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Reference vibrotactile perception thresholds on the fingertip obtained with Malaysian healthy people using ISO 13091-1 equipment

Roshada Daud¹, Setsuo Maeda², Nur Nazmin Mustafa Kameel³, Muhamad Yunus Ripin¹, Norazman Bakrun¹, Raemy Md Zeini¹, Masaharu Kido⁴ and Kiyotaka Higuchi⁴

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The purpose of this paper is to clarify the reference vibrotactile perception thresholds (VPT) for healthy people in Malaysia. The VPT was measured by using ISO 13091-1, equipment standard for the

assessment of nerve dysfunction and ISO 13091-2, for the analysis and interpretation of measurement at the fingertips. This equipment is to obtain the reference data for Malaysian people since there are no VPT data yet. The reference VPT data need to compare with the worker' s if it is used to diagnose of the hand-arm vibration syndrome. The measurement is done to thirty healthy Malaysian people and these data will be compared with the ISO 13091-2 standard equipment. None of them had prior occupational experience operating powered hand tools or had suffered any serious injuries in upper extremities. All the data were analyzed by using three-way ANOVA and t-test. From the comparison of these data, it was clear that the Malaysian healthy people' s VPT data were consistent with the reference data of the ISO 13091-2 standard.

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Reference vibrotactile perception thresholds on fingertip obtained with Malaysian healthy people using ISO 13091-1 equipment

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Proceedings of 10th International Conference on Hand-Arm Vibration, p.67-68, 2004.

Occupational exposures to hand-transmitted vibration cause a variety of disorders in the fingers, hand, and arms.

These include neurological disturbances and vascular disorders (sometimes called Raynauds' s phenomenon or vibration-induced white finger 1)). Fingertip vibrotactile thresholds have been used to quantify the neuropathy and to estimate the acute physiological effects of hand-transmitted vibration exposure. The vibration perception thresholds measurement equipment standard, ISO 13091-1 2), was used in optimizing testing procedures and interpreting vibrotactile perception thresholds. ISO 13091-2 was published to assess nerve dysfunction for analysis and interpretation of measurements at the fingertips. Since Malaysia don' t have any reference regarding to this measurement, this study were carry out to find the vibrotactile perception threshold for Malaysian healthy people. The main objective of this study is to measure the fingertip vibrotactile thresholds as to get reference data for the Malaysian people and then will compared to ISO 13091-2 by using an implementation of ISO equipment.. This study also is to find a comparison of vibrotactile perception thresholds for male and female.

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Sensory Nerve conduction velocities of the median, ulnar and radial nerve among patients with vibration syndrome

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Proceedings of the 9th International Conference on Hand-Arm Vibration, INRS, 5-8 June 2001, p171-175, 2004.

Objective: The present study was aimed at clarifying the effect of the vibration syndrome (VS) on the peripheral nervous system in the three nerves in the hand. Methods: Thirty-four patients with VS due to previous exposure to vibration and 23 age-matched controls were examined for sensory nerve conduction velocities (SCV) in the median, ulnar and radial nerve in the hands and arms. Results: SCV in the median nerve (the middle finger, the wrist - elbow) and ulnar nerve (the small finger, wrist ? elbow), and the amplitudes of the median nerve (the wrist ? proximal and distal part of the middle

finger), ulnar nerve (the wrist ? proximal and distal part of the small finger, the forearm ? the proximal part of the small finger, the upper arm - the proximal part of the small finger) and the radial nerve (the dorsal side of the hand ? the thumb) of VS patients were significantly reduced compared with those of controls. Conclusion: These findings suggested that VS affects the peripheral nervous system function in three nerves in the hands. The peripheral nerve disorders should be multi-focal neuropathy.

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Occupational Vibration

Setsuo Maeda¹

Conference Papers of 7th National Conference and Exhibition on Occupational Safety and Health, p.65-69, 2004.

