Essential Oils & The Skin

The Complete Skin Series

By Robert Tisserand

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= New sub-topic

Notes

Irritation & allergy

- Patch testing
- Irritation
- Allergic reaction
- Risk factors
- Safety regulations
- Relative risk

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Patch testing

Trolab
Webril
TRUE Test
Finn Chambers
Hilltop Chambers
Professional Products

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Grading system

Code	Strength of reaction	Signs
+?	Doubtful	Mild redness only
+	Weakly positive	Red & slightly thickened skin
++	Strongly positive	Red swollen skin with small water blisters
+++	Extremely positive	Intense redness & swelling with large blisters or spreading reaction
IR	Irritant	Redness improves once patch is removed

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Irritation

Carvacrol
Thymol

Max: 1%

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Limits for irritation

Essential oil	Maximum
Oregano EO	1.1%
Savory EO (winter)	1.2%
Thyme EO (thymol)	1.3%
Ajowan EO	1.4%
Savory EO (summer)	1.4%
Thyme EO (limonene)	2.1%
Thyme EO (borneol)	3.3%

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Allergic reaction

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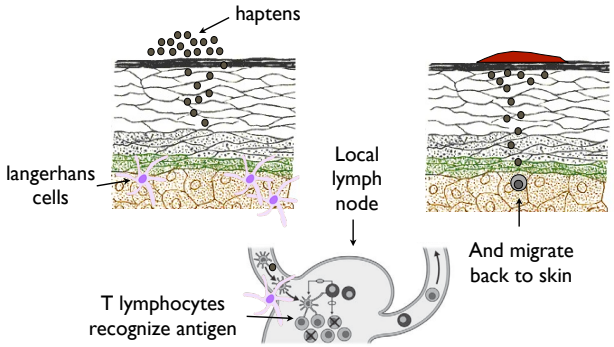
Induction & elicitation



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Risk factors

Dose metrics (quantity and concentration of substance)

Degree of percutaneous absorption of substance

Degree of reactivity between substance and immune system

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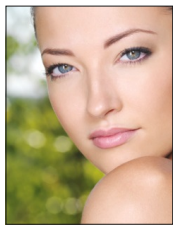
Being female



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Women are 3-4 times more susceptible to skin allergy than men, probably because female cellular immune reactions are more vigorous.
Cellular immunity is influenced by hormones.

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Case study

A 32-year-old physiotherapist

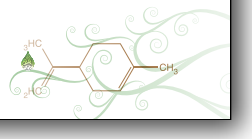
He massaged patients with a cream containing cinnamon bark oil and clove oil.

Stopping use of the cream led to improvement within 2 days. 8

Mild eczema on fingertips for 7 years

Patch testing showed allergy to 0.5% cinnamon bark oil and 1% clove oil

Developed a more severe reaction 7 months before consulting dermatologist



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Tea tree allergy

Concentration	Oil status	% who reacted	No. of reactions
5%		0.0%	0/160
5%		0.15%	1/725
5%	oxidized	0.3%	5/1,603
5%	oxidized	0.95%	10/1,058
5%	oxidized	1.07%	36/3,375
5% or 10%	oxidized	1.38%	32/2,329
10%		0.47%	1/217
5-100%		0.97%	3,309
100%		0.69%	5/725
100%		2.0%	3/150
100%	oxidized	2.4%	13/550

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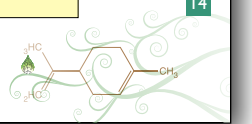
Clinical trial safety

Six clinical trials
Tea tree oil at 5% or 10%
295 patients
No allergic reactions
67 with inflamed skin condition

9 10 11 12 13 14

Mild reactions were no greater than placebo and in some cases were less



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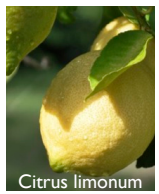
Limonene degradation



Citrus limonum

(*Z*)-limonene 1,2-oxide
(*E*)-limonene 1,2-oxide
(*Z*)-limonene-2-hydroperoxide
(*E*)-limonene-2-hydroperoxide

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After 10 weeks, some of these oxidation products start to polymerize

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Adding antioxidants

Antioxidant	Also known as	How much to use
Butylated hydroxytoluene	BHT	0.1-0.2%
Mixed tocopherols	T50	0.5-1.5%

Add antioxidants to preparations containing fatty oils and essential oils, to prolong shelf life
and inhibit adverse reactions

