

# **Virtual Slide Sharing (ePathology) to Enable Charitable Expert Opinions in Cancer Pathology to Under-Serviced Areas of the World**

Enhanced access to Pathology expertise translates to  
improved patient care and better patient outcomes

**World Congress of Cancer**

August 28, 2012

**Jared N. Schwartz MD PhD FCAP**

# Current Positions and Background

- **Chief Medical Officer, Aperio**
- **Consulting Professor Pathology, Stanford School of Medicine**
- **Board of Directors, Personalized Medicine Coalition**
- **Board of Directors, American Pathology Foundation**
- **Advisory Board Cancer Commons**
- **Past President College American Pathologists**
- **Director Pathology Laboratory Medicine Non-For Profit Large Multisite Integrated Health Network**

# Objectives



## At this seminar you will learn to enhance humanitarian efforts in Pathology:

- **Advantage** of creating digital whole slide images (eSlides) from glass slides.
- **Value** of real-time global viewing network of eSlides
- **Value** of conducting medical consults, education and reviews using eSlides for underserved areas
- **How** ePathology is already utilized to improve patient care in underserved areas



***"I shall pass through this world but once. Any good, therefore, that I can do or any kindness that I can show to any fellow creature, let me do it now. Let me not defer or neglect it for I shall not pass this way again."***

***— Etienne de Grellet (1773 – 1855)***

# Physicians Around the World Want to Help

- AAPI and Arpan Global Charities are collaborating for medical missions all over the world.

[Arpan Global Charities](#) is a 501(c)(3) charitable organization that seeks to bring health and hope to the medically under-served population around the world, while providing humanitarian assistance and medical knowledge to those who need it the most.



# Many Medical Organizations Providing Charitable Care

UCDAVIS



**MARCH 12**  
A Benefit Concert  
DJ OllieBata

*Project*  
**Aid2Africa**  
*Benefit Concert*

**Artists**  
Dariusz Czerwinski  
Tipping Point Band  
Joy Christian Band  
Kashia Lee  
Nora Pina  
Raven's Grace  
Cia Hines  
UCSD Gospel Choir

**Hosted by**  
MSR National California  
Alexandra Roca  
DANIELADAN

**Location**  
Good Shepherd  
Parish Hall  
6200 Gold Coast Dr.  
San Diego, CA 92120

**6:15PM**





## Bulletin of the World Health Organization

### Long-running telemedicine networks delivering humanitarian services: experience, performance and scientific output

Richard Wootton, Antoine Geissbuhler, Kamal Jethwani, Carrie Kovarik, Donald A Person, Anton Vladzymyskyy, Paolo Zanaboni & Maria Zolfo

Volume 90, Number 5, May 2012, 341-347D

Table 1. Main purpose of long-running telemedicine networks delivering humanitarian services

Network	Main purpose
Africa Teledermatology Project	Teledermatology in Africa
ITM Telemedicine	Advice for health-care workers treating HIV infection in Africa
Pacific Island Health Care Project (PIHCP)	Second opinions for Pacific Islanders health-care providers
Partners Online Specialty Consultations	Second opinions for rural clinics in Cambodia
RAFT	Health staff education in French-speaking African countries
Saifden Charitable Trust	Second opinions for physicians in developing countries
Teletrauma	Advice on trauma care advice in the Ukraine

# Long-running Telemedicine Networks and Humanitarian Services: Experience, Performance and Scientific Output\*

Notwithstanding the use of different organizational models, clinical case load was strikingly similar across networks:

All seven networks were providing only a few hundred tele-consultations annually. This activity level may stem from the fact that the networks are run by a single individual or “clinical champions”.

Since the present networks collectively appear to meet only a tiny fraction of the potential demand from the developing

Future work might therefore be directed at facilitating large-scale network operation.

**Richard Wootton <sup>a</sup>, Antoine Geissbuhler <sup>b</sup>, Kamal Jethwani <sup>c</sup>, Carrie Kovarik <sup>d</sup>, Donald A Person <sup>e</sup>, Anton Vladzimirskyy <sup>f</sup>, Paolo Zanaboni <sup>a</sup> & Maria Zolfo WHO Bulletin 2012**



# Actually Very Few Publications on Humanitarian Work of Pathologists

Articles

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Articles » September 18, 2011 » Telepathology for effective healthcare in...

