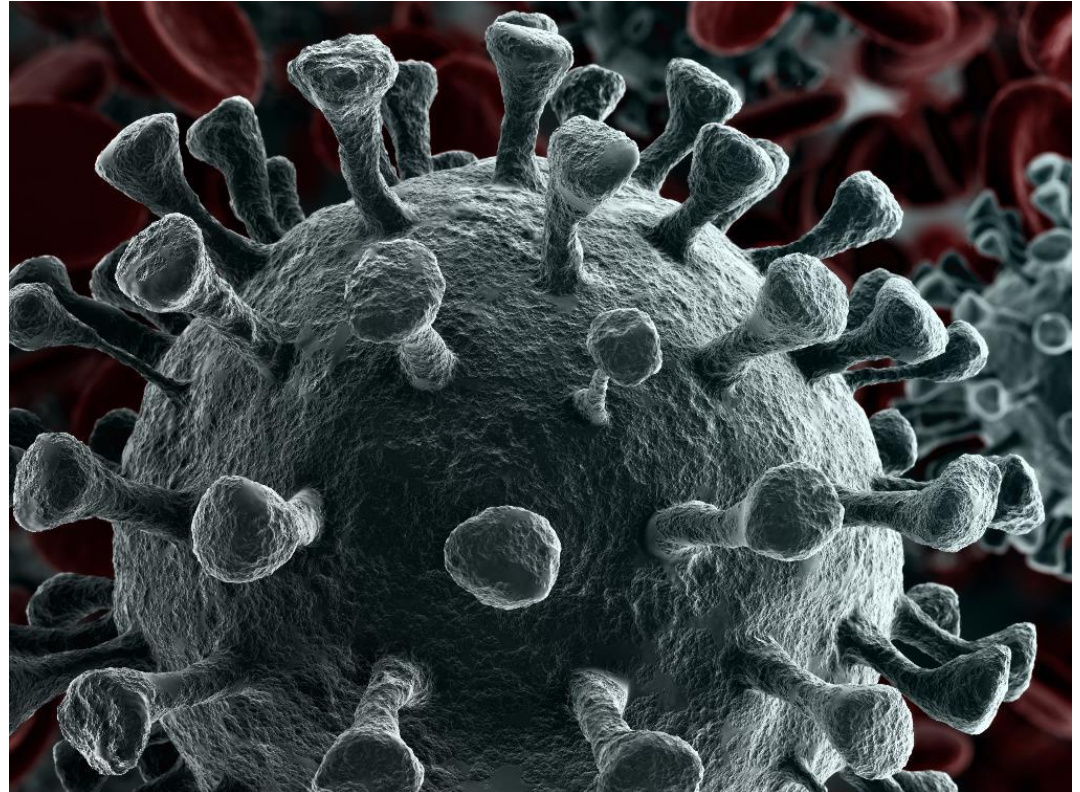


# AUSTRALIAN TEA TREE OIL

An effective anti-viral

# 코로나 바이러스

- 명칭 : SARS-CoV-2
- COVID-19란?  
SARS-CoV-2 감염에 의한 호흡기 증후군.
- 195 개국 현재 감염현황 (24/3/2020)
  - 382,008 cases
  - 16,558 deaths (4.3%)
  - 102,431 recovered
- 코로나 바이러스의 형태는 명명과  
구형으로 외부 spike 단백질이  
특징적인 크라운형태임.  
(전자현미경 관찰)
- 다른 코로나 바이러스  
SARS (2003 outbreak)  
MERS (2012 outbreak)



## Coronavirus (SARS-CoV-2) 예방수칙



- 백신 없음
- 올바른 손씻기
  - 흐르는 물에 비누로 30초 이상 꼼꼼하게 손씻기
  - 특히, 외출 후, 배변 후, 식사 전·후, 기저귀 교체 전·후, 코를 풀거나 기침, 재채기 후 등에는 반드시 실시
- 기침 예절 준수
  - 기침할 때는 휴지나 옷소매 위쪽으로 입과 코를 가리고 하기
  - 호흡기 증상이 있는 경우 마스크 착용
- 씻지 않은 손으로 눈, 코, 입 만지지 않기
- 주위 환경을 자주 소독하고 환기하기



