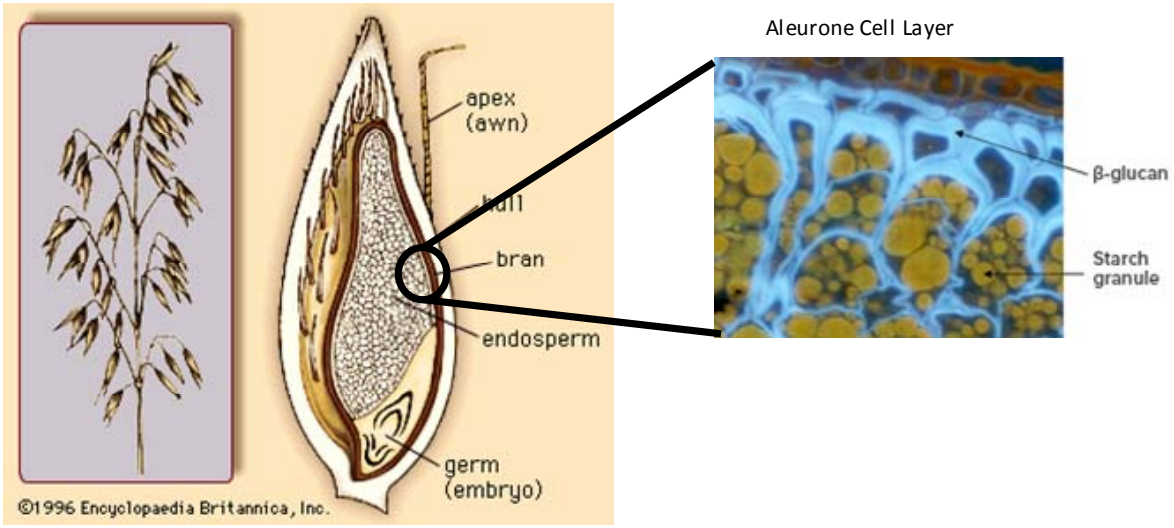
The clinical properties of avena sativa are derived from its chemical **polymorphism**. In particular, two constituents of avena sativa are of special interest for the operations of Ceapro: β-Glucan and avenanthramides. Oat's β-glucans are responsible for the protective and water holding functions of oat, while the presence of avenanthramides confers anti-oxidants and anti-inflammatory properties (Source: *Journal of Drugs in Dermatology*, Vol. 6[2]:167-170, 2007).

BETA GLUCAN (β-glucan)

β-glucan is a glucose polymer found in the cell walls of some cereals (e.g., oats and barley), certain types of mushrooms, yeasts, seaweed, and algae. The physicochemical properties of β-glucan vary greatly depending on the source, with differences in molecular mass, solubility, viscosity, branching structure, and gelation properties. Each type of β-glucan comprises a different molecular backbone, level of branching, and molecular weight, which affects its solubility and physiological impact. For example, according to Ceapro, although all β-glucan is a form of soluble fiber, oat derived β-glucan is the only type that is water soluble, which provides additional benefits and properties useful in the development of therapeutic and bioactive agents. In oats, β-glucan is concentrated in the outer layers of the **endosperm**, more precisely in the aleurone and sub-aleurone layer, as illustrated in Figure 19 (page 33).

Figure 19

OAT BETA GLUCAN



Sources: Swedish Oat Fiber AB (http://www.sweoat.com/oat-beta-glucans/) and Encyclopedia Britannica, Inc.

The β-glucan market is emerging, though the compound has been marketed as a specific ingredient for approximately 15 years. Global demand for β-glucan is projected to reach US$321 million in 2016, up from US$282 million in 2014, and is expected to grow at over 6% annually between 2015 and 2025. Of the total market, oat-derived β-glucan accounts for 69.3%. The growth is driven by the preference for food products with natural ingredients, and the "Better for Heart Health" labeling approved by the FDA. In addition, technological advancements and ongoing research has driven the inclusion of oats and β-glucan in functional food, supplements, and cosmeceuticals (Source: FMI's *Beta-glucan Market: Global Industry Analysis and Opportunity Assessment 2015 – 2025*, 2015).

Despite its potential as a therapeutic agent, the process of isolation and purification of oat β-glucan is extremely difficult. In addition, the macromolecular structure of the processed β-glucan and the level of impurities found in the final product—both of which have a direct relation to the different therapeutic properties and health benefits associated with β-glucan—are defined by the isolation and preparation method.

β-glucan Therapeutic Properties

Ever since the health-promoting effects of β-glucan were reported, several studies have been carried out to assess the effects of this natural compound on various health problems. Results of these studies have shown that oat β-glucan plays an important role in promoting health and preventing diseases. For example, β-glucan has been found to be a good lowering agent of total and LDL cholesterol. In addition, some studies also suggest that β-glucans may boost the immune system, improve the resistance to infectious and parasitic diseases, increase satiety, help regulate blood glucose levels, and decrease the risk of developing some types of cancer. However, research on most of these indications has not been consistent and advanced enough to determine the optimal administration method, specific daily requirements, and treatment protocol (Source: *Today's Dietitian*, Vol. 16[5]:16, 2014).

Cholesterol/Heart Disease

For over 10 years, health claims for β-glucan-containing foods have been allowed in the U.S., Canada, Sweden, Finland, and the UK. The health claims approved by the FDA and the European Food Safety Authority are based on research showing that consuming three grams of β-glucan per day, from either oats or barley, can lower blood cholesterol levels by 5% to 8% (Source: *Today's Dietitian*, Vol. 16[5]:16, 2014).

The mechanisms that allows β-glucan to cause a reduction of cholesterol is a sum of several effects. However, it is commonly accepted that the main mechanism for β-glucan's cholesterol-lowering effect has to do with its ability to increase the viscosity of the **food bolus**. This viscosity allows it to form a gel-type substance that entraps certain nutrients and excludes them from the interaction with the small intestine walls, limiting the absorption of fats into the blood vasculature, including cholesterol and bile acid (Source: *Critical Reviews in Food Science and Nutrition*, Vol. 53[2]:126-144, 2013).

Skin Regeneration

As an ingredient in personal care products, β-glucan possesses skin regenerative properties—antioxidant activity, anti-wrinkle activity, anti-ultraviolet light, and a moisturizing effect—and is used in cosmetics for nourishing and improving skin appearance as well as is an effective agent for treating a variety of skin conditions. β-glucan has the ability to induce cellular activities which lead to the regeneration of **collagen**-producing cells and revitalization of immune cells in the skin, strengthening the skin's ability to deal with adverse environmental effects, and leading to anti-aging and anti-wrinkle properties (Source: *Phytotherapy Research,* Vol. 28[2]:159-66, 2014).

Wrinkles, one of the primary characteristics of skin aging, are caused by a loss of structural proteins (type I collagen) as well as the skin's moisture reduction. Collagen, which makes 70% to 80% of the dry weight of skin, contributes to the stability and structural integrity of the skin, and its decline contributes to the formation of wrinkles and aging marks. Studies have shown that β-glucan is effective in stimulating collagen synthesis and has an important role in wound healing and skin restructuring.

In addition, β-glucan has antioxidant properties (oxidative stress is one of the main reasons for skin aging and dermatology conditions) as well as a moisturizing effect. The water content of the skin has an important role in the appearance and function of the skin. β-glucans have been found to replenish and protect the skin's moisture barrier as well as provide hydration against the drying effects of the sun, relieving dry and itchy skin and making oat a good option for moisturizing dry or sensitive skin (Source*: Indian Journal of Dermatology, Venereology and Leprology*, Vol. 78[2]:142-145, 2012).

The large molecular structure of β-glucans was thought to prevent them from effectively penetrating the skin when administered in a topical fashion. However, a study published in the *International Journal of Cosmetic Sciences* was the first to show β-glucan's ability to deeply penetrate the skin into the epidermis and dermis. (Source: *International Journal of Cosmetic Science*, Vol. 27 [5]:292, 2005). The same team conducted a study assessing the penetration abilities of oat β-glucan in 27 subjects during an eight-week period, with data indicating that the application of an oat-based product resulted in a significant reduction of wrinkle depth, height, and roughness (Source: *Phytotherapy Research*, Vol. 28[2]:159-66, 2014). Thus, the water solubility properties of cereal derived β-glucan provide it with the ability to penetrate the skin down into the dermis level, while other forms of β-glucan cannot.

Wound Healing

Wound healing is an intricate process in which the skin repairs itself after injury. β-glucan has been reported to enhance early wound repair and has been used as scaffolds for the growth of bioartificial skin (Source: *Journal of Drugs in Dermatology*, Vol. 14[1], 2015). The mechanisms of action by which β-glucan aid in the wound repair process are varied. β-glucan is believed to improve transportation of **macrophages** to the wound site (which assist in the removal of damaged tissue), stimulate tissue granulation (which consists of new blood vessels and components on the new provisional extracellular skin matrix), and improve collagen biosynthesis (Source: *Phytotherapy Research*, Vol. 28[2]:159-66, 2014). Numerous animal and human clinical studies have shown that the application of β-glucan resulted in increased collagen deposition, increased tensile strengths of wound tissue, and lower infection rates (Source: East Tennessee State University).

Diabetes

Oats have been shown to reduce the risk of glucose intolerance by slowing glucose absorption after a meal. One study followed more than 65,000 women for six years and found that dietary fiber, including β-glucan intake, was inversely associated with the development of Type 2 diabetes. The mechanism of action is similar to that which allows β-glucan to have a positive effect on cholesterol levels. β-glucan's viscous fibers may form a gel in the small intestine, which acts to delay nutrient absorption, slowing the delivery of glucose into the bloodstream, and reducing the need for insulin. These fibers' ability to lower **postprandial glycemia** and **insulinemia**, as well as cholesterol, has been established in numerous studies.

In addition, oat β-glucan may also play a role in modulating the metabolic effects observed after fiber-rich meals. Bacteria ferment β-glucan in the intestinal tract, producing short-chain fatty acids, which may stimulate insulin release from the pancreas and alter glycogen breakdown by the liver, and therefore play a role in glucose metabolism and protect against insulin resistance (Source: *Today's Dietitian*, Vol. 16[5]:16, 2014)

Immune System

Several *in vivo* and *in vitro* investigations and clinical trials have revealed that orally ingested β-glucan can modulate the immune system. Various receptor interactions, explaining possible mode of actions, have been detected. The effects mainly depend on the source and structure of the β-glucan. These include several human clinical trials with dietary insoluble yeast β-glucan. The results of these studies clearly indicate that oral intake of insoluble yeast β-glucan is safe and has an immune-strengthening effect (Source: *Nutrition Journal*, Vol. 13:38, 2014).

