



CASE STUDY

[ Medical Display Quality Control Solutions ]

RadiForce®

RadiCS™

RadiNET™ Pro

Osaka University Hospital / Japan



**800 medical imaging monitors  
creating a completely filmless environment**

radiforce.com



# The Day a Filmless Environment Became Reality.

『RadiForce』 『RadiCS』 『RadiNET Pro』 making a difference at **Osaka University Hospital**

Osaka University Hospital's objective was to establish an ultra-large-capacity server and high-speed network enabling easy, efficient digital medical report production and management in a completely filmless environment.

The core network components were an HIS (Hospital Information System), RIS (Radiology Information System), PACS (Picture Archiving and Communications System) medical imaging system, a reporting system, and over 800 EIZO RadiForce medical imaging monitors strategically installed throughout the hospital.

After careful comparison with competitor products, EIZO monitors, RadiCS and RadiNET Pro quality control software were selected as the most suitable for the task. We asked four radiologists at the hospital to explain in their own words exactly how these innovations provided precisely the solution they were looking for.

## Film diagnosis problems

### Towards improved services as an advanced healthcare center

Located in Suita-city, Osaka, Osaka University Hospital is implementing a wide range of measures to boost its capabilities as a leading medical institution while expanding its effectiveness as a core hospital in the region. At present, it has a total of 1,024 beds and 29 departments, and treats an average of 2,300 outpatients a day. The Radiology Department, which plays a key part in advanced healthcare, is broadly divided into three smaller departments of Diagnosis, Treatment and Nuclear Medicine. Working closely together, the doctors in these specialized fields play a central role in healthcare throughout the hospital.

“The data accumulated by the Radiology Department in 2003 included examinations of roughly 120,000 inpatients and outpatients and 280,000 X-ray films. There are reports for 20,000 CT and 7,500 MRI scans, not to mention CR, UGI, BaEnema, coronary angiography, IVR and other data.”

(Sukenobu, Technician)

To deal with such a large number of examinations, the hospital introduced an ordering system to support hospital duties in 1993, and a PACS in 2000.

“At the time, the PACS certainly worked, but since it was designed to handle primarily film, it did not radically improve service for the patients.”

(Dr. Naoki Mihara)

### ● Film diagnosis problems

For diagnosis
1. Film cannot be used simultaneously at both the diagnosis and consultation/ treatment site.
2. Going to the film storage area to search for previous film is inconvenient and time consuming.
3. Current and previous film are required for comparison, resulting in the need for a large film storage room.
4. MD-CT and MRI generate a large volume of images that cannot all be displayed when using film.
For patients
1. Long waiting time for patients.
2. Diagnosis fee includes the cost of the film.
3. During explanation of condition, patients have a difficult time understanding even if they view the film.if they view the film.



In 1901, Osaka prefecture government established a temporary hospital and a medical school in Daifukuji, healthcare workers included Kohan Ogata's son and heir, Suijun Ogata, a brother in law, Ikuzo and an adopted son, Sessai. The medical school underwent many changes until becoming the present Medical Department of Osaka University.

“Because the monitors at that time did not enable observation of detailed parts, film also had to be used. The result was that, although the PACS was useful, it did not help to reduce expenses.”

(Dr. Matsumura)

Looking back, because diagnosis was mainly conducted with film, a viewer had to be used to simultaneously observe the current and previous films, and a large film storage room was needed. Furthermore, time was wasted by staff having to go to the storage room to search for previous images. There was the inconvenience of not always being able to view diagnosis film at the consultation/treatment site until diagnosis had been completed. What's more, the thousands of images generated during examinations involving MD-CT and MRI were impossible to output using film.”

### Yasushi Matsumura, Doctor, Medical Care Information Department



Born April 29, 1959. After graduating from the Medical Department of Osaka University in 1985, he worked in Department 1 of Internal Medicine at

Osaka University Hospital, and in the Department of Circulatory Internal Medicine at Osaka Police Hospital. He has been a doctor at the Medical Department of Osaka University since 1989. In 1992, he became an assistant in the Medical Care Information Department of Osaka University Hospital and was engaged in construction of the hospital's information system. Since 1999 he has been assistant professor at the hospital.

### Naoki Mihara, Doctor, Radiology Department



Born November 11, 1968. As a graduate student in the Medical Department of Osaka University (specializing in internal medicine), he gained

experience working in a hospital in Osaka for two years before returning to graduate school. He then worked once more in a hospital in Osaka and in 2004 returned to Osaka University Hospital.

