

# Occupational health

**SOUTHERN AFRICA**

Vol 16 No 5 September/October 2010

**The Occupational Skin Disease Clinic at the NIOH, NHLS: five years' experience**

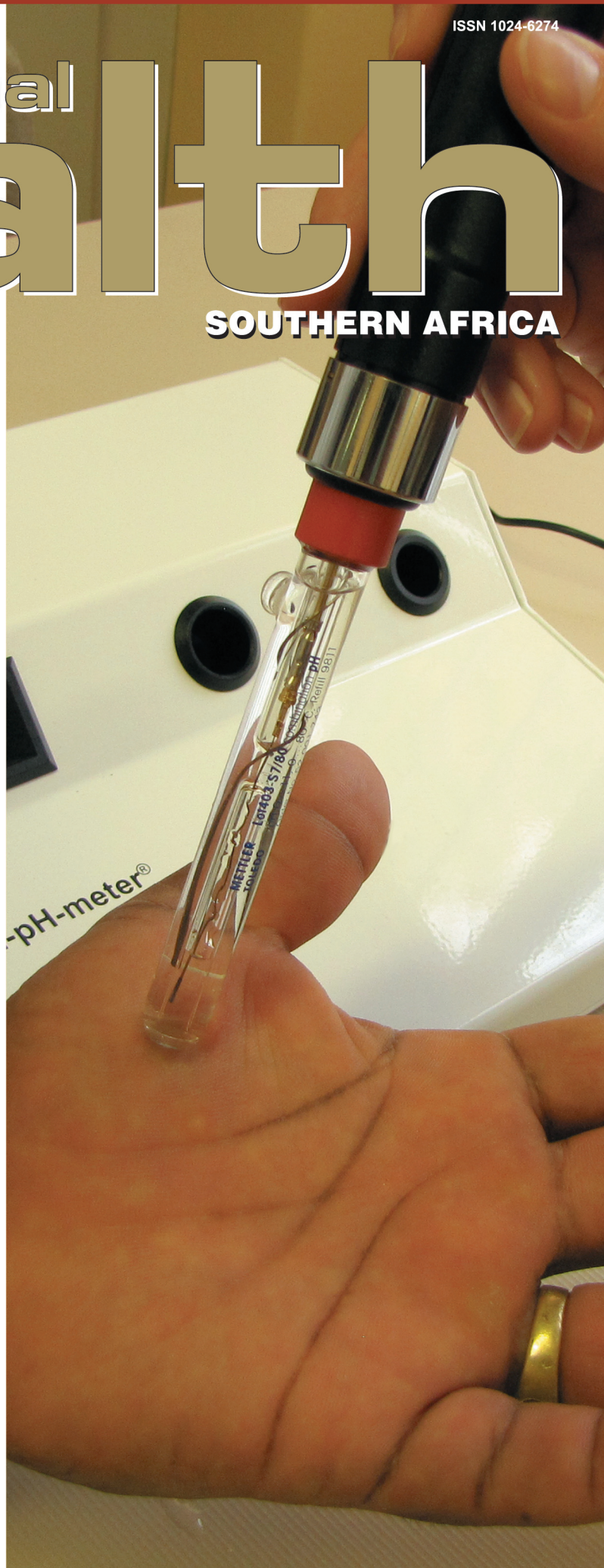
**The problem of compensation for occupational skin disease in South Africa**

**Is the substance hazardous in contact with the skin? Factors to be considered in assessing risk**

**Back to basics – the skin barrier and how it is affected in common occupational scenarios**

**Biological agents causing occupational airborne contact dermatitis**

**Patch testing in occupational allergic contact dermatitis**



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**Subscriptions:**

**Members: R220,00 per annum**

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**Non-members: R297,00 per annum**

**(includes VAT)**

**Publisher:**

Kevin Beaumont

**Published by Technique (Pty) Ltd**

**technique**  
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# occupational health

SOUTHERN AFRICA

ISSN 1024-6274

September/October 2010 Vol 16 No 5

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Cover photograph source: Johan du Plessis, School for Physiology, Nutrition and Consumer Sciences, Potchefstroom Campus, North-West University

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# From the Guest Editor . . .

Associate Professor G Todd, BSc (Agric), MBChB, FFDerm (SA), PhD,  
Head: Dermatology Division, Department of Medicine, Faculty of Health Sciences, University of Cape Town

This issue of *Occupational Health Southern Africa* is dedicated to occupational skin diseases and contains six articles on this important topic. A further two articles will be published in the January/February 2011 issue.

The article by Fourie and Carman is a record review of the cases of occupational skin diseases (OSDs) seen at the OSD Clinic at the National Institute for Occupational Health (NIOH) between 2005 and 2009. Approximately  $\frac{2}{3}$  of patients had occupational skin diseases (65% of referrals). Most cases (85%) were occupational contact dermatitis (CD). While irritant CD was the predominant diagnosis made, allergens identified as causing allergic CD, mostly cobalt and epoxy resin relevant reactions, probably reflect the local industries found in the regions, mining and manufacturing. A record review of the patients attending the Occupational Dermatology Clinic at Groote Schuur Hospital will be published in January/February 2011.

Carman's article, on compensation for occupational skin diseases, highlights just how common skin diseases in the workplace are and the problems encountered in getting compensation for workers from the Compensation Commissioner compared to privately funded compensation systems operative in the mining industry. These difficulties have been addressed in many previous publications<sup>1</sup> but until a complete audit and overhaul of the Commissioner's office is undertaken, the poor service to the affected workers, who should be the beneficiaries of this system, will remain unchanged. A further problem with compensation for skin disease is the lack of recognition of disability and permanence as reflected in the degree of disablement for which a worker will be compensated.<sup>2</sup> This disability is permanent and referable to all skin surfaces if allergic in nature. The South African guidelines and laws for compensating skin disease need to be reviewed by experts with a fuller understanding of skin disease and its consequences.

Packham discusses skin exposure in the workplace, illustrating the complex nature of the skin/substance interface. His background of engineering and skin exposure assessment allows him a unique appreciation of substance/skin interactions and risk evaluation and hence identification of the "real" hazard for each task. He cautions on relying on material safety data sheets (MSDSs) as these relate to the properties of the product as supplied, and not once the substance is in use. It is thus understandable that the risk assessment for each task will identify the chemical/substance hazard, often not the original products given in the MSDSs.

The basic science article on the skin physiology and function complements the articles on risk assessment with its in-depth discussion of skin barrier function. This semi-permeable barrier is finely tuned to function and provides protection at an air-water interface. Excess exposure to water (water-water interface) damages the barrier causing alterations in the normal keratinisation process, which requires an air-water interface to develop normally. The barrier is to a large degree dependent on the lipid bilayer of "mortar" which holds the corneocyte "bricks" together. Solvents and detergents damage this lipid bilayer causing cumulative damage as epidermal repair mechanisms fail to cope with repetitive

barrier insults. Irritant CD results when features of damage are clinically evident. Any damage to the barrier, even if clinically not evident, allows exposure to allergens not normally skin permeable and increases the chance of developing allergic CD. The normal skin barrier is permeable to lipid soluble substances.

The role of airborne biologic allergens in occupational respiratory diseases is well known, and much has been written on the recognition of such conditions. The fact that many airborne substances when deposited on skin, can trigger local inflammatory reactions is not generally well recognised. Singh, in her review paper, discusses the role of airborne biologic agents in the development of occupational CD and briefly describes the diagnosis of the condition. A favourite saying of the Guest Editor is that if respiratory protection is needed then skin exposure is already established. Singh also briefly highlights the challenges regarding the coexistence of non-occupational and occupational skin diseases in the same patient.

Patch testing is an important tool that is used in the diagnosis of occupational allergic contact dermatitis. Dlova and Leok emphasise that the interpretation of the results and attributing relevance to the reactions, requires knowledge and experience. Unfortunately the availability of patch testing facilities and expertise in South African dermatology departments is limited, although the commercial products used are readily available. This lack of training and experience compromises health care providers' ability to assist workers in obtaining compensation as well as determining the burden of CD in the workplace.

Carman has highlighted the frequency with which skin disease is reported to compensation bodies in South Africa. Despite this, skin disease has historically never been given more than a cursory introduction in occupational health programmes and, as a subject, it is poorly represented in most health care curricula in the country. The expertise and knowledge built up in the service and teaching centres in Gauteng and the Cape are national resources which should be recognised and developed. Workplace visits are essential for task risk assessment as highlighted by Packham. These should be integral to occupational skin disease clinics in order to encourage identification of the real hazard for each task. Appropriate funding for staff and resources should be made available to sustain and develop the current centres and services and efforts be made to expand the model into other regions so that all workers in South Africa can benefit.

## REFERENCES

1. Carman HA, Kruger P. Occupational skin disease: A review of international and South African literature and data. *Occupational Health Southern Africa*. 2008;14(4).12-17.
2. South Africa. Compensation for Occupational Injuries and Diseases Act, as amended. Circular Instruction regarding compensation for occupational contact dermatitis. Circular Instruction No. 181. Government Gazette. April 2004. Notice 499 of 2004. Accessed on 29 September 2010. Available at: <http://www.info.gov.za/view/DownloadFileAction?id=59565>

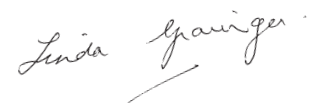


Professor Gail Todd

## From the Editor . . .

The Guest Editor for this issue, which has as its theme occupational skin diseases, is Professor Gail Todd. We are most grateful for her input and guidance on its contents, as she is a recognised leader in the field of dermatology in South Africa. Apart from the papers mentioned in her Guest editorial, we also feature the second in a three part series on the immunologic consequences of toxins by Coombs and Schillack. In it, they focus on skin sensitisation, which relates very well to our

theme. The societies have provided interesting reports on their various activities. Of note is the promotion of ARAOAH (SASOM page) and the upcoming MMPA Congress. Readers are encouraged to look at these society pages as the news has relevance for everyone.



# Upcoming events

## INTERNATIONAL CONFERENCES

DATE	PLACE	TOPIC	MORE INFORMATION
20–22 Oct 2010	Busan, South Korea	1st Int. Conf. on Accident Prevention (ICOH SC on Accident Prevention)	E-mail: <a href="mailto:overseas@kosha.net">overseas@kosha.net</a> <a href="http://www.icapkorea.org">www.icapkorea.org</a>
4–8 Dec 2010	Hobart, Tasmania	28th Annual Conf. of the Australian Institute of Occ. Hygienists Inc. "Green but clean: What is behind our clean green future?"	<a href="http://www.aioh.org.au/">http://www.aioh.org.au/</a>
4 – 6 April 2011	Rhodes University, Grahamstown	ODAM2011 10th Int. Symp. on Factors in Organisational Design and Management	E-mail: <a href="mailto:a.todd@ru.ac.za">a.todd@ru.ac.za</a> <a href="http://www.ODAM2011.net">www.ODAM2011.net</a>
11 – 15 Sept 2011	Istanbul, Turkey	XIX World Congress On Safety and Health at Work – Building a culture of prevention for a healthy and safe future.	E-mail: <a href="mailto:info@safety2011turkey.org">info@safety2011turkey.org</a>
18–24 Mar 2012	Monterrey, Mexico	30th ICOH Congress– Occupational Health For All: Research, Training and Good Practices	E-mail: <a href="mailto:admin@icohcongress2012.org">admin@icohcongress2012.org</a>

## LOCAL CONFERENCES

DATE	TOPIC	REGION	TARGET	COST	CONTACTNAME
3–5 Nov 2010	SASOHN Annual National Conference and AGM – Occupational Health Nursing: From Alpha to Omega	Club Mykonos, West Coast, Western Cape	OH&S professionals	To be advised	SASOHN National Office Tel: +27 (0)11 892 3174 E-mail: <a href="mailto:sasohnoffice@mweb.co.za">sasohnoffice@mweb.co.za</a>
26 Nov 2010	Academic Day: Occupational medicine. SASOM AGM	Oyster Box, Umhlanga, KwaZulu-Natal	OH&S practitioners	To be announced	Jenny Acutt Tel/Fax:+27 (0)12 803 7418 E-mail: <a href="mailto:info@sasom.org">info@sasom.org</a>

## 2010 SAIOH COUNCIL AND CERTIFICATION BOARD MEETINGS AND EXAMINATION DATES

5 November	NatCouncil Meeting/Written assessments
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## HEALTH AWARENESS DAYS, WEEKS AND MONTHS

DAY	TOPIC	DAY	TOPIC
<b>OCTOBER</b>		<b>NOVEMBER</b>	
<b>Mental Health Awareness Month</b>		<b>Red Ribbon Month</b>	
<b>Breast Cancer Awareness Month</b>		<b>Quality Month</b>	
1	National Inherited Disorders Day	6	National Children's Day
9 – 13	National Nutrition Week	8 – 12	SADC Malaria Week
10	World Mental Health Day	9	World Quality Day
12	World Arthritis Day	12	SADC Malaria Day
12 – 20	World Bone and Joint Week	14	World Diabetes Day
14	World Sight Day	25	International Day for the Elimination of Violence against Women
15	National Foetal Alcohol Syndrome Day	25/11 –	
15 – 19	National Obesity Week	10/12	16 Days of Activism on No Violence Against Women & Children
16	World Food Day		
17	World Spine Day		
17	World Trauma Day		
20	World Osteoporosis Day		
24	World Polio Day		

# An overview of the DRAFT amendment to the Construction Regulations, 2003

By Melanie L Govender, LexisNexis

**T**he DRAFT amendment to the Construction Regulations, 2003<sup>1</sup> was published in May 2010 for public comment to the Department of Labour by 9 July 2010. While there has been no finalisation as yet, it is useful to consider the implications of this draft Regulation. This long awaited amendment was drafted in consultation with members of the construction industry and with best practices in mind. Among the many smaller changes, there are two major changes – the added responsibilities of the client and the requirement that clients apply for a permit to do any construction work.

## THE RESPONSIBILITIES OF THE CLIENT

The client is “any person for whom construction work is performed”. The client is now more responsible for health and safety than before and must ensure that the steps outlined below are fulfilled.

For all intended construction work, a client must prepare a baseline risk assessment to determine all the health and safety risks at the construction site so that the client can find solutions to minimise these risks. A health and safety specification with sufficient documentation, based on the risk assessment, must be drawn up, and given to the designer. The client must ensure that the designer considers this specification in the designing process and that an approved inspection authority gives input, preferably early in the design process.

In appointing a principal contractor, the client must include the health and safety specification in the tender documents, ensure that potential principal contractors submitting tenders have made adequate provision for the cost of health and safety measures, and that the principal contractor to be appointed has the necessary competencies and resources to carry out the construction work safely. Before construction work can commence, a client must ensure that every principal contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer and the Unemployment Insurance Fund. All principal contractor appointments for the project, or part thereof on the construction site, must be written.

Construction work may only commence after the client has approved the principal contractor’s health and safety plan, the contents of which have been discussed and negotiated. The client must also ensure that this plan is implemented and that a copy is available on request from any employee, inspector or contractor.

The client must ensure that a copy of the audit report is provided to the principal contractor within seven days after the audit. If the client observes that any construction work is not being executed in accordance with the agreed health and safety specifications or plan, or that there is any threat to the health and safety of persons on the construction site, the client may stop such construction work from continuing.

If any changes are made to the design or construction, the client must ensure that sufficient health and safety information and appropriate resources are made available to the principal contractor to execute the work safely.

The client must ensure that a health and safety file, containing all documentation required in terms of the Occupational Health and Safety Act<sup>2</sup> and the Construction Regulations<sup>1</sup>, is opened, kept on site and made available to an inspector, the client, the client’s agent or a contractor upon request.

If a fatality or permanent disabling injury occurs on the construction site, the client must draw up a full report, in consultation with the inspector conducting the accident investigation, to send to the

Provincial Director. It must include the measures, to be implemented by the client within 30 days, to ensure a safe construction site as far as is reasonably practicable.

An agent may be appointed (in writing) to act as a representative for the client. Although the agent will manage the overall construction work and be responsible for the duties of that client as per the Construction Regulations, the client is liable for ensuring that the agent follows all legislative requirements. The client is ultimately responsible.

## THE NEW PERMIT SYSTEM

The old Regulations required a client to advise the Provincial Director of construction work to be carried out. Clients must now apply for permits for construction work at least 14 days BEFORE construction begins and must provide proof that certain duties have been complied with in order for the permit to be granted. No construction work may continue without the permit.

A permit is required if the construction work exceeds thirty days or involves more than 300 person days (a person day is defined in the draft Regulations as “one normal working shift of carrying out construction work by a person on a construction site”), and if construction work requires workers to work at a height where there is a risk of falling, or if there is demolition or the use of explosives on the site.

The Provincial Director will only issue a permit if all the required documentation is completed, written proof is provided showing that all principal contractors are registered and in good standing, and there is written proof that the specified duties of the client have been carried out.

This written permit with a site specific number for the specific construction site, must be displayed at the construction site entrance. The client must ensure that the principal contractor also has a copy of the permit in the health and safety file for inspection purposes.

## IMPLICATIONS OF THE DRAFT REGULATIONS

While the changes to the old Regulations are intended to improve the control of the health and safety in construction sites, many concerns linger. Immediate concerns are that the changes require a large amount of work to be done prior to the actual construction work. Also, the Provincial Director will have a lot more paperwork and one has to question whether the permits will be issued within a reasonable time frame in order for construction work to commence and to be completed according to the required deadline of the client. Another challenge is how the Provincial Director will be able to ensure that all construction work taking place is being done so with a permit. What stops those ignorant of the law from doing construction work without a permit?

We wait as the Department of Labour comes to a decision on these Regulations. Hopefully the comments received will address all the concerns in the industry and the Department will be able to make provisions for all these concerns. For a better understanding of the new requirements that may come into force, it is recommended that you read the whole draft which is available from LexisNexis.

## REFERENCES

1. South Africa, Department of Labour. Draft amendment to the Construction Regulations, 2003, GN 391. Government Gazette. 2010: 33176.
2. Department of Labour, South Africa. Occupational Health and Safety Act, No. 85 of 1993, as amended by the Occupational Health and Safety Amendment Act, No. 181 of 1993. Accessed on 18 January 2010. Available at <http://www.labour.gov.za/downloads/legislation/acts/occupational-health-and-safety/>

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# The Occupational Skin Disease Clinic at the NIOH, NHLS: five years' experience

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## ABSTRACT

**The incidence of occupational skin disease (OSD) is under-reported and under-compensated in South Africa. The OSD clinic at the National Institute for Occupational Health was started in 2005 to provide a service for the identification and management of OSD. Given the paucity of information on the burden of OSDs, a record review was conducted to characterise the cases of OSDs seen at the clinic between 2005 and 2009.**

**Of the 216 patients seen, 141 (65%) were diagnosed as having OSDs. The type of OSDs, duration, primary site, the most common occupations and exposures, and the role of atopy are presented. Contact dermatitis, either irritant or allergic (or both) was diagnosed in 120 (85%) of the cases. The majority (68%) had symptoms for longer than four months. Atopy was diagnosed in 29 (21%) of workers with OSD. Epoxy resin dermatitis was the most important single cause of occupational allergic contact dermatitis.**

**Key words:** occupational skin disease, contact dermatitis, atopy, HIV, causative agents

## INTRODUCTION

This article follows the introductory article by Fourie and Carman (2006) in which the necessity for the Occupational Skin Disease Clinic established at the National Institute for Occupational Health was discussed and preliminary findings described.<sup>1</sup> The incidence of occupational skin disease (OSD) is thought to be under-reported and under-compensated the world over. In SA the number of cases that are reported to the Compensation Commission (CC) is a fraction of those reported elsewhere.<sup>1</sup>

Occupational skin diseases (OSDs) are skin diseases that are caused entirely by or aggravated by the work environment.<sup>2</sup> Occupational contact dermatitis (OCD) may be caused by irritants, in which case it is termed irritant contact dermatitis (ICD), or it can be truly allergic, in which case it is termed allergic contact dermatitis (ACD).<sup>2</sup> OCD comprises the vast majority of occupational skin diseases (85%).<sup>3</sup> The rest include other dermatoses such as contact urticaria, oil acne, chloracne, chemically induced leucoderma and infections.<sup>3</sup>

It is well established that atopy plays an important role in the development of OSD and that atopic dermatitis (AD) in adults is frequently elicited or exacerbated by work. Trigger factors include humidity, heat, cold, dryness, dust and emotional stress.<sup>4-6</sup> In a study of 3730 individuals with confirmed OSD, 1366 (37%) had an atopic skin diathesis.<sup>7</sup>

It is to be expected that HIV/AIDS may be a confounding factor in the diagnosis of OCD given the high prevalence of the condition amongst South African workers. For example, according to Anglo American's figures (2004), 23% of all mine workers were HIV positive.<sup>8</sup> In KwaZulu-Natal all adult patients with positive HIV serology attending the dermatology outpatient clinic were analysed for, amongst other factors, the type of skin disease.<sup>9</sup> Herpes zoster was the commonest skin disease (19%), followed by seborrhoeic dermatitis (18%) and pruritic papular eruption of HIV (8%). Other diagnoses included drug rashes (5%), photo eruptions (3%) and psoriasis (5%). In a previous study at the same centre assessing inpatient admissions, 59% of all admissions were HIV positive. Psoriasis, drug reactions and eczema were the most common conditions requiring admission.<sup>10</sup> Thus dermatitis, eczema and itchy skin

eruptions are a feature of HIV/AIDS and may be aggravated by irritating chemicals in the work environment. It seems that there is very little in the literature on the association between HIV/AIDS and OSD.

