HONG KONG
July 15-16,
Harbour Grand Kowloon

APTOS 2017

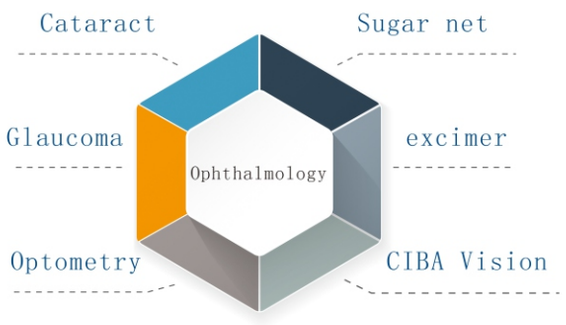
The 2nd Asia Pacific Tele-Ophthalmology Society Symposium

FINAL PROGRAM

北京远程视界眼科医院管理有限公司

Beijing Remote Horizon Department Of Ophthalmology Hospital Management Co.,Ltd

Company Profile



Beijing Remote Horizon Depariment Of Ophthalmology Hospital Management Co., Ltd. was founded in 2012 as a subsidiary of the Beijing Remote Horizon Technology Group, which is currently the largest specialist consortium dedicated to telemedicine in China. With our unique online to offline (O2O) platform, we have developed advanced telemedicine consultation services, online medical services, and smart healthcare to provide management services for hospitals, covering diseases and services such as cataract, diabetic retinopathy, glaucoma, excimer laser, optometry, and vision health.

Offline services are offered through our extensive hospital networks. Our telemedicine centers consist of a 3-tier networking system connecting a national hospital, a provincial hospital and a grade 2A county public hospital. Through software and system support, we provide an excellent cloud platform for hospitals to develop telemedicine consultations services.

In the meantime, we are actively engaged in exploring and developing a brand-new model of online medical services. With the Internet and cloud computing, we are building a big data platform where medical imaging pictures, health files, examination reports, electronic health records, etc. can be shared among hospitals.

New technologies have facilitated smart living and we are here to take it one step further – to individualized smart healthcare management. We have devised the "Cloud Service for a Healthy China" initiative. Using the Internet and new technologies such as the Internet of Things (IoT), cloud computing and wearable devices, we raise the health consciousness of the public by disseminating important healthcare information on a public platform and through the provision of individualized smart healthcare management services such as long-term tracking and predictive alerting.

In the rapid course of our development, we never neglect our social responsibility and have a long-standing commitment to philanthropy. By strategizing our philanthropy programs, we use our innovations and cutting-edge technologies to benefit the public, the needy in particular. We have undertaken a variety of charity projects, including vision restoration for cataract patients suffering from poverty, fundraising walkathons, the "Light of the Ocean" cataract initiative, and training programs for doctors serving in counties. We precisely match our services with the needs, effectively delivering poverty-alleviating aids and facilitating the sedimentation of quality medical services from the national level to the county level. With our dedication and vision for the remote areas, we provide a solution to the unequal distribution of quality medical services in cities, counties and villages by rebalancing the resources through telemedicine. It is our mission to tackle the difficulty and the high cost of seeing a doctor so that every patient, regardless of their economic status, will be able to afford and enjoy quality healthcare.

北京远程视界眼科医院管理有限公司

Beijing Remote Horizon Department Of Ophthalmology Hospital Management Co.,Ltd

公司简介

北京远程视界眼科医院管理有限公司成立于2012年，隶属于北京远程视界科技集团，是目前国内规模最大的专注专科远程医疗联合体O2O平台，开展有远程医疗会诊、互联网医疗、智慧医疗等，在白内障、糖网、青光眼、准分子、视光、视康等病种上提供医院管理服务。

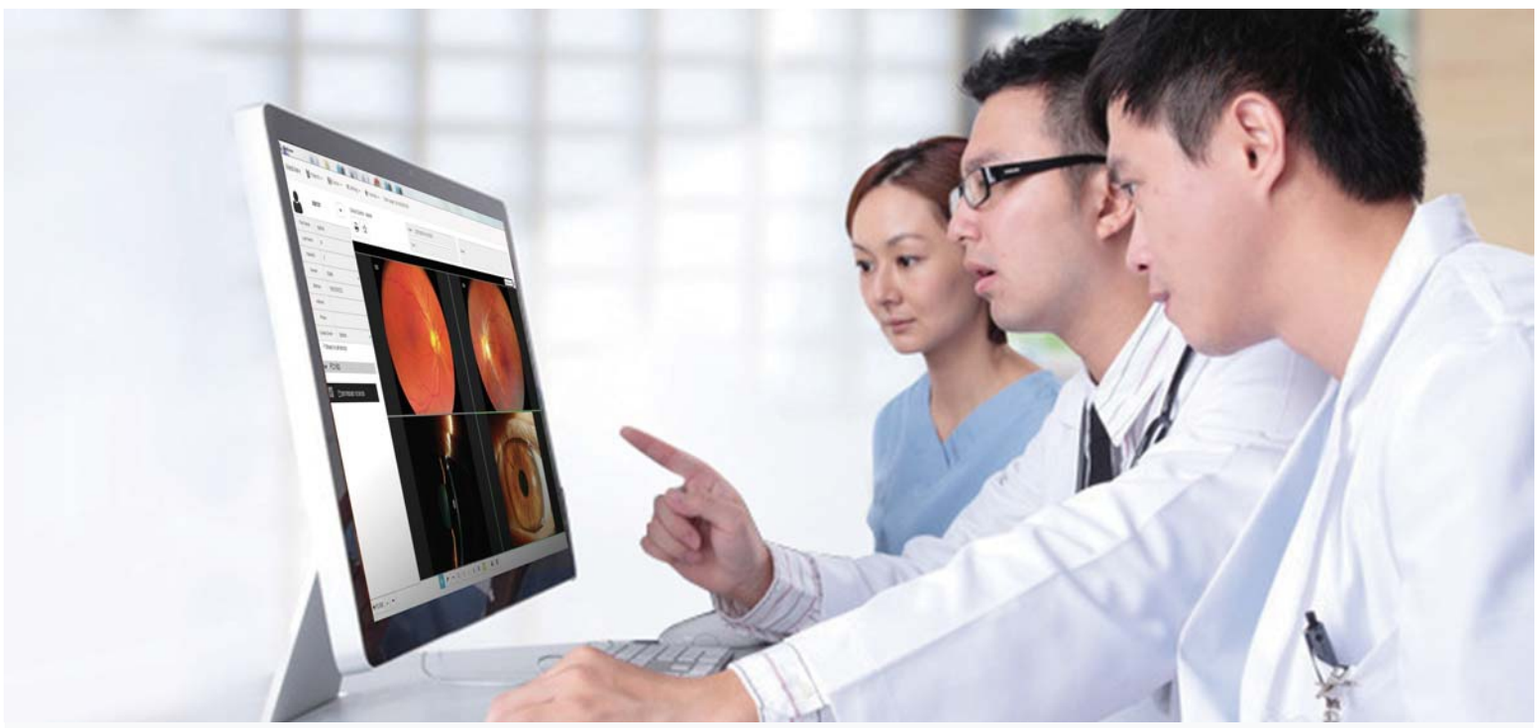
线下，公司以国家级、省级远程会诊中心，县市级二甲公立医院为基地建立三级会诊网络体系，形成以眼科远程会诊中心，通过提供软件系统支持，开展云平台互联网远程会诊医疗服务。