In particular, a clinical human trial published in the *European Journal of Nutrition*, based on a placebo-controlled, multicentric study in healthy subjects, showed that β-glucan helps prevent colds and increases the body's potential to defend against invading pathogens. Supplementation with insoluble yeast β-glucan reduced the number of symptomatic common cold infections by 25% when compared to placebo (Source*: European Journal of Nutrition*, Vol. 52[8]:1913–1918, 2013).

Cancer

β-glucan is considered a biological response modifier with immunomodulatory and health beneficial effects, including anticancer properties. Beta glucans have been used in immune-adjuvant therapy for cancers and tumors in clinical trials, mainly in the Far East, with a positive effect on patients' survival and quality of life (Source: *Anticancer Agents in Medical Chemistry,* Vol. 13[5]:709-719, 2013).

Although there is a large collection of *in vitro* and *in vivo* research data that demonstrates β-glucans have antitumor and anticancer activity, there are a limited number of human studies available. However, these trials established the ability of β-glucan to inhibit tumor growth in a variety of experimental tumor models, and indicate that oat β-glucan can contribute to the decrease in the risk of cancer and improve the quality of chemotherapy. Moreover, the antitumor efficacy of β-glucan seems to relate to the type of tumor, the genetic background of the subject, the dose, the route, and timing of administration (Source: *Critical Reviews in Food Science and Nutrition*, Vol. 53[2]:126-144, 2013).

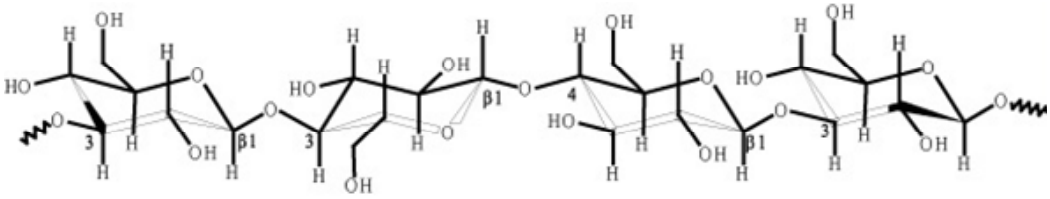
CEAPRO β-GLUCAN PRODUCTS

Ceapro's proprietary extraction and formulation technologies have allowed the Company to produce a liquid β-glucan product for the personal care and cosmeceutical market, which is currently being used in well-known product lines such as RoC® and Neutrogena®. The patented process yields a β-glucan liquid formulation that is water soluble, nearly clear, and odorless. This Ecocert® certified natural product is sold as a cosmetic-grade and medical-grade ingredient.

Ceapro's β-glucan is currently sold as a 1% solution in water, which according to the Company, is the maximum amount that can be placed in a solution to avoid possible viscosity issues that could limit its application in the cosmetic industry. The different product lines offered by Ceapro are shown in Figure 20.

Figure 20

CEAPRO'S CURRENT BETA GLUCAN PRODUCTS



Product Name	Distributor/Customer
CP Oat Beta glucan liquid	Oat Cosmetics, KAH Specialty, Ross Organic
Symglucan®	Symrise
Drago beta glucan liquid	Symrise
Beta glucan liquid Medical grade 10 & 100 ppm BAC	Stellen Medical (Brennen), Ross Organic

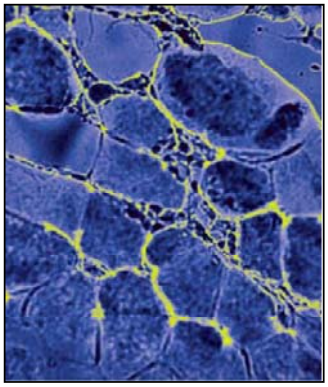
Source: Ceapro, Inc.

The Company believes that its Oat β-glucan is the only high molecular weight (800-1500 kDa) oat-based β-glucan solution that has been shown to effectively penetrate into the skin. According to the Company, it was the first to demonstrate that high-molecular-weight β-glucan can penetrate human skin, and has been able to show the ability of its product to penetrate into the deep layers of the skin. The left side of Figure 21 shows the Company's β-glucan product intercalated between the dermis cells, while the right side of Figure 21 shows Ceapro's 0.5% β-glucan absorption levels among the different skin layers after just one topical application.

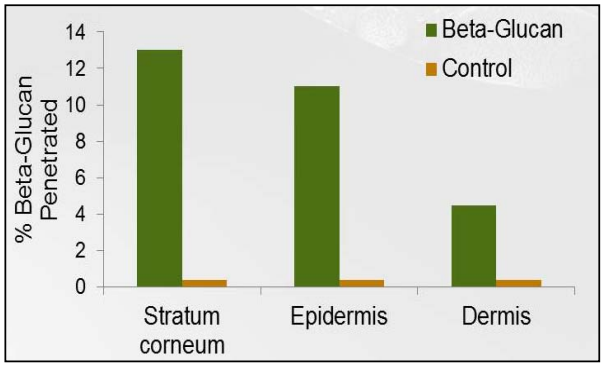
Figure 21

CEAPRO'S β-GLUCAN SKIN ABSORPTION

β-glucan Intercalated Between Dermis Cells



β-glucan Absorption Levels After 1 Topical Application



Source: Ceapro, Inc.

The skin absorption properties of Oat β-glucan, combined with β-glucan's natural health benefits, are particularly applicable to the cosmetic industry. Specifically, Ceapro's Oat β-glucan can be formulated into a variety of applications including skin care and hair care. On the skin care front, β-glucan's skin-related beneficial properties—including its use as an anti-aging, anti-wrinkle, and wound healing agent—allows for its inclusion in formulations for day creams, moisturizers, facial tonics, and sun protectants. Ceapro's Oat β-glucan's moisturizing and film-forming properties find applicability in shampoos, conditioners, and styling gels.

In addition, Ceapro's Oat β-glucan's skin absorption ability and percutaneous transportation allows it to act as a delivery platform, providing sustained released of an additional active ingredient into the skin, combining the benefits of β-glucan with those provided by the additional bioactive.

AVENANTHRAMIDES

Avenanthramides are a group of phenolic alkaloids found mainly in oats. These compounds, found predominantly in the oat's bran, are anti-pathogens, produced by the plant to defend it against plant pathogens, such as fungi. Oats contain more than 20 different forms of avenanthramides, differentiated by different molecular backbones, with each type displaying different physicochemical and therapeutic properties.

Avenanthramides are natural antioxidant compounds present in oat, and are considered the largest group of phytochemicals with disease-preventing and health-promoting effects. Avenanthramides have been the focus of intense research because of their antioxidant qualities, as well as additional biologic activities, including prevention of atherosclerosis, inflammation, and oxidation (Source: *Avenanthramides: Oat Compounds with a Growing Role in Dermatology*, Aveeno Md). According to Ceapro, the Company is the only commercial manufacturer of natural, pure avenanthramides, and the only producer of the specific avenanthramide used for its products, which is found in small concentrations in oats (0.3% of oat content).

Avenanthramides' Therapeutic Properties

A number of studies demonstrate that avenanthramides have anti-inflammatory, antioxidant, anti-itch, anti-irritant, and antiatherogenic activities (Source: *Journal of Drugs in Dermatology*, Vol. 14[1], 2015). Taken together, they portray avenanthramides as interesting candidates in the search for new therapies against a variety of human disorders (Source: *A study of avenanthramides in oats for future applications*, Upsala University School of Engineering, 2010).

Antioxidant and Anti-inflammatory effects

In normal cell metabolism, low concentrations of **radicals** or **reactive oxygen species (ROS**) and **reactive nitrogen species (RNS)** are produced. At **homeostatic** conditions, these substances take part in various cellular transduction pathways and defenses against pathogens. In high amounts however, these radical substances can afflict cell death and tissue damage by degradation of proteins, lipids, DNA, and RNA, leading to diseases such as cancer or atherosclerosis.

Avenanthramides have been found to exert antioxidant activities both *in vitro* and *in vivo*, with up to 30 times greater activity than other phenolic compounds found in oats. Furthermore, the structure of avenanthramides is similar to that of the synthetic drug Tranilast, which is used in certain allergy treatments. This finding indicates that avenanthramides may display synergistic interactions to other antioxidative compounds, decreasing the oxidative stress in biological systems (Source: *A study of avenanthramides in oats for future applications*, Upsala University School of Engineering, 2010). In addition, studies have demonstrated avenanthramides' anti-inflammatory attributes. These studies have shown that avenanthramides can inhibit the activity of **nuclear factor kappa-Beta (NF-kappa B)** and the release of pro-inflammatory **cytokines** and **histamine**, well-known key mechanisms in the pathophysiology of inflammatory dermatoses (Source: *Journal of Drugs in Dermatology*, Vol. 9[9]:1116-1120, 2010).

Avenanthramides in Dermatology

The abilities of poultices of oats and colloidal oatmeal to relieve different skin conditions have been known for some time, with colloidal oatmeal suspensions currently available in bath soaps, shampoos, shaving gels, and moisturizing creams. Application of oat-based products have indicated positive effects in dermatological conditions involving inflammation, loss of the skin's barrier function, or lack of hydration, such as sunburn, eczema, atopic dermatitis, and allergic or contact dermatitis (Source: *A study of avenanthramides in oats for future applications*, Upsala University School of Engineering, 2010).

Avenanthramides and Atherosclerosis

Atherosclerosis is a coronary heart disease where inflammatory processes interact with the vascular endothelium, causing adhesion of leukocytes to the endothelium, leading to plaque formation and thus thickening of the arterial wall. High intake of oats has been shown in both epidemiological and clinical studies to reduce the risk of coronary heart disease, with the positive effects on the blood vessels attributed to the avenanthramides (Source: *Critical Reviews in Food Science and Nutrition*, Vol. 53[2]:126-144, 2013).