There are two kinds of vibrations, whole-body vibration and hand-arm vibration. In general, whole-body vibration is transmitted to the whole-body through the surface of the body. (It is transmitted from the feet, the hips, the back or other parts.) The driver of a vehicle is exposed to whole-body vibration, for example, the hips. When the driver's back is supported, the vibration is transmitted from the back. The hand-arm vibration is transmitted from the hands and arms. Most of the hand-arm vibrations are experienced in operating a hand-held power tools. In this presentation, the methods for preventing occupational vibration syndrome caused by prolonged occupational vibration exposures to whole-body vibrations from vehicle seats and hand-arm vibrations from hand-held power tools will be explained.

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Measurement of hand-transmitted vibration exposure

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Proceedings of 10th International Conference on Hand-Arm Vibration, p.49-50, 2004.

Measurements are required so as to obtain a vibration dose for hand-arm vibration during working conditions and operating period. Measurement of hand-transmitted vibration shall be undertaken using instrumentation conforming to the requirements of ISO/DIS 8041 published in July 2003. Although Measuring instrumentation is defined by ISO, there is still difficulty to measure the hand-arm vibration exposure. This paper shows the most careful items of the measurement of hand-arm vibration exposures.

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Work computer for prevention of over exposure to hand-transmitted vibration

Setsuo Maeda¹

Proceedings of 10th International Conference on Hand-Arm Vibration, p.123-124, 2004.

There are many instruments to measure the noise and vibration. These devices include Noise Meter, Infrasound Meter, Vibration Meter, Noise Dose Meter, Human Vibration Meter, and TTS meter. These instruments can only measure the exposure level or exposure magnitude. They do not inform the residual time for avoiding the vibration disease such as low back pain, hearing loss or vibration induced white finger to the workers during work. On the other hand, like the Dive Computer that can tell the decompression time for avoiding the decompression sickness during diving in underwater to the divers, the Work Computer can be used to prevent the over-dose of vibration exposure among workers using the hand-held tools.

This paper proposes the concept and system of Work Computer for the prevention of the hand-arm vibration syndrome.

Can the measured TTS be used as an indicator of the effectiveness of anti-vibration gloves?

Setsuo Maeda¹

Proceedings of 10th International Conference on Hand-Arm Vibration, p.185-186, 2004.

In the workplaces, such as mining, forestry, the engineering-works construction industry, and a manufacturing industry, JIS T8114 is specified as a standard which evaluates the vibration-reduction effectiveness of the anti-vibration gloves for reducing vibration transmitted from a tool, a machine, etc. to a worker's hand. Now, the measurement system, which can evaluate the vibration-reduction effectiveness of the anti-vibration gloves by the form based on this JIS standard. The vibration attenuation value is recommended by the JIS standard, such a recommendation attenuation value. Moreover, the recommendation value of this standard is not given from the physiological influence of people.

Then, while proposing the method of measuring the vibration-reduction effectiveness of the anti-vibration gloves in the method according to the JIS T 8114 standard in this report. It evaluated whether the effect of vibration transfer for a worker that the vibration-reduction effectiveness of the anti-vibration gloves measured by the method is what value would be reduce using the amount of temporary threshold shift of the fingertip vibrotactile perception threshold used as an index of the diagnostic item of Hand-Arm Vibration Syndrome.

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Comparison of vibration reduction effectiveness of anti-vibration gloves between JIS T 8114 and ISO 10819 standards

Setsuo Maeda¹

Proceedings 12th Japan Group Meeting on Human Response to Vibration, p.67-75, 2004.

International standards 13753 and 10819 were originally published in 1998 and 1996. A revision of the 10819 standard has just started by the ISO committee. Japanese Industrial Standard JIS T 8114 was published in 1987. This paper compares the structure of the three standards and presents tabular comparisons of the guidance of the measurement of anti-vibration gloves. It is shown that the guidance in JIS T 8114 is simple to measure the reduction of the anti-vibration gloves than the guidance in ISO 13753 and 10819 standards.

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Strategy for Prevention of Occupational Vibration

Setsuo Maeda¹

Proceedings of Sino-Japanese International Symposium on Public Health in the 21st Century, p.146-151, 2004.