同时，公司积极开拓在线医疗卫生新模式，发展基于互联网的医疗卫生服务，构建医学影像、健康档案、检验报告、电子病历等医疗信息共享服务平台，逐步建立跨医院的医疗大数据平台。

在智慧医疗方面，开展“健康中国云服务计划”。积极利用移动互联网、物联网、云计算、可穿戴设备等新技术，推动惠及全民的健康信息服务和智慧医疗服务。利用云计算、大数据等技术搭建公共信息平台，提供长期跟踪、预测预警的个性化健康管理服务。

公司在迅速发展的同时，也积极承担社会责任，把公益慈善作为企业的长期发展战略。开展了各种慈善公益项目,包括贫困白内障患者复明工程”公益援助项目、“集善扶贫健康行”公益项目、“海之光”贫困白内障公益基金、“千县万医”培训工程等，这些公益项目将精准医疗与精准扶贫有效结合起来，在助推扶贫攻坚任务的落实的同时,推动了优质的医疗资源逐级下沉，弥补分级诊疗市、县、乡三级医疗机构医疗资源的缺失，解决老百姓看病难、看病贵的问题。

MediWorks



Medicloud Telemedicine Solution

Anytime, Anywhere, Safe, Open

Shanghai MediWorks Precision Instruments Co.,Ltd.

Add:Zone A,2nd Floor,No.69,Lane 1985,Chunshen Road,Minhang District,Shanghai,200237,China
Tel: +86-21-54260421 54260423 Fax:+86-21-54260425 Email: international@mediworks.biz

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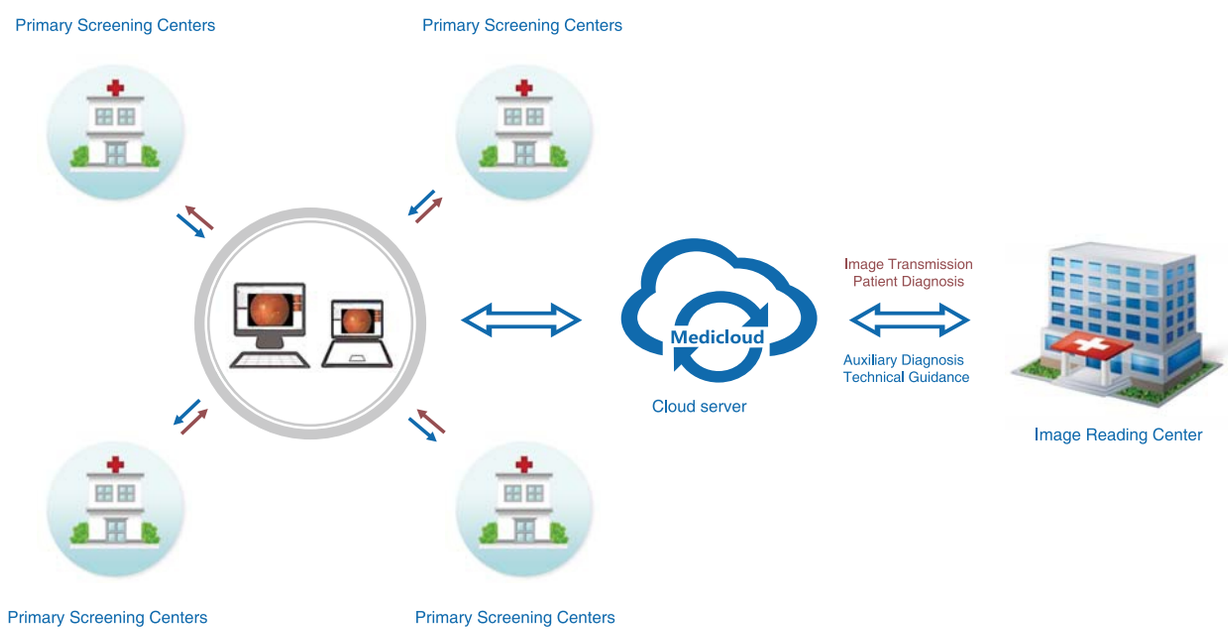
As a cloud-based platform, Medicloud can be installed conveniently and put into use quickly. It supports to add multiple clients to operate online image review and diagnosis.

Enhance the development of primary hospitals
Medicloud solution focus on primary medical centers and community clinics which provide common ophthalmic disease screening service.It let more people enable to obtain prompt and professional eye health diagnosis.The service level of these institutions can be largely improved by the Medicloud system.

Promote brand establishment of central hospitals
Medicloud also aims to build up 'Ophthalmic Telemedicine Center' in central hospitals to accomplish online image review and report delivery. With Medicloud, central hospitals and primary hospitals can guide the patients to achieve two-way diagnosis between hospital and primary health care center thus improving primary hospitals service level and patients' satisfaction.



Medicloud PC version

Medicloud App version

Medicloud App Version

Image capture, Patient case management, Cloud data transfer, Image review and diagnosis, Report delivery, Telediagnosis, two-way diagnosis between hospital and primary health care center, Patient situation track

Open Platform

Medicloud is open to all kinds of ophthalmic inspection device and also support DICOM. It can connect to PACS system and customize functions to meet different users' demand.

Safe and reliable

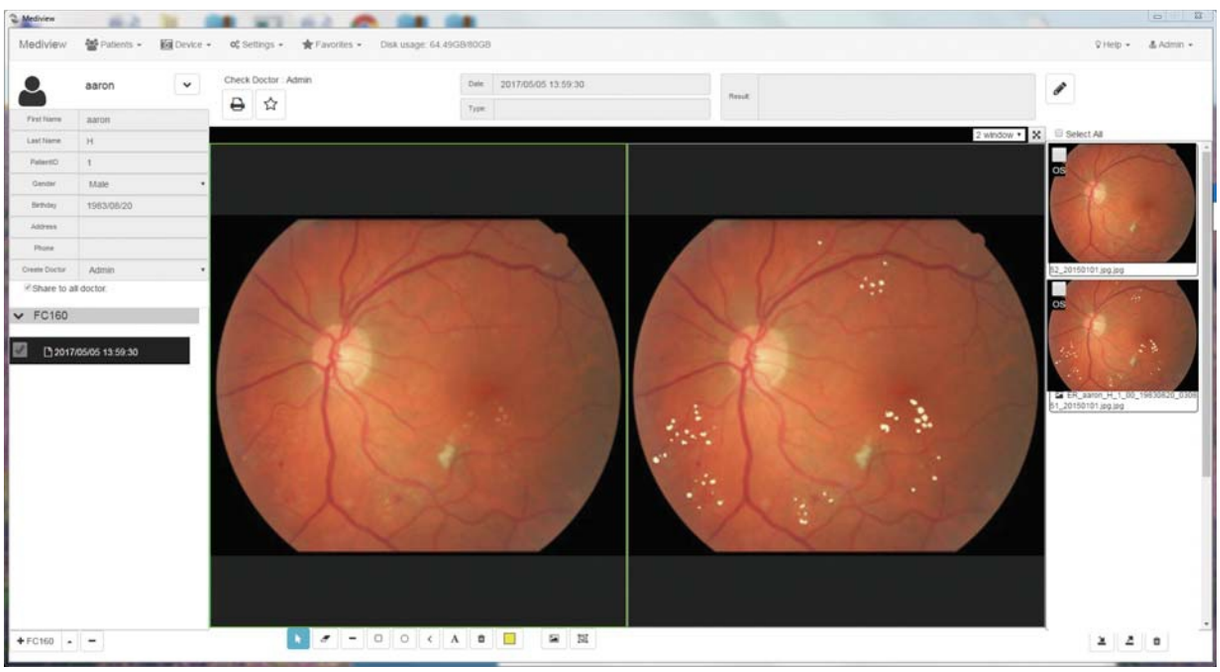
The data transfer is encrypted by SSL and is two-way certified by digital certificates to provide super safe data storage solution to users.