### Yoshiharu Sukenobu, Technician, Department of Radiology



Born March 25, 1959. Currently part way through a doctor course at the School of Health Sciences of the Medical Department of Osaka University. After

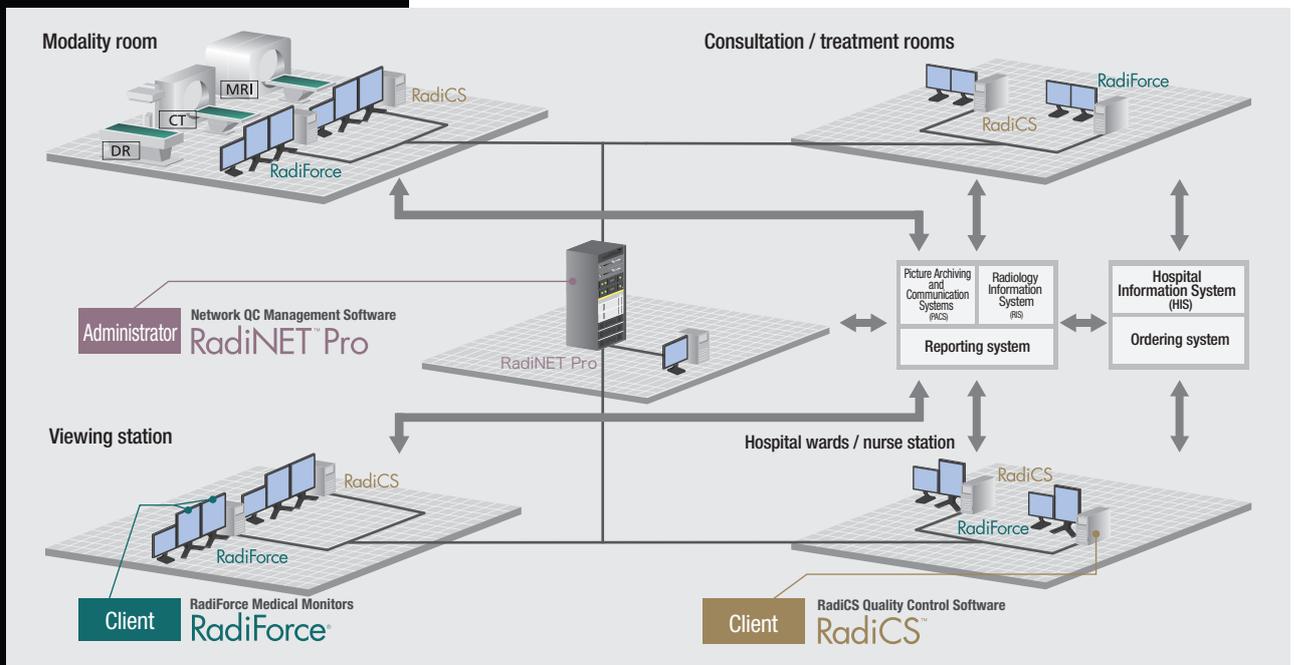
graduating from the Osaka University Medical Care Technology Junior College in 1981, he started working at Osaka University Hospital. He is a veteran technician with 25 years of experience. He enjoys traveling on trains with his child who is a third year elementary school student.

### Kuniyuki Hidaka, Department of Radiology



Born April 9, 1976. Gained a master's degree in radiology from the Graduate School of Medical Science, Osaka University. Currently examines patients using CT

and MRI scans. He enjoys snow boarding and other outdoor sports.



System configuration



RadiCS can run tests for both AAPM and DIN acceptance standards, and the AAPM, DIN, JIS and IEC constancy standards.



RadiCS performs easy confirmation of pattern, brightness, contrast and uniformity checks. Administrator workload is also reduced.



RadiNET Pro manages up to 8,000 monitors. It reduces the quality maintenance and management workload, and contributes to the reproduction of more precise, high-quality images.

### Towards a filmless environment

## From film to LCD monitor-based diagnosis

To deal with these kinds of problems, the hospital decided on a new, large-scale system. Enabling easy, efficient digital medical report production in a completely filmless environment, the system consists of an ultra-large-capacity server and high-speed network with the core components consisting of an HIS, RIS, PACS, reporting system, and over 800 1MP-3MP color/monochrome high-precision medical imaging monitors. In the Radiology Department, multiple monitors were installed in each examination room for viewing digital medical reports and high-precision images, while 16 primary viewing high-precision monitors were installed in a special viewing station. Compliance with the international Digital Imaging and Communications in Medicine (DICOM), standard, enabled storage of multi-modality images in the server.