Dermatitis was the most common condition diagnosed in a dermatology clinic at the Johannesburg hospital in 1999 and accounted for 31.2% of all cases.<sup>11</sup> In a case series of 237 mineworkers referred to the dermatology clinic of a specialist referral hospital between 1997-1999, 149 (63%) were diagnosed with dermatitis.<sup>12</sup> Of these, 62 were evaluated for possible work-related dermatitis and 50% had positive skin prick tests or positive RAST tests to inhalants, suggesting that atopy was playing a role. In only five patients could a clear correlation be made between the positive patch tests and exposure to these allergens in the workplace. These workers were allergic to rubber. The other workers were diagnosed as irritant contact dermatitis. At that time a directive had been issued which forbade testing for HIV so its possible role could not be investigated.

## The NIOH OSD Clinic


The clinic, run once monthly, is staffed by a dermatologist and a scientist with a special interest in the application and interpretation of patch tests. Workers are asked to sign a form giving consent to the use of information for statistical purposes. A questionnaire is used as the basis for taking a detailed work history, which includes past employment and the chemicals to which they are exposed in the workplace, the nature of the exposure, the hygienic facilities available in the workplace and the protective clothing used. Material safety data sheets obtained from employers are used to establish whether the substances to which the worker is exposed are allergenic, irritating or toxic.

An occupational dermatological history is taken to establish the chronological relationship between skin rashes and work exposures and predisposing factors such as atopy. Workers were asked about HIV status if this was thought to be relevant, although more recently this has become a routine question. A full dermatological examination is performed as well as a general examination if indicated.

*Continued on page 8*



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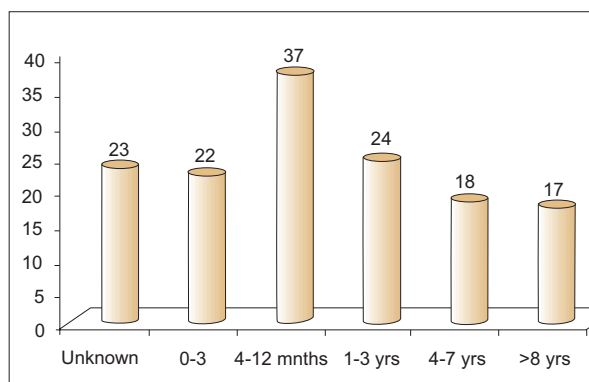
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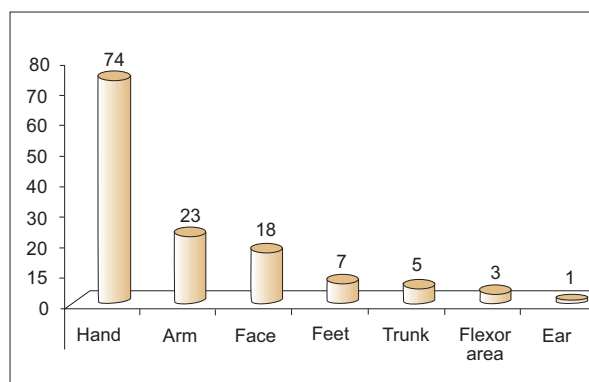
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**Figure 1. Duration of symptoms (N = 141)**



**Figure 2. Primary site of dermatitis (n = 131)**

*Continued from page 6*

Photographs are taken for record purposes and for submission to the Compensation Commission.

In nearly all cases with dermatitis, patch tests are done at the initial consultation. They are applied on Friday afternoon and the worker returns on the following Monday for reading of the tests. Many workers travel long distances, and so for practical reasons they are brought back once only, 72 hours after the application. The patch tests include the European standard series (ESS) on all workers and specialised series when indicated. The latter have included the metalworking oil, the hairdressing, the plastic and glues, epoxy, shoe and metal series. These series are from Chemotechnique Diagnostics in Sweden and were obtained from Laboratory Specialties. If appropriate, substances from the workplace are also used to patch test the workers in order to link the reactions to actual exposures. If atopy is suspected, skin prick tests to aero-allergens are done. If skin prick tests are impractical, blood is submitted to the laboratory for specific IgE against inhalant allergens (phadiotop®).

As the clinic has been in operation for five years and in view of the paucity of data on the burden of occupationally-related skin diseases in South Africa, an analysis of the cases seen at the clinic was conducted.

The objectives were to analyse the case records of workers with OSDs who attended the clinic between October 2005 and December 2009 in order to determine:

1. the types of OSD;
2. the duration of symptoms prior to consultation;
3. the primary site of the dermatitis;
4. the most common occupations;
5. the commonest exposures; and
6. whether atopy played a role in the OSDs.

## METHODOLOGY

A record review of the cases seen at the clinic between October 2005 and December 2009 was undertaken. An Access database, adapted by the British Contact Dermatitis Group for use in a dermatology clinic, has been used to establish a database. Data in the database relating to the study objectives, as well as demographics (age and gender) were extracted and a descriptive analysis performed. Ethical approval for the study was obtained from the University of the Witwatersrand, Faculty of Health Sciences Ethics Research Committee (Certificate number M080623).

## RESULTS

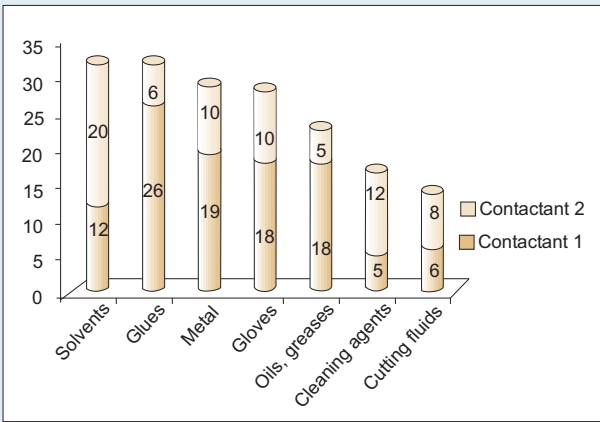
Workers were referred by occupational healthcare workers, employers, dermatologists in private and hospital practice, and general practitioners. In total, 216 workers were seen, 148 men and 68 women. The median age was 43 years. Of these, 141 (65%) were diagnosed as having skin diseases that could be related to the work environment, 50 (23%) were considered to be non-occupational and in 26 (12%) cases a conclusion could not be reached as to whether the condition was work-related or not either because patient did not return for follow up or no definitive decision could be taken.

Of those with OSDs, ICD was the most common condition. It was diagnosed in 59 workers (42%), ACD affected 27 workers (20%) and 34 workers (24%) were considered to suffer from ACD as well as ICD. Thus 85% of cases were diagnosed as having OCD. Of the remaining 21 workers, 10 (38%) were diagnosed with contact urticaria (CU) which was likely related to workplace exposures. Other diagnoses included: tinea pedis, tinea corporis, paronychia, recurrent abscesses and a case of Sezary syndrome which had been previously been mis-diagnosed as coal tar pitch photosensitivity dermatitis.

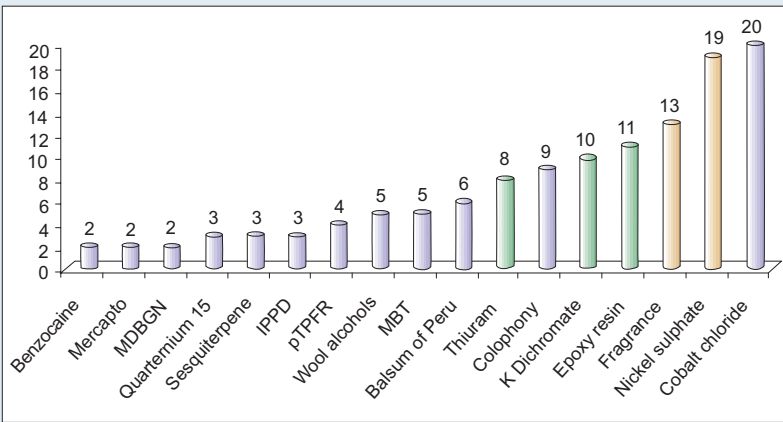
**Table 1. The ten most common occupational categories (n = 122)**

Occupational category	Frequency	Percentage
Metalworking production and maintenance fitters	22	18
Process operators	21	17
Coal mine operatives	17	14
Plant and machine operatives	17	14
Nurses	15	12
Metal making and treating process operators	6	5
Motor mechanics	6	5
Moulders and core makers	5	4
Laboratory technicians	5	4
Painters and decorators	4	3
Crane drivers	4	3
Total	122	100

**“ . . . 65% . . . were diagnosed as having skin diseases that could be related to the work environment.”**



**Figure 3. The most common exposures**



**Figure 4. Number of ESS Positive reactions in cases of occupational ACD**

Of the patients with epoxy resin dermatitis, three developed occupational leucoderma. Four workers were HIV positive and it was thought that irritants in the work environment were playing a role in their dermatitis.

Regarding duration of symptoms prior to consultation, 96 workers (68%) complained of having suffered from skin disease for longer than four months and 22 (16%) workers for less than four months (Figure 1). In 23 cases, no duration was given. This suggests that the majority of the patients had chronic disease.

On examination, as expected, the hands and arms, followed by the face were the primary site of dermatitis (Figure 2). These are the sites most likely to be exposed to substances in the workplace.

The ten most common occupational categories are shown in Table 1. The most common reported exposures were glues (including epoxy resins), followed by solvents, metals, gloves, neat oils and greases, cleaning agents and cooling fluids respectively (Figure 3). Workers were often exposed to more than two substances in the work environment (shown as contactants 1 and 2 in the figure). "Other" exposures included dust, silica, mica, thinners, coal, acids, perfumes, foodstuffs, rubber, fibreglass and acetone.

Of the 141 OSD cases, 29 (21%) had atopy as determined by a strong personal history of asthma, childhood eczema or hayfever, flexural eczema and/or positive skin prick tests or positive phadiotop® tests. Significantly more of the atopics [16 (55%)] developed ICD compared to those that developed ACD 4 (14%) (Fisher's exact  $p < 0.002$ ).

The European standard series (ESS) of patch tests was used in all workers while the specialised series were used where appropriate to the nature of the worker's employment (Figure 4). There were 125 positive reactions from the ESS patch testing. Positive reactions to the various patch tests did not always correlate with substances found in the workplace (Figure 5). All 11 cases who reacted to epoxy resin on patch testing were judged to have ACD to epoxy resins found in the workplace. A positive correlation was also made in 10 cases that tested positive to chromate. They were exposed to known chromate containing compounds – metal working oils, cement

dusts and leather protective clothing. All eight cases with positive reactions to thiuram (a rubber chemical) were in contact with rubber gloves.

Nickel sulphate was the second most common allergen and in 19 cases caused strongly positive reactions. Thirteen workers were positive to fragrance mix on patch testing. Positive tests to cobalt chloride occurred in 20 cases and cobalt was therefore the commonest positive allergen in this series.

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The most common occupational category of the workers with OSDs were "metal working production and maintenance fitters" [22 (16%)]. Of these, 17 were exposed to metal working oils and/or greases/oils and solvents and these were assumed to be the cause of the dermatitis. One worker had irritant dermatitis which was related to wet work, and one was exposed to chromate and acids.

The second most important category was "process and plant operators" (21). Of these workers eleven were exposed to epoxy resin and five had positive patch test reactions to epoxy. Nurses (15) had hand dermatitis as a result of using gloves or antiseptic cleansers. Two were shown to be allergic to thiuram.

### Most common exposures

The most common exposure of which patients complained were glues (including epoxy resins). Solvents, metals, gloves, neat oils and greases, cleaning agents and cooling fluids followed in this order of importance. Workers were often exposed to more than two substances in the work environment. Other exposures were dust, silica, mica, thinners, coal, acids, perfumes, foodstuffs, rubber, fibreglass and acetone. (Figure 3).

## DISCUSSION

The findings of the clinic were similar to those reported in the international literature. OCD was the most common OSD (84% in our study).<sup>13</sup> Also, ICD (42% of our cases) was more common than ACD (20%) and they coexisted in 24% of the cases.<sup>14</sup>

Contact urticaria was the single most important type of OSD other than OCD. In this analysis CU resulted from exposure to epoxy resins, fragrances, chemicals and latex particles. It is well documented that these reactions can be triggered by proteinaceous substances<sup>13</sup> e.g. latex, many foodstuffs, animal proteins, grains and enzymes and low molecular weight agents e.g. preservatives, fragrances, cosmetics and chemicals.<sup>15</sup> Since the list of causative agents is constantly growing the prevalence of occupational CU will probably increase.<sup>16</sup>

The most common occupations seen at the clinic were those involving exposure to epoxy resin, metal working oils, cleaning materials and gloves. Research into the long-term consequences for workers with this condition, i.e. impairment, disability compensation and ability to continue in employment is being undertaken by a medical registrar.

Atopy was diagnosed in 21% of patients attending the clinic and therefore is an important factor in the development

of OSD. Sixteen (55% of atopy cases) of these also had irritant contact dermatitis.<sup>17</sup> The hands and forearms were the areas most likely to be affected, followed by the face. This would be expected since these areas are most likely to be exposed to chemicals in the work place.

Occupational contact dermatitis tends to be chronic and persistent and most workers (96) had dermatitis for longer than four months before presenting to the clinic.<sup>18</sup> Patch tests were done on almost all workers suspected of having OCD. Although patch testing is important in the diagnosing of OCD, one must also be aware that not all reactions may be clinically relevant or may not be useful in determining whether or the dermatitis is occupational.<sup>13</sup> Of the patch tests, the ESS was most useful and the acquisition of the specialised series is probably only worthwhile for a dedicated occupational clinic. Tests in the additional series do however assist in identifying specific allergens, e.g. the epoxy and metalworking oil series provided several positive reactions which would have been missed had these tests not been used. Further confirmation can also be obtained by testing with substances from the workplace.<sup>19</sup> Although cobalt had the most positive reactions, in the majority of cases the reactions were weak and characterised by small purpuric papules. These were probably false positive reactions.<sup>14</sup> Fischer and Rystedt (1985) showed that only in 62% of cases were cobalt chloride positive reactions significant.<sup>20</sup> In seven cases there were also positive reactions to either nickel or potassium dichromate, a finding that is common.<sup>21</sup>

Although nickel and fragrances were two of the most common positive reactions on patch testing it is important to realise that these cannot always be linked to workplace exposure. Both nickel-containing metal objects and fragrances are ubiquitous both in the workplace and the home environment and it is often difficult to definitively diagnose an occupational disease on the basis of these positive reactions.

Nickel sulphate was the most common allergen to which our patients were allergic, but epoxy resin was the most common occupational allergen. Since 80 (66%) of the workers with dermatitis tested positive to one or more allergens, it seems that patch testing is an essential part of the assessment of suspected work-related dermatitis. In addition to the ESS, allergy can be confirmed by testing with occupation-specific series and with samples from the workplace. Ormond et al. (2002) showed that a dedicated patch test clinic increased the detection of ACD through the increased availability and use of batteries of allergens and workplace allergen testing.<sup>19</sup>

HIV positivity was shown in four cases with irritant contact dermatitis and appeared to play a role in the development of this dermatitis. Initially workers attending the dermatology clinic were not routinely questioned about their HIV status nor were HIV screening tests done. Patients were investigated when clinically relevant. More recently, because of the politically driven change in approach towards the testing and management of HIV/AIDS all patients are routinely questioned about their status. Given the high prevalence of skin conditions in HIV positive patients<sup>8-10</sup> this is important and will help to establish the role of HIV/AIDS in the development of occupational dermatitis in South African workers.

## CONCLUSION AND RECOMMENDATIONS

The study showed that contact dermatitis, either irritant or allergic (or both) was the most common OSD. Most cases

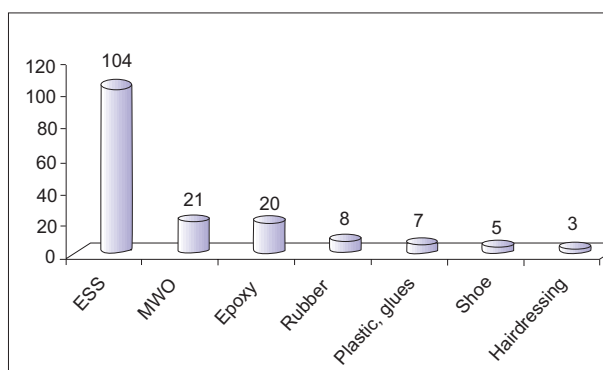


Figure 5. Specialised allergen series used for patch testing

**“The most common occupations . . . were those involving exposure to epoxy resin, metal working oils, cleaning materials and gloves.”**

had symptoms for longer than four months, and atopy was diagnosed in just under a quarter of cases. Epoxy resin dermatitis was the most important single cause of occupational allergic contact dermatitis.

The clinic is an attempt to provide a service to employers and workers and to collect information on the causes and extent of the problem in this country. In addition it is hoped that health care workers, dermatologists and general practitioners will be alerted to the importance of occupational skin disease and its relevance in their dermatology patients.


### LESSONS LEARNED

- It is well established that atopy plays an important role in the development of OSD and 21% of our occupational cases were found to be atopic.
- Dermatitis, eczema and itchy skin eruptions are a feature of HIV/AIDS and may be aggravated by irritating chemicals in the work environment.
- One hundred and forty-one (65%) workers were diagnosed as having skin diseases that could be related to the work environment.
- Eighty-five percent of cases were diagnosed as having OCD.
- Atopy was diagnosed in 21% of patients and was significantly more common in patients with ICD than those with ACD.
- Nickel sulphate was the most common allergen and epoxy resin was the most common occupational allergen.

### REFERENCES

1. Fourie AC, Carman HA. Necessity for a dedicated occupational skin disease clinic in South Africa – first 8 months. *Occupational Health South Africa*. 2006; 12 (5):35-37.
2. South Africa, Department of Labour. Circular Instruction regarding compensation for occupational contact dermatitis. Department of Labour. Government Gazette. Notice 499 of 2004. April 2004.
3. Diepgen TL, PJ Coenraads. The epidemiology of occupational contact dermatitis. *Int Arch Occup Environ Health*. 1999;72(8):496-506.
4. Rystedt I. Work related hand eczema in atopics. *Contact dermatitis*. 1985; 12(suppl):64-71.
5. Rystedt I. Prognostic factors in atopic dermatitis. *Acta Derm Venereol*. 1985;65(3): 206-213.
6. Rystedt I. Hand eczema and long-term prognosis in atopic dermatitis. *Acta Derm Venereol*. 1985;117(Suppl):1-39.
7. Dickel HB, Bruckner TM, Schmidt A, Diepgen, TL. Impact of atopic skin diathesis on occupational skin disease incidence in a working population. *J Invest Dermatol*. 2003;121(1):37-40.
8. South African Institute of Race Relations. South African Survey 2004/2005. Johannesburg: SAIRR; 2005.
9. Morar ND, Dlova NC, Mosam A, Aboobaker J. Cutaneous manifestations of HIV in Kwa Zulu Natal, South Africa. *Int J Dermatol*. 2006;45(8):1006-1007.
10. Mosam A, Iruken EM, Kagoro H, Aboobaker J, Dlova N. The impact of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) on skin disease in KwaZulu-Natal, South Africa. *Int J Dermatol*. 2004;43(10):782-3.

