

Oat Cosmetics on Nourishing Hand Care in the Wake of the Coronavirus (COVID-19) Outbreak

1. Introduction

The global outbreak of Coronavirus disease (COVID-19) is having an unprecedented impact on human life around the world. At the time of writing, global authorities have reported over 1 million confirmed cases of COVID-19, and famous landmarks usually bustling with life have fallen eerily quiet amid a vast number of country and city-wide lockdowns currently in place. These lockdowns have placed citizens under strict rule regarding their daily actions, with many now confined to their homes unless carrying out essential activities. Aside from these extraordinary lockdown measures, health authorities and organisations have also issued advice on additional lifestyle changes that should be made to reduce the spread of the virus: avoiding touching the eyes, nose and mouth; practising good respiratory hygiene; maintaining social distancing; and, notably, washing hands more frequently and thoroughly. More specifically, this final point has seen authorities advising people to wash their hands for at least 20 seconds with soap and water (or an alcohol-based hand sanitiser) as demonstrated [here](#), especially when arriving back in the home. Unfortunately, adhering to this advice can wreak havoc on the hands for many people; causing more dryness, irritation and general discomfort than ever before. It is for this reason that we've put together this article which explains, from a technical point of view, exactly what's happening on and under the surface of the skin when excessive hand washing is taking place. Read on to find out more about the hand's skin structure, the impacts of excessive washing, and the use of oats in hand care as a solution to the severe skin irritation experienced by many in the wake of the COVID-19 outbreak.

2. The Impact of the Coronavirus (COVID-19) Outbreak on the Hands

2.1 The Skin's Structure: A Brief Overview

The skin is made up of three different layers: the epidermis, the dermis and the hypodermis.

i. The Epidermis

The epidermis is the outermost layer; it protects against toxins, bacteria and fluid loss, and is covered with an emulsion of water and lipids (fats) called the hydrolipidic film. This film, maintained by secretions from the sebaceous and sweat glands, helps keep the skin supple and acts as an extra barrier to bacteria and fungi. The hands are more prone to dryness than other skin sites as they have fewer sebaceous glands, meaning they are less able to bind moisture.

ii. The Dermis

As for the dermis, this layer plays an essential role in protecting the body against external aggressors and irritating agents, while nourishing the outermost layers of the skin from the inside.



iii. The Hypodermis

The final, innermost layer of the skin is the hypodermis, of which the main function is to maintain energy levels: ensuring the storage (lipogenesis) and release of energy in the form of lipids (lipolysis).

2.2 Antibacterial Hand Hygiene

When washing the hands, the use of water alone is ineffective in achieving the antibacterial effect needed in the wake of the Coronavirus outbreak. This is because the hydrolipidic film is composed of sweat and sebum (a product of the sebaceous gland secretion), and comes in the form of fluid fat – a substance which is insoluble in water. Therefore, to suitably disinfect the hands, it is necessary to use soap as it contains fat-dissolving surfactants - water-soluble substances that concentrate and aggregate at the interfaces between water and other substances that are not very soluble in water. However, whilst soap has a hugely beneficial antibacterial effect, reducing the level of bacteria present on the surface of the skin, the fat it dissolves is that which makes up the hydrolipidic film that serves to protect the skin and retain its water. As a result, the use of soap puts the skin in a weakened position until the hydrolipidic film can be fully reconstituted after several hours. Moreover, the pH of soap is usually between 9 and 10 (basic), whilst that of the skin is between 4.5 and 5.75 (acidic), meaning its use can disturb the skin's natural protective acidity. This further strains the hydrolipidic film, rendering it unable to play its crucial part in hydrating and protecting the skin.

If soap and water are unavailable, another option to achieve the desired antibacterial effect is the use of alcohol-based hand sanitiser. Alcohol-based hand sanitiser denatures certain proteins in the viral envelope, thus making the virus incapable of entering a cell. Notably, however, excessive cleansing of the hands with alcohol-based sanitisers can damage the proteins in the upper layer of the epidermis resulting in further changes to the fats in the skin, and in turn depleting the natural protective barrier. This ultimately leads to the hands feeling dry and sore.

2.3 The Consequences of Excessive Hand Washing

Excessive washing of the hands can, among many things, disrupt the skin lipid barrier, cause skin dryness, and destroy the skin microbiome – all of which may have a significant impact on overall skin health and appearance.

i. Lipid Barrier Disruption

The skin cells in the stratum corneum, the outermost layer of skin, contain water-soluble compounds that absorb water from the lower layers. Each of these skin cells are surrounded by lipids: fats which prevent water on the skin from evaporating into the external environment. Excessive water and cleanser exposure may rid the skin of this protective lipid barrier which normally functions to keep skin optimally supple and comfortable.

