

## Letters to the Editor

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Dear Sir

There are several significant errors and inaccuracies contained in the article by Faoagali *et al.* [1] about Burnaid™, its antimicrobial activity and its application in the first aid treatment of burns. Prior to discussing these, it would be beneficial to give a little background on Burnaid™ Burn First Aid Gel, and the research Rye Pharmaceuticals commissioned.

Burnaid™ is a first aid treatment for burns, and as such its primary function is to cool and soothe the burn and offer relief. Any assistance it may offer in the prevention of secondary infection is a supplementary function. Burnaid™ consists of gel, and sterile open cell foam dressings impregnated with a water based soluble gel. Both contain tea tree oil (in the case of the gel 4 per cent, and the dressings 1.5 per cent). Burnaid™ is recommended for use; in the case of the gel for first aid on minor burns and scalds, and the dressing 1st and 2nd degree burns. The Burnaid™ Dressing is considered a pre-medical device and never a long-term treatment. The gel is water-soluble and can easily be washed off to allow further specialist medical treatment. Burnaid™ has been sold successfully throughout Australia, New Zealand, and Asia since 1984. More recently it has been used very successfully in Emergency Rooms in United States hospitals. In the first aid or emergency room situation, the benefit of cooling the burn and offering non toxic pain relief cannot be over emphasized.

Rye Pharmaceuticals was considering the development of a product suitable for the treatment of burns in burn units. It was with this in mind that Royal Brisbane Hospital was approached and work commissioned. The proposed product would be very different from Burnaid™, as it would need to keep the wound moist over long periods, and exhibit antimicrobial activity against high concentrations of organisms — that in general aren't present in any significant concentrations in the first aid situation. One of the starting points was to conduct *in vitro* antimicrobial studies of Burnaid™ Gel (4 per cent Tea Tree Oil), and an unrelated product Tinasolve Cream (10 per cent Tea

Tree Oil). Testing was in no way related to the existing first aid product, but to examine the possibility of developing an effective antimicrobial treatment product.

The authors incorrectly state that 'Burnaid™ is a sorbalence (*sic*)-based cream.' It is in fact a gel-based product. Subsequently, the authors present Tinasolve as the base for Burnaid™; that is Burnaid™ minus the Tea Tree Oil. Tinasolve is not the base for Burnaid™. It is a separate product with different excipients from those contained in Burnaid™. However, in contrast to statements in the article, the Tinasolve sample provided did contain Tea Tree Oil (10 per cent), but no Triclosan. Despite this, Tinasolve was written up as a control for the antimicrobial activity of Triclosan, and its antimicrobial activity compared to that of Burnaid™. The authors go on to suggest that 'tea tree oil is not the active ingredient in the Burnaid™. Since Tinasolve is not the base for Burnaid™ and since it does contain a significant concentration of Tea Tree Oil and no Triclosan, it cannot be used as a control for the antimicrobial activity of Burnaid™. This fundamental error leads the authors to draw erroneous conclusions regarding the antimicrobial activity of both products and leaves the paper seriously flawed.

The authors state that Tea Tree Oil is 'a mixture of at least eight different oils.' While not being incorrect this could at least be regarded as greatly understated as Brophy *et al.* reported in 1989 that tea tree oil is a mixture of approximately 100 individual components [2].

Work by Carson and Riley [3] is cited as indicating that *p*-cymene has no antimicrobial activity. This is not strictly accurate. Carson and Riley did report that *p*-cymene was inactive against *P. aeruginosa*, *E. coli* and *S. aureus* by the disc diffusion method. However, some activity against *C. albicans* was detected. In addition, some activity against *Bacteriodes fragilis* and *Clostridium perfringens* was reported. Admittedly, if the results of the more sensitive broth microdilution method are considered, the highest concentration of *p*-cymene tested (8 per cent v/v), did not have significant activity against *E. coli*, *C. albicans* and *S. aureus*

[3]. This concession however, only confounds attempts to understand subsequent citations made by Faogali *et al.* Carson and Riley demonstrated similar results for *p*-cymene and *y*-terpinene from both disc diffusion and broth dilution tests [3]. Despite this, *p*-cymene is cited as having ‘no antimicrobial activity’ and *y*-terpinene is cited as being ‘active against all organisms except *P. aeruginosa*.’ It is difficult to reconcile these two opposing statements around the data contained in the original paper by Carson and Riley.

The authors used a well infusion method to detect activity in the products and cite methodology adapted from Carson and Riley [3]. Further examinations of the cited reference affords the recommendation that ‘disc diffusion methods are suitable for screening purposes only and quantitative data should be sought using broth dilution technique.’ The use of a method that requires lipophilic components to diffuse through an aqueous agar medium is inappropriate in these circumstances and in fact contra-indicated by the original authors [3].

The authors cite work conducted by Tong *et al.* [4], showing no mycological effect on tinea pedis. The formulation used in the trials was tea tree (10%) in a sorbolene base, now widely known amongst tea tree formulators to inhibit the antimicrobial activity of tea tree oil — most probably due to the presence of nonionic surfactants.