Medicloud—Hardware Device

As a professional ophthalmic diagnostic device manufacturer, MediWorks can provide digital slit lamps, portable slit lamps, vision charts, vision screeners and anterior segment analystic device,etc to seamlessly connect with Medicloud.

These device covers a wide area of primary eye care examination such as youth sight screening, cataract examination, glaucoma examination, diabetic retinopathy, retina diseases examination .

Medicloud supports third party Artificial Intelligence Image Review System to grade DR screening images.



Standard Features

Medicloud Installing Software
Mobile App Installing Software
Cloud Server
Home Server (option)
Computer and Network Equipment
Ophthalmic Diagnostic Device (Digital Slit Lamp , Hand-Held Fundus Camera , Vision Chart , Portable Slit Lamp , Vision Screeners)

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Details Make the **Difference**

CONTENTS

FOREWORD

From Congress President

Dear Friends & Colleagues,

Artificial intelligence (AI), deep learning, convolutional neuron network, and automation have become the most widely used keywords in our grant applications, buzzwords on Google and hot topics in the news.

While AI has the potential to transform the way we practice medicine, there are challenges to overcome. For example, convolutional neuron network works very well in analyzing visual images, but it is like a black box – very few people understand how it works. Although computer scientists are working hard to improve its performance, this is impossible without working closely with ophthalmologists or service providers with clinical data. Eye care professionals are yet to fully embrace AI when they are not sure if AI is a friend of a foe. Will AI create new opportunities for them? Or will it simply take over their job?

The aim of this year's annual meeting of the Asia Pacific Tele-Ophthalmology Society (APTOS) is to share knowledge and to offer a platform for fruitful discussions. With our roundtables, we hope to reach an initial consensus on how to properly design and technically run AI-based telemedicine with recommendations on how to translate this into clinical practice with maximized benefit to our patients.

We are grateful for the participation of the over 300 registrants from 23 countries who are joining us at APTOS 2017. Our meeting will be a starting point for further interactions and collaborations.

Helen Keller said, alone we can do so little, together we can do so much!!

I wish you a wonderful time in Hong Kong and look forward to

meeting every one of you.

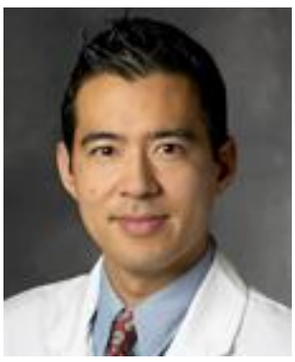
Yours sincerely,

Mingguang HE, MD, PhD
Congress President, APTOS 2017
President, Asia Pacific Tele-Ophthalmology Society
President, Asia Pacific Tele-Ophthalmology Alliance

FOREWORD AND WELCOME MESSAGES

FOREWORD

From Scientific Program Committee Chair



Dear Friends and Colleagues,

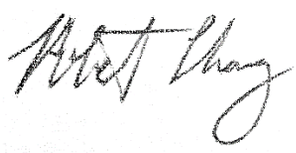
We are excited you have joined the Asia Pacific Tele-Ophthalmology Society (APTOS) 2nd Annual Symposium. This year's theme focuses on enabling telemedicine through deep learning. Today, our society is experiencing a major transformation, having transitioned from the industrial age to the information age to the age of machine intelligence – the Artificial Intelligence (AI) Revolution.

It is critical for the future of our medical profession to understand this new powerful technology and to be able to adapt as this game changing tool is used to enhance medical decision making. We are fortunate to have distinguished international faculty from both the eye community and industry to share their work and experience on this topic.

This is truly a unique eye meeting intended to generate enthusiasm for the potential of AI and to foster innovative research collaborations. I hope you will be inspired to play a role in shaping the AI revolution!

Welcome to the cosmopolitan city of Hong Kong, and I wish you a wonderful stay.

Yours sincerely,



Robert CHANG, MD
Scientific Program Chair, APTOS 2017
Vice-President, Asia Pacific Tele-Ophthalmology Society

WELCOME MESSAGE

From Secretary-General, Asia-Pacific Tele-Ophthalmology Society

Dear Friends & Colleagues,

On behalf of the Asia Pacific Teleophthalmology Society (APTOS), I welcome you to the 2nd APTOS Symposium.

Just over one year ago, the Inaugural Symposium of our Society was held in Beijing. Since then, APTOS has made its mark by advancing the exchange of ideas and foster collaborations among its growing number of members.

Despite its diversity in the level of development of its health systems, our region is progressing fast in applying telecommunication technologies to the delivery of health care. Our Society aims to bring together individuals, institutions and organizations to share their knowledge and collaborate to improve efficiency and quality of eye care by better utilizing these technological advances.

Over the next two days, the Symposium program offers a rich collection of free paper presentations, e-posters and videos, describing a broad range of telehealth and teleophthalmology applications.

The opening session will feature the inauguration of the International Diabetic Retinopathy Forum and four keynote lectures covering deep learning, artificial intelligence, breakthroughs in telemedicine and its applications.

I further encourage you to join the APTOS Roundtable on Sunday morning, to discuss challenges and solutions to incorporating artificial intelligence into telemedicine screening.

I also welcome all APTOS council members to our 3rd Council Meeting on Saturday.

All Symposium abstracts will be available from page XX and in the electronic proceedings available to each delegate.

For now, I wish you an interesting and successful Symposium.

Enjoy Hong Kong.

Yours sincerely,

Andreas MÜLLER, MPH, PhD

Secretary-General, Asia-Pacific Tele-Ophthalmology Society

FOREWORD AND WELCOME MESSAGES

WELCOME MESSAGE

From President-Elect, International Diabetes Federation (IDF)

Dear Colleagues,

It is my honor and privilege to participate in the 2nd Asia Pacific Tele-Ophthalmology Society (APTOS) Symposium.

According to the latest release of the 7th edition of International Diabetes Federation (IDF) Diabetes Atlas, it is estimated there are 415 million people with diabetes in the world, and 267 million (64.3%) live in Asia (Middle East, South East, and Western Pacific). The numbers are expected to increase to as high as 642 million by 2030, and 66.5% (427.1 million) of the people with diabetes will be residing in Asia. The state of diabetes "destruction" is occurring all over the world, but more prevailing and alarming in the Asian population.

Our enemy, diabetes, is countless, powerful, growing fast, and is currently unstoppable. IDF is doing our best to stop this global health disaster, but currently IDF is not strong enough to fight against our common enemy "diabetes". It is so good to know that we, IDF, have allies like APTOS to stand in the front line of the battle field to fight against diabetes, especially in the field of Diabetes Retinopathy. More than 93 million people currently suffer some sort of eye damage from diabetes. It is more problematic in low and middle income countries where there is shortage of ophthalmologists, limited access to care and medicine.