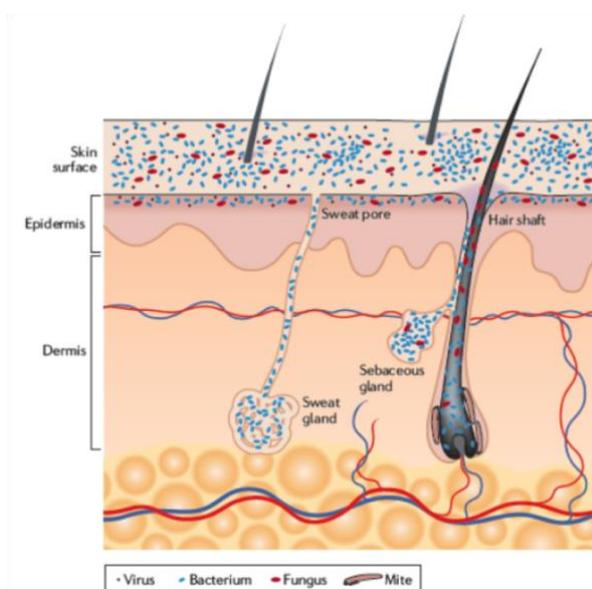
ii. Skin Dryness

Alcohol, the solvent in most hand sanitisers, is an irritant and may initiate an inflammatory response in the skin. The increased dryness/scaling of the skin and reduced hydration resulting from the use of alcohol-based hand-gel has been attributed to a decrease in the production of the water-binding natural moisturising factor (NMF) in the outer stratum corneum.

iii. Skin Microbiome Destruction

Like other skin sites, the microbiome flora on the hand's surface consists of microorganisms residing under the superficial cells of the stratum corneum. More than 150 bacterial species have been found on the hands, belonging primarily to the phyla Firmicutes, Actinobacteria, Proteobacteria, and Bacteroidetes. Interestingly, the hands have a greater bacterial diversity compared to other skin sites; this may be due to the hand's constant exposure to varying external environments.

The image shown here provides a snapshot of the skin microbiome. Commensal microorganisms inhabit the epidermis and are mainly found in the upper layers of the stratum corneum as well as in the ducts of the sweat glands and pilosebaceous follicles. The distribution of bacteria on the skin varies between individuals.



The constant use of harsh cleansers disrupts the skin's natural bacterial ecosystem. As soap generally has a much higher pH than the skin, its use can often lead to deterioration in the skin's microbiota, and excessive handwashing leaves large open spaces on the surface of the skin which present potential new territories for colonising bacteria. This skin degradation can lead to a decrease in barrier function and an increase in desquamation, meaning the integrity and composition of the skin microbiota may ultimately be compromised.

3. The Use of Oats in Alleviating Severe Skin Irritation

Oats are recognised for their ability to protect the skin, having been used for centuries to alleviate redness and itchiness and to improve skin condition. Today, we know that these capabilities are due to the specific molecules that oats possess which can help to restore the lipid barrier and reduce the granulation that occurs during an immune response.

3.1 Replenishing the Skin's Lipid Barrier with Oat

Within the oat kernel there exists an incredible complex of neutral and polar lipids, many of which are skin identical or equivalent. When gently extracted using a suitable solvent and careful refining and fractionation techniques, it is possible to obtain a balance of the polar and neutral lipids which reflects a similar lipid profile to that of the stratum corneum. The polar lipids found include ceramides and phospholipids; the neutral lipids contain phytosterols (cholesterol analogues) and PUFAs. These lipids can help to restore a disrupted lipid barrier and hydrolipidic film: ceramides, phospholipids and phytosterols – a key part of the stratum corneum's "cement" - can migrate between cells and help to restore the skin barrier, whilst PUFAs stay on the surface of the skin and help to prevent trans-epidermal water loss (TEWL).

