WORK SAFE BC
WORKING TO MAKE A DIFFERENCE

Policy and Research Division

Mailing Address
PO Box 5350 Stn Terminal
Vancouver BC V6B 5L5

Location
6951 Westminster Highway
Richmond BC

Telephone 604 276-5160
Fax 604 279-7599

WorkSafeBC

Policy and Research Division Discussion Paper

Compensation for Occupational Asthma and Contact Dermatitis

February 2006

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Discussion Paper

Compensation for Occupational Asthma and Contact Dermatitis

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DISCUSSION PAPER

1. TITLE

Compensation for Occupational Asthma and Contact Dermatitis

2. ISSUE

A worker who develops an allergy or hypersensitivity to a workplace substance that results in an asthmatic reaction or signs and symptoms of contact dermatitis is considered to have an occupational disease. Compensation is payable to such a worker during the period he or she is symptomatic. Under current policy, compensation, in the form of wage loss and/or a permanent disability award, is not payable when the worker's signs and symptoms have resolved and he or she is simply left with an underlying allergy or hypersensitivity to the workplace substance.

At issue is whether, given current scientific evidence, policy should be amended to provide compensation to workers who are asymptomatic[1] when removed from work, but who must avoid worksites containing a triggering substance or risk increasingly severe asthmatic reactions or flare-ups of contact dermatitis.

3. BACKGROUND

3.1. Legislation

Section 6(1) of the *Workers Compensation Act* ("*Act*") addresses compensation for occupational diseases. It establishes that three criteria must be met before WorkSafeBC - the Workers' Compensation Board ("WCB") can provide compensation to a worker:

1. The disease in question is recognized by the WCB as an occupational disease.

2. The occupational disease is due to the nature of the worker's current or past employment. Thus, once it is determined that a worker has a recognized occupational disease, the WCB must consider in each case whether the worker's employment played a significant role in causing or aggravating the disease.

[1] An "asymptomatic worker" is one who is symptom-free when removed from the workplace containing the triggering substance and who does not require medication to control signs or symptoms of the disease.

3. The worker is disabled from earning full wages at his or her normal employment as a result of the occupational disease.

Section 6(3) of the *Act* creates a rebuttable presumption that certain occupational diseases are work-related. It provides that where a worker employed in a process or industry listed in the second column of Schedule B of the *Act* contracts the disease listed in the first column, the disease is deemed to be due to the nature of the worker's employment, unless the contrary is proved. Both asthma and contact dermatitis are listed as occupational diseases in Schedule B.[2]

Section 23(1) of the *Act* provides that if a permanent partial disability results from a worker's injury, the WCB must estimate the impairment of earning capacity from the nature and degree of the injury. Compensation under this provision is provided for occupational diseases as if they were personal injuries.

Section 23(2) of the *Act* grants the WCB authority to compile a rating schedule of percentages of impairment of earning capacity for specific injuries to use as a guide in determining the compensation payable in permanent disability cases.

3.2. Policy

Current WCB policy on asthma and contact dermatitis provide that temporary disability benefits are payable until the temporary disability ends or until the worker's symptoms have stabilized.[3] Where the worker's symptoms do not entirely resolve and he or she is left with a permanent functional impairment, a permanent disability award may be granted.

However, policy generally excludes permanent disability benefits if:

- the worker's signs and symptoms have resolved;
- the worker has the same physical capabilities as before (although he or she may be precluded from a limited number of occupations because of the need to avoid exposure to the triggering substance); and
- the worker is left with an underlying allergy or hypersensitivity.

In such situations, the asymptomatic worker is no longer considered to have an occupational disease. Where the worker has to change jobs to avoid contact with the triggering substance, vocational rehabilitation assistance may be provided. However, no permanent disability award is granted to compensate for any loss of earnings as a result of the need to change employment.

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[2] Asthma is listed in Schedule B in connection with exposure to (1) western red cedar dust; (2) isocyanate vapours or gases; or (3) the dust, fume or vapours of other chemicals or organic material known to cause asthma. Contact dermatitis is listed in Schedule B in connection with excessive exposure to irritants, allergens or sensitizers ordinarily causative of dermatitis.

[3] See policy item #29.20 "Asthma" and policy item #30.50 "Dermatitis" of the *Rehabilitation Services & Claims Manual*, Volume II ("*RS&CM*").

It should be noted that a pre-existing asthma or dermatitis condition is not compensable unless it has been significantly aggravated, activated or accelerated by an occupational exposure. A worker is not entitled to compensation where his or her pre-existing condition is triggered or aggravated by substances which are present in both occupational and non-occupational settings unless the workplace exposure can be shown to have been a significant cause of an aggravation of the condition.

3.3. Practice

3.3.1. Asthma

The WCB Disability Awards Department has adopted guidelines, known as the "asthma impairment classification table", to assess permanent disability awards for asthma. The table is based upon the asthma impairment ratings in the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 5th edition (*"AMA Guides*"). However, it has been adapted to cover situations where the worker has episodes of subjective symptoms, such as shortness of breath on exertion, that are not clinically measurable. Workers with these types of subjective symptoms are considered to have a 3% to 9% impairment of the whole person, depending upon the severity of symptoms.[4] In contrast, under the *AMA* Guides, these workers would receive a 0% impairment rating.

The asthma impairment classification table developed by the Disability Awards Department does not address situations where the worker is asymptomatic when away from the worksite, but must change jobs to avoid the triggering substance.

In terms of statistics, from 1984 to 2004, the WCB accepted 1,118 claims for all work-related asthmas. There was a general increase in claims for asthma over this twenty year period; however, since 2000 the number of claims has consistently decreased. The majority of claims were for short-term disability, with approximately 22% of these becoming long-term disability claims. The wood and paper products subsector had the highest number of claims, the highest number of days lost and the greatest cost per claim compared with other subsectors. On the other hand, although the total number of claims for asthma increased from 1984 to 2004, there was a general decline in claims for red cedar dust asthma over this same period.

3.3.2. Dermatitis

The Disability Awards Department has developed an impairment classification table for skin conditions, based on the *AMA Guides.* The table applies to skin

[4] Workers whose impairment can be measured based upon reduced lung function, the degree of airway responsiveness and the type and amount of medication required to control symptoms may receive an impairment rating of between 10% and 100%.

conditions generally and is not limited to contact dermatitis. It assigns impairment ratings based upon whether the worker:

- is symptomatic and, if so, how often;
- requires treatment for his or her symptoms; and
- has been limited, as a result of the condition, in his or her activities of daily living.

As with the asthma impairment table, the skin conditions table does not address the situation of a worker who is asymptomatic when removed from the worksite, but must avoid workplaces containing a triggering substance.

In terms of statistics, from 1984 to 2004, the WCB accepted 4,162 claims for occupational contact dermatitis. The number of claims has consistently decreased over this twenty year period. The majority of claims were for short-term disability, with only approximately 1.6% of these becoming long-term disability claims. The accommodation, food and leisure and healthcare subsectors had the highest number of claims and the highest number of days lost. The highest average cost per claim was observed in the wood and paper products subsector. The highest average days lost per claim was observed in both the general construction and wood and paper products subsectors.

3.4. How this issue arose

The WCB's current policies on asthma and contact dermatitis can be traced to a 1976 Commissioners Decision which considered whether a worker diagnosed with an allergy to red cedar dust was eligible for a disability award[5]. The worker in that case could not continue in employment where he would be exposed to red cedar dust. The Commissioners found that a person who has the same physical capabilities as before the occurrence of the occupational disease, but who is precluded from a limited number of occupations because of a remaining allergy, is not eligible for a permanent disability award. The Commissioners characterized the worker's change of employment to avoid the offending substance as a preventive measure for which no permanent disability award is payable.

Over the years a number of appeal decisions have expressed doubt about the policy statement providing that once symptoms of asthma or contact dermatitis have resolved, the underlying allergy or sensitivity does not constitute an occupational disease. It has been suggested that the allergy remains present in the worker's body, even if asymptomatic, producing long-term physical changes.[6]

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[5] *Workers' Compensation Reporter* Decision No. 206 re: Allergy Due to Red Cedar Dust.

[6] See, for instance, Appeal Division Decision #00-1770.

4. DISCUSSION

As part of the policy development process, the WCB commissioned separate scientific reviews for occupational asthma and contact dermatitis. To avoid confusion, this paper discusses each condition separately, with asthma addressed in Tab A and contact dermatitis in Tab B.

5. CONSULTATION

Stakeholders are invited to provide feedback on the discussion paper, options, draft policy, and any additional comments that may be relevant to the issue.

Stakeholder comments will be accepted until **May 12, 2006**. When responding, please provide your name, organization, and address. Comments may be sent by mail, fax or e-mail to:

By mail: Susan Furlong
Acting Policy Director
Policy and Research Division
P.O. Box 5350, Stn. Terminal
Vancouver, B.C. V6B 5L5
By fax: 604 279-7599
By e-mail: policy@worksafebc.com

In addition, comments may be submitted through the online submission form on WorkSafeBC's website.

The WCB's governing body, the Board of Directors, will consider the options expressed by stakeholders before it adopts any amendments to the current policies.

Please note that all comments become part of the Policy and Research Division's database and may be published, including the identity of organizations and those participating on behalf of organizations. The identity of those who have participated on their own behalf will be kept confidential according to the provisions of the *Freedom of Information and Protection of Privacy Act*.

TAB A
ASTHMA

1. DISCUSSION

1.1. The Scientific Review Process

The WCB's Policy and Research Division ("PRD") commissioned Dr. Susan Tarlo of the University of Toronto[7] to review the medical/scientific literature on occupational asthma and to answer the following questions:

(1) Does an individual have asthma:
- only when he or she is displaying signs or symptoms of the disease; or
- also when he or she has developed an underlying allergy or sensitivity that may trigger these symptoms.

(2) Does an individual who has an underlying allergy or sensitivity to a workplace substance but who no longer displays the signs or symptoms of asthma once removed from the aggravating substance have a permanent impairment? If so:
(i) how is the impairment measured?
(ii) is there a threshold level below or above which the individual is considered not to have a permanent impairment?

Dr. Tarlo provided a report to the WCB in November 2004. This report was reviewed by Dr. Carrie Redlich of Yale University[8], who submitted her peer review to the WCB in March 2005. After considering the comments in the peer review report, Dr. Tarlo submitted a revised report in April 2005. In addition, Dr. Tarlo provided clarification on a number of questions raised by the PRD in June 2005. Dr. Tarlo's revised report is found at Appendix I. Dr. Redlich's peer review is found at Appendix II.

1.2. Dr. Tarlo's Review

Dr. Tarlo's report responds to the two specific questions that the PRD had submitted to her.

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[7] Dr. Tarlo is a professor in the Department of Medicine and the Department of Public Health at the University of Toronto. She is also a staff physician at Toronto Western Hospital and Gage Occupational and Environmental Health Unit.

[8] Dr. Redlich is a professor at Yale University School of Medicine Occupational and Environmental Medicine Program (Associate Director) and Section of Pulmonary and Critical Medicine. She is also a staff physician at the Yale-New Haven Hospital and the West Haven Veterans Administration.

It should be noted that there are two types of occupational asthma, which can be distinguished according to whether they are induced by exposure to a workplace sensitizer or respiratory irritant. Sensitizer-induced asthma may develop after a period of exposure to a triggering substance (sensitizer) that may vary from a few weeks to years. Irritant-induced asthma does not have a latency period and follows exposure to a respiratory irritant, including certain gases, fumes and chemicals, on one or several occasions.[9] If a worker has a pre-existing non-occupational asthma, signs and symptoms of the disease may be induced by work-related exposure to a sensitizer or respiratory irritant.

Dr. Tarlo states that she has focused her responses upon sensitizer-induced asthma, although the comments about airway hyperresponsiveness would also apply to irritant-induced asthma.

(i) Does an individual have asthma:

- **only when he or she is or she is displaying signs or symptoms of the disease, or**
- **also when he or she has developed an underlying allergy or sensitivity that may trigger these symptoms?**

Dr. Tarlo states that the answer to this question is both "yes and no". She suggests that, given the episodic nature of asthma symptoms, this question is not straightforward.

She notes that there is no generally accepted definition of asthma. However, the disease is characterized by symptoms such as shortness of breath, chest tightness, wheezing, sputum production and cough associated with variable airflow limitation and airway hyperresponsiveness. She notes that symptoms and pulmonary function changes are episodic, rather than constant. As a result, it is possible for a person to have asthma even though objective tests may be normal at the time they are performed.

In cases where a person has been objectively diagnosed with asthma, but is currently asymptomatic, most clinicians would still consider that the person has asthma if there has been a history of symptoms in the past year. Dr. Tarlo notes that there is no agreed fixed cut-off time period beyond which one would clearly say that a person no longer has asthma, although a period of two to three years with no symptoms and without taking asthma medication could be considered as not "having current asthma". Most epidemiologic studies of asthma have included asthma symptoms within the past 12 months as "having asthma". Nevertheless, even if there have been no symptoms within the past three years, this does not mean that the person could not again develop asthma symptoms with the right trigger/exposure.

[9] M.C. Yeung & J.L. Malo, *Occupational Asthma* (1995) 333 New England Journal of Medicine 107.

(ii) Does an individual who has an underlying allergy or sensitivity to a workplace substance but who no longer displays the signs or symptoms of asthma once removed from the aggravating substance have a permanent impairment? If so:
(a) how is the impairment measured?
(b) Is there a threshold level below or above which the individual is considered not to have a permanent impairment?

Dr. Tarlo's answer to question (ii) is "yes", an asymptomatic person with an underlying allergy or sensitivity to a workplace substance may have a permanent impairment. She notes that, even in the absence of ongoing asthma symptoms after removal from the workplace, there can be resulting impairment due to the fact of being sensitized to a workplace substance. The extent of impairment may relate in part to how ubiquitous the sensitizer and any cross-reacting agents are both in and outside the workplace.[10] In addition, the fact of sensitization can limit future job opportunities for the worker if the same sensitizer or cross-reacting sensitizers are used in potential future workplaces. This may be a very minor impairment if the sensitizer is confined to workplaces that the person is able to avoid, or it may be a greater medical impairment if it is a sensitizer found in everyday life, such as natural latex rubber.

In addition, Dr. Tarlo notes that asymptomatic airway hyperresponsiveness,[11] which is associated with transient asthma-like symptoms during periods of viral respiratory infections, exercise in cold air or exposure to relevant non-occupational allergens, also represents an impairment. The extent of this type of impairment depends on the clinical history of such symptoms, medication needs and pulmonary function assessments.

In response to question (ii)(a), Dr. Tarlo states that the overall impairment would be measured by considering:

(a) the fact of being sensitized and the extent to which the sensitizer is found firstly in workplaces from which the worker is excluded and secondly in everyday life outside the workplace; and

(b) the extent of airway hyperresponsiveness.

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[10] A person with a sensitivity to a workplace substance may also have to avoid situations outside the workplace where there may be exposure to the sensitizer or cross-reacting substances. For example, if the triggering workplace substance was natural rubber latex, the worker would also have to avoid the substance during future medical or dental procedures. In some cases, the worker may also have to avoid certain cross-reacting fruits.