Timely treatment can prevent almost all vision loss associated with diabetes, so regular eye exams become essential for all those living with diabetes. Regular eye screening should begin with primary health care. Early detection and treatment of diabetes retinopathy can slow down the deterioration of sight and reduce the burden of vision loss on individuals, their carergivers and society. However, the problem of early detection is the availability of screening, especially in developing countries and remote rural areas. Thus, IDF is in progress of developing a diabetes retinopathy screening program by utilizing tele-ophthalmology in remote areas, and low and/or middle income countries.

Let us work together to build a new medical system for screening and detecting diabetes-related eye diseases so that people living with diabetes will be able to see rainbows for many years to come.

Finally, on behalf of the IDF, I would like to congratulate APTOS on its past activities as well as successfully hosting the 2nd scientific meeting in Hong Kong.

With best regards,

Nam Han CHO, MD, PhD, CCD
President-Elect, International Diabetes Federation (IDF)

FOREWORD AND WELCOME MESSAGES

HOSTS

Asia-Pacific Tele-Ophthalmology Society

(APTOS)

Founded by a group of outstanding tele-ophthalmology specialists in the Asia-Pacific region in May 2016, the Asia Pacific Tele-Ophthalmology Society (APTOS) aims to bring together clinicians, researchers, technicians, institutes and organisations to form an alliance that promotes communication, exchange and collaboration in tele-ophthalmology. It provides a platform on which eye care or tele-medical professionals can share knowledge and collaborate to deliver efficient, accessible and quality universal eye care throughout the region.

Contact us:
APTOS Secretariat
c/o Centre for Eye Research Australia
Level 7 Peter Howson Wing, 32 Gisborne Street
East Melbourne VIC 3002
Australia
Webiste: www.asiateleophth.org
Email: secretariat@asiateleophth.org

Asia-Pacific Tele-Ophthalmology Alliance

(APTOA)

Wechat QR Code

全国眼科远程医疗联盟是集合各大三甲医院眼科专家为主体,将优质的医疗服务集合,为眼科医生提供培训、交流、互动平台。

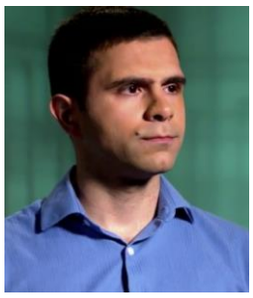
SCIENTIFIC PROGRAM COMMITTEE & FACULTY

Chair:	Co-Chair:
	
Robert CHANG (US)	Mingguang HE (Australia)

Keynote Speakers			
			
Nam Han CHO (South Korea)	Andre ESTEVA (US)	Divya NAG (US)	Tien-Yin WONG (Singapore)

Invited Speakers			
			
Robert CHANG (US)	Varun GULSHAN (India)	Mingguang HE (Australia)	Wei HE (China)

COUNCILS AND COMMITTEES

Invited Speakers			
			
Yogesan KANAGASINGAM (Australia)	Ryo KAWASAKI (Japan)	Jochen KUMM (US)	Theodore LENG (US)
			
Haotian LIN (China)	Darius MOSHFEGHI (US)	Andreas MÜLLER (Australia)	Gavin TAN (Singapore)
			
Suman THAPA (Nepal)	Raviila THULASIRAJ (India)	Lin-Chung WOUNG (Taiwan)	Reza ZADEH (US)

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叶　剑（第三军医大学大坪医院眼科）
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侯宝杰（武警总院主任医师）
吴　烈（广安门中医院的眼科主任）

PROGRAM OVERVIEW

July 15, 2017 (Saturday)

	Registration	Grand Ballroom
8:30-9:00		Registration
9:00-10:30		Opening Ceremony w/ Live Demonstration of Tele-Ophthalmology Consultation
10:30-11:00		Morning Tea & Exhibition
11:00-12:00		Keynote Session: Artificial Intelligence
12:00-13:15		Lunch & Exhibition
13:15-14:15		Keynote Session: Tele-Ophthalmology
14:15-15:00		Inauguration of the International Diabetic Retinopathy Forum w/ Live Demonstration of DR Tele-Treatment
15:00-15:30		Afternooon Tea & Exhibition
15:30-17:15		APTOS Symposium 1
18:15-20:00		Welcome Drinks & Exhibition/ First-Time Attendee Happy Hour

* The APTOS Roundtable Discussion on Tele-Ophthalmology will be held at 17:15 – 18:00 in Salon I.

July 16, 2017 (Sunday)

	Registration	Grand Ballroom
8:30-9:00		Registration
9:00-10:00		APTOS Symposium 2
10:00-11:00		APTOS Symposium 3
11:00-11:30		Morning Tea & Exhibition
11:30-12:45		APTOS Symposium 4
12:45-14:00		Lunch & Exhibition
14:00-15:30		Free Paper Session 1
15:30-15:45		Afternooon Tea & Exhibition
15:45-17:15		Free Paper Session 2

SCIENTIFIC SESSIONS

DAY 1 – JULY 15, 2017 (Saturday)

Time	Venue	Type	Theme
09:00 – 10:30	Grand Ballroom	Opening	Opening Ceremony & Tele-Ophthalmology Clinic Live Demo
11:00 – 12:00	Grand Ballroom	Keynote	Keynote Session: Artificial Intelligence
13:15 – 15:00	Grand Ballroom	Keynote	Keynote Session: Tele-Ophthalmology
15:30 – 17:15	Grand Ballroom	Symposium	Enabling AI & Telemedicine
17:15 – 18:00	Salon I	Roundtable	APTOS Roundtable on Tele-Ophthalmology Development – Challenges & Solutions to Incorporating Artificial Intelligence into Telemedicine Screening

DAY 2 – JULY 16, 2017 (Sunday)

Time	Venue	Type	Theme
09:00 – 10:00	Grand Ballroom	Symposium	AI Use Cases 1
10:00 – 11:00	Grand Ballroom	Symposium	AI Use Cases 2
11:30 – 12:45	Grand Ballroom	Symposium	Tele-Ophthalmology in the Asia-Pacific Region
14:00 – 15:30	Grand Ballroom	Free Paper	Free Paper Session 1
15:45 – 17:15	Grand Ballroom	Free Paper	Free Paper Session 2

CONGRESS INFORAMTION

Name of Event
The 2nd Asia Pacific Tele-Ophthalmology Society Symposium (APTOS 2017)

Venue
Harbour Grand Kowloon, Hong Kong

Registration Counter & Delegate Bag Collection
Location: Foyer, 1/F, Harbour Grand Kowloon

On-Site Payment
On-site payment with cash and credit card can be made at the registration and payment counter.

Delegate Bag Pick Up – Registration Counter
Delegates can collect their delegate bags at the registration counter.

Coffee Breaks & Buffet Lunch
Coffee and refreshments are served between sessions in the morning and in the afternoon. Buffet lunch is inclusive in the registration and served at Promenade, G/F, Harbour Grand Kowloon.

Policies
No Smoking Policy
Smoking is strictly prohibited in all session rooms, meeting and exhibition areas. Your cooperation is appreciated.

Photographing in Exhibition Hall
Attendees wishing to photograph or videotape an exhibit must obtain permission from the relevant company beforehand.

Photographing or Videotaping for Scientific Sessions
Photographing and/or videotaping during any of the Scientific Sessions are strictly prohibited. (Permission must be obtained in advance by media representatives.)

