Results of Research Conducted by Rosai Hospitals on Worker Medical Treatment

– A Summary of Clinical Medical Research (Part 1) of the 13 Fields of Occupational Injuries and Illnesses of the Japan Labour Health and Welfare Organization –

The Japan Labour Health and Welfare Organization

Website dedicated to the research and development,

and dissemination projects related to the 13 fields of occupational injuries and illnesses: http://www.research12.jp/

Contents

Research and Development, and Dissemination Projects Related to the 13 Fields of Occupational Injuries and Illnesses

In order for the Rosai hospital group to carry out its major role of providing medical treatment to workers, the Japan Labour Health and Welfare Organization initiated the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses in April 2004. The large-scale clinical medical research conducted by this hospital group is based on a total number of hospital beds of approximately 14,000 providing care to approximately 230,000 inpatients per year and approximately 36,000 outpatients per day.

Table 1. Part 1 of the Clinical Research Results of the 13 Fields of Occupational Injuries and Illnesses of the Japan Labour Health and Welfare Organization

	Field name and Research Center	Establishing Hospital	Principal Research Themes
1	Work related trauma such as limb amputation and bone fractures *Clinical Research Center for Occupational Trauma*	Tsubame Rosai Hospital	• Establish a method to estimate the possibility of work reinstatement and the level of functional recovery after finger replantation based on the severity score at the time the finger was severed. • Expand treatment such as the WAF method and transpositional replantation that deal with severed fingers and limbs
2	Spinal cord injury *Clinical Research Center for Worker's Spinal Injury*	Chubu Rosai Hospital	• Establish standard values for cervical spine and cervical spinal cord for Japanese based on MRI imaging, and identify increase in cervical spinal column stenosis in mature age workers.
3	Sensory organ impairment due to noise, electromagnetic waves, etc. *Clinical Research Center for Occupational Sensory Organ Disability*	Osaka Rosai Hospital	• Clarify relationship between inadequate control of blood sugar by a worker suffering from diabetes mellitus and actual work
4	Disorders dependent on physical factors such as temperature, air pressure, and radiation *Clinical Research Center for Occupational Physical Factor Induced Diseases*	Tohoku Rosai Hospital	• Clarify which products are the source of contact dermatitis in barbers and beauticians based on patch tests. After discontinuing use of positively identified products, clarify questionnaire results from those who were cured of rough hands • Research results are to be added to the agenda for the investigative commission of experts investigating the extent of job-related illness regarding worker regulations for Labor Standards Act Article 35
5	Muscular and skeletal disorders stemming from physically overburdening the body *Clinical Research Center for Occupational Musculo-Skeletal Disorders*	Kanto Rosai Hospital	• Clarify the mental and social causes of lower back pain in workers in addition to work-related posture, action, and environmental factors.
6	Hand-arm vibration syndrome *Clinical Research Center for Hand-Arm Vibration Syndrome*	Sanin Rosai Hospital	• Establish the Finger Systolic Blood Pressure (FSBP)% method as an objective method for diagnosing vibration induced impairment
7	Industrial poising from exposure to chemicals *Clinical Research Center for Occupational Poisoning*	Tokyo Rosai Hospital	• Report on the world's first case of orthophthalaldehyde poisoning from sterilization and disinfection of medical instruments • Establish a new exposure indicator for problematic toxic chemicals
8	Respiratory diseases due to dust inhalation *Clinical Research Center for Occupational Respiratory Diseases*	Hokkaido Chuo Rosai Hospital	• Prepare an X-ray-based collection of recent dust-related respiratory disease cases • Develop an early diagnosis method for coniosis complicated by lung cancer based on chronological subtraction method • Develop differential diagnosis method for intercostal vein and pleural plaque based on 3D CT method • Develop differential diagnosis method for coniotic nodule and lung cancer based on FDG-PET
9	Brain and heart disease caused by overwork (karoshi: death from overwork) *Clinical Research Center for Brain and Heart Disease in Workers*	Kansai Rosai Hospital	• Clarify if long working hours is the primary cause of metabolic syndrome
10	Worker's mental health *Clinical Research Center For Worker's Mental Health*	Yokohama Rosai Hospital	• Develop "MENTAL-ROSAI" an Internet-based mental heath evaluation application that workers can access at anytime from anywhere • Establish an objective method for evaluating depression using ^{99m}Tc-ECD SPECT imaging of cerebral blood flow
11	Medical care for working women *Clinical Research Center for Working Women's Health*	Wakayama Rosai Hospital	• Identify characteristics of menstrual pain and menopausal disorders of working women that lower the QWL • Clarify the effect of light stimulation from working at nighttime on the melatonin concentration in the blood • Discuss the need for comprehensiveness in constructing a women outpatient model system
12	Rehabilitation for returning to work *Clinical Research Center for Worker's Rehabilitation*	Kyushu Rosai Hospital	• Develop a method for estimating the probability of returning to work after recovery from the viewpoint of the onset of cerebrovascular disease
13	Asbestos related diseases *Clinical Research Center for Asbestos-Related Diseases*	Okayama Rosai Hospital	• Identify the need to improve early diagnosis of Stages I and II (currently 29.6%) in order to increase the rate of survivability from mesothelioma • Early diagnosis and development of a diagnosis method for mesothelioma using methylation of anti-oncogenes in pleural fluid

After 5 years, we finally ended part 1 of our research in March 2009. The research targets of the 13 fields of occupational injuries and illnesses and the main research results are given in Table 1. The main research themes pertain to promoting a healthy workplace, continuing work while receiving treatment after a misfortunate accident or illness occurred, and quickly returning to the workplace. In Japan, this is the first time this type of clinical medical research has been undertaken. We clarified that the current state of worker medical treatment must deal with many problems.

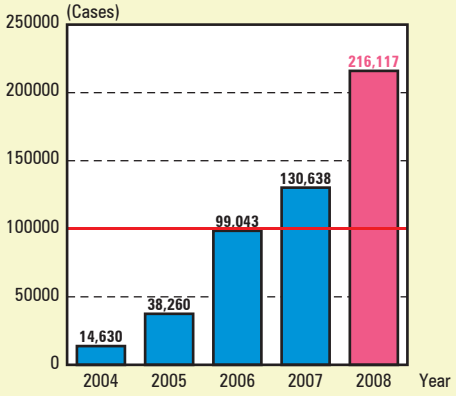
This time, in order to provide a better understanding of the existing state of worker medical treatment, we summarized the results of each field in this booklet. We hope that this aids in providing a better understanding of the worker medical treatment initiative by the Rosai hospital group.

Dissemination of Research Results

Presentations at meetings	539	(Domestic: 485 International: 54)
Papers	224	(Japanese: 171 English: 53)
Lectures	943	
Mass media / magazine publications	198	
Books / publications	40	
Workshops hosted by affiliated organizations	167	

Number of visits to the site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses
A total of 498,688 visits over five years.

[Target number of visits]
The target number of visits is more than 100,000 for the mid-term target period for the final fiscal year.



Increase in the number of visits by year

Future Themes

Based on the research results from each field in this project, we clarified the problems currently facing the medical treatment of workers, i.e., it is difficult for workers to receive medical treatment while continuing to work and to complete smoothly the process of returning to work. The root of this problem is believed to be the lack of a framework enabling cooperation between the attending physician providing treatment and the employer. We learned that from the investigation in the field of sense organ disorders, although currently there is very effective medicine that was developed for treating diabetes mellitus, controlling blood sugar for workers with diabetes mellitus is not an easy task. Since workers must give their undivided attention to work, they do not have enough time to deal with treatment and complications such as advancing retinopathy resulting in a decrease in visual acuity. As visual acuity decreases, it becomes impossible to continue work and unemployment ensues. It is clear that workers with diabetes mellitus are faced with this type of employment and treatment dilemma.

Hereafter are some ways that these workers afflicted with this disease can resolve this dilemma. First, the attending physician should provide information to the employer regarding the diagnosis. On the other hand, it is important that the employer provide the patient's work-related information to the attending physician. Based on this exchange of information both sides can establish a cooperative framework, and we believe that this will enable proper and adequate treatment, while the patient continues work and achieves a smooth return to work. On the diagnosis side, in addition to the attending physician, registered nurses, physiotherapists, occupational therapists, medical social workers, etc. should be arranged in the cooperative framework. At the workplace as well, focusing on industrial physicians and labor representatives, a system that supports the diagnosis side and its information exchange should be arranged.

From the investigation in the field of occupational trauma, based on an analysis of the conditions when the traumas occurred, we established that it is possible to estimate the level of functionality that returns after replantation when a worker experiences a trauma such as finger amputation. Furthermore, from the investigation in the field of rehabilitation, in the case that a worker suffers a cerebral

infarction, based on a detailed investigation of the overall status, the body functions and time period until rehabilitation begins, it is possible to estimate the ability for the patient to return to work after being discharged. In this way, from the estimations obtained from various fields and by carefully exchanging information and establishing a cooperative framework between the attending physician and employer, it is possible to improve the rate of return to work beyond that achieved currently.

We also clarified based on the research of this project that the workplace is the source of various diseases. From the investigation in the field of karoshi, i.e., death from overwork, we clarified that long working hours is a contributing factor to the metabolic syndrome in workers. From the investigation in the field of musculoskeletal disorders, we clarified that a contributing factor to worker lower back pain is psychological stress in the workplace. From the field of medical care for working women, we found that many of the female outpatients that came in for an examination stated that the reason for the onset of symptoms of an illness was related to the stress at the workplace in addition to the stress at home. Furthermore, from the field of physical factor induced diseases, we clarified the fact that various barbers and beauticians suffer from occupational allergic contact dermatitis. From these investigation results, we showed that, in the future, through cooperation between the attending physician and employer, we need to identify the source of the diseases afflicting workers everywhere and establish treatment methods.

In addition to a framework for cooperation between the attending physician and employer, this project clarified that cross field research where there is collaboration among the fields is necessary. We showed that stress in the workplace influences worker metabolic syndrome, lower back pain, and the menstrual cycles of working women. In the future, we believe that by pooling the knowledge from such as fields as karoshi, muscle skeletal disorders, and the medical care for working women and developing cross field research, we will be able to clarify the difficult research theme of stress in the workplace.

In this way, in resolving the various problems facing current worker medical treatment, the research for part 1 of this project identified the need to establish a cooperative framework between the attending physician at the health care facility and the patient's employer as well as the need for cross field research.

In the future, part 2 of this project starting in the 2009 fiscal year will deal with the problems clarified from the research results of part 1 (Table 2).

Table 2. Part 2: Themes Related to the Research, Development, and Dissemination of the Clinical Medical Research of the 13 Fields of Occupational Injuries and Illnesses of the Japan Labour Health and Welfare Organization

	Field Name	Themes Related to Research / Development and Dissemination
1	Work related trauma such as limb amputation and bone fractures	• Research, development, and dissemination involving the construction of a regional medical cooperative system for early treatment etc. of work-related injury resulting from crushing or traumatic amputation
2	Spinal cord injury	• Research, development, and dissemination related to establishing precautionary measures and early treatment system of spinal cord injuries
3	Sensory organ impairment due to noise, electromagnetic waves, etc.	• Research, development, and dissemination related to precautionary measures, treatment, etc. of acute visual impairment caused by work environmental factors
4	Disorders dependent on physical factors such as temperature, air pressure, and radiation	• Research, development, and dissemination related to constructing a database for diagnosis, treatment, and precautionary measures for work related skin diseases
5	Muscular and skeletal disorders stemming from physically overburdening the body	• Research, development, and dissemination related to clarifying the primary factor in the cause of lower back pain in the workplace
6	Hand-arm vibration syndrome	• Research, development, and dissemination related to an objective system for evaluating peripheral neuropathy and peripheral circulatory disorders due to Hand-arm vibration syndrome
7	Exposure to toxic industrial chemicals	• Research, development, and dissemination related to a quick and effective diagnostic procedure for industrial poisoning
8	Respiratory diseases due to dust inhalation	• Research, development, and dissemination related to a model for a diagnostic procedure for pneumoconiosis complicated with lung cancer • Research, development, and dissemination related to an objective evaluation system for complicated pneumoconiosis. • Research, development, and dissemination related to diagnosis and treatment methods for new respiratory diseases stemming from the onset of pneumoconiosis
9	Brain and heart disease caused by overwork (karoshi: death from overwork)	• Research, development, and dissemination related to the primary factor in the onset of brain and heart disease due to overwork
10	Worker's mental health	• Research, development, and dissemination related to precautions to prevent poor mental health conditions in the workplace • Research, development, and dissemination related to an objective diagnostic procedure for depression
11	Medical care for working women	• Research, development, and dissemination related to the effect of menstrual and menopausal disorders on Quality of Working Life (QWL) of working women • Research, development, and dissemination related to the effect of working late nights and long hours on women's endocrine system • Research, development, and dissemination related to the stress of working women and the onset and exacerbation of disease
12	Rehabilitation for returning to work, treatment for disease with high morbidity rates among workers, and work-compatible support	• Research, development, and dissemination related to a rehabilitation medical model for various diseases that enables early return to work • Cross field Research, development, and dissemination related to the effect of the onset of illness, treatment, and precautionary measures on the relationship among the characteristics of the individual worker, actual work and work environment, and a medical model for treating disease and dealing with career
13	Asbestos related diseases	• Research, development, and dissemination related to early diagnostic methods, treatment methods, and precautionary measures to improve the survival rate for asbestos related disease such as mesothelioma

1

Investigative Research on Treatments For Severe Trauma to the Upper Limbs

— Toward Recovery of Function After Work-Related Amputation and Smooth Work Reinstatement —

Field name "Work related trauma such as limb amputation and bone fractures"

The local industry of Tsubame city in Niigata prefecture is the manufacture of western-style cookware. As such there are many medium and small-sized businesses that deal with metalworking, and finger trauma occurs frequently.

After the opening of the Tsubame Rosai Hospital in 1979, the "Work-Related Hand Surgical Center" was established. Many cases of occupation finger trauma were treated, and up to now, there have been 187 cases of successful reconnection of wrists and finger amputation and 141 cases of reconstruction after crushing injury. From among these cases, 82 cases in which more than five years have passed since the injury occurred were considered in our investigation. After obtaining consent from 50 of the 82 cases, we examined the function recovery level and ability to return to work based on the relationship between the Hand Injury Severity Score (HISS) (Fig. 1) at the time of injury and the Tamai evaluation standard (Table 3) at the time of the investigation.

The results showed that the higher the HISS score at the time of injury the more the level of recovery deteriorates after hand surgery [1, 2, 3, 4] (Fig. 2). Moreover, we clarified that the higher the HISS score is, returning to the original work becomes more difficult, and it becomes increasingly likely that the patient must change the type of work or cannot return to work [1, 2, 3, 4] (Fig. 3).