Avenanthramides and Cancer

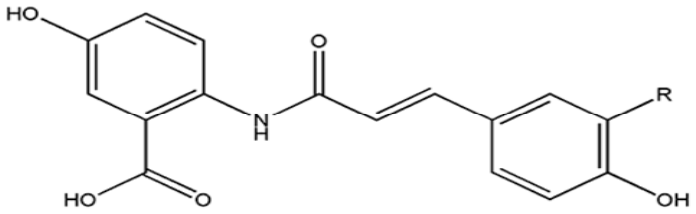
NF-kappa B, a key regulator of inflammation, has been identified as an essential modulator in cases where inflammation could develop into cancer. It has been shown that avenanthramides are responsible for anticancer activity, partially through the inhibition of NF-kappa B activation (Source: *Indian Journal of Dermatology, Venereology and Leprology*, Vol. 78[2]:142-145, 2012).

CEAPRO'S AVENANTHRAMIDE PRODUCTS

According to Ceapro, the Company is the only commercial manufacturer of natural, pure avenanthramides and the only producer of the specific avenanthramides used for its products, which are found in small concentrations in oats (0.3% of oat content). Combining a proprietary oat variety that contains a high concentration of avenanthramides with its harvest, growing, isolation, and processing capabilities, Ceapro was able to create a liquid product that contains an avenanthramide concentration of up to 200 ppm. Colloidal oat extract is a Ceapro product, and its CP Oat Avenanthramide Extract is sold in two different concentrations: 15 ppm and 100 ppm, as shown in Figure 22.

Figure 22

CEAPRO'S CURRENT AVENANTHRAMIDE PRODUCTS



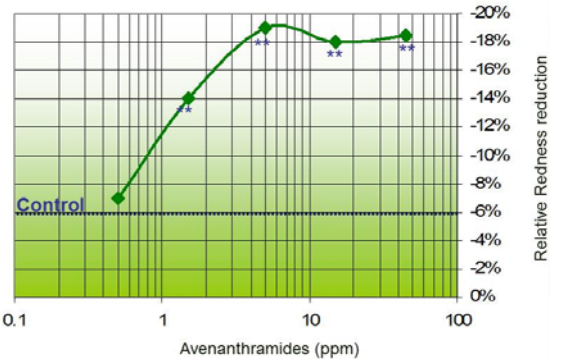
Product Name	Distributor/Customer
Drago Oat Actives (15ppm)	Symrise
DragoCalm®	Symrise
CP Oat Avenanthramide Extract (100ppm)	Oat Cosmetics, KAH Specialty, Ross Organic

Source: Ceapro, Inc.

To Ceapro's knowledge, no other company can produce avenanthramide extracts at Ceapro's high concentrations. Currently, Ceapro's colloidal oat extract is being utilized by Johnson & Johnson (JNJ-NYSE) in its Aveeno® brand as the major functional extract. Ceapro has affirmed that its scientists were the first to discover the link between the traditional use of colloidal oatmeal for alleviating red, itchy, and inflamed skin and naturally occurring avenanthramides in oats. As shown in Figure 23, in both UV- and chemical-induced *in vivo* erythema models involving 25 patients, topical application of a product containing avenanthramide concentrations of as little as 0.5% provided significant clinical relief. Additional studies, conducted by Johnson & Johnson and Symrise, have confirmed avenanthramides' skin therapeutic abilities.

Figure 23

AVENANTHRAMIDES' SKIN THERAPEUTIC EFFECTS



Source: Ceapro, Inc.

One study showed a significant improvement in erythema symptoms associated in subjects with mild to moderate atopic dermatitis, with 40% of patients experiencing improvement in itch perception after one week, and 62% of patients showing an improvement in their skin condition. In another study, 89% of patients with **atopy** reported significant improvement in itchiness after just one week, with continued improvements after four weeks.

Ceapro's CP Oat Avenanthramide Extract, characterized by a high level of avenanthramides, has the following benefits:

- effective at concentrations as low as 0.5 ppm;
- reduces erythema in both UV and chemical irritations;
- reduces inflammation and swelling (allergenic and non-allergenic activators);
- reduces itching; and
- protects cellular components of the skin from oxidative damage.

These benefits and therapeutic properties of the Company's CP Oat Avenanthramide Extract may provide a wide range of potential applications, including skin products for sensitive skin, anti-inflammation/antihistamine formulations, pre- and post-sun care formulations, moisturizing creams and lotions, moderate to severe skin conditions products (eczema, psoriasis, etc.), and products to alleviate insect bites.

Ceapro's Generation of Avenanthramides

Ceapro has secured the license for a new variety of oat—Value Added Oat (VAO 22)—having a different shape and potentially allowing the Company to mechanically extract a higher quantity of avenanthramides. In addition, due to an enabling technology in-licensed from Agriculture Canada based on the research of Agriculture Canada's Dr. Collins, the Company has been able to produce four batches in its current facility of the next generation of avenanthramides, extracted from malted oat, increasing avenanthramides' concentration from 22 ppm to over 200 ppm. The Company has also secured the rights for this enabling malting technology.

OTHER INGREDIENTS

In addition to β-glucan and avenanthramides, Ceapro markets a commercial line of natural active ingredients, such as oat powder and oat oil, to personal care, cosmetic, medical, and animal health industries through direct sales as well as through its distribution partners. Ceapro further markets veterinary therapeutic products, such as an oat shampoo, an ear cleanser, and a dermal complex/conditioner to veterinarians in Japan and other parts of Asia through agreements with Daisen Sangyo Co. Ltd.

Oat Oil

Oat oil is extracted from whole oat kernels by a gentle process that retains all of the important biologically active components. It is a clear oil with a mild natural odor that is rich in phospholipids and glycolipids, also called polar lipids, and free of trans-fatty acids. It contains a very high level of important natural antioxidants, including several forms of vitamin E, and is rich in essential fatty acids and natural emollients. According to the Company, this Ecocert®-certified, all-natural product, detailed in Figure 24, can provide softening, emollient, and hydrating actives for skin, cosmetics, and hair products.

Figure 24
CEAPRO'S OAT OIL

Benefits and Therapeutic Activity	Potential Applications
▪ High antioxidant content	▪ Scalp care
▪ Retention of biologically active components	▪ Skin creams, lotions, and oils
▪ Rich in unsaturated fatty acids: moisturizing	▪ Products for sensitive or inflammation-prone skin
▪ Soothing anti-irritant	▪ Stretch mark remedies

Source: Ceapro, Inc.

Oat Flour Superfine (SF)

Ceapro's oat flour SF allows stable formulations to be made for customers that want a more "natural" appeal to their formulation. Oat flour is sourced from a food-grade manufacturer in Europe and sold to KAH Specialty, Burt's Bees, and Ross Organic. It is incorporated into various cosmetics and personal care products.

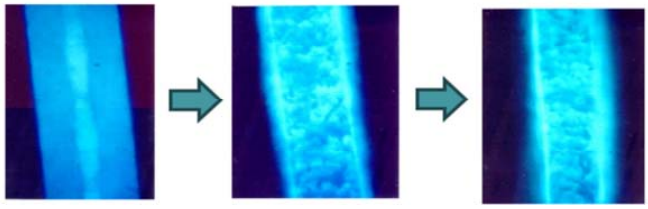
Oat Peptides

Ceapro's oat peptides are a multi-functional, Ecocert®-certified, natural extract produced by enzymatically **hydrolyzing** oat proteins. This extract is highly purified with the removal of carbohydrates and other undesirable naturally occurring compounds. The product's properties, namely its clear aqueous appearance and a very low odor, make it a useful alternative for hydrolyzed proteins such as wheat, which are often more highly colored, viscous, and odorous. In addition, since Ceapro's oat peptide product is negative when tested for a typical gluten response, it alleviates concerns over possible allergic reactions to wheat or gluten, making these oat peptides attractive alternatives for natural cosmetics.

According to the Company, its oat peptides provide benefits for both existing and new formulations for skin and hair care applications. The compound is water soluble; it penetrates the cortex with only a single application; and it can form a thin film on the skin and hair to impart protection, moisture, and shine without product buildup. In addition, it displays good foaming properties, emulsifying properties, and water-binding capacity. Figure 25 shows the protection provided by the product to hair after 1 and 10 applications.

Figure 25

OAT PEPTIDES OFFER HAIR PROTECTION



Source: Ceapro, Inc.

Lupin Peptides

Ceapro's Lupin Peptide product is pre-processed by Ceapro's proprietary method, and enzymatically hydrolyzed to produce defined, quality extracts with no odor and low color composition. The peptide concentration is standardized and the amino acid composition is minimized to ensure longer shelf-life stability. This gives Ceapro's Lupin Peptides advantages over acid hydrolyzed competitive products, which are dark, odorous, and variable in composition. According to the Company, Lupin Peptides penetrate hair and increase strength, provide good conditioning, protect hair without buildup, and statistically reduce color loss for up to 30 washes.

Pipeline and Market Expansion

Ceapro plans to capitalize on its active and profitable cosmeceutical base business by continuing to assess the therapeutic properties and applications of its key value driver ingredients—β-glucan and avenanthramides—with the intent of developing its bioactives into nutraceutical and pharmaceutical products.

The Company's initial efforts to penetrate the nutraceutical and pharmaceutical markets are based on the therapeutic properties of β-glucan and avenanthramides, respectively. Ceapro plans to utilize a PGX-derived dry formulation of β-glucan to generate its first two nutraceutical products: a cholesterol reducer and a component in a functional drink. The pharmaceutical development, based on avenanthramides, is initially focused on treatment of exercise-induced inflammation.

Long term, the Company plans to further build value by expanding its oat-derived, value-added products into different market segments and therapeutic applications. Among the different projects, Ceapro is evaluating the application of avenanthramides' anti-inflammatory qualities to treat inflammatory bowel disease (IBD) and the use of β-glucan for a wound healing product. Figure 26 lists the current products and product development pipeline for both β-glucan and avenanthramides as well as the clinical development status for Ceapro's nutraceutical and pharmaceutical projects.

Figure 26

CEAPRO'S PRODUCT PIPELINE

Beta Glucan	Preclinical	Clinical	Market
Cosmetics and Personal Care			✓
Functional Drink (Nutraceutical)	→		
Cholesterol (Nutraceutical)	→	4th Quarter 2016	

Avenanthramides	Preclinical	Clinical	Market
Cosmetics and Personal Care			✓
Exercise-Induced Inflammation (Pharmaceutical)	→		
Systemic Inflammation Based Disease (Pharmaceutical)	→	2nd Quarter 2017	

Source: Ceapro, Inc.