The authors suggest that ‘the lack of activity of either the Burnaid™ or the Tinasolve cream against *E. faecalis* and *P. aeruginosa* ... must limit potential usefulness of the product for application to burns’. The methods adopted in this study to assess the antimicrobial activity of the products are inadequate and inappropriate. The antimicrobial activity of both tea tree oil and tea tree oil products against *E. faecalis* and *P. aeruginosa* require using more appropriate and quantitative methods — a step Rye has already commenced with further work on *P. aeruginosa*. Work has also been conducted demonstrating that Burnaid™ passed British Pharmacopoeia Preservative Test 1980, indicating antimicrobial activity against *S. aureus*, *P. aeruginosa*, *C. albicans* and *A. niger* [5]. These results are at odds with those of the authors. However, this is surely missing the point of Burnaid™ — a pre-medical first aid treatment primarily designed to cool and soothe the burn and offer relief, and secondary infection — usually in a situation where the microbial count is reasonably low.

The authors have extrapolated from *in vitro* work by Soderberg [6] suggesting that tea tree oil is cytotoxic and proposed that it ‘may contribute to decreased healing and increased scarring’ when applied to burns. *In vivo* work examining the effect of the tea tree oil on experimental wounds [7] has not been cited, and it is difficult to extrapolate *in vitro* results to a clinical situa-

tion. In this work, attempts were made to determine if the application of tea tree oil to experimental wounds enhanced wound healing rates. When compared to untreated control wounds, there was no significant difference in healing times indicating tea tree oil neither enhanced nor delayed wound healing. Of course, further work to corroborate this would be useful.

In further *in vivo* work conducted on Burnaid™, the Draize irritation index was 0 for acute dermal irritation, indicating that it was a non-irritant. Skin sensitization studies indicated slight intradermal irritation reactions, although no sensitization properties were shown. Oral toxicity studies indicated that LD<sub>50</sub> to be greater than 10 g/kg — indicating a very low potential toxicity. It was evaluated as an eye irritant using the Draize procedure — however a very mild irritant [8].

In conclusion, Burnaid™ is not designed and marketed specifically as a long-term antimicrobial agent for burns. While the well-established antimicrobial properties of tea tree oil [9,10], are not entirely redundant in the first-aid treatment of burns, it is the other properties of Burnaid™ (cooling, soothing the burn and offering relief), and tea tree oil which make the product a useful adjunct in initial burn treatment. For the authors to represent Burnaid™ a long term antimicrobial burns treatment, is to misconstrue the intent and use of Burnaid™ and the reason the research was being undertaken. Furthermore there was no control in the research conducted, so to draw the conclusion that the antimicrobial properties of Burnaid™ were most probably the result of Triclosan is incorrect. The testing methods used have been shown to be unsuitable for quantitative antimicrobial testing of tea tree oil products — possibly leading to misleading antimicrobial results. Finally it cannot be concluded from *in vitro* work that a 4 per cent tea tree oil formulation may decrease healing and increase scarring. This is at odds with *in vivo* work conducted on tea tree oil.

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## References

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Sir

Further to the recent articles in December regarding the dangers of the intake of psoralens<sup>1,2</sup> and subsequent UV exposure producing significant burns, we would like to report a similar incident following the use of aromatherapy oils.

A 33 year old lady was referred to our Burns Unit with approximately 70% superficial partial thickness burns. Three days prior to admission she had taken an aromatherapy bath with six drops of oil of Bergamot and six drops of Geranium oil added to the water. About 3 hours later she spent 20-30 minutes on a sun-bed with no apparent ill effects. However, over the ensuing 48 hours she developed increasing erythema and blistering of the exposed areas causing considerable discomfort and leading to her subsequent admission.

On further enquiry there was a warning on the oil bottles regarding sun exposure after use but the patient had forgotten about the bath when she got on the sun-bed. It also transpires that one of the ingredients in oil of Bergamot is 5 Hydroxypsoralen, which as previously noted is a potent sensitiser of skin to the effects of UV light. Psoralens have been used both orally and in the bath as a skin sensitiser prior to PUVA treatment for psoriasis both in hospital and on a domiciliary basis<sup>3</sup>.

In this present age of homeopathic remedies, the use of essential oils not only in burners but also in baths and as massage oils is increasing. Oils are freely available over the counter anywhere from local supermarkets to garden centres and although the oil in this case did carry a warning, this is not always the case. In this case the oil was used several hours prior to UV exposure and the warning not appreciated by the patient in question. In general essential oils are bought in the belief that they are relatively harmless and certainly so in the small quantities used (in this case 6 drops in a bath of water). Warnings regarding the use of the oils, e.g. do not use within 3 hours of going in the sun or on a sun-bed, may be found in books<sup>4</sup> on the subject, but the majority of users at this time simply buy the oils and equipment for home use without looking further into the subject.

We feel that this case should be brought to people's attention, particularly aromatherapists, and that labelling of these products with potential hazards should be more rigorous.

**Dr H. Cocks (Senior House Officer), Mr D. Wilson (Specialist Registrar), Burns & Plastic Surgery Unit, City Hospital, Nottingham**

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Sir

Dear Sir

The case report by Watts and McCallum<sup>1</sup> describes a hot water injury to a child's airway which spared the mouth and tongue. They emphasize the need for vigilance when dealing with scalds in the region of the mouth. We wish to endorse this by describing a similar case of a child with a scald injury in which there were no intraoral signs but in whom there was significant airway injury.

An 18-month-old child, weighing 10.3 kg suffered 12 per cent total body surface area partial thickness burns to her face, chest and both arms having pulled a kettle of freshly boiled water onto herself. She was initially treated at her local Accident and Emergency Department and was then transferred to the Burns Unit at Nottingham City Hospital. She arrived at the Burns