Department of Environmental Health Engineering

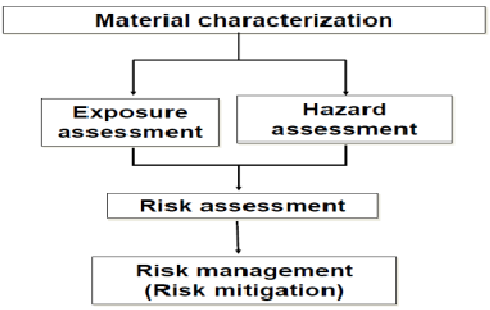
Professor: HIGASHI Hidenori, PhD
Assistant Professor: OYABU Takako, PhD

In the Department of Environmental Health Engineering, the recognition, evaluation and control of those environmental factors or stresses, arising in or from the workplace or among the citizens of the community, which may cause sickness, impaired health and wellbeing to workers, are being researched and taught;

1) to recognize the environmental factors and to understand their effect on man and his well being
2) to evaluate, on the basis of experiences and with the aid of quantitative measurement techniques, the magnitude of these stresses in terms of ability to impair man's health and wellbeing, and
3) to prescribe methods to eliminate, control or reduce such stresses when necessary to alleviate their effects.

Research topics

- Development of aerosol generation methods and examination of methods for measuring their particle size distribution and concentration, and application to development of exposure system.
- Performance evaluation of personal protective equipment and protectors.
- Comfortability assessment of work environment and infection risk assessment according to the environment.
- Physico-chemical properties of organic inhalable fine particles and hazard assessment by inhalation exposure.
- Development of aerosol sampling equipment, application to performance evaluation and environmental measurement.
- Risk assessment of particulate matter used in the work environment.
- Practical research on occupational health engineering measures in the workplace.



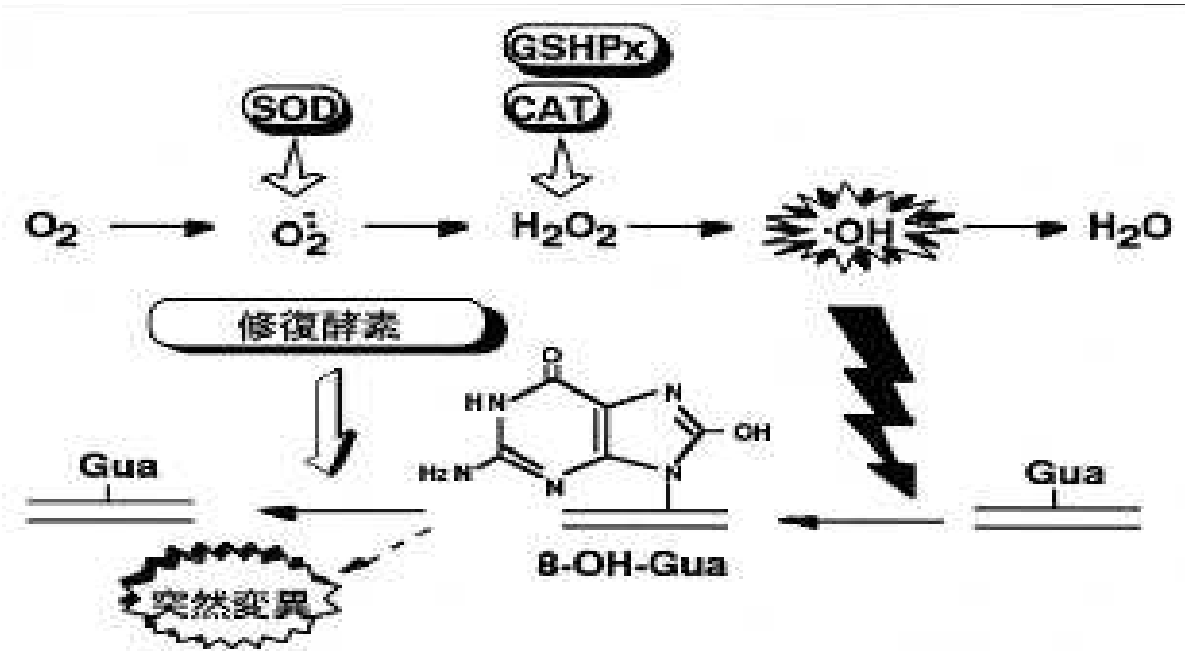
Flow sheet of risk assessment.