Re-Issue of Delegate Badge
Reissuing of delegate badges will be available at the Registration. Badges are non-transferable. An administration fee of USD20 may be incurred for re-issuing a delegate badge.

Speaker Ready Room/Preview Room – Salon II
Opening Hours:

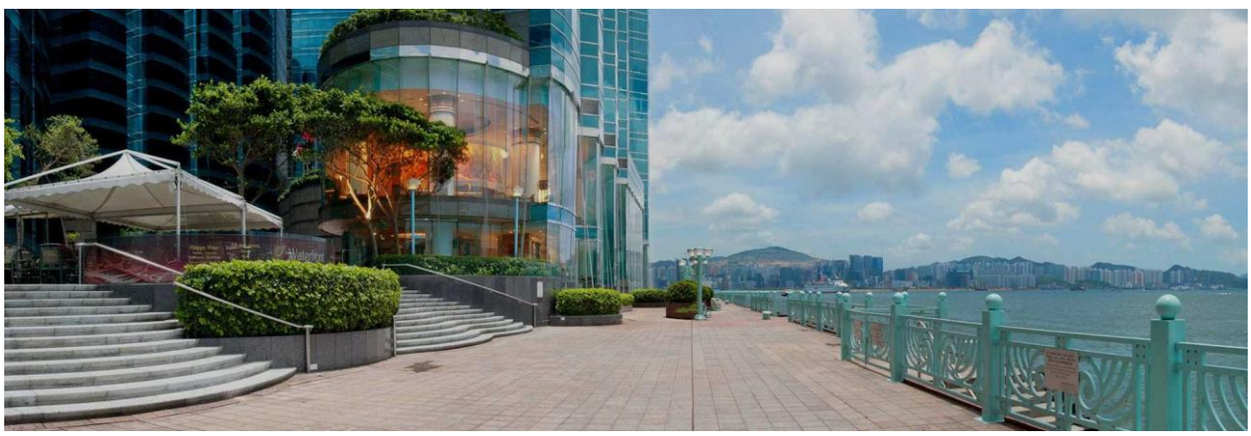
Date	Time
July 15, 2017	0800-1730
July 16, 2017	0830-1500

E-Poster & Video Platform – Foyer, Grand Ballroom
Delegates can visit the E-poster and Video Platform located at the foyer of Grand Ballroom.

■ GENERAL INFORMATION

Congress Venue

The 2nd Asia Pacific Tele-Ophthalmology Society Symposium will be held in Harbour Grand Kowloon, Hong Kong.



Equipped with world-class business and recreation facilities, Harbour Grand Kowloon is an ideal location for any special occasion or successful business conference.

Venue Information

Address: 20 Tak Fung Street, Whampoa Garden, Hunghom, Kowloon, Hong Kong
Phone: + 852 2621 3188

Wifi Login

SSID: Salon I / Salon II / Ballroom-1 / Ballroom-2
Password: **APTOS2017**

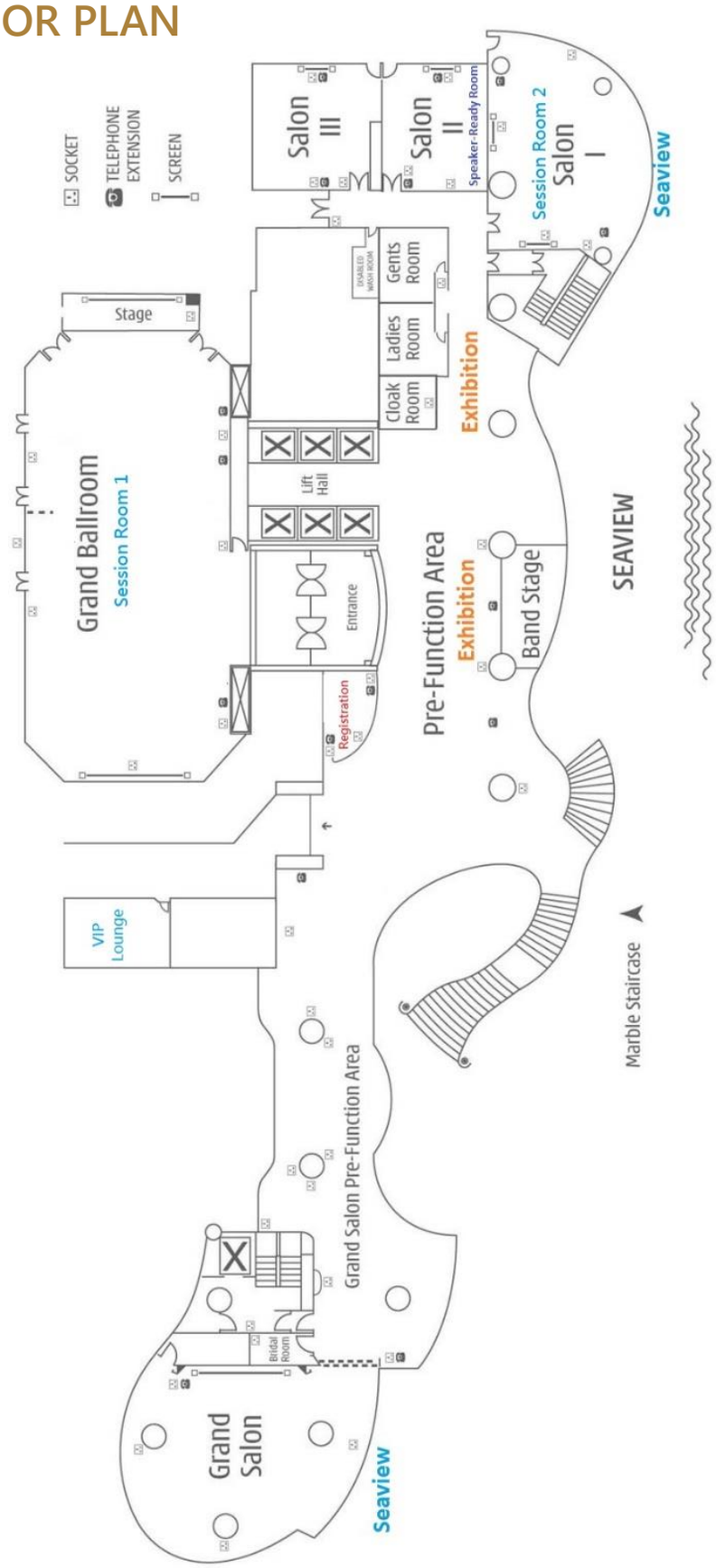
SOCIAL PROGRAM

First-Time Attendee Happy Hour & President's Reception

Date: July 15, 2017
Time: 6:15 – 8:00 pm
Venue: Exhibition Hall, 1/F, Harbour Grand Kowloon
Format: Cocktail Reception

The event is free-of-charge to all delegates while first-time attendees will enjoy priority in securing a spot.

FLOOR PLAN


SOCKET
TELEPHONE EXTENSION
SCREEN
Salon III
Salon II
Speaker-Ready Room
Session Room 2
Salon I
Seaview
Gents Room
Ladies Room
Cloak Room
Exhibition
Stage
Grand Ballroom
Session Room 1
Lift Hall
Entrance
Registration
Pre-Function Area
Exhibition
Band Stage
SEAVIEW
VIP Lounge
Marble Staircase
Grand Salon Pre-Function Area
Bridal Room
Grand Salon
Seaview

■ CORPORATE PARTNERS

Diamond Sponsor:

北京远程视界集团
Beijing Remote Horizon Group

Beijing Remote Horizon Eye Hospital Management Co., Ltd. was founded in 2012 as a subsidiary of the Beijing Remote Horizon Technology Group, which is currently the largest specialist consortium dedicated to telemedicine in China. With our unique online to offline (O2O) platform, we have developed advanced telemedicine consultation services, online medical services, and smart healthcare to provide management services for hospitals, covering diseases and services such as cataract, diabetic retinopathy, glaucoma, excimer laser, optometry, and vision health.

