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***H. pylori* under Spotlight as a Causal Bacterium of Gastric Cancer**

Helicobacter pylori (*H. pylori*), which has been known to be involved in the pathogenesis of gastritis, gastric ulcers, and duodenal ulcers, has recently been attracting attention as a cause of gastric cancer. Associate Professor Hidekazu Suzuki, Division of Gastroenterology & Hepatology, School of Medicine, Keio University, who published his research findings in the American medical journal *Cell Host and Microbe*, gave a lecture on this topic at the media seminar.

Looking for the toxin produced by *H. pylori*

Twenty years ago, the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) recognized *H. pylori* as the most potent carcinogen from epidemiological studies on gastric cancer. In a Japanese experiment using gerbils, animals developed gastric cancer about a year and a half after being infected by *H. Pylori*. Recently published study results demonstrated that people infected by *H. Pylori* were more likely to develop gastric cancer.

The molecular mechanism of the onset of gastric cancer has remained unknown, although a strong causal relationship between *H. Pylori* infection and gastric cancer has been suggested, as mentioned above. Therefore, our research team decided to study how the cancer protein CagA, which is produced by *H. Pylori*, behaves when it is injected into cancer stem cells.

Bad bacteria are those that do not produce vacuolating toxins

First, we studied the stability of CagA in cultured gastric mucosal cells that were infected by *H. Pylori* and found that CagA decreased over time. Even if CagA is injected by *H. Pylori*, it is eliminated by the proteolytic system (autophagy) within cells.

H. Pylori produces the vacuolating toxin VacA, which forms vacuoles within cells, in addition to CagA. We found that this VacA induced autophagy. This CagA-degrading autophagy did not occur, however, in CD44v9-expressing gastric cancer cells, which have the properties of cancer stem cells.

Why does it take several decades from *H. Pylori* infection to the onset of gastric cancer? Why do only some infected people develop gastric cancer? One of the possible reasons for these questions is that *H. Pylori* must meet cells that have the properties of gastric cancer stem cells, not normal gastric cells. From these findings, we considered that in order to evaluate the risk of onset or relapse of gastric cancer associated with *H. Pylori* infection, it was meaningful to track the expression of the cancer marker CD44v9.

Approval of *H. Pylori* eradication therapy for gastritis

Among Japanese people, gastric cancer is very common and the second leading cause of cancer deaths. In addition to gastric cancer, there are also a number of other gastric diseases such as various types of gastritis and peptic ulcers. In our hospital, we not only treat gastric diseases by detecting the presence of gastric or duodenal ulcers using endoscopes (gastric cameras), but we also try to predict and prevent future gastric diseases from a long-term perspective.

In order to predict gastric diseases, testing for *H. Pylori* infection is essential. Last February, *H. Pylori* eradication therapy for *H. Pylori*-related gastritis (*H. Pylori*-infected gastritis) was covered by insurance. This is also expected to contribute to the prevention of gastric cancer.

** This is a summary of the lecture by Dr. Suzuki, edited by the editorial desk.*



Dr. Hidekazu Suzuki
Associate Professor, Division of Gastroenterology & Hepatology,
Department of Internal Medicine, Keio University
Senior researcher, Medical-Pharmaceutical Gastroenterological
Disease Research Laboratory

Dr. Suzuki graduated from the School of Medicine, Keio University in 1989. He earned his PhD at the Graduate School of Medicine, Keio University in 1993, he became a senior resident (internal medicine) at Keio University Hospital. After assuming the positions of researcher at University of California, San Diego, and research associate in the Department of Internal Medicine (gastroenterological medicine) at Keio University, he was appointed as a full-time lecturer in 2003. He was then appointed as chief physician in the Department of Gastroenterology, Kitasato University Kitasato Institute Hospital in 2005, and took up his current position in 2011.

What is Necessary for the Development of the Medical Device Industry?

~Proposal to Japan Based on Lessons Learned from Successful Examples in the U.S. (Part 2) ~

In the previous issue, I suggested how to develop and make use of venture companies, which are small and flexible. The cooperation of medical professionals is necessary for solving problems. In order for the brain to generate new ideas, it is efficient to brainstorm with several people. And finally, at the stage where the eggs should start hatching, we should expect large companies to step in with their advice.

