

Rash judgment

Dr David Towlson briefs NEBOSH diploma students on causes of occupational dermatitis

Many of us know someone who has dermatitis. Some people have a genetic predisposition to forms of the skin condition, such as atopic eczema — also called atopic dermatitis, which typically affect the elbows, knees and face.

This article focuses on the forms of dermatitis that can result from exposure to substances in the workplace: occupational dermatitis.

The HSE estimates there are 84,000 people who have dermatitis caused or made worse by their work (www.hse.gov.uk/food/dermatitis.htm). Occupational dermatitis accounts for:

- 10% of compensation cases under the Department for Work and Pensions' industrial injuries scheme, and
- 13% of cases of occupational diseases notified to the HSE under the Reporting of Diseases, Injuries and Dangerous Occurrences Regulations.

Its prevalence earns it a place on the NEBOSH syllabus and this article focuses on Unit B.

What's in a name?

The term dermatitis is a Greek derived composite word which simply (and literally) means skin inflammation. It covers a range of conditions which exhibit persistent rashes, reddening, swelling, itchiness, blistering, cracking and soreness of the skin.

Dermatitis can go by many names depending on its manifestation and causative agents. Dandruff (seborrhoeic dermatitis), for example, is a common form which affects the scalp.

The condition can occur soon after exposure to the dermatitic agent (or some time later) but persists after it is removed from the skin. The reddening is most often observed on the hands as they are the organs we use most frequently to touch things.

Dermatitis is not normally considered infectious; you cannot catch it from others unless, of course, they end up transferring the causative agent to you before they wash it off their skin. However, inflamed, blistered and broken skin can subsequently be infected and some of these infections might be transmittable to others.

Why is it that dermatitis really gets under your skin? To understand that, let's first look at the nature of skin.

The skin is an extensive organ that stretches all over the body. Specialised skin continues its journey to places we would normally consider inside the body, such as the respiratory and gastrointestinal tracts, but which are technically still outside it.

The skin keeps stuff out (and other bits in) quite successfully. But everyone has probably experienced the odd accident when this barrier is compromised by cuts or grazes.

The skin is a multi-layered structure. There are three basic layers — epidermis, dermis and hypodermis (sub-cutis). At the risk of compromising the elegance of these terms, they translate from Greek approximately as on-top skin, skin and below-skin.

The diagram on page 38 shows these three layers in more detail.

- Epidermis is the outermost layer and largely consists of dead (or dying) cells.
- The middle layer (dermis) has all sorts of complex structures. Specialised glands secrete oils which make it waterproof. It is also loaded with more sensors than an iPad screen to alert you to potential problems through the universal language of pain, pressure and temperature. Hair follicles, blood capillaries, sweat glands, pigment cells and other similar structures complete the picture.
- The third layer (hypodermis) is mostly made of fat.

Seeing red

There are two principal categories of dermatitis that relate to the type of response the body gives when the skin is exposed to the dermatitic agent: These are:

- primary (or irritant) dermatitis. This is a non specific (innate) immune response; the classic, natural "brute force" response that the skin mounts for any physical injury
- secondary (or allergic) dermatitis. This is an over response of the specific (adaptive) immune system, that is, the targeted response for a given invader, involving, for example, production of antibodies. An allergic response is also known as



hypersensitivity. That is probably a better description because, as in common parlance, it indicates that it is out of all proportion to the reaction that you expected.

Primary dermatitis is caused by skin irritants. These damage cells directly through physical or chemical action. They can also promote damage to cells indirectly, for example by removing natural protective moisturising oils.

As we shall see later, even quite innocent activities like hand washing can lead to dermatitis if performed frequently enough. The damaged cells trigger an acute inflammatory response at the local site of contact.

Inflammation begins with blood capillary dilation, which in effect renders them porous, allowing blood borne defensive cells and plasma to invade surrounding tissues, phagocytising (literally cell eating) anything that shouldn't be there. The reddening and swelling is therefore an entirely normal response, which is then followed by repair (formation of scar tissue) in the later stages. People usually recover fully in time, after the irritant is removed.

The causative agents of secondary dermatitis are referred to as allergens or sensitisers. The reaction may take some time to develop. Indeed the first time you are exposed to a sensitiser, you may experience little or no response. But, under the bonnet,

the body is busily formulating a targeted response which is more than ready the next time you are exposed. This is a permanent change to the immune system in which you are said to have become sensitised. But not everyone reacts in the same way; not everyone may become sensitised.

Once triggered, this over-response is likely to occur on all subsequent exposures — even seemingly insignificant amounts can bring on all the classic symptoms we associate with allergic reactions. Reactions may be accompanied by widespread, systemic inflammation, severe swelling around the eyes or whole face, for example, which appears to have little relation to the site of contact. Some

hypersensitivities can send the immune system into such overdrive that it can kill the sufferer (by anaphylactic shock, for example). The symptoms usually dissipate on removal from the sensitiser. A further complication is possible cross sensitisation — that is, sensitisation to other, chemically related, agents.

Irritant and allergic dermatitis may be referred to as contact dermatitis because both require contact with the dermatitic agent but, confusingly, this term is sometimes used just to refer to the former. In both cases, if severe, the skin may become infected, which prolongs the agony. Dermatitis can be life changing if your job involves frequent potential exposure to irritants or sensitisers.

Cooks and bottle washers

The HSE's publication Work related skin disease in Great Britain 2013 (www.hse.gov.uk/statistics/causdis/dermatitis/skin.pdf) lists five occupations with the highest rates of dermatitis.

- florists (118 cases per 100,000 workers per year)
- hairdressers and barbers (94 cases)
- cooks (70 cases)
- beauticians (62 cases)
- metal working machine operatives (61 cases).