[11] Asymptomatic airway hyperresponsiveness means that the person has airways that are more reactive than normal to a stimulus such as methacholine or histamine, but does not have asthma symptoms outside of the laboratory setting.

In subsequent communications with the WCB, Dr. Tarlo clarified that she used the term "impairment" in the sense that if the person were exposed to the sensitizer, at work or elsewhere, he or she would likely have an asthmatic response. The person has an abnormal immune state (sensitization) that creates the risk of an adverse medical event.[12] Dr. Tarlo indicated that the WCB would have to decide whether her use of the term "impairment" met its criteria for determining whether a worker had a permanent impairment.

In response to question (ii)(b), Dr. Tarlo states that:

- There is no threshold level for permanent impairment due to the fact of being sensitized to a workplace substance. However, if the worker is re-employed in a new environment where he or she would never have exposure to the sensitizer the ongoing impairment may be minimal.

- A threshold for airway hyperresponsiveness causing no permanent impairment may be considered when airway responsiveness is very clearly in the normal range when no asthma medications are being taken.

1.3. Peer Review

Dr. Redlich provided a very favourable review of Dr. Tarlo's report. She notes that Dr. Tarlo clearly and appropriately addresses the questions posed. She agrees with Dr. Tarlo's answers, which she describes as well supported by the literature cited, and has no major criticisms or comments. She indicates that the literature, research and examples cited are relevant, accurate and sufficient.

Dr. Redlich does make some minor suggestions, such as clarifying how the report applies to irritant-induced occupational asthma. In response to Dr. Redlich's comments, Dr. Tarlo submitted a revised report to the WCB incorporating a number of minor changes.

1.4. Implications of the Scientific Review

Dr. Tarlo's report indicates that a person who has been asymptomatic for at least two to three years may be considered not to have current asthma. However, she also suggests that the fact of being sensitized to a workplace substance represents a medical impairment even in the absence of ongoing symptoms after removal from the workplace. The extent of the impairment may be measured by how common the substance is in occupational and non-occupational settings. Dr. Tarlo leaves open the question of whether the fact of being sensitized would qualify as an impairment for the purposes of the workers' compensation system.

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[12] For high molecular weight sensitizers, such as wheat flour and animal dander, this abnormal immune response can be measured by testing for IgE antibodies. In the case of low weight sensitizers, such as plicatic acid in red cedar dust and isocyanates, testing for IgE antibodies is a less useful measure. The immunologic response that provokes an asthmatic reaction to low weight compounds is not well understood.

1.4.1. Is there a permanent impairment?

Permanent disability awards in BC are generally based upon the worker's estimated loss of earning capacity, which involves a consideration of the likely impact of the worker's permanent impairment upon his or her earning potential. Thus, two factors must be present before a permanent disability award may be considered. First, the worker must have a permanent impairment. Second, there must be an estimated loss of earning capacity as a result of the permanent impairment.

The term "impairment" is not defined in either the *Act* or policy. However, it is generally understood to mean loss of physical function. This is similar to the definition in the *AMA Guides* as "a loss, loss of use, or derangement of any body part, organ system or organ function".

In many instances, a worker's permanent impairment can be objectively measured. For instance, it is possible to quantify impairment caused by a knee injury by calculating how it has affected the worker's range of motion in the knee joint. In addition, the scope and progression of diseases, such as cancer, can be objectively assessed. In contrast, the loss of physical function as a result of a workplace sensitization is not readily quantifiable in cases where the worker is asymptomatic when removed from the workplace.

On the other hand, the WCB has experience in compensating workers with permanent impairments that are not objectively quantifiable, including chronic pain, tinnitus and certain psychological conditions. As a result, it is not implausible to provide a permanent disability award in situations where an impairment is neither visible nor readily measurable.

The question becomes whether sensitization to a workplace substance, in the absence of ongoing signs and symptoms after removal from the worksite, constitutes a permanent impairment for the purposes of the workers' compensation system. This is essentially a question of policy choice.

On the one hand, it could be argued that there is no loss of function because, provided he or she avoids the triggering substance, the worker is physically sound with no ongoing need for asthma medication. As a result, the worker has not sustained a permanent impairment, although there may be periods of temporary impairment upon re-exposure to the triggering substance.[13] Re-exposure may eventually result in a permanent impairment when symptoms do not entirely resolve following removal from the workplace.

Such an approach would support retaining current policy. It is also consistent with the WCB's approach to preventive removal from the workplace in other situations where there is no permanent impairment.[14] For instance, a worker with

[13] The periods of temporary impairment may be compensable if work-related.
[14] See policy item #32.60, "Preventive Measures and Exposures" of the *RS&CM*, Volume II.

an activity-related soft tissue disorder ("ASTD"), such as tendonitis, does not receive a permanent disability award where he or she is removed from the worksite as a proactive measure to prevent a permanent impairment.[15]

On the other hand, the fact that the worker's hypersensitivity results in a need to avoid workplaces and other environments containing the triggering substance could be characterized as a loss of function stemming, as Dr. Tarlo suggests, from an "abnormal" immune state. The worker has sustained a loss of function in that he or she is no longer physically able to do work involving exposure to the triggering substance without having an asthmatic reaction. The worker's situation differs from other instances where a worker is removed from a workplace as a preventive measure because he or she has a residual hypersensitivity characterized by a propensity to react to small amounts of the triggering substance. In extreme cases, there is a potential that exposure to even minute quantities of the triggering substance could result in anaphylactic shock. This type of hypersensitivity could be characterized as an immunological impairment.

In contrast, a worker who, for instance, has bouts of tendonitis and who changes employment because he or she is at risk of permanent impairment does not have an ongoing underlying hypersensitivity. A worker with an ASTD may have to avoid certain repetitive motions, but does not have to avoid certain workplaces altogether because of the risk of a severe physiological reaction.

Nevertheless, it has been argued that hypersensitivities are no different than any other medical restriction or limitation which prevents a worker from returning to his or her workplace. By recognizing the underlying hypersensitivity as a permanent impairment, the WCB may be creating an exception to its approach to preventive measures and broadening its base of coverage.

1.4.2. Is there an estimated loss of earning capacity?

If it is decided that a worker who must avoid workplaces that contain a triggering substance has a permanent impairment, the question then becomes whether there is an estimated loss of earning capacity. In considering this question, it should be noted that a permanent partial disability award under section 23(1) of the *Act* reflects such factors as restrictions in future employment and the reduced capacity of the worker to compete in the labour market.[16]

Depending upon the prevalence of the substance, it may be argued that the extent of any loss of earning capacity would vary. If the sensitivity can be addressed through modification of the workplace, such as improved ventilation or personal protective equipment, then the worker may be viewed as having

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[15] A worker with an activity-related soft tissue disorder whose symptoms have resolved, but who risks a permanent impairment if returned to current employment, may receive preventative vocational rehabilitation assistance to assist in changing jobs.

[16] See policy item #39.00 of the *RS&CM*, Volume II.

sustained no or minimal loss of ability to earn in the future. However, if the sensitivity results in the need to avoid a large number of workplaces, then the worker could be characterized as having a greater loss of earning capacity.

For the purposes of calculating a worker's permanent disability award, the estimated impairment of earning capacity is reflected in the disability rating.

Current practice guidelines on asthma provide for disability ratings of between 3% and 100% for workers experiencing varying degrees of subjective symptoms, medication needs, airway hyperresponsiveness and lung function impairment. As a result, it would appear reasonable to provide a worker who is asymptomatic, but who must avoid certain workplaces containing a triggering substance, with a disability rating of 1% to 2% of a totally disabled person. Sensitization to a common substance, such as formaldehyde, would result in a higher rating than sensitization to a substance, such as isocyanates, found in a limited number of workplaces.

2. OTHER JURISDICTIONS

Compensation for permanent disabilities under the BC *Act* differs significantly from the approach in other Canadian jurisdictions so that jurisdictional comparisons are, at times, difficult to make.

As discussed above, permanent disability awards in BC are generally based upon the worker's estimated loss of earning capacity, which involves a consideration of the impact of the worker's permanent impairment upon earning potential.[17] In exceptional circumstances, a permanent disability award may be based upon the worker's future loss of earnings.[18] In contrast, most other Canadian jurisdictions provide a lump sum non-economic loss award, generally based upon the degree of the worker's permanent impairment. In addition, a loss of earnings award compensates for the worker's loss of income.

Most Canadian jurisdictions, either by policy or practice, will not provide a non-economic loss award if the worker does not have a lasting functional limitation or no longer has the signs or symptoms of the occupational disease. Specifically, Alberta, Manitoba, New Brunswick, Newfoundland, Northwest Territories, Prince Edward Island, Nova Scotia and the Yukon would not provide a non-economic loss (impairment) award for an asymptotic worker with a propensity to have an asthmatic reaction upon re-exposure to a workplace substance. Alberta, Manitoba, New Brunswick and Newfoundland advise that a worker may still qualify for a loss of earnings award if he or she incurs an economic loss as a result of being restricted from working in environments containing the triggering substance.

[17] See section 23(1) of the *Act*.
[18] See sections 23(3) and 23(3.1) of the *Act*.

In contrast, Ontario, Quebec and Saskatchewan may provide an asymptomatic worker with a propensity to have an asthmatic reaction with both a non-economic loss (impairment) award and a loss of earnings award.

Saskatchewan distinguishes between workers who have suffered an immunologic change and those who simply suffer irritation from work substances. Workers who have suffered an immunologic change often have neither signs nor symptoms after having been removed from contact with the offending substance for a period of time. However, they have work environment restrictions in that they will experience recurrences of their symptoms with exposure to only minute quantities of the offending substance. Workers who have suffered an immunologic change are considered to have a permanent functional impairment, but since they will have no objective findings, will be awarded a minimum sum.[19] Workers who simply have an irritation from work substances are not considered to have a permanent functional impairment.[20]

In Quebec, a 3% APD[21] is awarded for sensitization, as soon as a diagnosis of bronchial asthma is confirmed by special committee. This may be combined with an additional percentage based upon the degree of bronchial obstruction, bronchial reactivity and medication requirements.[22]

Guidelines in Ontario provide that if a worker has a clinically significant sensitization to a workplace substance, he or she is considered to have a permanent immune system impairment of approximately 3% to 5%.[23] A sensitization is considered to be clinically significant if the worker is sensitized, and, upon exposure to the workplace substance, experiences asthmatic symptoms. The level of exposure need not be excessive.

3. OPTIONS AND IMPLICATIONS

Option 1: Status quo

Under this option, policy would not be amended. Workers who are asymptomatic and do not take medication to remain symptom-free, but who must avoid workplaces containing a triggering substance, would not receive a permanent disability award. However, vocational rehabilitation assistance may be provided to assist the worker in changing employment.

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19 The minimum is currently $2,200.

20 See Policy 25/90: PFI – Allergies, as amended by ADM 04/2003.

21 APD means anatomicophysiological deficit.

22 *Annotated Scale of Bodily Injuries Regulation* (Quebec: Commission de la santé et de la securité du travail du Québec, 2000).

23 An additional award may be granted if the worker also has a respiratory impairment, based upon airflow limitation, airway hyperresponsiveness and minimum medication needs. The respiratory impairment rating and the immunological impairment rating are combined using the Combined Values Chart in the *AMA Guides*. See *Operational Policy Manual*, document No. 16-01-01.

Implications

- The status quo is consistent with the approach in most other Canadian jurisdictions, which do not recognize a permanent impairment where the worker is asymptomatic, without the need for medication, when removed from the workplace. On the other hand, many of these jurisdictions provide loss of earnings benefits where the worker must change employment to avoid the triggering substance, thereby incurring a loss of earning capacity.

- This approach appears inconsistent with Dr. Tarlo's advice that there can be resulting impairment due to the fact of being sensitized to a workplace substance even in the absence of ongoing asthma symptoms after removal from the worksite. However, Dr. Tarlo leaves open the question of whether the worker's sensitization constitutes a permanent impairment for the purposes of the workers' compensation system.

- Under this approach, removal of a worker from a workplace containing a triggering substance to avoid the risk of future asthmatic reactions is viewed as a preventive measure. WCB policy on preventive measures provides that compensation benefits are not payable to a worker who remains off work or changes employment to prevent a reoccurrence of an occupational disease that has resolved.

- In some instances, a worker may feel that he or she has no other choice but to return to the workplace containing the triggering substance, especially where vocational rehabilitation efforts have not been successful. This may result in the worker experiencing increasingly severe asthmatic reactions.

Option 2: Incorporate a disability rating table for asthma into policy

Under this option, a disability rating table for asthma would be developed, based upon the asthma impairment classification table contained in practice guidelines. The disability rating table would be incorporated into policy as part of the Permanent Disability Evaluation Schedule. The table would not recognize that an asymptomatic worker who must avoid workplaces containing a triggering substance has a permanent impairment.

Draft policy consistent with this option is attached as Appendix III.

Implications

- The implications are the same as those outlined for the status quo option.

- This option would promote transparency and consistency in decision-making.

Option 3: Amend policy to provide that an asymptomatic worker who must avoid workplaces containing a triggering substance has a permanent impairment

Under this option, policy would be amended to provide that an asymptomatic worker who must avoid workplaces containing a triggering substance has a permanent impairment. A disability rating of 1% to 2% would be awarded, with sensitization to common substances resulting in a higher award than sensitization to substances found in a limited number of work environments. In addition, a disability rating table for asthma would be incorporated into policy as part of the Permanent Disability Evaluation Schedule.

Draft policy consistent with this option is attached as Appendix IV.

Implications

- This approach is consistent with Dr. Tarlo's advice that there can be resulting impairment due to the fact of being sensitized to a workplace substance even in the absence of ongoing asthma symptoms after removal from the worksite. Such workers have an immune state (sensitization) putting them at risk of an adverse medical event.

- This option is consistent with the approaches in Ontario, Quebec and Saskatchewan, where sensitization to a workplace substance is recognized as a permanent impairment.

- Under this approach, removal from the worksite containing the triggering substance would not be viewed as a preventive measure. Rather, the worker's underlying hypersensitivity would be considered a permanent impairment.

- Some workers who must avoid workplaces containing a triggering substance may meet the criteria for a loss of earnings award under section 23(3) of the *Act*.

- By incorporating a disability rating table for asthma into policy, this approach would encourage transparency and consistency in decision-making.

TAB B
CONTACT DERMATITIS

1. DISCUSSION

1.1. The Scientific Review Process

The PRD commissioned Dr. Donald Belsito of the University of Kansas[24] to review the medical/scientific literature and to answer the following two questions with respect to contact dermatitis:

(1) Does an individual have contact dermatitis:
- only when he or she is displaying signs or symptoms of the disease; or
- also when he or she has developed the underlying allergy or sensitivity that may trigger these symptoms.

(2) Does an individual who has an underlying allergy or sensitivity due to a workplace substance but who no longer displays the signs or symptoms of contact dermatitis once removed from the aggravating substance have a permanent impairment? If so:
   (i) how is the impairment measured?
   (ii) is there a threshold level below or above which the individual is considered not to have a permanent impairment?