COSMECEUTICALS

Ceapro's expansion strategy for the cosmeceutical market relies on a two-pronged approach: (1) researching new indications for its current products; and (2) developing new products through clinical research. Currently, Ceapro's main value drivers—β-glucan and avenanthramides—are included in a wide array of products in the skin care and hair care markets. The anti-inflammation, anti-aging effects of the Company's key bioactives are well researched, including the key therapeutic abilities listed on page 43.

- *β-glucan:* Accelerates tissue healing, acts as a hydrating agent, improves skin elasticity, and acts as a natural skin protective barrier

- *Avenanthramides*: Provide relief from itching, reduce inflammation and swelling, and reduce redness (erythema)

In addition to commercializing these bioactives to additional companies with products in the skin and hair care segments, existing products are under further evaluation for previous undetermined cellular activities, with the intent of expanding operations to other markets within the healthcare sector. Furthermore, the Company is focused on identifying and researching new plants and novel functional bioactives. New natural plant sources are currently being investigated both internally and through strategic research partnerships, providing Ceapro with the ability to rapidly screen new prototype extracts to reveal new functional activities. Current projects are focused on Canadian crops with newly discovered attributes to assess the potential for new and innovative ingredients for cosmetic and personal care products.

The Company is also assessing the potential for licensing new technologies from Canadian universities to complement Ceapro's existing portfolio of processing technologies. The scientific data derived from the research of current and newly discovered bioactives, as well as the capabilities of new processing technologies, not only support the development of new products, but can lay the groundwork for additional applications of current and new bioactives in the nutraceutical and pharmaceutical markets.

NUTRACEUTICALS

The Company's initial efforts to penetrate the nutraceutical market are based on β-glucan's therapeutic properties. Ceapro utilizes its proprietary PGX technology to create a highly purified, dry formulation of β-glucan, developed according to pharmaceutical standards. Ceapro has stated that it plans to initially utilize this dry, pure β-glucan to generate its first two nutraceutical products: a cholesterol reducer and a component in a functional drink.

The global nutraceuticals market is expected to expand to US$279 billion by 2021, up from US$182.6 billion in 2015 (Source: Transparency Market Research's *Nutraceuticals Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast 2015 – 2021*, 2015). Growth is being driven by an increasing occurrence of chronic diseases coupled with consumers' increasing acceptance of dietary supplements and nutritional foods. To that end, approximately two-thirds (68%) of U.S. consumers report taking at least one supplement.

Technological advancements and new research that expands the applications of nutraceuticals are also predicted to propel the global nutraceuticals market in the coming years. For example, dietary supplements are consumed not only to meet the daily intake of the required nutrition, but also to boost physical performance. The emergence of clinical-style research to support health claims has also increased the acceptance of nutraceuticals among the population, with some products regarded as alternatives to OTC and prescription drugs (Source: *Nutraceuticals Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast 2015 – 2021*, 2015).

β-glucan as a Drug Delivery Platform

The ability to use Ceapro's β-glucan product as a delivery system is what drives the Company's future pathway for its β-glucan product into the nutraceuticals and pharmaceutical markets. The Company's β-glucan product—generated using its proprietary PGX technology—displays a low density that allows Ceapro to encapsulate or impregnate additional bioactive compounds into the Oat β-glucan matrix. Combining this ability with β-glucan's ability to effectively penetrate into the deep layers of the skin could allow the use of CP Oat β-glucan as a delivery system, combining the therapeutic benefits of both β-glucan and the impregnated bioactive compounds. According to Ceapro, this proprietary β-glucan drug-delivery platform has piqued interest from multiple parties that are looking to improve the delivery of their existing therapeutic products.

Cholesterol Nutraceutical Product

Ceapro is planning to capitalize on β-glucan's properties as a cholesterol-lowering agent and a regulator of glucose metabolism to create a cholesterol-lowering nutraceutical product. The Company plans to initiate a pilot clinical study to develop β-glucan as a cholesterol reducer during the fourth quarter 2016. The placebo-controlled clinical study is expected to enroll 200 patients and last 12 months with a crossover after 6 months.

Ceapro also plans to conduct a safety study to analyze the side effect profile of high purity oral β-glucan, which could take place at the same time as the clinical study. The safety study is expected to last 10 months. Previously existing safety and toxicology studies demonstrate a favorable safety profile for β-glucan in more than 200,000 individuals, from an industry partner currently commercializing β-glucan as a lubricating agent and carrier in a urinary incontinence device.

Functional Drink

Ceapro has initiated a study with the University of Alberta to develop a prototype formulation of a functional drink, which the Company anticipates could be completed by the end of 2016. The Company's second planned nutraceutical product is based on its ability to impregnate PGX-processed β-glucan with CoQ10, to be used as an energy booster functional drink. Ceapro plans to develop and test the formulations, and then once the process is successfully completed, commercialize through partnerships with established beverage makers.

CoQ10 is an antioxidant that is made in the human body and is needed for basic cell function, including maintaining the integrity of **mitochondria** and helping convert food into energy. Cells combine fuel (calories) with oxygen, and then use various nutrients (including CoQ10) in a multistep process to produce cellular energy, known as ATP. CoQ10 levels in the body decrease as an individual age, and may be low in people with cancer, certain genetic disorders, diabetes, heart conditions, HIV/AIDS, muscular dystrophies, and Parkinson's disease (Source: Mayo Clinic).

Promising therapeutic uses of CoQ10 may include eye disease, chest pain caused by exercise, asthma, chronic fatigue, and high cholesterol, as well as the treatment of chemotherapy side effects in children. Some studies also suggest that CoQ10 supplements, either by themselves or with other drug therapies, may help prevent or treat some cases of heart conditions, high blood pressure, diabetes, heart defects caused by chemotherapy, immune function of HIV-positive individuals, and improve exercise ability (Source: University of Maryland Medical Center).

The antioxidant and anti-inflammatory qualities of CoQ10 give this coenzyme potential benefits for recovery during strenuous exercise. Muscles are big users of CoQ10, with a prolonged lack of CoQ10 possibly contributing to significantly impaired muscle function. There are a number of studies that support this theory, although additional research needs to be conducted to fully understand the mechanism of action and the optimal form and dosage required.

A study of ultra-runners participating in a 50 km run that combined several degrees of high effort (mountain run and ultra-endurance) found that supplements of CoQ10 may counter the rise in oxidative stress and modulate the inflammatory signaling associated with strenuous exercise, and therefore, reduce subsequent muscle damage (Source: *European Journal of Nutrition,* Vol. 51[7]:791-799, 2012). These results are in line with previous studies that have found that CoQ10 supplementation increased the ability of healthy people to perform strenuous exercise before reaching fatigue, increased the sense of energetic vigor in middle-aged untrained subjects, and reduced free radical damage and boosted time to exhaustion levels during exercise directly related to oxygen utilization (Source: *Wellness Resources'* "Q10 Boosts Energy, Nerves, Muscles & Metabolism"). All of these positive effects on exercise imply that a CoQ10 supplement could allow people involved in physical activity to last longer before exhaustion, recover faster, and experience fewer injuries.

However, because of its hydrophobicity and large molecular weight, absorption of dietary CoQ10 is slow and limited (Source: *Free Radical Research*, Vol. 40[5]:445-53, 2006). According to the Company, the impregnation of CoQ10 into a β-glucan matrix could solve this issue. The β-glucan could not only act as a carrier to the CoQ10 enzyme, but could create a compound that sticks to the wall of the intestines, extending the time the CoQ10 interacts with them, resulting in a higher absorption of CoQ10 by the body.

PHARMACEUTICALS

Ceapro's ultimate objective is to enter the pharmaceutical market. The Company's pharmaceutical development efforts are based on avenanthramides' therapeutic qualities, specifically anti-inflammatory effects. Ceapro believes that because this type of compound was used as an ingredient in a pharmaceutical product approved for the Japanese and South Korean markets—Kissei Pharma's Tranilast—means that it could likely display a favorable toxicology and safety profile, making its approval process easier.

The global market for botanical and plant-derived drugs was valued at US$25.6 billion in 2015 and is expected to reach US$35.4 billion in 2020. The growth is driven by drug companies increasingly adopting a business model that includes development of botanical and plant-derived compounds amid consumer interest in natural health remedies (Source: BCC Research's *Botanical and Plant-Derived Drugs: Global Markets*, 2015).

Avenanthramides' Pharmaceutical Development

Although physical activity is known to reduce health risks for certain chronic diseases, rigorous exercise is known to generate reactive oxygen species (ROS) and cause an inflammatory response. Overproduction of ROS not only causes subtle cellular damage to muscle, but also increases the risk of systemic inflammatory response following rigorous physical exertion. Lengthening or **eccentric contraction (EC)** is an integral part of heavy exercise. EC breaks weakened myofibrils and activates proteases and lipases, followed by immunological responses such as free radical generation and expression of pro-inflammatory cytokines and chemokines. NF-kappa B activation escalates the process and provokes systemic inflammation that could have broad health outcomes, such as muscle pain or chronic inflammation, leading to underperformance. Thus, maintaining proper antioxidant defense during exercise and sports is an important issue for musculoskeletal health (Source: *European Journal of Applied Physiology*, Vol. 116[1]:67-76, 2016).

Recent research indicates that supplementation of antioxidants with pharmaceutical sources can be problematic as it interferes with the normal healing process and can diminish the benefit of exercise. However, the majority of the nutritional supplements available in markets are synthetic or from chemical extractions. Accordingly, the discovery and commercialization of **phytochemicals** derived from a natural food source that can demonstrate antioxidant and anti-inflammatory properties—such as avenanthramides—for potential dietary supplementation would be an advantage (Source: *European Journal of Applied Physiology*, Vol. 116[1]:67-76, 2016).

<u>Avenanthramide Studies</u>

Ceapro provided material for a bioavailability study that was recently completed at the University of Minnesota's Laboratory of Physiological Hygiene and Exercise Science. The Company plans to continue to investigate avenanthramides' antioxidant and anti-inflammatory function through a bio-efficacy study to be conducted at the University of Minnesota's Laboratory of Physiological Hygiene and Exercise Science. The aim of the proposed study is to examine whether long-term dietary supplementation of an oat flour cookie rich in avenanthramides could enhance blood antioxidant capacity and reduce blood inflammatory markers after a downhill running protocol among human subjects.