Generation of ideas through cooperation of medical professionals

In the development of innovative medical devices, generation of ideas is positioned on the most upstream side of the process and is considered to be most important. Without new ideas, nothing can start. In order to generate ideas for medical devices, it is important to determine unmet needs, or what people need in clinical settings, and come up with things that can meet such needs. Without this, truly useful medical devices will not be born. It is therefore important to develop medical devices that can solve problems.

In order to realize this approach, cooperation with medical professionals is most essential. However, it can be difficult depending on various circumstances. Even if needs are determined, this is only one part of the process before coming up with ideas. Devising possible solutions that can meet needs is the next and most important step, and such solutions will produce intellectual property.

You cannot come up with creative ideas on your own. It is important to brainstorm effectively with other people. It is desirable if you have learned how to brainstorm in school, but it is also possible to learn after you start working. You should never give up, because it is never too late.

Incubation companies are highly useful

While the generation of ideas is called innovation, the embodiment, or commercialization of ideas is called incubation. The subsequent production, distribution, and management process are called operations. At this stage of operations, most of the business can be entrusted to large companies, or venture companies themselves can be listed on stock exchanges.

In Silicon Valley, it has been financially difficult for venture companies to complete the whole process alone since the collapse of Lehman Brothers. Therefore, they often use the style of incubation companies, in which several venture companies come under the same umbrella for joint development until they can become fully independent.

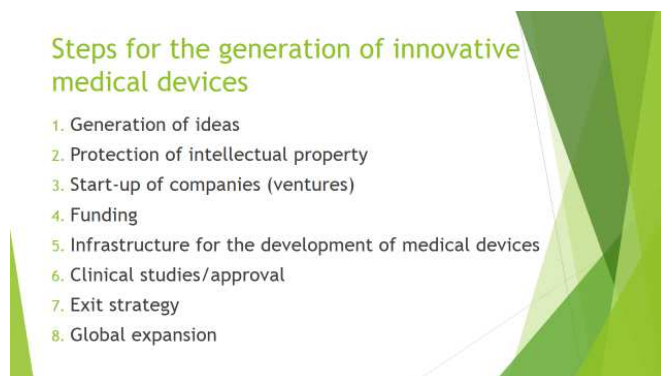
The advantages of incubation companies include the sharing of infrastructure, but the most important advantage might be the presence of experienced mentors (advisors). In the development led by venture capital (VC), VC itself often plays the role of mentor, but its point of view is often limited to business aspects. In contrast, engineers and medical

professionals as well as business people are often available as mentors in incubation companies, and they provide a wide variety of instructions at various stages of development. This mentorship from successful people not only increases the probability of success for inexperienced young challengers, but it also incubates people by cultivating young entrepreneurs who become important human resources in the medical device industry.

The best exit is acquisition by large companies

Venture companies without an exit will fail sooner or later, and for Japanese venture medical device companies, acquisition is the most promising goal for exit. However, since the number of large medical device companies is limited in Japan, venture companies that do not have an exit strategy from the initial launch of business will drop out before they can succeed.

There must be many difficult obstacles to overcome in the development of medical devices in Japan. However, the Japanese government has already steered itself toward the advancement of the medical device industry. As a physician who made a large transition into the medical device industry and also as a Japanese citizen, I would like to swear to the people who died in the Great East Japan Earthquake that I will commit the rest of my life to this theme.



Dr. Fumiaki Ikeno
Senior Research Associate, Division of Cardiovascular Medicine,
Stanford University
Guest Associate Professor, Department of Cardiology, School of
Medicine, Osaka University

Dr. Ikeno graduated from Jichi Medical University in 1992, and became an internal medicine resident at Shizuoka General Hospital. After working for the cardiovascular department of Yaizu City Hospital, he served as the chief of the Division of Health and Welfare, Department of Health and Welfare, Shizuoka Prefectural Government, and then as the chief doctor of internal medicine at Sakuma Hospital (Hamamatsu City). He assumed the position of research associate in the Division of Cardiovascular Medicine, Stanford University in 2001, and was appointed to his current post of the senior research associate at the same division in 2004.

Patient's Voice

Mutual Support Among Patients Through *Kodou*



By Kinzo Kobayashi
President, Seiryō Heart Association

Seiryō Heart Association was established more than 40 years ago in July 1971, to support patients who have undergone or will undergo heart surgery. Since then, the association has continuously issued its monthly magazine *Kodou* (20 pages in each issue) and actively offered telephone counseling and other services. It has recently published the 505th issue of *Kodou*, providing a place that patients with cardiovascular disease across Japan can rely on.