## Telepathology for effective healthcare in developing nations

Telepathology has grown immensely due to rapid advances in information and technology. It has a wide variety of applications especially in the developing world, namely for remote primary diagnosis, specialist referrals, secondary opinions, remote teachings and in research. Basic infrastructure and skilled and experienced staff are the prerequisites for its successful implementation. Socio-economic differences in developing nations result in a chaotic scenario so that, the advanced areas have expertise, while rural and remote areas remain deprived. Telepathology has the potential to bridge this gap. This article discusses how successful use of the internet for telepathology is bridging this gap in developing nations and thereby contributing positively to effective healthcare. Possible constraints to telepathology and some solutions to overcome them are also discussed. Key Words: Internet, Healthcare, Telepathology, Telereporting, Developing nations.

***Publication: Australasian Medical Journal (Online)***

***Author: Sankaye, Smita***

***Date published: September 18, 2011***

# Pathologists Are Trying



We often marvel at the newest and most cutting edge technologies in medical care and their impact on restoring health and prolonging life. Just last week, I wrote on the advances of [tissue engineering and regenerative medicine](#) after an American man received a synthetic trachea following removal of his cancerous trachea. However, in much of the developing world where the greatest burden of illness exists, access to even basic medical services is limited. The voids in access to medical care are even more pronounced when it comes to subspecialty care, including diagnostic

subspecialties such as pathology and radiology. Specialized diagnosticians like pathologists are integral to effective healthcare delivery, as their expertise is in handling and preparing various human specimens, examining these specimens, and making diagnoses which dictate the course of medical care.

To help put the shortages in the developing world into perspective, let's consider the status of pathologists in three countries in Sub-Saharan Africa (SSA). Tanzania and Nigeria have approximately one clinical pathologist available per 3 million people. In Zambia, the entire country has only one surgical pathologist for a population of 12 million. These ratios contrast starkly with developed nations, where there are teams of subspecialized pathologists available to serve the population in much greater numbers. In SSA, maldistribution further compounds the problem: the majority of specialists live in urban areas, making access more limited in rural communities.



# Professional Organizations and Individual Pathologists Dedicate Significant Time and Effort

## Virtual Surgical Pathology in Underdeveloped Countries

### The Zambia Project

Fabio Pagni, MD; Francesca Bono, MD; Camillo Di Bella, MD; Agostino Favarelli, MD; Anna Cappellini, MD†

• Only 1 surgical pathology laboratory is available in Zambia, a country with a population of 12 million people. Since 2004 the Italian association of pathologists Patologi Oltre Frontiera has been working to create a virtual laboratory through the use of telemedicine. The project has involved staining histologic preparations on site, with the interpretation of imaged slides performed abroad through telepathology. Starting in April 2007, all surgical specimens obtained in Mtendere Mission Hospital, Chirundu, Zambia, were submitted for microscopic examination through whole-slide scans. Two independent Italian pathologists evaluated the cases by means of satellite connection and the final diagnoses were sent to Zambian clinicians via the internet. This article describes the spectrum of diagnoses made via telepathology for the Zambian population. Also, we analyze the concordant and discordant data between this telepathology method and traditional microscopy in a developing country. Moreover, we provide possible solutions for providing pathology services in other underdeveloped countries.

(Arch Pathol Lab Med. 2011;135:213–219)

The Mtendere Mission Hospital of Chirundu, Zambia, is a 145-bed facility established in 1964<sup>1</sup> as a small rural health center. The hospital functions as a referral center for the entire Siavonga district of more than 60,000 people. The hospital offers an extensive range of diagnostic and treatment services including laboratory services, radiology services, operating theatres, and public health services.

pathologists. The University Teaching Hospital in Lusaka is the only center offering a surgical pathology service. This hospital serves 12 million people but lacks the necessary medical staff, technicians, and infrastructure to serve them completely.

In 2004, Chirundu surgeons contacted the Italian association Patologi Oltre Frontiera (POF) for assistance.<sup>2</sup> Patologi Oltre Frontiera was created in 2000 to improve pathology services in developing countries. To reach this goal, the association decided upon telepathology as an instrument for diagnosis and as an efficient training course for local staff in underdeveloped countries.<sup>3</sup> The benefits of telepathology in Zambia are several-fold. This technology provides surgical pathology diagnoses that dictate and improve treatment standards, and it may provide new jobs and career opportunities. Moreover, it may help promote a local culture of health.