Dr. Belsito submitted a report in September 2004. Dr. Howard Maibach of the University of California[25] was commissioned to conduct a peer review of Dr. Belsito's report on contact dermatitis. Due to the complexity of the issue, Dr. Maibach recommended that a group of scientists be invited to participate in the peer review. Three additional scientists, all of whom are recognized experts in the field of dermatology and members of the European Environmental and Contact Dermatitis Research Group, were subsequently commissioned to participate in the peer review. Dr. Thomas Diepgen of University Hospital, Heidelberg[26], Dr. Tove Agner of the University of Copenhagen[27] and Dr. Magnus Bruze of University Hospital, Malmö, Sweden[28], met with Dr. Maibach to review

[24] Dr. Donald Belsito is Professor and Director of the Division of Dermatology at the University of Kansas Medical Center. He is also an attending physician at University Hospital, University of Kansas Medical Center and Kansas City Veterans' Administration Medical Center.

[25] Dr. Maibach is a professor in the Department of Dermatology of the University of California and Chief of the Occupational Dermatology Clinic.

[26] Dr. Diepgen is Professor and Chairman in the Department of Social Medicine, Center of Occupational of Occupational & Environmental Dermatology, University Hospital Heidelberg.

[27] Dr. Agner is an associate professor in the Faculty of Medicine at the University of Copenhagen and a consultant at the Department of Dermatology, Gentofte Hospital, University of Copenhagen.

[28] Dr. Bruze is a professor in occupational dermatology and Head of the Department of Occupational and Environmental Dermatology, University Hospital, Malmö, Sweden.

Dr. Belsito's report and to discuss the two questions raised. The dermatitis peer review report was submitted to the WCB in July 2005. Dr. Belsito's report is provided in Appendix V. The peer review report is provided in Appendix VI.

1.2. Dr. Belsito's Review

In his report, Dr. Belsito explains the difference between irritant and allergic contact dermatitis[29] and describes the incidence and prevalence of each. He discusses the pre-disposing factors for occupational contact dermatitis and how it is diagnosed. Finally, he responds to the two questions submitted to him by the WCB.

(i) Does an individual have contact dermatitis:

- **only when he or she is displaying signs or symptoms of the disease; or**
- **also when he or she has developed the underlying allergy or sensitivity that may trigger these symptoms.**

In response to the first question, Dr. Belsito explains that the disease allergic contact dermatitis exists only in symptomatic individuals, however, the underlying allergy remains. The intensity of the allergy may wane with lack of exposure, but it is life-long and will recur under proper conditions. Similarly, individuals with chronic irritant contact dermatitis may have permanently overwhelmed the repair capacity of their skin.

(ii) Does an individual who has an underlying allergy or sensitivity due to a workplace substance but who no longer displays the signs or symptoms of contact dermatitis once removed from the aggravating substance have a permanent impairment? If so:

(a) how is the impairment measured?

(b) is there a threshold level below or above which the individual is considered not to have a permanent impairment?

In response to the second question, Dr. Belsito recognizes that individuals with an underlying allergy or sensitivity (with a propensity to develop contact dermatitis) have no obvious impairment of their skin. However, he indicates that "they remain permanently, albeit partially, disabled by virtue of lifestyle restrictions that affect their activities of daily living". He explains that workers with sensitivities to ubiquitous allergens may suffer severe lifestyle restrictions. In order to determine if the worker is suffering from a permanent impairment, he suggests that the frequency of recurrences and the difficulty in avoiding the offending agent(s) must be considered.

[29] Irritant contact dermatitis results from a direct cytotoxic effect of a chemical or physical agent on the skin. Allergic contact dermatitis is an allergic response to skin contact with an allergy-causing material.

According to Dr. Belsito, the main factors driving the final assessment of disability are the inciting cause(s) of the dermatitis, the worker's clinical course over time, and whether the worker suffers any lifestyle restrictions.

Dr. Belsito bases his definition of "threshold level" on the impairment rating table provided in the fifth edition of the *AMA Guides* dealing with skin conditions. He explains that the threshold level at which an individual would be considered not to have an impairment resulting in disability would include the following:

- signs and symptoms of the skin disorder were not present for at least one year; and
- the skin disorder did not result in any limitations in the performance of activities of daily living; and
- no treatment was required to maintain the integrity of the skin.

1.3. Peer Review

After careful review of Dr. Belsito's report, the reviewers decided not to conduct a critical review of the report, but rather provided their own answers to the questions posed.

In response to the first question, the reviewers indicate that a worker with an underlying allergy or sensitivity who is asymptomatic does not have a clinical disease (i.e., allergic contact dermatitis). An individual has the disease allergic contact dermatitis only when he or she is symptomatic.

In response to the second question, the reviewers advise that although the underlying allergy can last for years or perhaps life, it is not a medical impairment. The clinical disease occurs only upon re-exposure to the allergen at a sufficient level to elicit signs and symptoms. The reviewers recommend that impairment be measured by the following: extent and severity of the disease, individual threshold, localisation of disease, as well as by the potential for exposure in varying occupations and non-occupational settings.

Lastly, the reviewers indicate that each individual has a different threshold level of exposure, at which he or she will react. This individual threshold may vary over time.

1.4. Implications of the Scientific Review

In his report, Dr. Belsito advises that an asymptomatic worker may have "no obvious loss of use or derangement" of his or her skin (i.e. impairment). Nevertheless, such a worker may remain asymptomatic by virtue of stringent lifestyle restrictions. He advises that these restrictions should be considered when the worker's disability is assessed. However, Dr. Belsito's use of the term

"disability" is not entirely consistent with its meaning in the BC workers' compensation context.

As noted in the discussion of occupational asthma in Tab A, two factors must be present before a permanent disability award may be considered under the BC workers' compensation system. First, the worker must have a permanent impairment. Second, there must be an estimated loss of earning capacity as a result of the permanent impairment. Thus, before assessing the extent of a worker's permanent disability, the WCB must first determine that the worker has a permanent impairment, or loss of physical function.

1.4.1. Is there a permanent impairment?

The policy considerations raised in Tab A in relation to asthma are also applicable to contact dermatitis. On the one hand, it could be argued that there is no loss of function because, provided he or she avoids the triggering substance, the worker is physically sound with no ongoing need for medication. On the other hand, the fact that the worker's hypersensitivity results in a need to avoid workplaces and other environments where the triggering substance may be found could be characterized as a loss of function stemming from an immunological impairment. Dr. Belsito notes that "an apparently ineffective sensitizing stimulus is …registered immunologically …[and results in] enhanced subsequent responses to the same antigen."

In evaluating these arguments, it is important to consider that, in their report, Dr. Maibach and his colleagues indicate that individuals with an underlying allergy or sensitivity do not have the disease contact dermatitis unless they are symptomatic. They advise that an individual who tests positive for an allergy to a substance will not always react upon exposure to that substance. As a result, they would not describe the underlying sensitivity as an impairment.

On the other hand, the workers at issue in this discussion paper do react with symptoms of contact dermatitis upon re-exposure to the triggering substance. In certain extreme cases, the underlying hypersensitivity may have a drastic impact upon the worker's ability to work. For the reasons discussed in relation to asthma, a policy choice could be made to recognize that workers who, based on medical advice, must avoid certain workplaces because they will develop symptoms upon re-exposure to minute quantities of the triggering substance have a permanent impairment. At the same time, this approach may be viewed as creating an exception to the general principles that apply to removal of a worker from the workplace as a preventive measure.

1.4.2. Is there an estimated loss of earning capacity?

If a decision is made to recognize the underlying hypersensitivity as a permanent impairment, it must then be determined whether there is an estimated loss of

earning capacity. Again, the considerations raised in Tab A in relation to asthma also apply to contact dermatitis.

If the hypersensitivity results in the need to avoid a large number of workplaces, then the worker could be characterized as having a greater loss of earning capacity. However, if the worker's sensitivity can be addressed through modification of the workplace or through the use of personal protective equipment, such as protective gloves, then the worker may be viewed as having sustained no or minimal loss of earnings.

Current guidelines provide for a disability rating of 0% to 5% for those workers whose skin disorder signs and symptoms are present or intermittently present, require no or intermittent treatment, and who suffer no or few limitations in the performance of their activities of daily living. Arguably, it would appear reasonable to provide an asymptomatic worker, who must avoid certain workplaces containing a triggering substance, with a disability rating of 1% to 2%. This is consistent with the option presented in Tab A for occupational asthma.

A worker with an allergy or sensitivity to a ubiquitous agent, such as rubber latex, would receive a higher disability rating than a worker who is sensitized to a substance that is found only in a specific workplace.

2. OTHER JURISDICTIONS

In Alberta, Manitoba, New Brunswick, Newfoundland, Prince Edward Island and Yukon, a permanent functional impairment award is expressly precluded, under policy or practice, if a worker either:

- does not have a lasting functional limitation caused by the occupational disease, or
- no longer has any signs or symptoms of the occupational disease.

Alberta, Manitoba, New Brunswick and Newfoundland advise that a worker would still be eligible for a loss of earnings award.

In Quebec, Ontario and Saskatchewan, a worker with an underlying allergy or sensitivity, but no symptoms of contact dermatitis, would be granted an immunological impairment award. The worker would also be eligible for a loss of earnings award.

In Quebec, an impairment rating of 2% is granted as soon as a diagnosis of contact dermatitis through sensitization is made. A 3% to 5% impairment rating is awarded to workers in Ontario. In Saskatchewan, workers who have suffered an immunologic change (i.e., have workplace restrictions because they react to minute amounts of the substance upon exposure) are considered to have a permanent functional impairment. However, since they have no objective

findings once removed from the substance, workers are awarded the minimum sum.

The Northwest Territories awards a 0-5% impairment award when: a worker is asymptomatic, and little or no limitation exists in the performance of the activities of daily living, although unavoidable contact with specific irritant or allergic substances might temporarily increase the extent of the limitation.

Finally, in Nova Scotia, the *AMA Guides* are used. However, a worker with an underlying sensitivity is considered to have an aggravation of an underlying condition and would be awarded an impairment award of 1-3%.

3. OPTIONS AND IMPLICATIONS

Option 1: Status quo

Under this option, policy would not be amended. Workers who are asymptomatic and must avoid workplaces containing a triggering substance would not be eligible for a permanent disability award. However, vocational rehabilitation assistance may be provided to assist the worker in changing employment.

Implications

- This approach is inconsistent with Dr. Belsito's advice that an asymptomatic person with a propensity to develop contact dermatitis has a permanent partial disability by virtue of lifestyle restrictions.
- This approach is consistent with the peer reviewers' advice that an individual has the disease contact dermatitis only when he or she is symptomatic. As well, an underlying sensitivity does not constitute a permanent impairment.
- This option is consistent with the approach taken in Alberta, Manitoba, New Brunswick, Newfoundland, Prince Edward Island and the Yukon. However, the worker would still be considered for a loss of earnings award in most of these jurisdictions.
- A worker's removal from a workplace containing a triggering substance would continue to be viewed as a preventive measure.
- In some instances, a worker may feel that he or she has no other choice but to return to the workplace containing the triggering substance, especially where vocational rehabilitation efforts have not been successful. This may increase the frequency and severity of the worker's contact dermatitis.

Option 2: Incorporate a disability rating table for dermatitis into policy.

Under this option, a disability rating table for contact dermatitis would be developed, adapted from the table for skin conditions currently contained in practice guidelines. The contact dermatitis table would be incorporated into policy as part of the Permanent Disability Evaluation Schedule. The table would not recognize that an asymptomatic worker who must avoid workplaces containing a triggering substance has a permanent impairment.

Draft policy consistent with this option is attached as Appendix VII.

Implications

- The implications are the same as those outlined for the status quo option.
- Inclusion of a disability rating table for contact dermatitis in policy would promote transparency and consistency in decision-making.

Option 3: Amend policy to recognize that an asymptomatic worker who must avoid certain workplaces containing a triggering substance has a permanent impairment.

Under this option, policy would be amended to recognize that an asymptomatic worker who must avoid certain workplaces containing a triggering substance has a permanent impairment. These workers would be eligible for a 1% to 2% disability award, with sensitization to common substances resulting in a higher award than sensitization to substances found in a limited number of work environments. In addition, a disability rating table for contact dermatitis would be incorporated into policy as part of the Permanent Disability Evaluation Schedule.

Draft policy consistent with this option is attached as Appendix VIII.

Implications

- This approach is consistent with Dr. Belsito's advice that asymptomatic workers remain permanently disabled by virtue of lifestyle restrictions.
- This approach is inconsistent with the peer reviewers' advice that an asymptomatic individual with an underlying sensitivity does not have a permanent impairment.
- This option is consistent with the approach taken in Ontario, Saskatchewan, Quebec, the Northwest Territories and Nova Scotia.
- A worker's removal from a workplace containing a triggering substance would no longer be viewed as a preventive measure. The worker's underlying hypersensitivity would be considered a permanent impairment.

- Some workers who must avoid certain workplaces containing a triggering substance may meet the criteria for a loss of earnings award under section 23(3) of the *Act.*
- Inclusion of a disability rating table for contact dermatitis in policy would promote transparency and consistency in decision-making.

APPENDIX I

ASTHMA FINAL REPORT

BC WCB project, Nov 2004, updated April 2005

Prepared by Susan M Tarlo, MB BS FRCP(C), Professor, Departments of Medicine and Public Health Sciences, University of Toronto, Toronto Western Hospital and Gage Occupational and Environmental Health Unit.

APPENDIX I

ASTHMA FINAL REPORT

Questions posed by the BC WCB

Q1 Does an individual have asthma:

- ***only when he or she is displaying signs or symptoms of the disease, or also when he or she has developed the underlying allergy or sensitivity that may trigger these symptoms?***

Q2 Does an individual who has an underlying allergy or sensitivity due to a workplace substance but who no longer displays the signs or symptoms of asthma once removed from the aggravating substance have a permanent impairment? If so:

(i) how is the impairment measured?

(ii) is there a threshold level below or above which the individual is considered not to have a permanent impairment?

Methodology used to respond to questions: The respondent (Susan M Tarlo) has initially undertaken a literature review using PubMed to search for the term; asthma+definition+English language, which identified 281 references. Additional references were reviewed from the respondent's knowledge of relevant medical literature and in part from a PubMed database using the term; occupational asthma, containing 1611 references.

Clarification of responses: The responses given relate to occupational asthma caused by a workplace sensitizer, as implied in Q1. Occupational asthma can also be caused by a high level irritant workplace exposure and is not specifically

addressed in this document although the comments made about airway hyperresponsivess would also be applicable to irritant-induced occupational asthma.

Q1 Does an individual have asthma:

- ***only when he or she is displaying signs or symptoms of the disease, or also when he or she has developed the underlying allergy or sensitivity that may trigger these symptoms?***

Answer to Q1:

Short answer: ***Yes and no***. If an adult has previous adult-onset asthma and then becomes free of symptoms for a few months, most clinicians would still consider that patient to have asthma and to have the potential for further asthma exacerbations in the future (and such patients would be included in epidemiologic criteria for asthma). If symptoms have cleared for over a year but the patient still has airway hyperresponsiveness, there is no clear indication from the medical literature as to whether this should still be termed asthma or should be given a different designation. Potentially the patient may have reverted to a mild degree of airway responsiveness which may have been present even before they developed asthma. This is less likely to be the explanation if airway hyperresponsiveness is in the moderate to severe range (e.g. less than or equal to a methacholine or histamine PC_{20} of 1mg/ml). However, it may be expected that these patients, particularly those with moderate or severe

hyperresponsiveness would be more likely than the normal population to develop asthma symptoms at times of viral respiratory infections, or if exposed to other strong asthma triggers, such as exercise in cold air. In addition if there were to be further exposure to the workplace substance which caused sensitization, or to a cross-reacting sensitizer, then it would be expected that a clinical asthmatic response would again occur[1] even if the airway responsiveness to methacholine had become normal before re-exposure[1].