The association was founded when the new Department of Thoracic Surgery was established in the surgical division of Tohoku University Hospital. The name of the department was later changed to the promising-sounding Department of Cardiovascular Surgery. Non-members as well as members of the association participate in the health seminar entitled “Patients Association for Cardiovascular Diseases,” which is held every year in the large lecture hall in the training building at Tohoku University Hospital. In the Q&A session or health consultation after the lecture, the audience asks questions seriously, and lecturers answer each of these questions in a respectful manner.

Kodou has a regular column, “Medical Lecture,” which is written by physicians in the Department of Cardiovascular Surgery at Tohoku University. Recently, articles entitled “Aortic Aneurysm and Antihypertensive Drugs,” “Aortic Stenosis,” “Idiopathic Infantile Mitral Valve Stenosis/Rupture,” “Teamwork in Cardiac Surgery,” and “Hybrid Operation Room” received a lot of responses from our subscribers.

The association also cooperates in the prevention, treatment, and research of cardiovascular diseases. It also aims to deepen the general public’s understanding about cardiovascular diseases, encourage patients who have undergone or will undergo surgery, solve various problems of children and adults with heart disease, and contribute to the improvement of health and welfare.

The association, which is based in Sendai City, has been making efforts to host health promotion seminars in the area around Sendai City. However, seminars have been suspended in Minamisanrikucho (Shizugawa) and Ishinomaki City, which were devastated by the Great East Japan Earthquake. Nevertheless, we continue to host our seminars in Marumori-machi in the south of Miyagi Prefecture, which is located next to Soma City, Fukushima Prefecture. In the most recent seminar entitled “Know More about Hypertension,” the audience had a wide range of questions, from the basics of measuring blood pressure to the correct method of taking prescribed medicine. Attendees were pleased by the seminar, saying that it was very helpful in daily life.

Kodou asks for comments from our members, which trigger active discussions on topics such as clinical course after operation and related questions. It also reports on the progress of fund-raising activities for patients who wish to receive heart transplants in the United States. I appreciate the preciousness of mutual support among our members every day.

Medical Journalist Viewpoint Catheter Market in Japan – The History, Present, and Future of the Catheter Industry



By Mr. Satoru Hashimoto
Tcross Co., Ltd.
Medical journalist

Nearly 40 years have passed since the first coronary intervention in the world was performed by Gruentzig in Zurich, Switzerland, in 1977. After this treatment method was introduced to Japan in the 1980s, it spread all over the country in a short period and grew into a 120 billion yen market in 2011. At the early stage of introduction, foreign-affiliated companies competed in this market, but after the Japanese medical device company Terumo Corporation entered the market, many other Japanese companies also started competing, aiming to develop products to meet the needs of Japanese patients and physicians. Because of the aging of the society and westernization of diets, the number of patients with vascular disease continued to increase, and the market kept growing without any major impact from the collapse of the bubble economy. However, the healthcare industry could not avoid being affected by the economic stagnation in Europe and the United States, triggered by the collapse of Lehman Brothers. During this period, companies in Europe and the United States were repeatedly reorganized, and resources started to be focused on the development of innovative devices.

Only physicians can offer treatment using medical devices. Basic research and engineering materials are useless if they do not meet clinical needs, so the cooperation among physicians is necessary for the development and improvement of medical devices. Japanese operators are known to use delicate techniques, but demands from physicians are intuitive. Demands such as “feeling powerfully drawn to the inside” and “rough feeling conveyed from the tip,” which are difficult even for Japanese engineers to understand, are very difficult to translate into English and to explain these nuances to engineers in foreign-affiliated companies. In order to understand such abstract senses, it is necessary to continuously send engineers to clinical settings until they can understand the physician’s meanings and are able to interpret it into a drawing for development. This kind of relationship with operators (physicians) is the strength of Japanese companies.