It goes without saying that the display of MRI, CT and other images requires a high-precision monitor. To meet this demand, EIZO offers an extensive lineup of 1MP-5MP RadiForce monitors for displaying medical images, report production and other applications. EIZO's comprehensive range of solutions also includes RadiCS monitor quality control (QC) software providing total support of quality and management covering everything from calibration to acceptance tests and asset

management. In addition, RadiNET Pro network QC software enabling centralized management of all monitor quality information located throughout the hospital.

“Because our work involves looking at data, writing down our thoughts, and inputting collected information, we use multiple monitors. So monitors that can simultaneously display digital medical reports and images are extremely convenient. A wide screen is also a vital consideration.”

(Dr. Matsumura)

“In the Radiology Department, we have always been very particular about film quality. A patient's cooperation is also necessary to acquire an image, another reason why we demand the very best quality. So with the switch to a filmless environment, it's inevitable that the emphasis is on monitor quality.”

(Hidaka, Technician)

“When we introduced a large number of monitors we had various problems managing them, so we were very interested to hear of the timely development of EIZO's network QC management software, RadiNET Pro. After comparing it with other companies' software, we decided it was the easiest to use. Receiver Operating Characteristic (ROC) viewing tests were also conducted by all the medical staff at the Radiology Department to compare different monitors before it was decided that EIZO's monitor solutions were the best.”

(Sukenobu, Technician)



**Future possibilities presented by high-precision monitors**

**Scheduled development of a monitor for remote diagnosis**

Between the end of 2004 and the beginning of 2005, Osaka University Hospital installed over 800 RadiForce monitors, together with RadiCS and RadiNET Pro. Here's a look at the results from two months after installation.

"The biggest advantage when using the monitors is easy comparison of previous images with multi-modality images. Simultaneous comparison of previous and current images is possible, and since there is very little movement in the field of view, there is less chance of overlooking anything. Naturally, sitting in front of a monitor lets you refer to previous images with very little effort. Monitor displays also enable simultaneous use of image data at the consultation/treatment site and diagnosis site. We keenly felt the need to switch from film to a filmless environment to enable fast access to detailed information required for diagnosis and consultation/treatment."

(Dr. Mihara)

"At the hospital we are currently continuing with preparations to move over to a completely filmless environment for modalities other than CT and MRI. We are also looking at introducing

monitors for mammography diagnosis, CAD, and additional high-precision monitors. We also plan to use high-precision monitors for remote diagnosis. We believe there is a need to create an environment that enables monitor-based diagnosis with the same degree of precision as in the hospital when in viewing environments such as other hospitals and homes."

(Sukenobu, Technician)

"In future, the demand will certainly be for moving images at the diagnosis site, which draws attention to systems that can display them. I think the call will be for LCD monitors to be capable of displaying high-quality video images."

(Dr. Matsumura)

In addition to high-precision image display, a RadiForce monitor also assures stable brightness and contrast.



Storage room full of film (above), and the same room after introducing RadiForce, RadiCS and RadiNET Pro (below).

**● Problems solved by introducing RadiForce®, RadiCS™ and RadiNET™ Pro**

**For diagnosis**

1. Image data can be simultaneously used at the consultation/treatment and diagnosis sites.
2. Previous images can be referred to, eliminating wasted time and effort.
3. The need for a large film storage area is eliminated.
4. In addition to fast display of all image data, successive display and comparisons are possible.
5. LCD monitors enable diagnosis over an extended period without tiring eyes.
6. Minimal movement in the field of view reduces the possibility of missing details.
7. Using an image inspection system enables multiple third party checks to assure the best images possible.
8. Enables creation of a base for 3D/4D image production, CAD and remote healthcare.

**For patients**

1. Image data is transmitted to the consultation room soon after the images are taken, reducing patient waiting time.
2. No film expenses, which reduces diagnosis cost.
3. Necessary areas can be enlarged on the screen, facilitating easy-to-understand explanations.

## INTERVIEW

Osaka  
University Hospital  
Radiology Department

**Naoki Mihara**

Doctor

● Compared to film diagnosis, what are the advantages of monitor display?

I think image management is far superior. Naturally, you can view the latest medical images, but you also have access to previous images. Also, with film diagnosis, while medical images are being used at the diagnosis site, they are not available at the clinical site when consulting or treating a patient. These kinds of problems have been eliminated. Also, it would appear that when one moves one's field of view, many details in an image could be missed. But images displayed on a monitor can be moved themselves, which completely changes the way of viewing them. Up until now, when comparing six images we had to use a viewer to look at them one at a time, but with a monitor we can view them all at once, so it's much less tiring on the eyes.