Background: The characteristics of asthma have been well described but there remains no generally accepted definition of asthma[2;3]. The characteristics/criteria which have been used to classify individuals as having asthma have varied, depending whether the term is being used for epidemiologic questionnaire surveys, or for clinical diagnosis. Many epidemiologic surveys such as the European Health Survey[4], the ISAAC surveys of children and Canadian surveys, in order to define "current asthma" have relied on the history of symptoms within the past 12 months compatible with asthma (episodic cough, wheeze, shortness of breath, chest tightness in varying combinations and in some definitions occurring at specific times, such as on exercise or at night). Many surveys have also included a question on "doctor diagnosed asthma" [5] or physician visits or hospitalization for asthma[6] and have shown a relatively good correlation between this and other markers of asthma. Use of asthma medications has also been used in some surveys.

However, a clinical diagnosis of asthma, (doctor diagnosed asthma) is not uncommonly reached by history alone in family practice settings. Clinical response to asthma treatment is often used to support the diagnosis, and pulmonary function testing may not be obtained unless the diagnosis is questioned.

In specialist management a diagnosis of asthma is usually reached on the basis of a characteristic history, physical examination and additional objective testing. The Canadian Adult Asthma Consensus Guideline Report in 1999 and updated in 2004 in their paragraph on "definition of asthma" stated that " Asthma is characterized by paroxysmal or persistent symptoms such as dyspnea, chest tightness, wheezing, sputum production and cough, associated with variable airflow limitation and airways hyperresponsiveness to endogenous or exogenous stimuli. Inflammation and its resulting effect on airway structure are considered to be the main mechanisms leading to the development and maintenance of asthma." [7;8].

The most typical clinical findings of asthma are

a) the clinical history of one or more of episodic dry cough, retrosternal chest tightness, wheezing and shortness of breath, with or without findings of wheezing on physical examination of the chest.

b) documentation of episodic airflow limitation which may be shown by

(i) measurement of baseline spirometry with significant improvement in FEV1 (at least 12% and at least 180ml)[9] after a bronchodilator supports a diagnosis of asthma, or

(ii) if baseline spirometry shows no significant airflow limitation, then induction of a 20% fall in FEV1 during a methacholine or histamine challenge[10] with a PC20 8mg/ml supports a diagnosis of asthma[11] (responses of PC20 4-16mg/ml are borderline and can occur in mild asthmatics or in non-asthmatics), or

(iii) demonstration of variable peak flow responses on serial peak flow recordings (diurnal variability greater than 20% is outside the range of normal variability) is consistent with asthma if performed correctly,

c) demonstration of an airway inflammatory response, most commonly an eosinophilic response as measured by induced sputum[12;13].

Although the objective diagnosis of asthma in clinical practice is generally simple, based on symptoms, and pulmonary function findings, nevertheless, since symptoms and pulmonary function changes are episodic, it is possible that objective tests may be normal at the time they are performed and yet may not exclude asthma. In addition, although most physicians consider that they can recognize clinical asthma, nevertheless, 74% of those who had normal airway

responsiveness when measured in a pulmonary function laboratory had been treated for asthma by their primary care physician[14]. Although various definitions have been proposed for research purposes [15-18] and definitions for epidemiologic purposes[19] appear to be adequate, nevertheless, when strict definitions are required as for genetic studies, then a proportion of patients are found to have borderline objective results or discordance between a history and objective findings from which a diagnosis of asthma cannot be confirmed or excluded[20].

There are individuals who have one or more of the features of asthma but who do not have asthma. Asthma-like symptoms may be present without pulmonary function changes of airflow limitation or bronchial hyperresponsiveness and this is not considered to be asthma[21].

Airway hyperresponsiveness may be present without asthma. In the general population airway responsiveness as measured by methacholine or histamine challenge has a unimodal distribution. Hyperresponsiveness is more common in those with a family history of asthma or allergy even in the absence of symptoms of asthma. In addition it may occur on a transient basis. As an example, even young healthy non-asthmatic adults can develop transient airway hyperresponsiveness following a viral upper respiratory infection or on exposure to allergen or ozone[22]. By itself, this would not be regarded as asthma. A proportion of individuals with symptomatic allergic rhinitis but no chest symptoms will have mild airway hyperresponsiveness as measured by methacholine or

histamine challenge[11;23] but no symptoms of asthma. This also is not regarded as asthma. In addition, adults who have had asthma as a child but no longer report any asthma symptoms are commonly found to have ongoing airway hyperresponsiveness as measured by methacholine or histamine challenge. There is no specific clinical term used for these individuals if they are asymptomatic.

Fish JE and Peters SP, in their chapter on bronchial challenge testing textbook Allergy, Principles and Practice, 5th edition, 1998, edited by Middleton E, Reed CE, Ellis EF, Adkinson NF, Yunginger JW and Busse WW, (P454-464) have stated "It has become increasingly apparent over the past decade that methacholine and histamine have not achieved their expected status as "gold standards" in the diagnosis of asthma. In large part this reflects problems that exist in defining asthma. Certainly asthma is a heterogeneous disorder, not only with respect to etiologic factors but also in terms of pathological features and clinical manifestations." Thus, although airway hyperresponsiveness is a characteristic finding in asthma, the presence of airway hyperresponsiveness alone is not equivalent to a clinical diagnosis of asthma.

Finally, eosinophilic bronchitis can be present without airway hyperresponsiveness[24] and is considered to be a different disorder from asthma although it may progress to typical clinical asthma.

Therefore a history of symptoms of asthma alone is not diagnostic for asthma; all of the diagnostic tests individually are not specific for asthma and can be positive with other conditions. In addition they may be negative at times in patients who truly do have asthma, e.g. since asthma is characterized by variable airflow limitation, there may be no symptoms or airflow limitation at the time the patient is undergoing testing. Similarly the methacholine or histamine challenge, peak flow recordings and induced sputum examination may be normal in a patient who truly has asthma if the methacholine test is performed at a time when there has not been recent exposure to the agent(s) causing asthma or if asthma medications have been taken and may have suppressed peak flow variability or airway inflammation [13;25;26]. This has been most clearly shown when bronchodilator medications have been taken prior to testing, and the protocol for methacholine or histamine challenge testing requires discontinuation of such medications for an appropriate period before the test. The effect of inhaled steroids is more difficult to assess. The effects of inhaled corticosteroids, depending on the dosage taken, can produce a one to two doubling dose reduction in PC_{20} [27-29;29]. Therefore there may be a “falsely normal” methacholine or histamine challenge in a patient taking inhaled steroids (which usually are not discontinued prior to testing). Common clinical practice when a normal methacholine or histamine challenge is found in a patient with clinically diagnosed asthma, is to repeat consider tapering off the inhaled steroids if clinically feasible, and then repeating the test after a period without inhaled

corticosteroids. However there are no clear guidelines as to how long the effect of inhaled steroids may persist.

Therefore an objective diagnosis of asthma requires that asthma-like symptoms and changes in diagnostic tests, consistent with asthma have been documented but they do not necessarily have to be present at the time of assessment. In addition, if the patient has left the exposure to a suspected cause of asthma, and will not have further exposure to the agent, then if the objective tests are normal, an objective diagnosis may only possibly be reached by specific challenge tests[30].

Demonstration of allergic sensitization as demonstrated by skin testing to an allergen, similarly can occur with or without asthma[31-33]. A positive skin test to one or more common aeroallergens occurs in 20-50% of the general population, depending on the criteria used for a positive response[33-35].

Once asthma has developed in adult life it is usually persistent although it frequently varies in severity within an individual. Among those with occupational asthma due to a sensitizer a minority (in some studies around 20%) have symptom clearing after leaving the causative workplace exposure, especially if they are removed from exposure relatively soon after the onset of asthma and at a time when asthma is relatively mild[36-38]. However, even when symptoms clear, there may be persisting airway hyperresponsiveness as assessed by

methacholine or histamine challenge and airway inflammation[38] and it would be expected that these patients would be more likely than the normal population to develop asthma symptoms at times of viral respiratory infections, or if exposed to other strong asthma triggers, such as exercise in cold air.

Conclusions: There is no strict and specific definition of asthma. Clinical asthma requires a history of asthma-like symptoms in addition to other features documenting variable airflow limitation or airway hyperresponsiveness. If an adult has previous adult-onset asthma and then becomes free of symptoms for a few months off all asthma medications, most clinicians would still consider that patient to have asthma and to have the potential for further asthma exacerbations in the future (and such patients would be included in epidemiologic criteria for asthma). If symptoms have cleared for over a year but the patient still has airway hyperresponsiveness, there is no clear indication from the medical literature as to whether this should still be termed asthma or should be given a different designation. Potentially the patient may have reverted to a mild degree of airway responsiveness which may have been present even before they developed asthma. This is less likely to be the explanation if airway hyperresponsiveness is in the moderate to severe range (e.g less than or equal to a methacholine or histamine PC_{20} of 1mg/ml). However, as noted above, it may be expected that these patients, particularly those with moderate or severe hyperresponsiveness would be more likely than the normal population to develop

asthma symptoms at times of viral respiratory infections, or if exposed to other strong asthma triggers, such as exercise in cold air. In addition if there were to be further exposure to the workplace substance which caused sensitization, or to a cross-reacting sensitizer, then it would be expected that a clinical asthmatic response would again occur[1] even if the airway responsiveness to methacholine had become normal before re-exposure[1].

Q2 Does an individual who has an underlying allergy or sensitivity due to a workplace substance but who no longer displays the signs or symptoms of asthma once removed from the aggravating substance have a permanent impairment? If so:

(i) how is the impairment measured?

(ii) is there a threshold level below or above which the individual is considered not to have a permanent impairment?

Answer to question 2 and 2(i)

Short answer: *Yes*. There can be resulting impairment which is due to **the fact of being sensitized** to a workplace substance even in the absence of ongoing asthma symptoms after removal from the workplace. The extent of impairment may relate in part to how ubiquitous the sensitizer or cross-reacting agents is/are in normal life outside the workplace. In addition the fact of sensitization can limit future job opportunities for the worker if the same sensitizer or cross-reacting sensitizers are used in potential future workplaces. The presence of **asymptomatic hyperresponsiveness which is associated with transient asthma-like symptoms** with respiratory viral infections, cold air and exercise or at times of relevant allergen exposure also represents an impairment. The extent of this relies largely on the clinical history of such symptoms, medication needs and pulmonary function impairment at those times. The impairment would therefore be measured by a) the fact of being sensitized and

how commonly the sensitizer is found firstly in workplaces from which the worker is therefore excluded from working, and secondly in everyday life outside the workplace b) the extent of airway hyperresponsiveness.

Short answer to 2 (ii) A threshold of no permanent impairment does not exist for the fact of being sensitized, although if the worker is re-employed in a new environment where he/she would never have exposure to the sensitizer in or out of the workplace, then the ongoing impairment from the fact of being sensitized may be considered minimal. A threshold for airway hyperresponsiveness causing no permanent impairment may be considered when airway responsiveness is very clearly in the normal range, i.e. = 16mg/ml when no asthma medications are being taken.

Background and responses to (i) and (ii)

A subset of individuals with occupational asthma due to a workplace sensitizer will have clearing of symptoms after removal from the workplace exposure to that agent. Usually this is a minority of those with occupational asthma[39-42] but improvement can occur for more than 5 years after leaving the exposure[43]. Greater improvement is seen in those with an early diagnosis and early removal when asthma is relatively mild[40;41].

Among those who have clearing of symptoms and no further need for asthma medications, a significant proportion have continuing airway hyperresponsiveness as measured by methacholine or histamine challenge

testing as discussed above. Although a proportion of the normal population will have mild airway hyperresponsiveness without clinical asthma, unless there had been a measure of airway responsiveness performed before the causative employment, there is no way in which it can be determined whether mild ongoing asymptomatic airway hyperresponsiveness in a patient with previous occupational asthma reflects their pre-asthma state or whether it reflects the result of occupational asthma. Some helpful information may be obtained from the degree of airway hyperresponsiveness. In the non-asthmatic population, in the absence of significant airway disease, and in the absence of an upper of lower respiratory infection in the previous 6 weeks, airway hyperresponsiveness when present is generally mild, with a methacholine PC20 between 4 and 16mg/ml. A PC20 lower than this is unlikely to represent a normal variant and is therefore more likely to have resulted from occupational asthma. A PC20 between 4 and 16mg/ml in the absence of symptoms could represent increased reactivity from previous occupational asthma or could be a normal variant.

In assessing medical impairment from ongoing but asymptomatic airway hyperresponsiveness, the clinical history and duration of a lack of asthma symptoms and duration of a lack of need for asthma medication use would be helpful in determining the degree of impairment. As noted above, if symptoms have cleared only for a few months then it may be considered that the patient still has clinical asthma and impairment rating could be guided by the ATS criteria for

asthma disability rating[44]. This rating is based on minimum asthma medications required to control symptoms, airflow limitation on spirometry, and degree of airway hyperresponsiveness as measured by methacholine or histamine challenge. If there is a history of asthma-like symptoms such as a persistent dry cough for several weeks occurring at times of viral infection or symptoms on exercise in cold air and requirement for asthma medication at those times, then this would be regarded as a reflection of asthma. Similarly if symptoms recur on exposure to agents which would be expected to cross-react with the workplace sensitizer, this also would be considered to be a reflection of asthma.

If symptoms have cleared for several years and have not recurred even at times of upper respiratory viral infections or at times of exposure to cold air with exercise then it is more likely that the airway hyperresponsiveness is not of clinical significance and is not causing medical impairment. However the individual is still at risk of recurrent asthma symptoms if re-exposed to the workplace sensitizer or cross-reacting substances. There may be a medical impairment from the inability of the patient to obtain further work in areas where the sensitizer is present, and also the need to avoid situations outside of the working environment where there may be exposure to the sensitizer or cross-reacting substances. For example if the sensitizer was natural rubber latex, then avoidance would be needed during future medical, dental or surgical procedures, and in some cases there is a need for avoidance of contact or ingestion of cross-reacting fruits. Similarly those sensitized to laboratory animals may have

symptoms on exposure to animals in domestic settings. Conversely, if the patient was sensitized to a less common substance which is not found outside the workplace, then the resulting impairment would be less severe.

Thus there can be resulting impairment which is due to **the fact of being sensitized** to a workplace substance even in the absence of ongoing asthma symptoms after removal from the workplace. The extent of impairment may relate in part to how ubiquitous the sensitizer or cross-reacting agents is/are in normal life outside the workplace. In addition the fact of sensitization can limit future job opportunities for the worker if the same sensitizer or cross-reacting sensitizers are used in potential future workplaces.