There are two kinds of vibrations, whole-body vibration and hand-arm vibration. In general, whole-body vibration is transmitted to the whole-body through the surface of the body. (It is transmitted from the feet, the hips, the back or other parts.) The driver of a vehicle is exposed to whole-body vibration, for example, the hips. When the driver's back is supported, the vibration is transmitted from the back. The hand-arm vibration is transmitted from the hands and arms. Most of the hand-arm vibrations are experienced in operating a hand-held power tools.

In this paper, the brief introduction of whole-body vibration and hand-arm vibration, and the methods for preventing occupational vibration syndrome caused by prolonged occupational vibration

exposures to whole-body vibrations from vehicle seats and hand-arm vibrations from hand-held power tools will be explained.

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Comparison of 12 axes vibration data on the different kinds of vehicle seats according to the ISO 2631-1 standard

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Proceedings of IAC2004, p.4-8, 2004.

In 1997, ISO2631-1 (Evaluation of human exposure to whole body vibration - General requirement) was published. At ISO2631-1, the common indicator for evaluating the health, comfort, perception, and motion sickness about whole body vibration is defined, and it is decided by evaluation of the comfort when the human is taking-a-seat posture that vibrating 12-axis included in the human body of the supporting seat surface, the seat-back and the feet is measured simultaneously. 6-axis (3-axis vibration: x, y and z, and 3-axis rotational vibration: roll, pitch, yaw) in the supporting seat surface did not correspond to 3-axis seat pickup defined by ISO5008, and did not have the way measured actually. Moreover, there was also no measuring instruments which can carry out simultaneous measurement of the 12-axis based on ISO-2631-1 standard.

In this paper, the comparisons of 12 axes vibration data on the different kinds of vehicle seats according to the ISO 2631-1 standard are shown.

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Is Body Weight Alone Enough for The Vibration Measurement of Seated Human Ride Comfort Evaluation?

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Proceedings of ICA2004, p.1-4, 2004.

The purpose of this paper is to clarify the effect of seated human body characteristics on the r.m.s. acceleration measured on the motor vehicle seat, which is one of the most serious concern in the evaluation of vehicle comfortableness according to the ISO standards. The experiment was conducted from 45 volunteers with the same 5.5 minutes random vibration input in the laboratory. As the result of this experiment, it was clarified that not only the body weight but also the body height affect the r.m.s. acceleration.

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Occupational exposure to dioxin and its health effect: From the perspective of municipal solid waste incinerator workers

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Proceedings of the International Biochemistry Minisymposium on the Metabolism of Xenobiotics, Soonchunhyang University, Asan, 11 Mar, p56-59, 2004.

Residents living around a plant at Nose Osaka, which was releasing 180 ng I-TEQ/Nm³ of dioxin in flue gas, demanded to assess the contamination of dioxins in the environment. Soil samples were taken from the ground around the plant for the measurements of dioxin concentrations in 1998. Up to 8.5 ng I-TEQ/g of dioxins were detected in the samples of soil near the incinerator and 23 ng-TEQ/g in the bottom sludge of drain pond.

Further survey was carried out and samples from ash, drainage, sludge and others remained in the furnace and air pollution control devices of the incinerator were measured. The watery sludge remained

in the bottom of scrubber contained 13,000 ng I-TEQ/g of dioxins. According to the results the Ministry of Labor immediately organized the Research and investigation committee on the dioxin problem of Toyono-gun Clean Center under Japan Industrial Safety and Health Association to investigate the health effects of chronic exposure to dioxin and its accumulation on workers at the incinerator plant. The investigation was carried out in Sept 1998 and total of 92 workers were examined. Total blood dioxin levels (PCDD & PCDF) were from 13.4 to 805.8 pg I-TEQ/g-fat (median 39.7 pg I-TEQ/g-fat) and there were no findings or signs relating to dioxins exposure.

