Bolster Your Image Management Infrastructure

Spend less time organizing your diagnostic studies and more time analyzing what they reveal.

Adapted from presentations made during the 2005 American Academy of Ophthalmology annual meeting.

Sponsored By ANKA systems, inc.
Improving Digital Storage: A Better Management System

Get ready for a quicker, more efficient way to organize and retrieve diagnostic images.

Four years ago, my colleagues and I at the California Vitreoretinal Center of the Stanford University department of ophthalmology began developing a system to integrate and store digital images generated by various instruments. After exhaustive research and development, we created a software prototype that fit the style and needs of our practice. However, we soon learned that Anka Systems Inc. had developed a similar approach to image integration. Instead of continuing to develop our own software, we began using their network- and Internet-based image management system in our center. Our feedback also helped refine the product and incorporate additional features we felt would improve the system’s performance and utility to physicians. The result was Anka EyeRoute, an electronic networking system that combines convenient charting features with efficient image management.

In addition, Internet-based remote access lets us view images and add to a patient’s chart from any location. We can view records and images at home, at meetings or while traveling. The EyeRoute system automatically compresses images for easy viewing and transmission from any Internet connection.

Minimum Requirements

The EyeRoute system integrates diagnostic images generated by different technologies into a single, easily accessible electronic record. Everyday clinical images, such as color photographs, fluorescein angiograms, ocular coherence tomographs (OCTs) and ultrasounds don’t have to come from like-branded instruments to work with the EyeRoute system; the system is compatible with technologies from Zeiss, Topcon, Ophthalmic Imaging Systems and other manufacturers.

A simple, browser-like interface provides immediate access to a patient’s complete image archive. With one click, we can view stored images individually or compare different images, such as sequential angiography or serial OCTs, rather than fumbling through paper charts to find the same information.

Imag...
PowerPoint and other presentation programs.

Since we’ve been using the EyeRoute system, our ability to communicate with referring physicians has improved immensely. In keeping with a higher standard of care, the doctors with whom we work demand instant feedback, either by phone or fax. A typical note to a referring physician might read, “Patient seen, posterior vitreous detachment, no treatment recommended,” or “Retinal break, laser recommended.” A robust image integration system like the EyeRoute should make this process even easier by letting referring physicians retrieve reports from and add recommendations to patients’ records directly.

**Since adopting [the EyeRoute], we’ve reduced costs associated with stocking ... paper and ink for multiple printing devices.**

**EyeRoute Image Management**

Local area network-based image management systems can be slow and inefficient. The Anka EyeRoute system easily manages images from multiple modalities. Here are some examples.

- **Standardized measurements:** Optical coherence tomography (OCT) is a valuable clinical tool but can provide inaccurate information if you compare images with different measurement scales. If you use different tools to measure images captured by different methods, you can’t be certain the measurements are accurate. The EyeRoute system user interface standardizes measurement tools across different imaging modalities, presenting the results clearly and leaving no room for interpretation or doubt.

- **Compare sequential images:** Image comparison software lets you view archived images either side-by-side or as proof sheets. This feature is valuable for tracking the growth of a tumor, optic nerve changes in glaucoma patients or any condition where monitoring changes over time is critical.

The Anka EyeRoute measuring tool quantifies lesion size in fluorescein angiography (top left), effusion in ultrasound (top right) and retinal thickness on optical coherence tomography (bottom).

**Improving Practice Efficiency**

In the office, the EyeRoute helps us reduce costs while improving billing. The EyeRoute system also has improved the efficiency of our office staff. We no longer have to enter all clinical data manually, minimizing the risk of introducing inaccuracies and reducing dictation and transcription costs. Since adopting this system, we’ve reduced costs associated with stocking many types of paper and ink for multiple printing devices. The EyeRoute system also helps us manage our practice better, improves patient flow and simplifies patient education.

**A Sweeping Change**

A well-designed image integration system can potentially combine instruments and software and automate clinical workflow. The EyeRoute System offers this integration, presenting clinical and practical advantages to physicians and staff. By improving practice efficiency and clinical quality — including avoiding medical errors — integrated image management systems are changing the way we work.