Secondly the presence of **asymptomatic hyperresponsiveness which is associated with transient asthma-like symptoms** with respiratory viral infections, cold air and exercise or at times of relevant allergen exposure also represents an impairment. The extent of this relies largely on the clinical history of such symptoms, medication needs and pulmonary function impairment at those times.

A threshold of no permanent impairment does not exist for the fact of being sensitized, although if the worker is re-employed in a new environment where he/she would never have exposure to the sensitizer in or out of the workplace, then the ongoing impairment from the fact of being sensitized may be considered minimal. A threshold for airway hyperresponsiveness causing no permanent impairment may be considered when airway responsiveness is very

clearly in the normal range, i.e. = 16mg/ml when no asthma medications are being taken.

Addendum

Additional question:

Has a person who is asymptomatic, but has an underlying allergy/sensitivity, so that he or she is susceptible to become symptomatic in certain conditions, suffered a permanent change to the immune system?

Response:

The development of specific IgE antibodies to a workplace sensitizer is an immunologic response. The level of specific IgE antibodies may fall over time when there is no longer exposure to the sensitizer. The time period of a fall in specific IgE antibodies after removal from exposure to a work sensitizer has not been well documented to my knowledge. There have been reports for example, that for natural rubber latex, the skin test response may become smaller after years of avoidance of exposure[45]. However it has not been reported to become entirely negative, and at present it is assumed that there is a "permanent" immunologic sensitization. Therefore if exposure recurs there is likely to be increased specific IgE antibody production and increased likelihood of a clinical adverse response again. Therefore as noted before, there can be a medical impairment from the inability of a patient to obtain further work in areas where the sensitizer is present, and also the need to avoid situations outside of the working

environment where there may be exposure to the sensitizer or cross-reacting substances. For example if the sensitizer was natural rubber latex, then avoidance would be needed during future medical, dental or surgical procedures, and in some cases there is a need for avoidance of contact or ingestion of cross-reacting fruits. Similarly those sensitized to laboratory animals may have symptoms on exposure to animals in domestic settings. Conversely, if the patient was sensitized to a less common substance which is not found outside the workplace, then the resulting impairment would be less severe.

Thus there can be resulting impairment which is due to **the fact of being sensitized** to a workplace substance even in the absence of ongoing asthma symptoms after removal from the workplace. The extent of impairment may relate in part to how ubiquitous the sensitizer or cross-reacting agents is/are in normal life outside the workplace. In addition the fact of sensitization can limit future job opportunities for the worker if the same sensitizer or cross-reacting sensitizers are used in potential future workplaces.

APPENDIX I

ASTHMA FINAL REPORT

Reference List

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of powdered natural rubber latex gloves in a hospital. J Allergy Clin Immunol 1998; 102(5):841-846.

APPENDIX II

ASTHMA PEER REVIEW

March 24, 2005

Comments on Workers' Compensation Board of British Columbia Report on Occupational Asthma

Prepared by Dr. Carrie Redlich
Yale University School of Medicine
Occupational and Environmental Medicine Program

This report by Dr. Susan Tarlo on Occupational Asthma clearly and appropriately addresses the questions posed. The answers are well supported by the literature cited, and the report is well written. This reviewer agrees with Dr. Tarlo's answers and has no major criticisms or comments. The literature, research and examples cited are relevant, accurate and sufficient. The report does an excellent job answering important and difficult questions regarding occupational asthma. It is concise yet sufficiently detailed for the setting.

The accompanying letter was helpful in clarifying the Canadian use of the terms 'impairment' and 'disability' and the setting for this review.

The following comments are generally minor suggestions / clarifications, some of which may or may not be necessary and/or appropriate, depending on the use of this document and/ or the audience it was prepared for. These comments are meant to 'fine-tune' an already excellent document.

Two overall comments are provided first, followed by comments regarding each question, and lastly some very minor grammatical edits.

Overall Comments:

1) As a matter of style, this reviewer finds it helpful to give a very brief answer to the question first*,(i.e. Yes or No… An individual can have asthma when*…..,), and then provide the supporting literature and information and a more complete, detailed answer to the question if needed.

2) Clarification regarding what type of occupational asthma the document refers to.

The document clearly and appropriately addresses questions related to immune-mediated or sensitizer occupational asthma, as directed by the questions. Ms. Furlong's cover letter providing information regarding the British Columbia's WCB policy project states that *"the asymptomatic worker is no longer considered to have asthma, even if he or she had to change occupations to avoid future contact with the allergen or irritant."*

Although the issue of sensitizer vs irritant-induced occupational asthma may well be understood by all involved, it can understandably generate confusion. The specific questions and Dr. Tarlo's responses appropriately refer to immune-mediated or sensitizer asthma, asthma caused by presumed allergy or sensitivity to an allergen in the workplace. The answers may or may not be relevant to irritant-induced (or irritant-aggravated) asthma, an important type of occupational asthma that may be more common than generally recognized. Unfortunately the literature on irritant-related asthma is relatively limited, and thus it may be difficult to answer the questions posed regarding irritants and asthma, based solely on the published medical literature. However, the same basic question regarding irritants, does an individual who developed asthma due to an irritant exposure who is removed from that exposure still have asthma and a permanent impairment, is an important question. It is probably best to address questions regarding irritant-induced asthma in a separate document (and to

be clear that this document refers to allergen or immune-mediated occupational asthma).

Comments regarding Question 1:

1) Effects of asthma medications on diagnostic testing for asthma

The fact that methacholine challenge testing, peak flows and airway inflammation can be normal or suppressed if asthma medications have been taken is clearly stated. Given the widespread use of inhaled steroids (at least in USA), a brief addition clarifying what medications (beta-agonists and steroids) are being referred to, and the effects of these different medications (and the duration of these effects) on diagnostic tests for asthma. Inhaled or oral steroids clearly can reduce airway inflammation and hyperresponsiveness, resulting in "false positive" diagnostic tests for asthma. This reviewer is not aware of any literature that directly addresses the question of how long these medications would need to be discontinued for their effect to 'wear off' (vs. inhaled beta-agonists which affect primarily acute airway hyperresponsiveness and can be discontinued the day before testing). This can become an important practical question (again at least in USA), as many patients are started on inhaled steroids before a diagnosis of asthma is documented physiologically.

2) "*In addition, if the patient has left the exposure to a suspected cause of asthma, and will not have further exposure to the agent, then if the objective tests are normal, an objective diagnosis may only ?possibly be reached by specific challenge tests".*

The sentence is accurate as stated. However, it would be helpful to add that specific challenge testing <u>also</u> can be negative if the patient has been away from exposure (and for various reasons can be negative even when the patient has not left the exposure – no test is perfect).

Comments regarding Question 2:

Question 2, whether permanent impairment can exist if a person is sensitized but not actively asthmatic, is appropriately addressed. This reviewer agrees that it can. The two additional questions (i and ii) may benefit from additional clarification.

1) Question 2 (i): How is this impairment measured?

This question is answered for most scenarios. It may be helpful to provide more detail or guidelines regarding <u>how impairment would be measured</u> in the following settings cited as examples of permanent impairment without active asthma, if possible. If there are not specific quidelines or there are different approaches, it may be helpful to clarify the lack of clarity. (Or there may be good reasons to leave certain things unsaid).

a) *There may be a medical impairment from the inability of the patient to obtain further work in areas where the sensitizer is present, and also the need to avoid situations outside of the working environment where there may be exposure to the sensitizer or cross-reacting substances. For example if the sensitizer was natural rubber latex, then avoidance would be needed during future medical, dental or surgical procedures, and in some cases there is a need for avoidance of contact or ingestion of cross-reacting fruits…. Conversely, if the patient was sensitized to a less common substance which is not found outside the workplace, then the resulting impairment would be less severe.*

b) *Thus there can be resulting impairment which is due to **the fact of being sensitized** to a workplace substance even in the absence of ongoing asthma symptoms after removal from the workplace. The extent of impairment may relate in part to how ubiquitous the sensitizer or cross-reacting agents is/are in normal life outside the workplace. In addition the fact of sensitization can limit future job opportunities for the worker if the same sensitizer or cross-reacting sensitizers are used in potential future workplaces.*

This reviewer is not aware of any formal guidelines to assess impairment under these situations.

2) Question 2 (ii): Is there a threshold level regarding permanent impairment?
The discussion supports an answer of "no threshold". It would be helpful to directly address this question in a separate paragraph.

Additional Question regarding Permanency of Sensitization:

The answer to this additional question is appropriate. Although there is little data, a sentence could be added to address non-IgE mediated sensitivity, as may occur with isocyanates and other small molecular weight allergens. Similar to latex and animals, sensitization to small molecular weight agents also is assumed to result in permanent change to the immune system, possibly via altered T cell or monocyte responses.

Very minor grammatical / spelling edits:

1) *In addition, although most physicians consider that they can recognize clinical asthma objective tests performed in a pulmonary function laboratory showing normal airway responsiveness, included 74% who had been treated for asthma by their primary care physician[13].* The wording of this sentence is a bit awkward.

2) ***Conclusions:*** *……. Clinical asthma requires a history of asthma-like symptoms in addition to other features documenting variable airflow limitation or airway hyperresponsiveness. If an adult has previous adult-onset asthma and then becomes free of symptoms for a few months off all asthma medications, most clinicians…..* (Potential edits are underlined).

No additional references are felt to be necessary. Additional references demonstrating: 1) the effect of inhaled steroids on airway hyperresponsiveness, and 2) the effect of removal from exposure / timing of exposure on specific challenge testing could be added, but are not essential.

APPENDIX III

REHABILITATION SERVICES & CLAIMS MANUAL, VOLUME II
Draft Asthma Disability Rating Table

80. ASTHMA

Either Table A(1-3) or Table B is used to assess asthma severity. The following considerations determine which table is used:

- Tables A1, A2 and A3 are used to make a clinical assessment of the severity of the worker's asthma. The scores from Tables A1, A2 and A3 are added to obtain a total score for asthma severity.
- If the cumulative score from Tables A1, A2 and A3 is zero, Table B is used to assess the severity of subjective symptoms.

Based on the cumulative asthma severity score from Tables A1, A2 and A3, Table C is used to assign a percentage disability rating. If the cumulative score from Tables A1, A2 and A3 is zero, then the highest score from Table B is used to assign a percentage disability rating.

Table A1: Post-bronchodilator FEV_1

Score	FEV_1 % predicted
0	= lower limit of normal
1	70% – 80%
2	60% – 69% of predicted
3	50% – 59% of predicted
4	<50% of predicted

Table A2: Reversibility of FEV_1 or Degree of Airway Hyperresponsiveness*

Score	% FEV_1 Change OR	PC_{20} mg/ml or Equivalent (Degree of Airway Hyperresponsiveness)
0	<10%	>8 mg/ml
1	10% – 19%	8 mg/ml to >0.6 mg/ml
2	20% – 29%	0.6 mg/ml to >0.125 mg/ml
3	= 30%	= 0.125 mg/ml
4	n/a	n/a

Table A3: Minimum Medication Need

Score	Medication
0	None
1	Occasional (but not daily) Bronchodilator and/or occasional (but not daily) cromolyn
2	Daily bronchodilator and/or daily cromolyn and/or daily low dose inhaled steroid (< 800µg of beclomethasone or equivalent)
3	Bronchodilator on demand and daily high-dose inhaled steroid (>800µg of beclomethasone or equivalent) or occasional course

	(1-3 courses per year) of systemic steroid
4	Bronchodilator on demand and daily high-dose inhaled steroid (>800µg of beclomethasone or equivalent) and daily or every other day systemic steroid

*FEV_1 indicates forced expiratory volume; PC_{20} is the provocative concentration that causes a fall in FEV_1.

If FEV_1 is = to the lower limit of normal, PC_{20} should be determined and used for rating asthma severity; if FEV_1 is 70% to 80%, either reversibility or PC_{20} can be used; if FEV_1 is < 70% of the predicted, reversibility only is used for rating asthma severity.

Table B: Symptom Severity as Reported by the Treating Physician or Board Medical Advisor

Score	Symptoms
0	None
0.3	Shortness of breath on exertion
0.6	Shortness of breath & wheezing on moderate exertion
0.9	Shortness of breath, wheezing, cough, and chest tightness on mild exertion

Table C: Asthma Disability Rating

Score (Table A(1-3) or B whichever is higher)	Disability Rating
0.1	1%
0.2	2%
0.3	3%
0.6	6%
0.9	9%
1	10 %
2	14%
3	18%
4	22%
5	26%
6	30%
7	34%
8	42%
9	50%
10 - 11	51% - 100%

APPENDIX IV

REHABILITATION SERVICES & CLAIMS MANUAL, VOLUME II
DRAFT ASTHMA POLICIES

*Deletions shown in ~~Strikethrough~~, additions in **Bold***

#29.20 Asthma

Schedule B lists "Asthma" as an occupational disease. The process or industry listed opposite to it is "Where there is exposure to

(1) western red cedar dust; or

(2) isocyanate vapours or gases; or

(3) the dust, fume of vapours of other chemicals or organic material known to cause asthma."

There are many substances which are either known to cause asthma in a previously healthy individual or of aggravating or activating an asthmatic reaction in an individual with a pre-existing asthma condition. The significance of occupational exposures to these substances may be complicated by evidence that the worker is exposed to such substances in both occupational and non-occupational settings. In the investigation of the claim, the Board officer ~~should~~ seek**s** evidence of whether the worker is exposed to any sensitizing substances (obtaining where available any material safety data sheets), on the nature and extent of occupational and non-occupational exposure to such substances, and on whether there is any correlation between apparent changes in airflow obstruction/responsiveness and exposure to such substances. Additional medical evidence may be available in the form of airflow monitoring, expiratory spirometry, inhalation challenge tests, and skin testing for sensitization.

A pre-existing asthma condition is not compensable unless such underlying condition has been significantly aggravated, activated, or accelerated by an occupational exposure. A worker is not entitled to compensation where his or her pre-existing asthma condition is triggered or aggravated by substances which are present in both occupational and non-occupational settings unless the workplace exposure can be shown to have been a significant cause of an aggravation of the condition. A speculative possibility that a workplace exposure to such a substance has caused an aggravation of the pre-existing asthma is insufficient for the acceptance of a claim.

~~Compensation is not payable because a worker develops an allergy or sensitivity to a substance or substances as a result of their employment. Compensation may be paid where a workplace exposure to the allergen or substance results in an asthmatic reaction.~~

APPENDIX IV

REHABILITATION SERVICES & CLAIMS MANUAL, VOLUME II
DRAFT ASTHMA POLICIES

Deletions shown in ~~Strikethrough~~, additions in ***Bold***

In the case of ~~a compensable~~ asthma or a reaction of the respiratory tract to a substance with irritating or inflammatory properties, temporary disability benefits are payable until the temporary disability ends or until the worker's symptoms become stabilized. Where the worker's symptoms do not entirely resolve and he or she is left with a permanent impairment of the respiratory system, a disability award may be granted. ~~However, no such award can be made when the worker's symptoms have resolved and they are simply left with the underlying allergy or sensitivity. Not only is the worker not now suffering from the occupational disease set out in Schedule B, but they are not disabled from working. The Board cannot grant a permanent disability award to a person who has the same physical capabilities as they had previous to the occurrence of the occupational disease, but who is precluded from a limited number of occupations because of a remaining allergy or sensitivity.~~ ~~No~~ **However, no** permanent disability award can be made to a worker with a pre-existing condition when they have returned to their pre-exposure state.