北京远程视界眼科医院管理有限公司成立于 2012 年，隶属于北京远程视界科技集团，是目前国内规模最大的专注专科远程医疗联合体 O2O 平台，开展有远程医疗会诊、互联网医疗、智慧医疗等，在白内障、糖网、青光眼、准分子、视光、视康等病种上提供医院管理服务。

线下，公司以国家级、省级远程会诊中心及县市级二甲公立医院为基地建立三级会诊网络体系，形成以眼科远程会诊中心，通过提供软件系统支持，开展云平台互联网远程会诊医疗服务。

同时，公司积极开拓在线医疗卫生新模式，发展基于互联网的医疗卫生服务，构建医学影像、健康档案、检验报告、电子病历等医疗信息共享服务平台，逐步建立跨医院的医疗大数据平台。

在智慧医疗方面，开展“健康中国云服务计划”。积极利用移动互联网、物联网、云计算、可穿戴设备等新技术，推动惠及全民的健康信息服务和智慧医疗服务。利用云计算、大数据等技术搭建公共信息平台，提供长期跟踪、预测预警的个性化健康管理服务。

Hotline: (+86) 400-656-2020
Website: http://corp.yk2020.com/

Gold Sponsor:

Shanghai MediWorks Precision Instruments Co., Ltd. (NEEQ: 837871) was founded in 2004 with the belief that fine details will make a difference in user experience. The team consists of experienced mechanical, optical, software, electronic and algorithm engineers specialized in the optical industry. The team works relentlessly to pursue products with practical design and good optical quality. With more than ten years' development, MediWorks has now developed a series of reliable ophthalmic diagnostic equipment with high quality. We aspire to become an industry leader and we will never cease our efforts in reaching our goal.

上海美沃精密仪器股份有限公司（股票代码： 837871，股票简称：美沃股份）成立于 2004 年，专注于为医疗领域提供核心技术、产品和服务。美沃有一支专业从事光学仪器、医学影像和机器视觉的科研团队，结合尖端的光学技术、精密机械技术和电子技术，形成了光机电一体的精密医疗设备研发和制造体系。

核心产品：S 系列裂隙灯显微镜和 C 系列视力检查仪已经完成 SFDA,FDA,CE 注册，经过多年的市场实践经验，获得了国内外客户的一致好评。

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Website: http://www.mediworks.biz/

Bronze Sponsor:

Healgoo AI
A real world solution

Healgoo specializes in Research and Development of medical technology, and is dedicated to providing an advanced medical information platform and integrated healthcare solutions for medical institutions. Our products are all designed for high quality healthcare service delivery, specially our telemedicine and Cloud Technology, to meet the demands of different medical professionals. We have developed advanced products for researchers and institutions to run eye screening programs in domestic and international settings. Our clients include Zhongshan Ophthalmic Center, one of the leading eye hospitals in China, Life-Line Express, a non-profit organization based in Hong Kong, and Center for Eye Research Australia, University of Melbourne.

广州河谷互动医疗科技有限公司是一家高科技创业公司，致力于医疗大数据及人工智能诊断技术的研究，拥有多项包括智能眼底照相机在内的发明专利，Healgoo AI，EyeGrader 等产品在国内健康快车和国外澳大利亚眼科中心等得到推广和应用。公司秉承“科技，让人类更健康”的美好愿景，通过大数据和人工智能技术连接患者、医生、医疗机构，致力于提高医疗的诊疗水平和服务效率，让患者更健康，医疗更有价值。

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Website: https://www.healgoo.com/

Exhibitors:

Welch Allyn was founded in 1915 and acquired by Hill-Rom in September 2015. Welch Allyn has brought a unique perspective to developing diagnostic solutions by combining pragmatic knowledge with a visionary spirit of innovation and ongoing improvement. Since inventing the first direct-illuminating, hand-held ophthalmoscope, Welch Allyn has developed hundreds of breakthrough products and technologies to become a leading global manufacturer of physical examination instruments, and EMR-connected vital signs and cardiac monitoring solutions. With nearly 2,600 employees, Welch Allyn continues to focus on the customer and imagine how healthcare will be delivered in the future to develop tools and future-proof technologies.

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Website: www.welchallyn.com

北京神州视翰科技股份有限公司
Beijing China Shine Technology CO.,LTD

北京神州视翰科技股份有限公司成立于 2010 年，公司注册资本 1180 万元，现有员工 400 余人，专业技术人员超过百人。公司总部在北京海淀核心区域，是国家级高新技术企业、中关村创新示范企业，现已拥有 8 项国家发明专利、66 项软件著作权。公司在武汉、东莞两地分别设立软件研发、生产基地。在浙江、山东、四川、辽宁、贵州、陕西、河南、江苏、上海建立办事处等分支机构，初步完成全国范围的生产、销售、服务布局。公司 90%服务客户处于 1 小时服务圈内。目前公司已经为国内超过 800 多家医院提供信息化服务，产品遍布医院门诊、病房、远程医疗等区域。最近 3 年，公司一直保持高速增长，年复合增长率不低于 30%。

公司作为国内一流的“医疗信息化专业解决方案提供商”，目前能为医院提供“智慧门诊综合解决方案”、“病房数字化服务平台”、“远程医疗视频协作平台”、“医疗物联网解决方案”等四个方向的产品及信息服务。

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Phone: (+80) 51630706-527
Email: liaiyang@shine.com.cn
Website: http://www.china-shine.com.cn

KEYNOTE LECTURES

Professor Nam Han CHO, MD, PhD, CCD

South Korea

Professor Nam H. Cho is currently the President Elect of the International Diabetes Federation (2015-2017), and President of IDF (2017-2019), also holds the postion of Preventive Medicine and Director of Clinical Epidemiology at the ajou Univeristy Hospital, South Korea.

He is due to be the Program chairman of 2017 Abu Dhabi World Diabetes Congress, and Chairman of the IDF diabetes Atlas since 2015. He published more than 150 scientific findings in SCI journals, as well as publications including; textbook chapters in Gestational Diabetes Mellitus, Osteoporosis, and Metabolic Syndrome. He has been co-author of clinical Guidelines Task Force, Global Guideline for Type 2 Diabetes, and Global Guideline for Gestational Diabetes Mellitus.

He is the Founder and President of Jeremiahs Hope Korea-humanitarian Medical service to Cambodia and Founder of Cambodia-Korea National Diabetes Ceneter in Kossamak Hospital, Phnom Penh Cambodia.

He received the Chivalic Royal order with Mahasena Grade (Grand Officer) Insignia from the King of Kingdom of Cambodia in July 2015 for 15 years of humanitarian medical services.