Department of Environmental Oncology

Professor: FUJISAWA Koichi, MD, PhD
Associate Professor: LI Yun-shan, PhD
Research Associate: KAWASAKI Yuya, PhD
Emeritus Professor: KASAI Hiroshi, PhD, KAWAI Kazuaki, PhD

The primary objective of Environmental oncology is the prevention of occupational cancer. For this purpose, 1) detection and identification of environmental mutagens and carcinogens, 2) their interaction with cellular components and 3) methodology for risk assessment of newly developed chemicals will be studied.

- Analysis of environmental mutagens
- Mechanism of oxygen radical induced carcinogenesis
- Risk assessment of chemical carcinogens by analysis of DNA adducts
- Mental stress and Oxidative stress
- Passive smoking and oxidative damage
- Antioxidants and cancer chemoprevention
- Epigenetic change and cancer
- Genetic counseling in occupational health



Hydroxyguanine production induced by reactive oxygen species and its repair

Department of Occupational Pneumology

Professor: MORIMOTO Yasuo, MD, PhD
Associate Professor: IZUMI Hiroto, MD, PhD
Research Associate: TOMONAGA Taisuke, MD, PhD
Trainees of Residency Program: KAWAI Naoki, MD

The primary concern of the Department of Occupational Pneumology is to elucidate the development and pathophysiological mechanisms of occupational and environmental lung disease.

The results of these studies are incorporated into post-graduate education and applied in the field of occupational health. Therefore, particular focuses are; 1) To introduce molecular-biomarkers into the hazard assessment system of occupational exposed particles, 2) To apply molecular-biomarkers into conventional research methods, for the purpose of preventing and detecting early effects caused by occupational exposure to particles.

Lung is one of the most important organs that have directly contact with the work environment. For this reason, factors concerning pathogenesis of occupational or work-related lung disease would be multiple. Evaluating the environmental factors including smoking is also important. Education for diagnosis of occupational lung disease has been performed.

- Hazard/Risk assessment of inhaled chemical including nanoparticles and polymeric materials
  Physiological and pathological changes have been examined through In vitro studies and in vivo studies (intratracheal instillation studies and inhalation studies) in order to examine effects of inhaled chemical including nanomaterials on human.
- Development of biomarker for estimation or speculation of cell injury induced by inhaled chemicals through analysis of cell-mediated response using molecular biological method
- Development of an predictive marker for toxicity of chemical in vitro study
  In order to find the predictive marker for pulmonary toxicity of respirable chemical, specific exosomal microRNAs present in supernatant have been analyzed using alveolar epithelial or macrophage cells exposed to respirable chemicals.
- Development of diagnosis method for occupational lung disease.
  In order to develop the objective methods for diagnosis of occupational lung disease, we analyzed the metal components of respirable chemicals between handled in workplace and in worker's lung.
- Field researches for occupational lung disease
  Epidemiological researches (case-control and cohort) have been performed in companies
- Effect of lunar regolith on human

Department of Ergonomics

Professor: EBARA Takeshi, PhD
Associate Professor: FUJIHARA Hiroaki, PhD
Postgraduate Students (Doctoral Course): MORIDERA Aiko

We believe that the main goal of Ergonomics in the field of occupational medicine is to maintain health and safety of workers through optimizing the work for human. The research focus covers a wide range of area such as work conditions, work environments, health managements and industrial managements.

It is important for workers to maintain a high quality of sleep so that they can obtain the best mental and physical performance at workplace and in daily life. Insufficient sleep and/or dyssynchrony between internal clock and external light/dark cycle acutely cause daytime sleepiness and chronically induce health problems. The daytime sleepiness could result in a reduction of the working efficiency and it might cause economic loss. Moreover, it also could be a fatal risk such as traffic accident due to their low level of vigilance. Recent report also suggested that lack of sleep might be a risk factor for chronic health problems such as metabolic syndrome and depression. It is thus important to help workers understand the importance of the sleep hygiene and to investigate how the inadequate sleep and/or inappropriate rhythm of sleep cause the chronic health problems. We established the mouse model of shift work to investigate the acute and chronic health problems in shift workers and to find their solution.