The trial builds on past studies conducted by some of the clinical trial researchers to assess avenanthramides' ability to attenuate exercise-induced inflammation and its anti-inflammatory mechanism of actions. One study assessing avenanthramides' effect on murine skeletal muscle cells found that it exhibits anti-inflammatory effects by inhibiting NF-kappa B activation in select cell lines, reducing the resulting inflammatory response. During the study, rats that were fed an avenanthramides-supplemented diet for 50 days displayed lower ROS generation and lipid peroxidation in skeletal muscle and higher levels of superoxide dismutase (SOD) and glutathione peroxidase (GPX) activities in the muscle, heart, liver, and kidney (Source: *Nutritional Research*, Vol. 23:1579-1590, 2003).

A subsequent and recent pilot study using Ceapro's avenanthramides is believed to be the first to test avenanthramides' ability to reduce exercise-related inflammation in human subjects. The study, published in the *European Journal of Applied Physiology*, investigated whether dietary supplementation of an oat product rich in avenanthramides would increase antioxidant protection and reduce inflammation in humans after a downhill running protocol in young female subjects. The study results indicated that long-term avenanthramide supplementation can attenuate blood inflammation markers, decrease ROS generation and NF-kappa B activation, and increase antioxidant capacity during an eccentric contraction exercise bout that elicits an inflammatory response (Source: *European Journal of Applied Physiology*, Vol. 116[1]:67-76, 2016). Of significance, one of the researchers of this pilot study is affiliated with PepsiCo's Quaker Oats Center of Excellence, which represents the growing interest in the potential applications of avenanthramides in nutraceutical and pharmaceutical markets.

The proposed trial protocol follows up on the design and findings of the pilot study published in the *European Journal of Applied Physiology*, as one of the lead investigators for Ceapro's trial—Li Ji from the University of Minnesota's Laboratory of Physiological Hygiene and Exercise Science—was also part of that pilot study. Ceapro's proposed trial design includes male and female participants and tests for mental health changes and muscle soreness levels. The protocol calls for subjects to take two oat cookies made with oat flour per day for a period of eight weeks, with subjects randomly assigned to take H-AVA cookies (with an avenanthramide concentration of 229.56 mg/kg) or L-AVA cookies (32.69 mg/kg). Following a downhill running test on treadmills, the subjects are to be tested for inflammatory, oxidative stress, and muscle damage blood markers.

The Company expects the bio-efficacy study to further demonstrate the efficacy of avenanthramides in alleviating exercise-induced inflammation based on the results of previous studies. If additional positive trends are observed, Ceapro expects to commence its clinical program with avenanthramides as an anti-inflammatory compound during the second quarter 2017. The Company believes that if the bio-efficacy of avenanthramides is confirmed, this trial could not only provide evidence as to the protective benefits of avenanthramides in the sports science field, but also stimulate the development of oat-derived, value-added products in different market segments and therapeutic applications.

One such alternative that the Company is evaluating is the application of avenanthramides' anti-inflammatory qualities for the treatment of inflammatory bowel disease (IBD). IBD represents a group of intestinal disorders that cause prolonged inflammation of the digestive tract, and primarily includes ulcerative colitis and Crohn's disease. IBD, which affects an estimated 1.6 million people in the U.S., can be debilitating and sometimes leads to life-threatening complications, with conditions involving severe diarrhea, pain, fatigue, and weight loss. There is currently no cure for IBD, with treatment options involving either drug therapy or surgery. The goal of drug therapy is to reduce the inflammation that triggers symptoms, leading to symptom relief, and in the best case scenario, long-term remission and reduced risks of complications (Source: Mayo Clinic).

β-glucan Pharmaceutical Development

Ceapro also plans to capitalize on the therapeutic abilities of β-glucan for its pharmaceutical development program. In particular, the Company plans to rely on its ability to impregnate or encapsulate bioactive compounds with its β-glucan product in order to serve as a potential delivery system. According to Ceapro, this proprietary β-glucan drug-delivery platform has piqued interest from multiple parties that are looking to improve the delivery of their existing therapeutic products.

Potential Competition

The following description is not intended to be an exhaustive collection of potential competitors to Ceapro; however, it is believed to be representative of the type of competition the Company may encounter as it seeks to further commercialize its proprietary ingredients. Ceapro currently markets its oat-derived avenanthramides and β-glucan ingredients to cosmetic companies for use in an array of third-party cosmetic formulations. Figure 27 summarizes Ceapro's view of its competitive landscape, noting a selection of companies that are directly competitive and other similar products (ingredients) that are indirectly competitive.

Figure 27
POTENTIAL COMPETITION OVERVIEW

Ceapro's Product	A Selection of Direct Competitors	Examples of Indirect Competitors
Avenanthramides	None presently known, though Ceapro expects direct competition may come	Any with anti-inflammatory properties
Beta Glucan	▪ Biovelop (now part of Tate & Lyle) ▪ A few Chinese companies	Hyaluronic acids and gums, such as xanthum gum
Oat Oil	▪ Swedish Oat Fiber	Many plant oils on the market
Colloidal Oatmeal	▪ Food companies ▪ Small mills	N/A
Oat Peptides	Unknown	Oat protein, hydrolyzed oats, and so on
Lupin Peptides	Unknown	▪ White lupin products from Expascience (very expensive) ▪ Silicone-based products for hair color retention

Source: Ceapro, Inc.

The Company's products may also be beneficial as part of certain nutraceutical formulations—a market Ceapro could seek to enter going forward. Globally, there are over 3,000 companies producing nutraceutical ingredients, which range in size from small, development-stage entities working to identify new compounds to large, multinational corporations with diversified and established product lines. Of the latter group, the major firms include DuPont, Royal DSM, and Cargill.

Tate & Lyle PLC
www.tateandlyle.com

London-based Tate & Lyle is a global provider of specialty ingredients and solutions to food, beverage, and other industries. In 2013, the company acquired a Swedish manufacturer of oat β-glucan, called Biovelop. In the transaction, Tate & Lyle received control of Biovelop's production facility in Kimstad, Sweden, and associated business, including the following products that are still manufactured by Tate & Lyle. One of Biovelop's core products was PromOat®, which entails soluble β-glucan fiber used to lower cholesterol and reduce post-prandial glycemic response. The PromOat ingredient is used in the food, beverage, and supplement markets, from smoothies to low-fat mayonnaise, cookies to soups, and sauces to bars. Another of its products is Avenacare™, which is the brand for providing oat β-glucan to the cosmetics industry for use in cosmetics and personal care products. The Avenacare oat β-glucan is a gluten-free and paraben-free liquid active ingredient used in skin applications to reduce the appearance of skin redness and in hair products for hair tensile strength. Biovelop further produces oat protein, oat dextrin, and insoluble oat fiber, each of which is now under the Tate & Lyle organization. Its oat protein product, prOATein™, was first launched in 2012 as a non-GMO, dairy-free, nut-free, vegan-friendly protein powder that is rich in the leucine and lysine amino acids. Tate & Lyle's acquisition of Biovelop complemented the company's own line of fibers and other health and wellness ingredients. These products are now known as Tate & Lyle Oat Ingredients and are still produced from the Kimstad plant. Tate & Lyle's business further includes a range of specialty ingredients, such as acidulants, starches, corn products, food stabilizer systems, sweeteners, and more.

Swedish Oat Fiber AB
www.sweoat.com/

Swedish Oat Fiber is a closely held company in Sweden that has been producing oat-based ingredients for over 25 years. The company markets oat β-glucans, fine oat flours, and oat oils under the brand name SWEOAT®. All of the SWEOAT® products are produced using Swedish oats in a factory in Sweden. The company believes that its production process used to fractionate the oat kernel into its three product lines—β-glucan, oat flour, and oat oil—can fractionate concentrations of β-glucans from 6% up to 32%. The company is also pursuing an additional product line that is rich in dietary oat fiber. Swedish Oat Fiber markets its ingredients to food production companies (including for sport and nutritional products), the cosmetics industry, and the feed industry (including pet food). The SWEOAT™ B-glucan Products and Flours for cosmetics are found in shampoos and conditioners, skin care creams and lotions, talcs and dusting powders, and foundations. The SWEOAT™ Oils for cosmetics are found in hand and body lotions, day and night creams, BB creams, body oil, cuticle oil, and as a replacement for other oils in cosmetics. The SWEOAT® Bran is high in β-glucan and may help keep bread fresher longer.

Charkit Chemical Corp.
www.charkit.com/

Charkit Chemical of Norwalk, Connecticut, is a diversified firm offering products in each of the following market focus areas: hydrazine, imaging, flavor and fragrance, metal and water treatment, personal care, nutritional products, and pharmaceuticals. Its personal care segment, which entails hundreds of products on its own, is the most likely to present competition for Ceapro, which may expand to include nutritionals and pharmaceuticals in the future. Charkit's personal care segment is targeted toward skin and hair care products promoting a healthier and younger-looking appearance via the inclusion Charkit's value-added ingredients. Such ingredients include "Exemplary Oat Extracts," such as oat oil, colloidal oatmeal, oat protein, oat starch, and β-glucan for promoting skin rejuvenation, among a range of other specialty ingredients (meadowfoam seed oil; organic oils, aloes, butters and waxes; a diglucose sugar; cosmetic butters [shea butter etc.]; argan oil; lanolin and lanolin derivatives; and more). The company employs a team to assist its customers through the product development process when formulating its components into moisturizers, bath and body lotions, toners, cosmetics, sun care, shampoo, and conditioning products.

Cargill, Inc.
www.cargillfoods.com/

Cargill is a global producer of food, agriculture, financial, and industrial products and services. The company has been in business for 150 years and has roughly 150,000 employees. The businesses under the Cargill brand encompass agriculture trading and processing, food ingredients and products, meat, poultry and eggs, farmer services, animal feed and nutrition, energy and industrial, and financial. The business that specifically may compete with Ceapro is Cargill Food Ingredients, which develops and sells goods ranging from staples like cocoa, chocolate, eggs, and flour to "Health Promoting Ingredients" like oils and shortenings, protein, starches and derivatives, and sweeteners. Within Cargill Food Ingredients, the company offers a cholesterol-lowering product, barley betafiber, marketed under the Barliv™ brand name, for use in nutritional bars, beverages, soups, sauces and baked goods. As well, Cargill's CoroWise® plant sterols are used in dietary supplements, nutritional bars, yogurt and other dairy products, beverages, and other foods to lower cholesterol levels and promote heart health.