As the insurance reimbursement price has largely decreased and the process of clinical development to authorization is time-consuming in Japan, the Japanese market has become less attractive for foreign-affiliated companies compared to the past. However, global clinical studies have recently become common, and as a result, the Zilver PTX drug-eluting stent was authorized in Japan before the United States. This trend will further accelerate in the future, and more medical devices developed by foreign-affiliated companies will be authorized in Japan ahead of the original country. Therefore, it will be important to build cooperative relationships with physicians who have sufficient language skills and international sense to communicate with foreign physicians on an equal basis, rather than those who can provide beneficial opinions on the development and improvement of medical devices.

In order to succeed in the Japanese market in the future, Japanese companies will need to develop devices that are required for more delicate procedures, and foreign-affiliated companies will need to create breakthrough devices that will change therapeutic value in the market in a rapid and continuous manner.

AMDD Held Media Seminars with Two Related Organizations

The American Medical Devices and Diagnostics Manufacturers' Association (AMDD) held joint media seminars with other organizations last April and June.

The first seminar, entitled “Clinical Practice for *Helicobacter Pylori*-Infected Gastritis – Eradicate *Helicobacter Pylori* from the Japanese Archipelago,” was jointly held with the Japan Association of Clinical Reagents Industries (JACRI) on April 24.

First, Mr. Toshiaki Goto, Manager of Product Business Planning, Diagnostics Division, Otsuka Pharmaceutical Co., Ltd. talked about the diagnostic method for *Helicobacter pylori* (*H. Pylori*) and explained that the diagnosis of infection before *H. Pylori* eradication therapy was strictly performed by one or two of the following six tests: rapid urease test, microscopy, culture method, antibody test, urea breath test, and stool antigen test. Next, Associate Professor Hidekazu Suzuki, Division of Gastroenterology & Hepatology, School of Medicine, Keio University, explained the detailed results of the most recent study conducted by his gastroenterological disease research team in a lecture entitled “Clinical Practice for *Helicobacter Pylori*-Infected Gastritis” (*see summary of his lecture on p. 1*).

The second media seminar, entitled “Current Situation of Sudden Cardiac Death and Its Prevention,” was held jointly with Japan Arrhythmia Device Industry Association (JADIA) on June 24. Sudden cardiac death refers to heart-related death associated with loss of consciousness that occurs within one hour after the onset. Sudden cardiac death occurs even in people without underlying cardiac disease, and the mechanism or time of onset cannot be predicted.

Approximately 350,000 sudden cardiac deaths occur annually in the United States. In Japan, the number of sudden cardiac deaths has been increasing in recent years and exceeded 70,000 per year two years ago. Sudden cardiac death is also attracting attention from a social perspective, because it frequently occurs in people in their 40s or 50s, in the prime of their careers. In most cases, the direct cause is arrhythmia, called ventricular fibrillation, which is a heart disease that is preventable with appropriate treatment.

In this media seminar, Professor Takashi Nitta, Department of Cardiovascular Surgery, Nippon Medical School, talked about the topics “Current Situation of Sudden Cardiac Death in Japan” and “Prevention of Sudden Cardiac Death,” while Professor Takanori Ikeda, Department of Cardiovascular Medicine, Faculty of Medicine, Toho University, talked about the topic “Cause of Sudden Cardiac Death and Its Prediction/Prevention” (*see summary of their lectures on p. 10-14*).

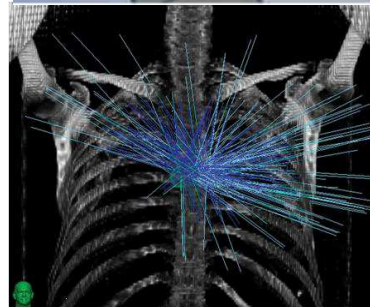
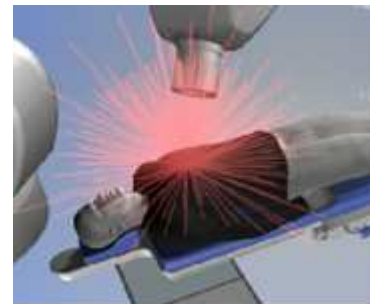
The Value of Medical Technology (Capital Equipment)

Radiotherapy Device Controlled by Robot

Radiotherapy has a long history. An example of the application of radiation to treatment was published in 1896, which is the year after the discovery of the X-ray. Information technology has enabled high-precision treatment that can deliver high radiation doses to cancer, and new models have consistently been developed even though radiotherapy devices are large in size. Currently, radiotherapy is applied to different sites for various purposes, ranging from palliative care to radical cure in combination with surgery or chemotherapy.