11. Hartshorne ST. Dermatological disorders in Johannesburg, South Africa. *Clin Exp Dermatol*. 2003;28(6):661-5.
12. Todd GC, Carman H. Occupational skin disorders. In Guild R, Ehrlich RI, Johnson JR, Ross MH. Editors. SIMRAC Handbook on occupational health practice in the South African mining industry. Johannesburg: SIMRAC; 2001.
13. Gawkrödger DJ. Patch testing in occupational dermatology. *Occupational and Environmental Medicine*. 2001;58(12):823-8.
14. Chew AL, Maibach HI. Occupational issues of irritant contact dermatitis. *International Archives of Occupational and Environmental Health*. 2003;76(5):339-46.
15. Amaro C, Goossens A. Immunological occupational contact urticaria and contact dermatitis from proteins: a review. *Contact Dermatitis*. 2008;58(2):67-75.
16. Ale SIM, Maibach HI. Occupational contact urticaria. In Kanerva LE, P, Wahlberg JE, Maibach HI. Editors. Handbook of occupational dermatology. Berlin: Springer; 2000.
17. Marks JP, Elsner VD, Editors. Contact and occupational dermatology. 3rd ed. St Louis: Mosby Inc; 2002.
18. Wall LMG, Gebauer KA. A follow-up study of occupational skin disease in western Australia. *Contact dermatitis*. 1991;20:241-3.
19. Ormond P, Hazelwood E, Bourke B, Lyons JP, Bourke JF. The importance of a dedicated patch test clinic. *Br J Dermatol*. 2002;146(2):304-7.
20. Fischer T, Rystedt I. False-positive, follicular and irritant patch test reactions to metal salts. *Contact Dermatitis*. 1985;12(2):93-8.
21. Stingeni L, Pelliccia S, Lisi P. Cobalt: a controversial contact allergen. *Giorn It Allergol Immunol Clin*. 2003;13:17-22.



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# The problem of compensation for occupational skin disease in South Africa

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## ABSTRACT

The problem related to compensation for occupational skin disease in South Africa was investigated. It is illustrated by three cases of the commonest occupational skin diseases seen by the Dermatology Clinic of the National Institute for Occupational Health, namely allergic contact dermatitis, irritant dermatitis and occupational urticaria. Of the 129 cases seen at this clinic from 2007 to 2009, 66 were occupational skin disease. The outcome of claims for compensation is provided.

A comparison of claims' data for occupational skin disease from the Compensation Commissioner, the Rand Mutual Assurance and the Federated Employers' Mutual Assurance was conducted. The rate of reporting of claims to the Compensation Commissioner was lower than to the two private insurance companies, and only a small proportion was accepted and finalised.

The plight of workers and their lack of compensation for occupational disease have been highlighted in media reports and statements of the official opposition.

**Key words:** occupational skin disease, compensation, allergic contact dermatitis, irritant dermatitis, occupational urticaria

## INTRODUCTION

Concern has previously been expressed over the decline in compensation claims for occupational skin disease (OSD) in South Africa.<sup>1</sup> It is recognised that OSDs are characterised by under-diagnosis, under-reporting and neglected compensation.<sup>2</sup> Whilst the success of compensation will depend upon accurate diagnosis and correct claims submission procedures, anecdotal evidence has suggested that there may be problems surrounding compensation for such diseases. At the time of the establishment of the Occupational Dermatology Clinic at the National Institute for Occupational Health the stated aim was to provide a service to workers and their employers, to collect data on OSDs in workers referred to the clinic, and also to facilitate compensation for workers diagnosed with OSD. When it became apparent that few workers were being compensated it was decided to try to establish the extent of the problem. This paper reports the results of this investigation, which involved the follow-up of OSD claims submitted by the Dermatology Clinic of the NIOH, a comparison of claims statistics from the three carriers responsible for compensation in terms of the rates of reporting, acceptance and finalisation of claims, and a description of parliamentary enquiries and media reports on problems with compensation.

## FOLLOW-UP OF OSD CLAIMS SUBMITTED BY THE DERMATOLOGY CLINIC OF THE NIOH

### *Illustrative case reports from the NIOH Dermatology Clinic*

In order to illustrate the problem of compensation for

occupational skin disease in South Africa, three cases of the commonest occupational skin diseases seen at the Dermatology Clinic of the National Institute for Occupational Health (NIOH) are presented, namely allergic contact dermatitis, irritant dermatitis and occupational urticaria.

#### Case 1

Male, 46 years old. *Diagnosis: True allergic contact dermatitis.* (Photograph 1)

He trained as a panel beater and has worked as such since leaving school in 1981. He developed recurrent dermatitis and was referred to the NIOH in December 2008. The rash cleared whilst away from work and relapsed on return to work. He attributed the rash to a filling substance



**Photo 1. Allergic contact dermatitis following exposure to styrene in a filling substance**

that he used in the car panel-beating process. This substance is styrene which hardens as a cured resin. He had no prior history of eczema or asthma.

He was treated with steroids, both oral and topical and told to stay away from work which he could do since it was his annual leave. His dermatitis cleared completely and he was patch tested in January 2009 with the European standard series and the Epoxy resin series. The material

safety data sheets were obtained. On patch testing he showed a positive reaction (1+) to paratertiary-butylphenol-formaldehyde resin (PTBP-F-R). Styrene, with which he works frequently contains p-tert-Butylcatechol (PTBC) and may contain low levels of PTBP-F in cured resins, even if not declared in the material safety data sheet (MSDS).<sup>3</sup> Both are known causes of contact dermatitis.<sup>4</sup> The PTBP-F-R has been shown to cross react with PTBC.<sup>5</sup>

Thus he was presumed to be allergic to the substances with which he works in the course of his employment as a panel beater. Unfortunately styrene is used by all panel beaters and the firm for which he works is small and unable to offer him alternative employment.

He continued to work for the firm in spite of the ongoing dermatitis until March 2010 when he resigned. He states that he is unable to find work as a labourer and is qualified to do nothing else.

All compensation documents were completed in March 2009 and submitted to the CC's office in Pretoria. He visited the office himself on four occasions. On each occasion he



**Photos 2a and b. Severe irritant dermatitis and leucoderma after exposure to calcium carbide**

can result especially in confined spaces. Calcium hydroxide is alkaline and irritating to the skin. He reported a burning sensation on his face when he sweated.

Because the company was large he could be moved away from the area in which he was in contact with calcium carbide and given alternative work. A factory visit was paid by occupational hygienists from the NIOH and the process of dealing with calcium carbide has now been mechanised.

With respect to his artwork, he was told to stop using acrylic paints and confine himself to charcoal and water

**“... OSDs are characterised by under-diagnosis, under-reporting and neglected compensation.”**

was told that the documents were not on the system.

His claim has been accepted but by July 2010 he had not received compensation. He has applied for funding from the UIF.

#### Case 2

Male, aged 31 years. Labourer and part time artist. *Diagnosis: Irritant contact dermatitis.* (Photographs 2a and b). He was seen initially in November 2008, having worked for a large chemical company since 2003. The factory manufactures industrial and domestic gases. He presented with severe dermatitis concentrated in the sun-exposed areas of his face, neck, and forearms but generalised over his whole body.

At work he was exposed to pool acid, calcium carbide trichloroethylene and acetone. He was required to manually scoop calcium carbide out of the conveyor mechanism into a bucket below the conveyor belt. Although he wore long rubber gloves and overalls the calcium carbide slipped down behind his gloves. In addition, there was dust containing calcium carbide around his workplace. According to the MSDS calcium carbide (CaC<sub>2</sub>) in contact with water generates acetylene gas and calcium hydroxide.<sup>6</sup> The acetylene gas formed by contact with moisture is flammable and fire

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colours. He responded temporarily to oral steroids but his dermatitis relapsed on stopping these. Although initially denying HIV positivity he was subsequently tested and shown to be positive. Once on treatment the dermatitis responded well and he is now able to pursue his hobby of painting while also being securely employed.

Positive HIV status does not preclude the diagnosis of occupational irritant contact dermatitis although HIV associated skin diseases such as eczema, seborrhoeic dermatitis, photosensitivity eruptions and erythroderma are well described.<sup>7</sup> Indeed, according to the Occupational Health and Safety Act of 1993, there is a presumption that, if a worker was exposed to chemicals and developed an occupational disease, "such disease arose out of and in the course of employment unless the contrary is proved."<sup>8</sup>

His claim has been registered but not adjudicated.<sup>9</sup>

### Case 3

Female, aged 46 years. *Diagnosis: Occupational urticaria and allergy.* (Photograph 3)

She presented to the NIOH in May 2009. She worked as a line supervisor for a large multinational cosmetic company. Her problem started after exposure to the contents of a strong smelling hand cream that was spilt in the workplace. She developed urticaria on her hands at the site of contact with the cream. Her throat closed and she developed a hoarse voice. She was admitted



**Photo 3. Delayed skin prick test reaction to perfume in hand cream**

to hospital and treated with steroids and antihistamines. Her condition was attributed to influenza or the antibiotics which she had taken for this three weeks before. She had no prior history of eczema, asthma or hay fever. She subsequently developed similar symptoms when she smelt the cream and attributed her problem to the cream.

Since her history was clearcut and judged to be honest, the diagnosis was made of occupational urticaria and allergy. It was suggested that she be moved from this area and given alternative employment in order to avoid all future contact with the cream.

**Table 1. Cases assessed at Dermatology Clinic NIOH 2007-2009**

Non-occupational and not submitted*	63
Occupational	66
Total	129

\*Non-occupational – either not related to work exposure or not followed up by patient for proper diagnosis.

Whilst complying with this suggestion, the company refused to accept the diagnosis without the confirmation of skin prick testing. The twelve component chemicals of the cream were made up according to the correct specifications for testing at the parent laboratory in France and shipped to South Africa. She was tested in a hospital setting. As soon as the perfume (cocoxrem and caramele 0626724\02) was applied to the skin she became acutely distressed and itchy, she complained of difficulty with breathing, her voice became hoarse, she developed itchy red wheals and chest rhonchi. She was given adrenaline, antihistamine and steroids and was admitted to the High Care Unit of the hospital from which she was discharged after two days. She developed a positive skin prick test about four to five hours after the test was done and her husband photographed this.

She was subsequently referred to the NIOH where her chest X-ray was found to be normal, and her FEV<sub>1</sub> within normal limits. The methacholine challenge test which identifies airway hyper-responsiveness was positive and of moderate severity. She was diagnosed as having occupational asthma. Thus she had an immediate response as well as a delayed response to the suspected perfume compound.<sup>10,11</sup>

The relevant forms were completed and sent to the CC. She has been given work in the reception office of the company and is asymptomatic and well. However, the company has informed her that she should find other employment and she was asked to leave the company in May 2010. Her issue has been taken up by her trade

**Table 2. Outcome of claims submitted to the Compensation Commission**

NR\NN*	29
Reg\NA†	20
Repudiated	1
Accepted‡	7
Total	57
% Accepted of total	12.3%

\*NR\NN – not received by insurance fund or no record of having been received.

† Reg\NA – registered not adjudicated.

‡ Accepted – accepted by CC, not necessarily paid out.

**Table 3. Outcome of claims submitted to the Rand Mutual Assurance**

NR\NN*	1
Incomplete†	1
Finalised‡	7
Total	9
% Finalised of total	77.8

\*NR\NN – not received by insurance fund or no record of having been received.

† Incomplete – not all documents submitted.

‡ Finalised – finalised and processed by RMA.

union and so her dismissal has been suspended at least in the short term.

Her claim status is that she has been registered not adjudicated.

### COMPENSATION OUTCOME OF CLAIMS FOR EMPLOYEES WITH OSDs ATTENDING THE NIOH DERMATOLOGY CLINIC

#### Methods

Data on a diagnosis of OSD and claims outcome were extracted from all the case records for employees seen at the NIOH Dermatology Clinic between 1 January 2007 and 31 December 2009. A search was done into the Compensation Commission's website (<http://196.25.215.109/EnquiriesClaimStatusWeb>)<sup>9</sup> to establish the fate of workers who had been diagnosed as having OSDs in the years 2007, 2008 and 2010. In addition

in a false account in 2008 and only on vigorous follow-up by the worker's mother was her son finally compensated in April 2010.

### STATISTICS OF CLAIMS FOR OCCUPATIONAL SKIN DISEASE

In 1993, the Compensation for Occupational Injuries and Diseases Act (COIDA)<sup>12</sup> replaced the previous Workmen's Compensation Act of 1941. It is supposed to cover all employees in South Africa, both those formally and informally employed, but excludes domestic, independent and self-employed workers from compensation. Although informal workers are covered under the Act their employers generally do not pay into the fund and employees are unaware of the cover. Thus there are seldom claims from the informal sector.<sup>13</sup> Mine workers who develop pneumoconiosis, tuberculosis, airways obstruction and systemic sclerosis are covered under

**"Positive HIV status does not preclude the diagnosis of occupational irritant contact dermatitis . . ."**

the Rand Mutual Assurance provided the status of claims for those mine-workers insured through this company. Summary statistics were calculated.

#### Results

Between 2007 and December 2009, a total of 129 patients were seen at the NIOH Dermatology Clinic (see Table 1). Of these, 66 were diagnosed as having OSDs. The diagnosis was based on a detailed occupational and dermatological history, a skin and medical examination, patch and skin prick testing, blood tests in some cases and perusal of safety data sheets as well as follow-up over months in some cases. A factory visit was carried out in one case.

Of the 57 cases diagnosed as occupationally induced skin disease, seven cases (12.3%) were accepted by the Compensation Commissioner (Table 2). These workers have not all been paid out. Of nine cases covered by the RMA, seven cases (77.8%) have been finalised (Table 3).

Of the seven "accepted" workers, six were contactable and contacted. Of these, four had not been paid out and were told that they should pursue the matter with the CC's office. Thus two and possibly three workers have been paid. In one case the money had been fraudulently deposited

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the Occupational Diseases in Mines and Works Act 73 of 1973 (ODMWA).<sup>13</sup> When mining diseases are not covered under this act then the COIDA applies, and the Rand Mutual Assurance (RMA) is liable for all diseases in respect of its members. There are three carriers responsible for compensation, namely the Compensation Fund, the RMA and Federated Employers' Mutual Assurance (FEMA).<sup>13</sup> An attempt was made to establish the compensation statistics for all claims for OSD in South Africa based on the data from the Compensation Commission, RMA and FEMA.

## Methods

The statistics of reported, accepted and finalised cases with OSDs were requested from the CC, RMA and FEMA for the years 2006, 2007, 2008 and 2009. The figures from the CC were obtained from K Hauptfleisch who requested them from the IT department of the CC's office. These figures included workers who were reported, accepted and finalised by the CC as having OSD and also occupational diseases. The Annual Report of the Compensation Fund for the year ended 31 March 2009<sup>14</sup> was obtained.

**Table 4. Compensation Commission: Registered employees, reported cases of occupational skin diseases (OSD) and occupational diseases (OD)\***

Year	2006	2007	2008	2009
Registered employees	6 777 052	6 242 728	6 153 503	6 348 142
Cases reported with OSD	70	40	76	102
Cases reported with OD	2305	1995	3188	3925
Reported OSD/10000/year	0.10	0.06	0.12	0.16
Reported OD/10000/year	3.4	3.2	5.2	6.2

\*Supplied by K Hauptfleisch, Senior Statistician, Compensation Fund.

**Table 5. All occupational diseases reported, and finalised by the Compensation Commissioner\***

	2006	2007	2008	2009
Occupational diseases reported	2305	1995	3188	3925
Occupational diseases finalised	436	260	217	131
% finalised of reported	18.9	13.0	6.8	3.3

\*Supplied by K Hauptfleisch, Senior Statistician, Compensation Fund.

**Table 6. OSDs reported, accepted and finalised by the Compensation Commissioner\* (see Figure 2 also)**

	2006	2007	2008	2009
OSD reported	70	40	76	102
OSD accepted	50	24	25	28
OSD finalised	19	6	8	1
% accepted of reported	27	15	11	1
% finalised of accepted	38	25	32	4
% finalised of reported	27	15	11	1

\*As at 3 August 2010. Finalised – not necessarily paid out. Supplied by K Hauptfleisch, Senior Statistician, Compensation Fund.

**Table 7. Occupational disease claims finalised, Annual Report of Compensation Fund March 2009<sup>14</sup>**

Disease	2005/2006	2006/2007	2007/2008	2008/2009
Noise-induced hearing loss	3228	2644	785	1123
Tuberculosis of the lung	119	69	54	223
Pneumoconiosis	261	172	102	87
Occupational asthma	159	109	80	59
Occupational skin diseases	204	142	92	45
Irritant induced asthma	12	6	39	33
Repetitive strain injuries	70	32	30	61
Mesthelioma	47	29	22	12
Lung cancer	8	9	5	3
Chronic obstructive airways disease	30	10	15	12
Diseases caused by chemical agents	35	323	105	98
Diseases caused by physical agents, excluding noise	14	10	27	31
Diseases caused by biological agents	275	144	75	63
Others	102	21	12	45
Total	4564	3720	1443	1 895

As of July 2010, this is the most recent report available.

Dr Deodat Kritzinger of the RMA provided the figures of all reported cases of mineworkers covered by the RMA for the years 2001-2009, of those workers for whom liability had been accepted by the RMA, and of all workers who are insured by this fund each year. These figures were requested in March 2010.

Mr McIntosh of the FEMA provided the compensation statistics of workers (mainly in the building and construction industry) whose insurance is provided by this body and the number of workers covered by this fund for the years 2005-2009. All those workers with reported OSD were accepted and finalised by FEMA. These figures were obtained in March 2010.

The Compensation Commissioner (K Hauptfleisch) supplied figures of the employers registered with the Compensation Commissioner and the number of employees registered for the years 2006-2009. Although all workers, both in the formal and informal sector are eligible to claim for compensation, in order to effect a comparison

between the rate of claims/10 000 workers/year between the three carriers, the number of registered workers has been used as a denominator. Any employee who claims compensation is automatically registered (Table 4).

The whole study was approved by the Faculty of Health Sciences Research Ethics Committee, University of the Witwatersrand (Certificate number M10821).

### Results

The data obtained are shown in Tables 4 to 7, and 10 to 14. Comparisons of data are provided in Tables 8, 9 and 15.

### DISCUSSION OF RESULTS FOR NIOH DERMATOLOGY CLINIC FOLLOW-UP AND SOUTH AFRICAN COMPENSATION FOR OSD STATISTICS

As noted above, the follow-up of the 57 cases diagnosed at the NIOH Dermatology Clinic as OSD in the years 2007-2009 and eligible for submission revealed that only 12.3% have been finalised by the Compensation Fund. Only two and possibly three have received a payout. There is

***“There is no record of 29 claims having been received by the CC’s office.”***

**Table 8. Comparison of finalised occupational skin disease cases in Annual Report<sup>14</sup> compared with data provided by Compensation Commissioner’s IT department**

	2005	2006	2007	2008
Annual report claims finalised	204	142	92	45
Figures from CC claims finalised.		27	15	11

**Table 9. Comparison of finalised occupational diseases (all) in Annual Report<sup>14</sup> with data provided by Compensation Commissioner’s IT department**

	2005	2006	2007	2008
Annual Report claims finalised	4564	3720	1443	1895
CC claims finalised.		436	260	217

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**Table 10. Total number of workers in the mining industry covered by the Rand Mutual Assurance\***

	2005	2006	2007	2008	2009
Employees insured	376 600	367 500	368 300	413 700	400 000

\*Figures supplied by RMA.

**Table 11. Occupational skin diseases reported to the Rand Mutual Assurance\***

	2005	2006	2007	2008	2009	Total
Number of OSD claims (contact dermatitis and infections)	31	14	26	13	17	101
OSD claims/10 000 workers	0.82	0.38	0.71	0.31	0.43	

\* Supplied by D Kritzinger.

no record of 29 claims having been received by the CC's office. The fault here may lie with the CC's office or with the system of reporting by employers and the NIOH itself. In contrast, although the numbers are small, of nine cases covered by the RMA, seven (77.8%) have been finalised. None of the illustrative three cases presented in this paper have been compensated yet.

Regarding the statistics of all OSDs, the rate of reported claims to the CC is lower than to FEMA and RMA (Figure 1 and Table 15). This may be partly explained by the fact that the mining and construction industries are both high risk for occupational skin disease. However, the proportion of reported cases which were accepted and finalised is much lower in the case of the CC as compared with FEMA and the RMA. All cases submitted to FEMA were accepted (Table 14) whilst 67.5% of cases submitted to the RMA were accepted (Table 12).

From the figures obtained from the CC's office it is apparent that of the reported cases of occupational disease

**Table 12. Outcome of claims for 83 cases of dermatitis and skin infections submitted to the RMA\***

Accepted <sup>†</sup>	56
Not accepted	17
Undecided	10
Total	83
% claims accepted of total	67.5

\* Supplied by D Kritzinger.