## Australian Tea Tree Oil (TTO) (*Melaleuca alternifolia*)

### Functional Properties

### Applications

Anti-bacterial	Acne, Oral, Hands, Body odor
Anti-fungal	Dandruff, mold, toenail, feet, HVAC/air treatment
Anti-inflammatory	Minor wounds, grazes, insect bites
Anti-yeast	Feminine care
Anti-acari	Home care (linen, carpets)
Anti-viral	Home, Industrial, Personal care



“해당 연구결과는 TTO(Tea tree oil) 이 외피보유 (피막) 바이러스와 비피막 바이러스 모두에 대하여 항바이러스 효과가 있을 수 있음을 가리킨다.”

C. F. Carson, K. A. Hammer, and T. V. Riley, *Melaleuca alternifolia (Tea Tree) Oil: a Review of Antimicrobial and Other Medicinal Properties*, Clin Microb Rev, Jan 2006, pp 50-62.

CLINICAL MICROBIOLOGY REVIEWS, Jan. 2006, p. 50-62  
0893-8512/06/5008.00+0 doi:10.1128/CMR.19.1.50-62.2006  
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Vol. 19, No. 1

## *Melaleuca alternifolia* (Tea Tree) Oil: a Review of Antimicrobial and Other Medicinal Properties

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### INTRODUCTION

Many complementary and alternative medicines have enjoyed increased popularity in recent decades. Efforts to validate their use have seen their putative therapeutic properties come under increasing scrutiny in vitro and, in some cases, in vivo. One such product is tea tree oil (TTO), the volatile essential oil derived mainly from the Australian native plant *Melaleuca alternifolia*. Employed largely for its antimicrobial properties, TTO is incorporated as the active ingredient in many topical formulations used to treat cutaneous infections. It is widely available over the counter in Australia, Europe, and North America and is marketed as a remedy for various ailments.

### COMPOSITION AND CHEMISTRY

TTO is composed of terpene hydrocarbons, mainly monoterpenes, sesquiterpenes, and their associated alcohols. Terpenes are volatile, aromatic hydrocarbons and may be considered polymers of isoprene, which has the formula  $C_5H_8$ . Early reports on the composition of TTO described 12 (65), 21 (3),

and 48 (142) components. The seminal paper by Brophy and colleagues (25) examined over 800 TTO samples by gas chromatography and gas chromatography-mass spectrometry and reported approximately 100 components and their ranges of concentrations (Table 1).

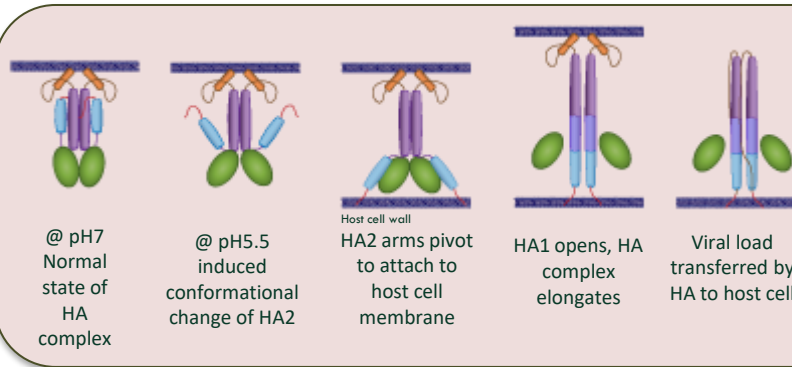
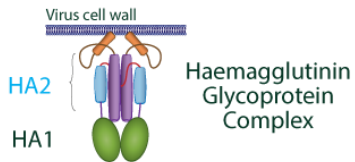
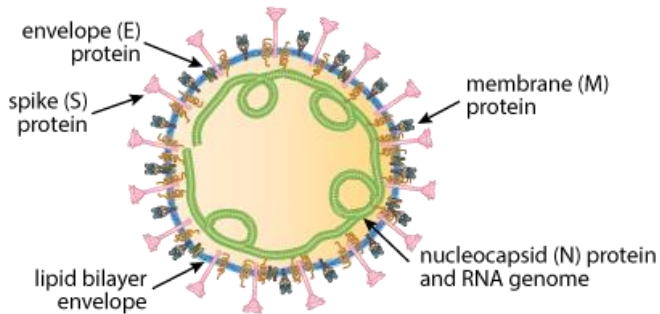
TTO has a relative density of 0.885 to 0.906 (89), is only sparingly soluble in water, and is miscible with nonpolar solvents. Some of the chemical and physical properties of TTO components are shown in Table 2.

