



Natural hand cleanser

According to the World Health Organisation (WHO), antiseptic handrubbing can be understood as “applying an antiseptic handrub to reduce or inhibit the growth of microorganisms without the need for an exogenous source of water and requiring no rinsing or drying with towels or other devices”.¹

Most of the hand sanitisers and hand cleansers available in the market contain ethanol or other short-chained alcohols. However, although alcohols can provide effective antimicrobial action, they also bring a series of drawbacks, such as quick evaporation from the skin, possibility to cause allergies, and flammability.^{2,3} Additionally, there is evidence that certain pathogen populations are becoming tolerant to alcohol-based handwashing.⁴ Because of these limitations, **Imuno ND** was developed as a natural and safer alternative for hand cleansing.

Imuno ND is an **alcohol-free natural hand cleanser**.

It contains a blend of **natural components** that act together to help reducing microorganisms that potentially can cause diseases, including SARS-CoV-2.⁵

The importance of being *alcohol-free*

- Frequent use of alcohol-based formulations for hand antisepsis tends to cause drying of the skin.
- Alcohols are rapidly germicidal when applied to the skin but have no appreciable persistent (residual) activity.
- Instability. Alcohols are volatile, then the active concentration of such components can decrease throughout time as they evaporate after the container is opened.
- Allergy. Alcohol-based products can cause allergic reactions due to true allergy to the alcohol, or allergy to an impurity or aldehyde metabolite. The allergic contact dermatitis or immediate contact urticarial reactions can be caused both by ethanol or isopropanol, the two most common alcohols used in hand-sanitisers.⁶
- Alcohol-based sanitisers are flammable, therefore posing a threat when misused or stored under high temperatures (inside a car, for example).
- Children are especially sensitive to alcohol poisoning.



The natural ingredients of Imuno ND

Eucalyptus globulus Leaf Oil

Eucalyptus is a plant genus native to Australia and which possesses a high amount of 1,8-cineole (eucalyptol). *Eucalyptus globulus* is a species from this genus, and its leaf oil is traditionally known as possessing prominent antiviral properties, including against enveloped mumps virus, herpes simplex virus (HSV-1 and HSV-2) and respiratory viruses such as the influenza A virus subtype H1N1.^{13–19} Recently, there is also increasing evidence that the eucalyptol from *E. globulus* oil can bind to SARS-CoV-2 proteinases.^{19,20}



Melaleuca alternifolia Leaf Oil

Melaleuca alternifolia leaf oil is an essential oil derived from the leaves or terminal branches of the native Australian tea tree. It contains a broad range of active components, being the most frequent terpinen-4-ol (56%–58%), γ -terpinene (20.65%), and α -terpinene (9.8%).²¹

The antimicrobial effects of *M. alternifolia* oil are diverse and include actions against Gram-positive and Gram-negative bacteria, both aerobic and anaerobic; and yeasts and moulds: clinically isolated fluconazole-resistant *Candida* strains, *Mycoplasma pneumonia*, *M. fermentans* and *M. hominis*.²² Antiviral effects are observed against influenza A (H1N1) virus and herpes simplex virus (HSV-1).^{21–23}

Aloe barbadensis Leaf Juice Powder

Aloe vera is a plant species originating from the Arabian Peninsula and used worldwide for skin and wound care.²⁴ It has been successfully used in chronic wound treatment and in the treatment of burns, where the prevention of infections is important.^{25,26}

In **Imuno ND**, Aloe vera is included for its emollient properties against dehydration of the skin,²⁷ and due to its antimicrobial activity.^{28,29}



Macadamia integrifolia Seed Oil

Macadamia integrifolia is native to rainforests in south east Queensland and northern New South Wales, Australia, and its oil is rich in tocopherols, tocotrienols, and squalene.^{30,31}

In **Imuno ND**, the macadamia oil provides emollient and antioxidant properties, as well as pleasant sensorial characteristics (soft touch to hands).³²

The advantages of Imuno ND

- Alcohol-free.
- Non-drying to hands.
- Non-greasy.
- Non-flammable.
- Safe for kids



