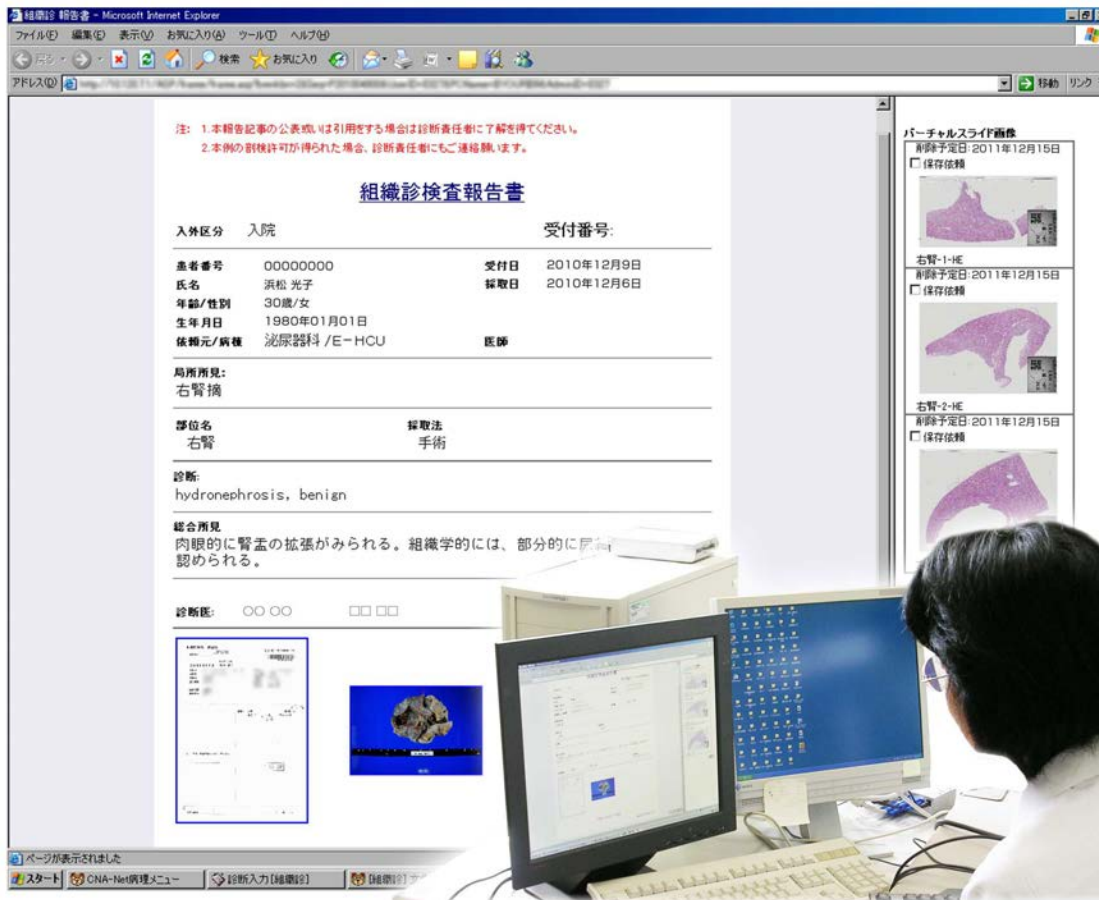


NanoZoomer[®] in action (3)

Link whole slide imaging to an electronic medical records system at Tokushima University Hospital

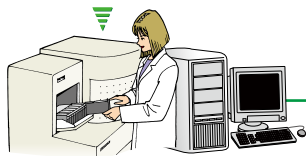


NanoZoomer

Barcode (patient information)



Glass slide



(1) Incorporate barcode information into the file name and migrate whole slide imaging to an image distribution server.

Image distribution server

Automatically make files available



(2) Automatically make whole slide imaging available within the hospital network using NDP.serve slide distribution and management software functions.

Pathological & cytodiagnosis examination support system



Add whole slide imaging to a pathological examination report



(3) Add relevant whole slide imaging as per the barcode information to pathological examination reports as needed and make the report available.

Electronic medical records system terminal



Browsing examination reports

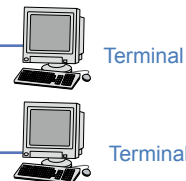


(4) Use browser software to access a pathological examination report from the electronic medical records system and browse the whole slide imaging.

Benefits of utilizing NDP.serve

NDP.serve slide distribution and management software offer the following benefits.

- Reduces load on network when browsing whole slide imaging.
- Browsing slides on familiar viewing software.



□ Why did you consider linking to your electronic medical records?

For two reasons: one, in order to share tissue images with clinicians throughout the hospital using NanoZoomer (whole slide scanner), and two, to reduce the storage space for glass slides throughout the hospital. I thought we could share tissue information just by looking at tissue images (including magnified images) together with the patient information from an electronic medical records terminal. Traditionally, you could reduce labor in slide creation and storage space in clinical departments by looking at data instead of slides created to be returned to the various clinical departments. I thought we could provide an all-around useful.

