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National occupational health research priorities, agenda and strategy of Japan: invited report in NORA symposium 2001, USA

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An invited report on national occupational health research priorities, agenda and strategy of Japan was delivered in the NORA (National Occupational Research Agenda) Symposium 2001, USA. The third NORA Symposium was held by the US National Institute for Occupational Safety and Health (NIOSH) in Washington DC on June 27, 2001. 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 the national occupational health research agenda and strategy for the next decade in Japan was identified. A total of 50 Conference members, i.e., representatives from various fields of occupational health in Japan, ranked 58 comprehensive research topics, yielding short-term (5-year) and long-term (6-10 year) priority research topics. Overall (10-year) priority research topics were calculated by combining the short-term and long-term priority scores. Together with the ranking by 145 extramural occupational health specialists, it was identified that work stress (i.e., one of the 58 research topics) was the first overall priority research topic for the next 10 years 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 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 key research issues (National Occupational Health Research Agenda, NOHRA). Finally, eight implementation measures of national strategy for the Japanese Government to promote occupational health research were introduced.

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Evaluation of whole-body response to vibration exposure during vehicle operation by compression stress method prescribed in the proposal to ISO2631-5

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This paper concerns the evaluation of vibration exposure during vehicle operation by the stress at the spinal experimentally. The measurement of acceleration in 3-axes was made for three types of passenger cars and two types of agricultural tractors at the different surface condition. The data was sampled at 160 points/second and they were processed in accordance with the proposal to ISO/DIS 2631-5. The evaluation by the index of this proposal, the daily equivalent static compressions, were compared with the evaluation by the frequency-weighted r.m.s. acceleration, and at even the rough surface, the clear effect to the health was not indicated. From this, it is thought that more detailed investigation is necessary. It was shown that the evaluation by the compression stress is almost equivalent to evaluation by the r.m.s. acceleration. It was also shown that the equivalent compression stress can be approximately estimated from z-axis acceleration. For the reference, measurement sampling at 320Hz were also made and the data was separated into two data series, each of which was the same as sampled at 160Hz. The results calculated both series were the same so that it might be considered that the peaks value can be caught at 160Hz.

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Evaluation of whole-body vibration on comfort by category judgment method

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In this experiment, the method of Category Judgement was used. And three different spectrum, five different frequency-weighted r.m.s. acceleration and three repetition are used. Subjects judged the comfort of each stimulus assigning a category number which seemed to reflect the comfort of the whole-body vibration on the vibrator. As a result, the relationship between frequency-weighted r.m.s acceleration according to the ISO 2631-1 standard and category scale was obtained in this experiment.

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Effect of noise on vibrotactile threshold measurement in fingertips

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Proceedings of 11th Japan Group Meeting on Human Response to Vibration, Asahikawa, Hokkaido, July 23rd to 25th, pp.24-27, 2003.

The aim of the present study was to clarify the effect of noise on vibrotactile threshold measurement in fingertips. This experiment measures by making four healthy college students into a subject. The vibrotactile perception threshold measurement was carried out in two places of a general conference room (40, 50, 60 dB (A)) and an echoic room (27.5 dB(A)). A Rion AU-02A was used to measure the vibrotactile perception thresholds. The vibrotactile perception thresholds in the general conference room was increased by the increasing the noise level. Also, the vibrotactile perception thresholds in the general conference room were greater than the results in the echoic room. In the vibrotactile perception threshold measurement, it was clear that the vibrotactile perception threshold value was influenced by the noise level.

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Development of a six degree of freedom electro vibrator for human vibration experiment

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The growing importance of detrimental vibrations on mobile machinery, magnified by increasing working speed, emphasizes the need to evolve from static to dynamic design of mechanical systems. Simulators are an indispensable tool to study present-day machinery dynamics in a repeatable way, under controlled laboratory conditions. The kinematic and dynamic aspects of a shaker design become more and more complex, as modern test rigs have an increased number of degree of freedom and allow faster movements. There are very few studies investigating perception or comfort of multi-axis vibration. Data on which to base developments of standard multi-axis prediction techniques for comfort are therefore limited. To facilitate such development, further studies are required that use the same subjects, equipment and techniques to make assessments of the relative importance of single and multi-axis vibration by using multi-axis vibrator. Therefore, in this paper, the design of a six-degree-of-freedom test rig is worked out.

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Six degree of freedom electro vibrator for human responses to vibration experiment

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Proceedings of the 38th United Kingdom Conference on Human Response to Vibration, Institute of Naval Medicine, Alverstoke, Gosport, 17-19 September, pp.1-4, 2003.