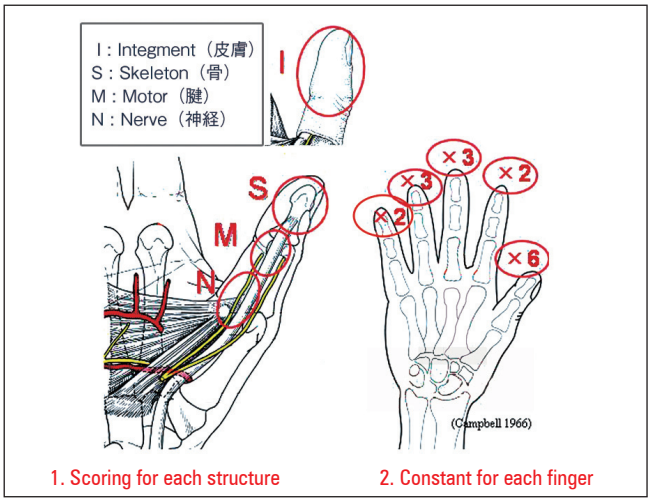


Fig. 1. Method for assessing hand injury severity score (HISS)

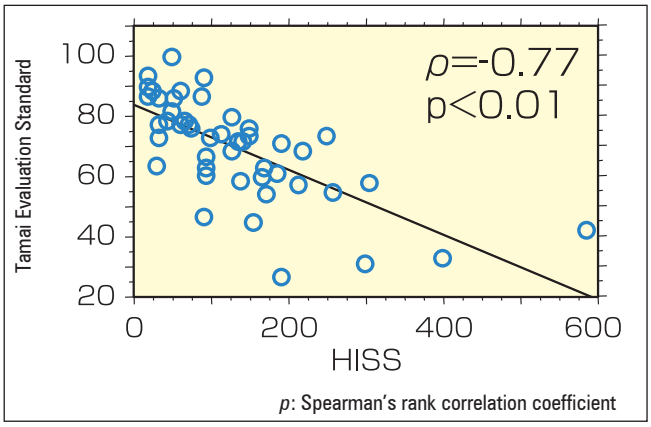


Fig. 2. Correlation between hand injury severity score (HISS) at the time of injury and the Tamai evaluation standard at time of investigation

Table 3. Tamai Evaluation Standard

Tamai Evaluation Standard

- Range of motion (20 pts)
- Daily living activities (20 pts)
- Perception (20 pts)
- Subjective symptoms (10 pts)
- Appearance (10 pts)
- Patient satisfaction level (20 pts)
- Occupation: Return to original work (0 pts)
  Change in occupation (-5 pts)
  Unable to return to work (-10 pts)
- Judgment of results: Excellent 80-100 pts.
  Good 60-79 pts.
  Satisfactory 40-59 pts.
  Not satisfactory 39 or less pts.

Perfect score of 100 pts is the best result
As the degree of injury increases the score decreases

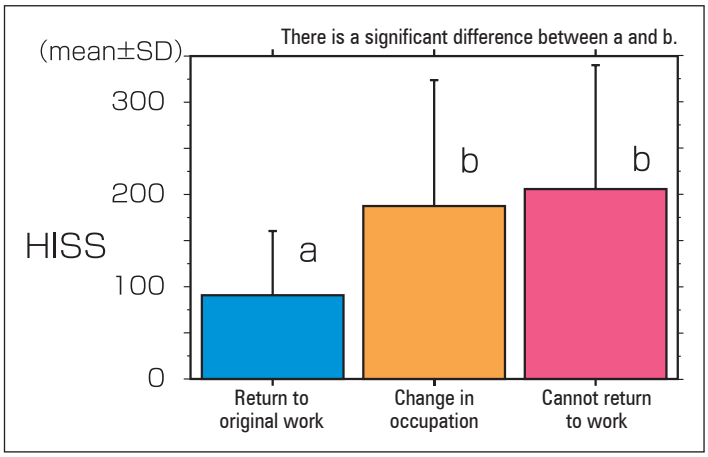


Fig. 3. Hand injury severity score (HISS) at the time of injury and ability to return to work

For amputation or crushing of multiple fingers, in order to plan the improvement in the function of the fingers "transpositional replantation" is carried out in cases where replantation is impossible after thumb amputation. The hallux is engrafted and the thumb is reconstructed by carrying out the "Wrap Around Flap method" (WAF) (Fig. 4).

Accordingly, based on seven cases where "transpositional replantation" was carried out and in nine cases in which we employed the WAF method, we also investigated the hand function after replantation and the ability to return to work. All the cases where "transpositional replantation" was performed were successful. Moreover, we could not discern any significant difference in the degree to which hand functionality returned or the rate for returning to work in the "transpositional replantation" cases compared to the cases where the same finger was replanted [3, 4]. Also for the WAF method, we could not discern any significant difference in functionality such as the range of motion of the thumb in cases where the thumb was replanted [3, 4].

These results show that based on the advances in various treatment methods hand function after hand / finger amputation can be maintained and it is possible to return to the workplace. In the future, in order to increase the number of cases where patients return to work, we believe that the employer should be informed of the estimated time to recover and that it is important that the process of returning to work advance smoothly.

Fig. 4. Wrap Around Flap (WAF) method

References:

1) Matsuzaki H., Narisawa H., Miwa H., and Toishi S.: Predicting functional recovery and return to work after mutilating hand injuries: Usefulness of hand injury severity score. J Hand Surg, 34A:880-885, 2009.
2) Matsuzaki H.: Investigative research on treatments for severe trauma to the upper limbs – Toward smooth work reinstatement of injured workers. Japan Labour Health and Welfare Organization, Clinical Research Center for Occupational Trauma, 2007.
3) Matsuzaki H.: Investigative research on treatments for severe trauma to the upper limbs – Toward smooth work reinstatement of injured workers (Part 2). Japan Labour Health and Welfare Organization, Clinical Research Center for Occupational Trauma, 2008.
4) Matsuzaki H., et al.: Research, development, and dissemination related to reconstruction of work-related injury resulting from crushing or traumatic amputation and expanding the range of movement after hand surgery, Research report. Japan Labour Health and Welfare Organization, Clinical Research Center for Occupational Trauma, 2008.

* Reference 3 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.
* Reference 4 can be viewed at **http://www.research12.jp/h13/index2.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

2

Measures to Prevent Cervical Spinal Cord Damage Without Bone Damage for Mature Age Workers and Establishing an Early Treatment System

— Increase in Cervical Spinal Column Stenosis and Deterioration in Movement Function of the Extremities in Mature Age Workers —

Field name "Spinal cord injury"

In order to develop measures to prevent cervical spinal cord damage in cases without bone damage in mature age workers, we examined the cervical vertebrae of 1200 healthy individuals and performed an age-categorized investigation of the degree of change in the spine and spinal cord due to ageing based on MRI (Fig. 5). The results show that the anteroposterior of the spinal column, dural tube anteroposterior (Fig. 6), anteroposterior spinal cord (Fig. 7), and spinal area (Fig. 8) decrease with age, while the intradural occupancy rate of the spinal cord (Fig. 9) increases with age. Furthermore, from a neurological viewpoint, we clarified based on the "ten second hand test" (Fig. 10) and "ten second step test" (Fig. 11) that the cervical spinal cord deteriorates with age.

Based on these results, we clarified that for mature age workers the rate of occurrence of cervical spinal column stenosis increases, that the movement function of the extremities decreases, and that the probability that hyperextension of the cervical vertebrae in job-related cervical spinal cord damage without bone damage is high [1, 2, 3, 4].

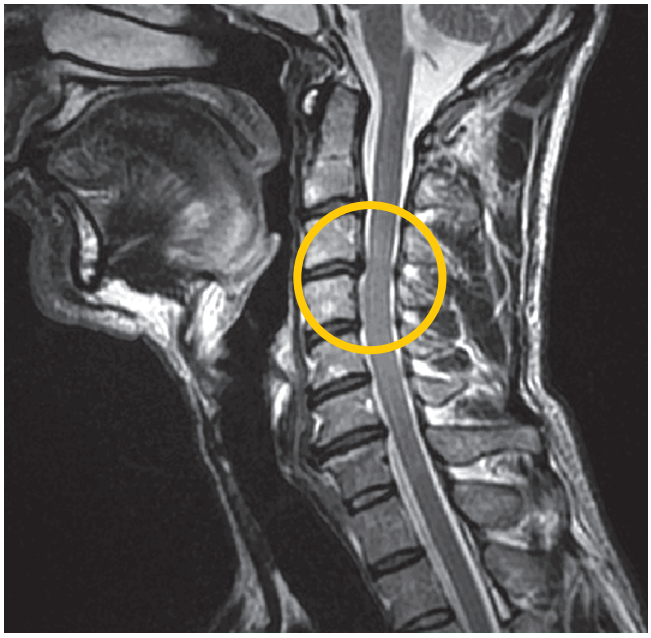


Fig. 5. MRI of cervical vertebrae and cervical spinal cord

Diagnoses of the spinal canal, endocranial tube, and spinal cord are possible.
This T2 weighted sagittal MRI image highlights spinal canal stenosis at the C3/4 vertebrae in a 46 yr. old male. The endocranial tube at the C3/4 vertebrae is very constricted.

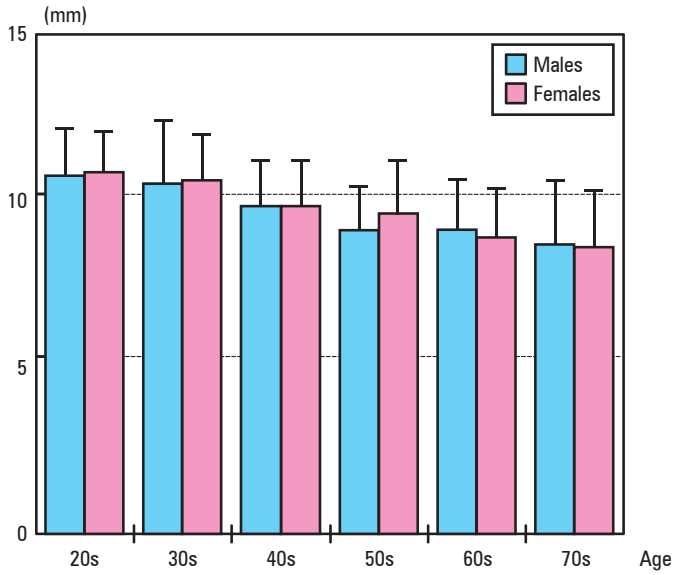


Fig. 6. Change in anteroposterior diameter of the endocranial tube due to ageing

C5/6 intervertebral spacing (sagittal plane) based on the anteroposterior diameter of the endocranial tube (Mean±SD)

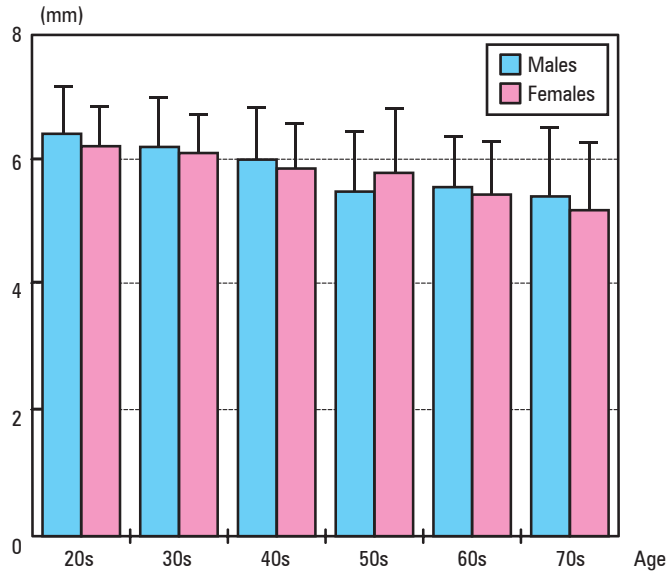


Fig. 7. Change in anteroposterior diameter of the spinal cord due to ageing

C5/6 intervertebral spacing (sagittal plane) based on anteroposterior diameter of the spinal cord (Mean±SD)

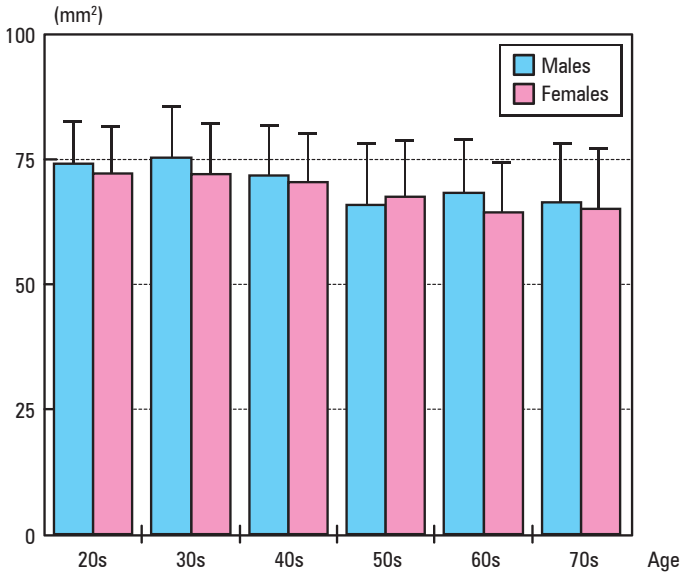


Fig. 8. Change in spinal cord area due to ageing

C5/6 intervertebral spacing (sagittal plane) based on spinal cord area (Mean±SD)

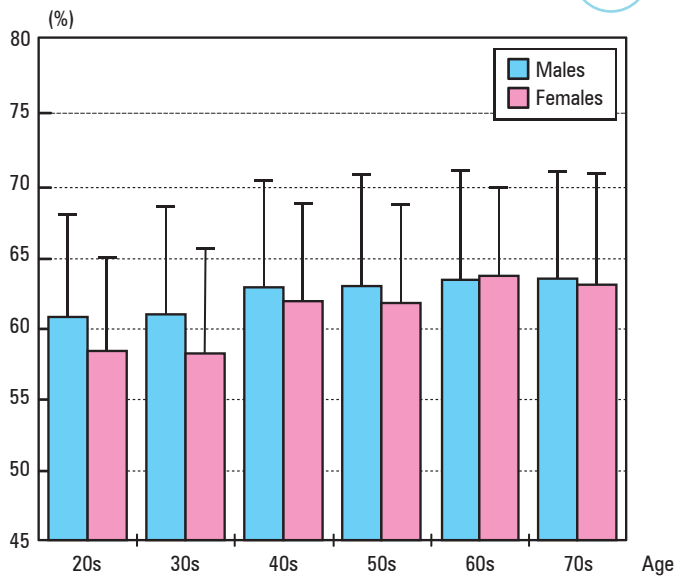


Fig. 9. Change in intradural occupancy rate of the spinal cord due to ageing

C5/6 intervertebral spacing (sagittal plane) based on the intradural occupancy rate of the spinal cord (Mean±SD)