<sup>†</sup> Accepted – accepted by CC. Not necessarily paid out.

and OSD, a small minority are accepted and finalised. In the years 2006 – 2009, 18.9%, 13.0%, 6.8% and 3.3% were finalised respectively for occupational disease (Table 5) and 27%, 15.0%, 11.0% and 1.0% respectively for OSD (Table 6 and Figure 2). This points to a dysfunctional and steadily deteriorating system of compensation for workers who have been reported to the CC as having occupational disease and who have been acknowledged by the CC to have been reported. Cases which have been reported and not acknowledged are not reflected in these figures.

**Table 13. Occupational diseases reported to Rand Mutual Assurance\***

Occupational diseases	2005	2006	2007	2008	2009
Number of occupational disease claims	6398	3647	2695	2025	1830
Number of workers insured.	376 600	367 500	368 300	413 700	400 000
OD claims/10 000 workers	169.9	99.2	73.2	48.9	45.8

\* Supplied by D Kritzinger.

**Table 14. Building Industry. Federated Employers' Mutual Assurance (FEMA)\***

	2004	2005	2006	2007	2008	2009
Employees insured	162 364	187 767	217 881	255 268	282 116	277 307
OSD reported and accepted		31	28	18	14	27
Rate of OSD \10 000 workers		1.65	1.29	0.71	0.50	0.97

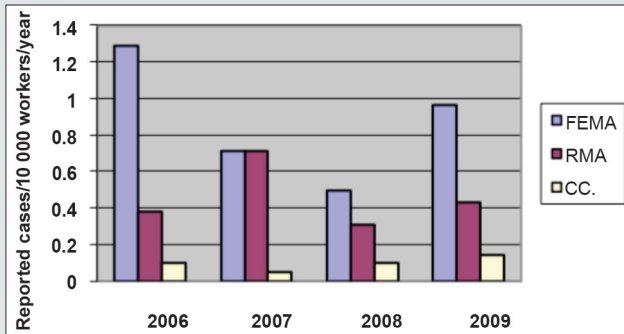
\* Supplied by Mr McIntosh.

**Table 15. Comparison of rates for cases of occupational skin disease: RMA reported, FEMA reported and accepted, CC reported (see Figure 1 also)**

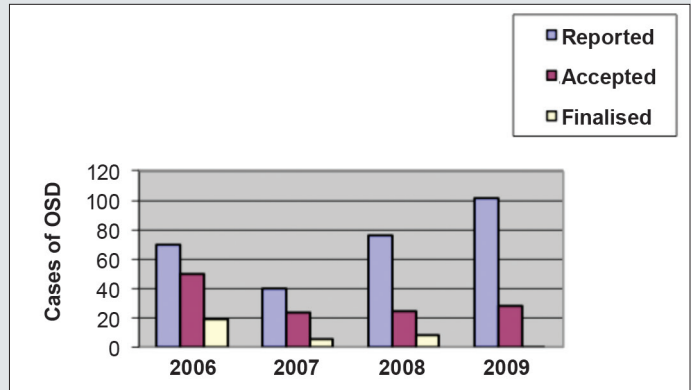
	2006	2007	2008	2009
FEMA OSD/10 000/year	1.29	0.71	0.5	0.97
RMA OSD/10 000/year	0.38	0.71	0.31	0.43
CC OSD/10 000/year	0.1	0.05	0.1	0.14

**“Of the . . . cases diagnosed as occupationally-induced skin disease . . .**

**12% . . . were accepted by the Compensation Commissioner . . .”**



**Figure 1. Comparison between the rates of reported cases/10 000 workers to FEMA, RMA and CC, 2006-2009 (see Table 15 also)**



**Figure 2. Occupational skin diseases – Cases reported to, finalised and accepted by the Compensation Commissioner (see Table 6 also)**

It should be noted that reported cases in one year may not be adjudicated in that same year since there may be a delay in processing. The figures are nonetheless useful as over a long period they will reflect the proportion of cases finalised to those reported.

A glaring problem with the figures presented above is the discrepancy between the figures supplied by the CC's office and those reflected in the Annual Report (Tables 8 and 9). This discrepancy refers to both OSD and also all occupational diseases. The Annual Report reflects finalised cases and these are more than the reported cases as reflected in the CC figures. The figures are also much higher than the figures of finalised cases supplied by Dr Sekudu in previous years.<sup>2</sup> This requires an explanation and further investigation.

In South Africa Ministers are obliged to provide accurate statistical information in response to parliamentary questions. The poor rates of acceptance and finalisation of compensation claims shown in this study are confirmed by the statistics provided by the Ministers of Health and Labour and reported during parliamentary proceedings and in the media (see contents of Textbox 1).

### CONCLUSION AND RECOMMENDATIONS

The study findings have confirmed anecdotal evidence and the claims experience of the NIOH Occupational Dermatology Clinic that there is a problem in obtaining compensation for workers with OSDs. The rate of reporting of claims to the Compensation Commissioner was lower than to the two private insurance companies, and only a small proportion was accepted and finalised. These two

private carriers, namely the RMA and FEMA, appear to have effective systems in place. Further investigation is required to determine the causes for these low rates.

Although the legislation surrounding the compensation

*Continued on page 21*

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## TEXTBOX 1: SUMMARY OF PARLIAMENTARY ENQUIRIES AND THE MEDIA REPORTS RELATING TO THE WORKMEN'S COMPENSATION FUND

The matter of the State's Compensation Fund has come before parliament. Various press statements have been released in 2009 and 2010 by the official parliamentary opposition and reports have appeared in the media.

A statement issued by the Deputy Shadow Minister of Labour in October 2009<sup>15</sup> quoted the Department of Labour (DoL) admitting that the software used for workers compensation is so flawed that "it cannot possibly account for each claim in the system and it cannot tell us the status of that claim". The required software was ordered from Siemens in a R1.7 billion contract entered into 10 years ago. The apparent failure on the part of Siemens means that other entities within the DoL cannot meet their administrative requirements. So far R1 billion had been paid to Siemens and the outstanding R700 million will be paid so as not to incur penalties.

The Opposition has asked searching questions of the Department of Labour and the Department of Health, while three oversight bodies namely the Auditor General (AG), the Public Protector and the Select Committee on Public Accounts (SCOPA) have questioned the Commissioner and senior officials of the Compensation Commission for Occupational Diseases (CCOD) about the failing system.<sup>16</sup> The CCOD does not know how many miners have claimed compensation, how many have been paid out or how many mines should be paying into the fund. No actuarial evaluation has been made since 2004.

An article in the Business Day (11/2/2010)<sup>17</sup> reported that revenue for the Compensation Fund amounted to R4.5 billion in 2008/2009 and that R3 billion was paid out in benefits. Administrative expenses were R434 million and there was an accumulated surplus of R6.5 billion. The Commissioner stated that there was a backlog of 60 000 out of the 154 000 claims registered from April – December 2009. The Commissioner blamed the backlog on lack of proper management, lack of skilled staff and lack of an efficient data capturing computer system. A succession

of qualified Auditor General Reports and disclaimers has been made. A disclaimer means that no audit into the financial affairs of the organisation can be conducted. The Commissioner stated that R574 million would be paid out to employers who have a good track record with regard to injury claims as a "merit rebate." He also stated that a turnaround strategy had been implemented and that the unit was now fully staffed and functional.

In a statement released on 11th February 2010<sup>18</sup> it was reported that the Commissioner admitted to SCOPA that the CCOD had been defrauded of R24.6 million in false claims. Medical doctors were accused of colluding with staff and 11 staff members have been arrested and prosecuted. However, R57 million still remains unaccounted for in the Compensation Fund's financial statements. The audit for the tax year 2009 will be qualified as has been the case for the last four years.

In a statement released in May 2010 by the official opposition<sup>19</sup> the Labour Department was called on to explain the "missing" billion rand in compensation payouts. This was revealed after a presentation to the Parliamentary Labour Committee which revealed an inexplicable R1 billion shortfall in compensation paid out to injured workers in the last financial year. The number of compensation claims made has remained steady over the last few years (Table 16).

The payout in 2008\2009 amounted to R2.9 billion. The payout in 2009/2010 was R1.9 billion. Thus the amount paid out was half that of the previous year and fewer than half the claims submitted by workers were paid out. The Commissioner and board members of the CCOD were unable to give an explanation for the dramatic drop in payments made.

Dr Motsoaledi, (Minister of Health) has revealed in reply to a parliamentary question that the Commissioner for Occupational Injuries and Diseases has processed less than 17% of all claims it received in 2009 and that this is the pattern over the last five years.<sup>20</sup> For instance, 10.2% of claims were processed in 2005, 7.1% in 2006, 35.7% in 2007 and 14.3% in 2008.

**Table 16. Claims received, repudiated and paid according to period \***

Dates	Claims received	Repudiated	Paid
2007\2008	209 830	1448	162 411
2008\2009	203 711	654	150 090
2009\2010	200 599	127	87 800

\*Information provided to parliament by the Minister of Health, Dr Aaron Motsoaledi, in response to parliamentary question

**“ . . . the proportion of reported cases which were accepted and finalised is**

**much lower in the case of the CC as compared with FEMA and the RMA.”**

Continued from page 19

of workers with occupational diseases is enlightened, the apparent failure of the system means that workers are not accessing the compensation which is their right under this legislation. The Department of Health and the Department of Labour need to address these problems urgently.

### LESSONS LEARNED

1. OSDs are under-diagnosed, under-reported and problems with obtaining compensation from the CC frequently occur.
2. Styrene frequently contains p-tert-Butylcatechol and may contain low levels of paratertiary-butylphenol-formaldehyde in cured resins, even if not declared in the MSDS. Both are known causes of contact dermatitis.
3. Positive HIV status does not preclude the diagnosis of occupational irritant contact dermatitis although HIV associated skin diseases such as eczema, seborrhoeic dermatitis, photosensitivity eruptions and erythroderma are well described.
4. According to the OHS Act, there is a presumption that, if a worker was exposed to chemicals and developed an occupational disease, “such disease arose out of and in the course of employment unless the contrary is proved.”<sup>8</sup>
5. There are three carriers responsible for compensation, namely the Compensation Fund, the Rand Mutual Assurance, and Federated Employers' Mutual Assurance.

### REFERENCES

1. Kruger P, Bello B, Phohleli D. The burden of skin disease in South African mines. Occupational Health Southern Africa. 2008;14(6):4-11.
2. Carman HA, Kruger P. Occupational skin disease: A review of international and South African literature and data. Occupational Health Southern Africa. 2008;14(4):12-17.
3. EECDRG p-tert-Butylphenol-formaldehyde resin. Accessed 11 August 2010. Available at: [http://orgs.dermis.net/content/e05eecdrg/e05news/e686/e716/index\\_ger.html](http://orgs.dermis.net/content/e05eecdrg/e05news/e686/e716/index_ger.html)
4. Rietschel RL, Fowler JF, Fisher AA. Plastics, adhesives and synthetic resins. In: Rietschel RL. Fischer's Contact Dermatitis. USA: BCDecker; 2008. Chapter 27, p548.
5. Zimerson E, Bruze M, Goosens A. Simultaneous p-ter-butylphenol-formaldehyde resin and p-ter-butylcatechol contact allergies in man and sensitizing capacities of p-ter butylphenol and p-ter-butyl

catechol in guinea pigs. J Occup and Environ Med. 1999;41:23-28.

6. S.A. Calcium Carbide. Material safety data sheet. Newcastle: SA Calcium Carbide. In terms of the provisions of the Occupational Health and Safety Act.

7. Saavedra A, Johnson RA. Cutaneous manifestations of human immunodeficiency virus disease. In Wolff K, Goldsmith LA, Katz SI, Gilchrist BA, Paller AS, Leffell DJ, Editors. Fitzpatrick's dermatology in general medicine. Chapter 198. 7th Edition. New York: McGraw-Hill; 2008.

8. Department of Labour, South Africa. Occupational Health and Safety Act No 85 of 1993, as amended by Occupational Health and Safety Amendment Act, no.181 of 1993. Presumption regarding cause of occupational disease. Section 66 Chapter, 7 p32. Accessed on 5 August 2010. Available at: <http://www.labour.gov.za>.

9. Compensation Fund Claims status.Website of the Department of Labour. <http://196.25.215.109/EnquiriesClaimStatusWeb/claim-Search.co/id1=790618571508> Date 25/07/2010..

10. Kaplan AP. Urticaria and angedema. In: Wolff K, Goldsmith LA, Katz S, Gilchrist BA, Paller AS, Leffell J. Eds. Fitzpatrick's dermatology in general medicine. 7th Edition. USA: McGraw-Hill; 2008. Chapter 37, p331.

11. Frank Austen K. Allergies Anaphylaxis and systemic mastocytosis. In: Braunwald E, Fauci A, Kasper D, Hauser SL, Longo DL, Jameson J. Harrison's principles of internal medicine. 15th Edition. USA: McGraw-Hill Publishers; 2001.

12. Department of Labour, South Africa. Compensation for Occupational Injuries and Diseases Act, No. 130 of 1993, as amended by the Compensation for Occupational Injuries and Diseases Amendment Act No. 61 of 1997. Accessed on 18 January 2010. Available at <http://www.labour.gov.za/legislation/acts/compensation-for-occupational-injuries-and-diseases/compensation-for-occupational-injuries-and-diseases-act>.

13. Garzelli G, Keeton Stolk L, Schoer V. Workers compensation in the Republic of South Africa. Publication produced for review by the United States Agency for International Development. Johannesburg: School of Economic and Business Sciences, University of the Witwatersrand; 27 March 2008.

14. Compensation Commissioner. Annual Report of Compensation Fund March 2009. Accessed March 2010. Available at: [www.labour.gov.za](http://www.labour.gov.za)

15. Ollis I. MP. Statement issued by DA “Workers compensation fund: R1.7 billion for zero service” October 2009.

16. Waters M. MP. Hurt workers still not being compensated. Statement issued by DA 24th February 2010. Available on <http://www.politicsweb.co.za/politicsweb/view/politicsweb/en/page71654?oid=162403&sn=Detail>.

17. Ensor L. Political correspondent. States worker fund joins casualty list. Business Day 11/2/2010. Accessed on 7 August 2010. Available at: <http://www.businessday.co.za/Articles/Content.aspx?id=93471>

18. Andrew Louw MP. Compensation fund must shape up and deliver to workers. Statement issued by DA 11th February 2010.

19. Ollis I. MP. The missing R1-billion: Labour Department must explain Compensation Fund figures. DA statement 5th May 2010. Accessed on 6 August 2010. Available at: <http://www.politicsweb.co.za/politicsweb/view/politicsweb/en/page71654?oid=174741&sn=Detail>

20. Louw A. MP. Only 17% of compensation fund claims processed in 2009. Statement issued by DA 31 March 2010. Accessed on 6 August 2010. Available at: <http://www.politicsweb.co.za/politicsweb/view/politicsweb/en/page71654?oid=168852&sn=Detail>.

# Is the substance hazardous in contact with the skin? Factors to be considered in assessing risk

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## ABSTRACT

**Risk assessment for skin exposure to chemicals must take account of a number of factors in order to correctly determine whether a hazard exists. Task-related factors concern the repeated use of a chemical and the use of an additional chemical. Non-task related factors are atmospheric exposure and biological factors. Therefore a process-based risk assessment made by a person who has adequate knowledge about the interaction between the skin and the environment is required.**

**Key words:** skin exposure risk assessment, chemical hazard

## INTRODUCTION

We simply cannot eliminate contact with chemicals, at least not in the majority of working environments. After all, even water is a chemical (dihydrogen monoxide). So, to carry out effective risk assessment for each task occurring in our workplace, it is essential that we identify the hazards that arise out of the use of chemicals and their end results. Note the statement: "...arise out of the use of..." We generally introduce chemicals into our workplace for them to fulfil a particular task. In the process it is inevitable that in many cases the nature or composition of the chemical will change. Such changes may have a major effect on both the severity and nature of the hazards to the skin that the chemical represents. Therefore the purpose of this article is to briefly review some of the factors that must be considered when carrying out a risk assessment for exposure of the skin to chemicals. It emphasises that process-based risk assessment of skin contact with potentially harmful substances is highly desirable.

## SOME FACTORS WHICH CAN INFLUENCE WHETHER A CHEMICAL IS HAZARDOUS ON CONTACT

### *Task-related factors*

If our risk assessment for each task is to be valid it is essential that it is based on the real chemical hazard present during the execution of the task. In a large number of cases, the material safety data sheet (MSDS) will not provide the necessary information since this relates only to the properties of the chemical as supplied. This is unsurprising, since the supplier of the product and MSDS may have limited or no knowledge of how this substance is going to be used. Is this really such a problem? Hopefully the following examples will make clear the need for caution. In fact, in the author's experience identifying the real hazard is frequently the most difficult part of any skin exposure risk assessment. In order to identify the real hazard we first need a full understanding of the actual process. From this we can then start to determine what effect this will have on the chemical/s involved. This may be simple or complex.

#### *Repeated use of the chemical*

When a chemical is used repeatedly the changes can be progressive so that for the same task the hazard at the end of the working shift might be different from that at the start.

An example in which the determination of the real hazard is relatively simple is that of a degreasing tank containing a solvent, say toluene. We fill the clean tank at the start of the shift with toluene. As soon as the first component is degreased the solvent in the tank is no longer pure toluene, but toluene together with whatever we have removed from the component. With successive components the concentration of contaminants will increase and probably therefore also the potential for the mixture to cause damage to health due to skin exposure. So our risk assessment for the last cleaning operation of the day is, perhaps, the assessment we must accept for determining the control measures we need to introduce, rather than those needed for pure toluene or for the low level of contaminant after the first operation. Furthermore, if we are degreasing components that have been returned from use away from our workplace, can we be sure we really know what it is that we have introduced into our tank?

#### *Use of an additional product in the task*

Frequently, determining the real hazard can be more complex. For example, in an aerospace plant, large amounts of carbon fibre mat, pre-impregnated with epoxy resin, were being used. Gloves were worn to protect against the physical abrasion of the skin when handling the mat, but these provided no real chemical protection. A case arose where it appeared that a worker had developed an allergic contact dermatitis to a constituent of the epoxy impregnation. Investigation revealed that in the operation in which this worker was involved none of the sensitiser assumed to be the cause of the skin reaction was being released into the gloves. Further investigation revealed that the true cause of her dermatitis was non-occupational exposure. However, in another part of the plant the same mat was being softened with a solvent prior to use. In this situation the solvent was eluting the sensitiser from the epoxy, posing a significant risk of workers developing an allergic contact dermatitis and requiring appropriate control measures to be introduced. This illustrates how it is often the task and not the original product that is key to determining the hazard.

#### *Non-task related factors*

##### *Atmospheric exposure*

Other factors, not specifically task-related can also affect

the hazard. In many countries there is a move away from the petroleum-based degreasing chemicals towards "natural" products, such as the oils extracted from the peel of citrus fruits. This substance, known as d-limonene, or dipentene, is an effective degreasant.<sup>1</sup> Thus it is a skin irritant. However, it has not been registered as a sensitiser, since in its pure state it does not initiate any response from the immune system. Despite this, evidence shows that when exposed to air a process of oxidation occurs, resulting in the appearance of sensitisers in the original chemical. So here, even without doing anything with or to the chemical, apart from exposing it to the atmosphere, changes in the hazard will occur.<sup>2</sup>

#### Biological factors

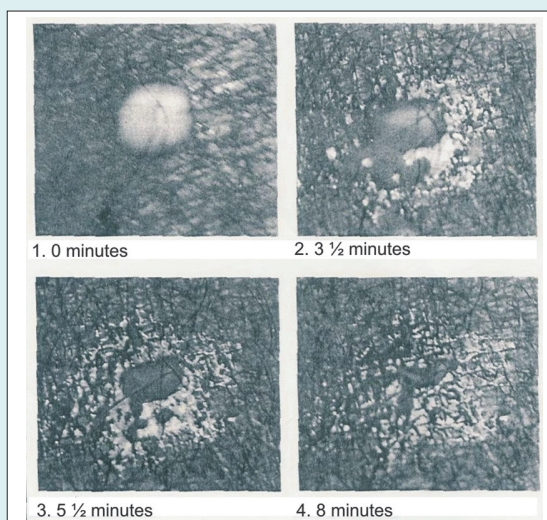
Biological factors may also play a role. Within the outer layer of the skin, the stratum corneum, are enzymes that can, under certain conditions, metabolise a chemical, once this has been absorbed into the skin. For example, methanol, which is not regarded as a sensitiser, may be metabolised, with one of the metabolites being formaldehyde, a well-known sensitiser.<sup>3</sup> Methylene chloride, still commonly used in industry as a degreasing agent, can metabolise to carbon monoxide and formaldehyde.<sup>4</sup>

Another example is with the water-mixed metalworking fluid found commonly in engineering workshops and wherever metal has to be machined. This is usually purchased in concentrated form as a blend of many different chemicals. It is then mixed with water, usually in a ratio of somewhere between 3 and 15% concentrate, the rest being water. Some of the constituents of the concentrate may well be sensitisers. It is often assumed that in its diluted form there will be insufficient of the sensitiser present to represent any significant risk of skin contact eliciting an allergic contact dermatitis. However, it has been shown that when drops of the fluid land on the skin this then – as Figure 1 shows – splits and reverts to pure water and the concentrate.<sup>5</sup> The water may then be absorbed into the skin, lowering the skin's barrier performance and allowing the concentrate, complete with sensitiser, to penetrate.