While a new technology called particle beam therapy has come under the spotlight, a new robot-based treatment method was developed with an X-ray for which operation techniques have been accumulated. An irradiation port that is located at the tip of the robot arm captures the treatment target stereographically in a 360-degree view, and treats the target with 100 to 150 beams selected from 4,000 or more options.

It is ideal to treat cancer at an early stage with less burden, which can be detected through the advancement of diagnostic technology. Robot-controlled treatment devices can automatically detect, track, and relocate the target and deliver radiation while avoiding the surrounding vital organs. This might enable treatment for lung cancer that moves with respiratory motion and patients that have difficulties in being treated by surgery.



Irradiation by a
robot-controlled device

(Takako Takeda, Accuray Japan K.K.)

AMDD Participated in the Summer Vacation Event “Children’s Day” in Kasumigaseki

The American Medical Devices and Diagnostics Manufacturers’ Association (AMDD) participated in Children’s Day, which was held in Kasumigaseki on August 7-8. This event, which is organized every year by the Ministry of Education, Culture, Sports, Science and Technology and other ministries in Kasumigaseki, is designed to provide children with an opportunity to learn about what the ministries in Kasumigaseki do.



Many children on summer vacation and their parents visited the event held at the Ministry of Health, Labour and Welfare. AMDD was a part of the corner called “Useful Devices and Machines that Save Lives,” and set up a booth for children to touch medical devices with their hands. Once again this year again, devices and machines that people cannot usually see – such as a device to operate the abdomen using a camera, technique to remove stones deposited in organs, machine to check functions of the heart, and a technique to cure abnormalities in bones – gained popularity among visitors.

In addition to the AMDD, there was also cooperation from member companies of the Medical Equipment Committee of the European Business Council and the Japan Federation of Medical Devices Associations, and many children were able to experience handling various medical devices with curiosity.

How to Prevent Sudden Cardiac Death, Which is Increasing Year by Year

The media seminar entitled “Current Situation of Sudden Cardiac Death and Its Prevention,” was held jointly by the Japan Arrhythmia Device Industry Association (JADIA) and the American Medical Devices and Diagnostics Manufacturers’ Association (AMDD) last June. The lectures given by Professor Takashi Nitta and Professor Takanori Ikeda in this seminar are summarized in this article.

196 sudden cardiac deaths occur every day in Japan

Cardiac deaths are increasing faster than cancer deaths

At the beginning of the 20th century, the leading causes of death among Japanese people were tuberculosis and gastrointestinal diseases. The ranking of the cause of death has gradually changed since then, and in recent years, cancer remains the leading cause of death because of the aging of the society, with an increasing rate of 17% over the past 10 years. Cardiac disease is the second leading cause of death, but the increasing rate of the number of deaths from cardiac disease is 27%, which is remarkable.

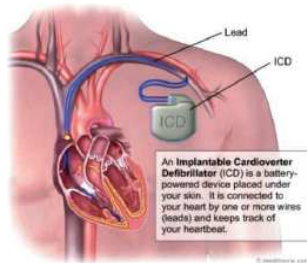
Sudden death refers to death that occurs within 24 hours after the onset of symptoms, which accounts for 12% of all deaths. Cardiac arrest due to myocardial infarction, arrhythmia, myocardial disease, etc. is called sudden cardiac death, which accounts for 74% of all sudden deaths. Two years ago, the number of sudden cardiac deaths reached 71,660, or 196 per day. These numbers are much larger than those of suicides or traffic accidents, but the government has not taken any effective countermeasures. Sudden cardiac death is considered to have a huge social and economic impact, because it frequently occurs in men younger than 65 years old, in the prime of their careers.

Public access defibrillation (PA) is necessary for saving lives

In Japan, automated external defibrillators (AEDs) have started to be rapidly installed at various places since 2004 to reduce the number of sudden cardiac deaths. The density of AED installations has a large impact on the saving of lives. For example, if there are four AEDs per square kilometer, the time required to reach an AED is two minutes, and if there is one or less AED per square kilometer, the time required to reach an AED is four minutes or more. Today, we can use smartphone applications or other tools to check where AEDs are located. If you wait for the arrival of emergency assistance and do not use an AED, the one month survival rate is less than 14%. If you immediately use an AED, this increases to 30%.