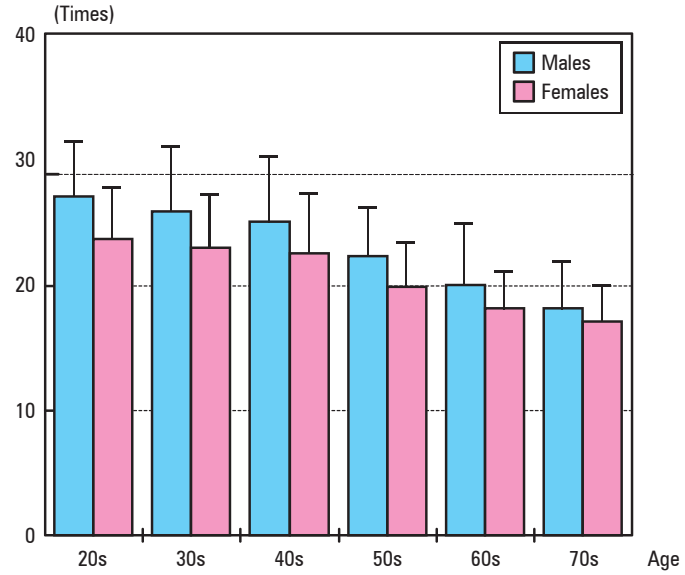


Fig. 10. Change in ten second hand test (right hand) results due to ageing

(Mean±SD)

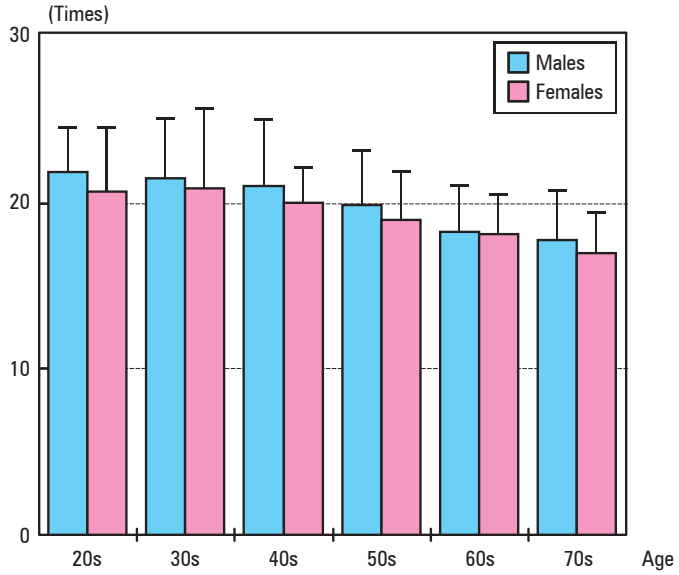


Fig. 11. Change in ten second step test results due to ageing

(Mean±SD)

References:

1) Kato F.: Preventative measures for cervical spinal cord damage without bone damage and establishing an early treatment system – Determining Japanese standard values for cervical vertebrae / cervical spinal cord based on MRI, and new initiatives regarding cervical vertebrae examination. Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Spinal Injury, 2007.
2) Kato F.: Preventative measures for cervical spinal cord damage without bone damage and establishing an early treatment system – Determining Japanese standard values for cervical vertebrae / cervical spinal cord based on MRI, and new initiatives regarding cervical vertebrae examination (Part 2). Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Spinal Injury, 2008.
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* Reference 2 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.
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3

Establishing Treatments Enabling Patients With Vitreoretinal-Disorder-Based Acute Blindness to Return to Work

— Preserving the Eyesight of Workers with Diabetic Retinopathy, How to Overcome the Work and Treatment Dilemma —

Field name "Sensory organ impairment due to noise, electromagnetic waves, etc."

In Japan, diabetes mellitus is the source of blindness for very many, and in order to clarify the effect exerted by a worker's working conditions, we investigated the relationship between visual impairment and work for workers suffering from diabetes mellitus based on 519 cases of diabetic retinopathy (215 observation cases, 124 cases of photocoagulation, and 180 cases who underwent corpus vitreum surgery).

In the group that underwent surgery, since there was inadequate treatment of diabetes mellitus, the level of visual acuity deteriorated strikingly (Figs. 12 and 13) and if we consider the working status of these cases, retired people comprise half the number in each group (Fig. 15).

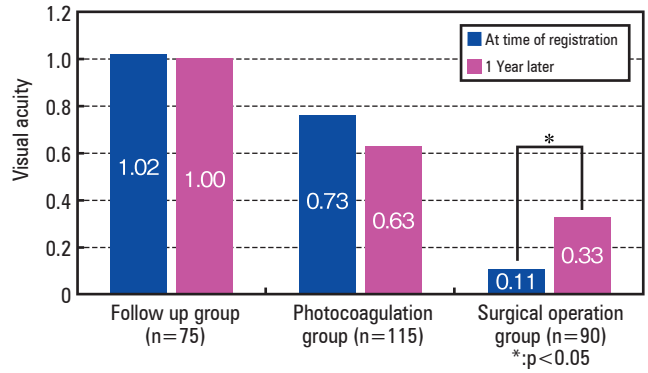

Fig. 12. Visual acuity of those with diabetic retinopathy in each group at the time of registration and one year later.

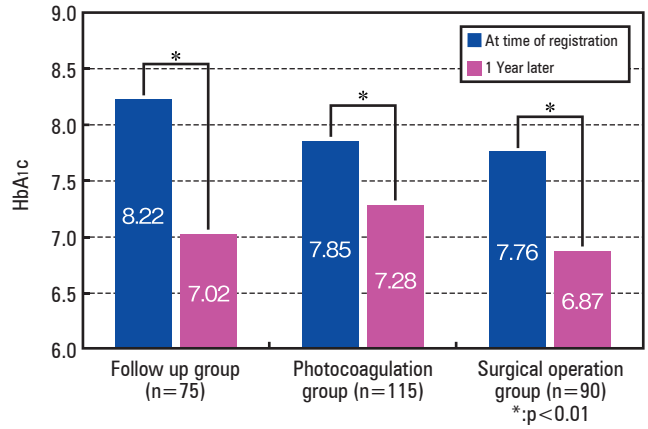

Fig. 13. HbA1c results of those with diabetic retinopathy in each group at the time of registration and one year later.

HbA1c (Glycated hemoglobin)

If a hyperglycemic state continues for too long, the intravascular surplus of glucose combines with protein in the body. At this point, hemoglobin (Hb), the protein in red blood cells, and the glucose combine to form glycosylated hemoglobin. There are several types of glycosylated hemoglobin, and the type that has a very close relationship with diabetes mellitus is HbA1c.

From the investigation results above, we believe that workers with diabetic retinopathy are faced with the work and treatment dilemma (Fig. 14) [1, 2, 3, 4, 5, 6].

In the group that underwent surgery, if we examine the level of visual acuity one year after surgery the level after surgery improved (Fig. 12) and the quality of life (QOL) improved. However, the percentage of retired people showed no improvement one year later, and even if the level of visual acuity returned to the previous level we confirmed that it was unrelated to reemployment (Fig. 15) [1, 2, 3, 4, 5, 6].

If we examine the ophthalmological and internal medicine histories, we found that workers were unable to go to the hospital as often as they should have because they devoted themselves to their work (Table 4).

In the future, with close cooperation between the attending physician and the workplace, we need to construct a system that focuses on medical treatment of diabetes mellitus and that helps employees from retiring due to illness.

Facts about diabetic retinopathy

Patient side:
Because the patient is not committed to medical treatment in order to continue employment, visual acuity deteriorates resulting in loss of employment.

Treatment side:
Medical treatment at an early stage is desirable.

→ **Dilemma between employment and medical treatment!**

Essential to create a system for resuming work !?

Fig. 14. Dilemma between work and diabetic retinopathy treatment for workers

Table 4. Ophthalmological and Internal Medicine Histories for Each Group

	Follow up group	Photocoagulation group	Surgical operation group
Ophthalmological history	42%	31%	47%
Internal medicine history	74%	65%	65%

(If the patient was continually commuting to hospital for more than 1 year prior to registration, he is considered to have a history.)

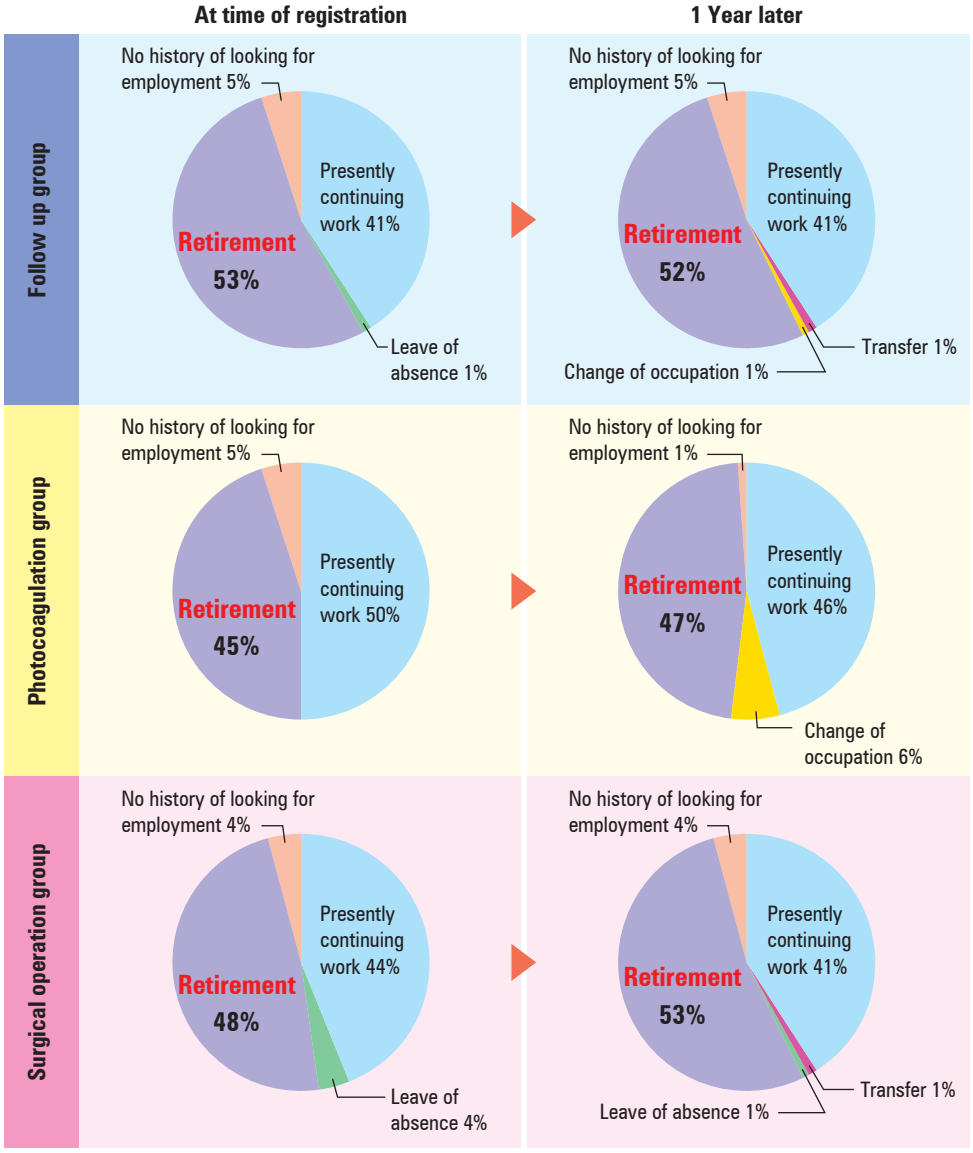

Fig. 15. Employment conditions for diabetic retinopathy sufferers in each group at time of registration and one year later.

References:

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4

Contact Dermatitis Afflicting Barbers and Beauticians

— Barbers and Beauticians Afflicted with Rough Skin —

Field name "Disorders dependent on physical factors such as temperature, air pressure, and radiation"

Based on an investigation using questionnaires submitted to barbers and beauticians in Miyagi prefecture, we identified that many barbers and beauticians suffer from rough skin due to allergic contact dermatitis the source of which is thought to be hair products such as hair dye used in their work [1, 2, 3, 4] (Fig. 16). When we carried out patch tests on 61 barbers and beauticians to screen for the source of the rough skin, we found that products such as hair dye, shampoo, and perm solution tested positive (Fig. 17). Furthermore, when we carried out patch tests on the components of the products, we found that chemicals such as p-phenylenediamine, p-amino azobenzene, Red 225, and cocamidopropyl betaine tested positive (Figs. 18 and 19).

After we informed the patients of which hair products tested positive, they commented that after diluting the shampoo that tested positive they noticed that the rough skin subsided or that after replacing the product that tested positive with another product, they recovered from the skin rash. These statements are proof that the results of this research are useful in preventing occupation contact dermatitis.

We summarized the research results up to this point and produced the barber and beautician guidebook for preventing hand rash and rough skin [4].

In April 2009, the "Specialized Investigative Committee on Article 35 of the Labor Standards Enforcement Regulations" was convened with "contact dermatitis from the use of barber/beautician shampoo, cold perm solution, etc." as the agenda using the results of this research as the basis.

