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**EGG YOLK PROTEIN PEPTIDES**  
THE COSMETIC APPLICATIONS OF ECOVATEC'S PROPRIETARY BLEND -  
ECOVAPURE™ YPP

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## Executive Summary

Ecovatec's revolutionary technology has unlocked the amazing potential of **egg yolk protein peptides** for skincare applications. Ecovatec is the only known commercial producer of this particular blend of egg yolk peptides in the world, due to the presence of incredibly bioactive phosphatidyl peptides (PVP). This paper will explain what bioactive peptides are, why and how they are used in cosmetics, and how they exert their benefits on the skin. Ecovatec's **natural cosmetic peptides** are unparalleled as proteins are carefully isolated from egg yolk and broken into peptides while retaining all their **bioactivity**. Vitellus Health Inc. has formulated these peptides into **Repairing Egg Peptide Face Cream** that will capture their **anti-aging, acne-fighting, skin-firming, and antioxidant** properties and deliver them to consumers to support your **skin health and vitality**.

## Background

### What are Bioactive Peptides and How Are They Used in Cosmetics?

Every single cell in our bodies relies on proteins to function. Proteins are made up of building blocks called "amino acids". There are 21 different kinds, and the body cannot make 9 of them, so it relies on us to provide those through food and the skin. When these amino acids combine, they create peptides, which are further combined into a larger protein or group of proteins. Many peptides, short chains of amino acids, are "**bioactive**", which means they benefit the body in a way that is measurable and **improves health** (Samaraweera Mudiyansele, 2012). Some peptides are more bioactive than others, and many have been tested for their effects improving skin concerns when formulated into cosmetics. These peptides are often discussed in by referring to their "activities" or as "active ingredients".

In moisturizers, serums, and creams, peptides can reduce the appearance of fine lines and wrinkles, reduce inflammation, combat bacteria, lock in hydration, and make skin appear firmer and more youthful (Norris, 2020; Niven-Phillips, 2019). **A combination of different kinds of peptides with different activities can deliver many of these benefits at once!**

### How Do Peptides Interact with the Skin?

The skin has 2 major layers – the epidermis and the dermis. The epidermis is the waterproof layer that protects the skin from the environment. The dermis gives skin its **strength and flexibility**, containing **collagen, elastin, hyaluronic acid**, and other proteins in the extra-cellular matrix (ECM) (Ledwoń et al., 2021). To target skin concerns, active ingredients need to make it past the outside layer to deliver ingredients into cells that produce the ECM (Lee et al., 2020). Full proteins, like collagen, are too big to get into the ECM, so small peptides are ideal.

There are 4 major classes of peptides considered in cosmetics: carrier peptides, enzyme inhibitor peptides, signal peptides, and neurotransmitter peptides (Yang, 2020). Carrier peptides deliver minerals to the cells that create the ECM proteins, **supporting this production**. Enzyme inhibitor peptides act **reduce the skin's breakdown** of these proteins. Signal peptides tell the skin cells **to produce more ECM** proteins. Lastly, Neurotransmitter peptides tell the muscle cells under the skin to stop contracting so they reduce "expression lines", like a weaker version of botulinum toxin (Botox). Keep in mind that each signaling peptide only acts with certain cell "receptors" which transmit the signal. Therefore, you need a combination of the right peptides – not just any peptide will do (Dellarocco, 2020).

Although not considered its own class of peptides, some peptides can also have antioxidant activity. As your body goes about keeping you alive, it is constantly producing "free radicals" (Arnarson, 2019). These free radicals are important for some body functions, but if too many accumulate, they can cause problems (oxidative stress). The body produces "antioxidants" to combat these free radicals. As we age or take on damage from our environment, the body produces fewer antioxidants, so we need to supply our cells with these through the skin and through diet (Arnarson, 2019). Using skin care products with **antioxidant and anti-inflammatory peptides is one way to combat both ageing and environmental stress**.

Some specific peptides have **antimicrobial and/or antiviral properties**, which means they prevent bacteria and viruses from replicating, kill them directly, or bind to them to prevent them from acting on body cells. Very few peptides can kill these microorganisms in multiple ways at once which makes them excellent against "multi-drug resistant bacteria". These peptides are of great interest in current skincare research, especially for their effects **fighting acne**. (Lei et al., 2019, Rahnamaeian & Vilcinskis, 2015).

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*Well known ECM  
(Extra Cellular Matrix)  
Proteins: Collagen,  
Elastin, Hyaluronic Acid,  
Keratin. These give skin  
a firm, flexible,  
youthful, and healthy  
appearance and feel.*

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## How Can Peptides Affect Common Facial Skin Concerns?