AEDs are effective only when there is someone (a bystander) around the person who collapsed. It is very important that average people can reach an AED and use it for the person who collapsed. In consideration of this, the term “PAD” has been frequently used in recent years. However, the annual frequency of AED use by general people is 583 in 2009. According to the rough estimation based on the number of sudden cardiac deaths in Japan in 2011, it is about 600 to 700. If it is assumed that an AED was used for people who suffered sudden cardiac death before they died, the rate of AED use is only 1%, and

the rest of the people died without the use of an AED. Even patients who were brought to the hospital might suffer damage to the brain or to other organs if it takes time to perform defibrillation or other procedures. It is estimated that only about 5% of hospitalized patients can successfully return to society after one month.



Implantable cardioverter-defibrillator (ICD)

Avoidance using implantable cardioverter-defibrillators (ICDs)

Since PAD using AEDs has limitations, sudden cardiac death should be prevented. Primary prevention is to determine the risk of sudden cardiac death by various examinations and take preventive measures, while secondary prevention is to take measures in order to avoid the second occurrence of symptoms for people who have already had the symptoms before. In the United States, implantable cardioverter-defibrillators (ICDs) (*see figure*) are often used as effective medical devices for primary prevention.

An ICD is implanted in the upper part of the chest, and a thin electrode (lead) is inserted in the heart through the vein and connected to the main body. It continuously monitors your pulse, and if any danger is detected, it automatically produces an electric shock and normalizes the pulse. It is just like a bystander who keeps an eye on you, inside your body. However, the number of ICDs implanted per unit population in Japan is about 10% of that in the United States. There is also a regional difference in the rate of ICD use in Japan.

Furthermore, the prognosis of patients who use an ICD for primary prevention in Japan is worse than that in the United States. This suggests that in Japan, ICDs might be used after symptoms worsen. There might not be accurate understanding about the importance of primary prevention – not just among the general public, but also physicians. As explained by Professor Ikeda, the risk of sudden cardiac death can be diagnosed by various methods.

Finally, I would like to recommend people with impaired cardiac function or an abnormal electrocardiogram to talk to a physician specializing in arrhythmia.

Last year, the Japanese Heart Rhythm Society and The Japanese Society of Electrocardiology jointly set up a qualification system to certify physicians specializing in arrhythmia with a very difficult examination. There are still only 430 arrhythmia specialists in Japan, but they will give a diagnosis about procedures including implantation of an ICD.

** This is a summary of the lecture by Dr. Nitta, edited by the editorial desk.*



Dr. Takashi Nitta
 Professor, Department of Cardiovascular Surgery, Nippon Medical School

Dr. Nitta graduated from Nippon Medical School in 1981. He started training at Sakakibara Memorial Hospital in 1987. He studied abroad at Washington University in St. Louis, Missouri, twice from 1991 to 1997. He assumed the positions of lecturer and assistant professor at Nippon Medical School in 1998, and was appointed to his current post in 2006. He is a specialist in arrhythmia surgery.

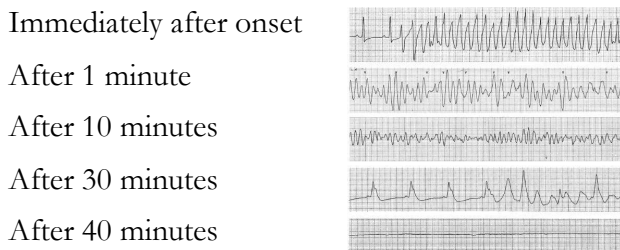
Toward an Era When Sudden Cardiac Death Will Be Predictable

Ventricular arrhythmia accounts for 80% of all causes

Sudden cardiac death is defined as death that occurs within 24 hours after the loss of consciousness. Most patients do not have time to visit a hospital, however, because death often occurs within one hour after the loss of consciousness.

What is the direct cause of sudden cardiac death? Data on sudden cardiac death was incidentally recorded in patients with a Holter monitor, which can record electrocardiograms for 24 consecutive hours. According to these data, 62% had ventricular tachycardia and 13% had a special type of ventricular tachycardia called torsade de pointes. All of these patients ultimately died from ventricular fibrillation, and another 8% of the patients only had ventricular fibrillation. In total, 82% of patients died from ventricular arrhythmia.