Given the scope for batch-to-batch variation, it is fortunate that the composition of oil sold as TTO is regulated by an international standard for "Oil of *Melaleuca*—terpinen-4-ol type," which sets maxima and/or minima for 14 components of the oil (89) (Table 1). Notably, the standard does not stipulate the species of *Melaleuca* from which the TTO must be sourced. Instead, it sets out physical and chemical criteria for the desired chemotype. Six varieties, or chemotypes, of *M. alternifolia* have been described, each producing oil with a distinct chemical composition. These include a terpinen-4-ol chemotype, a terpinolene chemotype, and four 1,8-cineole chemotypes (83). The terpinen-4-ol chemotype typically contains levels of terpinen-4-ol of between 30 to 40% (85) and is the chemotype used in commercial TTO production. Despite the inherent variability of commercial TTO, no obvious differences in its bioactivity either in vitro or in vivo have been noted so far. The suggestion that oil from a particular *M. alternifolia* clone possesses en-

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One of the top cited papers globally in Scientific literature. Over 1044 citations as of March 2020

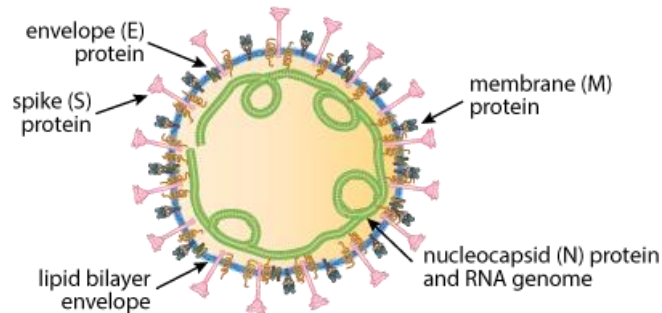
### Typical Virus Mode of Infection



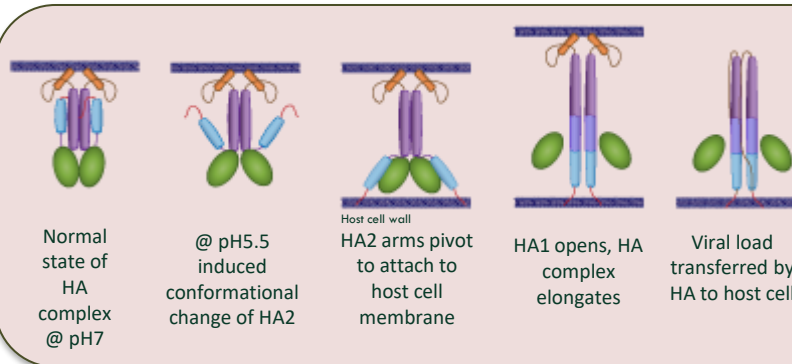
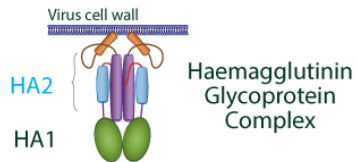
**Routine Viral Transfer**  
A properly functioning  
Haemagglutinin glycoprotein  
complex enables viral/host  
attachment

- 바이러스 는 Hemagglutinin-esterase 단백질을 생성하는데. 이는 바이러스 입자의 숙주세포 부착 및 유리 과정에서 중요한 역할을 담당함.

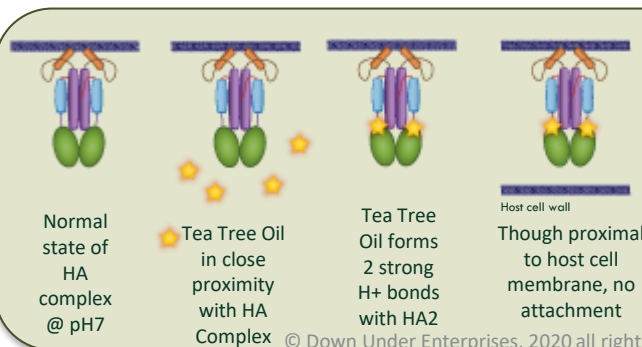
# Tea Tree Oil의 항바이러스 메카니즘



- 연구 논문에 의하면, 바이러스의 숙주세포 감염 과정에서 TTO의 성분이 존재하는 경우, 바이러스의 숙주세포 부착에 중요한 역할을 하는 Haemagglutinin glycoprotein 기능이 손실 되면서 바이러스의 세포 감염이 차단되었음.