- Occupational Sleep Medicine
  - Using the shift work mouse model;
    - Investigating the difference of sleep architecture between control and shift work mouse model
    - Elucidating the acute physiological and behavioral effects of the shift work model
    - Elucidating the chronic physiological effects of the shift work mouse model
- Ergonomics research
  - To install the work assist tool to the workplace effectively;
    - Developing a guideline for installing the work assist tools to the workplace
    - Developing a standard method for the evaluation of fundamental assist tool performance
  - To assess the risk of fall in the workplace;
    - Investigating the effect of visual condition on dynamic balance during walking

Department of Radiobiology and Hygiene Management

Professor: OKAZAKI Ryuji, MD, PhD
Assistant Professor: KOHZAKI Masaoki, PhD
Occupational and environmental health basic research fellow: Duo Wang, PhD

Aim

We will be involved in comprehensive occupational health measures for radiation workers in decommissioning of nuclear power plants and medical personnel involved. Appropriate implementation of work management, work environment management, health management, and worker education are important. We will train professional occupational health personnel who can provide appropriate guidance and implementation of these in the field. We conduct research on the anxiety and education of radiation workers, develop methods for evaluating the biological effects of low-dose radiation exposure, and conduct basic research on radiation effects using cell and mouse experiments using molecular biology, biochemistry, and molecular genetics techniques. In addition, we will provide education and practical activities for disaster responders including radiation disasters and Fukushima nuclear power plant workers.

Research outlines

1. Support and research of TEPCO Fukushima nuclear power plant workers

   As the Fukushima nuclear power plant support team at the University of Occupational and Environmental Health, we continue to support workers in hygiene management and radiation education. We analyze TEPCO's health diagnosis data and conduct radiation anxiety surveys.
2. Study of the effects of low-dose radiation using mice and cultured cells

   The only scientific evaluation of low-dose radiation is the radioadaptive response. The long-term effects of low-dose radiation will be analyzed in terms of survival and cause of death. To elucidate the involvement of the p53 gene using p53 gene-modified mice maintained in our department and the carcinogenic mechanism of radiation exposure, we will conduct research by molecular biological, biochemical, and genetic methods using our own established radiation-sensitive tumor suppressor gene, RecQL4 knock-in cells. We are working to develop novel cancer drugs targeting new cancer cell characteristics for clinical application.
3. Development of personal assessment of radiation sensitivity

   The legal radiation dose limit is the collective dose determined by epidemiological surveys, so it is not strictly an evaluation of individual radiation sensitivity. We are considering a study to evaluate the radiosensitivity of individuals. A blood sample is taken and irradiated, and the most specific one is used as an indicator of the individual's radiosensitivity through various analyses.
4. Development of education policy for radiation disasters and Fukushima nuclear workers

   We hold seminars on radiation disasters for first responders and create manuals for educational methods. We are also developing an educational program to reduce the anxiety of Fukushima nuclear power plant workers.

Department of Health Policy and Management

Professor: HORIE Seichi, MD, MPH, PhD
Assistant Professor: NAGANO Chikage, MD, PhD
Trainees of Residency Program: SAKAGAMI Taku, MD, SHIMAZAKI Yu, MD,
MAEDA Kisaki, MD, KADO Kentaro, MD, TAJIMA Keiichi, MD
Postgraduate Course Students(Doctoral Course): NISHI Kento, MD, NAKAO Yumi

We aim at improving the adaptation of workers to their works by applying knowledge and technologies developed from the occupational health researches.

1) Occupational health policies

Sociological researches on legislations, ordinances, and ethics on occupational health professionals, health information and cardiovascular diseases caused by long working hours are promoted. Outcomes of these studies are summarized in websites (https://www.zsisz.or.jp/images/pdf/syokuba.pdf, http://www.oshdb.jp/).

2) Occupational medicine

Experimental researches and field researches on the prevention of heat-related illnesses, noise-induced hearing loss and musculoskeletal diseases caused by awkward postures and heavy lifting are promoted in the artificial climate room, the anechoic room, and the kinesiological analysis room. Currently investigated research topics includes the real-time monitoring of core temperature and sweating, the evaluation of cooling vests and hearing protection devices, the exploration of the best mix for biomarker for overwork. Outcomes of these studies are summarized in websites（http://www.oshdb.jp/, http://heatstroke.oshdb.jp/）. We are in charge of the secretariat of Research Committee of Society of Occupational Hearing Loss（http://www.souon.jp/）of Japan Society for Occupational Health.