Several problems need to be addressed when establishing a surgical telepathology laboratory in a developing country. Purchasing telepathology and communication equipment for the laboratory is very expensive. The endeavor also requires the training of individuals to manage the laboratory autonomously. Two individuals from the Chirundu Hospital completed a 2-year technologist training program. They were able to prepare the routine specimens and interface with the telepathology equipment. The specimens were then scanned, transmitted, and analyzed by volunteer Italian pathologists, who provided Zambian physicians a much needed histopathologic diagnosis.

pathtalk.org is a weblog about pathology and laboratory medicine.

Posted by  
Gregory Henderson

Date  
January 15, 2010  
3:52 pm

Tagged

Category  
General

## Now Is The Time For All Primary Care Pathologists To Come To The Aid Of Haiti

Announcement From the CAP Foundation:

January 15, 2010

Dear Colleagues,

All of us are reading and watching the devastating news and seeing the wrenching pictures from Haiti in the aftermath of the terrible earthquake earlier this week. As a physician, I read the news and looked at the images with grief, with shock, and with a strong desire to reach out to the struggling people, injured and terrified. But, as a pathologist, I also realize that there is little I would be qualified to do in Haiti today, besides comfort those who are alive and have suffered loss and provide rudimentary first aid.

The CAP Foundation does have a way that you can help Haiti in this hour of need.

Our Humanitarian Grant program has sponsored several pathologists who have done wonderful laboratory outreach work in Haiti in the past. We are working with these pathologist-humanitarians to identify the areas where the CAP Foundation can help Haiti with short-term immediate support and the longer term struggles ahead. I urge you to join me in donating to the CAP Foundation, where pathologists will be part of providing laboratory services, humanitarian efforts, and medical aid during Haiti's moment of crisis and beyond.

I know that each and every one of you would go to Haiti, comfort the survivors, give medical care, and help laboratories cope with the medical situation. And, if you are a pathologist who is planning to join an established relief mission to Haiti, please contact the CAP Foundation and tell us your story. But, we are also acutely aware that there will be incredible needs, short and long term, that will require funding, supplies, and equipment, for health care and laboratory services. By donating to the CAP Foundation Haiti Relief Effort, pathologists can contribute what is needed most, when it is needed most, to provide these desperately needed services.

***“Whenever science makes a  
discovery,  
the devil grabs it while the angels  
are debating  
the best way to use it.”***

**~Alan Valentine**



# What is ePathology?

## **ePathology:**

Converting Analog Pathology Slides into a Digital Format ie eSlides

## **ePathology Means Much More to our Specialty and Patient Care**

- **Enhance** Your REACH, Your Professional IMAGE.....
- **Efficiency and Effectiveness** to Your Daily Work
- **Expand** Your Quality Assurance Tools
- **Enable** Access to More Information in the Image Using Image Analysis
- **Enter** the EHR
- **EXCITE** and **ENTICE** Medical Students, Histology Staff, and Residents to an ever **EVOLVING** Specialty Career in **Pathology**

# Evolution of ePathology to Meet Needs Pathology Services



## Virtual Microscopy

*Circa 2001-2005*

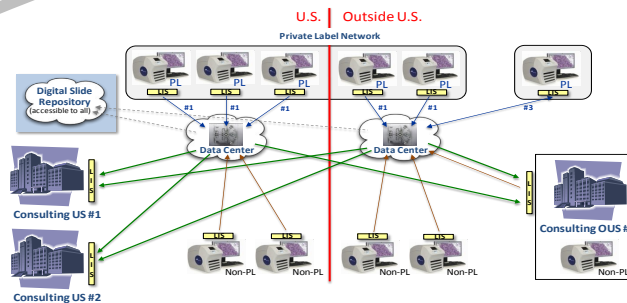
- scanner captures whole-slide images
- archival
- limited analysis
- basic sharing



## Digital Pathology

*2005-2011*

- remote conferencing
- metadata and images
- improved analysis
- archival
- integration with LIS



## ePathology

*2012...*

- Easy to use
- Network and sharing throughout institutions
- **Global sharing**
- Precision tools widely available
- Integration of Pathology Images into records
- Incorporate repositories
- **Setting a new standard**