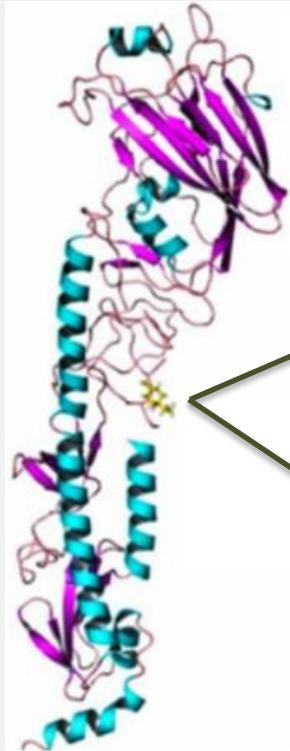


**Routine Viral Transfer**  
A properly functioning Haemagglutinin glycoprotein complex enables viral/host attachment



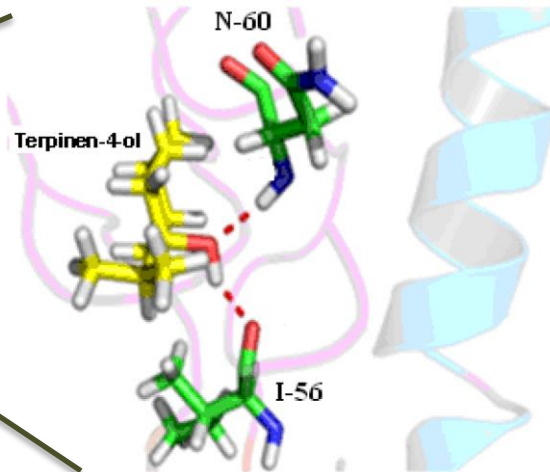
**Australian Tea Tree Oil**  
Presence of TTO compounds induces dysfunction of Haemagglutinin glycoprotein  
∴ lack of viral/host attachment

# Tea Tree Oil's 항 바이러스 메카니즘



In silica modelling of HA Complex and TTO binding site  
(Source: Xinghua Li et al, 2013)

Two strong H<sup>+</sup> bonds are formed at H1



- 해당 논문의 in silico 구조 분석에 의하면, Tea tree Oil 의 분자 구조 일부가 Haemagglutinin glycoprotein complex와 결합하는 것으로 보여짐.
- 따라서 바이러스의 숙주세포 부착이 비활성화 되는 것으로 추측할 수 있음.



Li X, Duan S, Chu C, Xu J et al.,  
(2013) *Melaleuca alternifolia*  
Concentrate Inhibits in Vitro Entry of  
Influenza Virus into Host Cells.  
Molecules, 18, 9550-66.



## Product Applications and Support



### Key Takeaways:

- TTO의 항바이러스 연구 논문에 의하면 평균적으로 0.02% 함량에서도 항바이러스 효과 나타냄.
- 호주산 TTO의 경우, 최저 0.001%에서도 효과가 있었으며 5% 적용까지는 인체에 안전함.

- 손세정제에서 TTO는 피부로 흡수 되지 않고 약 4-8시간 동안 피부 표면에 남아 있어 지속성 있는 항바이러스 효과를 기대 할 수 있음.

- TTO 이 처리된 필터 테스트에서 호흡기 바이러스의 활성 관찰시, 비활성화 효과가 있었음.

