

Damage to health from dermal exposure (EnviroDerm Services)

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Although there are no reliable statistics about the extent of damage to health from workplace dermal exposure, there is no doubt that such exposure is a major contributor to the high level of occupational ill health that still occurs in most industrial countries.

What is dermal exposure?

It is any contact between the skin and a chemical, irrespective of location or form. Location can be anywhere on the body; form can range from solid through liquid to vapour and gas. Airborne contact dermatitis is much more common than most people realise.

What are the consequences of dermal exposure?

These are shown in Figure 1.

Many chemicals can actually damage the skin over the area of contact. This might result in an instant reaction, such as a chemical burn; but more common is the accumulation of invisible damage due to repeated exposure to many different chemicals, until the skin finally succumbs and irritant contact dermatitis appears.

Some chemicals can be absorbed into the skin. There they may react with the body's immune system. The main function of the immune system is to protect us from infection. However, certain chemicals may cause it to overreact, releasing large amounts of inflammatory chemicals into the body. The result is what we commonly term an allergic reaction. This might be allergic contact dermatitis or the rarer form, contact urticaria. In a limited number of cases the contact urticarial reaction may be so pronounced that anaphylactic shock may occur. In extreme cases this may be life-threatening.

Some chemicals can be absorbed through the skin and can then reach internal organs or body fluids. This poses a risk of long-term damage, even death.

As the extent of the damage to the internal organ will depend on the dose, it may well be the combination of routes of entry that is significant (respiratory, dermal penetration and ingestion). This is one reason why we cannot be certain how much damage to health is caused by dermal exposure alone. More recently it has become apparent that, with some chemicals, respiratory reactions (such as asthma) may be caused by dermal exposure. A few chemicals are carcinogens. If these can reach an organ within the body, cancer may develop.

It is a common mistake to assume that we only need to be concerned with those chemicals that show on the safety data sheet as having a 'risk phrase', indicating damage to the skin. Risk phrases deal only with acute hazards, i.e. where a chemical causes an immediate effect. Most occupational effects from dermal exposure are what we term 'chronic'; that is, the damage accumulates over time, possibly many years, until it finally becomes visible. It may then be irreversible. There are many chemicals, most of which will not bear a risk phrase, that can cause adverse skin reactions. For example, in many occupations the cause of the irritant contact dermatitis may be as a result of excessive exposure to water!

All this has significant implications for those responsible for workers' health and safety. Many safety data sheets will only list those chemicals for which there is a risk phrase. The belief is that this is sufficient for legal compliance. In fact, this only ensures compliance with the Chemicals (Hazard Information and Packing for Supply) Regulations (CHIP). There is a much more extensive, and overriding, duty imposed upon the supplier under the Health and Safety at Work Act 1974 to disclose sufficient information to enable the end-user to use the product safely. So a safety data sheet that merely complies with the CHIP regulations may not be legally compliant. This presents end-users with a problem. If they do not know what is in a preparation, how can they ensure that it is used safely? The supplier may need to be contacted to obtain additional data.

By now it should be obvious that the employer needs to conduct a comprehensive risk assessment for all chemicals used in the workplace. However, since they may not know what is in the particular chemical product, how can this be done? One approach is to consider the use to which the product will be put. For example, if it is being used to degrease, then it will be a skin irritant. The more effective it is as a degreasant the stronger the irritant effect. A full explanation on how to conduct a risk assessment for dermal exposure is beyond the scope of this article, but the diagram showing possible routes of exposure should serve to indicate its complexity (Figure 2).

Having identified a potential risk, the employer now needs to manage that risk. The simple rules are: if there is no contact then there can be no dermal exposure; and we should try to control the process rather than the person. This means implementing measures that render the task implicitly safe. This could be the design of the actual equipment or such safeguards as exhaust ventilation, splash guards etc.

If this cannot be achieved, it may be necessary to use personal protective equipment, such as gloves. However, for regulatory compliance it is important that protective equipment should only be used after the implementation of all other practicable control measures and only in conjunction with them. Simply accepting that there is a chemical hazard and providing gloves does not result in compliance with regulations such as COSHH.

Selection and use of gloves for chemical protection can be complicated and difficult. The person responsible for this will have to consider many different factors, including degradation, permeation, temperature, abrasion, the nature, extent and duration of contact, etc. In some cases gloves may need to be changed at very frequent intervals, even though they may appear to be in good condition. The invisible permeation of a chemical through the glove may be putting the health of the user at severe risk.

Incidentally, the Health and Safety Executive has now agreed that so-called 'barrier' or pre-work creams cannot be used for primary protection of the skin against chemical hazards.

Personal hygiene, or skin care, can play an important role. However, it cannot replace proper risk management. What personal hygiene can achieve is the removal of any chemical soiling from the skin and help for the skin to recover from any damage done. Often overlooked is the importance of emollient lotion. Sometimes called an 'after-work cream' or moisturiser, this is an essential element in any skin care programme. It should be applied every time the hands are washed to help replace the natural oils lost during work and hand washing. Only then can the skin work as an effective barrier to protect the health of the worker.

Whenever there are chemicals capable of causing damage to health from contact with the skin and where there is a risk of such damage occurring, then skin health surveillance is a legal requirement in order to comply with COSHH. Traditionally, this has taken the form of a visual check on the worker's skin. However, this will only detect damage that has progressed far enough to be visible. Underlying, subclinical damage cannot be detected by visual examination. Recently, modified dermatological research equipment has become available that can measure certain skin conditions and provide an indication of invisible damage. Instruments are now available that will measure conditions such as the skin's loss of water (an indication of barrier condition) and skin moisture level (an indication of general skin condition) (see Figure 3).

In this short article it has not been possible to do more than mention some of the main factors that anyone concerned with the health and safety of the worker should consider in order to ensure a safe, healthy and compliant workplace. Prevention of damage to health requires an in-depth knowledge of these factors, a full assessment of the risks that the particular workplace presents as a result of dermal exposure and the appropriate action to manage these risks.

Dermal exposure is an aspect of health and safety where there are many myths and misconceptions. It is easy to take action that appears logical, but which can actually increase the probability of damage to health. Facilities managers would be wise to consider how such knowledge can be obtained or made available to ensure that their facility remains a safe and healthy place to work.

Further information

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