Raisio plc
www.raisio.com/

Finnish company Raisio Group is a multinational provider of plant-based nutrition through the sale of foods, functional food ingredients, and feeds. The company was founded in 1939 and today has over 1,500 employees. Raisio's growth occurs organically as well as through acquisitions. It is segmented into two major divisions, "Brands," which include the company's numerous food and food ingredient products, and "Raisioagro," through which Raisio serves agribusinesses (e.g., its Benemilk product that increases milk yield and improves the contents of milk). In its Brands division, one of the company's most well-known products is the cholesterol-lowering Benecol™, which contains plant stanol esters that can mimic cholesterol when they are consumed. Upon consumption, the stanol esters take up space and prevent actual cholesterol from being absorbed. Benecol™ products include margarine, beverages, dairy, and cereal items that are sold around the world. Raisio's functional food ingredients are ultimately found in a range of breakfast, snack, and baking products, confectionary, and feeds for livestock and fish. The company's other brands include Elovena, Fox's, Hercules (environmentally friendly fish feed), Juicee Gummee, Maituri, Nordic, Poppets, and Provena.

Historical Financial Results

Figures 28, 29, and 30 summarize Ceapro's key historical financial statements: its Consolidated Statements of Operations, Balance Sheets, and Statements of Cash Flows, as presented in the Company's second quarter 2016 financial report issued on August 24, 2016. Subsequent to the end of the second quarter, in July 2016, Ceapro announced the completion of a brokered private placement, which resulted in gross proceeds of C$10 million.

Figure 28
CONSOLIDATED STATEMENTS OF NET INCOME AND COMPREHENSIVE INCOME
(Unaudited)

Expressed in Canadian Dollars (C$). At 6/30/16, C$1.00 ≈ US$0.77.

	Quarters Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
	C$	C$	C$	C$
Revenue (note 15)	4,167,855	2,439,366	8,231,431	4,153,851
Cost of goods sold	1,153,517	690,229	2,383,280	1,612,615
Gross margin	3,014,338	1,749,137	5,848,151	2,541,236
Research and product development	(61,251)	236,835	266,581	342,742
General and administration	524,858	629,225	1,020,504	1,431,158
Sales and marketing	643	3,506	2,829	6,673
Finance costs (note 14)	48,896	37,024	147,377	143,774
Income from operations	2,501,192	842,547	4,410,860	616,889
Other operating loss (note 13)	(143,587)	(184,823)	(319,279)	(189,253)
Income before tax	2,357,605	657,724	4,091,581	427,636
Income taxes				
Current tax expense	36,090	—	(421,916)	—
Deferred tax (expense) recovery	(757,897)	—	(820,475)	36,250
Income tax (expense) recovery	(721,807)	—	(1,242,391)	36,250
Total comprehensive income for the period	1,635,798	657,724	2,849,190	463,886
Net income per common share (note 20):				
Basic	0.03	0.01	0.05	0.01
Diluted	0.02	0.01	0.04	0.01
Weighted average number of common shares outstanding (note 20)				
Basic	62,879,483	61,669,149	62,731,361	61,605,706
Diluted	66,476,458	65,843,789	66,106,894	65,298,020

** See the "Notes to Consolidated Financial Statements" section of Ceapro's Q2 2016 Unaudited Condensed Consolidated Financial Statements for the Second Quarter ended June 30, 2016. This report is located on Ceapro's website at http://ceapro.com/.*

Source: Ceapro Inc.

Figure 29

CONSOLIDATED BALANCE SHEETS

(Unaudited)

Expressed in Canadian Dollars (C$). At 6/30/16, C$1.00 ≈ US$0.77.

	June 30, 2016 C$	December 31, 2015 C$
ASSETS		
Current Assets		
Cash and cash equivalents	909,934	1,681,125
Trade receivables	1,332,038	538,995
Other receivables	71,462	124,132
Inventories (note 4)	960,302	1,242,417
Prepaid expenses and deposits	117,489	259,560
	3,391,225	3,846,229
Non-Current Assets		
Investment tax credits receivable	487,339	603,302
Deposits	94,309	93,264
Licenses (note 5)	31,848	33,329
Property and equipment (note 6)	13,047,816	9,868,676
Deferred tax assets	326,578	1,258,674
	13,987,890	11,857,245
TOTAL ASSETS	17,379,115	15,703,474
LIABILITIES AND EQUITY		
Current Liabilities		
Accounts payable and accrued liabilities	1,906,688	2,005,611
Deferred revenue (note 9)	372,328	1,172,198
Current portion of long-term debt (note 7)	988,291	984,318
Convertible debentures (note 8)	914,569	872,355
Current portion of CAAP loan (note 11)	77,858	72,942
Income tax payable	200,840	95,180
	4,460,574	5,202,604
Non-Current Liabilities		
Long-term debt (note 7)	1,758,369	2,277,186
CAAP loan (note 11)	254,484	235,529
Deferred tax liabilities	-	111,621
	2,012,853	2,624,336
TOTAL LIABILITIES	6,473,427	7,826,940
Equity		
Share capital (note 10)	6,973,903	6,800,018
Equity component of convertible debentures (note 8)	106,200	106,200
Contributed surplus	1,035,643	1,029,564
Retained earnings (deficit)	2,789,942	(59,248)
	10,905,688	7,876,534
TOTAL LIABILITIES AND EQUITY	17,379,115	15,703,474

** See the "Notes to Consolidated Financial Statements" section of Ceapro's Q2 2016 Unaudited Condensed Consolidated Financial Statements for the Second Quarter ended June 30, 2016. This report is located on Ceapro's website at http://ceapro.com/.*

Source: Ceapro Inc.

Figure 30
CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited)

Expressed in Canadian Dollars (C$). At 6/30/16, C$1.00 ≈ US$0.77.

Six Months Ended June 30,	2016 C$	2015 C$
OPERATING ACTIVITIES		
Net income for the period	2,849,190	463,886
Adjustments for items not involving cash		
Finance costs	22,270	25,815
Transaction costs	12,744	11,843
Depreciation and amortization	190,708	197,546
Unrealized foreign exchange gain on long-term debt	(38,346)	(10,718)
Accretion	62,363	56,116
Deferred tax expense (recovery)	820,475	(36,250)
Share-based payments	82,531	395,856
Net income for the period adjusted for non-cash items	4,001,935	1,104,094
CHANGES IN NON-CASH WORKING CAPITAL ITEMS		
Trade receivables	(793,043)	(395,580)
Other receivables	52,670	188,805
Investment tax credits receivable	115,963	
Inventories	282,115	(376,484)
Prepaid expenses and deposits	141,026	(61,984)
Deferred revenue	(799,870)	432,483
Income tax payable	105,660	
Accounts payable and accrued liabilities relating to operating activities	60,615	(536,321)
Total changes in non-cash working capital items	(834,864)	(719,081)
Net income for the period adjusted for non-cash and working capital items	3,167,071	385,013
Interest paid	(108,552)	(105,751)
CASH GENERATED FROM OPERATIONS	3,058,519	279,262
INVESTING ACTIVITIES		
Purchase of property and equipment	(1,253,669)	(572,757)
Purchase of leasehold improvements	(2,045,988)	(589,649)
Accounts payable and accrued liabilities relating to investing activities	(159,538)	(46,025)
CASH USED BY INVESTING ACTIVITIES	(3,459,195)	(1,208,431)
FINANCING ACTIVITIES		
Long-term debt	—	715,000
Convertible debentures	—	960,000
Employee future benefits obligation repayment	—	(127,009)
Stock options exercised	97,433	30,083
Transaction costs	—	(28,802)
Repayment of long-term debt	(485,520)	(379,375)
Grant used for purchasing of leaseholds, property and equipment	17,572	79,655
Repayment of royalty financial liability	—	(43,075)
CASH GENERATED FROM (USED IN) FINANCING ACTIVITIES	(370,515)	1,206,477
Increase (decrease) in cash and cash equivalents	(771,191)	277,308
Cash and cash equivalents at beginning of the period	1,681,125	272,845
Cash and cash equivalents at end of the period	909,934	550,153

** See the "Notes to Consolidated Financial Statements" section of Ceapro's Q2 2016 Unaudited Condensed Consolidated Financial Statements for the Second Quarter ended June 30, 2016. This report is located on Ceapro's website at*

Source: Ceapro Inc.

Recent Events

09/28/2016–Announced the opening of its new 30,000-square-foot bioprocessing extraction/manufacturing facility in Edmonton, Alberta, Canada. In addition to current extraction fractionation process technologies, Ceapro's new bio-processing GMP facility includes an expanded production area specifically designed to house a commercial- and demonstration-scale PGX skid and an ethanol recycling system, which could make Ceapro a "greener" company.

09/27/2016–Announced that the Company was awarded the 2016 BioAlberta Achievement Award for Company of the Year. The ceremony took place at BioAlberta's 17th Annual AGM and Awards Gala held on September 26, 2016.

09/21/2016–Announced that the German-Canadian Centre for Innovation and Research (GCCIR) made a non-reimbursable grant contribution of C$250,000 for the advancement of Ceapro's PGX technology. This grant matches Ceapro's contribution as part of a C$1.5 million project involving three German-based organizations along with the University of Alberta and Ceapro. The main objective of this project is to further advance PGX technology and to proactively make PGX a greener process through the integration of an ethanol recycling system to be made possible through the development of novel retention membranes.

09/13/2016–Announced that the Company received allowance from the Canadian Patent Office for Canadian Patent Application Serial No. 2,794,960 entitled, "Supercritical Fluid Treatment of High Molecular Weight Biopolymers." Upon issuance, this patent, which was filed as part of the international Patent Cooperation Treaty (PCT), will likely provide intellectual property protection through 2036.

08/24/2016—Announced its financial results for the three-month and six-month periods ended June 30, 2016, and provided an overview of recent operational highlights. The Company reported its best second quarter performance with revenues reaching historical highs and with total sales of C$4,168,000 and C$8,231,000 for the quarter and six-month period, respectively, compared to C$2,439,000 and C$4,154,000 for the same periods in 2015, a 98% increase for the first six-month period of the year. The Company reported net profit of C$1,636,000 and C$2,849,000 for the three months and six months ended June 30, 2016, respectively, compared to a net profit of C$658,000 and C$464,000 for the same periods in 2015.

07/14/2016—Ceapro announced that it closed the second and final tranche of its previously announced brokered private placement. The second tranche resulted in the issuance of 4,085,370 units, including 20,000 units held in escrow pending final approval of the offering by the TSX Venture Exchange, each issued at a price of C$1.06 per unit, which resulted in gross proceeds from the second tranche of C$4,330,492. Aggregate gross proceeds of the offering are C$10 million. Each unit consisted of one common share and one-half of one common share purchase warrant. Each warrant entitles the holder thereof to acquire one additional common share at an exercise price of C$1.50 for a period of 24 months following the closing of the second tranche. The majority of the offering was subscribed to by fundamental institutional investors.

