

Institute of Clinical Medicine and Research

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General Summary

The Institute of Clinical Medicine and Research conducts research with a focus on clinical applications. In 2008, the Institute conducted medical research to clarify the etiology, diagnosis, and treatment of intractable diseases. Therefore, we have continued to perform research on the relationship between oxidative stress and disease, including an analysis of the effect of oxidative stress on hepatocarcinogenesis, the role of reactive oxygen species (ROS) in physiological and pathological conditions, and the usefulness of antioxidant agents. We also have performed research to develop the release of anticancer drugs with a magnetically guided nanostructure. Additionally, we have performed studies to define the pathological conditions underlying hyperlipidemia and heart disease. Microbiology has also been a part of our work. The DNA diagnosis of mycosis was performed, and the use of the polymerase chain reaction for rapid, simple, and lower cost testing for epidemiological studies was developed.

Research Activities

Liver disease and oxidative stress

1. Gene expression profiling analysis for oxidative stress-induced liver carcinogenesis
Our group investigated how the continuous exposure to ROS produced in oxidation-reduction (redox) reactions would affect carcinogenesis in the setting of chronic liver damage, using an animal model with naturally occurring and oxidative stress—induced hepatotumorigenesis. On the basis of our experiments, we have narrowed down numerous candidates to 2 signatures. Our gene expression profiling data have been uploaded to the National Center for Biotechnology Information Gene Expression Omnibus website.

2. Development of a novel antioxidant agent

We have verified the antioxidant activity of lactoferrin and proposed its mechanism of antioxidant action. We are attempting to develop a novel type of pegylated lactoferrin and apply it to clinical practice.

3. Analysis of factors contributing to treatment outcome in chronic hepatitis C

To develop more rational and effective treatments for chronic hepatitis C, we are improving antiviral treatment regimens and novel agents by analyzing viral factors, such as kinetics, and host-related factors in cooperation with the Division of Gastroenterology and Hepatology, Kashiwa Hospital.

Development of drug delivery systems

The aim of our research is to develop anticancer drug release and magnetically guided nanostructures. To delivery sufficient amounts of therapeutic agents to the interior of deep tumor lesions with minimal drug doses, the combined use of magnetic nanostructures and transplantable magnets is now being developed. We have devised a new self-assembled nanoparticle formulation that can magnetically deliver and silence genes in cells and tumor tissues (Nature Nanotechnology). This work has been supported by an Industrial Technology Research Grant, Program 08C46049a, from the New Energy and Industrial Technology Development Organization of Japan in 2008, by the Futaba Electronics Memorial Foundation in 2008, by the Takeda Science Foundation in 2007, and by the Tsuchiya Foundation in 2006.

Clinical microbiology

The DNA diagnosis of mycosis was performed with a morphological base study to assist the Microbiology section of the Central Laboratory and the Rhinosinusitis division of the Department of Otolaryngology. A rapid, simple, and lower-cost test based on the polymerase chain reaction for epidemiological study was developed to replace pulse field gel electrophoresis.

Infectious waste treatment of zoonoses in an experimental animal laboratory was investigated with observation and questionnaires. Guidelines for H1N1 influenza virus waste management were researched with the Ministry of the Environment.

Induction of follicular regression by photodynamic therapy

Polycystic ovary is a severe ovarian factor in infertility. Accumulation of follicles without ovulation is peculiarity of polycystic ovary. On the other hand, photodynamic therapy is a physiotherapy that causes cell death through a photosensitizer excited by laser light of a specific wavelength. Photodynamic therapy is used to treat several kinds of cancer. We have found that the photosensitizer accumulates in ovarian follicles. Using this characteristic of the photosensitizer, we examined the induction of follicular regression by photodynamic therapy.

Publications

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