BIO



MOISTURISER



WITH
TEA TREE OIL



RINSE-FREE
CLEANING



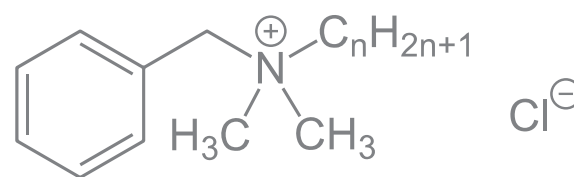
EUCALYPTUS
SCENT



WITH ALOE VERA
LEAF JUICE

Benzalkonium Chloride

Benzalkonium chloride is the primary ingredient for alcohol-free hand cleansers and it is present in **Imuno ND**. It is a quaternary ammonium compound with bacteriostatic (for both Gram-positive and Gram-negative bacteria) and fungistatic activities, and also microbicidal capacity against some organisms.⁷ It can also inactivate enveloped viruses (e.g., herpes simplex virus type 1 – HSV-1, and human immunodeficiency virus type 1 – HIV-1) and some non-enveloped virus, such as the human coxsackie virus.⁸ This component has been used both as antiseptics to the skin (and even for wound cleansing) and as surface disinfectants (“spray & wipe”), and it does not require to be rinsed off after application.⁹ It is well tolerated, non-flammable, non-toxic, has low allergenic potential and continue to provide protection well after the product has dried.^{1,10}



$n = 8, 10, 12, 14, 16, 18$

The mechanism of action of the antimicrobial activity of benzalkonium chloride is related to the adsorption to the cytoplasmic membrane, with consequent penetration in the microorganism, damaging the cell membrane integrity and causing leakage of low molecular weight cytoplasmic constituents – and this can cause cell wall lysis.^{11,12}

Imuno ND and SARS-CoV-2

Imuno ND* was evaluated in laboratory and has proven efficacy eliminating SARS-CoV-2, the coronavirus that causes COVID-19.⁵ In the study, an area of 100 cm² is spiked with a known quantity of SARS-CoV-2, and then sampled by rubbing a swab soaked in solution (Icthen broth or phosphate buffer). The sample is then sent to the laboratory for the extraction of the SARS-CoV-2 genetic material (RNA, in this case) and analysis by reverse transcription polymerase chain reaction (RT-PCR).

* Pending Biocide application.