~~Where a worker who is allergic to western red cedar dust declines to take any employment which involves exposure to that dust, such worker is taking a preventive measure. Compensation is not payable for such preventive measures. However, rehabilitation assistance may be provided to a worker in this situation (see policy item #86.30).~~

A worker whose symptoms have resolved and who is left with a significant underlying allergy or sensitivity resulting in the need to avoid workplaces containing a triggering substance may be considered to have a permanent impairment. In assessing the need to avoid certain workplaces, the Board officer considers medical advice from the attending physician and/or Board Medical Advisor on the nature of the sensitization and the degree of medical risk should the worker return to work environments containing the substance.

The asthma tables found in the *Permanent Disability Evaluation Schedule* are used to assess the disability rating. Sensitization to common substances, found in many workplaces, results in a higher rating than sensitization to substances found in a limited number of work environments.

APPENDIX IV

REHABILITATION SERVICES & CLAIMS MANUAL, VOLUME II
Draft Asthma Disability Rating Table

80. ASTHMA

Either Table A(1-3), Table B or Table C is used to assess asthma severity. The following considerations determine which table is used:

- Tables A1, A2 and A3 are used to make a clinical assessment of the severity of the worker's asthma. The scores from Tables A1, A2 and A3 are added to obtain a total score for asthma severity.
- If the cumulative score from Tables A1, A2 and A3 is "0", Table B is used to assess the severity of subjective symptoms.
- If the score from Table B is also "0", Table C is used to assess sensitization in an asymptomatic worker, resulting in the need to avoid work environments containing a triggering substance.

Based on the cumulative asthma severity score from Tables A1, A2 and A3, Table D is used to assign a percentage disability rating. If the cumulative score from Tables A1, A2 and A3 is zero, then the highest score from Table B or C is used to assign a percentage disability rating.

Table A1: Post-bronchodilator FEV_1

Score	FEV_1 % predicted
0	= lower limit of normal
1	70% – 80%
2	60% – 69% of predicted
3	50% – 59% of predicted
4	<50% of predicted

Table A2: Reversibility of FEV_1 or Degree of Airway Hyperresponsiveness*

Score	% FEV_1 Change OR	PC_{20} mg/ml or Equivalent (Degree of Airway Hyperresponsiveness)
0	<10%	>8 mg/ml
1	10% – 19%	8 mg/ml to >0.6 mg/ml
2	20% – 29%	0.6 mg/ml to >0.125 mg/ml
3	= 30%	= 0.125 mg/ml
4	n/a	n/a

Table A3: Minimum Medication Need

Score	Medication
0	None
1	Occasional (but not daily) Bronchodilator and/or occasional (but not daily) cromolyn
2	Daily bronchodilator and/or daily cromolyn and/or daily low dose inhaled steroid (< 800µg of beclomethasone or equivalent)
3	Bronchodilator on demand and daily high-dose inhaled steroid (>800µg of beclomethasone or equivalent) or occasional course (1-3 courses per year) of systemic steroid
4	Bronchodilator on demand and daily high-dose inhaled steroid

	(>800µg of beclomethasone or equivalent) and daily or every other day systemic steroid

*FEV_1 indicates forced expiratory volume; PC_{20} is the provocative concentration that causes a fall in FEV_1.

If FEV_1 is = to the lower limit of normal, PC_{20} should be determined and used for rating asthma severity; if FEV_1 is 70% to 80%, either reversibility or PC_{20} can be used; if FEV_1 is < 70% of the predicted, reversibility only is used for rating asthma severity.

Table B: Symptom Severity as Reported by the Treating Physician or Board Medical Advisor

Score	Symptoms
0	None
0.3	Shortness of breath on exertion
0.6	Shortness of breath & wheezing on moderate exertion
0.9	Shortness of breath, wheezing, cough, and chest tightness on mild exertion

Table C: Sensitization

Score	Sensitization
0	The worker is able to return to the workplace without experiencing asthmatic symptoms.
0.1	The worker experiences asthmatic symptoms upon exposure to a triggering substance and, after considering medical advice, the Board determines that the worker must avoid workplaces containing that substance. The substance is found in only a limited number of work environments.
0.2	The worker experiences asthmatic symptoms upon exposure to a triggering substance and, after considering medical advice, the Board determines that the worker must avoid workplaces containing that substance. The substance is commonly found in many work environments.

Table D: Asthma Disability Rating

Score (Table A(1-3), B or C whichever is higher)	Disability Rating
0.1	1%
0.2	2%
0.3	3%
0.6	6%
0.9	9%
1	10 %
2	14%
3	18%
4	22%
5	26%

APPENDIX IV

REHABILITATION SERVICES & CLAIMS MANUAL, VOLUME II
Draft Asthma Disability Rating Table

6	30%
7	34%
8	42%
9	50%
10 - 11	51% - 100%

APPENDIX V

DERMATITIS FINAL REPORT

Occupational Contact Dermatitis:
Etiology, Prevalence and Resultant Impairment / Disability

Donald V. Belsito, M.D.
Division of Dermatology
University of Kansas Medical Center

INTRODUCTION:

Occupational contact dermatitis (OCD) can be broadly classified into irritant and allergic reactions. In reality, however, as reviewed by Andersen,[1] it is often multifactorial in origin and the various contributing factors to disease can be difficult to determine. Approximately 80% of occupational contact dermatitis cases have hand involvement,[2, 3] while 10% have involvement of the face.[4] If the offending agent contaminates clothing, it can produce dermatitis at frictional sites, such as the upper back, axillae, thighs and feet. Airborne exposure to dust can produce dermatitis where particulate matter becomes trapped against skin, such as the collar, waistband, flexural areas and proximal aspects of the shoes/socks, in addition to direct contact with the exposed areas of the face and anterior neck. Finally, it must be remembered that irritants and allergens can be transferred to other sites of the body (especially the genitalia) by unwashed hands and that such ectopic spread of disease is not unusual among outdoor workers, where hygienic conditions may not be optimal.

OCD is an inflammatory skin condition resulting from cutaneous contact with materials found in the workplace. Although it has been widely quoted that 80% of all OCD are caused by irritant contact dermatitis (ICD) and the remainder by allergic contact dermatitis (ACD),[4, 5] as reviewed by Holness,[6] there is a wide variation in the distribution of ACD vs ICD among reports of OCD in the literature. In Australia, Wall and Gebauer[7] found that 71% of 993 workers with occupational skin disease had ICD, while only 38% had ACD. In Singapore, Goh and Soh reported a similarly high prevalence of ICD (66% ICD vs 34% ACD).[8] In contrast, other authors have found a relatively equal distribution of ACD and ICD. In Finland, Kanerva, et al.[9] reported the incidence rate of ACD to be 50% and that for ICD 47%. Sertoli, et al.[10] found that, among Italian workers they evaluated, 49% had ICD and 51% ACD. During the first half of 1999 in Denmark, 431 recognized cases of OCD were observed; ACD was judged to be the significant contributing factor in 48% of women and 40% of men.[11] Nethercott and Holness[12] reported a nearly identical distribution among workers with OCD in Toronto. In the United States, the North American Contact Dermatitis Group (NACDG) reported significantly more occupational ACD (60%) than ICD (32%).[13] As discussed by Holness,[6] Kucenic and Belsito[14] and Andersen,[15] the reasons for these disparate incidence rates may be due to differences in the types of industries in a geographical area, in the age and sex distribution of the patients assessed, in selection biases inherent among patients

referred to tertiary dermatologic centers, in the ability of the health care provider to fully assess the worker by patch testing, and in national regulations and notification systems. In addition, it has been reported that the sensitivity and specificity of patch testing are approximately 70% with a 50% relevance for positive tests.[16] Thus, as reviewed by Diepgen and Coenraads,[17] there are individuals with occupational ACD and ICD who are wrongly classified because of limitations in the patch testing procedure, which remains the gold standard for the diagnosis of ACD.

METHODOLOGY:

References for this manuscript were identified by searching PubMed for the following terms: "occupation* and skin" and "occupation* and dermatitis". Titles and/or abstracts were reviewed to assess the relevance of the publication to this review on OCD. Excluded were most case reports and publications not pertinent to the following aspects of OCD: diagnosis, incidence / prevalence, prognosis, or determination of impairment / disability. In general, primary references were used. However, in some cases, prior reviews that adequately summarized the existing data at the time of publication were relied upon. When reviews are referenced, the primary sources were checked to assure that they were accurately summarized in the manuscript.

PATHOPHYSIOLOGY:

Irritant Contact Dermatitis

ICD results from a direct cytotoxic effect of a chemical or physical agent on the skin. Irritants will cause a reaction in most individuals when applied in a sufficient concentration for an adequate length of time. The spectrum of irritant contact dermatitis has been reviewed by Iliev and Elsner,[18] who divided the disease into the following subtypes: acute, acute delayed, irritant reaction, cumulative, traumatic, exsiccation eczematid, pustular and acneiform, and subjective. This author prefers a narrower classification as follows: corrosion (third degree chemical burn), acute irritation (second degree chemical burn), chronic cumulative irritation, and phototoxicity. Thus, it should be obvious that the lack of a standard case definitions for the spectrum of ICD can result in misclassification and, as reviewed by Lushniak,[19] overestimation or underestimation of disease frequency.

Phototoxicity is the least commonly reported form of occupational ICD. It requires that a worker be exposed to both a photoabsorbing chemical and light. Thus, phototoxicity is most commonly seen among outdoor workers, especially roofers (tar) and agricultural workers (furocoumarins).[20] Cytotoxicity results when the phototoxic chemical binds to biologic substrates, is activated by light and releases free radicals.[21]

Acute irritation and corrosion result from exposure to highly alkaline materials, strong acids and powerful oxidizing or reducing agents.[19] Whether acute irritation or corrosion results following these exposures frequently depends upon the concentration, vehicle, and duration of contact with the chemical.[22] Highly irritating chemicals cause significant disruption of the epidermis, resulting in direct cytotoxicity.[23] As a result, a number of pro-inflammatory cytokines, including IL-1 and TNF-α, are released into the skin and contribute to inflammation.[23]

Chronic cumulative ICD is the most prevalent form of occupational ICD. It results from ongoing exposure to mild irritants, such as water, soaps, solvents, greases, etc. Chronic friction and repeated microtraumas can produce subclinical irritation that eventually leads to clinically perceptible ICD.[24, 25] By chronic, low grade disruption of the stratum corneum lipid barrier, the above exposures result in a loss of cellular cohesion, desquamation and an increase in transepidermal water loss.[23, 26]

Allergic Contact Dermatitis

While almost any chemical (including water) in sufficient concentration and under the right conditions can induce irritation, only certain chemicals are allergens and only a small proportion of people are typically

susceptible to them. ACD begins with a sensitization phase, in which molecules pass through the stratum corneum and are processed by Langerhans cells in the epidermis. As reviewed by Basketter,[27] these chemicals are typically small, uncharged and fairly hydrophobic. Antigen-coupled Langerhans cells then leave the epidermis and migrate to the regional lymph nodes via the afferent lymphatics, where they present the antigen to naïve CD4+ T cells. The responding T cells are stimulated via a complex immunologic process to proliferate into memory and effector T cells, which are capable of inducing ACD following re-exposure to the allergen. The elicitation of ACD typically occurs within 48-96 hours following re-challenge of sensitized indiviudals.[28] However, as reviewed by Belsito,[28] the induction of clinically evident ACD can take months to years of exposure to low levels of an allergen. Although there are over 3700 known cutaneous allergens,[29] as reviewed by Holness,[6] a small number of these (potassium dichromate, epoxy resin, rubber accelerators/antioxidants, para-phenylenediamine, etc.) are overly represented among patients with occupational ACD.

DIAGNOSIS OF OCD:

Corrosion, acute irritant contact dermatitis and phototoxicity are usually easily diagnosed due to the significant erythema, vesicles and/or bullae that develop in a sharply delineated area within minutes to hours following exposure. In contrast, chronic cumulative ICD may be clinically indistinguishable from ACD, although certain features may suggest one over the other (Table 1). The diagnosis of ACD depends upon proper diagnostic patch testing. The diagnosis of ICD is one of exclusion, since there is no diagnostic test for this condition. Unfortunately, there are no reliable clinical features to determine whether a dermatitis is ICD or endogenous. In her landmark study of 263 hand eczema patients, Cronin[30] found no association between clinical patterns and causative factors, with the exception that a central palmar pattern correlated with an underlying endogenous process, such as atopic dermatitis.

To complicate matters, determination of a relationship between contact dermatitis and occupation is not always clear cut. Adapting criteria initially proposed by Key,[31] Methias[32] proposed that a “yes” answer to four of the following seven questions was generally adequate to establish probable occupational causality:

1. Is the clinical appearance compatible with contact dermatitis?
2. Are there workplace exposures to potential irritants or allergens?
3. Is the anatomic distribution of the eruption compatible with job exposure?
4. Is the temporal relationship between exposure and onset consistent with contact dermatitis?
5. Have non-occupational exposures been excluded as causes?
6. Does the dermatitis improve away from work exposure to the suspected irritant or allergen?
7. Do patch or provocation tests identify a probable allergic cause?

These criteria, while not gospel, are helpful in establishing the diagnosis of OCD.

INCIDENCE AND PREVALENCE:

Incidence

In many countries, OCD ranks first among reportable occupational diseases and may constitute up to 30% of payable compensation.[17] However, comparison of data across countries is hampered by differences in reporting occupational diseases. Furthermore, national registries are typically incomplete and thus the incidence of OCD is underreported.[33] This is particularly true in the United States, where occupational disease statistics originate from an annual survey by the Bureau of Labor Statistics that includes only a representative random sample of employees in private industry.[34] Thus, it has been estimated that the incidence of occupational skin diseases in the United States is underestimated by 10-50 times and that the milder cases of skin diseases are never registered.[35]

In most countries, the reported incidence rate for OCD varies between 5-19 cases per 10,000 full-time workers per year.[36-41] The Scandinavian countries and Germany have the most active nationwide notification programs for OCD. In Denmark, the incidence was approximately 8 per 10,000 workers per year.[37] In Germany, the estimated overall incidence of OCD from 1990 to 1999 was estimated at 6.7 cases per 10,000 workers per year with the highest incidence rates among hairdressers, bakers and florists.[40] Some industries, especially agricultural and manufacturing, have particularly high rates of OCD with incidence rates per 10,000 workers above 16.8 and 14.1, respectively.[34]

In the United Kingdom, the EPIDERM project has collected data on occupational skin disease from consulting dermatologists in the UK since 1993 and from consultant occupational physicians from May of 1994 through December of 1995.[41] During this time, the annual incidence of OCD reported by dermatologists was 6.4 per 10,000 workers and by occupational physicians 6.5 per 10,000 workers for an overall rate of 12.9 cases per 10,000. However, since this system is purely voluntary, is composed only of dermatologist and occupational physicians, and requires that an affected worker seek medical attention, the epidemiologic limitations are obvious.[41]

Prevalence

While incidence figures, which report the number of newly diagnosed cases of disease, are preferred for analyzing risk factors for OCD, they do not provide information on the number of workers at any one time (point prevalence) or over a defined period of time (period prevalence) who are affected by OCD. Since OCD is often a chronically relapsing disease, the incidence and point prevalence are less informative than the period prevalence, which include subjects with long-lasting contact dermatitis, as well as relatively recent cases.