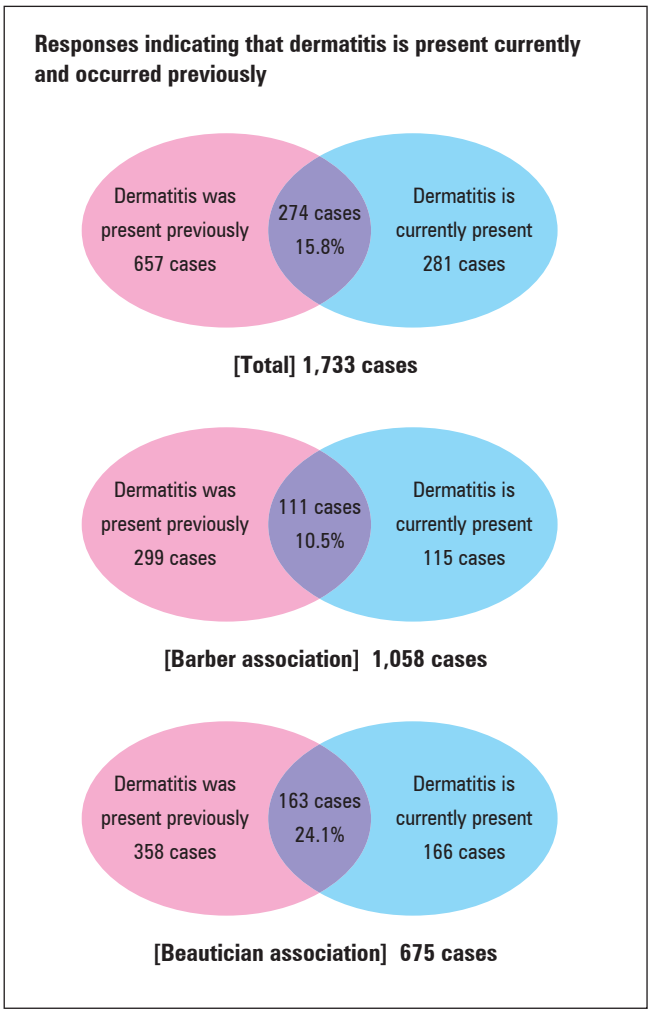


Fig. 16. Fieldwork report on barbers and beautician in Miyagi prefecture

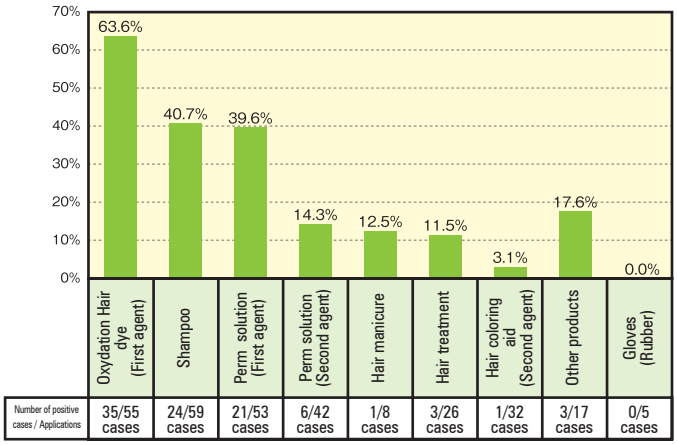
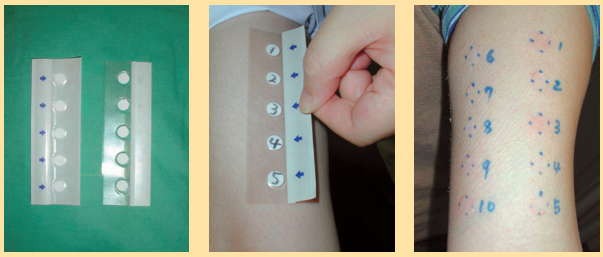
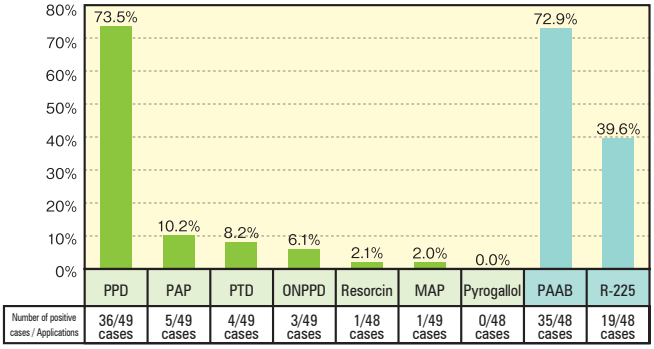


Fig. 17. Results of product patch test (positive rate for patch test according to product)

Patch test

To confirm the source of contact dermatitis or rash,the questionable substance is applied to the back or arm to verify a reaction.

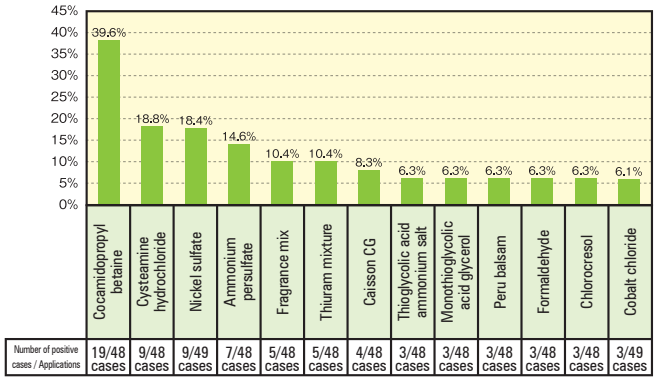




* PDD: p-Phenylenediamine PAP: Paraaminophenol PTD: Paratoluenediamine
ONPPD: Ortho-Nitro-p-phenylenediamine MAP: Meta-aminophenol
PAAB: p-Aminoazobenzene R-225: Red 225

* Although PAAB and R-225 are not hair dye components, we tested them because they were reported to be allergens.

Fig. 18. Patch test positive rate of components ① hair dye components and related substances



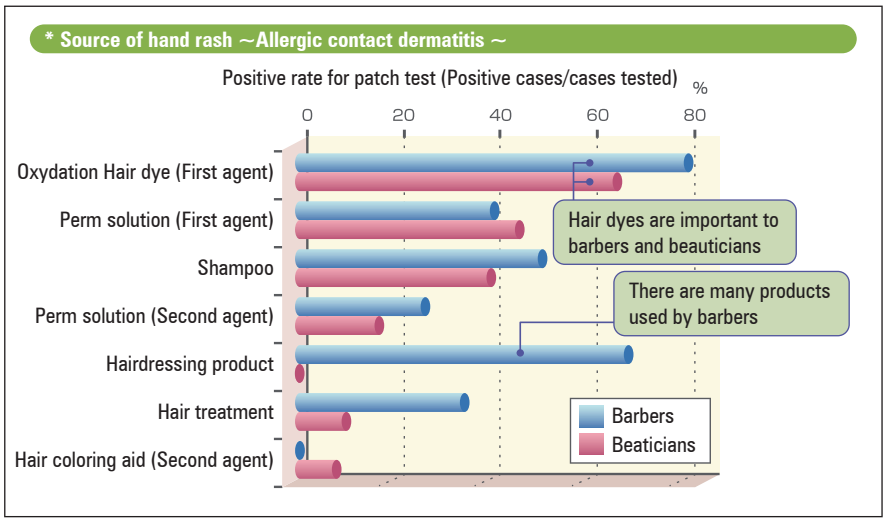
* Two of 48 cases tested positive (positive rate of 4.2%) for hydrogen peroxide water, chloroacetamide, imidazolidinyl urea, quotanium 15, and zinc pyrithione. One of 48 cases tested positive (positive rate of 2.1%) for monoethanol-amine and chloroxylenol.

Fig. 19. Patch test positive rate of components ② other allergens

Comments from the patch test subjects

- *I was surprised that the products that claimed to be gentle to the skin tested positive in the patch test. If I didn't take the patch test I wouldn't have known the source of my dermatitis.*
- *After replacing the product that tested positive with another product, my skin rash went away completely.*
- *After diluting the shampoo that tested positive in the patch test and avoiding touching the areas where the hair dye was applied, my skin rash became less severe than before.*

Barber and beautician guidebook for preventing hand rash and rough skin



Results based on the patch test of 63 barbers and beauticinas in Miyagi prefecture

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5

Facts Regarding Worker Lower Back Pain

— Investigation into Psychological and Social Causes of Lower Back Pain in the Workplace —

Field name "Muscular and skeletal disorders stemming from physically overburdening the body"

In order to clarify the cause of lower back pain in the workplace, we carried out an investigation using questionnaires that covered not only physical causes such as work posture, but also depression, stress, interpersonal relationships at work, and social causes. We obtained responses from 9,307 people. The analysis results clarified the points below [1, 2, 3].

The severity of lower back pain in the previous month was categorized as indicated below.

1. No lower back pain (Grade 1) 49%
2. There was lower back pain, but it did not hinder work (Grade 2) 45%
3. Although lower back pain was a hindrance to work, no work leave was taken (Grade 3) 5%
4. Work leave was taken due to lower back pain (Grade 4) less than 1%

Although half of the responders had lower back pain, those with lower back pain to the extent that it was a hindrance was 6% (Fig. 20).

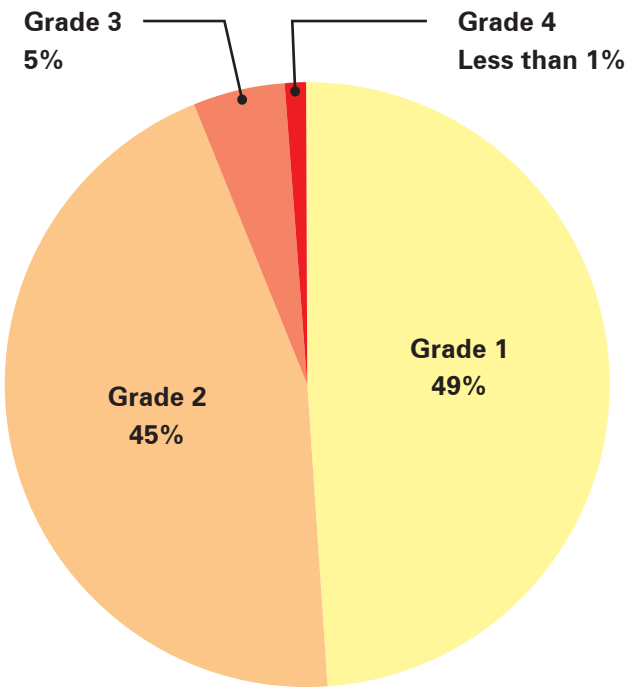

Fig. 20. Severity of lower back pain in the previous month

When we investigated the causes of the relationship between lower back pain and work, we clarified that work posture is significantly correlated to working long hours in that posture for those engaged in manual labor, those that work in unnatural positions such as being bent over, those that work standing up, and vehicle operators in that order (Table 5).

Table 5. Relationship Between Work Posture and Lower Back Pain

	Odds ratio	95% Confidence interval
• Manual labor	1.63	1.47-1.81
• Unnatural posture	1.26	1.22-1.31
• Work standing up	1.14	1.10-1.17
• Vehicle operator	1.09	1.02-1.16
• Desk work	0.76	0.68-0.85

For work behavior, there is a significant correlation between actions such as lifting, lowering, twisting, bending over, shifting side to side, pushing, pulling, carrying things or walking and working long hours (Table 6).

Table 6. Relationship Between Work Behavior and Lower Back Pain

	Odds ratio	95% Confidence interval
• Lifting and lowering	1.78	1.61-1.96
• Twisting at waist	1.77	1.59-1.97
• Bending forward	1.76	1.60-1.94
• Shifting (side to side)	1.72	1.55-1.90
• Pushing	1.70	1.53-1.90
• Pulling	1.62	1.45-1.81
• Carrying	1.60	1.44-1.78
• Walking	1.47	1.33-1.62

In the work environment, there is a significant correlation between conditions such as heat and humidity, a narrow and tight workspace, unstable footing, low illumination, an environment with uneven footing or many obstacles, cold, noisy, or shaking and vibration and working long hours (Table 7).

For the psychological and social causes, we found that there is a significant correlation between lower back pain and the causes of work stress such as a high level of complaints from patients regarding physical burden, a high level of stress from the working environment, a feeling that his/her own work is without purpose or meaning, a feeling of having a low level of aptitude for his / her own work, not having much control of work, a high level of stress from interpersonal relationships at the workplace, and a heavy burden of psychological work (quality and quantity) (Table 8).

From the knowledge we obtained, in addition to the causes of lower back pain in the workplace such as work posture, work behavior, and the work environment that have been uncovered up to now, we found that psychological and social causes contribute to lower back pain.

Table 7. Relationship Between Work Environment and Lower Back Pain

	Odds ratio	95% Confidence interval
• Hot and humid	1.83	1.65-2.03
• Narrow and tight	1.73	1.55-1.93
• Unstable footing	1.58	1.40-1.78
• Dark	1.58	1.41-1.78
• Steps or obstacles	1.49	1.34-1.65
• Cold	1.48	1.31-1.60
• Noisy	1.48	1.36-1.61
• Shaking and vibration	1.46	1.31-1.62

Table 8. Relationship Between Psychological and Social Causes and Lower Back Pain

	Odds ratio	95% Confidence interval
• Subjective evaluation of the degree of physical burden	1.58	1.45-1.71
• Stress from work environment	1.58	1.45-1.72
• Work satisfaction	1.27	1.14-1.41
• Aptitude level for own work	1.23	1.10-1.37
• Degree of control of work	1.17	1.12-1.22
• Stress from personal relationships in workplace	1.14	1.09-1.19
• Burden of psychological work (Amount)	1.13	1.08-1.18
• Burden of psychological work (Quality)	1.13	1.07-1.18
• Degree to which you apply your skill	0.84	0.76-0.93

Odds Comparison

Odds are a value that expresses the probability that an event occurs. Odds are also used to express the probability that a horse will come in first place in horse racing.

An odds ratio is the ratio of the probability of one event (group) occurring to that of another event occurring. The odds ratio of one means that both events have the same probability of occurring and a value of greater (lesser) than one means that one event has a better chance of occurring than the other.

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2) Machida H.: Facts about worker lower back pain – psychological and social causes at the workplace as contributing factors (Part 2). The Japan Labour Health and Welfare Organization, Clinical Research Center for Occupational Muscle Skeletal Disorders, 2008.
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6

FSBP% (Finger Systolic Blood Pressure%) as an Objective System for Evaluating Peripheral Circulatory Disorders Caused by Hand-Arm Vibration Syndrome

In order to establish an objective diagnostic method for vibration induced-impairment, repeated examinations [1, 2, 3, 4] (Fig. 22) have shown that employing the Finger Systolic Blood Pressure (%) (FSBP) is useful. Furthermore, when Raynaud's phenomenon manifests itself, we found that the FSBP% becomes zero [5] (Fig. 21). The cut-off, sensitivity, and specificity values are given in Table 9. If the cut-off value is set to 70%, the sensitivity is 71.9%, and the specificity is 85.5%.

What is the Finger Systolic Blood Pressure%?

The Finger Systolic Blood Pressure% (FSBP%) is a method that is performed in the following manner.

The finger blood flow is constricted for 5 min., the finger to be measured is cooled to 10˚C, and the FSBP value after cooling is measured. The measurement is compared to the control finger (thumb) to verify change.