Diabetes and Telemedicine: IDF Focus on Diabetes Retinopathy
Jul 15, 2017, 13:30 – 14:00
Grand Ballroom

2015 IDF Diabetes Atlas, 7th edition uses age-stratified data and a consistent methodology to estimate the diabetes prevalence in adults aged 20-79 years, across 170 countries and territories. Diabetes is one of the largest global health emergencies of the 21st century. Each year more and more people live with this condition, which can result in life-changing complications. Approximately 415 million people worldwide, or 8.8% of adults aged 20-79, are estimated to have diabetes, and there are 318 million adults with impaired glucose tolerance which put these adults at high risk of developing diabetes in the future. About 75% live in low- and middle-income countries. If these trends continue, by 2040 some 642 million people, or one adult in ten, will have diabetes. The largest increases will take place in regions where economies are moving from low- to middle-income levels. Currently there are more people with diabetes in urban (269.7 million) than in rural (145.1 million) areas. In low- and middle-income countries, the number of people with diabetes in urban areas is 186.2 million while 126.7 million live in rural areas.

Approximately 5.0 million people globally, between 20 and 79 years of age, died from diabetes in 2015, equivalent to one death every six seconds. Diabetes accounted for 14.5%

of global all-cause mortality among people in this age group. Close to half (46.6%) of deaths due to diabetes are in people under the age of 60. The highest number of deaths due to diabetes occurred in countries with the largest numbers of people with diabetes: China, India, USA, and the Russian Federation. Diabetes related morbidities such as macrovascular and microvascular diseases are yet to be tackles effectively. On of area the IDF put more emphasis is in diabetes retinopathy. Diabetes retinopathy effects over on third of all people with diabetes and is the leading cause of vision loss in working-age adult. The management of diabetes and its complications begins in primary health care and this should include screening for diabetic retinopathy. Moreover, more conservative estimates suggest health spending on diabetes accounted for 11.6% of the total health expenditures worldwide in 2015. Over 80% of the countries covered in this report dedicated between 5% and 20% of their total health expenditure to diabetes. Furthermore, global health spending to treat diabetes and prevent complications was estimated to be 673 in 2015, and projected to exceed 802 billion US$ by 2040. Thus, placement of economical, efficient, and effective diabetes care management system, such as telemedicine are critical to prevent diabetes related morbidity and mortality in the future.

KEYNOTE LECTURES & AWARDS

KEYNOTE LECTURES & AWARDS

Andre ESTEVA

United States

Andre is currently a 5th-year PhD Candidate in Artificial Intelligence at Stanford University, advised by Sebastian Thrun, where he is interested in broadly applying AI & machine learning to high-impact domains. His current research is in AI for healthcare, with a focus in dermatology. His work has been widely covered by the WSJ, Fortune, BBC, and others .

He finished undergraduate degrees in Electrical Engineering and Mathematics (highest honors) from UT-Austin and was awarded the Outstanding Scholar-Leader Award for academics and leadership on campus - the highest honor awarded to a graduating engineering senior.

Artificial Intelligence in Detecting & Tracking Skin Conditions
Jul 15, 2017, 11:30 – 12:00
Grand Ballroom

Skin cancer, the most common human malignancy, is primarily diagnosed visually, beginning with an initial clinical screening and followed potentially by dermoscopic analysis, a biopsy and histopathological examination. Automated classification of skin lesions using images is a challenging task owing to the fine-grained variability in the appearance of skin lesions.

Deep convolutional neural networks (CNNs) show potential for general and highly variable tasks across many fine-grained object categories. Here we demonstrate classification of skin lesions using a single CNN, trained end-to-end from images directly, using only pixels and disease labels as inputs. We train a CNN using a dataset of 129,450 clinical images—two orders of magnitude larger than previous datasets — consisting of 2,032 different diseases. We test its performance against 21 board-certified dermatologists on biopsy-proven clinical images with two critical binary classification use cases: malignant carcinomas versus benign seborrheic keratoses; and malignant melanomas versus benign nevi. The first case represents the identification of the most common cancers, the second represents the identification of the deadliest skin cancer.

The CNN achieves performance on par with all tested experts across both tasks, demonstrating an artificial intelligence capable of classifying skin cancer with a level of competence comparable to dermatologists. Outfitted with deep neural networks, mobile devices can potentially extend the reach of dermatologists outside of the clinic. It is projected that 6.3 billion smartphone subscriptions will exist by the year 2021 and can therefore potentially provide low-cost universal access to vital diagnostic care.

Divya Nag
United States

Divya Nag leads the team at Apple that created ResearchKit, an open-source developer toolbox that piggybacked on the company's HealthKit framework—which allows users to store and share health data—to allow doctors and researchers to create apps that make it easy to participate in medical research. There are now several dozens in play, including ones for autism, Parkinson's disease, and even NFL–related concussions. With ResearchKit, researchers studying everything from autism to diabetes can collect data from tens of thousands of patients via phones, rather than limiting their studies to people who can physically get to their research facilities. Now, she's bringing this data-sharing effort to the patient-physician relationship. Through Apple's new CareKit tools, doctors can automatically alert outpatients when it's time to take their medications or exercise—while patients can reciprocate with continual updates on their condition. Doctors and hospitals are already using CareKit apps to provide better care, staying in touch with post-surgery patients, and there are countless applications for monitoring diabetes, mental health, pregnancy, and more. Nag dropped out of Stanford when she was 20 years old to found Stem Cell Theranostics, a drug screening biotech, and StartX Med, the official medical innovation accelerator program for Stanford University and Stanford Hospital. She joined Apple in 2014.

Mobile Technology's Role in Advancing Ophthalmology
Jul 15, 2017, 11:00 – 11:30
Grand Ballroom
Apple's journey into the world of healthcare has uncovered unprecedented opportunities for mobile technology to play a significant role in medical research and care for consumers all around the world.

Professor Tien-Yin WONG, MD, PhD
Singapore

Professor Tien Yin Wong is Medical Director of the Singapore National Eye Centre (SNEC) where he is a senior consultant ophthalmologist sub-specialising in medical retina.

He is also the Academic Chair of the Ophthalmology & Visual Sciences Program at Duke-NUS Medical School, National University of Singapore where he is concurrently Vice-Dean, Office of Clinical Sciences, coordinating clinical and translational research strategy and execution across the SingHealth-Duke-NUS Academic Medical Centre (AMC). As Head of the Academic Medicine Research Institute (AMRI), he facilitates and plans the development and support of clinician scientists and clinician-investigators.

Prior to these roles, Prof Wong has served as Chairman of the Department of Ophthalmology, National University of Singapore, Chairman of the Department of Ophthalmology, Royal Victorian Eye and Ear Hospital, the University of Melbourne, Australia and was the immediate past Executive Director of the Singapore Eye Research Institute (SERI), where he continues to chair SERI's Board and is a Senior Principal Clinician Scientist.

Deep Learning Technology & Its Applications in Diabetic Screening
Jul 15, 2017, 14:45 – 15:26
Grand Ballroom

Diabetic retinopathy (DR) is a major complication of diabetes, and the leading cause of blindness among working adult people worldwide. About 600 million will have diabetes by 2040, with a third having DR and 10% with severe vision-threatening DR (VTDR). DR screening along with timely referral and treatment, is a universally accepted strategy for the prevention of visual impairment. Currently, DR screening by fundus photography, usually within a tele-ophthalmology framework, with assessment of the fundus photographs by human assessors (e.g., ophthalmologists, general physicians, technicians) is the most commonly used method for DR screening. However, this type of DR screening program is limited by availability and training of human assessors, and long-term financial sustainability. The need for low cost, sustainable DR screening programs is substantial.