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Just a few years ago, the Doheny Eye Institute at the University of Southern California, Los Angeles, had a large collection of unintegrated digital images taken from various sources. Now, we integrate instruments from many different manufacturers and organize the image archive with the Anka EyeRoute system. In this article, I provide a walk-through of some of this system’s most useful features and describe how it has streamlined our practice.

Easy Access and Reliability

The most obvious advantage of the EyeRoute system is the immediate availability of stored images, regardless of when they were captured. Any location with Internet access can be turned into a remote viewing station simply by logging onto a secure Web server.

Unrestricted instant access improves communication among various clinical sites and prevents examination and treatment delays that can occur when images must be physically transferred between practice locations. For example, images from different satellite clinics are always available for viewing and measurement before treatment at a centralized photodynamic therapy (PDT) site.

View, Sort and Interpret

The first screen you see when you enter the EyeRoute system lists the images acquired that day. This feature is very convenient in a clinical setting, where practitioners typically want to see test results for patients they’re currently evaluating. Clicking on the blue folder next to a patient’s name provides immediate access to all past imaging studies for that patient, letting us compare current and previous test results quickly and conveniently.

The EyeRoute system’s intuitive interface makes it easy to access the exact information you want. For example, you can retrieve images by searching for a patient’s name, record number, diagnosis or treating physician. The system displays all images in the same window, regardless of the instrument of origin. In our clinic, we can view data collected by Zeiss and Topcon cameras, a Zeiss OCT, a Humphrey visual field analyzer and a Nidek MP-1 by calling up a patient’s file at any computer terminal.

Exam Room Utility

When examining patients, I don’t want to waste time tracking down old images to compare against current studies. With the EyeRoute system, I can evaluate and compare

Instant access to all diagnostic studies means I can spend more time using the images to educate patients about their disease and discussing treatment options.

The Anka EyeRoute system lets you view any patient’s complete image archive, such as this fluorescein angiography proof sheet, from any Internet-enabled workstation.
a sequence of angiograms acquired over several months with just a few clicks of the mouse. Instant access to all diagnostic studies means I can spend more time using the images to educate patients about their disease and discussing treatment options.

Stereo image viewing also is a snap. Instead of choosing paired stereo images from a proof sheet, I click the “Stereo” button that sits between all image pairs to bring up the stereoscopic display mode. If the stereo view needs to be reversed, I can use a software feature to switch image locations.

The EyeRoute system also offers a movie mode, which automatically presents sequential frames of a fluorescein angiography sequence. I can customize the interval between frames, freeing me to concentrate on the areas of interest without manually clicking through serial images.

Another feature, the side-by-side mode, lets me compare different image modalities at the same time. I can compare an angiogram with an OCT on the same screen. Physicians who use fundus imaging and OCT will find this integration very useful, whereas those who use visual field analysis will appreciate the ability to compare serial field tests.

Finally, the EyeRoute system’s measurement tools make it easy to calculate accurate lesion and laser spot sizes for PDT treatment. Comparative testing has shown that measurements obtained by the EyeRoute correlate well with those obtained by the instrument that captured the original image.

Adding Digital Drawing

A new feature of the Anka EyeRoute system is currently in beta testing, but promises to enhance the way we produce retinal drawings. The addition of a digital drawing program will help clinicians document retinal examination findings quickly and accurately. You can use standardized templates to record observations or annotate previously captured fundus images. The system lets you integrate digital drawings into an electronic medical record or paste an annotated image into a letter for referring physicians.

Speed and Security

The EyeRoute system has made a big difference in how we archive and retrieve diagnostic images at the Doheny Eye Institute. The old system was slow, taking as long as 10 minutes to load a single high-resolution image. In contrast, the EyeRoute system compresses and retrieves images quickly and efficiently, providing instant access on any network.

The EyeRoute system’s intuitive, ergonomic interface lets us compare images reliably from multiple diagnostic modalities. This application has changed our day-to-day routine positively, and we anticipate new features, such as digital drawing software, will only enhance its value.

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EyeRoute FAQs

At the 2005 annual meeting of the American Academy of Ophthalmology, Ken Lee, president of Anka Systems Inc., answered some frequently asked questions about the EyeRoute system.