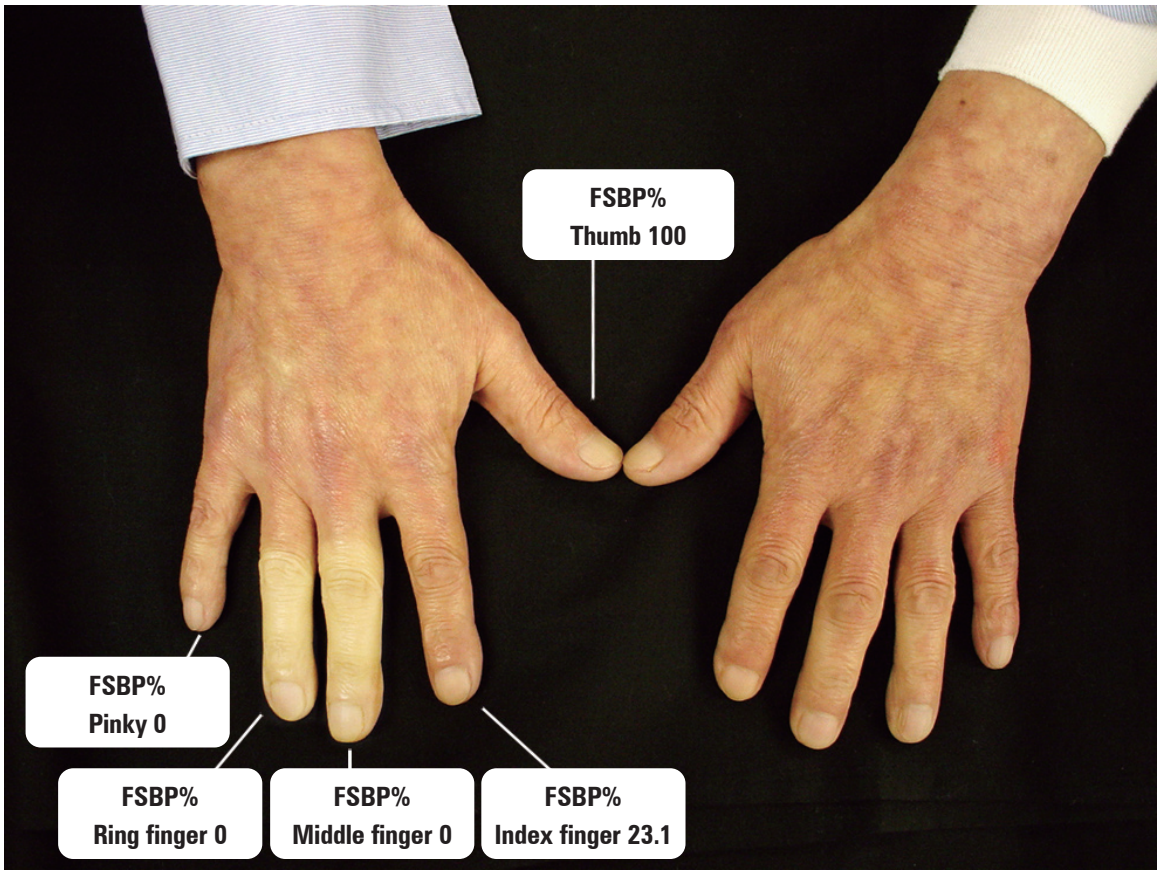

Fig. 21. Raynaud's phenomenon and the FSBP% measured at the time of the episode

The right middle and ring fingers exhibit Raynaud's phenomenon. The pinky exhibits Raynaud's phenomenon to a lesser extent. The SBP% is 0 for each of the middle finger, ring finger, and pinky exhibiting Raynaud's phenomenon.

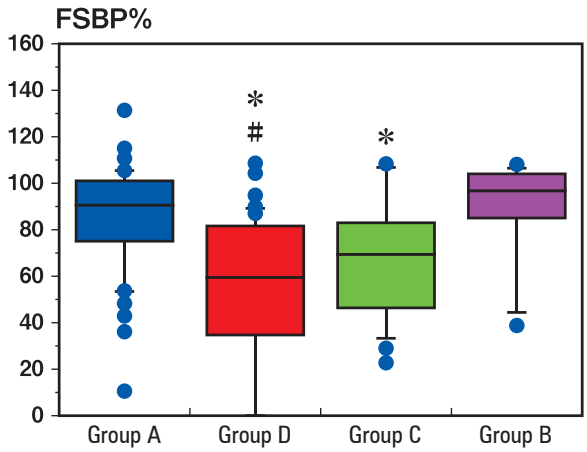

Fig. 22. FSBP% comparison (Room temperature 21±1°C)

Group A: Control group
Group B: Vibration exposed group that did not express Raynaud's phenomenon
Group C: Group in which Raynaud's phenomenon was not expressed at examination one year prior
Group D: Group currently expressing Raynaud's phenomenon
The distribution for the FSBP% value of each group is shown as a box plot.
* indicates a significant difference ($p<0.05$) compared to Group A.
# indicates a significant difference ($p>0.05$) compared to the members of Group B that did not express Raynaud's phenomenon

Table 9. Cut-Off Value, Sensitivity, and Specificity

	21±1℃	
Cut-Off Value (%)	Sensitivity (%) N=134	Specificity (%) N=96
60.0	59.4	95.8
65.0	67.2	94.0
70.0	71.9	85.5
75.0	71.9	80.7
80.0	78.1	75.9
85.0	89.1	60.2
90.0	95.3	54.2
95.0	95.3	47.0

References:

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7 Research, Development, and Dissemination of an Exposure Evaluation Method to Diagnose Toxic Chemicals Quickly and Effectively

Field name "Industrial poisoning from exposure to chemicals"

The focus of this field is the research, development, and dissemination of a useful exposure indicator for the diagnosis and treatment of health hazards related to industrial chemical substances. From the consultation examples collected by the Tokyo Rosai Hospital Clinical Research Center for Occupational Poisoning and through the practical application of the newest analysis technologies, we established a new exposure indicator for toxic chemicals as described below [1].

1. In order to establish a method for evaluating the arsenic exposure of former Japanese army chemical weapon disposal technicians, we established an analytical method according to the form of the arsenic compounds excreted in urine based on HPLC-ICP-MS for organic arsenic compounds such as diphenyl arsinic acid (DPAA) [2]. As the first step, we clarified the level of normal Japanese workers that did not have occupational exposure to arsenic compounds [3]. Furthermore, we investigated the change in arsenic compounds found in urine that were absorbed from the large quantities of arsenic compounds found in hijiki, a brown algae type seaweed, that is consumed by many Japanese [4].

2. We developed the flame photometric detection – gas chromatography (FPD-GC) method that simultaneously assays N-methyl-2-pyrrolidone (NMP) and its metabolites such as N-methylsuccinimide (MSI) and 2-hydroxy-N-methylsuccinimide (2-HMSI) for a biomonitoring method of NMP because the amounts of these compounds used in solvents in resin systems is increasing [5].

3. We reported on a hemoglobin adduct for a proteomics-based exposure evaluation system [6].

4. We reported on the world' s first case of a healthcare worker being poisoned by ortho-phthalaldehyde (OPA) a replacement for glutaraldehyde (GA) as an antiseptic to sterilize medical instruments [7]. Furthermore, we carried out environmental research and medical examination outside the normal screening schedule [8].

5. We developed a highly precise lead measurement method for biological specimens that uses a newly developed chelate resin [9]. Furthermore, we reported on the diagnosis and treatment of lead poisoning regarding patients with acute lead poisoning who were administered chelate treatment [10].

6. We reported on chrome ulcers and their estimation based on chromium level measurement results and the skin condition obtained through discussion with a patient with chemical burns from undetermined causes [11]. Afterwards, we verified the cause as hexavalent chromium exposure based on research by The Labor Standards Bureau.

7. In a consultation case from overseas, we developed the HPLC-ICP MS method for measuring the urine concentration in a patient with acute dimethyltin- based poisoning and confirmed the metabolite based on LC-MS/MS. We also reported the details of the case [12, 13, 14]. Furthermore, we conducted collaborative research with Nagoya University to verify the methylation in mammals, and reported the results of animal experiments [15].

8. As an influence index for pyrethroid-based pesticide exposure, we developed a method for measuring permethrin in the blood [16].

9. We clarified that psychological tests such as the State-Trait Anxiety Inventory (STAI) and Profile of Mood States (POMS) tests can be used as a differentiation diagnostic procedure for the sick house syndrome (SHS) and multiple chemical sensitivity (MCS).

In addition to these many research items, we created a homepage for the occupational poison center that provides a search function (Fig. 23) for information regarding the legal regulations and toxicity of approximately 800 substances and information on the allowable concentrations is updated annually [17].

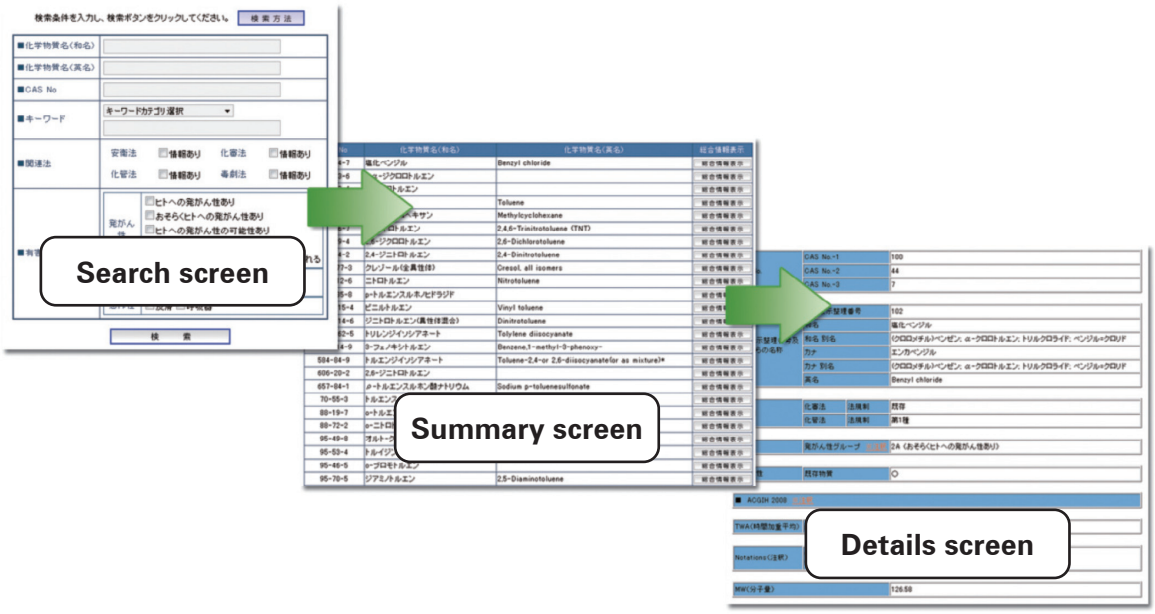

Fig. 23. Screens showing Industrial chemical substance search protocol (homepage is open to public)

[http://www.research12.jp/sanchu/kagaku/index.html]

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8

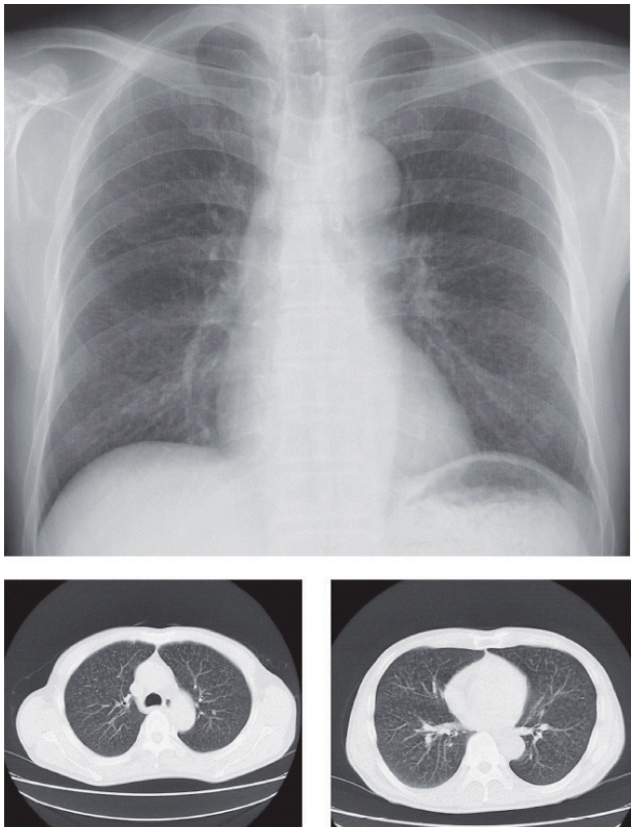
Development of New Diagnostic Imaging Method and Compilation of Photo Collection of Various Types of Dust and Occupationally Categorized Coniosis

Field name "Respiratory diseases due to dust inhalation"

Although it was thought that there were no new cases of pneumoconiosis and that it was a disease in the past, recently a new type of pneumoconiosis has emerged as a new problem afflicting welders (Fig. 24) and dental technicians. In regard to the chest x-ray images for these cases of pneumoconiosis, we present findings specific to dust that was inhaled, and in order for many specialists to become aware of the characteristics, we created two volumes. One complies chest x-rays of the latest cases of pneumoconiosis according to the occupation and is called "Compilation of image based examinations of pneumoconiosis cases according to current occupations" [2] and the other provides a simple explanation to medical practitioners called "Compilation of image based examinations of current pneumoconiosis cases" [3]. From Rosai hospitals from all over Japan, we collected chest x-rays of the latest pneumoconiosis cases based on occupation.

The number of cases of pneumoconiosis complicated with lung cancer is increasing and in order to diagnose accurately the shadow of newly emerging lung cancer in pneumoconiosis cases with complicated chest x-rays, we established the temporal subtraction technique so that we can accurately and quickly diagnose pneumoconiosis complicated with lung cancer [1, 4, 5, 6].

We also successfully established the 3D CT method to obtain 3D images [1, 4, 7, 8] of pleural plaque and a differential diagnosis method for coniotic nodules and lung cancer based on PET [1, 9, 10].



Indistinct faint small granular shadows are scattered around the periphery of both lungs in these chest x-ray images. Although we can recognize faint small ground glass patch shadows around the ends of the centrilobular bronchial tubes in the CT, clear granular shadows are scarce. We also recognize a mild increase in the branching shadows.