Experiment in the anechoic room

Staffs and residents in 2022

Department of Mental Health

Professor: EGUCHI Hisashi, MD, MBA, PhD
Assistant professor: MAFUNE Kosuke, PhD, PSW
Research Associate: HINO Ayako, MD, PhD
Trainees of Residency Program: KIMURA Toya, TERASAKA Saki, MORITA Ryosuke
Postgraduate Students (Doctoral Course): FURUSAWA Ryutaro
Postgraduate Students (Master Course): TERAMICHI Hiroki, YASUDA Tomohiro

The ratio of workers who have perceived severe job stress reaches about 60%. The number of workers suffering from mental disorders such as depression has been increasing, and there are some long absence cases in many companies. In this situation, mental health measures become one of the most important and urgent issues in occupational health.

We aim at analyzing the mental states of Japanese workers and various job stresses from different angles and developing useful tools (assessment scales and checklists) for promoting mental health measures in the workplace. Moreover, we study the methodologies of occupational health activities using the tools.

Researches

1) Development of new tools for promoting mental health measures and interventional approaches using these tools.
   (1) Mental Health Improvement & Reinforcement Research of Recognition (MIRROR)
   (2) Mental Health Climate Scale for Workplace Invigoration (WIN)
   (3) Checklist for workplace readjustment of workers with mental disorders
   (4) Classification table of measures that can be used to support workers with various mental disorders
   (5) Guidelines for supporting workers with mental disorders in the workplace
2) Study on the effect of overtime works on the mental health of workers.
3) Intervention study for improvement of work environment
4) Trials of mental health promotion in a hospital
5) Mental health promotion for local government offices
6) Study on the mental health of nuclear emergency workers.

Fig. Tools to encourage the employer to deepen the occupational mental health

Department of Health Development

Professor: YAMATO Hiroshi, MD, PhD
Assistant Professor: JIANG Ying, PhD
Research Associate: TOMONAGA Ryo, MD
Trainees of Residency Program: YAMANE Takahiro, MD
Postgraduate Students (Doctoral Course): TOMONAGA Ryo, MD,
KUWAHARA Mayumi
Postgraduate Students (Master Course): MIKAYAMA Shirou

The purpose of our laboratory is the health promotion in workplace and in society. Regular aerobic exercise through working age of 40 years and smoking control could be the solutions for this matter.

1. Research on regular aerobic exercise (Lifestyle modification)
   (1) Effects of lifestyle and working environments modification on non-communicable diseases.
   (2) Acquirement of exercise habit in busy workers.
   (3) Effects of active rest program on the physical activity, personal relationships, mental health and presenteeism.
   (4) Lowering effect of postprandial increase in glucose levels by aerobic and resistance exercises during lunch breaks among workers.
2. Research on smoking control

   WHO Framework Convention on Tobacco Control requires to implement legislative measures to reduce exposure to secondhand tobacco smoke. We are monitoring measures against SHS in general society in Japan; implementation of the total smoking ban in medical and dental faculties, local municipal offices, and exposure level of SHS in public places and hospitality industries.

   (1) Secondhand smoke from a veranda spreading to neighboring households. J UOEH, 42, 335-338, 2020.
   (2) Cohabitation with smokers is an independent factor for worsening arterial stiffness even in smoking workers. J UOEH, 42, 251-259, 2020.
   (3) Frequency of exposure to secondhand smoke outside the home is associated with a lower FEV1/FVC in male workers regardless of smoking status. J UOEH, 41, 15-24, 2019.
   (4) Relationship between nicotine dependence and occupational injury in Japanese large-scale manufacturing enterprise. J Occup Environ Med, 60, 656-662, 2018.
   (5) Designated smoking areas in streets where outdoor smoking is banned. Kobe Journal of Medical Sciences. 59(3): 93-105, 2013.

Department of Environmental Epidemiology

Professor: FUJINO Yoshihisa
Associate Professor: ISHIMARU Tomohiro
Research Associate: OKAWARA Makoto
Postgraduate Students (Doctoral Course): IBAYASHI Koki, MIYAKE Fuyu, KONNO Yusuke, MIZUKI Kazuyoshi, YAMASHITA Satoshi, SAWAMOTO Naoya

The goal of the Department of Environmental Epidemiology is to advance the field of scientific knowledge concerning the relationship between environmental, socio economic factors and human health through epidemiological studies.
In addition to the occupational and environmental health issue, we strive to conduct epidemiological researches in a wide range of health field including health services in medical and nursing care. The department also provides broad range of statistical consulting to clinical researchers.