## Microscopy

*Circa 1600*

- no remote access
  - no archival
  - no analysis

## Telepathology

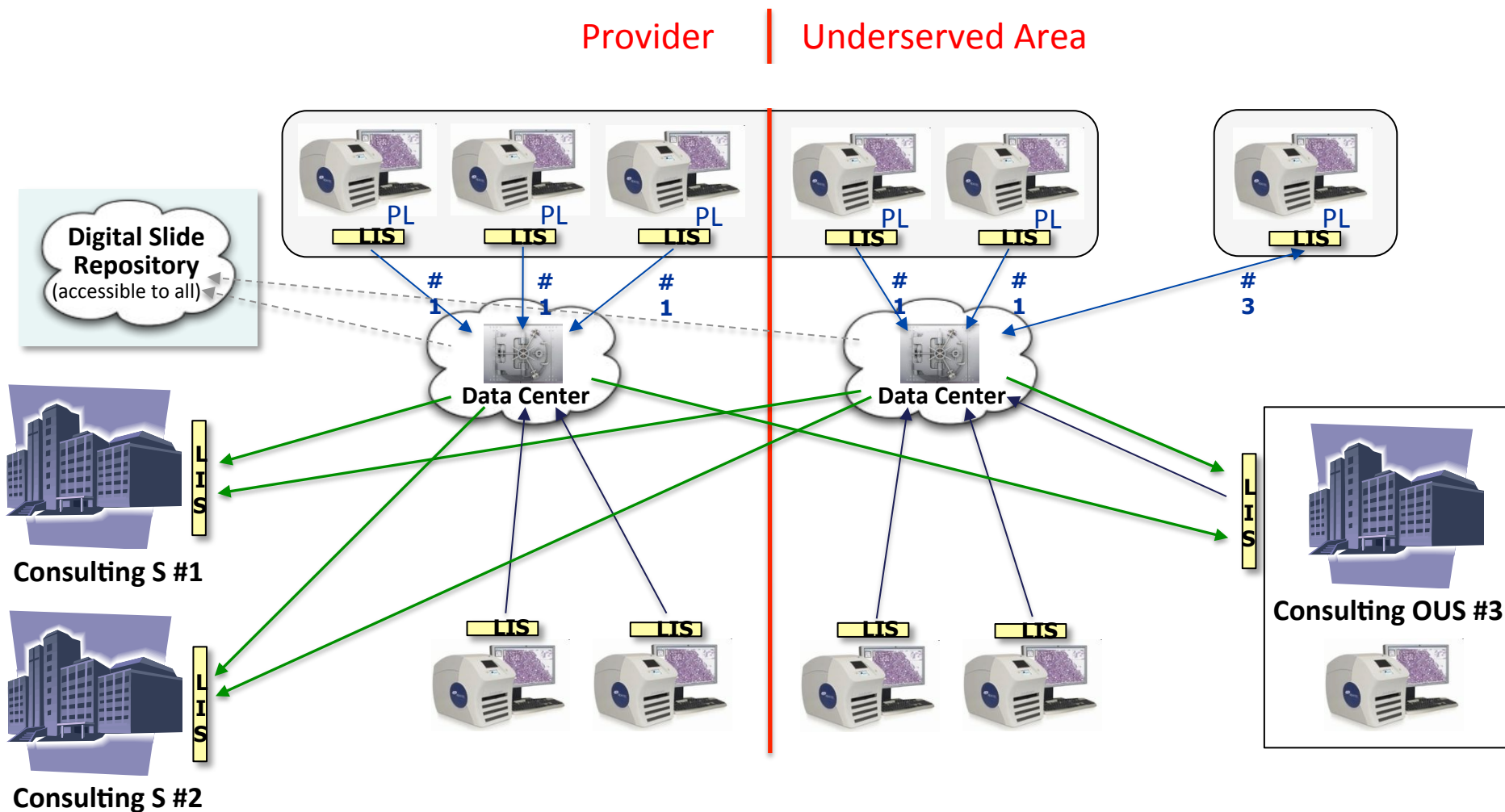
*1995...*

- limited remote access
- no archival
- no analysis





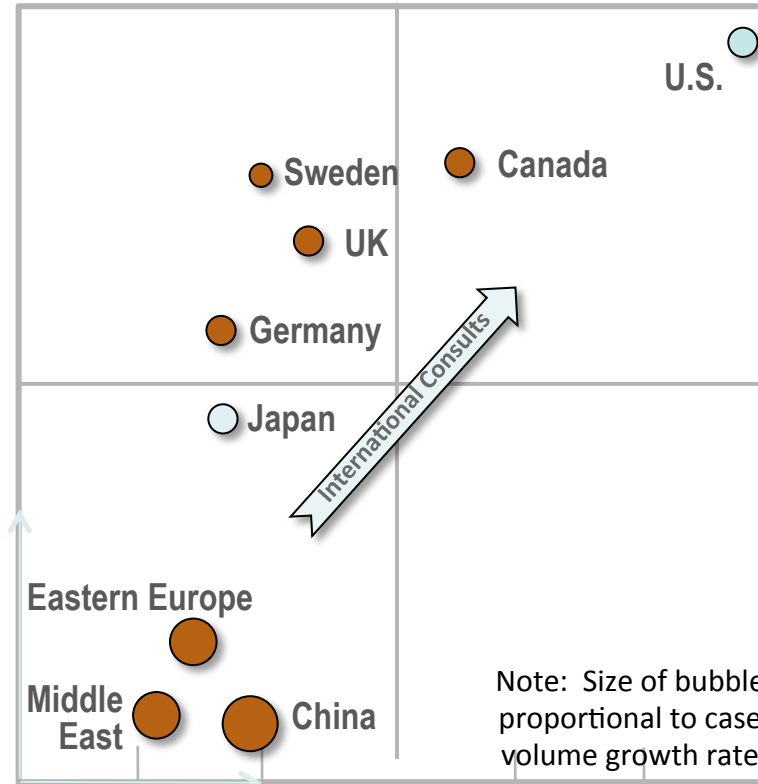
# Expanding ePathology Solutions to Address Global Imbalance of Pathology Expertise



# Global Imbalance in Pathologists: Underserved in Every Country!



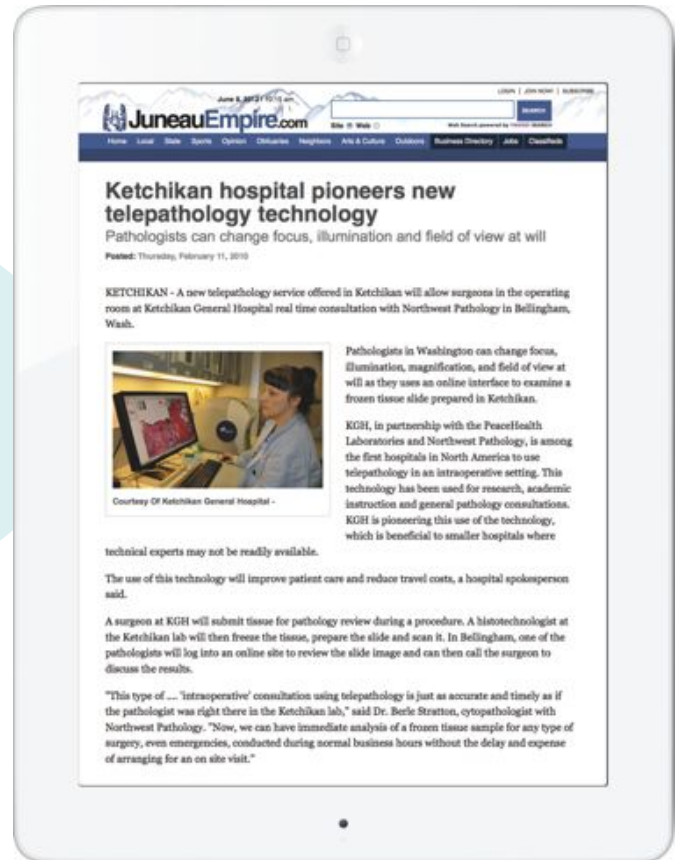
%  
subspecialist  
pathologists



# pathologists per mil population



# Pathologists Can and Are Providing Help to Hospitals/Communities with No Pathologists



# ePathology Networks Will Enable Regional Centers to Provide Assistance

## Major technological advance improves cancer treatment at Kuwait Cancer Control Center

Kuwait: Monday, July 09 - 2012 at 13:38

PRESS RELEASE

The University Health Network (UHN) in partnership with the Kuwait Cancer Control Center (KCCC) and the support of the Ministry of Health, have installed cutting-edge telepathology equipment in the KCCC laboratories.