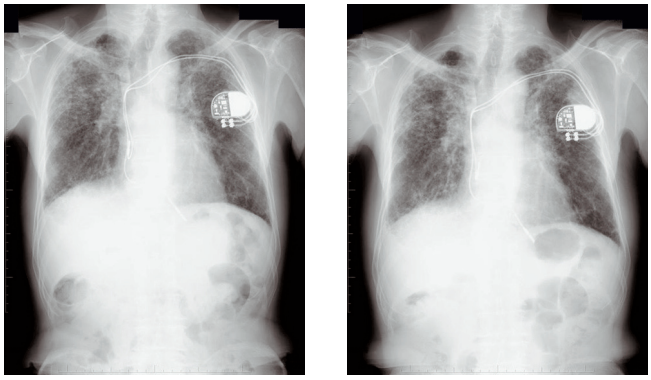
Fig. 24. Example of welder's lung in a 55 year old electric welder with 38 years of experience.

Temporal Subtraction Technique

Finding the new shadowed area that emerges between the 2 chest x-ray images of pneumoconiosis in Fig. 25 is quite difficult, but as shown in Fig. 26, by utilizing computers to generate a subtraction image from the two chest x-rays, we can render the new shadow generated by the two images. By employing these types of methods, detecting new shadowed areas in cases of pneumoconiosis becomes easier.

Pleural plaque images based on 3D CT method

As shown in the horizontally sliced simple CT image



Taken Oct. 2004 Taken March 2005

Fig. 25. Chest X-rays of a 78 year old patient with a 34 year history as a coal miner

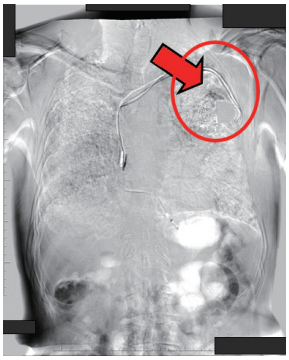


Fig. 26. Image generated by subtracting 2 chest x-ray images.
The shaded area of the pneumoconiosis was hidden by the shaded area of the lung cancer (red arrow)

Fig. 28. Pneumoconiosis complicated by lung cancer indicated by dark areas based on FDG-PET imaging

of the chest (Fig. 27 right side), although pleural plaque (yellow and blue arrows) and intercostals veins (red arrow) are indicated in the same way in the images, if we generate a new image using the 3D imaging method (Fig. 27 left side), the images are totally different and differential diagnosis becomes easy.

Coniotic nodule and lung cancer differential diagnosis method based on PET

If FDG-PET is used, we clarified that for pneumoconiosis complicated by lung cancer, coniotic nodules are relatively darker than other areas (Fig. 28). By using FDG-PET, we were able to clarify that for pneumoconiosis complicated by lung cancer coniotic nodules are relatively darker than other areas (Fig. 28).

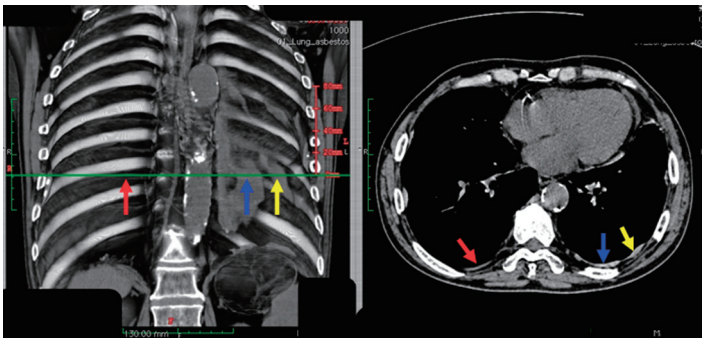


Fig. 27. Image of pleural plaque and intercostal veins using 3D CT (left)
Image taken using conventional CT image (right)

References:

1) Kimura K.: Research, development, and dissemination of a model diagnosis method for pneumoconiosis complicated by lung cancer, Research report. The Japan Labour Health and Welfare Organization, Clinical Research Center for Occupational Respiratory Diseases, 2008.
2) The Japan Labour Health and Welfare Organization: Compilation of image based examinations of pneumoconiosis cases according to current occupations. The Japan Labour Health and Welfare Organization, 2007.
3) The Japan Labour Health and Welfare Organization: Compilation of image based examinations of current pneumoconiosis cases. The Japan Labour Health and Welfare Organization, 2008.
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7) Honda H., Kimura K., Awaka M., Takagi M., and Kaji H.: A trial of the 3D display of the pleural plaque re-constructed by the CT images. Special publication. Japanese Journal of Occupational Medicine and Traumatology, 55:49-54, 2007.
8) The Japan Labour Health and Welfare Organization: New image-based diagnostic method for pleural plaque using 3D chest images. The Japan Labour Health and Welfare Organization, 2008.
9) The Japan Labour Health and Welfare Organization: New image-based diagnostic method: Research on pneumoconiosis based on FDG and MET-PET. The Japan Labour Health and Welfare Organization, 2008.
10) Kanegae K., Nakano I., Kimura K., Kaji H., Kuge Y., Shiga T., Zhao S., Okamoto S., and Tamaki N.: Comparison of MET-PET and FDG-PET for differentiation between benign lesion and lung cancer in pneumoconiosis, Ann Nucl Med 21: 331-337, 2007.

* Reference 1 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.
* References 3, 5, 8, and 9 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

9-1 Facts About the Onset of Brain and Heart Diseases Due to Overwork and Investigative Research on the Background Factors

— Preventing Onset of Brain and Heart Diseases Caused by Overwork (Karoshi) —

Field name "Brain and heart disease caused by overwork (karoshi: death from overwork)"

We investigated what kind of influence the quantitative and qualitative burden of work on workers has on the onset of brain and heart diseases using 3,200 employees of the Japan Labour Health and Welfare Organization as the subjects of this investigation [1, 2]. Over a 5 year average observation period, we observed the onset of brain and heart diseases in 35 people (23 males and 12 females), and the annual incidence rate per 1000 people was 3.5 males and 1.2 females.

When we investigated the relationship between the quantitative and qualitative workloads and the onset of brain and heart diseases, we found a relationship among the conditions regarding the acquired vacation time (Table 10), low practical use of technical skill, and the level of control of work (Table 11).

We also investigated the relationship between the quantitative and qualitative workloads and carotid hardening lesions and that between the reoccurrence of coronary lesions in patients with acute myocardial infarction and the character traits that indicate onset [1, 2].

Table 10. Relationship Between Quantity of Workload and Brain and Heart Disorders

		Acquired vacation	Length of business trip (days)
Patient without complications	(n=2,130-2,293)	9.0	3.0
Patient with complications	(n=34-35)	6.7	5.2
	p value	0.0442	0.0802

Table 11. Relationship Between Quality of Workload and Brain and Heart Disorders(Partial NIOSH Occupational Stress Questionnaire)

		Low practical use of technical skill	Control of work (Level of discretionary authority)
Patient without complications	(n=2,294)	8.1	47.6
Patient with complications	(n=33)	9.5	42.9
	p value	0.0074	0.0331

Least square average based on by sex and age

References:

1) Nanto S., et al.: Research, development, and dissemination of facts and background factors concerning the onset of brain and heart disease from overwork, Research report. The Japan Labour Health and Welfare Organization, Clinical Research Center for Brain and Heart Diseases in Workers, 2008.

2) Nanto S., et al.: Preventing onset of brain and heart disease caused by overwork (karoshi) – the significance of occupational stress. The Japan Labour Health and Welfare Organization, Clinical Research Center for Brain and Heart Diseases in Workers, 2008.

9-2 Relationship Between Worker Overtime and the Conditions That Sustain Metabolic Syndrome

— Long Work Hours the Cause of Metabolic Syndrome —

Field name "Brain and heart disease caused by overwork (karoshi: death from overwork)"

In order to investigate the relationship between an excessively heavy work load and the onset of metabolic syndrome, we conducted a study using the employees of The Japan Labour Health and Welfare Organization for whom the BMI and blood data were clear. We targeted 2,108 employees that had overtime in the previous year. We investigated the influence of the onset risk of metabolic syndrome and premetabolic syndrome on the group that had worked overtime (Table 12) [1, 3].

Figure 29 shows frequency distributions for metabolic syndrome , premetabolic syndrome and non-metabolic syndrome based on overtime classification. The figure shows that if overtime exceeds 500 hours there is an increasing trend in the frequency distribution of the metabolic syndrome and premetabolic syndrome groups.

We also clarified that if overtime exceeds 500 hours

Table 12. Definition of Metabolic Syndrome and Pre-metabolic Syndrome Groups

1) Hypertension (systolic blood pressure higher than 130 mm Hg or diastolic blood pressure of higher than 85 mm Hg)
2) Lipids abnormality (150 mg or more of triglyceride /dl or less than 0 mg of high density lipoprotein (HDL) cholesterol /dl)
3) Hyperglycemia (More than 110 mg of fasting blood sugar /dl)

↓

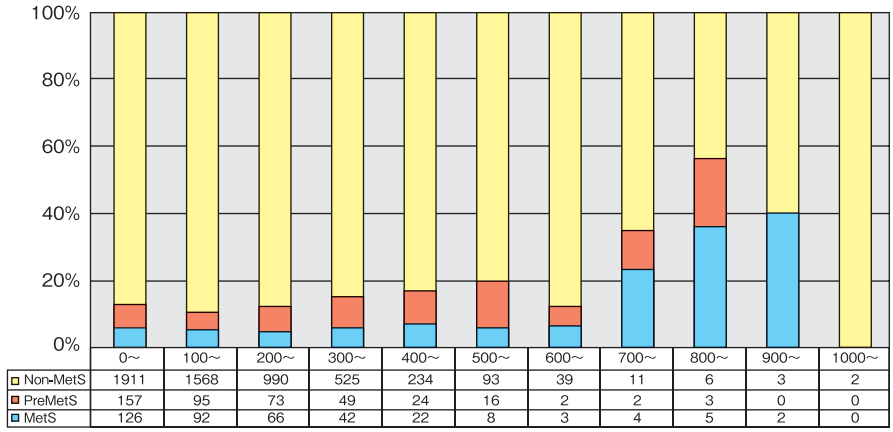
BMI of 25 or higher and 2 of the above 3 are present Metabolic syndrome (MetS)

BMI of less than 25 and 1 of the above 3 are present Premetabolic syndrome (PreMetS)

All others are considered Nonmetabolic syndrome (Non-MetS)

per year, the risk to the under 40 and 40 to 44 age group increases (Table 13).

These results show that the number of working hours has a significant influence on the onset of metabolic syndrome and that in addition to overeating, lack of exercise, and stress, working hours is a contributing factor to the cause of metabolic syndrome. In the future, we need to investigate the influence that long working hours has on overeating, lack of exercise, and stress (Figs. 30 and 31).



	0~	100~	200~	300~	400~	500~	600~	700~	800~	900~	1000~
Non-MetS	1911	1568	990	525	234	93	39	11	6	3	2
PreMetS	157	95	73	49	24	16	2	2	3	0	0
MetS	126	92	66	42	22	8	3	4	5	2	0

Fig. 29. Relationship among yearly overtime and the group that became afflicted with metabolic syndrome (MetS) the following year, the Premetabolic syndrome group (PreMetS), and the Non-metabolic syndrome (Non-MetS) group.

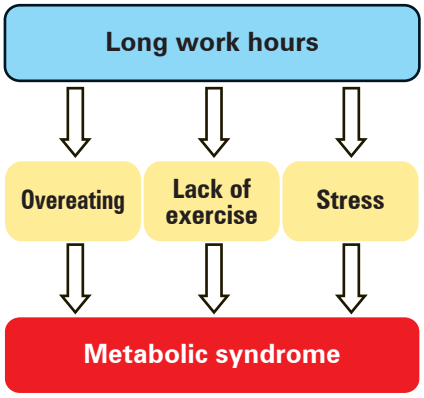


Fig. 30. Onset mechanism for metabolic syndrome in the workplace

Table 13. Onset Odds Ratio for Metabolic Syndrome and Pre-metabolic Syndrome Group Based on More Than or Less Than 500 hours of Overtime

Age	Metabolic syndrome classification	Less than 500 hours overtime	More than 500 hours overtime	Chi-square Distribution p value	Odds ratio (95% Confidence interval)
Under 40	Mets or PreMets Non-Mets	141 (8.8%) 1,456 (91.2%)	18 (25.0%) 54 (75.0%)	p<0.001	3.442 (1.965, 6.030)
40 ~ 44	Mets or PreMets Non-Mets	240 (13.1%) 1,590 (86.9%)	17 (28.8%) 42 (71.2%)	p<0.001	2.682 (1.502, 4.787)

Fig. 31. Image depicting the cause of the onset mechanism for metabolic syndrome in the workplace

References:

3) Munakata M.: Investigative research on the relationship between worker overtime and the onset of metabolic syndrome – long work hours the cause of metabolic syndrome. The Japan Labour Health and Welfare Organization, Clinical Research Center for Brain and Heart Diseases in Workers, 2008.

* Reference 1 can be viewed at **http://www.research12.jp/h13/index2.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.
* References 2 and 3 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

10-1

Corroborative Research Related to Internet Based Mental Health Evaluation and the Usefulness of Mental Health Counseling

— Establishing a System That Busy Workers Can Use at Anytime From Any Where —

Field name "Worker's mental health"

We established a convenient Internet-based mental health checkup system (MENTAL-ROSAI) (Fig. 33) that workers can use whenever and wherever they wish. We clarified that MENTAL-ROSAI is a useful screening method for early detection of depression [1, 2, 3].