Research themes:

- Development and verification of assessment methods for presenteeism and work functioning impairment.
- Health Impact Assessment
- Health services in medical and nursing care
- Smart and wellness house project on housing and health
- Occupational health and safety in Asian countries (Collaboration with ILO and WHO)
- Workers' survey on social environment and health under COVID-19 pandemic (CORoNaWork project)

Department of Occupational Toxicology

Professor: UENO Susumu, MD, PhD
Research Associate: GOTO Motohide, MD, PhD
Trainees of Residency Program: ISHIZUKA Tsunetoshi, MD, HASEGAWA Wataru, MD, MIZOUE Shun, MD, SHIMOGAMA Manaki, MD

This department is an experimental laboratory that conducts basic experiments to evaluate the toxicity of industrial chemicals and to investigate the mechanisms of toxicity. On the other hand, we collect information on basic knowledge and countermeasures against chemical disasters including Natech (natural-hazard triggered technological accidents) and chemical terrorism, which is then provided to medical personnel and first responders.

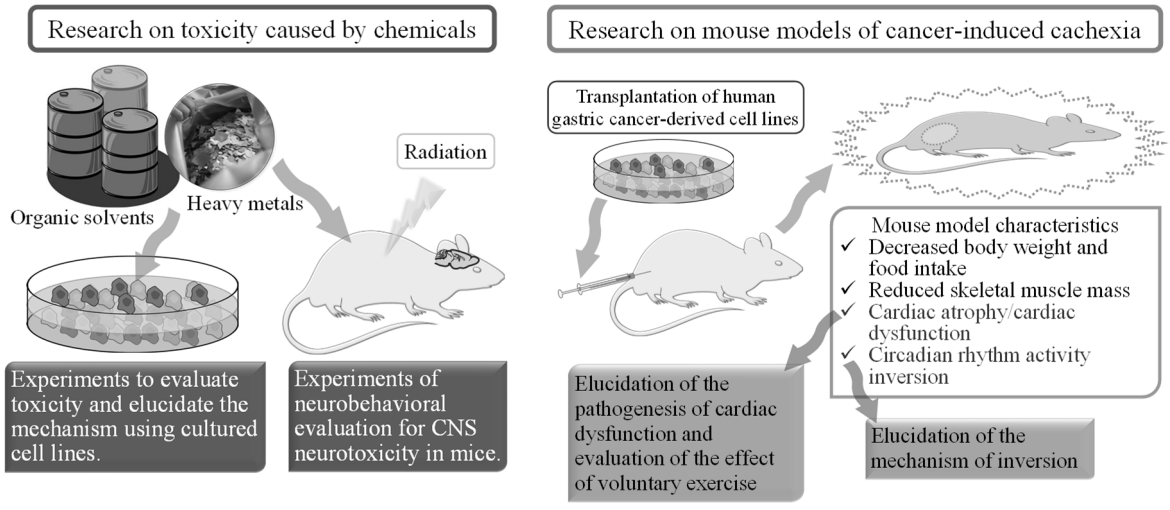
Some of the topics are:

- Evaluation of toxicity induced by chemicals using in vitro/in vivo system.

  Using primary cultured cells and cell lines, toxicity induced by chemicals are evaluated and the molecular mechanisms are elucidated in vitro. Additionally, the CNS neurotoxicity caused by chemical exposure is evaluated by the neurobehavioral phenotype of rats and mice.
- Evaluation of the effect of voluntary exercise on cancer cachexia-induced cardiac dysfunction.

  Systemic functional deterioration due to the progress of cancer is major obstacles to achieving treatment and work balance in cancer patients. Therefore, we have aimed to develop an exercise program that can be carried out even in the workplace for the prevention and improvement of deterioration in cancer patients. As translational research, we investigate the effect of voluntary exercise on cachexia-induced cardiac dysfunction using mouse model of cancer cachexia.
- Establishment of a mouse model of shift-work type circadian rhythm sleep disorder and elucidation of its mechanism.

  We have found that the mouse model of cancer cachexia mentioned above shows an inversion of the circadian rhythm of activity - higher locomotor activity appears in the light phase rather than in the dark period. Therefore, we have established this mouse as a model for shift-work type circadian rhythm sleep disorder and have begun to elucidate the mechanism of this inversion.



