Workers’ Compensation for Occupational Respiratory Diseases

INTRODUCTION

Standards for the recognition of occupational diseases (ODs) have been little changed since their enactment in 1954. In 2013, significant changes were made to the specific criteria for OD recognition, which were established under the Enforcement Decree of the Industrial Accident Compensation Insurance Act (ED-IACIA) (1). The respiratory system is a major route of occupational exposure. Occupational respiratory diseases can be caused by repeated, long-term exposure or a single, severe exposure to hazardous particles, chemicals, vapors, or gases (2). Accordingly, occupational respiratory disease, a major OD, incorporates a variety of interstitial lung diseases as well as inflammatory airway diseases. Although there have been many respiratory hazardous agents and diseases, with the exception of pneumoconiosis, very few respiratory diseases have been compensable in Korea (3). We do not deal with respiratory cancer here because occupational cancer is described as a separate category.

In this article, the authors deal with the implications of the ED-IACIA amendment and changes to occupational respiratory diseases in Korea.

MATERIALS AND METHODS

The procedure for amending the specific OD recognition criteria in ED-IACIA and the Enforcement Decree of the Labor Standard Act (ED-LSA) is described in Song et al. (4).

RESULTS

Trends of occupational lung disease as detected by compensation

In Korea, the numbers accredited by the Industrial Accident Compensation Insurance Act (IACIA) are considered official occupational lung disease (OLD) statistics; in 2012, there were 572 cases. According to the official statistics, between 2008 and 2012, there were 3,128 cases of OLDs or approximately 4.66 per 100,000 workers (Table 1).

Changes of structure (major contents of the revision)

Before the 2013 amendment to ED-IACIA, there was no category called occupational respiratory diseases because the previous criteria were based on specific hazardous agents and their health effects (Table 2). For example, asthma was described under the health effects of chemicals (such as wood dust, animal hair dust, and antibiotics), chromium and its compounds, and diisocyanates. Therefore, if someone diagnosed with asthma wanted to know about the compensation standards, they were required to read all related documents. Furthermore, the agent-based criteria were unknown to both workers and clinicians. To improve this situation, a major OD system-based struc-
However, specific criteria for occupational COPD recognition are limited to workers exposed to high concentrations of coal mine dust, silica, or cadmium fumes for prolonged periods because COPD is common among the general population.

Through a study of 3400 British miners over a 10-yr period, Marine et al. (6) demonstrated an exposure-related FEV1 reduction in coal miners irrespective of the smoking history. This result eventually became the basis for the current statutory compensation offered to COPD-affected coal miners in the UK (7). Underground miners and other workers who work with crystalline silica have an increased risk of airflow obstruction independent of radiological silicosis (8). Exposure to cadmium fumes increases the risk of COPD through the induction of pulmonary emphysema in a dose-dependent manner (9).

Asthma, reactive airway dysfunction syndrome (RADS), and hypersensitivity pneumonitis (HP)

Over 400 agents are known to cause occupational asthma. Well-known etiologic agents such as grain dust, flour, reactive dyes, nickel, cobalt, formaldehyde, aluminum, and acid anhydride were added to the existing list. Specific and detailed methods of diagnosing asthma due to diisocyanates, such as specific IgE, PEFR variability, and metacholine provocation test, were deleted because such methods are not confined to diisocyanate-induced asthma, and describing such diagnostic methods in the specific criteria is inappropriate. Furthermore, work-aggravated asthma was added to the criteria. Accordingly, if the condition of a person with asthma is aggravated by their working conditions, the person can claim compensation under IACIA. In the previous criteria, RADS was described as a disease caused only by diisocyanates. In the current criteria, RADS is described as an independent disease entity, and major etiologic agents such as chlorine, hydrogen chloride, and hydrochloric acid are included. HP was also described as a disease caused only by diisocyanates. However, in the amendment, well-known chemi-

| Year | OD  | OLD | Proportion (%) of total ODs | OLD cases per 100 thousand workers |
|------|-----|-----|-----------------------------|-----------------------------------|
| 2008 | 8,760 | 733 | 8.37 | 5.35 |
| 2009 | 7,941 | 626 | 7.88 | 4.38 |
| 2010 | 6,986 | 543 | 7.77 | 3.88 |
| 2011 | 6,516 | 654 | 10.04 | 4.47 |
| 2012 | 6,742 | 572 | 8.48 | 5.43 |
| Total | 36,945 | 3,128 | 8.47 | 4.66 |