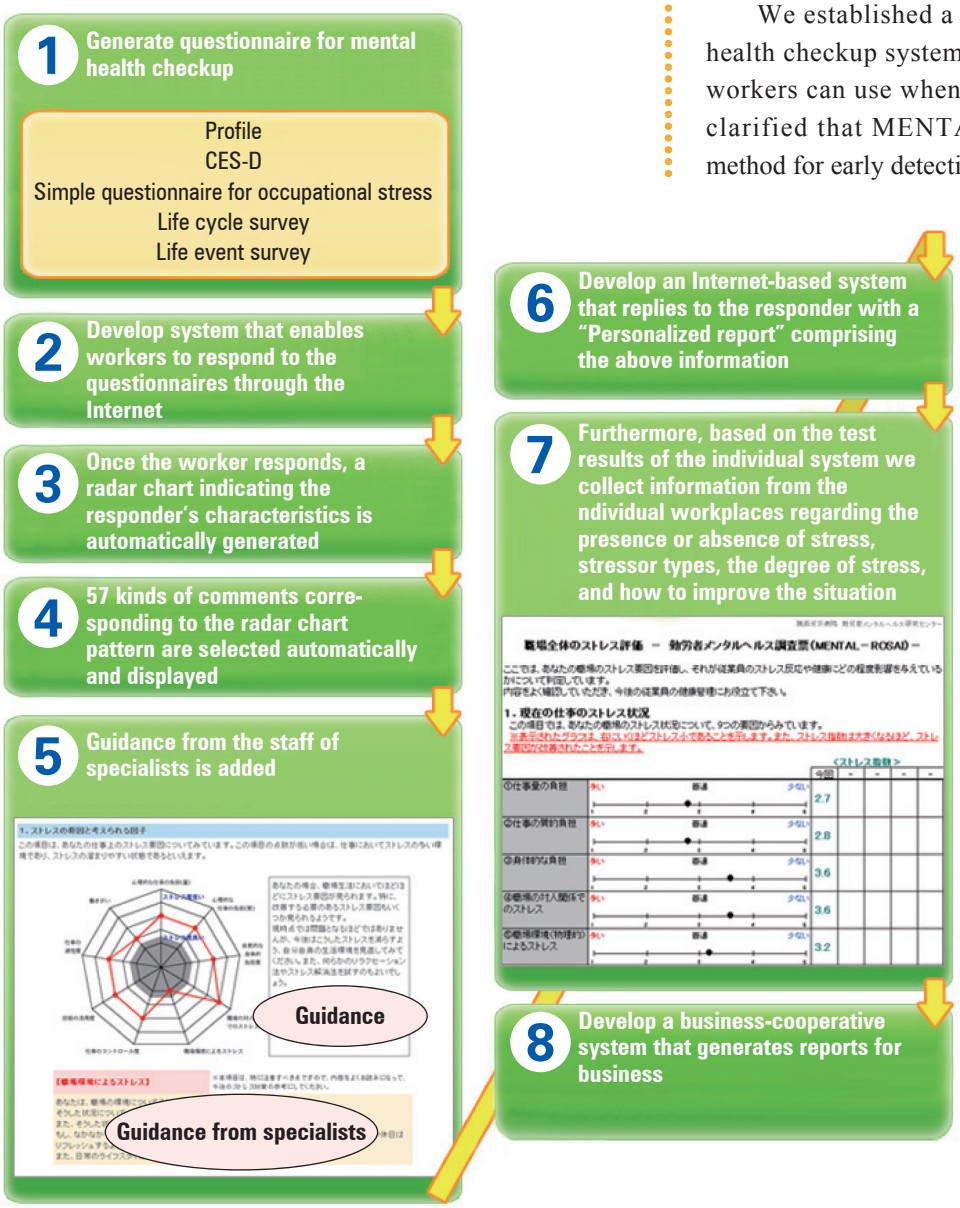


Fig. 33. Outline of the Internet-based mental health checkup

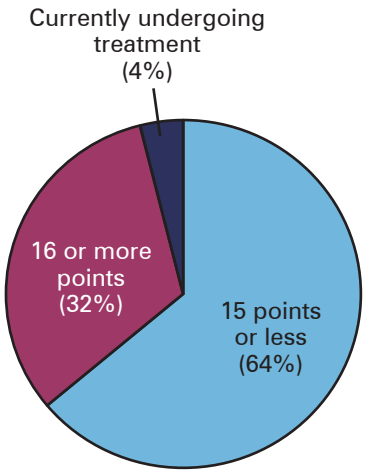


Fig. 32. CES-D test results

32% of the participants in the mental health check exhibited a CES-D score of 16 or higher indicating suspected depression and were encouraged to consult a specialist. We clarified that in this way MENTAL-ROSAI can effectively prevent depression and escalation to the level of a serious disease.

References:

1) Yamamoto H., et al.: Research on the relationship between the workplace and worker mental health disorders and research, development, and dissemination of a treatment method and preventative measures, Research report. The Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Mental Health, 2008.
2) Yamamoto H.: Corroborative research related to Internet based mental health evaluation and the usefulness of mental health counseling - establishing a system that busy workers can use at anytime from any where. Research report, The Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Mental Health, 2007.
3) Yamamoto H.: Corroborative research related to internet based mental health evaluation and the usefulness of mental health counseling - establishing a system that busy workers can use at anytime from any where – (Part 2). Research report. The Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Mental Health, 2008.

10-2

Research and Development of Objective Evaluation Method for Depression Using ^{99m}Tc-ECD SPECT Imaging of Cerebral Blood Flow

— Research and Development of an Objective Rating System for Depression Images Based on Images of the Brain —

Field name "Worker's mental health"

Based on an objective evaluation method of brain images taken of patients suffering from depression using ^{99m}Tc-ECD Single Photon Emission Computerized Tomography (SPECT) imaging, we observed decreased blood flow in the left brain (frontal / parietal lobes, etc.) of the patients in the group suffering from depression and the decreased blood flow ameliorated in the remission stage (Fig. 34). Furthermore, we clarified that there was a decrease in the blood flow in the right cephalic fold due to the accumulation of fatigue in the group suffering from depression [1, 4, 5, 6] (Fig. 35).

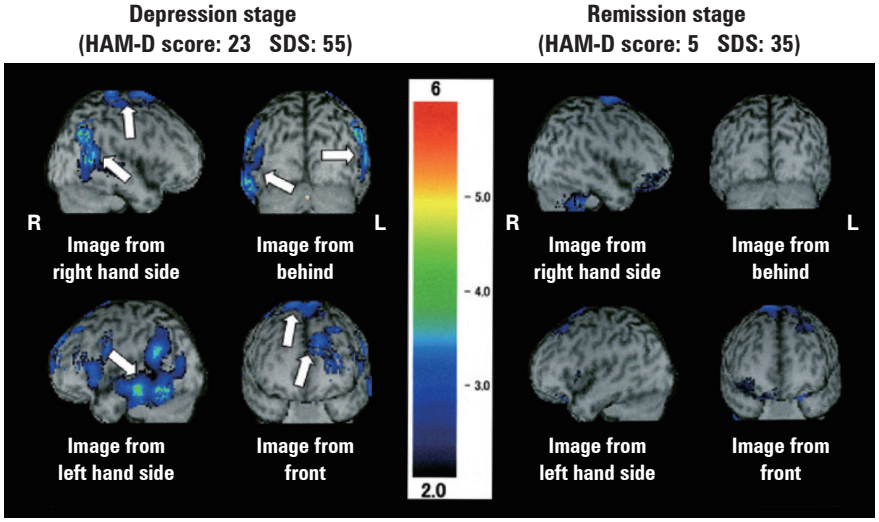


Fig. 34. Examination of the cerebral blood flow using ^{99m}Tc-ECD SPECT imaging

The large blue regions indicate decreased blood flow during the depression stage.
In the remission stage, the blue areas are smaller (^{99m}Tc-ECD is a cerebral blood flow scintigraphy agent used in SPECT imaging).

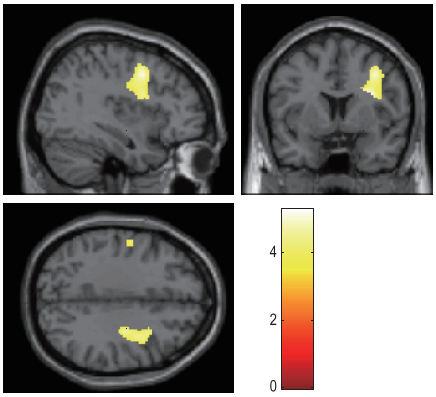


Fig. 35. SDS fatigue item and SPECT

In the group suffering from depression, the higher that a person scored on the fatigue item point scale in the SDS (Self-rating Depression Scale) test, the more significant blood flow decrease is expressed (yellow region) in the right frontal lobe.

References:

4) Koyama F.: Research and development of objective evaluation method for depression using ^{99m}Tc-ECD SPECT imaging of cerebral blood flow - Research and development of an objective rating system for depression images based on images of the brain. The Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Mental Health, 2007.

5) Koyama F.: Research and development of objective evaluation method for depression using ^{99m}Tc-ECD SPECT imaging of cerebral blood flow - Research and development of an objective rating system for depression images based on images of the brain – (Part 2). The Japan Labour Health and Welfare Organization, Clinical Research Center for Worker's Mental Health, 2008.

6) Koyama F., Hojo K., Otsuki K., and Yamamoto H.: Changes in regional cerebral blood flow correlate with symptoms of depression and severity of fatigue in 99mTc-ECD SPECT study in 45 Workers. Japanese Journal of Occupational Medicine and Traumatology, 56:122-127, 2008.

* Reference 1 can be viewed at **http://www.research12.jp/h13/index2.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.
* References 3 and 5 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

11-1 Investigative Research on Menstruation and Menopausal Related Disorders That Affect the Quality of Working Life (QWL)

Field name "Medical care for working women"

The results of a questionnaire regarding the influence of menstrual pain or menopausal disorders on the Quality of Working Life (QWL) for women administered to 2,045 subjects showed that 77% of working women reported menstrual pain (Fig. 36) and 37% of those reported the need for painkillers (Fig. 37). We found that menstrual pain and premenstrual syndrome significantly decrease the QWL, and that 24% of women age 20 to 60 suffer from menopausal disorders that significantly decrease the QWL [1, 2].

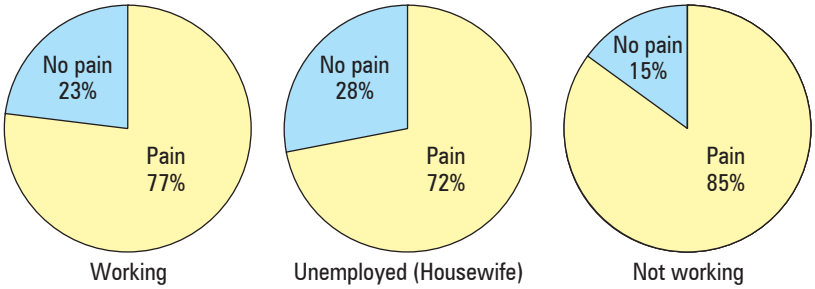


Fig. 36. Presence of mentstrual pain based on working status

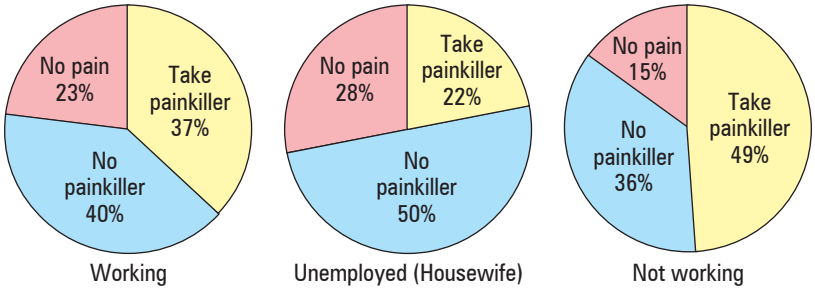


Fig. 37. Use of painkiller during mentstrual period based on working status

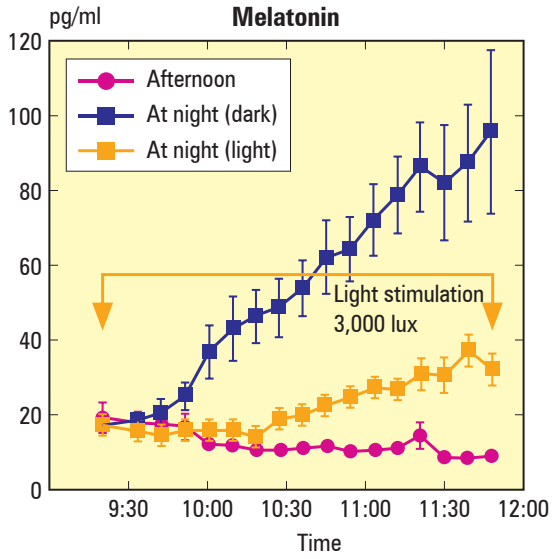
References:

1) Yamoto M., et al.: Research, development, and dissemination on the relationship between women's diseases and employment status and that between women's diseases and work content, Research report, The Japan Labour Health and Welfare Organization, Clinical Research Center for Working Women's Health, 2008.
2) Yamoto M.: Investigative research on menstruation and menopausal related disorders that affect the Quality of Working Life (QWL), The Japan Labour Health and Welfare Organization, Clinical Research Center for Working Women's Health, 2008.

11-2 Investigative Research on Effect of Late Night and Long Work Hours on Women's Endocrine System

Field name "Medical care for working women"

In the investigation of the influence of late night and long working hours on the endocrine system of women, in order to clarify the mechanism of why there are many cases of irregular menstrual cycles for those that work late at night, we studied the change in the endocrine hormones in nurses who work at night. Darkness at night causes the melatonin level to increase, and we identified that since the nurses work in a lighted workspace there is no increase in the melatonin level [1, 3, 4] (Fig. 38).



Melatonin

Melatonin is a hormone that is secreted from the pineal body. The function of melatonin is to constrict the melanophore and suppress the growth of the gonads. In addition, the melatonin secretion capacity usually increases in people at night, and it is thought that this promotes sleep.

Fig. 38. Influence of light stimulation on melatonin in the blood

References:

3) Miyauchi F.: Research on the influence of late night and long working hours on women's endocrine system - Toward clarifying the influence on hormone secretion in working women. The Japan Labour Health and Welfare Organization, Clinical Research Center for Working Women's Health, 2007.

4) Miyauchi F.: Research on the influence of late night and long working hours on women's endocrine system - Toward clarifying the influence on hormone secretion in working women (Part 2). The Japan Labour Health and Welfare Organization, Clinical Research Center for Working Women's Health, 2008.

11-3 Development of Model System for Women Outpatients

— Report Based on Questionnaires Submitted to Female Outpatients —

Field name "Medical care for working women"

We administered a questionnaire regarding a female outpatient model system. We analyzed 549 responses and found that diseases afflicting the women that received consultation covered an extremely wide range of diseases related to obstetrics and gynecology, psychiatry, internal medicine, urology, mammary glands, and proctology. We found that there were 158 diagnosed diseases, and clarified the fact that many of the working women continued to work while coping with the pain and the importance of female outpatients (Table 14).

In terms of the construction of a female outpatient model system, these results showed that the attending physicians need "comprehensiveness" when dealing with such a wide range of diseases [1, 5].

Furthermore, 58.4% of the women believe that stress at the workplace and home is a contributing factor to the onset of symptoms that are the reason for them to seek consultation.

Table 14. Summary of the number diagnosed diseases for female outpatients

Obstetrical and gynecological diseases	32
Psychiatric diseases	18
Other diseases	
Internal medicine	84
Urology	8
Mammary gland / proctology	16
Total	158

* Total number of diagnosed diseases was 158

References:

5) Tatsuta H.: Development of model and system for women outpatients - Report based on questionnaires submitted to female outpatients. The Japan Labour Health and Welfare Organization, Clinical Research Center for Working Women's Health, 2008.