## CONCLUSIONS AND RECOMMENDATIONS

This brief review of some of the factors to consider when conducting a risk assessment for exposure of the skin to chemicals has indicated that it is not as simple as may, at first, appear. The watchword is 'caution' and the guiding principle should be: "If in doubt seek professional advice from someone with the necessary chemical know-how to be able to evaluate the changes and advise on the real hazard" such as a competent occupational hygienist. Hence, only a process-based risk assessment for skin exposure will reflect the true risk of damage to health.

Finally, only some of the complexities that surround the interaction between the skin and the working environment have been discussed. There are many other factors to consider, for example that affect skin uptake and penetration, with the consequent potential for systemic effects. Our knowledge is far from complete and we still have much to learn about the complex – and fascinating – way in which our skin interacts with our environment and how this can affect health.



**Figure 1. Drops of the fluid land on the skin, splits, revert to pure water and the concentrate, and are absorbed**

## LESSONS LEARNED

1. The MSDS may not provide the necessary information as it relates to the chemical's properties and not how it is to be used.
2. All skin exposure risk assessments must be task based.
3. Repeated use of a chemical can result in progressive changes so that for the same task the hazard at the end of the working shift might be different from that at the start.
4. Use of an additional product, can change the primary product resulting in a hazard when skin contact occurs.
5. Some chemicals, when exposed to air oxidise, resulting in the appearance of sensitisers in the original chemical.
6. When drops of a diluted fluid, containing a sensitiser, lands on the skin this can split and revert to pure water and the concentrate, which is then absorbed into the skin, lowering the skin's barrier performance and allowing the concentrate, complete with sensitiser, to penetrate.
7. Within the outer layer of the skin are enzymes that can metabolise a chemical, once this has been absorbed into the skin, resulting in the formation of toxic chemicals.

## REFERENCES

1. IPCS International Programme on Chemical Safety. Concise International Chemical Assessment Document No. 5 Limonene. Accessed on 4 August 2010. Available at: <http://www.inchem.org/documents/cicads/cicads/cicad05.htm>
2. Karlberg AT, Doooms-Goossens A. Contact allergy to oxidized d-limonene among dermatitis patients. *Contact Dermatitis*. 1997; 36(40):201-206.
3. IPCS International Programme on Chemical Safety. Health and Safety Guide No. 105. Methanol Health and Safety Guide. Accessed on 4 August 2010. Available at: <http://www.inchem.org/documents/hsg/hsg/v105hsg.htm>
4. IPCS International Programme on Chemical Safety. Environmental Health Criteria 164 Methylene Chloride. 1996. Accessed on 4 August 2010. Available at: <http://www.inchem.org/documents/ehc/ehc/ehc164.htm#SectionNumber:1.1>
5. Krbek F, Schaefer T. Untersuchung and Tropfen und Rückständen von Wassermischbaren Kühlschmierstoffen, *Arbeitsmedizin, Sozialmedizin, Präventivmedizin*. 1991; 26(10):411-416.

# Back to basics – the skin barrier and how it is affected in common occupational scenarios

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## ABSTRACT

This paper provides a brief and informative explanation of the skin barrier and how it is affected in common occupational scenarios. The role of solvents, surfactants, mechanical injury, wet-work, and skin irritants and allergens in disrupting the barrier function of the skin is described.

**Key words:** skin, barrier function, disruption, occupational setting

## INTRODUCTION

Skin diseases are one of the most important emerging risks related to the exposure to, and use of chemicals.<sup>1</sup> In many European countries, occupational skin diseases are second to musculoskeletal disorders in all occupational diseases. In South Africa, Kruger et al. recently reported a one year skin disease prevalence of 31% and 31.2% respectively, at a gold and coal mining company.<sup>2</sup> In the accompanying paper in this issue, Packham describes how solvents, irritants and wet-work may influence the skin barrier and ultimately lead to occupational skin disease. This paper aims to explain the skin barrier and how it is affected by solvents, surfactants, mechanical injury and wet-work.

## SKIN ANATOMY AND SKIN BARRIER FUNCTION

The skin is made up of an outer self-renewing epidermis separated from the underlying dermis of connective tissue by a basement membrane.<sup>3-5</sup> The superficial epidermis consists of stratified squamous epithelial cells, mainly keratinocytes.<sup>3-5</sup> Keratinocytes, surrounded with aqueous intercellular fluid originate in the stratum basale (also known as the stratum germinativum) and move outward toward the skin surface while undergoing a two week programme of terminal differentiation. Four distinct morphological layers are formed in the epidermis by the transit of keratinocytes, namely the stratum germinativum, stratum spinosum, stratum granulosum and stratum corneum.<sup>3-5</sup> Keratinocytes undergo profound changes in their structure during the final steps of their differentiation and are transformed into flattened corneocytes of the stratum corneum.<sup>6</sup>

The skin functions as a physical barrier preventing loss of body fluids and penetration of substances (chemicals) or infectious agents.<sup>6-8</sup> This physical, permeability barrier resides primarily in the stratum corneum.<sup>4,9,10</sup> The corneocytes, encased by a cornified envelope and cytoskeletal elements and corneodesmosomes (cell-cell connections) provide mechanical strength to the skin, while a barrier to the movement of water and substances is provided by the hydrophobic extracellular lipid matrix.<sup>6,10,11</sup> This organisation is commonly referred to as a “brick-and-mortar” array, with corneocytes representing the bricks and the intercellular lipids, the mortar.

Generally, small molecules (molecular weight < 150) with good solubility in fat and water can be absorbed better than large, highly hydrophilic or highly lipophilic substances. Movement of substances may occur through an intercellular route (in between adjacent corneocytes), a transcellular route (across corneocytes) or diffusion along hair follicles and sweat glands (“shunt” pathway).<sup>12</sup>

## COMMON OCCUPATIONAL SCENARIOS IN WHICH SKIN DAMAGE CAN OCCUR

Damage to the skin and a compromised skin barrier due to physical and mechanical irritation and chemical damage (water, solvents and detergents) are common in occupational settings such as health care, metal machining, food preparation, printing, hairdressing, cleaning and the rubber industry.<sup>12</sup> Once the skin barrier is disrupted, a complicated rapid repair response is initiated to restore the barrier function.

## Solvents

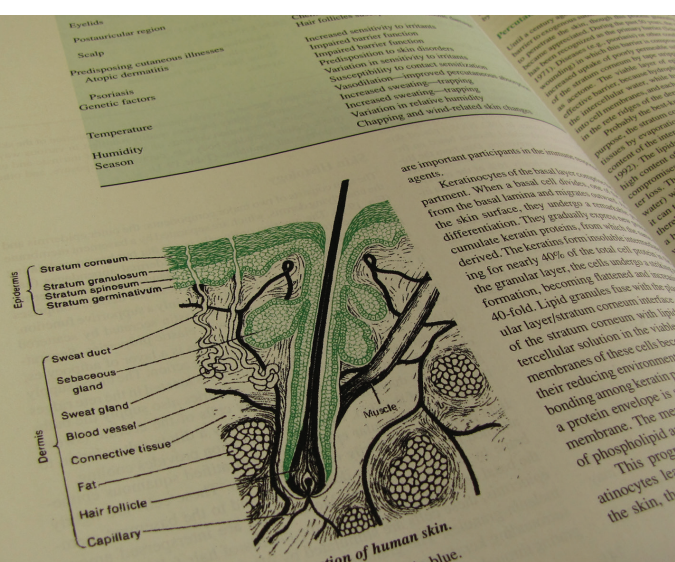
It has been suggested that organic solvents increase skin permeability, i.e. disrupt the skin barrier, by extracting intercellular lipids from the stratum corneum and altering the structure of extracellular lipids (the “mortar”).<sup>12,13</sup> Desmosomes (cell-cell connections) may also be damaged which may lead to partitioning of the stratum corneum and a reduction in barrier function.<sup>12</sup>

## Surfactants

Sodium lauryl sulphate (SLS) is a well known surfactant used in soaps and cleansers. Surfactants affect the skin barrier by interacting with skin lipids and proteins leading to disorganisation of the extracellular lipids, reduced corneocyte cohesion and decreased moisture of the stratum corneum.<sup>12,14</sup>

## Mechanical injury

Scrubbing, skin friction or abrasion may partially or completely remove the stratum corneum and thus disrupt the skin



barrier by exposing the viable and water-rich epidermis to the environment and thus facilitating entry of substances.<sup>12,13</sup>

### Occlusion, wet-work and skin washing/cleaning

Prolonged wearing of protective clothing, especially protective gloves, creates an enclosed environment around the skin resulting in occlusion that prevents evaporation of water leading to accumulation of water in intercellular spaces across the stratum corneum and swelling of corneocytes.<sup>7</sup> At present, the precise mechanism of permeability enhancement by water is not fully understood, but it has been suggested that upon contact with the skin, water permeates the intercellular spaces, and crosses cell membranes leading to swelling of the corneocytes.<sup>8,12</sup> It was proved that the stratum corneum is able to absorb more than its dry weight in additional water when immersed or placed in a wet environment.<sup>8</sup> Therefore, frequent and/or prolonged contact with water in the form of wet-work or skin-washing/cleaning will, therefore, disrupt the skin's extracellular lipids and reduce corneocytes' cohesiveness and enhance the permeability of substances.

### Skin irritants and allergens

Inflammatory skin diseases such as irritant and allergic contact dermatitis are also associated with skin barrier disruption.<sup>6,16</sup> Irritants impair the barrier by removing lipids or disrupting the intercellular lipid organisation in the stratum corneum. This facilitates penetration into the viable epidermis, where cell membranes of keratinocytes are damaged and extracellular lipid organisation is disrupted. This leads to irritant contact dermatitis associated with ongoing skin barrier impairment and inflammation.<sup>16</sup> A defective skin barrier is considered to be the primary event enabling allergen penetration into the skin and consequential initiation of immunological reactions and inflammation.<sup>6</sup> Therefore, irritant dermatitis very often precedes allergic contact dermatitis.<sup>16</sup>

### CONCLUSIONS

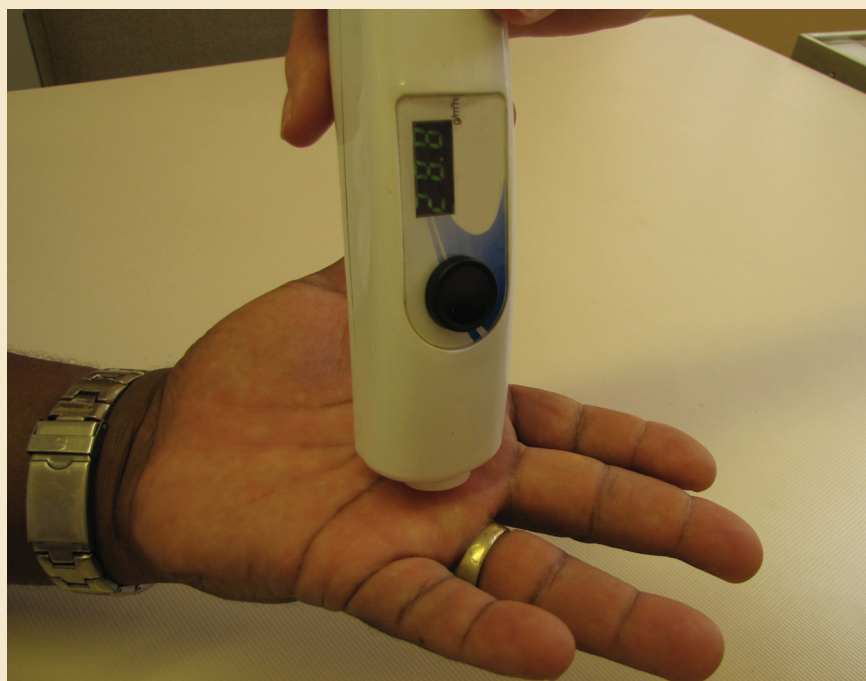
Although this short review has described how the skin barrier is affected in common occupational scenarios it should be noted that it is also influenced by various individual factors (age, gender, ethnicity etc.), environmental factors (ambient temperature and relative humidity) and diseases (other than irritant and allergic contact dermatitis, i.e. atopic dermatitis and psoriasis). Advances in the cosmetic sciences have led to the development of instruments capable of measuring skin hydration, skin surface pH and transepidermal water loss (TEWL), with the latter being used extensively to evaluate the skin barrier.<sup>7,9,17,18</sup> It is foreseen that these measurements could form part of the battery of tests used to assess the fitness of workers upon employment and during periodic screenings.

### LESSONS LEARNED

1. Damage to the skin barrier due to physical and mechanical irritation and chemical damage is common in occupational settings such as health care, metal machining, food preparation, printing, hairdressing, cleaning and the rubber industry.
2. Organic solvents increase skin permeability.
3. Surfactants affect the skin barrier by interacting with skin lipids and proteins.
4. Frequent and/or prolonged contact with water will enhance the skin permeability of substances.
5. A skin barrier damaged by irritants can enable allergen penetration and result in allergic contact dermatitis.

### REFERENCES

1. De Craecker W, Boskams N, Op de Beeck R. (2008) Occupational skin diseases and dermal exposure in the European Union (EU-25): policy and practice overview. European Agency for Safety and Health at Work. Luxembourg. 240 p. ISBN 978 92 9191 165 5.
2. Kruger P, Carman H, Bello B. (2008) The burden of skin disease in South African mines. *Occup Health Southern Africa*; 14(6):4-11.
3. McGrath JA, Eady RAJ, Pope FM. Anatomy and organization of human skin. In Burns T, Breathnach S, Cox N, Griffiths C, Editors. *Rook's textbook of dermatology*. Oxford: Blackwell Publishing; 2004. p. 3.1-3.8. ISBN 978 0 63 206429 8.
4. Bouwstra JA, Ponc M. The skin barrier in healthy and diseased state. *Biochim Biophys Acta*. 2006; 1758(12):2080-2095.
5. Rice RH, Mauro, TM. Toxic responses of the skin. In Klaassen CD, Editor. *Casarett and Doull's toxicology. The basic science of poisons*. New York: McGraw Hill; 2008. p. 741-759. ISBN 978 0 07 147051 3.
6. Proksch E, Brandner JM, Jensen J-M. The skin: an indispensable barrier. *Exp Dermatol*. 2008; 17(12):1063-1072.
7. Zhai H, Maibach HI. Occlusion vs. skin barrier function. *Skin Res Technol*. 2002; 8(1):1-6.
8. Agache P. Stratum corneum histophysiology. In Agache P, Humbert P, Editors. *Measuring the skin*. Berlin: Springer-Verlag; 2004b. p. 95-100. ISBN 3 540 01771 2.
9. Pirot F, Falson F. Skin barrier function. In Agache P, Humbert P, Editors. *Measuring the skin*. Berlin: Springer-Verlag; 2004. p. 513-524. ISBN 3 540 01771 2.
10. Feingold KR. The role of epidermal lipids in cutaneous permeability barrier homeostasis. *J Lipid Res* 2007; 48(12):2531-2546.
11. Jensen JM, Proksch E. The skin's barrier. *G Ital Dermatol Venereol*. 2009; 144(6):689-700.
12. Kezic S, Nielsen JB. Absorption of chemicals through compromised skin. *Int Arch Occup Environ Health*. 2009; 82(6):677-688.
13. Fluhr JW, Darlenski R, Angelova-Fisher I, Tsankov N, Basketter D. Skin irritation and sensitisation: mechanisms and new approaches for risk assessment. *Skin Pharmacol Physiol*. 2008a; 21(3):124-135.
14. Nielsen JB. Percutaneous penetration through slightly damaged skin. *Arch Dermatol Res*. 2005; 296(12):560-567.
15. Agache P, Black D. Stratum corneum dynamic hydration tests. In Agache P, Humbert P, Editors. *Measuring the skin*. Berlin: Springer-Verlag; 2004. p. 153-163. ISBN 3 540 01771 2.
16. Proksch E, Fölster-Holst R, Jensen J-M. Skin barrier function, epidermal proliferation and differentiation in eczema. *J Dermatol Sci*. 2006; 43(3):159-169.
17. Levin J, Maibach H. The correlation between transepidermal water loss and percutaneous absorption: an overview. *J Control Release*. 2005; 103(2):291-299.
18. Rawlings AV, Matts PJ, Anderson CD, Roberts MS. Skin biology, xerosis, barrier repair and measurement. *Drug Disc Today: Dis Mech*. 2008; 5(2):e127-e136.



# Immunologic consequences of toxins within an occupational environment – skin and lung sensitisation

## Second article in a series of three.

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## INTRODUCTION

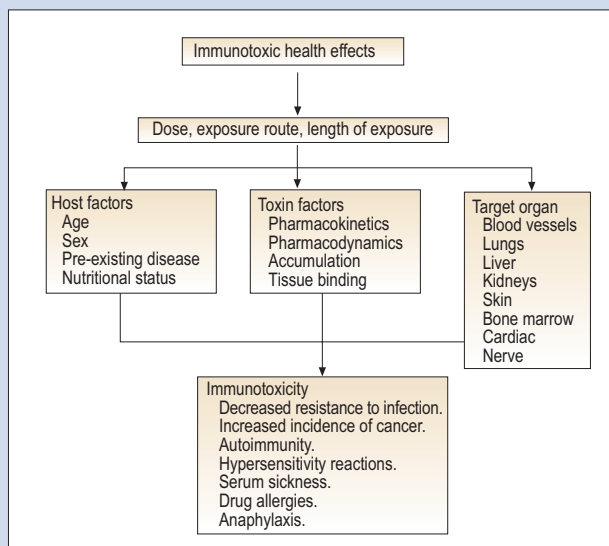
Immunotoxicology is the study of alteration in the immune system by xenobiotics, drugs, biologicals and chemicals. The complex activity of the immune system provides multiple targets for disruption by immunotoxicants. The fact that chemicals produce immune dysfunction is historically recognised and accepted as the cause of a variety of occupational diseases. This is the second article in a series of three that introduces the reader to the typical allergens commonly encountered in industry and their effects.

The principles of lung and skin sensitisation are no different to any other occupational exposure and effects which are illustrated in Figure 1.

Many lists of skin and respiratory allergens exist. The lists from the ILO are shown in Tables 2, 3 and 4.

## SKIN NOTATIONS

Most chemicals, especially the organic chemicals, have a tendency to be absorbed through the skin and can result in other health effects as well as contributing to the dose absorbed by inhalation from chemical exposure in the work environment. This could lead to confounding results in biological monitoring programmes. In many cases, this process of skin absorption can occur without even being noticed by the worker. Frequently, non-volatile substances deposited on the skin or the clothing can remain on these surfaces for long periods of time and result in exposures that may be more significant than the lung route of absorption. In this regard, NIOSH published a new strategy for assigning skin notation. From this strategy and scientific evidence, 142 substances were identified with multiple skin notations – distinguishing between effects due to exposures. Tables 2 and 3 list some chemicals that are generally associated with dermal absorption and which result in systemic toxicity with lethal or life threatening consequences. The assignment of multiple skin notations assists in distinguishing systemic (SYS), direct (DIR), and sensitising (SEN) effects caused by exposure of the skin (SK) to chemicals (Table 1). Chemicals that occur in the occupational



**Figure 1. The resulting health effects and clinical spectrum of diseases depends on the route of exposure, duration of exposure, dose and host factors**

environment that are highly toxic, lethal or life threatening are designated with the systemic subnotation (FATAL). Irritants and corrosive chemicals with a potential for direct effects are assigned a notation of SK:DIR(IRR) and SK:DIR(COR). Thus depending on the severity of skin interaction, different skin notations are assigned to different chemicals. Figure 2 summarises the process followed and recommended by NIOSH for the identification of such substances.