● What is the purpose and usage of RadiForce monitors introduced to each department?

RadiForce monitors are used to display digital medical reports and images from a web-based in-hospital image reference system. Image quality with this system depends on the monitors used, and at present our staff are very pleased with the performance of the EIZO monitors.



## Diagnosis time is two to three times faster since introducing monitors.

● What is your opinion of RadiForce monitors?

When we first planned to switch to a filmless operation, many staff members were very apprehensive. Once the system was up and running, however, the demand for film rapidly dropped. From just one month after introducing the system, a majority of the doctors had moved over to filmless consultation/treatment with no complaints about image quality. I feel this is thanks to the exceptional image quality delivered by EIZO monitors.

● What has improved since introducing RadiForce monitors?

I think we have created a filmless viewing environment. Viewing time is now shorter than it was in a film environment. As a comparison of the actual time taken to make a diagnosis with film or a monitor, some doctors could previously only complete 10 to 13 cases in a morning, whereas now using a monitor enables 20 or more diagnoses.

## INTERVIEW

Osaka  
University Hospital  
Radiology Department

**Yoshiharu  
Sukenobu**

Technician

● Why did you choose RadiForce monitors and QC software?

Monitor QC is extremely important, particularly for the Radiology Department. Having said that, checking whether the image quality of each of the more than 800 monitors installed has changed would be difficult. For this reason, the introduction of centralized network management software was a vital consideration. I now realize that as well as the monitors, EIZO's software is a valuable tool for the hospital.

● Did RadiForce monitors make the PACS easier to use?

I think RadiForce monitors are particularly advantageous when viewing CT and MRI images. No problems concerning image quality have been raised by any of the Radiology Department staff.

● What is your opinion of RadiForce monitors?

There have been absolutely no complaints about monitor quality from any of our departments. On the contrary, many staff members have voiced their praise. One respiratory system specialist who is very particular about image quality commented, "These days I hardly ever look at film. I just use the monitor". Monitors are also taken advantage of when explaining images to patients, and I think they make a huge contribution to improved healthcare and services.



## A respiratory system specialist very particular about image quality now uses a monitor instead of viewing film.

● What has improved since introducing RadiForce monitors?

Up until now, even when radiologists believed they had taken good medical images, it was often the case that, due to insufficient image quality control, major details were not in fact captured on the film. Using the image inspection system, however, enables checking of images by a third party. Thanks to these multiple checks, we are able to provide high-quality images. In this respect too, the monitor system for medical image display is making a valuable contribution.

● What do you think of the service provided by EIZO?

The delivery schedule was tight, but the work and system setup were completed efficiently. Rather than a job done in a hurry, I gained the impression that everyone involved worked with a real sense of enthusiasm.



## OSAKA UNIVERSITY HOSPITAL

2-15 Yamada-oka, Suita-city, Osaka 565-0871

TEL: 06-6879-5111

URL: <http://www.hosp.med.osaka-u.ac.jp>

In 1901, Osaka prefecture government established a temporary hospital and a medical school in Daifukuji, healthcare workers included Kohan Ogata's son and heir, Suijun Ogata, a brother in law, Ikuzo and an adopted son, Sessai. The medical school underwent many changes until becoming the present Medical Department of Osaka University. Today, it is located in Yamada-oka, Suita-city, where the facilities were moved into a brand new building in 1993.

Under the banner of "Osaka University Hospital shall promote education and research in medicine through health care and make a contribution to developments in medical care", we have been strengthening our capabilities as a hospital developing advanced medical care. From the stance of "Living in the local community", we are continuing to expand our functions and conduct more activities for the community as a core hospital in the area.

In line with the National University Corporation Law enacted in April, 2004, we are also proceeding with rationalization for more efficient management in administration. We now have 1,024 beds, 29 departments and treat roughly 2,300 outpatients a day.

Specifications are subject to change without notice.

All product names are trademarks or registered trademarks of their respective companies. RadiCS and RadiNET are trademarks, and EIZO and RadiForce are registered trademarks of Eizo Nanao Corporation.

## EIZO NANAO CORPORATION

153 Shimokashiwano, Hakusan, Ishikawa 924-8566, Japan

Phone +81-76-277-6792 Fax +81-76-277-6793

For product information,  
visit the RadiForce website at : [radiforce.com](http://radiforce.com)