Prevalence data for OCD is scarce. However, assuming that hand eczema can be used as a surrogate for OCD, prevalence rates in Europe can be seen to range from 6.7 to 10.6% of the population during a defined one year period (Table 2). The validity of using hand eczema as a surrogate for OCD is supported by Meding's studies on the prevalence of hand eczema in the general population of Gothenburg, Sweden (one year prevalence of 10.6%) vs the one year prevalence of occupational hand eczema in this same population (11.8%).[43, 46]

Reliability of Incidence and Prevalence Data

As outlined by Diepgen and Coenraads,[17] there are many factors that could influence, positively or negatively, the incidence and prevalence data noted above. Measures of disease frequency need an accurate numerator (i.e., the number of cases) and denominator (i.e., the population at risk). In many reports, the numerator will be biased because individuals with OCD who are undiagnosed, misdiagnosed or lost to follow-up are not included. Furthermore, in many cases, the denominator is unknown; this is particularly true in studies from tertiary care centers that rely on referred cases only. Finally, the data will be influenced by the nature of the study, which could vary from an intensive medical examination of the entire population to the more easily undertaken questionnaire. Smit at al.[47] investigated the differences in prevalence estimates that can arise as a result of differences in methodologies used to assess eczema. They compared two types of questionnaire-based diagnoses (symptom-based and self-reported) with diagnoses based upon medical examination. The prevalence of hand eczema determined by medical diagnosis was 18%, while that based upon a symptom-based questionnaire was 48% and by a self-reported questionnaire 17%. Thus, the symptom-based questionnaire widely overestimated the incidence of hand eczema, while the self-reported questionnaire slightly underestimated the prevalence when compared to medical diagnosis.

Lushniak[48] outlined other issues complicating the epidemiology of OCD. These include:

1. OCD is seen and treated by medical professionals in multiple specialties, which makes a review of physician-based data sources inefficient.
2. Many cases of OCD are never documented in any data source.
3. Individuals seeking medical care for OCD may not be representative of the entire population and, through this self-selection bias, the data may be skewed.

4. Different populations and different industries have unique exposures, which makes the epidemiology of OCD difficult to generalize across populations.
5. Work-related exposures change over time and affected workers may continue to suffer disease induced by a causative agent to which he/she is no longer exposed. Evaluation of these prior exposures can be difficult and is subject to recall and information bias.
6. Cross sectional studies of workers in a specific occupation, a frequently used study design, are subject to survivor bias as individuals with severe disease may have left the workforce and only those workers with limited or no disease remain for evaluation. And,
7. Standard case definitions for OCD do not exist and thus misclassifications of OCD from one data source to the other can occur.

PREDISPOSING FACTORS FOR OCD:

Skin contact with irritants and/or allergens is a necessary prerequisite for OCD. The probability and severity of a reaction depend upon the type of exposure and its length. However, there are numerous endogenous and exogenous factors that influence the development of OCD. Among these, age, gender, ethnicity, atopic constitution, environmental factors and specific occupational risks have received the most attention in the literature.

Age

Several studies have suggested that susceptibility to irritants is inversely proportional to age. ICD may be enhanced in children and appears to decline with advancing age.[49-52] While children less than eight years of age may be more likely to develop ICD, the data is far from definitive.[53, 54] In aged (= 60 year old) individuals, irritant responses to sodium lauryl sulfate were decreased as compared to young,[55] as were irritant reactions to croton oil.[49]

Gender

Women have been reported to have more intense irritant reactions than men when exposed to alkalis[56] and detergents.[57] Epidemiologic studies have also shown an increased risk for ICD among women;[58,59] however, these findings could not be verified in other studies. Lammintausta, et al.[60] and Holst and Moller[61] found no gender-related differences in experimental ICD induced by sodium lauryl sulfate. In another study,[62] there were no gender-related differences following exposure to such irritants as sodium lauryl sulfate, benzalkonium chloride, soap, hydrochloric acid, cantharidin and croton oil in patients with hand eczema and normal controls. Thus, whether gender truly impacts ICDis unclear.[63] As reviewed by Meding, the higher prevalence of ICD among women is most likely due to exposures, both occupational and non-occupational, and not inherent gender-related differences in susceptibility of the skin to cutaneous irritants.[64]

Race

Whether African-Americans develop significantly fewer reactions than do Caucasians to potent allergens, such as dinitrochlorobenzene or para-phenylenediamine, is controversial.[65] In the limited number of studies performed to date, the rate of sensitization to weaker allergens (e. g., nickel and neomycin) seem to be reduced in African-Americans when compared to Caucasians.[65] This reduced rate of sensitization most likely relates to the greater compaction of the lipid content in the stratum corneum of African-American skin as compared to Caucasian skin.[65] This enhanced barrier function of African-American skin, which is also thought to result in reduced rates of ICD in this population,[65] most likely causes the observed differences in ACD, rather than any innate, genetically based, immunologic factors.

Studies regarding ACD in other racial groups are extremely limited. In human “maximization tests” of cosmetic ingredients, Japanese individuals showed more severe allergic reactions than did Caucasians, although incidence rates for reactivity were the same.[66] Furthermore, Goh found no differences in the incidence of ACD among the indigenous (Malay, Chinese and Indian) populations of Singapore.[67] Additional studies evaluating racial differences in immunologic and non-immunologic factors affecting contact dermatitis are needed.

APPENDIX V

DERMATITIS FINAL REPORT

Atopic Dermatitis

Individuals with a personal history of atopic eczema have an enhanced risk of developing hand dermatitis when exposed to environmental irritants.[58, 68] Nonetheless, ACD based upon Type IV or delayed-type hypersensitivity to occupational sensitizers does not seem to be more prevalent among atopics.[69, 70] Schmunes and Keil[71] reported that workers with atopy were more likely to develop OCD and that they tended to fare worse than nonatopic workers. Forsbeck et al.[72] found that workers with atopic dermatitis (AD) were likely to develop OCD, but that they improved with control of exposure to irritants. In a retrospective/prospective study, Rystedt[70, 73] found that children with AD were at greater risk of developing hand dermatitis if they took occupations involving wet work than individuals without AD. Rosen and Freeman[74] reported that 79% of workers without AD improved over a period of follow-up compared with 62.4% of workers with AD. Holness and Nethercott[75] also found that workers with both AD and OCD were more likely to have persistent disease and less likely to improve than workers with OCD alone. Workers with both conditions, however, lost less time from work and were less likely to have filed a worker's compensation claim than other workers in Canada.

In prospective cohort studies, Diepgen and coworkers investigated the risk of developing OCD in hairdressers and nurses.[76] In the first year of study, 68% of the hairdressers developed mild to moderate or severe hand eczema. Using a logistic regression model, it could be demonstrated that an atopic skin diathesis enhanced the probability of developing hand eczema by an odds ratio of 2.1. However, it must be kept in mind that, even though epidemiologic data suggest atopic eczema enhances development of subsequent ICD, the apparent irritant effect may well be an exacerbation of the atopic eczema. Regardless, the consensus opinion is that atopics who develop OCD of the hands have a poorer prognosis than non-atopic workers,[77, 78] as they frequently have persistent dermatitis even if they change jobs.[70]

Environmental Factors

"Wet work" induces maceration of the skin. In addition, repeated wetting and drying result in scaling and fissuring that enhance the penetration of both allergens and irritants into the skin. In hot humid environments, perspiration solubilizes chemicals that contact the skin,[79] and allows them to penetrate more easily. In contrast, low-humidity environments cause desiccation and subsequent disruption of the epidermal barrier.[79] Chronic friction and repeated microtraumas can similarly disrupt the barrier making the host more susceptible to irritants and allergens.[25]

Occupational Risks

In addition to endogenous and environmental factors, a number of occupations have unique exposures resulting in enhanced rates of OCD. In a patch test clinic study of more than 9700 patients in Belgium, the most commonly affected occupational groups included mechanics, housekeepers, metal workers, cleaners, healthcare workers, office workers, construction workers, hairdressers, beauticians, bakers and cooks.[2] In Oregon, accepted Worker's Compensation claims for OCD were mostly seen among laborers, food service workers, machine operators, agricultural workers, health professionals, janitors and maids, mechanics, construction workers and cosmetologists, in decreasing order of frequency.[80] Common to these professions are extensive exposure to wet work, solvents/caustic materials and/or microtrauma.

PROGNOSIS OF OCD:

As reviewed by Hogan, et al.[81] the prognosis for OCD prior to 1990 was poor, with improvement noted in only 30-50% of patients. However, more recent reviews suggest that response rates have significantly improved: 78-84% of patients with OCD, when appropriately managed, recover without impairment.[12, 82] It has been suggested that the improved prognosis of OCD may relate to enhanced diagnostic procedures, more accurate identification of irritants/allergens, and increased preventative efforts, especially worker education.[83] Factors that have been associated with a worse prognosis for OCD include ACD to nickel or

chromium,[84] chronicity of the dermatitis,[81, 85] treatment delay,[71] a history of atopic dermatitis,[7, 74, 75] and a poor understanding by the worker of his/her disease.[86]

Generalizations regarding the prognosis of occupational ACD vs ICD are difficult to make. Indeed, there are numerous conflicting reports in the literature, which state that ICD has a better, equal or worse prognosis than ACD.[81] It must be kept in mind that the prognosis for ACD or ICD depends upon the allergen or irritant and its prevalence outside of the workplace. As reviewed by Hogan et al.,[81] ACD to nickel, chromate and glutaraldehyde are associated with a poor prognosis, whereas ACD to epoxy resins carries a favorable prognosis. Avoidance of nickel, chromate, formaldehyde and rubber, which are ubiquitous in the environment, can be difficult and ACD to these materials frequently results in chronic disease.[83]

The prognosis for ICD is similarly varied. Chronic cumulative ICD to cutting fluids and solvents tends to cause persistent dermatitis despite avoidance, whereas acute ICD to acids and alkalis most often clears when exposure is discontinued.[87] Overall, chronic cumulative ICD typically has a worse prognosis than ACD or acute ICD.[12, 88, 89]

While gender[82] and age[12, 82] do not appear to be related to chronicity of symptoms, older workers tend to spend more time away from work because of their skin disease.[82] In addition to age, workers with ACD or pending medicolegal claims spent more time away from the workplace because of OCD.[82] Factors increasing the likelihood that a worker quickly returns to his/her prior occupation include job satisfaction, skill level and education regarding avoidance of the contactant.[81]

As noted above, not all OCD clears completely when the responsible contactant is apparently eliminated. There are workers with OCD who never recover for unclear reasons. Among the potential contributing factors are the possibility that the repair capacity of skin can be overwhelmed, or that contact dermatitis may enter a self perpetuating and recurrent cycle by virtue of the fact that the OCD triggered an underlying propensity to endogenous eczema.[90, 91] As stressed by Rietschel,[92] efforts must be taken to clarify and verify what is irritant and what is endogenous in chronic OCD.

Studies of the general population reveal that most workers with OCD who change jobs do so for reasons other than dermatitis.[85, 93] The majority of studies assessing the role of change in occupation among workers with OCD have not found the prognosis to be improved.[85, 93-99] Many workers can continue to work despite ongoing OCD.[85, 94, 100-104] While the prognosis of OCD may be guarded, if the affected worker can continue to work, he or she may have a better social prognosis despite the ongoing presence of OCD.[105, 106] A change in occupation is indicated only for a minority of affected workers.[81, 107-109] As reviewed by Hogan, workers requiring a job change include those with severe allergy to an allergen that cannot be avoided and those with atopic hand eczema whose occupation includes repeated exposure to cutaneous irritants, such as water, soaps and solvents.[110]

WORKER'S COMPENSATION:

Although the assessment of the work-relatedness of contact dermatitis can be complicated, evaluation as to the impairment and the resultant disability of work-induced OCD can be more difficult. According to the 5th edition of *Guide to the Evaluation of Permanent Impairment,* impairment is defined as "a loss, loss of use, or derangement of any body part, organ system or organ function."[111] Although impairment is a medical issue to be assessed by healthcare providers, disability is non-medical and typically assessed by worker's compensation boards or litigating attorneys. Disability is defined as an "alteration of an individual's capacity to meet personal, social, or occupational demands."[111] Impairment is considered permanent when the worker has reached "maximum medical improvement", meaning the disease is "well stabilized and unlikely to change substantially in the next year with or without medical treatment."[111] While most authors consider the disorder to become permanent after 12 months duration,[112] the time frame may, in some cases, be longer.

APPENDIX V

DERMATITIS FINAL REPORT

Worker's compensation laws are essentially no-fault statutes that hold employers responsible for the cost of occupational injury and disease. These laws vary widely from country to country and even among states/provinces within the same nation. The Worker's Compensation Act in British Columbia states that "a worker who suffers from an occupational disease due to the nature of his or her employment and is thereby disabled from earning full wages at his or her work is entitled to compensation." Therefore, OCD is considered compensable. However, according to current policy, a worker who has suffered from contact dermatitis but whose symptoms have resolved, has the same physical capabilities as before, or is simply left with an underlying allergy or sensitivity, is no longer considered to have dermatitis and therefore has no claim to permanent partial disability as a result of their OCD. This policy raises the following issues:

1. Does an individual have contact dermatitis only when displaying signs or symptoms of the disease (e.g., skin lesions) or also when he or she has developed the underlying allergy or irritability that may trigger symptoms of ACD or ICD, respectively?

If one defines contact dermatitis as clinically evident skin lesions, then a worker has contact dermatitis only when displaying signs or symptoms of disease. However, in studies that evaluated recovery time following experimentally induced chronic ICD, Choi, et al.[113] reported apparent normalization in the skin within 2-5 weeks after experimental induction of chronic ICD. However, although the skin appeared healed by such sensitive measures as visual erythema score, transepidermal water loss, skin color reflectance and skin capacitance, it remained hyperirritable (i.e., more easily inflammed by irritants) for periods of up to ten weeks. Other authors have noted similarly protracted recovery times following both acute and chronic ICD.[114, 115] The mechanism(s) underlying this enhanced and more easily induced reactivity to irritants are not clear. Serup[116] speculated that hyperreactivity after repeated exposure to irritants depends on individual defense and repair mechanisms that result in a change in the threshold for ICD. These may include changes in skin lipids,[117, 118] composition[119, 120] and viable epidermis/dermis.[121, 122] Thus, for at least some individuals, chronic cumulative ICD remains at a subclinical level not easily evaluated by the naked eye. Nonetheless, this does not make the presence of disease any less real.