### Cancer Treatment Centers

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AdChoices

Telepathology is defined as the "practice of pathology at a distance" using telecommunications technology to make it possible to transfer image-rich pathology data between distant locations for the purposes of diagnosis, education, and research.\* UHN is a leader in the field of telepathology.

The Chief Pathologist at the Kuwait Cancer Control Centre (KCCC), Dr Salah Al-Waheeb, was asked by a colleague from a nearby hospital to look at microscope slides of a tissue specimen from a Kuwait citizen that he thought had a rare type

of cancer.

Usually, when this type of situation arises; a biopsy is done to get a specimen from a mass found in the body. This specimen is then placed on microscope slides to be reviewed by a pathologist to confirm the type of cancer and its changes of malignancy. Specialists would then be able to prescribe the correct treatment for the diagnosed cancer.

Dr Salah Al-Waheeb looked at the microscope slides and requested that they be sent for review by his Canadian colleague, a specialist pathologist located at UHN in Toronto, Canada.

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# ePathology Rapidly Enabling Us to Do More Without Traveling: A Sample

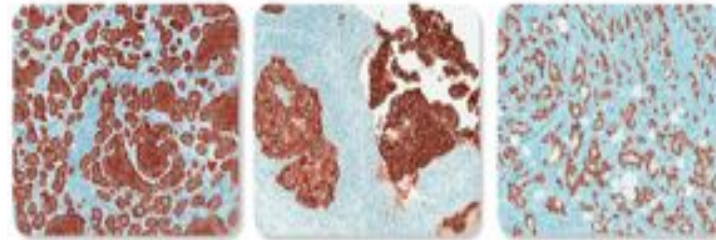
## UCLA

May 06, 2010

Live tele-consultation of complex cases, professional pathological diagnosis, regular packaged delivery---these are steps to guarantee the double check of diagnosis of every patient's pathology by experts of both the Second Affiliated Hospital Zhejiang University and UCLA Medical Center. This is the perspective on joint pathology consultation by the Second Affiliated Hospital and UCLA stated by Prof. Rao Jianyu, tenured professor of pathology and epidemiology at UCLA Medical Center, Director of gynecologic pathology and cytopathology.

The medical diagnostic center at the Second Affiliated Hospital Zhejiang University is the first one UCLA Medical Center is involved in, and it is an exploratory pattern expected to benefit not only people of Zhejiang Province, but also of a wider area in near future. This is regarded as one step toward the goal of medical reform.

It's learned that UCLA Medical Center has a reservoir of more than 30 experts in pathology to provide remote medical consultation service. Most of these specialists in cell pathology, urinary pathology, etc., have rich clinical experiences with solid academic background and patients with complex cases or special requests can have their pathological images transmitted to UCLA for diagnosis.



# eIHC

*Leveraging Digital Image Technology  
for Rapid Interpretation of  
Immunohistochemical (IHC) Stained Slides*

Incorporating technological advances in digital imaging, eSlide is enhancing research, education, and patient care across the street and around the world. Cleveland Clinic Laboratories now offers web-based eSlides of IHC-stained slides to help optimize clinical workflow for IHC.

In collaboration with Aperio, a provider and global leader of ePathology Solutions, a secure internet site provides access for clients to read immunohistochemically stained eSlides on a computer monitor anytime, anywhere. When a case is opened, all case, specimen and slide information, as well as controls are conveniently at your fingertips.

The service provides access to eSlide conferencing and secure messaging allowing the pathology community to engage in dialog and exchange information.

The opportunity to view stained eSlides within 24 hours after the blocks arrive at Cleveland Clinic may help clients follow a staining algorithm rather than requesting batches of stains, some of which may ultimately be unnecessary.



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  - UPMC Digital Pathology Consultation Portal
- Residencies and Fellowships
- Nurses
- Aided Health
- Credentialing
- Physician Liaisons

## DIGITAL

### UPMC Digital Pathology Consultation Portal

Now it's easier than ever to send your slides electronically and let UPMC Pathology experts be your second set of eyes for diagnosis and treatment.

The UPMC Digital Pathology Consultation Portal gives you a valuable second opinion necessary to be accurate and efficient in both diagnosis and treatment.

Our pathologists, who are physicians at UPMC and faculty of the University of Pittsburgh, deliver their expertise and high-quality consultation directly to your practice, hospital, or lab. Now you can get rapid consultations with no mail, courier, or inconvenience required.