OD: Occupational disease, OLD: Occupational lung disease. Occupational lung diseases include pneumoconiosis, asthma, and asbestos-related diseases.

Table 3. Revision of specific criteria for the recognition of occupational diseases in Enforcement Decree of Industrial Accident Compensation Insurance Act

| Diseases of the respiratory system | |
|-----------------------------------|--|
| A. Asbestosis due to asbestos | |
| B. Asthma due to wood dust, grain dust, flour, animal hair dust, antibiotics, chromium or its compounds, diisocyanates, reactive dyes, nickel, cobalt, formaldehyde, aluminum, acid anhydride, and others, or aggravated by work | |
| C. Reactive airway dysfunction syndrome due to diisocyanates, hydrogen chloride, hydrochloric acid, etc. | |
| D. Hypersensitivity pneumonitis due to diisocyanates, epoxy resin, acid anhydride, etc. | |
| E. Allergic rhinitis due to wood dust, animal hair, antibiotics, etc. | |
| F. Metal fume fever due to metal fumes such as zinc and copper | |
| G. Chronic obstructive pulmonary disease due to coal mine dust, cadmium fumes, etc. | |
| H. Pneumonia due to manganese or its compounds, chromium or its compounds, cadmium or its compounds, etc. | |
| I. Ulceration or perforation of the nasal septum due to chromium or its compounds | |
| J. Respiratory diseases such as inflammation of the respiratory tract mucosa due to pyrolysis of synthetic resins, etc. | |
| K. Rhinitis due to organic solvents | |
cal agents such as epoxy resin and acid anhydride were added.

Asbestosis
Asbestosis is defined as parenchymal fibrosis due to asbestos exposure. In general, fibrosis manifests clinically within 20 yr of the onset of exposure. Asbestos exposure lasting more than 1 yr is necessary for defining occupational exposure to asbestos. However, even sufficiently intense short-term exposure for less than a month can result in asbestosis (10). Chest radiography is the primary tool for asbestosis diagnosis. Upon chest radiography, small and irregular opacities are evident in the mid and lower lung zones. However, in some cases, asbestosis cannot be detected by chest radiography, and high-resolution computerized tomography (HRCT) is helpful for diagnosis in such cases. So, HRCT is recommended for diagnosing asbestosis (11).

Other occupational respiratory diseases (allergic rhinitis, metal fume fever, and other agent-based list)
Wood dust, animal hair, and antibiotics were added as etiologic agents for allergic rhinitis. Further, many agents such as wheat flour (12), metal working fluid (13), grain dust (14), and disocyanate (15) can also cause allergic rhinitis. However, it is impossible to describe all possible agents that can cause allergic rhinitis. Therefore, previously, only three agents were listed as examples. Zinc and copper were added as agents that induce metal fume fever. This list is the same as that in the previous criteria. In general, metal fume fever occurs in 4-8 hr after exposure to metal fumes, and it is eliminated in 1 or 2 days. Additional treatment is not necessary, except for exposure management. Manganese, chromium, and other organic solvents can cause diverse inflammations of the upper airway. These chemicals were included in the list as agent-based descriptions. Chemical pneumonitis due to metal fumes, ulceration of the nasal septum due to chromium, inflammation of the respiratory tract mucosa due to pyrolysis of synthetic resins, and rhinitis due to many organic solvents are examples of these criteria.