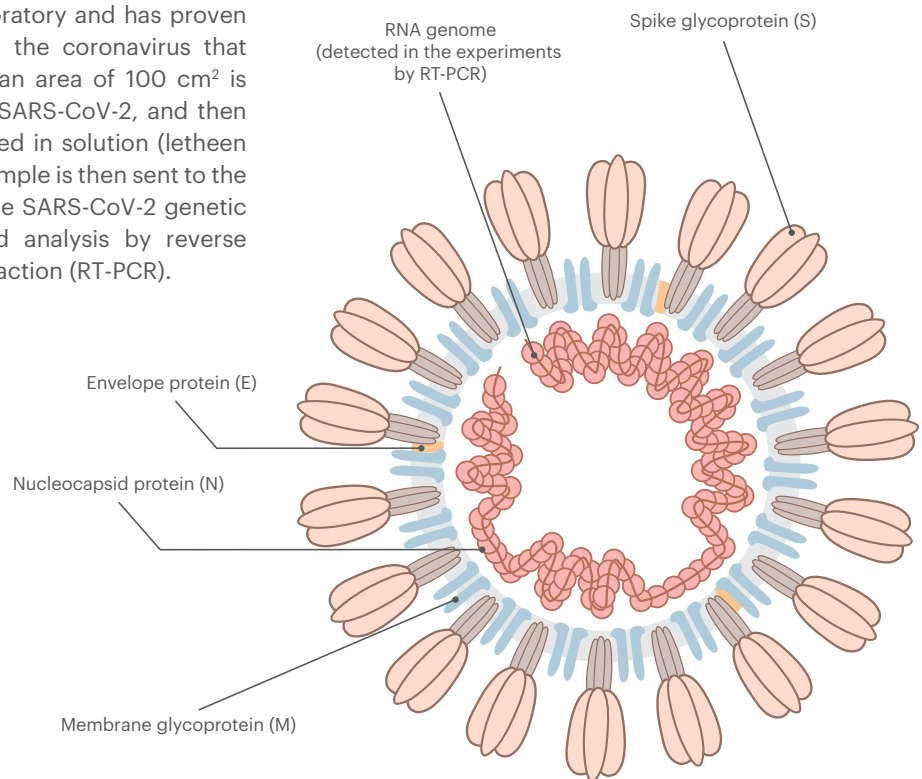


Figure 1 depicts the counting of the virus genetic material after the experiments. It shows that the treated samples did not contain viable genetic material from the SARS-CoV-2 inoculum, while the control samples remained contaminated.

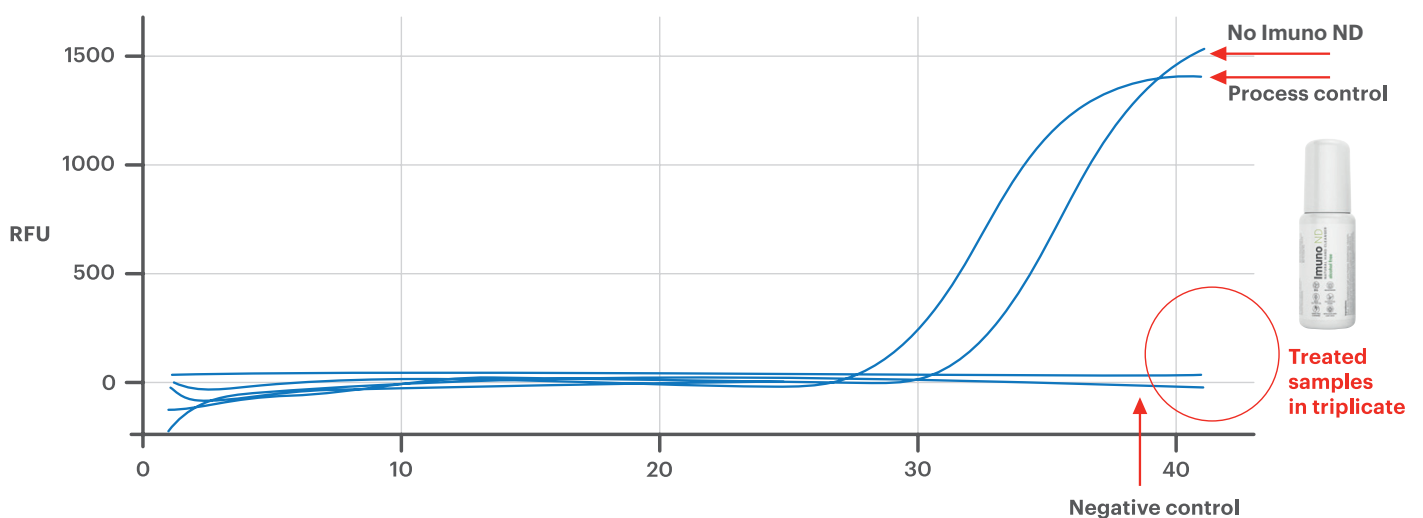


Figure 1. Graphical representation of the curves resulting from the RT-PCR (reverse transcription polymerase chain reaction) to detect SARS-COV-2 genetic material. The test was performed in three different treated samples independently. No viral genetic material was quantified in the samples treated with **Imuno ND** (contact time = 10 min).