## IMMUNOTOXICITY OF THE SKIN

Many environmental toxins come into contact with the skin and the effects as noted by NIOSH are medically diagnosed as:

1. skin contact with irritation, corrosion or direct effect – contact dermatitis;
2. systemic effects; and
3. allergic or immunologic response – allergic dermatitis.

**Table 1. Skin notations assignment according to NIOSH.**

Abbreviation	Explanation
ID <sup>(SK)</sup>	After evaluation, insufficient data exist to assess the skin exposure hazard accurately.
ND	Not evaluated by this strategy and the health hazard associated with skin exposure is unknown.
SK	Skin notation.
SK	Indicating that reviewed data did not identify a health risk associated with skin exposure.
SK:DIR	Potential for direct effects to the skin following contact with a substance.
SK:DIR (COR)	Potential for a substance to be corrosive following skin exposure.
SK:DIR (IRR)	Potential for a substance to be a skin irritant following skin exposure.
SK:SEN	Potential for immune-mediated reactions following exposure.
SK:SYS	Potential for systemic toxicity following skin exposure.
SK:SYS (FATAL)	Highly or extremely toxic substance and may be potentially lethal or life threatening following skin exposure.

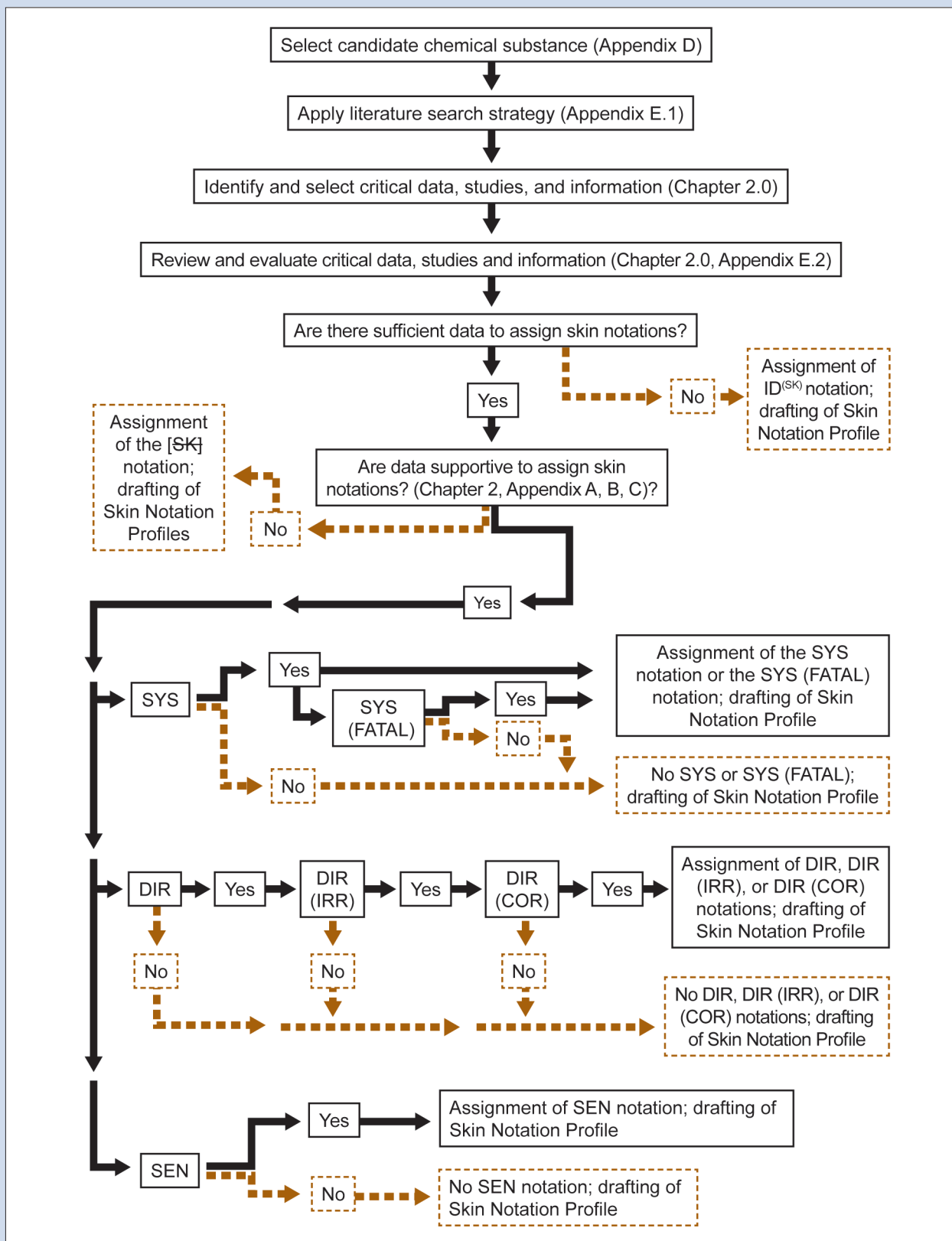


Figure 2. Decision tree for assigning new NIOSH skin notations

### SKIN TESTS FOR DIAGNOSIS AND INVESTIGATION

The primary method for diagnosing immediate hypersensitivity is skin testing. The characteristic response, as demonstrated in Figure 3 is a wheal and flare caused by extravasation of serum from capillaries in the skin, which result from the direct effect of histamine. In most cases where the skin test is positive, IgE antibody will be detectable in the serum. However, blood tests for IgE antibody are generally less sensitive than skin tests.

### IMMUNOTOXICITY OF THE LUNG

As most environmental toxins are absorbed via the respiratory tract, it is unsurprising that respiratory disorders are prominently studied and reported on in occupation medicine. Although respiratory diseases / disorders are broad and markedly variable there are three basic mechanisms by which inhaled substances affect the respiratory tract:

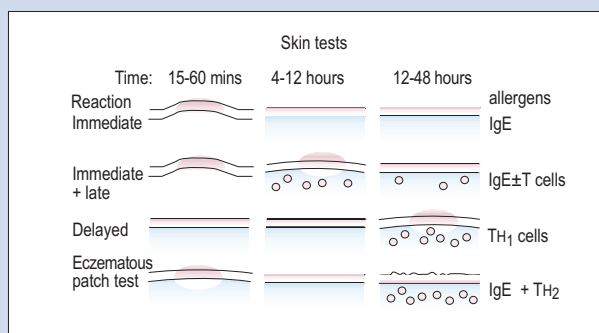
1. deposition in the upper respiratory tract, lung parenchyma or

**Table 2. Common skin irritants (ILO)**

Acids and alkalis	Plastics
Soaps and detergents	Epoxy, phenolic, acrylic monomers
Solvents	Amine catalysts
Aliphatic: Petroleum distillates (kerosene, gasoline, naphta)	Styrene, benzoyl peroxide
Aromatic: Benzene, toluene, xylene	Metals
Halogenated: Trichloroethylene, chloroform, methylene chloride	Arsenic
Miscellaneous: Turpentine, ketones, esters, alcohols, glycols, water	Chrome

**Table 3. Common skin allergens (ILO)**

<b>Metals</b> Nickel Chrome Cobalt Mercury  <b>Rubber additives</b> Mercaptobenzothiazole Thiurams Carbamates Thioureas  <b>Dyes</b> Paraphenylene diamine Photographic colour developers Disperse textile dyes	<b>Plants</b> Urushiol ( <i>Toxicodendron</i> ) Sesquiterpene lactones ( <i>Compositae</i> ) Primin ( <i>Primula obconica</i> ) Tulipalin A ( <i>Tulipa, Alstroemeria</i> )  <b>Plastics</b> Epoxy monomer Acrylic monomer Phenolic resins Amine catalysts  <b>Biocides</b> Formaldehyde Kathon CG Thimerosal
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**Figure 3. Skin test reactions**

- lymphatics with subsequent inflammatory or fibrotic reaction;
- 2. irritation of the lining of the tracheobronchial tree with inflammation and / or oedema; and
- 3. allergic or immunologic response.

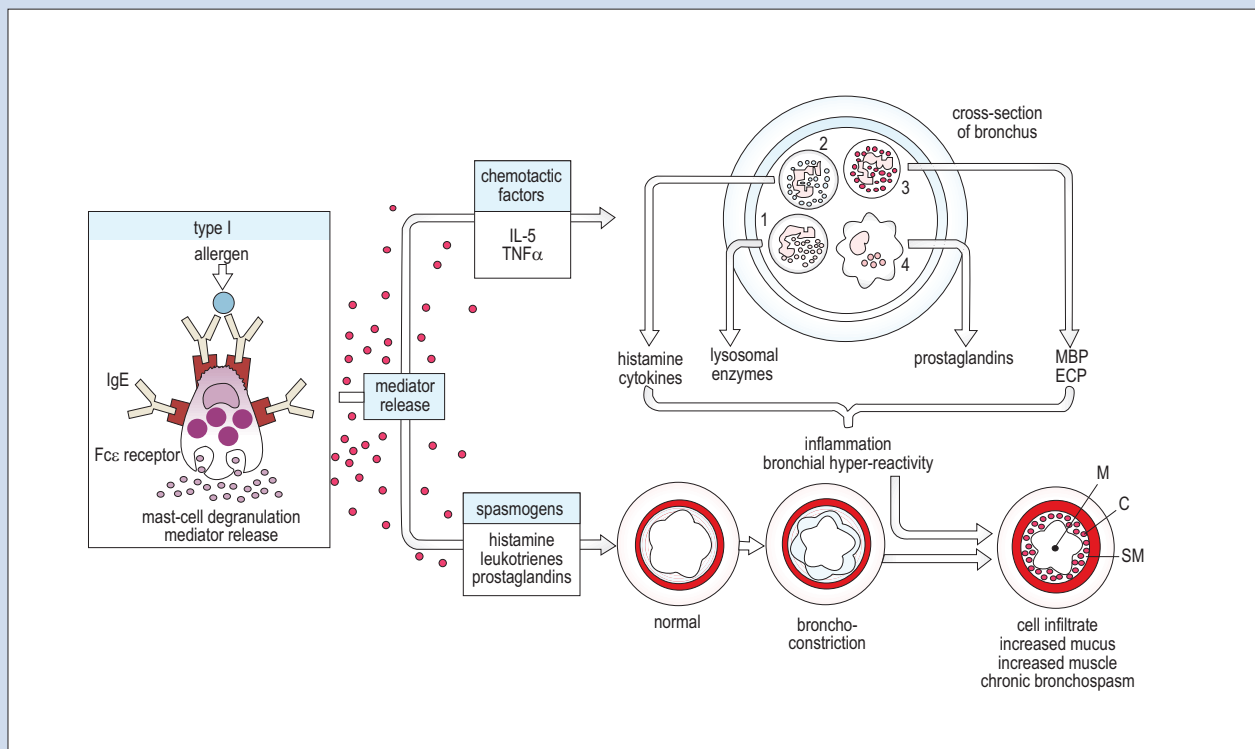
The inflammatory response in asthmatic bronchi is shown in Figure 4. Evidence for this response can be obtained from increased exhaled nitric oxide; increased eosinophils or eosinophil cationic protein (ECP) in induced sputum; and experimentally from biopsies of the lung. The mechanisms involved in the response are known to introduce or are implicated in causing occupational asthma. Many of the occupational chemical or environmental agents are responsible for asthmatic reactions and the list is steadily growing. Although the effect of asthma is primarily immunological mediated, various mechanisms have been recognised in the pathogenesis of occupational asthma including IgE delayed hypersensitivity. However, chemically induced asthma does occur in 2 – 15% of all asthmatic incidence within the industry and once an IgE mediated problem occurs, any exposure to minute amounts

can precipitate bronchospasm (Figure 4). Obstructive lung disease, including asthma, emphysema, and chronic bronchitis, is frequently the result of long-term exposure to work-environment allergens. The latter two are often called chronic obstructive pulmonary disease (COPD) because of their ongoing or chronic nature. Whereas asthma is an inflammatory condition, often associated with allergies that is characterised by broncho-constriction and airway oedema. Studies of asthma at the cellular level show that a variety of chemical signals may be responsible for inducing acetylcholine, histamine, substance P (a neuropeptide) and leukotrienes (lipidlike bronchoconstrictors) secreted by mast cells, macrophages, and eosinophils released during an inflammatory response (see Figure 4). Respiratory disorders, whether they are pneumoconioses, occupational asthma, hypersensitivity pneumonitis (extrinsic alveolitis), respiratory irritants or metal / polymer fume fever syndrome, may be the result of exposure to hazardous chemicals within the work environment.

We now know that multiple chemical sensitivity (MCS) is a syndrome, said to be caused by low-level exposure to environmental chemicals, which results in immune system alteration. For example, human IgG, IgM, and IgE antibodies are formed *in vivo* in response

**Table 4. ILO Sensitising agents that can cause occupational asthma (ILO)**

Classification	Sub-groups	Examples of substances	Examples of jobs and industries
High-molecular-weight protein antigens	Animal-derived substances	Laboratory animals, crab/seafood, mites, insects	Animal handlers, farming and food processing
	Plant-derived substances	Flour and grain dusts, natural rubber latex gloves, bacterial enzymes, castor bean dust, vegetable gums	Bakeries, health care workers, detergent making, food processing
Low-molecular-weight/chemical sensitisers	Plasticisers, 2-part paints, adhesives, foams	Isocyanates, acid anhydrides, amines	Auto spray painting, varnishing, woodworking
	Metals	Platinum salts, cobalt	Platinum refineries, metal grinding
	Wood dusts	Cedar (plicatic acid), oak	Sawmill work, carpentry
	Pharmaceuticals, drugs	Psyllium, antibiotics	Pharmaceutical manufacturing and packaging
Other chemicals		Chloramine T, polyvinyl chloride fumes, organophosphate insecticides	Janitorial work, meat packing



**Figure 4. Inflammatory response in asthmatic bronchi**  
 Key: 1 – neutrophils, 2 – basophils, 3 – eosinophils, 4 – monocytes

to chronic formaldehyde exposure, resulting in health effects and clinical disease which generally depend on the route of exposure, duration of exposure, dose and host factors.

### MISDIAGNOSIS OF SKIN AND RESPIRATORY OCCUPATIONALLY-RELATED DISEASES

Common background lung diseases (e.g. COPD, asthma, hay fever) and skin diseases (e.g. eczema, psoriasis, fungal) as well as atopy, a common condition in up to 20% of populations, complicates the immunotoxicological picture of many workplace exposures. Complicating the picture even more is the increasing incidence of the systemic and infectious diseases, TB, HIV/AIDS, SLE, and many others in the South African populations. This leads to many skin and respiratory occupational-related diseases being misdiagnosed.

### WAY FORWARD

Occupational health professionals should have a high index of suspicion regarding skin and respiratory sensitisation. First and foremost is the identification of workplace sensitisers. Specialists, local and specialist laboratories (pathology and lung) will provide tests and test batteries inclusive of Total Ig, RAST, specific RAST, Melissa, CD counts, skinprick, bronchoprovocation and other challenge tests.

Skin and respiratory disease are of the most underreported occupational diseases in South Africa. Sentinel surveillance initiatives, such as the SORDSA and Dermatological surveillance projects of the NIOH, are most important but depend on the participation of all OH professionals for success.

### CONCLUSION

Owing to the variability in work related chemicals as well as concurrent exposures in different occupational setting, further research clarifying the synergistic effect of various chemical exposures in relation to work related skin allergies and asthma is required.

### REFERENCES

- Schulte P, Ahlers HW, Chen C-P, Demchuk E, Dotson GS. Current Intelligence Bulletin 61. A strategy for assigning new skin notations. Cincinnati, Ohio: National Institute for Occupational Safety and Health (US); 2009. Accessed on 23 September 2010. Available at: <http://www.cdc.gov/niosh/docs/2009-147/pdfs/2009-147.pdf>
- Sasseville D. Occupational contact dermatitis. In Chapter 12. Skin diseases. International Labour Organization. Encyclopaedia of occupational health and safety. Fourth edition. Geneva: ILO; 1998. Accessed 23 September 2010. Available at: [http://www.ilo.org/safework\\_bookshelf/](http://www.ilo.org/safework_bookshelf/).
- Bekesi JG, Holland J, Anderson HA, Fishbain AS, Rom W, Wolff MS, et al. Lymphocyte function of Michigan dairy farmers exposed to polybrominated biphenyls. Science. 1978;199:1207–9.
- Scott LK, Grier LR, Arnold TC, Conrad SA. Respiratory failure from inhalational nickel carbonyl exposure treated with continuous high volume hemofiltration and disulfiram. Inhal Toxicol. 2002; 14(11):1103-9.
- Platts-Mills TAE, Vervloet D, Thomas WR, Aalberse RC, Chapman MD. Indoor allergens and asthma: report of the Third International Workshop [review]. J Allergy Clin Immunol. 1997; 100(6 Pt 1):S2-S24.
- Friedman-Jimenez G, Petsonk EL. Occupational asthma. In Chapter 10. Respiratory system. International Labour Organization. Encyclopaedia of occupational health and safety. Fourth edition. Geneva: ILO; 1998. Accessed 23 September 2010. Available at: [http://www.ilo.org/safework\\_bookshelf/](http://www.ilo.org/safework_bookshelf/).
- Reinl, W. Scleroderma caused by trichloroethylene in workers? Bull Hyg. 1957;3:678-9.
- National Institute for Occupational Health. Johannesburg: NIOSH. Accessed on 23 September. Available at: <http://www.nioh.ac.za/research.php?main=info&fa=3&pnum=924402>.

These pages are sponsored by Drs Du Buisson & Partners.

# Biological agents causing occupational airborne contact dermatitis

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## ABSTRACT

**Introduction:** Exposure to airborne biological agents (plant and animal) is frequently associated with occupational contact dermatitis. Airborne bacteria and fungi have also been associated with work-related skin disease in the absence of pulmonary disease.

**Methodology:** A literature review of scientific papers (1966-2009) related to biological agents implicated in occupational airborne contact dermatitis was conducted. The search was done using Google, as well as major dermatitis and occupational health journals and information from credible occupational health and safety institutes.

**Results:** An overview of airborne biological agents and their role in occupational dermatoses, as well as the diagnosis of such conditions is provided. The coexistence of occupational and non-occupational skin diseases is highlighted.

**Conclusion:** Occupationally induced skin reactions by airborne biological agents (microbial, plant, animal) are more common than in the non-occupational context. The role of airborne biological agents should be considered in the diagnostic workup of workers with skin reactions in air-exposed areas.

**Keywords:** hazardous biological agents, occupational, airborne, contact dermatitis, skin disease, dust, plant, animal, bacteria, fungi, mould, allergens, allergy

## INTRODUCTION

Certain workers, particularly in agriculture, are exposed to large quantities of dust during their work. The dust consists of varying amounts of inorganic material, organic substances of plant and animal origin as well as viable and non-viable microorganisms and their by-products (biochemical components, toxins, antigens).<sup>1-4</sup> The pathogenic role of dust components in relation to respiratory disease has been well documented.<sup>5</sup> Apart from inhalation, these airborne dust particles, which are regarded as hazardous biological agents, also settle on exposed skin and may trigger local inflammatory reactions, referred to as 'airborne dermatitis'.<sup>6-9</sup> The dermatitis was coined airborne contact dermatitis due to the inflammatory reaction (either allergic or irritant) of exposed skin areas (in which the causative role of sunlight can be excluded) initiated by airborne agents that settle on the skin.<sup>10-11</sup> Airborne causal agents may be protein in nature resulting in protein contact dermatitis. The pathogenesis of protein contact dermatitis is unclear but may involve a type I (IgE mediated) hypersensitivity reaction, type IV (cell-mediated delayed) hypersensitivity reaction, and/or a delayed reaction due to IgE-bearing Langerhans' cells.<sup>12</sup>

Many occupational practitioners overlook the effects of these agents on exposed workers and it is important to promote awareness of airborne particle deposition as a trigger of local inflammation. The main purpose of this paper is to explain the role of airborne biological agents in occupational contact dermatitis, to emphasise the challenges regarding the coexistence of non-occupational and

occupational skin diseases and to describe the diagnosis of the condition.

## METHODOLOGY

Studies on occupational airborne contact dermatitis associated with hazardous biological agents and their constituents were identified through a Google search. The keywords used included hazardous biological agents, microorganisms, occupational, airborne, contact dermatitis, skin disorder, exposure, bacteria, fungi, mould, allergens, type IV allergy and T cell mediated. Major peer-reviewed dermatitis journals and occupational health journals were also searched. Only selected publications (1966-2009) were used after evaluation, as this review focused on the influence of airborne biological agents and their constituents on occupational contact dermatitis. There are numerous case reports of chemical exposure which were excluded, with the exception of endotoxin which is briefly mentioned in this manuscript.