The growing importance of detrimental vibrations on mobile machinery, magnified by increasing working speed, emphasizes the need to evolve from static to dynamic design of mechanical systems. Simulators are an indispensable tool to study present-day machinery dynamics in a repeatable way, under controlled laboratory conditions. The kinematic and dynamic aspects of a shaker design become more and more complex, as modern test rigs have an increased number of degree of freedom and allow faster movements. There are very few

studies investigating perception or comfort of multi-axis vibration. Data on which to base developments of standard multi-axis prediction techniques for comfort are therefore limited. To facilitate such development, further studies are required that use the same subjects, equipment and techniques to make assessments of the relative importance of single and multi-axis vibration by using multi-axis vibrator. Therefore, in this paper, the design of a six-degree-of-freedom test rig is worked out.

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Thermoregulatory characteristics and thermal loads observed during alternately repeated exposure to cold and warm environments

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Ventilation 2003, Proceedings of The 7th International Symposium on Ventilation for Contaminant Control, pp.195-200.

The objective of this study was to investigate how alternately repeated exposure to cold and warm environments affects thermal comfort, thermal sensation and associated thermoregulatory behavioral and physiological responses and to discuss a possible mechanism of the thermoregulatory characteristics observed under such thermally unsteady conditions. Ten young adult men aged 21 to 23 years, wearing only shorts, were exposed six times to a temperature of 10°C for 10 minutes, followed by 10 minutes' exposure to a temperature of 30°C. The rectal and tympanic temperatures of the subjects continued to decrease gradually during the repeated exposure to a cold environment, and even during the repeated exposure to a warm environment. The mean skin temperature decreased during each cold exposure, but recovered during each warm exposure. Thermal discomfort, cold sensation, behavioral motivation for seeking warmer conditions, and subjective shivering sensation increased rapidly during each cold exposure. Concomitantly, metabolic heat production in some subjects also increased during that period. These thermoregulatory behavioral and physiological responses significantly strengthened with the repetition of cold exposure. However, these thermoregulatory responses quickly disappeared during each warm exposure following each cold exposure, and thermal comfort and warm sensation even increased despite the progressive body core cooling. Blood pressure increased during each cold exposure, while it decreased during each warm exposure. With the repetition of warm exposure, however, the level of blood pressure tended to increase gradually. These results suggest that subjective criteria such as thermal discomfort, cold sensation, and behavioral motivations for seeking warmer conditions during repeated cold exposure are sensitive and reliable indices for estimating the progressive hypothermic states of the body and increases in cardiovascular loads. They also suggest that these subjective criteria during warm exposure periods following repeated cold exposure are not always reliable indices for monitoring these thermal loads. Furthermore, the thermoregulatory behavioral and physiological characteristics observed during alternately repeated exposures to cold and warm environments could be explained by a multiplicative interaction between skin surface and body core temperatures in the generation of thermoregulatory effector responses. These thermoregulatory characteristics may be a potential risk factor of health problems in cold work environments.

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Assessment and control of sick house syndrome at work exposure to chemicals in construction

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Exposure to chemicals related with sick house syndrome and level of hemoglobin adduct of formaldehyde among construction worker; In order to clarify the exposure levels of formaldehyde and other aldehydes and other volatile organic compounds of construction workers, personal sampling by DPNH sampler and charcoal sampler were performed to the workers in construction worksites, and hemoglobin adduct of formaldehyde in construction workers was also measured. Recent exposure levels of those chemicals in construction workers were considered to be not high, since various devices including formaldehyde-free pastes for wallpapers had been done. However, further monitoring will be necessary to prevent the incidence of sick house syndrome.

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Realization of 12-axis vibration measurement on the seat according to the ISO 2631-1 standard

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Proceedings of 11th Japan Group Meeting on Human Response to Vibration, Asahikawa, Hokkaido, July 23rd to 25th, pp.125-131, 2003.

In 1997, ISO 2631-1 (Evaluation of human exposure to whole-body vibration – Part 1: General requirement) was published. At ISO 2631-1, 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 and yaw) in the supporting seat-surface did not correspond to 3-axis seat-pickup defined by ISO 5008, 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.

¹ IMV Corp. Ltd.; ² National Institute of Industrial Health

Realization of 12-axis vibration measurement on the seat according to the ISO 2631-1 standard

Koji Yamashita¹, Setsuo Maeda²

Proceedings of the 32nd International Congress and Exposition on Noise Control Engineering, Inter-Noise2003, 2523-2528, 2003.

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. Therefore, in order to solve this problem, 6-axis seat pickup was developed. The 12-axis vibration measurement on the seat was realizable with this 6-axis seat pickup. In this research, comfort evaluation of 12-axis under an actual operating condition was performed for about various vehicles. And we report the result of this research.

¹ IMV Corp Ltd; ² National Institute of Industrial Health