References

- World Health Organisation. *WHO Guidelines on Hand Hygiene in Health Care.*; 2009. http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf
- Suchomel M, Rotter M. Ethanol in pre-surgical hand rubs: Concentration and duration of application for achieving European Norm EN 12791. *J Hosp Infect.* 2011;77(3):263-266. doi:10.1016/j.jhin.2010.10.014
- Bondurant SW, Duley CM, Harbell JW. Demonstrating the persistent antibacterial efficacy of a hand sanitizer containing benzalkonium chloride on human skin at 1, 2, and 4 hours after application. *Am J Infect Control.* 2019;47(8):928-932. doi:10.1016/j.ajic.2019.01.004
- Pidot S, Gao W, Buultjens A, et al. Increasing tolerance of hospital Enterococcus faecium to hand-wash alcohols. *bioRxiv.* 2016;6115(August):053728. doi:10.1101/053728
- Eurofins. *RNA Extraction and RT-PCR (Polymerase Chain Reaction with Reverse Transcription) for the Detection of SARS-CoV-2 and Other Viruses Belonging to the Coronavirus Group on Surfaces Exposed to Sanitation.*; 2020.
- Ophaswongse S, Maibach HI. Alcohol dermatitis: allergic contact dermatitis and contact urticaria syndrome. A review. *Contact Dermatitis.* 1994;30(1):1-6. doi:10.1111/j.1600-0536.1994.tb00719.x
- Rotter M. Hand washing and hand disinfection. In: Mayhall CG, ed. *Hospital Epidemiology and Infection Control.* 2nd ed. Lippincott Williams & Wilkins; 1999:1339-1355.
- Wood A, Payne D. The action of three antiseptics/disinfectants against enveloped and non enveloped viruses. *J Hosp Infect.* 1998;38:283-295.
- World Health Organisation. *Combating Waterborne Disease at the Household Level.*; 2007.
- Gold NA, Avva U. *Alcohol Sanitizer.* StatPearls Publishing; 2018.
- McDonnel G, Russel D. Antiseptics and Disinfectants: Activity, Action, and Resistance. *Clin Microbiol Rev.* 1999;12(1):147-179.
- Merianos JJ. Quaternary ammonium antimicrobial compounds. In: Block SS, ed. *Disinfection, Sterilization, and Preservation.* 4th ed. Lea & Febiger; 1991:225-255.
- Cermelli C, Fabio A, Fabio G, Quaglio P. Effect of eucalyptus essential oil on respiratory bacteria and viruses. *Curr Microbiol.* 2008;56(1):89-92. doi:10.1007/s00284-007-9045-0
- Elaissi A, Rouis Z, Salem NAB, et al. Chemical composition of 8 eucalyptus species' essential oils and the evaluation of their antibacterial, antifungal and antiviral activities. *BMC Complement Altern Med.* 2012;12:1-15. doi:10.1186/1472-6882-12-81
- Sadatrassul MS, Fiezi N, Ghasemian N, et al. Oil-in-water emulsion formulated with eucalyptus leaves extract inhibit influenza virus binding and replication in vitro. *AIMS Microbiol.* 2017;3(4):899-907. doi:10.3934/microbiol.2017.4.899
- Schnitzler P, Schön K, Reichling J. Antiviral activity of Australian tea tree oil and eucalyptus oil against herpes simplex virus in cell culture. *Pharmazie.* 2001;56(4):343-347.
- Vimalanathan S, Hudson J. Anti-influenza virus activity of essential oils and vapors. *Am J Essent Oils Nat Prod.* 2014;2(1):47-53. <http://www.essencejournal.com/vol2/issue1/pdf/8.1.pdf>
- Ma L, Yao L. Antiviral Effects of Plant-Derived Essential Oils and Their Components: An Updated Review. *Molecules.* 2020;25(11):1-13. doi:10.3390/molecules25112627
- Asif M, Saleem M, Saadullah M, Yaseen HS, Al Zarzour R. COVID-19 and therapy with essential oils having antiviral, anti-inflammatory, and immunomodulatory properties. *Inflammopharmacology.* 2020;28(5):1153-1161. doi:10.1007/s10787-020-00744-0