## RESULTS

### Epidemiological studies

Only two epidemiological studies have been reported to date among Austrian and Italian population groups.<sup>13,14</sup> In the former study, 0.29% (15/5092) patients were diagnosed with airborne contact dermatitis of which 0.09% (5/5092) were confirmed as occupational and 0.14% (7/5092) could be regarded as occupational if 'housewife' was included as an occupation.<sup>13</sup> In the study by Crippa et al.,

occupational airborne contact dermatitis was suspected in 0.85% (10/1169) patients.<sup>14</sup> These studies highlighted that occupational airborne contact dermatitis due to biological and chemical exposure exists, although it is more rare in unselected patch-test populations than implied by the increasing number of biologically-related case reports over the last few decades.

### Sources of exposure in various occupational settings

The sources of the reactions may be multiple with new agents causing airborne dermatoses continually being added to the list. Table 1 gives an unexhaustive list of biological agents and

Fungal substances are capable of inducing delayed allergic reactions in workers. *Aspergillus fumigatus* had been implicated in respiratory allergy due to the Asp f I/a allergen however, it appears that skin reactions are caused by a different *A. fumigatus* antigen.<sup>36</sup> High concentrations of *A. fumigatus* antibodies were found among compost workers which co-existed with work-related skin disease in some cases.<sup>17</sup>

Although only a handful of studies have been reported on the relationship between skin symptoms and bacteria and fungi and their products, the possible link needs to be considered for the management of the affected worker. The rarity of the condition may be due to misdiagnosis

**“ . . . these airborne dust particles . . . also settle on exposed skin and may trigger local inflammatory reactions . . . ”**

their by-products causing dermatoses. Cases of occupational airborne contact dermatitis have mainly been reported in agriculture and food-processing industries<sup>15</sup> but are not uncommon in other industries such as health care<sup>16</sup> and waste<sup>17</sup> industries.

### The role of plant and animal derivatives in work-related skin disease

Historically, grain was regarded almost exclusively as the source of respiratory disease in farmers. However, recent studies have shown that working with grain was a cause of skin problems in 15.8% of grain workers<sup>30</sup> and 18.4% in cow and pig breeders.<sup>31</sup> Contrary to the belief that storage mites only cause asthma and rhinitis, skin symptoms related to storage mites were also demonstrated in a Polish farmer.<sup>32</sup>

### The role of microbial derivatives in work-related skin disease

Most studies of workers exposed to high concentrations of airborne bacteria focus on respiratory symptoms. However, bacterial extracts contain superantigens which are potent inducers of the immune reactions and are suspected of playing a role in a variety of skin diseases.<sup>33</sup> In a study of compost workers a significantly increased frequency of skin diseases was related to increased IgG levels to *Saccharopolyspora rectivirgula* and *Streptomyces thermovulgaris*.<sup>17</sup> Positive patch tests to *S. rectivirgula* were also found in two farming students.<sup>4</sup> Interestingly, all farming students in this study also reacted to the Gram negative bacterium *Pantoea agglomerans*, which is the main source of endotoxin found in agricultural dust.<sup>4</sup> *P. agglomerans* has been shown to induce a type III response in agricultural workers exposed to organic dust, resulting in cutaneous late phase reactions.<sup>15</sup> Several cases of work-related dermatitis due to *Bacillus thuringiensis*, widely used as a bacterial insecticide, have also been reported.<sup>34,35</sup>

owing to practitioners failing to look for an association between airborne exposure and skin symptoms.

### Skin reactions and location of lesions

A variety of reactions may occur (e.g. irritant, allergic or urticarial), depending on the nature of the airborne agent.<sup>13</sup> Furthermore, a particular agent can cause several different reactions as in the case with garlic exposure which may cause irritant as well as allergic type reactions.<sup>11,26</sup> Generally, rashes in airborne contact dermatitis have a characteristic appearance, and mainly affect the face and hands. This eruption frequently has a sharp demarcation at the mid-biceps level and the upper sternal V line. Unlike photo-induced dermatitis, airborne contact dermatitis also affects the submental area or

**Table 1. Biological agents implicated in occupational airborne contact dermatitis.**

<b>AGENT NAME</b>
<b>Animal derived allergens</b>
Fish <sup>18</sup>
Cow dander <sup>19</sup>
Mites (house dust mite, storage mites) <sup>15</sup>
<b>Microbial derived agents</b>
Fungi <sup>7,20</sup>
Bacteria <sup>5,17,21</sup>
Fungal alpha-amylase <sup>22</sup>
<b>Plant derived allergens</b>
Grain dust (hops) <sup>23</sup>
Champignon mushroom <sup>24</sup>
Flour (wheat, rye, soya) <sup>25</sup>
Latex <sup>16</sup>
Garlic <sup>26</sup>
Pine <sup>27</sup>
Sawdust <sup>28</sup>
Cinnamon <sup>29</sup>

postauricular sites.<sup>37</sup> A further suspicion of airborne exposure is the presence of symmetric lesions on anatomically occluded areas of the body such as eyelids, area behind the ears, scalp covered by hair and area under the chin. The upper eyelids are particularly susceptible to airborne agents and may at times be the only site affected.<sup>11</sup>

### Diagnostic work-up

Cases of airborne dermatoses have mainly been reported in the context of occupational settings. Although dermatologists and occupational medical practitioners are becoming increasingly aware of the airborne source of contact dermatitis, it remains greatly underestimated due to the misunderstanding between the route of exposition and relation to the clinical picture. It is therefore important for clinicians to perform an extensive history when lesions are located on air-exposed areas.<sup>38</sup> To make the clinical diagnosis four fundamental criteria must be considered: 1) the presence of airborne exposure, 2) clinical symptoms, 3) the history of patient, and 4) the results of epicutaneous tests.<sup>39</sup>

### Patch tests

One of the challenges in the diagnosis is the availability of biologically-derived agents in the commercial patch test screening series. Patch tests can be carried out with the airborne extract by soaking small pieces of filter paper in the extract solution. Extracts should be checked for sterility and lack of toxicity before fixing to the patients' back for 48 hours using patch test chambers. The reading of the reaction should be carried out at 48 and 72 hours. Controls should be carried out on healthy individuals.<sup>23</sup> The limitation of using an extract is that it may contain a mixture of substances. However, a positive reaction is indicative of the presence of the causative agent. Subsequent characterisation may be pursued to identify the specific agent in question.

In the case of protein contact dermatitis, negative patch-test results could occur because large protein-based molecules cannot penetrate intact, uninvolved skin. Another possibility is that the type I histamine response may block the detection of a type IV response. This is supported by experimentation of chronic dermatophytosis, wherein *Trichophyton mentagrophytes* induces an immediate type I reaction with no subsequent delayed type IV response. However, when the antihistamine chlorpheniramine is injected, blocking the type I reaction, a positive delayed type IV reaction is uncovered.<sup>12</sup> In such cases, the prick testing and scratch testing methods may be of more value.

### Prick tests

Prick testing involves placing one drop of diluted test allergen, negative control, and positive control (histamine) onto the volar forearm of the patient. The test sites are pricked with lancets to introduce the allergen into the dermis. The results are read at 15-minutes after introduction of allergen. A positive reaction is a wheal of at least 3 mm in diameter

after subtracting the wheal size of the positive control, in the absence of a reaction in the negative control.<sup>12</sup>

### Scratch tests

Scratch testing involves placing one drop of diluted test allergen, negative control, and positive control (histamine) onto the volar forearm and scratching the skin lightly with a needle. The test sites are read at 15-minute intervals over 1 hour. A positive reaction is a wheal that is at least half the diameter of the histamine control in the absence of a reaction in the negative control.<sup>12</sup>

### Contemporary and emerging issues

Occupational skin diseases frequently remain undiagnosed for years due to a lack of awareness. Furthermore, the co-existence of a non-occupational disease such as rosacea can mask an occupational skin disease which can often then be missed.<sup>15</sup> In addition, the disease may be misconstrued as non-occupational if the work-related dermatitis started after the onset of the non-occupational condition.<sup>15</sup> In fact, the coexistence of both diseases of the same organ should not affect one's compensation rights, irrespective of the possible difficulties in determining which part of the impairment was actually work-related.<sup>40</sup> One also needs to be alerted to multiple adverse reactions occurring in the work environment. An example is an allergic reaction superimposed by an irritant component of a biological substance – garlic. In this case, the worker was diagnosed with occupational airborne contact dermatitis from garlic powder used to manufacture margarine containing garlic, with concurrent IgE mediated or type I allergy.<sup>26</sup>

The role of airborne agents in occupational contact dermatitis is important for the management of the worker. A case that stands out is that of a nurse using vinyl gloves due to contact dermatitis from latex rubber gloves. Her colleagues continued wearing latex gloves. Skin prick test using commercial latex extract, specific IgE for latex and glove use test were all negative, whilst delayed readings for latex haptens using patch tests were positive.<sup>16</sup> This case report describes hypersensitivity type IV reaction to latex without direct contact and also highlights the challenges in managing such workers due to airborne exposure.

Employers should make efforts to reduce exposure and provide personal protective equipment. However, in the case of occupational airborne contact dermatitis provision of the latter may be insufficient as it may be impractical to cover the entire skin. Unfortunately if symptoms persist after reduction of exposure (where reasonably practical) the worker would need to be relocated.<sup>11,26</sup>

### CONCLUSION

Cases of occupational airborne contact dermatitis to biological agents or varying origin are well documented. The onus is on the clinician to make the link between exposure and skin symptoms which forms the basis for the management of the patient and the establishment of adequate prevention.

### LESSONS LEARNED

- Biological agents play a role in occupational airborne contact dermatitis.
- Hazardous biological airborne agents that settle on the skin can initiate an inflammatory reaction of exposed skin areas.
- A variety of reactions may occur, depending on the nature of the airborne agent.
- Non-occupational disease e.g. rosacea can mask the occupational skin disease and lead to misdiagnosis.
- Patch tests can be performed using extracts to make a diagnosis.
- Recognising the characteristic nature of the reactions can facilitate the diagnosis.

### REFERENCES

1. Eduard W. Exposure to non-infectious microorganisms and endotoxins in agriculture. *Annals of Agricultural and Environmental Medicine*. 1997;4:179-86.
2. Hallas TE, Iversen M. Sources of exposure to storage mites in the farming environment. *Annals of Agricultural and Environmental Medicine*. 1996;3:9-12.
3. Moloczniak A. Time of farmers' exposure to biological factors in agricultural working environment. *Annals of Agricultural and Environmental Medicine*. 2004;11:85-9.
4. Spiewak R, Skorska C, Gora A, Horoch A, Dutkiewicz J. Young farmers with cellular reactivity to airborne microbes suffer more frequently from work-related skin symptoms and allergic dermatitis. *Annals of Agricultural and Environmental Medicine*. 2001;8:255-9.
5. Dutkiewicz J. Bacteria and fungi in organic dust as potential health hazard. *Annals of Agricultural and Environmental Medicine*. 1997;4:11-16.
6. Kanerva L, Vanhanen M, Tupasela O. Occupational allergic contact urticaria from fungal but not bacterial alpha-amylase. *Contact Dermatitis*. 1997;36:306-7.
7. Kanny G, Becker S, de Hauteclocque C, Moneret-Vautrin DA. Airborne eczema due to mould allergy. *Contact Dermatitis*. 1996;35(6):378.
8. Spiewak R, Skorska C, Dutkiewicz J. Occupational airborne contact dermatitis caused by thyme dust. *Contact Dermatitis*. 2001;44(4):235-9.
9. Spiewak R, Skorska C, Gora A, Horoch A, dutkiewicz J. Young farmers with cellular reactivity to airborne microbes suffer more frequently from work-related skin symptoms and allergic dermatitis. *Annals of Agriculture and Environmental Medicine*. 2001;8:255-9.
10. Bjorkner BE. Industrial airborne dermatoses. *Dermatol Clin*. 1994;12(3):501-9.
11. Goossens A. Airborne dermatosis. *Acta Dermatovenerol Croat*. 2006;14(3):153-5.
12. Levin C, Warshaw E. Protein contact dermatitis: allergens, pathogenesis and management. *Dermatitis*. 2008;19(5):241-51.
13. Komerricki P, Aberer W, Kranke B. An 8-year experience in airborne contact dermatitis. *Wien Klin Wochenschr*. 2004;116/9-10:322-5.
14. Crippa M, Baruffini A, Belleri L, Cirila A, Leghissa P, Pisati R. Occupational dermatitis in a highly industrialised Italian region: the experience of four occupational health departments. *Sci Total Envir*. 2001;270(1-3):89-96.
15. Spiewak R, Dutkiewicz J. A farmer's occupational airborne contact dermatitis masqueraded by coexisting rosacea: delayed diagnosis and legal acknowledgement. *Annals of Agricultural and Environmental Medicine*. 2004;11(2):329-33.
16. Nettis E, Colanardi MC, Ferrannini A, Tursi A. Airborne allergic contact dermatitis. *Allergy*. 2001;56(6):583-4.
17. Bunger J, Antlauf-Lammers M, Schulz TG, Westphal GA, Muller MM, Ruhnau P, et al. Health complaints and immunological markers of exposure to bioaerosols among biowaste collectors and compost workers. *Occupational and Environmental Medicine*. 2000;57(7):458-64.
18. Jeebhay M, Robins T, Lehrer S, Lopata A. Occupational seafood allergy: a review. *Occupational Environmental Medicine*. 2001;58(9):553-62.
19. Mahler V, Diepgen TL, Heese A, Peters KP. Protein contact dermatitis due to cow dander. *Contact Dermatitis* 1998;38(1):47-8.
20. Fujisawa S, So Y, Ofuju S. Eczematous dermatitis produced by airborne molds. *Arch Dermatology*. 1966;94(4):413-20.
21. Kiviranta H, Tuomainen A, Reiman M, Laitinen S, Nevalainen A, Liesivuori J. Exposure to airborne microorganisms and volatile organic compounds in different types of waste handling. *Annals of Agricultural and Environmental Medicine*. 1999;6(1):39-44.
22. Vissers M, Doekes G, Heederik D. Exposure to wheat allergen and fungal alpha-amylase in the homes of bakers. *Clin Exp Allergy*. 2001;31(10):1577-82.
23. Spiewak R, Dutkiewicz J. Occupational airborne and hand dermatitis to hops (*Humulus lupulus*) with non-occupational relapses. *Annals of Agricultural and Environmental Medicine*. 2002;9:249-52.
24. Kanerva L, Estlander T, Jolanki R. Airborne occupational allergic contact dermatitis from champignon mushroom. *American Journal of Contact Dermatitis*. 1998;9(3):190-2.
25. Llombart B, Revert MA, Sastre A, Dura M, Pelaez A, Jorda E. Occupational protein contact dermatitis from flour and cuttlefish. *Contact Dermatitis*. 2003;49(5):268-9.
26. Bassioulas K, Orton D, Cerio R. Occupational airborne allergic contact dermatitis from garlic with concurrent Type I allergy. *Contact Dermatitis*. 2004;50(1):39-41.
27. Watsky KL. Airborne allergic contact dermatitis from pine dust. *Am J Contact Dermat*. 1997;8(2):118-20.
28. de Cock P, van Ginkel CL, Faber WR, Bruynzeel DP. Occupational airborne allergic contact dermatitis from sawdust in livestock sheds. *Contact Dermatitis*. 2000;42(2):113.
29. Ackermann L, Aalto-Korte K, Jolanki R, Alanko K. Occupational allergic contact dermatitis from cinnamon including one case from airborne exposure. *Contact Dermatitis*. 2009;60(2):96-9.
30. Spiewak R, Skorska C, Dutkiewicz J. Work-related skin symptoms among Polish farmers exposed to plant dust. *Contact Dermatitis*. 2000;42(Suppl 2):62-3.
31. Spiewak R, Skorska C, Dutkiewicz J. Work-related allergic skin symptoms among cattle and swine breeders. *Allergy*. 2000;55(Suppl 63):155.
32. Spiewak R, Gora A, Dutkiewicz J. Work-related skin symptoms and type I allergy among Eastern-Polish farmers growing hops and other crops. *Annals of Agricultural and Environmental Medicine*. 2001;8:51-6.
33. Skov L, Baadsgaard O. Superantigens. Do they have a role in skin diseases? *Arch Dermatology*. 1995;131(7):829-32.
34. Bernstein IL, Bernstein JA, Miller M, Tierzieva S, Bernstein DI, Lummus Z, et al. Immune responses in farm workers after exposure to *Bacillus thuringiensis* pesticides. *Environ Health Perspect*. 1999;107(7):575-82.
35. Green M, Heumann M, Sokolom R, Foster RL, Bryan R, Skeels M. Public health implications of the microbial pesticide *Bacillus thuringiensis*: an epidemiological study, Oregon, 1985-86. *American Journal of Public Health*. 1990;80:848-52.
36. Disch R, Menz G, Blaser K, Cramer R. Different reactivity to recombinant *Aspergillus fumigatus* allergen I/a in patients with atopic dermatitis or allergic asthma sensitised to *Aspergillus fumigatus*. *Int Arch Allergy Immunol*. 1995;108(1):89-94.
37. Yokozeki H, Satoh T, Katayama I, Nishioka K. Airborne contact dermatitis due to Japanese cedar pollen. *Contact Dermatitis*. 2007;56(4):224-8.
38. Huygens S, Goossens A. An update on airborne contact dermatitis. *Contact Dermatitis*. 2001;44(1):1-6.
39. Santos R, Goossens A. An update on airborne contact dermatitis: 2001-2006. *Contact Dermatitis*. 2007;57(6):353-60.
40. Taylor JS. Evaluation of impairment due to work-related skin disease. *Occupational Medicine*. 1994;9(1):1-9.

# Patch testing in occupational allergic contact dermatitis

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## ABSTRACT

**Patch testing is a cornerstone in the investigation of patients with suspected occupational allergic contact dermatitis. The purpose of the paper is to raise awareness of challenges related to patch testing for this condition. Availability issues and the improvement of test procedure are considered.**

**Keywords:** occupational, allergic contact dermatitis, patch testing, procedure improvements, availability

## INTRODUCTION

Contact dermatitis is the commonest clinical manifestation of occupational skin disease. Patch testing, which was introduced by Josef Jadassohn<sup>1</sup> over a century ago to diagnose allergic contact dermatitis ACD, is a cornerstone in the investigation of patients with suspected occupational ACD. The purpose of the paper is to raise awareness of problems related to patch testing for this condition.

## PATCH TEST PROCEDURE

Patch testing should be carried out with the proper standard technique and the test allergens should be pure and properly diluted in a base. Patients should be instructed about the patch test procedure.

A number of allergens, grouped together for patch testing, are referred to as a patch test battery or patch test series. The "standard battery" which contains common environmental allergens is the most commonly applied. Special batteries, e.g. photographic battery, hairdresser battery, dental battery, rubber chemical battery, clothing or textile battery, cosmetic battery, cutting fluid battery, preservative battery are applied where indicated. The standard battery is extremely useful and should be applied on all patients undergoing patch testing. Often unsuspected causes of allergic contact dermatitis can be identified.<sup>1</sup>

Closed patch tests with the Finn Chamber or Al patch test strip are the most practical patch test method (Figures 1 and 2). The True test system is an alternative. The duration of application of allergens is 48 hours, after which patch test chambers are removed for not less than 15 minutes and then read (Figures 3 and 4). A second reading is done at 72 hours or 96 hours after the application. An allergic reaction should persist after 48 hours (Figures 3 and 4).

## INTERPRETATION OF POSITIVE REACTION

The patch test procedure is simple but reading and interpretation of the reaction requires experience. A positive reaction must be interpreted correctly as it may be of present or past relevance. Occasionally a patient may have past exposure to the allergen without dermatitis.<sup>1</sup> The reaction may be unexplained. A false positive or negative reaction also has to be considered.<sup>1</sup>

## COMPLICATIONS OF PATCH TESTING

These include pigmentation, depigmentation, scarring, necrosis, exacerbation, dessemination, sensitisation, infection, koebnerization, and keloid.<sup>1</sup> When the patch testing is completed, and the allergen identified as the cause of ACD, the dermatologist must provide the patient with sufficient information to avoid recurrence of the reaction. The name and possible sources of the allergen should be given to the patient.