- **Skin Ageing:** As we age, our cells produce fewer ECM proteins, this leads to wrinkles, dryness, loss of firmness, etc. (Dellarocco, 2020). Peptides that increase ECM proteins as well as antioxidant and anti-inflammatory peptides can address this. Specifically, collagen is known to plump the skin and lips, therefore reducing the appearance of fine lines (Varani et al., 2006) and elastin makes skin look firmer.
- **Dryness:** Hyaluronic acid (HA) holds 6L of water in 1g of protein, so peptides that increase HA in skin increase moisture (Ledwoń et al., 2021).
- **Acne:** anti-microbial and anti-inflammatory peptides are key in combatting acne.
- **Sensitive Skin:** Since peptides are naturally found in the body, they are unlikely to cause adverse effects to people with sensitive skin.
- **Inflammation and Redness:** Anti-inflammatory peptides can react with skin proteins that cause inflammation to reduce it.
- **Eczema and Psoriasis:** A specific type of signaling peptide, called a phosphate acceptor, can reduce inflammation associated with autoimmune conditions like eczema and psoriasis. (Bar-Or, 2013)

## How and Why have Eggs Been Used in Skin Care?

One of the factors that consumers need to look for in choosing the right peptides for their skin care regimen is that the peptides are natural rather than synthetic (Nakin Skincare, 2020).

Egg yolks have long been used in beauty treatments since they contain all the necessary nutrients needed to support life. Other protein sources are often compared to egg since it is the standard, with a perfect score for protein quality (biological value) (Gunnars, 2018). This means egg yolks contain all 9 essential amino acids the body cannot produce as well as all the non-essential ones. Egg yolk protein peptides have been shown to have **antioxidant, antiviral, antibacterial, anti-cancer, and anti-inflammatory properties** (Samaraweera Mudiyansele, 2012; Samaraweera et al., 2011; Ren et al., 2015; Gunnars, 2018). These peptide functions are in addition to the benefits of the fatty acids, carotenoids (antioxidants), and cholesterol found in egg oils (see [Vitellus' egg oil products](#), and Ecovatec's [paper discussing its skin benefits](#))

## Activity of Egg Yolk Protein Peptides in Cosmetics

What kinds of peptides are in Ecovatec's Egg Yolk Protein Peptides (YPP)

The peptides in YPP function as carrier, enzyme inhibitor, and signal peptides. These peptides are created by isolating and carefully breaking apart egg proteins such as lipoproteins, phosvitin proteins, and livetins to maximize the bioactivity of the peptides.

The distinguishing feature of Ecovatec's YPP is that it contains **phosvitin peptides (PVPs)** which give it the wide range of bioactive functions mentioned above. Phosvitin is a rare protein, special because it contains the most amount of serine (an amino acid) found in a natural protein.

Ecovatec partnered with a researcher at Louisiana State University, Dr. Jack Lusso, to test the **antioxidant activity** of our egg yolk protein peptides and found that its "free radical scavenging" activity was **exceedingly high**, just under that of vitamin C. YPP also performed well on tests associated with the presence of phosvitin peptides.

Properties of Phosvitin Peptides (a component of YPP)

You can read our [PVP white paper](#) to learn about the specific scientific studies performed on these peptides and their results. In summary:

- Jung et al. (2012) showed that PVP **inhibits melanin production**, reducing age spots, freckles, and moles.
- Li et al., (2016), Ma et al., (2012), Hu et al., (2013), and Sun et al. (2013) investigated the **antibacterial** and **antiviral** functions of phosvitin peptides, with positive results.
- Moon et al. (2014) found that PVP **inhibits** growth of several **cancer** cells.
- Xu et al. (2007) confirmed PVP's **antioxidant** properties.
- Xu et al. (2012) found the **anti-inflammatory** properties of PVP.
- Bar-Or (2013) found that phosvitin in certain forms can act as a phosphate acceptor, reducing inflammation associated with **eczema and psoriasis** and therefore improving the skin condition.

A recent study by (Ledwoń et al., 2021) has also found that phosvitin **slowed the breakdown of elastin and hyaluronic acid** and was more effective at preventing elastin breakdown than many of the most common skincare peptides. This is due to the serine in phosvitin, which is particularly effective at binding the enzyme that breaks down elastin. This improves **skin firmness and moisture!**

## Conclusion

Vitellus' egg peptide face cream was carefully formulated with 2% yolk protein peptides, which is more than enough for the peptides to exert all their antioxidant, antibacterial, anti-inflammatory, anti-aging, moisturizing, and firming effects. **These egg yolk peptides contain the vital amino acids necessary for your skin to function well, look healthy, and repair itself – leading to youthful, glowing skin.**

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## VITELLUS

Ecovatec formulates and manufactures Vitellus Health retail products with egg oil and peptides which are distributed in the UK by Just Superb