- Sharma A, Kaur I. Eucalyptol (1,8 cineole) from Eucalyptus Essential Oil a Potential Inhibitor of COVID 19 Corona Virus Infection by Molecular Docking Studies. Preprints. doi:10.20944/preprints202003.0455.v1
- Li X, Duan S, Chu C, et al. Melaleuca alternifolia concentrate inhibits in vitro entry of influenza virus into host cells. *Molecules.* 2013;18(8):9550-9566. doi:10.3390/molecules18089550
- Garozzo A, Timpanaro R, Bisignano B, Furneri PM, Bisignano G, Castro A. In vitro antiviral activity of Melaleuca alternifolia essential oil. *Lett Appl Microbiol.* 2009;49(6):806-808. doi:10.1111/j.1472-765X.2009.02740.x
- Brun P, Bernabè G, Filippini R, Piovani A. In Vitro Antimicrobial Activities of Commercially Available Tea Tree (Melaleuca alternifolia) Essential Oils. *Curr Microbiol.* 2019;76(1):108-116. doi:10.1007/s00284-018-1594-x
- Maan AA, Nazir A, Khan M, et al. The therapeutic properties and applications of Aloe vera: A review. *J Herb Med.* 2018;12:1-10.
- Oryan A, Mohammadalipour A, Moshiri A, Tabandeh MR. Topical application of aloe vera accelerated wound healing, modeling, and remodeling. *Ann Plast Surg.* 2016;77(1):37-46. doi:10.1097/SAP.0000000000000239
- Takzaree N, Hadjiakhondi A, Hassanzadeh G, Rouini MR, Manayi A, Zolbin MM. Transforming Growth Factor-β (TGF-β) Activation in Cutaneous Wounds after Topical Application of Aloe Vera Gel. *Can J Physiol Pharmacol.* 2016;94(12):1285-1290. www.nrcresearchpress.com
- Hekmatpou D, Mehrabi F, Rahzani K, Aminiyan A. The effect of Aloe Vera gel on prevention of pressure ulcers in patients hospitalized in the orthopedic wards: A randomized triple-blind clinical trial 11 Medical and Health Sciences 1103 Clinical Sciences. *BMC Complement Altern Med.* 2018;18(1):1-11. doi:10.1186/s12906-018-2326-2
- Pellizzoni M, Ruzickova G, Kalhotka L, Lucini L. Antimicrobial activity of different Aloe barbadensis Mill. and Aloe arborescens Mill. leaf fractions. 2012;6(10)(Giugno):1975-1981. doi:10.5897/JMPR11.1680
- Danish P, Ali Q, Mm H, Malik A. Antifungal and antibacterial activity of Aloe vera plant extract. *Biol Clin Sci Res J.* 2020;2020(e004):1-8.
- Wall MM. Functional lipid characteristics, oxidative stability, and antioxidant activity of macadamia nut (Macadamia integrifolia) cultivars. *Food Chem.* 2010;121(4):1103-1108. doi:10.1016/j.foodchem.2010.01.057
- Mereles LG, Ferro EA, Alvarenga NL, et al. Chemical composition of Macadamia integrifolia (Maiden and Betcher) nuts from Paraguay. *Int Food Res J.* 2017;24(6):2599-2608.
- Wallace HM, Walton DA. *Macadamia (Macadamia Integrifolia, Macadamia Tetraphylla and Hybrids).* Woodhead Publishing Limited; 2011. doi:10.1533/9780857092885.450

Disclaimer

Imuno ND is a cosmetic hand cleanser and it is not intended to diagnose, treat, or cure any disease.

Warnings

For external use only.

Do not use this product in or near the eyes. In case of contact, rinse eyes thoroughly with water.

Stop use and ask a doctor if lasting irritation or rashes appear.

Keep out of reach of children. Do not use on mucosa or open wounds. If swallowed, get medical help or contact a Poison Control Centre immediately.

Children under 6 years of age should be supervised when using this product.

Do not freeze and avoid excessive heat above 40 °C (104 °F).

Scientific Support

Please contact our scientific experts to get more details about the applications and technical benefits of ImunoND.



Fagron Johannesburg

T +27 11 675 5331
M +27 76 240 1703
jhb@fagron.co.za

Fagron Cape Town

T +27 21 933 5545
M +27 65 860 4999
cpt@fagron.co.za