In connection with the closing of the second tranche of the offering, the Company paid Echelon Wealth Partners Inc. a cash commission of 7% of the gross proceeds raised in the second tranche and 285,976 broker unit warrants. Each broker unit warrant entitles Echelon to acquire one common share and one-half of one common share purchase warrant at a price of C$1.06 for a period of 24 months following the closing of the second tranche. Each broker warrant entitles Echelon to acquire one additional common share at an exercise price of C$1.50 for a period of 24 months following the closing of the second tranche. Proceeds of the offering are targeted for R&D and general working capital purposes. All securities issued pursuant to the offering will be subject to a statutory hold period expiring four months and one day after closing of the offering. None of the securities issued in connection with the offering will be registered under the *United States Securities Act of 1933*, as amended and none of them may be offered or sold in the U.S. absent registration or an applicable exemption from the registration requirements of the 1933 Act.

07/11/2016—Announced that it closed the first tranche of its previously announced brokered private placement and increased the maximum size of the offering from C$5,750,000 to C$10,000,000. The first tranche resulted in the issuance of 5,348,592 units, including 405,500 units held in escrow pending final approval of the offering by the TSX Venture Exchange, each issued at a price of C$1.06 per unit, which resulted in gross proceeds of C$5,669,508. Each unit consisted of one common share and one-half common share purchase warrant. Each warrant entitles the holder thereof to acquire one additional common share at an exercise price of C$1.50 for a period of 24 months following the closing of the offering.

07/07/2016—Issued a press release in response to a recent request by the Investment Industry Regulatory Organization of Canada (IIROC) to comment on recent trading activity in its stock. The Company announced that it was not aware of any material, undisclosed corporate developments and had no material change to report at that time.

06/09/2016—Announced that it appointed Echelon Wealth Partners Inc. as sole agent to undertake a brokered private placement financing, on a commercially reasonable basis, of 4,716,981 units at a price of C$1.06 per unit for gross proceeds to the Company of C$5,000,000.

05/18/2016—Announced financial results for the three months ended March 31, 2016, and provided a business update.

05/09/2016—Announced that it presented its PGX technology at the 15th European Meeting on Supercritical Fluids held in Essen, Germany. The oral presentation entitled, "PGX Technology: An Enabling Technology for Generating Biopolymer Fibrils, Particles Aerogels and Nano-Composites," was presented by Bernhard Seifried, Ph.D., senior research scientist at Ceapro and co-inventor of the PGX technology, during the session "Materials – Organic materials, polymers and composites," chaired by Irina Smirnova.

04/14/2016—Announced financial results for the year ended December 31, 2015. The Company reported the highest full year revenue in its history with all main financial indicators exceeding the previous records set in 2014.

04/06/2016—Announced the signing of a new long-term agreement with German-based multinational Symrise AG for the distribution and commercialization of Ceapro's active ingredients to major international players in the cosmetic market. The financial terms of the agreement were not disclosed. However, Symrise is to provide Ceapro with financial support under the form of a significant line of credit until January 1, 2019.

03/01/2016—Announced that the Company will initiate an extensive research program in collaboration with McMaster University to develop novel chemistries for stabilizing the PGX-derived products. Professors Todd Hoare and David Latulippe from the Department of Chemical Engineering at McMaster University have been awarded a C$370,300 research grant from the Natural Sciences and Engineering Research Council of Canada (NSERC) to support this strategic research collaboration. This strategic research project is a three-year agreement contributing to the training in applied research of three doctorate-level students as well as two undergraduate students per year. The study focuses on the development and application of highly tunable porous biopolymer and smart polymer scaffolds using Ceapro's PGX technology.

02/03/2016—Announced the issuance from the U.S. Patent and Trademark Office (USPTO) for U.S. Patent No. 13/638,254 titled, "Supercritical Fluid Treatment of High Molecular Weight Biopolymers." The allowed patent claims cover methods related to the production, impregnation, and microencapsulation of micro- and nano-particles, agglomerates, and fibers from high-molecular-weight, water-soluble biopolymers applying supercritical fluid technology utilizing PGX.

Risks and Disclosures

This Executive Informational Overview® (EIO) has been prepared by Ceapro Inc. ("Ceapro" or "the Company") with the assistance of Crystal Research Associates, LLC ("CRA") based upon information provided by the Company. CRA has not independently verified such information. Some of the information in this EIO relates to future events or future business and financial performance. Such statements constitute forward-looking information within the meaning of the Private Securities Litigation Act of 1995. Such statements can only be predictions and the actual events or results may differ from those discussed due to the risks described in Ceapro's public documents as well as other forms filed from time to time.

The content of this report with respect to Ceapro has been compiled primarily from information available to the public released by the Company through its news releases, website, and presentations. Ceapro is solely responsible for the accuracy of this information. Information as to other companies has been prepared from publicly available information and has not been independently verified by Ceapro or CRA. Certain summaries of activities and outcomes have been condensed to aid the reader in gaining a general understanding. CRA assumes no responsibility to update the information contained in this report. In addition, CRA has been compensated by the Company in cash of forty thousand U.S. dollars and 100,000 options for its services in creating this report and for updates. Investors should carefully consider the risks and information about Ceapro's business described below, and should not interpret the order in which these considerations are presented as an indication of their relative importance. Risks and uncertainties overviewed in Ceapro's materials may not be the only risks that the Company faces. Additional risks and uncertainties not presently known to Ceapro or that it currently believes to be immaterial may also adversely affect its business. If any of such risks and uncertainties develops into an actual event, Ceapro's business, financial condition, and results of operations could be materially and adversely affected.

This report is published solely for information purposes and is not to be construed as an offer to sell or the solicitation of an offer to buy any security in any state. Past performance does not guarantee future performance. For more complete information relating to the risks involved in an investment in Ceapro, as well as to receive additional information about the Company, its public filings, or to receive copies of this Executive Informational Overview® either in paper or electronic format, please contact Ceapro at (780) 421-4555.

GENERAL BUSINESS RISKS

Biotechnology companies are subject to a number of risks and uncertainties inherent in the development of any new technology. General business risks include, for example, uncertainty in product development and related clinical trials and validation studies, the regulatory environment, delays or denial of approvals to market products, the impact of technological change and competing technologies, the ability to protect and enforce a patent portfolio and intellectual property assets, the availability of capital to finance continued and new product development, and the ability to secure strategic partners for late-stage development, marketing, and distribution of products. To the extent possible, the Company has pursued and implemented strategies to reduce or mitigate the risks associated with its business.

CREDIT RISK

Trade and Receivables

The Company makes sales to customers that are established within their respective industries. Based on previous experience, the counter-parties had zero default rates and management views this risk as minimal. Approximately 93% of trade receivables were due from two customers at December 31, 2015 (2014 – 95% from two customers) and all trade receivables at December 31, 2015 and 2014 are current. These main customers are considered to have good credit quality and historically have a high quality credit rating. Other receivables represent amounts due for research program claims, government goods and services taxes, and scientific research and development tax credits. The collectability risk is deemed to be low because of the good quality credit rating of the counter-parties.

Cash and Cash Equivalents

The Company reported cash and cash equivalents in the amount of C$1,681,125 at December 31, 2015 (2014 – C$272,845) and C$909,934 at June 30, 2016, and mitigates its exposure to credit risk on its cash balances by maintaining its bank accounts with Canadian Chartered Banks and investing in low-risk, high-liquidity investments. There are no past due or impaired financial assets. The maximum exposure to credit risk is the carrying amount of the Company's trade and other receivables and cash and cash equivalents. The Company does not hold any collateral as security.

LIQUIDITY RISK

In meeting its financial obligations, the Company may be exposed to liquidity risks if it is unable to collect its trade and other receivables balances in a timely manner, which could in turn impact the Company's long-term ability to meet commitments under its current facilities. In order to manage this liquidity risk, the Company regularly reviews its aged trade receivables listing to ensure prompt collections. There is no assurance that the Company will obtain sufficient funding to execute its strategic business plan.

Figure 31 lists the contractual maturities of the Company's financial liabilities and obligations, as of June 30, 2016.

Figure 31
FINANCIAL LIABILITIES AND OBLIGATIONS (as of the second quarter ended June 30, 2016)
Expressed in Canadian Dollars (C$). At 6/30/16, C$1.00 ≈ US$0.77.

	within 1 year	1 to 3 years	3 to 5 years	over 5 years	Total
	C$	C$	C$	C$	C$
Accounts payable and accrued liabilities	1,906,688	—	—	—	1,906,688
Long-term debt	1,086,966	1,674,796	214,282	—	2,976,044
Convertible debentures	998,610	—	—	—	998,610
CAAP loan	83,884	167,767	167,767	83,884	503,302
Total	4,076,148	1,842,563	382,049	83,884	6,384,644

Source: Ceapro Inc.

MARKET RISK

Market risk is composed of interest rate risk, foreign currency risk, and other price risk. The Company's exposure to market risk is detailed below.

Foreign Currency Risk

Foreign currency risk arises from the fluctuations in foreign exchange rates and the degree of volatility of these rates relative to the Canadian dollar. Figure 32 (page 57) summarizes the impact of a 1% change in the foreign exchange rates of the Canadian dollar (CD) against the U.S. dollar (USD) and the Euro on the financial assets and liabilities of the Company.

The carrying amount of accounts receivable and accounts payable and accrued liabilities in USD and long-term debt in Euro represents the Company's exposure at December 31, 2015. The Company has minimal interest rate risk because its long-term debt agreements are all at fixed rates.

Figure 32

IMPACT OF A 1% CHANGE IN FOREIGN EXCHANGE RATES OF CANADIAN DOLLAR (CD) AGAINST U.S. DOLLAR (USD) AND EURO ON FINANCIAL ASSETS AND LIABILITIES (as of the second quarter ended June 30, 2016)

	CARRYING AMOUNT (USD)	FOREIGN EXCHANGE RISK (USD)	
		-1% EARNINGS & EQUITY	+1% EARNINGS & EQUITY
Financial assets			
Accounts receivable	1,023,937	10,239	(10,239)
Financial liabilities			
Accounts payable and accrued liabilities	291,960	(2,920)	2,920
Total increase (decrease)		7,319	(7,319)

	CARRYING AMOUNT (EURO)	FOREIGN EXCHANGE RISK (EURO)	
		-1% EARNINGS & EQUITY	+1% EARNINGS & EQUITY
Financial liabilities			
Long-term debt	534,417	(5,344)	5,344
Total decrease (increase)		(5,344)	5,344

Source: Ceapro Inc.