Q: How does the system retrieve images from ophthalmic instruments?

Ken Lee: Every instrument is slightly different. EyeRoute might grab the image from a printer port, through the screen capture or from a database. For all image modalities, the software retrieves images without loading any software onto the instruments or affecting them in any way.

Q: What licensing requirements do we need to access and view EyeRoute via an online browser? Can anyone access information from any workstation any time?

Ken Lee: The software is extremely scalable. EyeRoute users range from one-doctor, one-office practices to large practices comprising 100 different practitioners. The software is sold on a per-user license, but one user can log in to 10 workstations.

Q: Why not make an all-in-one image integration and electronic medical record (EMR) system?

Ken Lee: Rather than duplicate existing EMR technologies, we designed EyeRoute to complement current systems. Our clients have not expressed a preference for a particular EMR system, but we’re partnering with Escalon and Topcon to build compatible technology.
Integrating New Data

Newly developed software enables us to draw directly into the EyeRoute system, improving treatment plans.

Clinical experience has shown the Anka EyeRoute system efficiently integrates and organizes digital images from multiple modalities, but this application’s utility doesn’t end there. Anka continues to design new software that will let practitioners incorporate more clinical data, creating a seamless, integrated electronic medical records (EMR) system. The first step in this process is the addition of a digital drawing package.

Creating Digital Drawings

Retinal physicians always include a fundus drawing in medical records, but paper-and-pencil images are difficult to incorporate into EMR systems. Anka currently is producing a simple, intuitive program that works in conjunction with the EyeRoute system to create detailed, digitized retinal drawings.

A clinically beneficial digital drawing program must offer a variety of easy-to-use tools that speed, not delay, the recording process. Other desirable features include uniformity and clarity, which can minimize time lost struggling with difficult-to-read notations and interpreting colleagues’ hand-drawn diagrams.

How It Works

An ideal drawing program will entice users, not discourage them with awkward, inefficient interfaces. Such a system can improve and enhance clinical performance.
The drawing program currently under development at Anka offers two different approaches. You can either draw on one of several available templates or create your own template using a digital image in a patient’s file. Standard templates offer ways to record retinal tears and detachments, age-related macular degeneration and diabetic retinopathy, to name a few.

Mouse-based drawing systems are often awkward to use, so Anka opted for a tablet-based input. Drawing on a digital tablet with a stylus provides a more pencil-and-paper feel and improves accuracy.

Drawing Made Easier

Retinal drawings can be complex, so the Anka drawing system gives users intuitive options. Buttons on the side of each template screen list common objects for different kinds of drawings and let users search for additional useful objects. For example, to record the presence of a retinal tear, you choose the button labeled “Retinal tear” to place the defect on the template. The system automatically annotates the drawing and orients the object to the proper position. You also can add manual notations or adjust objects if the default settings don’t meet your needs.

Anka’s drawing program also allows you to add features such as laser photocoagulation scars, lattice degeneration, retinal detachment or subretinal fluid. You outline the area of interest, and the system fills in and annotates the area with the desired element. To record laser scars, click on the appropriate spots, and the system automatically annotates the change.

Since not every case fits the provided templates, the drawing program gives you the option to create freehand drawings and annotate irregular features, such as atypical epiretinal membranes.

Promising Progress

As Anka engineers continue to develop and test their drawing software, we plan to expand automated object and annotation options, as well as improve the EyeRoute system’s capacity to integrate these drawings into reports and EMRs. Eventually, the system will be able to generate reports that incorporate drawings and annotations with a comprehensive diagnostic image archive and quantitative measurements.

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EyeRoute

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- No more lost or misplaced charts
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- Instant access to all images from anywhere, at anytime
- Integrate imaging records with your existing EMR or EPM

**FEATURES**
- Web browser based and runs on any PC
- Automatically imports Digital Fundus, ICG, OCT, Ultrasound, Visual Fields, SLO AVI, Auto-refractor and others
- Easily transfer images to PowerPoint
- Database search engine for research
- 24/7 monitoring for highest reliability
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