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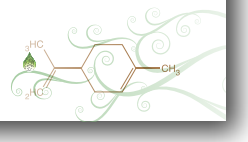
Safety regulations

IFRA
The International Fragrance Association 9
www.ifraorg.org



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Up to 0.1%

Substance	Maximum for skin	Reference
Elecampane EO	no safe level	IFRA
Fig leaf ABS	no safe level	IFRA
Costus EO	no safe level	IFRA
Massoia EO	0.01%	Tisserand (no safe level IFRA)
Saffron EO/ABS	0.01%	IFRA (for safranal*)
Lavandin ABS	0.03%	Tisserand
Cassia EO	0.05%	IFRA (for cinnamaldehyde)
Cinnamon bark EO	0.06%	IFRA (for cinnamaldehyde)
Oakmoss ABS	0.1%	IFRA
Treemoss ABS	0.1%	IFRA
Lavender ABS	0.1%	Tisserand

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* based on IFRA category 4: body oils & lotions

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0.2 - 1.0%

Substance	Maximum for skin	Reference
Tea leaf ABS	0.2%	IFRA
Lemon verbena ABS	0.2%	IFRA
Clary sage ABS	0.25%	Tisserand
Peru balsam EO	0.4%	IFRA
Clove bud EO	0.5%	IFRA (for eugenol*)
Wild mountain sage EO	0.5%	Tisserand (for massoia lactone)
Cinnamon leaf EO	0.6%	IFRA (for eugenol*)
Clove leaf EO	0.6%	IFRA (for eugenol*)
Clove stem EO	0.6%	IFRA (for eugenol*)
Opopanax EO	0.6%	IFRA
Styrax EO	0.6%	IFRA
Jasmine ABS	0.7%	IFRA
Lemon myrtle EO	0.7%	IFRA (for citral*)

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* based on IFRA category 4: body oils & lotions

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0.2 - 1.0%

Substance	Maximum for skin	Reference
Lemongrass EO	0.7%	IFRA (for citral*)
Pungent basil EO	0.8%	IFRA (for eugenol*)
May chang EO	0.8%	IFRA (for citral*)
Narcissus ABS	0.8%	Tisserand
Lemon tea tree EO	0.8%	IFRA (for citral*)
Ylang-ylang EO	0.8%	IFRA*
Cananga EO	0.8%	IFRA*
Bay EO (West Indian)	0.9%	IFRA (for eugenol*)
Lemon leaf EO	0.9%	IFRA (for citral*)
Melissa EO	0.9%	Tisserand (for citral)
Honey myrtle EO	0.9%	IFRA (for citral*)
Verbena EO	0.9%	Tisserand (for citral)
Holy basil EO	1.0%	IFRA (for eugenol*)

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* based on IFRA category 4: body oils & lotions

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EU 'allergens' max

0.001%
Leave-on products

0.01%
Wash-off products

Oakmoss absolute	Citral
Treemoss absolute	Citronellol
Anisyl alcohol	Coumarin
Benzyl alcohol	Eugenol
Benzyl benzoate	Farnesol
Benzyl cinnamate	Geraniol
Benzyl salicylate	Isoeugenol
Cinnamaldehyde	Limonene
Cinnamyl alcohol	Linalool

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Relative risk

Patch tests, dermatitis patients

Substance	Test %	When	Result	Percent reactions
Cinnamaldehyde	1%	1987-2007	354 of 17,544	2%
Linalool	10% or 20%	1969-2007	13 of 25,164	0.05%

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Linalool

Bergamot	Lavender
Clary sage	Neroli
Coriander seed	Petitgrain
Ho wood	Rosewood
Ho leaf	Spike lavender
Lavandin	Ylang-ylang

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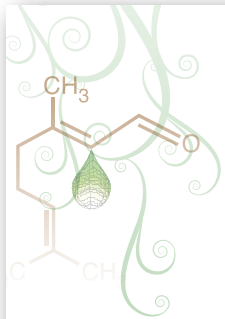

Summary points

- Most allergic reactions are due to skin contact with allergenic molecules.
- Fragrant allergens are not equally potent.
- Allergic reactions are concentration-dependent.
- Once an allergy is established, desensitization is difficult.
- There are many risk factors, including genetics.
- Patch testing may be useful, but can be difficult to perform and interpret.
- And there are doubts about its reliability.
- Antioxidants inhibit both oxidation and allergic reactions.
- Some essential oils should be used in limited concentrations on the skin.

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