## IMPROVING PATCH TESTING PROCEDURE

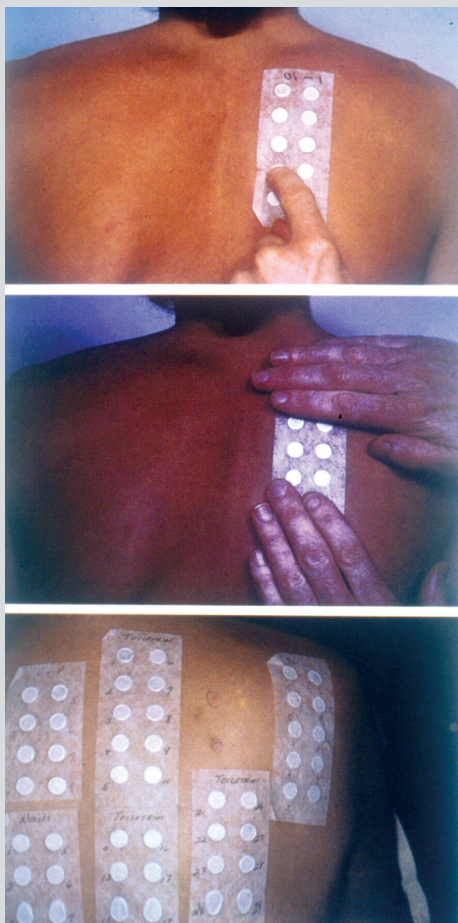
Patch testing is a simple procedure but the selection of the patch test allergen for patch testing and interpretation of patch test reactions requires adequate experience. Since the introduction of patch testing, ideas for refining the technique and the interpretation of its clinical relevance have been ongoing resulting in great improvements in patch-test technology, patch-test strategy, and interpretation of patch-testing. This in turn has improved the way we manage occupational contact dermatitis.

To further refine Jadassohn's patch testing<sup>1</sup>, the following questions might be addressed:

- Stability of patch test allergens<sup>2</sup> – what is the bio-availability of the test allergens over time?

**“Often unsuspected causes of allergic contact**

**dermatitis can be identified.”**



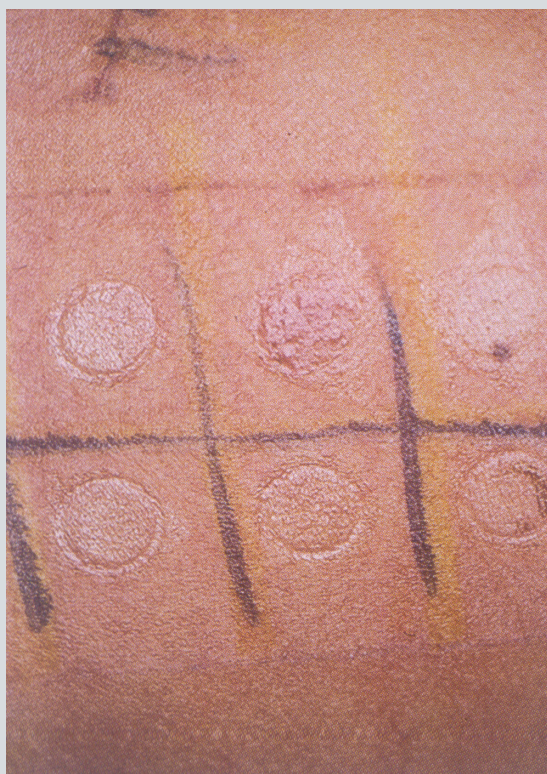
**Figure 1. Patch testing procedure – application of patch test battery on the patient’s back**



**Figure 2. European standard battery**



**Figure 3. A strongly positive patch test reaction with erythema and vesiculation**



**Figure 4. A weakly positive and negative reaction**

- Identifying the causative allergen – we often assume that causative chemical produces the positive patch test but could it have been a metabolite<sup>3,4</sup>?
- What of the need for serial dilutions testing as not everyone reacts to the same concentration of a substance and clinical immunology should not be considered an “all or none” science?
- How do we define irritancy as allergens are marginal irritants, resulting in false positive patch-test reactions?
- What is the ideal patch test occlusion duration – is the standard 48 hours occlusion necessary<sup>5,6</sup> as patients would appreciate a shorter wearing time?
- How do we interpret clinical relevance of positive patch-test reactions which may signify an immunologic response, but may have little or no clinical significance?<sup>7-9</sup>

To further improve the diagnosis of ACD, the future will see research into identifying less invasive procedures, *in vitro* diagnostic methods, skin physiology measurement instruments, and ribonucleic acid diagnostic methods. However, these procedures include animal studies and are still in the experimental stage so are not readily available for clinical use.

and interpretation, further refinements are needed. Furthermore, patch testing remains unavailable in many dermatology departments. There is an urgent need to improve the availability of such testing.

### LESSONS LEARNED

- Patch testing should be carried out with the proper standard technique and the test allergens should be pure and properly diluted in an appropriate base.
- The standard battery should be applied on all patients undergoing patch testing. Additional patch test series can then be added depending on the suspected aetiology of the allergic reaction.
- An allergic reaction should persist after 48 hours.
- A positive reaction must be interpreted correctly as it may be of present or past relevance.
- False positive or negative reactions can occur.

*“The . . . procedure is simple but reading and interpretation of the reaction requires experience.”*

### AVAILABILITY OF PATCH TESTING FOR OCCUPATIONAL ALLERGIC CONTACT DERMATITIS

Patch testing remains unavailable in many dermatology departments in some developing countries. In South Africa for example, only one or two of the eight academic dermatology training centres do patch testing, the main limiting factor being the cost of running a contact dermatitis clinic. Up until such time that we have adequate resources and funding, proper and holistic management of occupational contact dermatitis will remain a challenge for developing countries like South Africa. Efforts should be made to ensure that patch testing is made available in as many dermatology centres as possible to benefit patients with occupational contact dermatitis.

### CONCLUSION AND RECOMMENDATIONS

Patch testing is a key component of the accurate diagnosis and management of occupational allergic contact dermatitis. Despite improvements in the procedure

### REFERENCES

1. Rycroft RJG. Textbook of contact dermatitis. Berlin and New York: Springer; 2001. p. 5.
2. Frick M, Zimerson E, Karlsson D, Marand A, Skarping G, Isaksson M, et al. Poor correlation between stated and found concentrations of diphenylmethane-4,4'-diisocyanate (4,4'-MDI) in petrolatum patch-test preparations. *Contact Dermatitis*. 2004;51(2):73–8.
3. Aeby P, Sieber T, Beck H, Gerberick GF, Goebel C. Skin sensitization to p-phenylenediamine: the diverging roles of oxidation and N-acetylation for dendritic cell activation and the immune response. *J Invest Dermatol*. 2009;129(1):99–109.
4. Krasteva M, Bons B, Ryan C, Gerberick GF. Consumer allergy to oxidative hair coloring products: epidemiologic data in the literature *Dermatitis* 2009;20:123–41.
5. Ale SI, Maibach HI. 24-hour versus 48-hour occlusion in patch testing. *Exog Dermatol*. 2003;2:270–6.
6. Rougier A, Lotte C, Maibach HI. In vivo percutaneous penetration of some organic compounds related to anatomic site in humans: predictive assessment by the stripping method. *J Pharm Sci*. 1987;76:451–4.;
7. Hostynek JJ, Maibach HI. Thresholds of elicitation depend on induction conditions. Could low level exposure induce sub-clinical allergic states that are only elicited under the severe conditions of clinical diagnosis? *Food Chem Toxicol*. 2004;42:1859–65.
8. Lachapelle JM. A proposed relevance scoring system for positive allergic patch test reactions: practical implications and limitations. *Contact Dermatitis*. 1997;36:39–43.
9. Marrakchi S, Maibach HI. What is occupational contact dermatitis? An operational definition. *Dermatol Clin*. 1994;12:477–84.

# SASOHN supports Breast Cancer Awareness Month

In addition to 2010 being the International Year of the Nurse, October is Breast Cancer Awareness Month. In recognition of the centenary of the passing of Florence Nightingale a "My100" initiative was launched for 2010. EXCO embarked on a project through Reach for Recovery that simultaneously provided involvement in the My100 and highlighted Breast Cancer Awareness Month.

Reach for Recovery's comprehensive programme enables women to make relevant personal decisions about their diagnosis and treatment. Women volunteers, who have experienced breast cancer, assist by offering support, giving advice and fitting women with prostheses. Receiving no government grants, the programme is totally reliant on public support to fund the supply of external breast prostheses to women who thereby regain their self-esteem. Costing about R600 each, the increasing number of affected women makes fundraising imperative. This service is offered at Charlotte Maxeke/Johannesburg Academic Hospital, Chris Hani Baragwanath and RFR East Rand.

SASOHN commends and supports Reach for Recovery, but rather than donate money EXCO decided to "DO". Our contribution was in folding pink ribbons to be sold by Reach for Recovery to organisations, which then distribute them to be worn on lapels in October. A target of 100 ribbons per EXCO member was set, and with a team of 20 that would have meant 2000 ribbons. However, due to the overwhelming enthusiasm and the



**SASOHN Executive Committee with over 11 000 pink ribbons folded for Breast Cancer Awareness Month**

involvement of regional committees, 11 124 were folded which will raise R11 000.00. This project was particularly meaningful for SASOHN as we have members who are breast cancer survivors, as well as past members who lost their battle with cancer.

*SASOHN Executive Committee*

## The Value of the OHNP of the Year Award

### Background

The award is presented to the most outstanding OHNP as audited by peers in accordance with criteria contained in the SASOHN Constitution. As a previous winner (2008) I would like to share my experience in the hope that more practitioners will subject themselves to this process.

I have been a practicing OHNP since 1983 and am passionate about my job. With encouragement from SASOHN West Rand and a desire for professional development, I was nominated as a candidate for the award in 2007. Having investigated the peer evaluation process, I spent the year reviewing my clinic setup and felt confident that I met all criteria, making me a good candidate for the award. Throughout, I received support from my region, employer and the occupational medical practitioner with whom I worked.

### The Regional Audit

Three auditors (one from a similar industry, one with auditing experience, and a SASOHN member) all from the candidate's nominating region conduct the audit. In addition to the support and encouragement of the team, I was fortunate to have a past winner as one of my auditors, which gave me tremendous insight into the national process. I learnt much about service delivery and administration of the occupational health centre, especially as it was the first time that my peers – people with insight and driven by the same goals and knowledge – were evaluating my clinic. Having scored over 90% on the audit I was eligible for the next round.

### The National Audit

EXCO reviews the eligible regional candidates, conducts a verification audit of the top two to ensure that their scores are a true reflection of their work and then determines the national winner. During this audit I felt intimidated and stressed, as everyone seemed to be requesting documentation at the same time. However, the auditors explained their intent and provided guidance, and I realised that I would not have wanted to participate in an audit that was just a "tick" process. Apart from verifying, the auditors complimented me on what was in place and offered further help. The standards and criteria are intended to maintain and enhance the ethos of our profession. The reward for my efforts was National Runner-up in 2007, a learning experience like none I had previously experienced and improved service delivery as a result of acting on their recommendations.

After much deliberation, I re-entered in 2008. A second award had been introduced to recognise individual OHNPs separately from corporate OHNPs since service delivery through a corporate environment is very different to that

of an individual practitioner. My first experience made me realise that although I was confident I needed to "lift the bar". I was honoured with the award and the personal achievements for me include enhanced self-esteem, the ability to transfer skills to others, recognition both by peers and within the business environment, and achieving better standards in the clinic. Despite many hours of work and stress it was a motivating and unbelievable learning experience. I therefore strongly recommend that all OHNPs go through this audit even if only at a regional level. A good start would be to conduct a self audit using the SASOHN evaluation tool and then ask a mentor to audit you.



**Ann Davis with the SASOHN OHNP of the Year award – Individual Category 2008**

### Conclusion

Even though I was honoured to receive the award this should not be the sole purpose of participating. Maintaining and developing our profession is paramount and by meeting all the criteria we are enhancing our clients' health care.

*Ann Davis*

### MESSAGE FROM SASOHN EDUCATION REPRESENTATIVE

When SASOHN introduced the OHNP of the Year Award in 2001 to acknowledge excellence within the profession at clinic level, a minimum score of 80% at audit was required for consideration as a candidate. We note with great pride that every award winner has scored over 97%. It must also be remembered that the activities of the practitioner and not the company are assessed and recognised with this award. To all past winners, SASOHN again extends its congratulations – we honour each of you for your achievement. To those future winners – you have to take the first step to be a winner.

*Karen Michell*

# Report on the SASOM Annual Congress and promotion of the African Regional Association of Occupational Health



In an attempt to promote a revival of the African Regional Association of Occupational Health (ARAOH), SASOM invited many of the ICOH2009 delegates who came from countries in Africa, to attend the SASOM Annual Congress and a meeting on progress with the revival held near Johannesburg from 29 to 30 July 2010. The invitation included sponsorship by SASOM for accommodation, local travel and the Congress fees.

ARAOH is a scientific society that aims to foster scientific progress, knowledge transfer and the development of all aspects of occupational health, across the African continent.

An ICOH Board member, Ms Uche Ojomo from Nigeria, Drs Kader Toure and Khalief Cisse from Senegal, and Dr Musa Nyandusi from Kenya participated in the meeting with members of the SASOM Executive Committee and other interested persons, to discuss progress on a draft ARAOH constitution and a conference for the African region in 2011. This International Congress will probably take place in Johannesburg from 22 to 24 August 2011 and we invite support from all interested in the spreading of occupational health information throughout Africa.

The theme of the SASOM Annual Congress was 'Clinical Conditions in Occupational Health Care' and the excellent presentations included:

- Your voice and your work presented by Dr JW Callaghan and Ms R Gous;
- Eye injuries and management thereof by Prof. T Carmichael;
- Contact dermatitis and fungal infections of the skin by Dr H Carman;
- Cardiac conditions and diabetes mellitus in the workplace by Prof. J Ker;
- Physical disablement and work by the National Council for People with Physical Disabilities;



**Dr Mary Ross pictured with ICOH Board member, Ms Uche Ojomo**

- Depression and post traumatic stress disorder by Dr V Ferreira;
- Respiratory problems and work presented by Prof. G Richards;
- Interpretation of spiromograms and management of programmes by Mr C van der Westhuizen;
- Renal failure and dialysis at work was explained by Dr H Bierman;
- Immune activation in HIV in 2010 by Prof. L Webber was an excellent update;
- Viral hepatitis by Prof. L Webber also shed new light on the subject;
- Infection control in the workplace by Ms R van der Gryp; and
- Balance, co-ordination and cerebellar disorders was presented by Dr W Duim.

The two-day programme also included stress management and interactive sessions on laughing therapy, music therapy and equine assisted psychotherapy, and was thoroughly enjoyed by all the delegates who remained to the end on a Friday afternoon! We thank them for their contributions and appreciation.

*Jenny Acutt, SASOM National Office,  
E-mail: [info@sasom.org](mailto:info@sasom.org)*

**D**ear SAIOH member

The Council met on the 6th of August 2010. A number of matters were discussed.

The Gauteng Branch hosted a workshop on the 19th of August 2010 at Shere View Lodge Conference Centre in the East of Pretoria on Nanotechnology. The event was well attended by about 70 delegates and eight exhibitors.

Presentations included:

- SAIOH – what's in it for me? – Melinda Venter.
- Introduction to Nanotechnology – Philip van Dyk.
- Radiation – Frik Beeslaar.
- Laboratory Analysis – Eugene Cowley.
- Occupational Health and Hygiene National Programme – Milly Ruiters.
- New Instrumentation – Howard Palmer.

The presentations can be downloaded from the SAIOH website ([www.saioh.co.za](http://www.saioh.co.za)). Thank you to the organisers. Council supports workshops and seminars as a platform to learn, share knowledge and also gain CPD points.

The KZN branch met on the 15th July 2010 with the main topic discussed being vibration. The next meeting will be held on 25 September 2010.

Mpumalanga branch members met on 21st May 2010. The subject under discussion was vibration. The attendance by invited guests from Government departments was disappointing. It was noted that there was some concern regarding Department of Labour inspectors' ability to measure vibration.

SAFECONEX will not be held in 2011 as it will only take place every second year in the future. SAIOH will therefore arrange a national conference in the second half of 2011. Contributions from all members in all regions will be appreciated. Ideas can be forwarded to [melindav@lantic.net](mailto:melindav@lantic.net).

The Department of Labour has requested all Occupational Health and Hygiene Approved Inspection Authorities (AIAs) to update their details. A final AIA list will be available from the department from the 20th of September 2010.

Note: Both optimists and pessimists contribute to our society. The optimist invents the aeroplane and the pessimist the parachute (Gil Stern). Let us, within the occupational hygiene profession, choose to be the optimist!

Best wishes 'till our next issue!

*Melinda Venter,  
SAIOH President*



Full attention being given to the speaker



Delegates enjoying the tea break

# Mine Medical Professionals' Association Thirteenth Annual Congress 8–10 October 2010



The congress will be held at Valley Lodge, less than an hour from the heart of Gauteng. Set on the banks of the Magalies River, Valley Lodge is a glorious blend of time-honoured tradition and modern hospitality.

Facilities: walking trails, fly fishing (catch and release), rowing boats, swimming pool, three tennis courts (1 floodlit), billiards table, pool tables, fully equipped gymnasium, bird watching, small game viewing, volley ball, croquet, boule and children's play area.

This CPD accredited congress will be of interest and great benefit to all practicing health care professionals.

To secure your booking please contact Jacqui Myers, Committee Secretary, +27 (0)11 498 7377 or [jmyers@bullion.org.za](mailto:jmyers@bullion.org.za).

It is anticipated that the Congress will be well subscribed; therefore it is advised that you book as soon as possible, as rooms will be allocated on a first-come, first-served basis.

## PROVISIONAL PROGRAMME

### Friday, 8 October 2010

12h00 – 12h30 Registration, tea, coffee and sandwiches

12h30 – 12h40

#### SESSION 1

**Dr Deodat Kritzinger, President and Chairperson: Official Welcome**

12h45 – 13h20 Sietse van der Woude: The Rocky Road to Zero Harm

13h25 – 14h00 Roger Baxter – Chief Economist, Chamber of Mines

Challenges and Opportunities in the Mining Industry

14h05 – 14h40 Prof. Efraim Kramer

Haitian Earthquake Experience in Search and Rescue

14h45 – 15h20 Prof. Lucille Blumberg

Update on Infectious Diseases

15h20 – 15h50

#### TEA BREAK

#### SESSION 2

**Chairperson – Dr Charles Mbekeni**

15h50 – 16h25 Dr L Ndelu: MBOD: Challenges and New Opportunities

16h30 – 17h05 Dr Thuthula Balfour-Kaipa: The Chamber's Approach to TB in Mining

17h10 – 17h45 Peter Ucko: Smoking – Public Health

17h50 – 18h20 Sponsors' Slot

18h30

#### DINNER

### Saturday 9 October 2010

07h30 – 08h30 **BREAKFAST**

#### SESSION 1

**Chairperson – Dr B Mokgata**

08h30 – 09h05 Prof. Mary Ross: Ethics of Providing an Occupational Health Service in the Economic Crisis

09h10 – 09h45 Dr Anna Stratling: Recent Advances in Antibiotics

09h50 – 10h25 Dr A Moodley: TB Management Best Practice

10h25 – 10h55 **TEA BREAK** X-Ray Viewing

#### SESSION 2

**Chairperson – Dr N Mtshali**

10h55 – 11h30 Dr Don Emby: Don't Die by Mistake (Part 2)

11h35 – 12h10 Dr Danie van Tonder: Acute Trauma Life Support in the Mining Setting

12h15 – 12h50 Dr Andy Lancaster: The Treatment of Hand Sepsis

12h50 – 13h50 **LUNCH** X-Ray Viewing

#### SESSION 3

**Chairperson – Dr F Prins**

13h50 – 14h25 Dr Jim Murphy: Ethics

14h30 – 15h05 Dr Wendy Neethling: Mining Related Deaths and Causes

15h10 – 15h45 Dr Lesego Rametsi-Dikoma: Wellness of the HIV/AIDS, TB Patient

15h45 – 16h15 **TEA BREAK**

#### SESSION 4

**Chairperson – Dr L Maiphethlo**

16h15 – 16h50 Prof. Jill Murray: Wellness Clinic: Insights from an 8 year old population based study.

16h55 – 17h30 Dr Charles Mbekeni: Handling of NIHL Shifts

17h35 – 17h50 Dr Don Emby: Answers to X-Ray Quiz

17h55 – 18h10 Dr Vanessa Govender (Past President):

Closure of Congress

18h30

#### DINNER

### Sunday, 10 October 2010

08:00 – 10:00 Breakfast and check out of the lodge after settling personal accounts.

For further information contact Jacqui Myers, Committee Secretary, +27 (0)11 498 7377 or [jmyers@bullion.org.za](mailto:jmyers@bullion.org.za)

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