Pneumoconiosis
In cases where a worker desires to receive medical care benefits and/or pneumoconiosis compensation annuity for work-related pneumoconiosis, the worker requests payment through the Korea Workers’ Compensation and Welfare Service (KCOMWEL). Upon receipt of such a medical care benefit payment request from a worker, KCOMWEL requests the health examination service to conduct the necessary medical examinations for confirming pneumoconiosis. The health examination service conducts the necessary medical examination for diagnosing pneumoconiosis and submits the examination results to KCOMWEL. KCOMWEL then deliberates on and determines the type and spectrum of pneumoconiosis, presence and type of complications, level of cardiopulmonary function, etc., of the concerned worker after the Pneumoconiosis Examination Council’s assessment. The radiological findings of pneumoconiosis are divided by the profusion of small opacities as Category 1 (1/0, 1/1, 1/2), Category 2 (2/1, 2/2, 2/3), and Category 3 (3/2, 3/3, 3/+), and in the presence of large opacities as Category 4 (4A, 4B, 4C). Cardiopulmonary function is divided into 4 grades according to spirometry results. Pneumoconiosis disability grades are determined by combinations of pneumoconiosis type and cardiopulmonary function. A pneumoconiosis-affected worker can get Pneumoconiosis Compensation Annuity, which is the sum total of “basic annuity” and “pneumoconiosis disability annuity.” The criteria for medical care benefits are complications such as active pulmonary tuberculosis, pleurisy due to infection, bronchitis, bronchiectasis, pneumothorax, emphysema (accompanied by impairment of forced vital capacity (FVC) to less than 70% of the predicted value or the forced expiratory volume in the first second (FEV1) of less than 70% of the predicted value and an FVC/FEV1 ratio of less than 70%), cor pulmonale, nontuberculous mycobacterial infection, and primary lung cancer (in the mining industry).

DISCUSSION
Occupational respiratory disease is considered a major OD for several reasons. First, historically, lung diseases such as pneumoconiosis have been reported continuously in most industrialized countries. Second, causative agents that induce lung diseases can be comparatively recognized easily. Through occupational history, radiologic findings, and specific challenge tests, causative agents can be verified for occupational respiratory diseases such as asbestosis, silicosis, and asthma. Third, the respiratory tract is a major route of occupational exposure to toxic chemicals. Therefore, occupational respiratory diseases are included on the OD list in most countries.

In the former criteria, agent-based descriptions were common on the OD list. However, such descriptions were incompatible with occupational respiratory diseases because clinical confirmation is the first step for evaluating work-relatedness in the case of an occupational respiratory disease. Furthermore, workers are more familiar with the disease-based approach as opposed to the agent-based approach. A few agent-based descriptions remain in the current list because the authors thought that focusing on agents continues to be meaningful.

The International Labor Organization (ILO)’s OD list describes respiratory diseases as an independent disease system among ODs by target organ system (16). It is comprised of 11 types of diseases and 1 comprehensive regulation that considers other work-related respiratory diseases. The European Schedule of Occupational Diseases published by the European Commission (EC) in 2009 (17) deals with occupational respiratory diseases under a section of diseases caused by the inhalation of.
substances and agents (Table 4); the EC includes cancers of the respiratory system in the same section. However, the ILO describes occupational cancer in a separate section comprised of agents only, but not the corresponding cancers. Occupational cancers are not covered in this article.

Smoking is the largest contributing factor to respiratory diseases, and the smoking rate among Korean workers is very high (18). Smoking increases the risk of malignant tumors and various types of respiratory diseases due to the synergistic effects associated with work-related harmful substances. Consequently, determining the effect of smoking on occupational respiratory disease is a complicated issue. This issue is highlighted in the COPD work-relatedness evaluation. In this revision, the inclusion of COPD in the list was the most notable change.

The former criteria did not reflect the results of recent studies, so the current revision tried to apply recently revealed agents and evidences. In the current criteria, however, concrete guidelines for evaluating work-relatedness, such as estimation of the exposure level, latent period, and detailed examination methods, have not been described. The results of further studies can be used to formulate detailed criteria.

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**DISCLOSURE**

The authors declare that they have no conflicts of interest to disclose.

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