

# Preventing allergic skin reactions to synthetic rubber gloves

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**The safe use of natural rubber latex (NRL) in gloves and other devices used by health care workers is now a matter of record<sup>1</sup>. Of the wide-ranging strategies developed to ensure that NRL-allergic staff avoid exposure, one has been a trend towards the use of synthetic gloves<sup>2</sup> (also sometimes referred to as latex-free or non-latex gloves).**

Although synthetic gloves may not contain NRL, some brands remain capable of causing skin problems. According to recent research, the frequency of allergic contact dermatitis in healthcare workers significantly increased when there was a transition from NRL to synthetic rubber gloves<sup>3</sup>.

The problem would appear to be chemical residues called 'accelerators'. These chemicals are used in glove manufacture to modify properties such as durability and elasticity. Unfortunately, chemical accelerators are also a common cause of allergic skin reactions. Whilst accelerators are also used in the manufacture of NRL gloves, synthetic gloves may exhibit higher residual levels of these chemicals (than NRL) due to differences in manufacturing process<sup>4</sup>.

## Many chemicals

In the research mentioned above, where a switch from NRL to synthetic gloves increased the frequency of allergic contact dermatitis, a chemical accelerator called 1,3-diphenylguanidine was identified as the most commonly implicated allergen – in total 86% of the healthcare workers patch-tested (where small quantities of potential allergens are applied to the skin on small patches) reacted positively to 1,3-diphenylguanidine. However this was not the only culprit- around one third of those tested also reacted positively to other accelerator chemicals called thiuram mix (a combination of Dipentamethylenethiuram disulfide, Disulfiram [tetraethylthiuram disulfide], tetramethylthiuram disulfide and tetramethylthiuram monosulfide<sup>5</sup>).

It would appear that a complex chemical 'soup' of accelerators may be used in the manufacture of some synthetic



Keep irritation out of the OR. Don't let contact dermatitis or type IV allergies become a barrier to performance.

gloves. In 2013, Swedish Occupational Dermatologists (Lund University) noted increasing reports of occupational contact hand dermatitis among surgical OR staff<sup>6</sup>.

### What is in the gloves you use?

A surprising mixture of chemical residues may be present in synthetic rubber gloves. In fact there are many more 'accelerator' chemicals that may be used in synthetic glove manufacture than can be listed in this short article.

This begs the question – do you know what residues are present in medical gloves you routinely use? The answer for most readers will likely be 'no'. I can say this with some confidence because research has identified a poor knowledge of the chemical composition of synthetic rubber gloves for example amongst occupational health staff and safety engineers<sup>7</sup>.

### Avoiding problems

Contact dermatitis (irritant or allergic) is the most common occupational skin disease. In fact occupational skin diseases account for almost half of all occupational illnesses<sup>8</sup> making them a priority for prevention – not only to prevent individual suffering, but also to reduce the considerable cost to society in sickness absence and treatment.

Prevention of hand dermatitis among nursing and other health care staff can be achieved by reduction of wet-work exposure. Research suggests that it is frequency hand

wetting, rather than the duration of wet hands that predicts development of hand dermatitis<sup>9</sup>.

The findings on wet-work were of interest. It comes as a surprise to many, but water is a potential irritant which penetrates relatively easily through the skin's outermost layer, the stratum corneum. Frequent exposure to water causes swelling and shrinking of this layer and can lead to hand dermatitis (irritant contact dermatitis)<sup>10</sup>.

The key message to any health care worker with hand symptoms such as dryness, redness, itching, flaking, scaling, cracking, blistering or pain is to self-refer to Occupational Health to establish the cause – especially if these symptoms seem associated with a recent change to the gloves used in your hospital. Sometimes a simple change of glove-type can completely clear hand dermatitis<sup>10</sup>.

Other important preventive measures must also be considered. A wide-ranging Australian study of occupational skin disease reviewed 555 healthcare workers referred to an Occupational Dermatology Clinic over 22 years<sup>11</sup>. The most common diagnosis was irritant contact dermatitis, followed by allergic contact dermatitis. Unsurprisingly, the major substances causing allergic contact dermatitis were accelerants (thiuram mix and tetraethylthiuram disulfide), preservatives (formaldehyde, formaldehyde releasers, and isothiazolinones), and excipients in hand cleansers and antiseptics. Occupational irritant contact dermatitis was mostly caused by water/wet work and hand cleansers, and environmental irritants such as heat and sweating. The authors stressed the importance of understanding the causes of occupational skin disease in order to develop successful prevention strategies and recommended that skin care advice should be incorporated into hand hygiene education. They further recommended that use of alcohol-based hand rubs should be encouraged (rather than commercial hand cleansers) and accelerator-free gloves should be provided for workers with allergic contact dermatitis.

### Wet-work definition

Wet-work can be defined as an activity where workers have to immerse their hands in liquids for >2 hours per shift, or wear waterproof (occlusive) gloves for a corresponding amount of time, or wash their hands >20 times per shift<sup>8</sup>

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