□ Who views the whole slide imaging?

Anyone involved in diagnosis: for example, out-patient and ward clinicians, and medical and dental department doctors. There are 1,200 terminals to view the information, including electronic medical records and pathology support system terminals.

□ Are there benefits to using whole slide imaging with electronic medical records?

Clinicians are able to easily observe tissue images. For them, using a microscope just to observe tissue images is a time-consuming work. Now they can observe images of tissues the clinician has removed with a simple click of the mouse, which allows them to constantly confirm cases from tissue images. And now they can treat patients while coming up with even more pathologies during biopsies and surgeries, which has been a huge help to the Pathology Department. Clinicians who are jointly diagnosing patients have also praised how easy it is for them to confirm tissue images too. Being able to view whole slide imaging together with radiographic images at conferences or when speaking to patients is a huge benefit for them.

Another benefit for clinicians is being able to take microscopic images of specimens themselves. In the past, they needed to make a request to the Pathology Department for a microscopic image for reports. Now they themselves can take microscopic images out from whole slide imaging together with electronic medical records containing patient information, so there are much fewer requests for these images. This saves the trouble of taking the image on the pathology side, and the clinician can check the tissue image from their own case at any time. However, we have them get the permission of the pathologist who made the diagnosis when using the pathology image at conferences or in dissertations.

Finally, the Pathology Department has been able to reduce the number of slides they create. Normally they would create two HE stain slides, with one going to the clinician. Now they can share slide information using whole slide imaging, so now they basically only have to create one slide. Naturally, they create additional slides when it's difficult to make a diagnosis with one slide. They can also check special stainings and immunostainings not normally given to the clinician.

□ Are there any drawbacks of using whole slide imaging with electronic medical records?

When viewing objects at greater than 40x magnification, it's better to use a microscope. For example, when observing *H. pylori*, hemograms, renal GBM spikes, and so on.

* In EU, four types of NanoZoomer (NanoZoomer-XR, NanoZoomer-SQ, NanoZoomer S210, NanoZoomer S60) and NDP.serve3 software are CE marked under EU's In Vitro Diagnostics Directive (IVDD) for in vitro diagnostic use.

In China, three types of NanoZoomer (NanoZoomer 2.0-HT, NanoZoomer2.0-RS, NanoZoomer-XR) are registered for in vitro diagnostic use.

In the US, Japan and other countries, NanoZoomer is for research use only and is not permitted to use for clinical diagnostic purposes.

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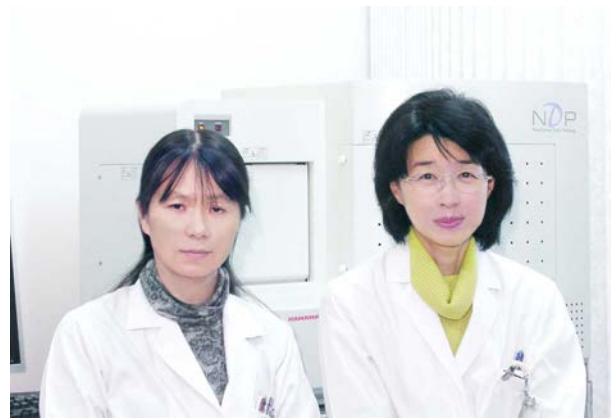
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Dr. Takai

Dr. Bando

□ Did you have any trouble in finally connecting to the electronic medical records system?

I think everyone in the Medical IT Center had a really tough time. Connecting to these electronic medical records was mainly handled by everyone in this center. First they took a detailed look at the flow of work being performed by the Pathology Department, and then made designs and conducted simulations from the point of view of what they could do that would really be useful. They explained the benefits and drawbacks they got to the doctors in the Pathology Department and clinicians. They also coordinated with the electronic medical records system, pathological support system, and whole slide imaging scanner manufacturers. Thanks to all their efforts they succeeded in connecting the two.

□ Are there any problems in linking with the electronic medical records?

Right now, no. It's become very convenient now that we've incorporated position, staining, and other information into the (2D) barcode and made them available for browsing. We have more clinicians who are viewing whole slide imaging while discussing results and answering other questions by phone. As a result, the Pathology Department is double checking examination results with the clinical side, which is giving us good results.

□ What else is needed to have this linkage with the electronic medical records be used elsewhere?

First, I think you need to consider what the storage capacity will be for saving whole slide imaging. It's enormously expensive to save all the slides created every day. The Pathology Department limits how long slides are saved, as a rule, whole slide imaging are retained for one year, after which thumbnails only are kept, with the details of the image no longer available. If you want to save the slide you need to make a special request, and pathologists and clinicians put a checkmark by the request. So it's important to set rules on how to handle the data. I also think the cost of the whole slide imaging system needs to be lower and scanners need to be able to support nonstandard slides.

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