Department of Work Systems and Health

Professor: OGAMI Akira, MD, PhD
Research Associate: ANDO Hajime, MD., MOH, PhD.
Trainees of Residency Program: TOGO Hiroshi, MD, NASU Ayako, MD, YAMAGUCHI Daiki, MD, YOSHIMOTO Yasuro, MD
Postgraduate Students (Doctoral Course): MICHII Satoshi, SEKOGUCHI Shingo, TOMONAGA Kenta
Postgraduate Students (Master Course): NAGAMINE Hiroko, MIYOSHI Tsuyoshi

The primary concern of the Department of Work Systems and Health (WSH) is not only to elucidate the mechanisms of disease, concentrating on detailed examination of the process involved, resulted from inadequate work conditions, but also to offer an effective method for improving work systems by analyzing environmental and human factors leading to disease. The primary objective of this department is to do research and to educate using comprehensive viewpoints pertinent to the architecture of human's lifetime work and health.

- Epidemiological research on exposure and human health effects of particulate matters, chemical substances.
- Research on organizational Occupational Health Service (OHS) Systems
- Research and development for countermeasures to recent work style and overwork
- Development of system and tools for education and training of occupational health professionals
- How to provide occupational health services to dispersed work branches
- Epidemiological research on exposure and human health effects of radiation workers
- Research for data input standardization such as special health checkups and development of data utilization tools

In addition to above, WSH organizes collaboration study on current OHS issues with registered occupational health physicians and professionals, especially the graduates of the Residency Program in Occupational Health.

Department of Occupational Health Practice and Management

Professor: MORI Koji. MD, PhD

Associate Professor: NAGATA Tomohisa. MD, PhD

Research Associate: ODAGAMI Kiminori. MD, Nuri Purwito Adi

Trainees of Residency Program: MATSUYAMA Akiko. MD, MATSUYAMA Kazufumi. MD, MORIYA Kenta. MD, INAGAKI Mizuho. MD, FUJIWARA Hideki. MD, YAMA Asumi. MD, YAMAMOTO Ayaka. MD

Postgraduate Students (Doctoral Course): MORI Takahiro. MD, KAWASUMI Mika. MD, INOUE Shunsuke. MD, SAKAI Kohsuke. MD

Department of Occupational Health Practice and Management (OH Practice and Management) was established in April 2012. We aim at deepening the relationships between corporate management and OH activities, and collecting evidences and developing programs to meet changes in OH needs due to social and business environment. We take marketing approach and management system as the base of the program development and delivery.

Our research area was classified into four categories as follows,

1) Development of OH organization and resources that can provide high quality services,
2) Development of procedures and programs of OH activities,
3) Development of advanced OH activities in correspondence with changes in business environment and practices,
4) Evaluation and accountability of OH activities from management viewpoints.

The current main topic of the researches are as follows,

+ Health and productivity management / Health investment (Investigating impact of workers' health on business and developing intervention programs that contribute to both health and business, et al)

+ Developing a global implementation program of occupational safety and health management system in the corporations operating business globally.

+ Research on Disaster Occupational Health

+ Developing effective role models of managing occupational physicians in corporate wide occupational health management system

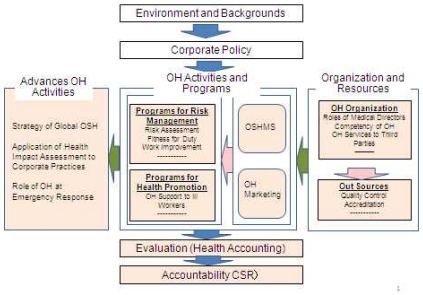


Fig. Research area of OH Practice and Management

Disaster Occupational Health Center

Professor: TATEISHI Seiichiro, MD, PhD
Research Associate: IGARASHI Yu, MD

The main research theme of the center is to minimize the health effects of workers during disasters, such as natural disasters, industrial accidents, and pandemics. The mission of the center is to conduct research and provide practical support for unexpected health effects during the entire process from disaster response to recovery activities. In order to prepare for catastrophic disasters in the future, such as the Nankai megathrust earthquake and earthquake directly beneath the capital, we have formed a disaster occupational health assistance team consisting mainly of graduates of the University of Occupational and Environmental Health, and are working to improve the team's capabilities through regular training sessions.

Research contents

1) Health effects on workers at the Fukushima Daiichi Nuclear Power Plant
2) Health effects on workers of the Kumamoto earthquake
3) Health effects on workers of the heavy rain disaster in the Hitoyoshi Kuma area
4) Development of manual for occupational health professionals for disasters
5) Research on corporate business continuity
6) Support for business continuity related to COVID-19 (NHK, Kitakyushu City Office)