Through this exclusive technology, you overcome geographic, time, social, and cultural barriers by connecting to the set of second subspecialty eyes needed to speed diagnosis and treatment of your patients.

### A Gateway to Better Health Care

We will set up infrastructure on your terms and make it easy to open unsurpassed access to our team of pathology experts.

Your slide image systems and whole-slide scanners are an easy gateway to real-time telepathology, consulting, and second opinions.

### Access Top Experts

UPMC has one of the largest academic pathology departments in the country, with more than 100 diagnostic anatomic pathologists.



# Beyond Ordinary Consultations to Truly Collaborative Pathology Globally

***"ePathology holds the promise of moving beyond ordinary Consultations to truly collaborative pathology. The old passive, hub and spoke model of sending glass slides to a single consultant and waiting for a fax will give way to a broadly linked digital network of experts. Instant access to the best minds in pathology is finally possible. "***

**—Dr. Eric Glassy, MD  
Medical Director, Pathology, Inc**

**Global ePathology Network  
No Border Barriers for Pathologists to Provide Help**



# What are We Waiting for?



Janie Tsou/Stanford EdTech



Staff help students Aug. 19 to set up the iPads they just received.

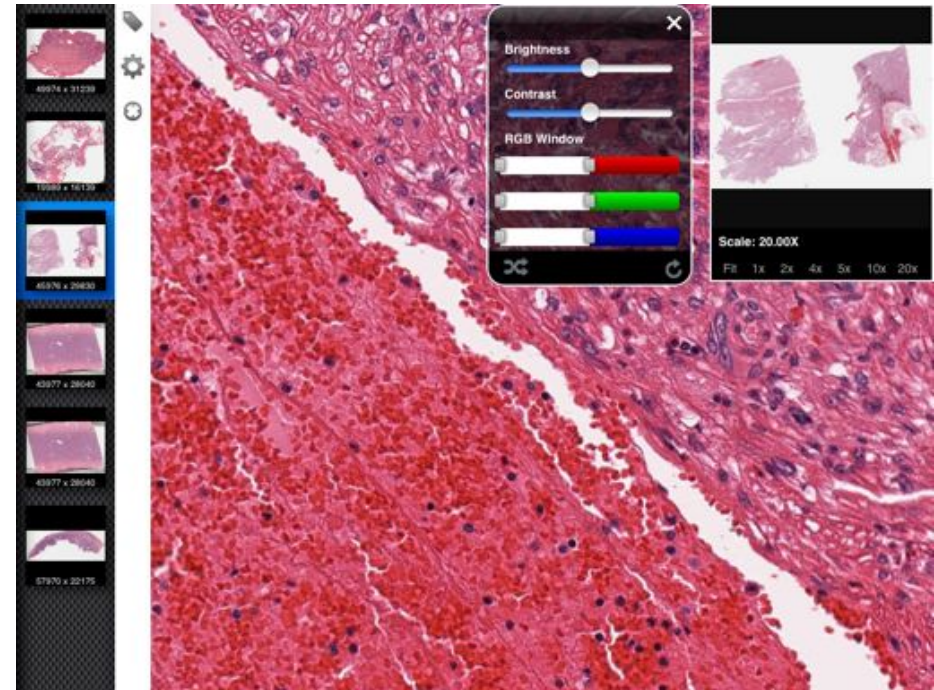
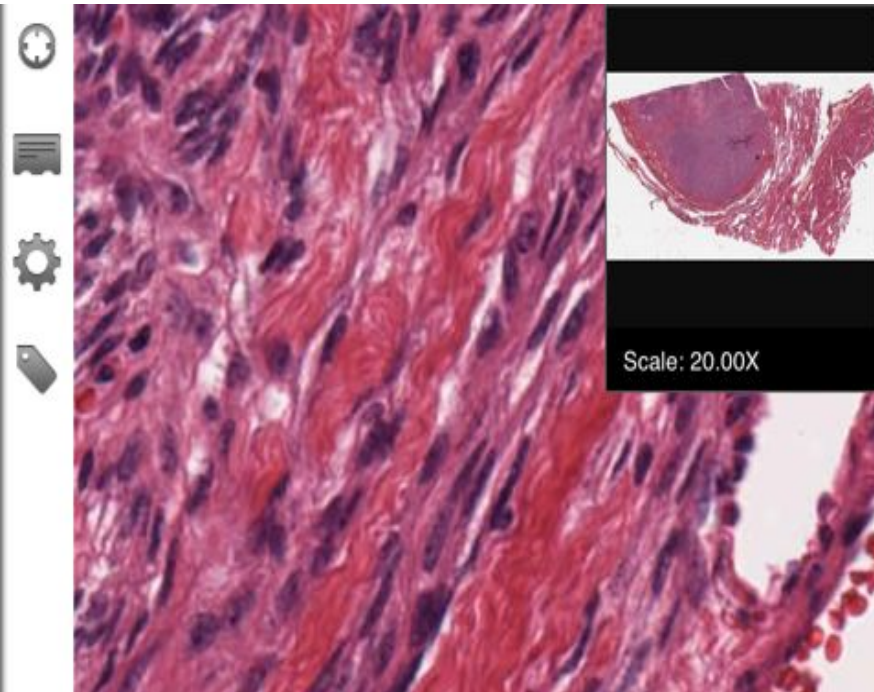
Stanford Medical Students