The situation for ACD is similar to ICD. Numerous studies have documented the existence of allergic contact hypersensitivity for periods of up to ten years following diagnosis.[123-126] While the intensity of the allergy may wane with lack of exposure, it is lifelong and will recur under proper conditions.[28] Thus, while the disease ACD exists only when symptomatic, the underlying pathophysiology (e.g., allergic contact hypersensitivity or delayed-type hypersensitivity) remains. As noted by Friedmann in his landmark studies on the dose/response relationship in ACD to the potent allergen dinitrochlorobenzene, "An apparently ineffective sensitizing stimulus is…registered immunologically…[and results in] enhanced subsequent responses to the same antigen."[127]

Workers with OCD need to be evaluated at least for a period of one year before a final assessment of impairment can be made.[112] This time span allows for the effects of seasonal and other environmental factors on the disease process. Finally, it is imperative that workers be evaluated while performing their current occupation with appropriate accommodation(s) before it can be determined whether maximum medical improvement has occurred and the resultant impact of their disease on any disability rating.

2. Does an individual who has an underlying allergy or sensitivity to a workplace substance, but who no longer displays the signs or symptoms of contact dermatitis once removed from the aggravating substance, have a permanent impairment and/or disability?

As delineated above, worker's with OCD to nickel, chromate, formaldehyde, rubber, and other ubiquitous environmental allergens tend to have chronic and recurrent disease.[81, 83] Similarly, workers who have suffered from prolonged chronic cumulative ICD may have permanently overwhelmed the repair capacity of their skin or have entered a self-perpetuating and recurrent cycle of dermatitis.[90, 91] Therefore, assuming that an individual has been reassigned to another occupation or has had modification in his/her

job environment, and assuming that the worker has been followed for a period of at least one year and has not had signs or symptoms of his/her OCD, then the worker is less likely to suffer from any permanent impairment. However, for workers with ACD to ubiquitous environmental allergens, or in whom chronic cumulative ICD has unleashed an apparent endogenous eczema, it is unlikely that, while under observation for 12 months or longer, they will remain free of active dermatitis. In these cases, impairment would be measured based upon the frequency of recurrences of the dermatitis and the difficulty in avoiding the precipitating factors. However, a minority of workers may remain asymptomatic by virtue of stringent restrictions in life style. These restrictions need to be considered when disability is assessed.[111] Thus, as reviewed by Bergner, et al.,[128] each case needs to be carefully and individually evaluated based upon a well-documented history, periodic physical examinations and appropriate testing.

3. Does there exist a threshold level below or above which the individual is considered not to have a permanent impairment and/or disability?

According to the 5th edition of the *Guides to the Evaluation of Permanent Impairment*, individuals whose skin disorder is present or intermittently present, induces no or few limitations in performances of the activities of daily living, and requires no or intermittent treatment have a class I or 0-9% impairment of the whole person.[111] Based upon this definition, the threshold level at which an individual would be considered not to have an impairment resulting in disability would include the following: 1) Signs and symptoms of the skin disorder were not present for at least one year; and, 2) the skin disorder did not result in any limitations in the performance of activities of daily living; and, 3) no treatment was required to maintain the integrity of the skin. However, as discussed above it must be kept in mind that workers allergic to ubiquitous allergens or with chronic cumulative ICD may suffer severe lifestyle restrictions to maintain a disease-free state without medical treatment. Thus, these workers may have no obvious “loss, loss of use or derangement” (i.e., impairment) of their skin, but, nonetheless, remain permanently, albeit partially, disabled despite lack of dermatitis by virtue of lifestyle restrictions that affect their activities of daily living.[111]

In summary, OCD is a frequent cause of work-related disability. Depending upon the inducing factors, the dermatitis may be continually or intermittently present. The determination of maximum medical improvement requires, in many cases, observation for periods of up to one year. Sub-clinical activity of the disease may persist for periods of weeks to years. The inciting cause(s) of the dermatitis, the worker’s clinical course over time, and lifestyle restrictions are the main factors driving the final assessment of disability.

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APPENDIX V

DERMATITIS FINAL REPORT

Table 1. Irritant vs Allergic Contact Dermatitis

	ICD	ACD
Number of people affected	Many	Few
Distribution	Localized	Spreads
Onset	Rapid (hrs) with strong irritants; late (days-weeks) with weak irritants	24—72 hrs in clinically sensitized individuals
Resolution	Improves after 3-6 weeks away from exposure	May improve within days after exposure; some cases persist
Atopy	Predisposition	Variable
Diagnosis	History and physical examination; Exclusionary diagnosis	History, physical examination and patch testing

APPENDIX V

DERMATITIS FINAL REPORT

Table 2. One-year Prevalence of Hand Dermatitis in Various Countries

Country	Investigational tool	Number of responders	Prevalence of hand eczema (%)		
			Males	Females	Total
Norway[42]	Q	14667	4.9	13.2	8.9
Sweden[43]	Q, E	16587	8.8	14.6	10.6
Netherlands[44]	Q	2185	5.2	10.6	8.2
Germany[45]	E	1196	5.6	10.5	6.7

E, dermatological examination; Q, questionnaire

APPENDIX VI

DERMATITIS PEER REVIEW

May 24, 2005

Comments on the Workers' Compensation Board of British Columbia's Report on Occupational Contact Dermatitis

Introduction:

The Workers' Compensation Board of British Columbia commissioned Dr. Tove Agner, Dr. Magnus Bruze, Dr. Thomas Diepgen and Dr. Howard Maibach to conduct an independent critical review of the report prepared by Dr. Donald Belsito on occupational dermatitis, with particular emphasis on Dr. Belsito's analysis of the following two questions:

(1) Does an individual have contact dermatitis:

- only when he or she is displaying signs or symptoms of the disease; or
- also when he or she has developed the underlying allergy or sensitivity that may trigger these symptoms?

(2) Does an individual who has an underlying allergy or sensitivity due to a workplace substance but who no longer displays the signs or symptoms of contact dermatitis once removed from the aggravating substance have a permanent impairment? If so:

(i) how is the impairment measured?

(ii) is there a threshold level below or above which the individual is considered not to have a permanent impairment?

APPENDIX VI

DERMATITIS PEER REVIEW

The reviewers met on May 1st, 2005 and subsequently prepared this report. The group reviewed Dr. Belsito's report and submitted their own comments on the two questions outlined above.

Question 1: Does an individual have contact dermatitis only when he or she is displaying signs or symptoms of the disease; or also when he or she has developed the underlying allergy or sensitivity that may trigger these symptoms?

Background: Contact allergy defines an underlying hypersensitivity that is demonstrated by appropriate patch and or intradermal testing. However, allergic contact dermatitis refers to the underlying immunologic hypersensitivity plus the clinical *manifestations:* signs and symptoms. Hence, allergic contact dermatitis is diagnosed by identifying appropriate morphology, a careful exposure assessment, a localisation related to this exposure, and a state of the current science diagnostic patch test. (Ale, S.I. and Maibach, H.[1]) Yes, by definition displaying signs and symptoms refers to the clinical disease; and contact allergy refers to the underlying immunologic state and does not mandate the presence of signs and symptoms (contact dermatitis). An individual has the disease allergic contact dermatitis only when he or she is symptomatic. The underlying contact allergy is not itself a clinical disease. For instance, a person may patch test positive to salts of gold, indicating a contact allergy to gold. However, he or she may never develop symptoms of contact dermatitis upon exposure to gold. (Lachapelle, J-M. and Maibach, H[2]; Bruze, M and Andersen, KE[3])

An individual who has a propensity to react but is not in a symptomatic state does not have a clinical disease.

Irritant Contact Dermatitis

Irritant contact dermatitis is a complex non-immunologic syndrome, which includes a dermatitis that may morphologically resemble allergic contact dermatitis. When an individual heals completely after experiencing irritant dermatitis, he or she eventually is able to tolerate reasonable exposure to the same chemicals. Complete healing may take many weeks or even occasionally months after the skin clinically appears normal. (van der Valk, Pieter G.M. and Maibach, H[4])

Question 2: Does an individual who has an underlying allergy or sensitivity due to a workplace substance but who no longer displays the signs or symptoms of contact dermatitis once removed from the aggravating substance have a permanent impairment? If so (i) how is the impairment measured? (ii) is there a threshold level below or above which the individual is considered not to have a permanent impairment?

Background: An individual who has demonstrated contact allergy (see above for definition) presumably has this for years or life. When the level of exposure exceeds the threshold level of elicitation, clinical disease (signs and symptoms) occurs. This is defined as elicitation.

Contact allergy (the immunologic state) lasts for years or perhaps life. However, contact allergy is not a medical impairment. (Bruze, M and Condé-Salazar, L[5]; Bruze, M[6]**)** The clinical disease (allergic contact dermatitis)

occurs with re-exposure at a sufficient level to elicit the clinical disease (allergic contact dermatitis). Note that this refers not only to the allergen, but also to some cross-reacting substances. (i) This means, that impairment (as defined by Workers Compensation BC) is measured by the following: Extent and severity of the disease, individual threshold, localisation of disease, as well as by the potential for exposure in varying occupations and non-occupationally.

(ii) As noted above, each individual has a threshold level of exposure, to which he/she will react. The individual threshold may however vary over time.

ENDNOTES

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APPENDIX VII

REHABILITATION SERVICES & CLAIMS MANUAL, VOLUME II
Draft Contact Dermatitis Disability Rating Table

81. Contact Dermatitis

Disability Rating	Signs & Symptoms	Treatment (see I and II for details)
0 - 5%	Skin disorder signs and symptoms present or intermittently present.	Requires no or intermittent treatment with agents listed in I.
6 - 24%	Skin disorder signs and symptoms intermittently or constantly present.	Requires intermittent treatment with agents listed in I and II.
25 - 50%	Skin disorder signs and symptoms constantly present.	Constant treatment with agents in I and II. Cases such as these are rare and require tertiary level medical input.

In evaluating the severity of the worker's condition and its effect on earning capacity, the Board officer may consider the limitations experienced by the worker in his or her activities of daily living.

I. <u>TREATMENTS</u>

a. Topical Treatment

May be indicated for mild cases of contact dermatitis, limited site of involvement, acute contact dermatitis when the offending agent has been removed, or chronic contact dermatitis with limited symptoms.

- Topical therapy frequently includes:

i. Emollients, lubricants, moisturizers
ii. Non-alkaline cleansers instead of soap
iii. Cool compresses with saline, water, milk, aluminum subacetate
iv. Lotions, such as calamine
v. Topical corticosteroids cream, ointment, lotion, gel or spray.
vi. Antibiotics

b. Systemic Treatment

i. Antihistamines
ii. Antibiotics

II. <u>SYSTEMIC TREATMENT (OTHER)</u>

May be indicated for control of itching and/or edema even in cases of limited extent. Systemic treatment may also be indicated for moderate to severe acute and/or chronic contact dermatitis.

i. Antihistamines
ii. Corticosteroids (oral or parenteral)
iii. Antibiotics (oral or parenteral)
iv. Psoralen (topical or oral) and ultraviolet A radiation (PUVA)
v. Azathioprine
vi. Cyclosporin

APPENDIX VIII

DRAFT DERMATITIS POLICIES

*Deletions shown in ~~Strikethrough~~, additions in **Bold***

#30.50 Contact Dermatitis

Schedule B lists "Contact dermatitis" as an occupational disease. The process or industry described opposite to it is "Where there is excessive exposure to irritants, allergens or sensitizers ordinarily causative of dermatitis".

The payment of temporary disability benefits and permanent disability awards are subject to the same general principles as are set out in policy item #29.20 in respect of asthma or a reaction of the respiratory tract to a substance with irritating or inflammatory properties. Therefore, there is no disability for the purpose of the *Act* unless the worker has an actual loss of body function or physical impairment resulting from the dermatitis which causes the worker to be disabled from earning full wages at the work at which he or she was employed.

Temporary disability benefits are payable while the disability is a temporary one, but cease when it disappears or stabilizes or becomes permanent. If the worker's symptoms do not entirely resolve and they are left with a permanent impairment, a disability award may be granted. ~~However, neither temporary disability benefits nor a permanent disability award is payable simply because the worker has developed a susceptibility to react to a certain substance as a result of his or her work which causes periods of temporary impairment if he or she is exposed to the particular substance, but otherwise causes no complaints. Rehabilitation assistance may be provided to assist the worker in obtaining alternative employment which does not expose him or her to the substance in question (see policy item #86.30).~~

A worker whose symptoms have resolved and who is left with a significant underlying allergy or sensitivity resulting in the need to avoid workplaces containing a triggering substance may be considered to have a permanent impairment. In assessing the need to avoid certain workplaces, the Board officer considers medical advice from the attending physician and/or Board Medical Advisor on the nature of the sensitization and the degree of medical risk should the worker return to work environments containing the substance.

The Contact Dermatitis Disability Rating Table found in the *Permanent Disability Evaluation Schedule* is used to assess the disability rating. Sensitization to common substances, found in many workplaces, results in a higher rating than sensitization to substances found in a limited number of work environments.

APPENDIX VIII

REHABILITATION SERVICES & CLAIMS MANUAL, VOLUME II
Draft Contact Dermatitis Disability Rating Table

81. Contact Dermatitis

Disability Rating	Signs & Symptoms	Treatment (see I and II for details)
1 – 2% (Sensitization to substances commonly found in many work environments results in a higher rating than sensitization to substances found in a limited number of work environments.)	Skin disorder signs and symptoms not present when the worker is removed from a triggering substance but worker experiences signs and symptoms upon exposure to the substance, and, after considering medical advice, the Board determines that the worker must avoid workplaces containing that substance.	Requires no treatment.
3 - 5%	Skin disorder signs and symptoms present or intermittently present.	Requires no or intermittent treatment with agents listed in I.
6 - 24%	Skin disorder signs and symptoms intermittently or constantly present.	Requires intermittent treatment with agents listed in I and II.
25 - 50%	Skin disorder signs and symptoms constantly present.	Constant treatment with agents in I and II. Cases such as these are rare and require tertiary level medical input.

In evaluating the severity of the worker's condition and its effect on earning capacity, the Board officer may consider the limitations experienced by the worker in his or her activities of daily living.

APPENDIX VIII

REHABILITATION SERVICES & CLAIMS MANUAL, VOLUME II
Draft Contact Dermatitis Disability Rating Table

I. TREATMENTS

a. Topical Treatment

May be indicated for mild cases of contact dermatitis, limited site of involvement, acute contact dermatitis when the offending agent has been removed, or chronic contact dermatitis with limited symptoms.

- Topical therapy frequently includes:

i. Emollients, lubricants, moisturizers
vii. Non-alkaline cleansers instead of soap
viii. Cool compresses with saline, water, milk, aluminum subacetate
ix. Lotions, such as calamine
x. Topical corticosteroids cream, ointment, lotion, gel or spray.
xi. Antibiotics

b. Systemic Treatment

i. Antihistamines
iii. Antibiotics

II. SYSTEMIC TREATMENT (OTHER)

May be indicated for control of itching and/or edema even in cases of limited extent. Systemic treatment may also be indicated for moderate to severe acute and/or chronic contact dermatitis.

vii. Antihistamines
viii. Corticosteroids (oral or parenteral)
ix. Antibiotics (oral or parenteral)
x. Psoralen (topical or oral) and ultraviolet A radiation (PUVA)
xi. Azathioprine
xii. Cyclosporin