From the results, the committee concluded that the concentrations of dioxins among the bloods of the workers who had engaged in maintenance of the furnace, the electric dust collector, and the wet scrubber of the incinerator were higher compared with those of residents in surrounding areas. However, there were no signs or findings correlating to total blood level of dioxins, and the levels were not high enough to induce sufficient health effects from the review of published papers.

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Effects of 50Hz Electromagnetic Fields on Reproduction in Mice. A Three Generations Study.

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Proceedings of 3rd International Workshop on Biological Effects of Electromagnetic Fields. p971-973, 2004

Some epidemiological studies suggested that electromagnetic fields (EMF) might have adverse effects on reproduction in occupationally exposed workers. The aim of the present study is to elucidate the effects of 50Hz EMF on reproduction in experimental mouse systems. Three consecutive generations of IQI/Jic mice were kept continuously in 1mT, 0.1mT and control (less than 0.05 μ T) MF. In every generation, male and female mice weighing more than 33g and 28g at 10 weeks old, respectively, were selected and 5 or 6 pairs (1 male and 2 female) mated for 2 weeks, and related pregnancy outcome was observed. Sperm in cauda epididymus, testicular weights and plasma testosterone levels were examined in 12 weeks old male mice. In all generations, incidence of pregnant female mice, total number of weanlings, their ratio of male to female, and their weight gain were not different significantly between each group. Sperm motility, testicular weight, and plasma testosterone levels were similar in all groups. These results indicated that 50Hz EMF might not effect on male reproductive system or related pregnancy outcome in mice even after continuous exposure over 3 generations.

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International Trend in Assessment of Occupational Thermal Stress and Future Issuers

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Proceedings of Sino-Japanese International Symposium on Public Health in the 21st Century, August 19-21, Hefei, China, p125-131, 2004.

The International Organization for Standardization (ISO/TC159/SC5/WG1) has proposed a series of international standards concerned with thermal environments. Some of them, being currently under revision and development, can be used to assess occupational heat and cold stress and ensure that workers do not experience unacceptable thermal strain and disorders. This contribution reviews the recent trend in international standardization of assessment methodology of occupational heat and cold stress and the future issues to address considering the possible application to Asian workers. ISO7243 (2003) provides a simple method for monitoring the heat stress based on the Wet Bulb Globe Temperature (WBGT) index. If measured WBGT values are higher than suggested limit values, the heat stress at the workplace needs to be reduced or a more detailed analysis made to avoid

unacceptable heat strain. ISO7933 (1989), in such situations, provides the more detailed method of analysis of the hot environment and can be used in work design as well as assessment. It takes a rational approach considering the heat transfer between a clothed worker and the environment and based on predicted heat strain allows interpretation of results in terms of recommended work-rest schedules. ISO/TR 11079 (1993) proposes a rational method for assessment of cold stress by calculating the clothing insulation required for thermal equilibrium (IREQ_{min}) and that required for thermal comfort (IREQ_{neutral}). For persons who wear clothing insulation which is less than IREQ_{min}, there is a risk of progressive body cooling. If clothing with insulation greater than IREQ_{neutral} is worn, there will be an increasing feeling warmth and overheating. The interval between IREQ_{min} and IREQ_{neutral} is the clothing regulatory zone, where each individual chooses the appropriate clothing level. Local cooling of the hands, head and feet is also considered in this ISO/TR. In extreme environments, it is necessary to measure the physiological strains on workers exposed to heat or cold stress as well as to assess the thermal stress by using ISO7243, ISO7933 or ISO/TR11079. For meeting this need, ISO9886 (2004) provides methods for measuring and interpreting body core temperature, skin surface temperatures, heart rate and body mass loss together with the limit values. Two of these ISO standards are currently under revision: ISO7933 to improve its validity and scope; ISO/TR11079 to provide the further information on selection of appropriate clothing from IREQ. Furthermore, new proposals are being made concerning a risk assessment strategy for the prevention of thermal stress (ISO15265, 2004) and a working practice in cold environments (ISO15743, 2004). As the name “ISO” implies, the scope of these standards should be international. However, they have so far been designed with European and American subjects, primarily for use in those countries. As a result, little consideration has been made about how valid and usable they are in Asian countries. Therefore, future issues to address in these ISO standards should include validation study for Asian population and new proposals from Asian members through active participation in the ISO activities.