Yale Medical Students



# The Future is Now: ePathViewers Available



# Education is Critical Part of Humanitarian Mission

## Development and use of a genitourinary pathology digital teaching set for trainee education

Li Li,<sup>1</sup> Bryan J. Dangott,<sup>2</sup> and Anil V. Parwani<sup>2</sup>

<sup>1</sup>Department of Pathology, Albany Medical Center, 43 New Scotland Ave Albany, NY, 12208, USA

<sup>2</sup>Center for Pathology Informatics, Department of Pathology, **University of Pittsburgh Medical Center**, Pittsburgh, PA 15232, USA

Anil V. Parwani: [parwanjav@upmc.edu](mailto:parwanjav@upmc.edu)

April 5, 2010.

A teaching set of over 295 glass slides has been used for resident training at the Division of Genitourinary Pathology, Department of Pathology, University of Pittsburgh Medical Center (UPMC).

Whole slide imaging technology and computer accessibility have advanced to the point that virtual microscopy can be integrated into a pathology residents' educational activities. The digital teaching set we developed provided additional benefits of using the glass slides.



**ePathology - eMobile - eLearning**



# Lets Not Forget Research Collaboration

## UCLA Pathology & Laboratory Medicine

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#### Sharing Samples and Skills Around the World

- Strategies to Cut the Risk of Atherosclerosis
- Wayne Grody Pioneers DNA-based Testing

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## Sharing Samples and Skills Around the World



Anatomic pathology is concerned with the study and diagnosis of disease based on the examination of human tissue. Much like biofluids, human tissue has long been a wealth of information in the clinical setting. It gives physicians important insight into disease processes, and often serves as the most important diagnostic, prognostic, and therapeutic tool in patient care.

More recently, human tissue has proved just as valuable to the biomedical research community. There is a growing need among investigators for tissue that can be used for a wide range of molecular, biochemical, and tissue analyses. Since 1996, these services have been provided by the UCLA Translational Pathology Core Laboratory (TPCL). This lab collects, processes, stores, and distributes human remnant tissue from routine surgical resections for use by investigators in basic science, translational and clinical research studies.

"In the past, there was no central resource for translational pathology services on campus," explained Sarah Dry, Associate Professor in the Department and Director of the TPCL. Instead, individual research teams would tackle the tedious process of identifying, procuring, processing, and storing their own tissue specimens. It was a difficult and time consuming process that few researchers managed to master. To address this, the Department of Pathology and the Jonsson Comprehensive Cancer Center together supported the creation of TPCL.

# The Challenges Are Real But Not Insurmountable

- Desire
- Training
- Resources
- IT Infrastructure
- Maintenance
- Quality of Histology Prep from Referring Source
- Regulatory Issues of Referring Country and Liability
- Other.....

# Telepathology Funding: A Plea

## Summary

Telepathology – a wonderful gift for effective healthcare has materialised only because of advances in information technology, namely the internet. It has the potential to provide satisfactory diagnosis even in the most remote places and thereby help alleviate the sufferings of mankind. Hence a positive impetus from local government and national and international scientific bodies is required especially in regions where pathology services are scarce and most needed.

Please cite this paper as: Sankaye SB, Kachewar SG.  
Telepathology for effective healthcare in developing nations.  
AMJ 2011, 4, 11, 592-595  
<http://dx.doi.org/10.4066/AMJ.2011.855>



# WHY ePathology NOW?

Patients  
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Globally -