## Tea tree oil 의 응용



Alcohol-based Hand Sanitizers

Hand Washes



Skin Sprays

Air Diffusers and HVAC Dispersion



Protective Hand and Facial Creams

## TTO – Sample Formulations



*This nourishing and protective facial oil is 100% natural. With a uniquely refreshing and uplifting lemony aroma, facial skin will feel enriched and cleaner, even after the first use.*

### Protective Facial Oil

	Ingredient	INCI	Supplier	% (w/w)
	Golden Jojoba Oil	Simmondsia Chinensis (Jojoba) Seed Oil		to 100
A	Australian Tea Tree Oil	Melaleuca Alternifolia (Tea Tree) Leaf Oil	Down Under Enterprises	3.00
	Australian Lemon Scented Tea Tree Oil	Leptospermum Petersonii Oil	Down Under Enterprises	0.03
	TOTAL			100

#### Procedure:

1. Mix Phase A thoroughly
2. Dispense to suitable container for use

## TTO – Sample Formulations



For those sensitive to alcohol, this formulation offers a Tea Tree Oil based solution. This hand lotion is designed to enrich the skin, while also the potential of a natural and long-lasting antibacterial action.

### Alcohol-Free Protective Hand Lotion`

	Ingredient	INCI	Supplier	% (w/w)
	Golden Jojoba Oil	Glyceryl Stearate		to 100
A	Australian Tea Tree Oil	Melaleuca Alternifolia (Tea Tree) Leaf Oil	Down Under Enterprises	3.00
	Australian Lemon Scented Tea Tree Oil	Leptospermum Petersonii Oil	Down Under Enterprises	0.03
	TOTAL			100

Procedure:

1. Mix Phase A thoroughly
2. Dispense to suitable container for use



# TTO for Anti-Viral – Sample Formulation



*With a 70% alcohol base and 2.0% Australian Tea Tree Oil, this instant hand sanitizer offers rapid and long lasting (4+ hour) protection, in an easy-to-use format without water.*

## Instant Hand Sanitizer

	Ingredient	INCI	Supplier	% (w/w)
A	Rheostyl UP	Acrylates Copolymer		4.00
	Deionized Water	Aqua		to 100
B	NaOH (10% aqueous solution)	Sodium Hydroxide Water		1.34
C	Glycerin	Glycerin		2.00
	Alcohol	Alcohol		70.00
D	Australian Tea Tree Oil	Melaleuca Alternifolia (Tea Tree) Leaf Oil	Down Under Enterprises	2.00
TOTAL				100

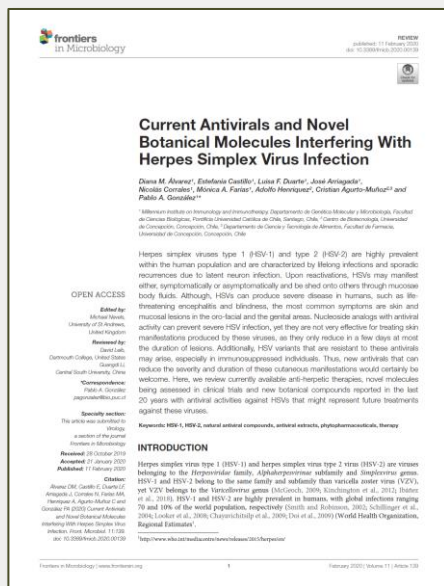
### Procedure:

1. Mix Phase A thoroughly, then add to B for neutralization
2. Add each subsequent phase one-by-one to base, mix thoroughly
3. Dispense to suitable container for use

### Physical roperties:

Viscosity: 1800-2200 mPa.s  
pH: 6.5-7.0 (direct)

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## Australian Tea Tree Oil

Common name: Tea Tree Oil - 澳洲茶树精油

Botanical name: *Melaleuca alternifolia*

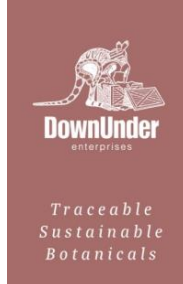
EINICS: 互生叶白千层 (MELALEUCA ALTERNIFOLIA) 叶油

INCI: Melaleuca alternifolia (tea tree) leaf oil

Manufacturing: Steam distillation

Defined by: ISO4730: 2017

Beware of adulteration  
look for the ATTIA logo



Essential Oil  
Producers  
Association of  
Australia



ATTIA  
Australian Tea  
Tree Industry  
Association



American  
Botanical  
Council



Natural  
Products  
Association



Orangutan  
Foundation  
International



Australian  
Certified  
Organic



COSMOS-  
Standard  
AISBL