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Trends in European electromyography research about musculoskeletal disorders (MSD).

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Musculoskeletal disorders (MSD) are the most prevalent work related disorders in many countries. As they are serious occupational problems, big international projects were performed to do “evidence based research” in European Union (EU). Many research tools were developed in these projects, such as new type of surface electrode, pre amplifier and amplifier, data logger, software for analyzing EMG signal, questionnaires. Using these tools, we studied occupational MSD in forearm extensor muscle prevalent among office workers. While two subjects tapped for one hour with right index finger, we studied changes in tapping performance and registered continuously intramuscular electromyography (iEMG), surface electromyography (sEMG), tapping force and movement of the index finger. The results were following: 1) In a subject, touching time for sensor button got longer 2) During some time, there was a motor unit which activated continuously. These phenomena supported the Cinderella hypothesis which explains the mechanism of MSD caused by low-level force task.

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Single Nucleotide Polymorphisms and Inter-individual Variability in Health Effect of Chemicals

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There are many special chemicals in the workplace environment, and workers are exposed to them. Industrial compounds are usually metabolized by the catalysis of drug-metabolizing enzymes. On the other hand, many enzymes exhibit genetic polymorphisms, and workers with aberrant genes for these enzymes may show a different pattern of toxicity in response to certain compounds. We found that low-Km mitochondrial ALDH2 activity is deficient in about 30-50% Orientals, and the inherited nature of the variation is the mutant allele ALDH2*2. ALDH2 gene is the most important ones to affect alcohol's metabolic rate in body. Lack of ALDH2 activity renders the individuals vulnerable to tissue injury due to an accumulation of the highly reactive and toxic acetaldehyde during alcohol consumption. We investigated the effect of ALDH2 polymorphisms on the metabolism and toxicity of ethylene glycol monoethyl ether (EGEE), and found that genetic polymorphisms of ALDH2 affect the toxicity of EGEE in both spermatogenesis and hematopoiesis, and the ALDH2 *2 allele may also be a protective factor against damage caused by EGEE.

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Facing Challenge to Occupational Health in the 21st Century: National Strategy for Promotion of 18 Priority Research in Japan

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Abstract: The national conference in Japan entitled “Conference on Occupational Health Research Strategies in the 21st Century” was organized by the Japanese Ministry of Labour (Currently, Ministry of Health, Labour and Welfare) in the years 1998-2001, and national occupational health (OH) research agenda and strategy for the next decade was identified. A total of 50 Conference members, i.e., representatives from various fields of OH in Japan, ranked 58 comprehensive OH research topics, yielding 10-year priority research topics in Japan.

Together with the ranking by 145 extramural OH specialists, it was identified that Work stress (i.e., one of the 58 research topics) was the first priority research topic in Japan. Three other topics, i.e., Elderly workers, Women workers and maternity protection, and Mental health and quality of work and life, were the second group of priority topics; and Hazard and risk assessment and Biological effect index were the third priority group. Based on the scores for the short-term and long-term priority research topics, all 58 research topics were classified into three key research areas with 18 research priorities (National Occupational Health Research Agenda, NOHRA). Finally, eight implementation measures of the national strategy for the Japanese Government to promote OH research were introduced.

The “National Conference on Promotion of Occupational Health Research Priorities” was organized by the National Institute of Industrial Health of Japan in the years 2001-2004 in order to promote the 18 priority research introduced by the previous national conference. So far, the 4 following research priorities are found to have been most investigated in terms of the number of research workers and original papers published in the past 4 years: Work stress and mental health, Quality of working life and health promotion, Toxicity assessment of chemicals, and Risk assessment and health effect index. On the other hand, International standard and collaboration and Multiple exposure to environmental factors have been least investigated in terms of both the research workers and the original papers.

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