* Reference 1 can be viewed at **http://www.research12.jp/h13/index2.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

* References 2, 4, and 5 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

12

Research and Development of a Rehabilitation Model System That Enables Early Return to Work

— For the Early Return to Work of Workers Suffering from Cerebrovascular Disorders —

Field name "Rehabilitation for returning to work"

In order to develop a rehabilitation model system that enables early return to work (Fig. 39), we conducted an investigation targeting cases of cerebrovascular disorders, and looked for the cause of the differences between two groups, one that returned to work (104 cases) and another comprising those who could not return to work (247 cases). The results of the investigation confirmed the following.

1. Based on demographic examination, there are many examples indicating that those of higher posts (managerial positions) can return to work early.
2. Based on an investigation from a medical and social medicine support viewpoint, the following factors influence the ability to return to work.
   - The shorter the time period before beginning rehabilitation the better (Fig. 40-1).
   - The shorter the time period before hospitalization the better (Fig. 40-2).
   - The higher the score when performing functions such as eating and moving at the beginning of rehabilitation and at discharge (Barthel Index) (Fig. 40-4 / 5) or overall status (Modified Rankin Scale) the better (Fig. 40-6 / 7).
   - The higher the level of awareness at discharge (check based on Mini-Mental State Examination) the better (Fig. 40- 8).
   - The sooner the patient meets with a Medical Social Worker (MSW) the better (Fig. 40-9).

These results showed that based on factors such as the investigation of the type of occupation, the period before beginning rehabilitation, and the body function and overall status at the beginning of rehabilitation, we can estimate the ability to return to work after discharge from the hospital. The results also showed that, at the time rehabilitation begins, returning to work can be facilitated by having the attending physician contact the workplace to inform them of the possibility of returning to work [1, 2, 3, 4].

Barthel Index and Modified Rankin Scale

- The more that a patient retains functionality, the higher the Barthel Score.
- The more that a patient retains functionality, the lower the numerical value of the Modified Rankin Score.

Physiotherapist uses stairs to train patient suffering from paralysis of the left side of the body.

Occupational therapist uses a PC to train patient suffering from paralysis of the left hand.

Fig. 39 Rehabilitation training for cerebrovascular disorder cases

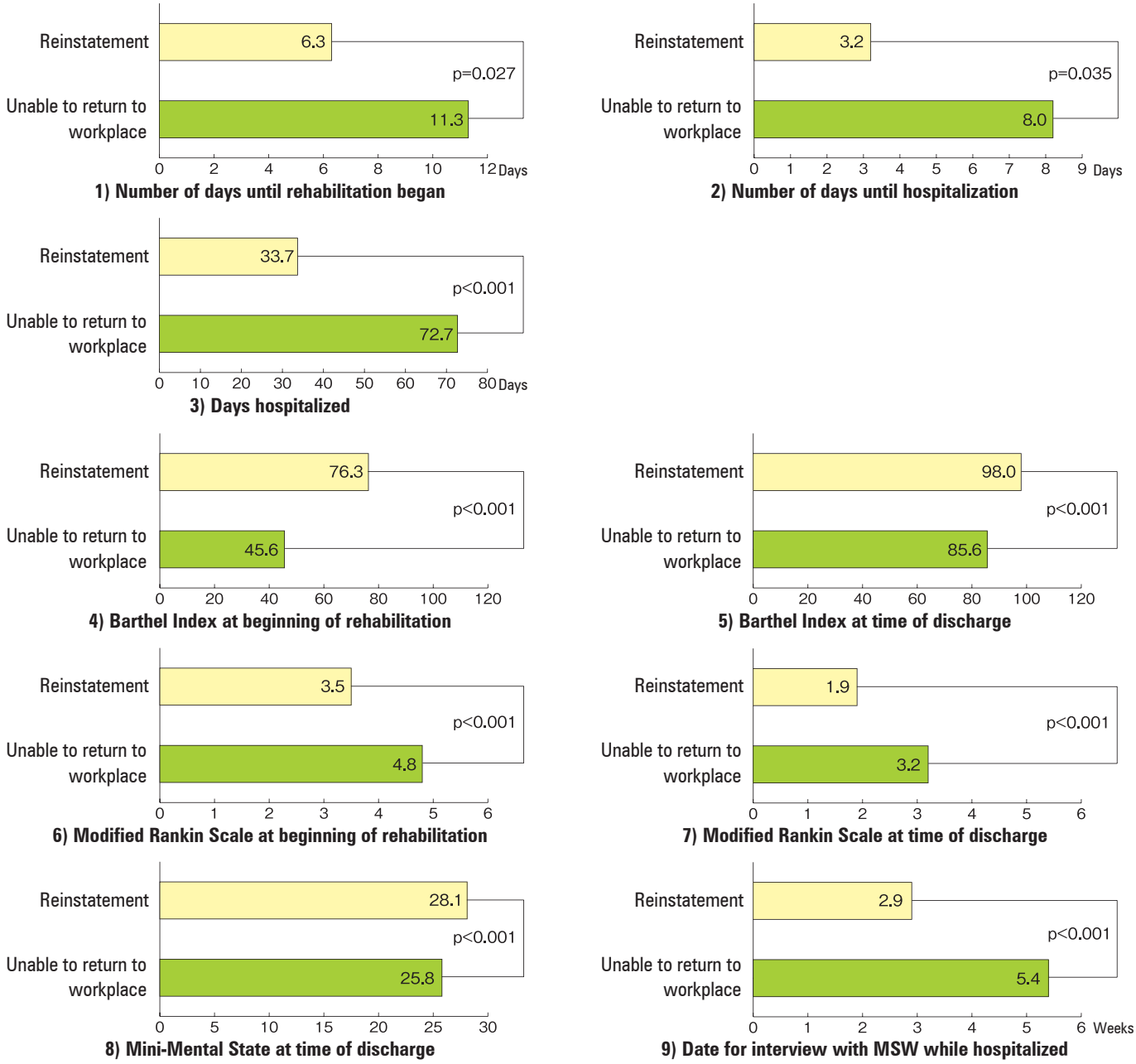


Fig. 40 Investigation of the factors promoting early reinstatement
Comparison between cases where early reinstatement was not possible and cases of early reinstatement based on factors such as the number of days until rehabilitation began

References:

1) Toyonaga T.: Research, development, and dissemination of a rehabilitation treatment model for various diseases that enables early return to work, Research report. The Japan Labour Health and Welfare Organization, Clinical Research Center for Worker' s Rehabilitation, 2008.
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3) Toyonaga T.: Rehabilitation for returning to work - Discriminating factors for work reinstatement of workers at discharge after a stroke. Japanese Journal of Occupational Medicine and Traumatology, 56: 135-145, 2008.
4) Tanaka H. and Toyonaga T.: Role of the occupational physician in return to work of stroke patients. Japanese Journal of Occupational Medicine and Traumatology, 57: 29-38, 2009.

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* Reference 2 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

13

Investigative Research on Mesothelioma Caused by Asbestos Exposure in Japan

— Clinical Picture Based on 221 Cases from the Rosai Hospital Group —

Field name "Asbestos related diseases"

In June 2005, asbestos exposure became a large social problem. In this field we immediately began investigations on the patients diagnosed with mesothelioma in the 27 Rosai hospitals countrywide. Based on the 221 cases of pleura, peritoneum, pericardium, and tunica vaginalis testis mesothelioma, we clarified the clinical picture in our country [1, 2, 3, 4].

We investigate the occupational histories of the admitted patients and to the extent that we investigated regarding the possibility of occupational exposure to asbestos in these cases, we found the exposure rate of 84.1% to asbestos, which is the same level as that in Europe and the US (Table 15). In the Rosai hospitals, the practice of investigating the occupational history helped in calculating the rate of occupational exposure to asbestos in the cases of mesothelioma in our country.

Furthermore, although we found that radical operation based on early diagnosis had the best prognosis, there was a problem in that the detection rate in Stage I and Stage II where radical operation was possible was a low 29.6%, and in approximately 70% of the cases mesothelioma was found too late for radical surgery (Fig. 41).

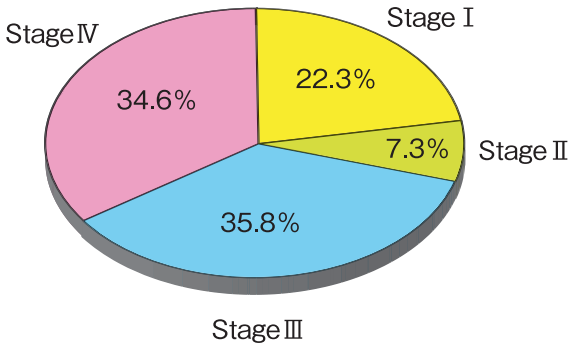

Fig. 41 Classification of cases of pleural mesothelioma in Japan at time of detection

In order to deal with this problem, we published a diagnosis guide to aid in early detection so that doctors on the frontlines can become familiar with asbestos related diseases [5]. To date we published 14,000 copies, and promoted the diffusion of fundamental knowledge that was indispensable to diagnosing asbestos associated diseases. Furthermore, we compiled early detection cases (Fig. 42) and published the "Guide to early detection and diagnosis of asbestos associated diseases" [6] and published the "Handbook for diagnosing pleural mesothelioma" [7] targeting pulmonologists and pulmonary surgeons.

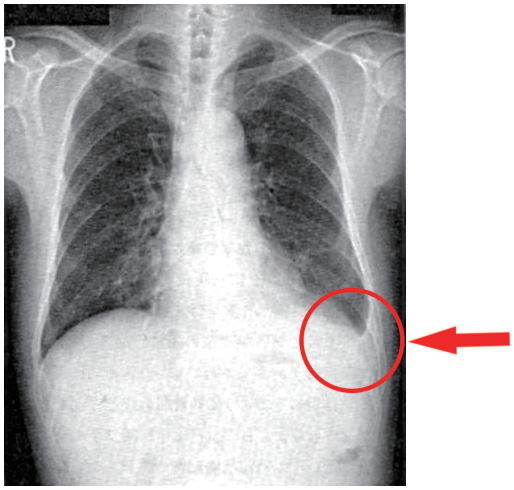

Fig. 42 Some pleural effusions detected in the left lung at the time pleural mesothelioma was detected at Stage I.

Furthermore, in order to establish an early diagnosis method for mesothelioma, we noted the methylation of the cancer suppressor gene in pleural effusion. Based on the results of copious research, we developed an early diagnosis method that can differentiate mesothelioma and benign asbestos pleural effusion caused by asbestos exposure from lung cancer (adenocarcinoma) and tuberculous pleurisy [11].

In this case, we also clarified that the latency period for the onset of mesothelioma due to asbestos exposure was approximately 40 years (Table 16).

Also, following mesothelioma, we determined the clinical picture in our country for lung cancer due to asbestos exposure [8, 9] and benign asbestos pleural effusion [10].

If we investigate the change in the amount of asbestos imported into Japan, we find that the peak was between 1970 to 1990. This indicates that after 40 years from 2010 to 2030, there is the probability that the number of incidences of mesothelioma due to asbestos exposure will increase. In Japan, improving the early detection rate and increasing the survival rate for the increasing number of patients with mesothelioma are large research topics that we must overcome.

Table 15. Frequency Based on Occupation of Suspected Cases of Occupational Exposure to Asbestos

		Pleural Mesothelioma	Peritoneal Mesothelioma	Total
Number of cases where research was conducted on occupational history		171	24	201*
Type of occupation with suspected occupational asbestos exposure	Shipyard work	34	3	37
	Construction	20	2	22
	Insulation work	12	4	19*
	Plumbing	15	0	15
	Asbestos product manufacturing industry	10	5	15
	Electrician	12	1	13
	Mechanic appliance manufacturing industry	10	0	11*
	Driver	6	1	7
	Vehicle manufacturing industry	5	0	5
	Demolition work	4	1	5
	Warehouse work	4	0	4
	Car manufacture/ repair work	3	0	3
	Sheet metal work	3	0	3
	Other asbestos-related work	8	2	10
	Total	146 (85.4%)	19 (79.2%)	169 (84.1%)

* Includes four cases of pericardium mesothelioma and two cases of tunica vaginalis testis

Table 16. Latency Period Until Episode of Mesothelioma

	Pleural Mesothelioma	Peritoneal Mesothelioma	Total*
Latency Period (Years)	42.6 ± 9.5 (n=143)	43.4 ± 8.8 (n=17)	42.5 ± 9.5 (n=162)

(Average ± SD) *Includes one case each of tunica vaginalis testis and mesothelioma of an unidentified site.

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* Reference 4 can be viewed at **http://www.research12.jp/h13/index2.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.
* References 3, 9, and 10 can be viewed at **http://www.research12.jp/h13/index.html**, a site dedicated to the research and development, and dissemination projects related to the 13 fields of occupational injuries and illnesses.

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Date of Publication: March 2009

* This research is based on the research and development, and dissemination projects by the Japan Labour Health and Welfare Organization related to the 13 fields of occupational injuries and illnesses.

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Saitama	2-2-3-6F Takasago, Urawa-ku, Saitama-shi, Saitama 330-0063 Japan	+81-48-829-2661
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Niigata	2077-6F Nino-machi, Ishizue-chodori, Chuo-ku, Niigata-shi, Niigata 951-8055 Japan	+81-25-227-4411
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Mie	2-191-4-5F Sakurabashi, Tsu-shi, Mie 514-0003 Japan	+81-59-213-0711
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Hyogo	6-1-20-8F Gokodori, Chuo-ku, Kobe-shi, Hyogo 651-0087 Japan	+81-78-230-0283
Nara	1-1-15-3F Omiya-cho, Nara-shi, Nara 630-8115 Japan	+81-742-25-3100
Wakayama	11-6F Hachiban-cho, Wakayama-shi, Wakayama 640-8157 Japan	+81-73-421-8990
Tottori	7-3F Ougi-machi, Tottori-shi, Tottori 680-0846 Japan	+81-857-25-3431
Shimane	111-5F Tono-machi, Matsue-shi, Shimane 690-0887 Japan	+81-852-59-5801
Okayama	2-1-3-12F Shimoishii, Kita-ku, Okayama-shi, Okayama 700-0907 Japan	+81-86-212-1222
Hiroshima	11-13-5F Moto-machi, Naka-ku, Hiroshima-shi, Hiroshima 730-0011 Japan	+81-82-224-1361
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Tokushima	3-61-3F Saiwai-cho, Tokushima-shi, Tokushima 770-0847 Japan	+81-88-656-0330
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Saga	6-4-8F Eki-Minami-honmachi, Saga-shi, Saga 840-0816 Japan	+81-952-41-1888
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