SHARE PRICE RISK

Ceapro's share price is subject to equity market price risk, which may result in significant speculation and volatility of trading due to the uncertainty inherent in the Company's business and the technology industry. There is a risk that future issuance of common shares may result in material dilution of share value, which may lead to further decline in share price. The expectations of securities analysts and major investors about the Company's financial or scientific results, the timing of such results, and future prospects, could also have a significant effect on the future trading price of Ceapro's shares.

PEOPLE AND PROCESS RISK

A variety of factors may affect Ceapro's future growth and operating results, including the strength and demand for the Company's products, the extent of competition in markets, the ability to recruit and retain qualified personnel, and the ability to raise capital.

Ceapro's consolidated financial statements are prepared within a framework of International Financial Reporting Standards (IFRS) selected by management and approved by the Board of Directors. The assets, liabilities, revenues, and expenses reported in the consolidated financial statements depend to varying degrees on estimates made by management. An estimate is considered a critical accounting estimate if it requires management to make assumptions about matters that are highly uncertain and if different estimates that could have been used would have a material impact. The significant areas requiring the use of management estimates relate to provisions made for inventory valuation, amortization of property and equipment, tax liabilities and tax assets, normal provisions, the assumptions used in determining share-based compensation, the interest rates used in determining the employee future benefits obligation, and the estimated sales projections to value the royalty financial liability. These estimates are based on historical experience and reflect certain assumptions about the future that the Company believes to be both reasonable and conservative. Actual results may differ from those estimates. Ceapro constantly evaluates the estimates and assumptions.

LOSS OF KEY PERSONNEL

Ceapro relies on certain key employees whose skills and knowledge are critical to maintaining the Company's success. The Company always strives to identify and retain key employees and be competitive with compensation and working conditions.

INTERRUPTION OF RAW MATERIAL SUPPLY

Interruption of key raw materials could significantly impact operations and the Company's financial position. Interruption of supply could arise from weather-related crop failures or from market shortages. Ceapro attempts to purchase key raw materials well in advance of their anticipated use and is in-licensing technologies from third parties to reduce this risk.

ENVIRONMENTAL ISSUES

Violations of safety, health, and environmental regulations could limit operations and expose the Company to liability, cost, and reputational impact. In addition to maintaining compliance with national and provincial standards, Ceapro maintains internal safety and health programs.

REGULATORY COMPLIANCE

As a natural extract producer, Ceapro is subject to various regulations. Violation of these could limit markets into which the Company can sell its products. Ceapro has introduced a range of procedures which is expected to ensure that the Company is well prepared for new regulations and obligations that may be required.

Glossary

3A Sanitary Standard—A set of standards and accepted practices for cleanability and inspection of dairy and food processing equipment and systems, developed by 3-A Sanitary Standards, Inc.

Anhydrous Ethanol—Dehydrated alcohol, also known as anhydrous ethanol or absolute ethyl alcohol, is a volatile, flammable, colorless chemical compound with a purity of at least 99.5% and a moisture level of under 0.2%.

Antiatherogenic—Preventing or inhibiting atherogenesis (the formation of fatty plaques in the arteries).

Antioxidant—A substance that inhibits oxidation or reactions promoted by oxygen, peroxides, or free radicals**.**

Anti-pathogens—Any drug or compound that counters the effects of a pathogen.

Atopy—Refers to the genetic tendency to develop allergic diseases such as allergic rhinitis, asthma, and atopic dermatitis (eczema).

Avena Sativa—Common oat. A species of cereal grain widely cultivated for thousands of years for its edible grains as a food source for humans (as oatmeal and rolled oats) and livestock.

Avenanthramides—A group of phenolic alkaloids found mainly in oats, which display health-promoting activities, including anti-oxidation and anti-inflammatory effects.

Beta-carotene—An organic, strongly colored, red-orange pigment abundant in plants and fruits. It is a member of the carotenes, and the most common carotene found in plants. Beta-carotenes are considered important diet components, as they are precursor of vitamin A.

Beta Glucan (β-glucan)—A group of polysaccharides naturally occurring in the cell walls of cereals, yeast, bacteria, and fungi, with significantly differing physicochemical properties dependent on source.

Bioactives—A compound that has a biological effect, or in other words, is capable of having an effect or eliciting a response from a living organism, tissue, or cell. Ceapro's bioactives are active compounds used as ingredients in a product or pharmaceutical drug that is biologically active and has an effect on a living organism.

Bioavailability—The proportion of a drug or other substance that enters the circulation when introduced into the body and so is able to have an active effect.

Biopolymers—A polymeric substance (i.e., a substance that has a molecular structure consisting mainly or entirely of a large number of similar units bonded together) occurring in living organisms, such as a proteins or DNA.

Crohn's Disease—A chronic inflammatory disease of the intestines, especially the colon and ileum, associated with ulcers and fistulae.

Coenzyme Q10 (CoQ10)—A natural antioxidant coenzyme that is made in the human body and needed for basic cell function. This fat-soluble substance is a component of the aerobic cellular respiration process, which generates 95% of the human body's energy in the form of ATP.

Collagen—The main structural protein found in animal connective tissue.

Colloidal Oatmeal—A product that consists of oats that have been ground very fine and are suspended in a liquid. It is normally used as a home remedy for itchy or dry skin.

Cosmeceutical—A cosmetic that has or is claimed to have medicinal properties.

Cytokines—Any of a number of small secreted proteins released by cells of the immune system that have a specific effect on the interactions and communications between cells.

Eccentric Contraction (EC)—A type of muscle activation that increases tension on a muscle as it lengthens.

Endosperm—The part of a seed that acts as a food store for the developing plant embryo, usually containing starch with protein and other nutrients.

Erythema—Superficial reddening of the skin, usually in patches, as a result of injury or irritation causing dilatation of the blood capillaries.

Food Bolus—A ball-like mixture of food and saliva that forms in the mouth during the process of chewing.

Functional Drink—A non-alcoholic drink including ingredients like herbs, vitamins, minerals, or amino acids that provide a specific health benefit. Examples of functional beverages include sports and performance drinks, energy drinks, and enhanced water.

GRAS (Generally Recognized As Safe)—A U.S. Food and Drug Administration (FDA) designation that a chemical or substance added to food is considered safe by experts, and so is exempted from the usual Federal Food, Drug, and Cosmetic Act (FFDCA) food additive tolerance requirements.

Gum Arabica—A gum exuded by some kinds of acacia, used in the food industry, in glue, as the binder for watercolor paints, and in incense.

Histamine—A compound that is released by cells in response to injury and in allergic and inflammatory reactions, causing contraction of smooth muscle and dilation of capillaries.

Homeostatic—The condition of balance or equilibrium within the body's internal environment, even when faced with external changes.

Hydrolyzing—Breaking down a compound into its components by chemical reaction with water.

Inflammatory Bowel Disease (IBD)—A chronic condition that involves the inflammation of all or part of the digestive tract. IBD primarily includes ulcerative colitis and Crohn's disease.

Insulinemia—An abnormally large concentration of insulin in the blood.

LDL Cholesterol—Low-density lipoprotein (LDL) are particles that transfer lipids (fats) around the body in the extracellular fluid thereby facilitating fats to be available and taken up by the cells' body. LDL particles are sometimes referred to as bad cholesterol because they can transport their content of lipid molecules into artery walls, attract macrophages, and thus drive atherosclerosis.

Macrophages—A type of white blood cell that engulfs and digests cellular debris, foreign substances, microbes, cancer cells, and other target cells, normally found in stationary form in the tissues or as a mobile white blood cell, especially at sites of infection.

Mitochondria—An organelle found in large numbers in most cells, in which the biochemical processes of respiration and energy production occur.

Nano-sized—Having a size measured in nanometers. The term nanoparticles is associated with particles between 1 and 100 nanometers in size.

Nuclear Factor Kappa-Beta (NF-kappa B)—A protein complex found in almost all animal cell types and involved in cellular responses to stimuli such as stress, and bacterial or viral antigens. NF-kappa B plays a key role in regulating the immune response to infection. Incorrect regulation of NF-kappa B has been linked to cancer and inflammatory and autoimmune diseases.

Nutraceutical—A product derived from food sources containing health-giving additives and having medicinal benefit.

P3A Sanitary Standard—A set of standards and accepted practices for cleanability of equipment for the manufacture of active pharmaceutical ingredients, developed by 3-A Sanitary Standards, Inc.

Phenolic Alkaloids—Alkaloids are a class of nitrogenous organic compounds of plant origin that have pronounced physiological actions on humans and include many drugs and poisons. Phenolic alkaloids are alkaloids consisting of a hydroxyl group (—OH) bonded directly to a hydrocarbon group that are found mainly in plants and are known to display antioxidant properties.

Phytochemicals—Any of various biologically active compounds found in plants.

Polymorphism—The condition of occurring in several different forms, or having multiple forms.

Postprandial Glycemia—The presence or levels of glucose in the blood after a meal.

Radicals—An atom or group of atoms that has at least one unpaired electron and is therefore unstable and highly reactive.

Reactive Nitrogen Species (RNS)—A family of antimicrobial molecules that act together with reactive oxygen species (ROS) to damage cells.

Reactive Oxygen Species (ROS)—Chemically reactive chemical species containing oxygen. ROS are formed as a natural byproduct of the normal metabolism of oxygen and have important roles in cell signaling and homeostasis. However, during times of environmental stress, ROS levels can increase dramatically, and may result in significant damage to cell structures. Cumulatively, this is known as oxidative stress.

Secondment—The detachment of a person from his or her regular organization for temporary assignment elsewhere.

SEM—SEM, or scanning electron microscope, is a type of electron microscope that produces highly magnified images of a sample by scanning it with a focused beam of electrons.

Skid Engineering—Design for the supporting unit of PGX equipment.

Spray Drying—A method of producing a dry powder from a liquid or slurry by rapidly drying with a hot gas.

Ulcerative Colitis—An inflammatory bowel disease (IBD) that causes long-lasting inflammation and ulcers (sores) in the digestive tract. Ulcerative colitis affects the innermost lining of the large intestine (colon) and rectum.

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