+ ON THE SYLLABUS

The syllabus for the National Diploma in Occupational Safety and Health contains content relating to health effects of hazardous substances on the skin and dermatitis, in particular in Unit B; Element 1.

The syllabus covers general topics such as an outline of human anatomical systems including the skin, as well as health effects of chemicals used in the workplace. Dermatitis and workplace examples of typical causative agents are specifically covered in Element B1.4.

The role of PPE in protecting the skin is covered in Element 3.2.

Common occupational irritants include:

- cement (in construction work)
- foods (including spices, citrus fruit and onions in catering)
- organic solvents (chemical industry)
- oils (car maintenance)
- cleaning products (cleaners)
- hair/face products (shampoos, detergents in hairdressing, beauty treatment).

Frequent hand washing (so called “wet working”) is also a common cause of occupational dermatitis in food preparation and hairdressing. People working in these industries may have wet hands for a significant part of the working day.

In the case of the catering industry, this is driven by food hygiene rules — the need to wash hands in between tasks — as well as cleaning tasks.

For hairdressing, it may be driven by the need to apply wet chemicals to hair, wash hair and retrieve equipment soaking in disinfectants.

Wet working strips the skin of its natural oils, leading to dry, flaky outer layers, cracking, sores and possibly secondary infection. Obviously it is best to avoid frequent exposure by redesigning the task — using a mechanical dishwasher to replace hand washing or a food processor as a substitute for hand chopping ingredients.

Wearing non latex gloves is also an option, for example in hairdressing, but this is not always practical.

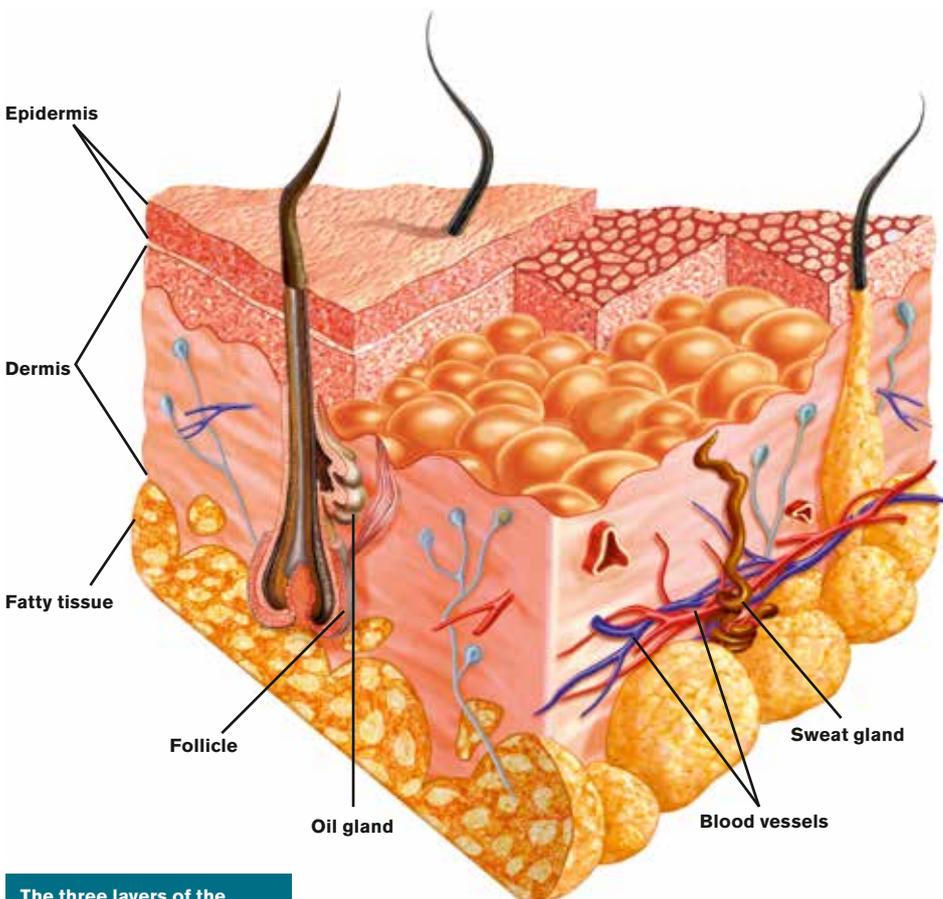
Long term use of the same gloves through the day can also create a local “wet-working” environment as the hands become hot and sweaty. Measures such as thorough drying of hands (after washing) and frequent application of moisturiser can help. Checking for early signs of dermatitis is a good precaution.

Allergic dermatitis can be caused by handling hair dyes, some chromium compounds (found in some cements, albeit at low levels), nickel compounds (used in electroplating and jewellery making), some foods (shellfish), wood dusts, resins, and plants and plant products (affecting forestry workers and florists).

The same agent may be capable of causing both irritant and allergic dermatitis. Indeed, sensitisers are usually also irritants.

The skin is wonderfully designed to resist invaders. But sometimes it develops dermatitis. To those who have never had this debilitating condition, it may seem trivial. Living with it is a different matter, especially if you work in a job where it is almost certain to occur without simple precautions.

Dermatitis is a response from irritants and sensitisers. Sensitisers are perhaps the most insidious agents because they initiate an immunological reaction which can be extreme and life changing. Some people may have to give up their jobs because it is simply not worth the risk of exposure to even tiny amounts of the sensitiser. ■



The three layers of the skin: epidermis, dermis and hypodermis (fatty tissue)



This article was prepared for the National Examination Board in Occupational Safety and Health by Dr David Towson BSc, PhD, CMIOSH, AIEMA, Cert Ed (PCET), MifL