The ventricle occupies the lower half of the heart and sends blood from the heart. The left ventricle also sends blood to the brain. If this part is fibrillated and starts shaking, the blood delivery capacity is weakened, the brain develops the state of anemia, and consciousness is lost in about 10 seconds. The time course of electrocardiogram in sudden cardiac death is shown in the figure below. Again, these electrocardiograms were accidentally recorded in a hospitalized patient under continuous electrocardiographic monitoring who developed fibrillation during the night and then died.



Time course of electrocardiogram in a patient who suffered sudden cardiac death

The first several minutes after the loss of consciousness are important

The top figure is the electrocardiogram recorded immediately after onset. High jagged waves appeared, consciousness was lost shortly after 10 seconds, and brain death started in about 30 seconds. After a short time, the heart became unable to send blood, the amplitude of waves became small in 10 minutes, and no blood was delivered to the brain. In other words, if treatment is not started within the first several minutes after the loss of consciousness, the patient might be in extreme danger, and even if the disease is treated, the patient could possibly be in a vegetative state.

In the atrium that occupies the upper half of the heart, an arrhythmia called atrial fibrillation occurs. Former Yomiuri Giants manager Nagashima, soccer manager Osim, and Prime Minister Obuchi collapsed from a cerebral embolism, which is caused by the blockage of small blood vessels in the brain from blood clots formed by atrial fibrillation. Atrial fibrillation is also treatable. There are various types of arrhythmia, but premature atrial contraction and atrial tachycardia do not need to be treated in most cases.

ICDs are recommended for high risk patients

The first method to stop ventricular fibrillation is the intravenous bolus injection of the antiarrhythmic amiodarone. Amiodarone is only effective, however, if it is intravenously injected soon after the loss of consciousness. The drug was proven to be effective in Japanese people and was recently covered by insurance in Japan, although it has a long history of use in emergency settings in Europe and the United States. Unfortunately, the drug is useful only for hospitalized patients or in emergency outpatient units.

According to the data from the Fire and Disaster Management Agency of the Ministry of Internal Affairs and Communications, which manages emergency medical care settings, sudden death occurs much more frequently at home than in public spaces. It might occur when you are relaxing in the living room or sleeping in the bedroom, or even in the bathroom or toilet. Even if you know that an automated external defibrillator (AED) is installed nearby or there is someone at home, the only thing that people can do is to call an ambulance.

For the reasons mentioned above, arrhythmia specialists including myself are trying hard to develop diagnostic methods that can reveal patients at risk for ventricular arrhythmia before onset of the disease. As blood tests, 12-lead electrocardiography, and chest X-rays are not enough to make a diagnosis, routine cardiovascular examinations such as echocardiography, Holter electrocardiography, and exercise electrocardiography are combined with electrophysiological studies (EPS), which are invasive examinations requiring hospitalization. We are also conducting studies to discover cardiac dysfunction, repolarization abnormality, depolarization abnormality, autonomic nerve abnormality, and trigger indicators. As the result of these studies, examination methods called late potential, which is a depolarization abnormality indicator, and T-wave alternans, which is a repolarization abnormality indicator, were finally approved by the Ministry of Health, Labour and Welfare and covered by insurance last year. These examinations are noninvasive, easy, and convenient procedures that can be performed on an outpatient basis.

Finally, I believe that it is socially important to recommend high risk patients to use an implantable cardioverter-defibrillator (ICD) in order to prevent sudden death.

** This is a summary of the lecture by Dr. Ikeda, edited by the editorial desk.*



Dr. Takanori Ikeda
Professor, Department of Cardiovascular Medicine, Faculty of Medicine,
Toho University

Dr. Ikeda graduated from the Faculty of Medicine, Toho University in 1986. He worked as a resident and researcher at Toho University Hospital. He assumed the position of research associate in the Faculty of Medicine, Toho University in 1993. He conducted research at Cedars-Sinai Medical Center and University of California, Los Angeles. He moved to the School of Medicine, Kyorin University in 2002 and was appointed as a professor before taking up his current post in 2011. He is the supervisor of the Cardiovascular Center.

Value of Medical Technology

Our mission is to make more people understand the unlimited potential of advanced medical technology and its contribution to the reformation of the Japanese medical care system

Note: All opinions in this newsletter are the personal opinions of the authors, and do not necessarily represent the opinions and activities of AMDD.