Recommended Oat Ingredients: Oat Lipid e and AvenaPLex

[Oat Lipid e](#) and [AvenaPLex](#) are two ideal ingredients for replenishing the skin's lipid barrier and both of which are derived from oat oil. [Oat Lipid e](#) is an easily absorbed, emollient, dry-oil containing 10% polar lipids and which is proven non-comedogenic. It is a stable oil and can be heated without degradation to enable easy incorporation into emulsions. These properties make it the perfect ingredient for regular, daily use hand creams and lotions. [AvenaPLex](#), on the other hand, is a 40% polar lipid anhydrous active. It is a viscous lipid complex which absorbs into the skin without leaving any sticky residue behind. [AvenaPLex](#) contains approximately 4% ceramides and 15% polar lipids which penetrate through the stratum corneum to supplement essential lipids lost due to excessive hand washing. This ingredient is ideal for intensive moisturising creams and will have a noticeable skin-softening effect while reinvigorating, hydrating and smoothing dry hands.

3.2 Alleviating Signs of Dry and Irritated Skin with Oat

Colloidal oatmeal is a recognised skin protectant which is best known for its ability to reduce the adverse effects of atopic skin conditions. It has a broad spectrum of efficacy that includes anti-inflammatory, anti-pruritic, moisturisation and cleansing properties. Colloidal oatmeal is rich in anti-oxidants, particularly avenanthramides, that give rise to these anti-inflammatory properties. Studies have shown that avenanthramides can inhibit the activity of nuclear factor kappa B and the release of proinflammatory cytokines and histamine - notable mechanisms in the pathophysiology of inflammatory dermatoses. Oat beta-glucan is another molecule found in colloidal oatmeal that will benefit dry, damaged hands as it contributes significantly to the formation of an occlusive film as well as a humectant. This film enables stratum corneum water retention and improvement of a dysfunctional skin barrier, thus enhancing moisturisation and helping to relieve irritation and pruritic sensations.

Recommended Oat Ingredient: Oat COM

[Oat COM](#), our advanced colloidal oatmeal, is manufactured from a high beta-glucan oat variety to improve efficacy and utilises a patented process to ensure it is clean



and easy to use in cosmetic formulations such as moisturising hand creams. It is available as either an EcoCert / COSMOS approved natural or EcoCert / COSMOS certified organic material.

3.3 Rebalancing the Microbiome with Oat

Skin subjected to excessive washing and exposure to hand sanitisers may have less microbial diversity or an unbalanced microbiome. This results in a compromised skin barrier which may allow the ingress of irritants that can cause inflammation, flare-ups and itching. Crucially, however, the balance of the microflora can be restored through the use of probiotic, prebiotic, and postbiotic substances. By definition, probiotics are living microorganisms that, when introduced to the microbiome, will be adopted by the other microflora and will enhance the population and diversity; prebiotics provide nutrients to the microflora; and postbiotics are the metabolic byproducts of probiotic organisms. Oats themselves are known prebiotics that support the growth of the microflora within the skin microbiome. Notably, fermentation of the oat can further enhance this effect as the process makes prebiotic substances more available for the microflora to use, creates postbiotic substrates and produces molecules that can help to repair damaged skin.

Recommended Oat Ingredient: aurafirm

*[aurafirm](#) is a range of fermented oat ingredients derived from the fermentation of Oat COM, our advanced colloidal oatmeal, with a culture of lactobacillus. These ingredients possess the ability to repopulate a disrupted microflora and rebalance it selectively in favor of useful organisms such as *S. epidermidis*: a key bacterium in a healthy microbiome which helps to reduce the skin's pH by increasing production of lactic acid and producing antimicrobial peptides.*

4. Creating Oat-Derived Hand Care Products

4.1 Our Hand Cream Formulation

We've formulated an intensely nourishing [Hand Cream](#) containing 5% [Oat Lipid](#). This free-to-use formulation has gone through full stability testing, meaning it's ready to go for the production of hand care products aimed at alleviating the impacts of excessive hand washing during the Coronavirus (COVID-19) outbreak. Read more about the formulation and its benefits [here](#).

4.2 Success Stories

For even more inspiration, many real-world examples of hand care products containing our ingredients can be found over on our [Success Stories page](#).

5. More Information

We hope the information contained within this article is of exceptionally good use to all at a time when the adverse effects of frequent, thorough hand washing are very apparent. If you



have any queries relating to the points discussed, please [contact us](#) and a member of our team will be delighted to chat with you. Alternatively, if you'd like to get straight into using our ingredients to create a hand care product that fulfils current market needs, take a look at our global distributor network to find the details of your [local operative](#).

Finally, above all else, the Oat team sends their best wishes to all at this challenging time. Stay safe and well.

Sources

Websites

- World Health Organisation: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

Scientific Papers

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