Deep learning technology is a relatively new branch of artificial intelligence (AI) that has substantial potential for DR screening. Previous technology for automated DR screening using traditional "pattern recognition" techniques to detect specific DR lesions (e.g., microaneurysms) have been promising but has not broken the "translational gap" from research to clinical adoption. Deep learning uses much larger datasets and uses a "black box" approach to mine, extract and learn patterns and/or features to determine a disease state or condition. Recently, researchers from Google using deep learning technology have reported high sensitivity and specificity (>90%) in detecting referable DR from retinal photographs. However, for translational impact, deep learning technology should be trained and validated in "real-world" screening programs where fundus images have varying qualities (e.g. cataract,

poor pupil dilation, poor contrast/focus), and with patient samples of different ethnicity (i.e. different fundi pigmentation) and systemic control (poor and good control). Furthermore, in any screening programs for DR, the detection of incidental but common vision-threatening conditions such as glaucoma and age-related macular degeneration should be incorporated, as missing such cases may not be acceptable to clinicians. Only then will deep learning technology be applicable in large scale screening programs for DR.

KEYNOTE LECTURES & AWARDS

APTOS YOUNG INNOVATOR TRAVEL GRANTS

The Asia Pacific Tele-Ophthalmology Society will offer up to 3 travel grants for outstanding presenters and young innovators to attend the 2nd APTOS Symposium in Hong Kong. Priority will be given to young innovators who are aged 40 or below, from a developing country and whose presentations (free paper or poster) have been accepted by the Scientific Program Committee of the 2nd APTOS Symposium.

Jose Tomas ARENAS-CAVALLI, PE
Chile

Gaurav MATHUR
India

Daniel TING, MBBS, PhD
Singapore

JUL 15, 2017 (SAT)

Opening Ceremony & Tele-Ophthalmology Clinic Live Demo

09:00 - 10:30 Venue: Grand Ballroom

09:00 ***Opening Ceremony***
10:00 ***Tele-Ophthalmology Clinic Live Demo***

ARTIFICIAL INTELLIGENCE

Keynote Session: Artificial Intelligence

11:00 - 12:00 Venue: Grand Ballroom
Chair(s): Robert ***CHANG***

11:00 ***Mobile Technology's Role in Advancing Ophthalmology***
Divya ***NAG***
11:30 ***Artificial Intelligence in Detecting & Tracking Skin Conditions***
Andre ***ESTEVA***

TELE-OPHTHALMOLOGY

Keynote Session: Tele-Ophthalmology & Deep Learning in Diabetic Retinopathy

13:15 - 15:00 Venue: Grand Ballroom
Chair(s): Mingguang ***HE***

13:15 ***Telemedicine & Diabetes: IDP Challenges on Diabetic Retinopathy***
Nam Han ***CHO***
13:45 ***IDF-APTOA Diabetic Retinopathy Screening Program***
Andreas ***MUELLER***
14:00 ***Diabetic Retinopathy Tele-Treatment Live Demo***
Moritz ***WINKLER***
14:30 ***Deep Learning Technology & its Applications in Diabetic Screening***
Tien-yin ***WONG***

TELEMEDICINE

Enabling AI & Telemedicine

Computer vision deep learning algorithms are a promising tool to scale tele-ophthalmology. This symposium will introduce the concept of combining automated image analysis with eye screening.

15:30 - 17:15 Venue: Grand Ballroom
Chair(s): Robert ***CHANG***
15:30 ***Promises & Pitfalls of AI and Digital Health***
Robert ***CHANG***
15:50 ***Artificial Intelligence: Integrating Algorithms and Hardware for Clinical AI in Retinal Ophthalmology***
Jochen ***KUMM***
16:10 ***Pediatric Retina Universal Newborn Screening: Confluence of Telemedicine, Telegenomics, and Artificial Intelligence***
Darius ***MOSHFEGHI***
16:30 ***Scaling Computer Vision in the Cloud***
Reza ***ZADEH***
16:50 ***Tele-screening/Automated-screening for Eye Diseases: What do ophthalmologists expect?***
Ryo ***KAWASAKI***

TELE-OPHTHALMOLOGY

APTOS Roundtable on Tele-Ophthalmology Development - Challenges & Solutions to Incorporating Artificial Intelligence into Telemedicine Screening

17:15 - 18:00 Venue: Salon I
Chair(s): Robert ***CHANG****, Mingguang* ***HE***

17:15 ***Overview of Existing AI-Based Telemedicine Screening Programs***
Mingguang ***HE***
17:25 ***Discussion 1: Technology***
17:40 ***Discussion 2: Business Model***
17:55 ***Summary***
Robert ***CHANG***

JUL 16, 2017 (SUN)

ARTIFICIAL INTELLIGENCE

AI Use Cases 1
Multiple publications in ophthalmology have highlighted the impressive performance of deep learning neural networks against human expert graders. Hear more about these landmark papers.

09:00 - 10:00 Venue: Grand Ballroom
*Chair(s): Theodore **LENG***

09:00 ***Artificial Intelligence's Potential to Fight Blindness***
*Theodore **LENG***
09:20 ***Artificial Intelligence Platform for Multicenter Collaborative Management of Congenital Cataracts***
*Haotian **LIN***
09:40 ***Deep Learning for Automated Retinal Disease Assessment***
*Varun **GULSHAN***

AI Use Cases 2
Beyond screening, AI technology can be an ideal clinical decision support tool. This session covers different uses cases and universal accessibility via the cloud.

10:00 - 11:00 Venue: Grand Ballroom
*Chair(s): Carol **CHEUNG***

10:00 ***Deep Learning Enables Opportunistic Screening and Diagnostic Assistance***
*Mingguang **HE***
10:20 ***AI Based Clinical Decision Support System for Diabetic Retinopathy for Use by Primary Care Medical Doctors in Australia***
*Yogesan **KANAGASINGAM***
10:40 ***Telemedicine Screening for Diabetic Macular Edema***
*Gavin **TAN***

TELE-OPHTHALMOLOGY

Tele-Ophthalmology in the Asia Pacific Region
Multiple nations have rolled out tele-ophthalmology systems specific to their local healthcare environment. Understanding these similarities and differences can optimize AI-enabled versions in the future.

11:30 - 12:45 Venue: Grand Ballroom
*Chair(s): Mingguang **HE***

11:30 ***Tele-Ophthalmology in India***
*Thulasiraj **RAVILLA***
11:50 ***Tele-Ophthalmology in Taiwan***
*Lin-chung **WOUNG***
12:10 ***Tele-Ophthalmology in Nepal***
*Suman **THAPA***
12:30 ***A Comprehensive System for the Prevention and Treatment of Diabetic Eye Diseases in China***
*Wei **HE***

SUBMITTED PROGRAM- FREE PAPERS

FREE PAPER SESSION 1

14:00 - 15:30 Venue: Grand Ballroom
*Chair(s): Andreas **MUELLER***

14:00 ***Drishti: An Artificial Intelligence based Platform for detecting Diabetic Retinopathy in Retinal Data***
*Ameya **JOSHI***
14:09 ***Discussion 1***
*Ameya **JOSHI***
14:14 ***Artificial Intelligence for Automated Detection of Referable and Sight-threatening Diabetic Retinopathy, Glaucoma Suspect (GS) and Age-related Macular Degeneration (AMD)***
*Daniel **TING***
14:23 ***Discussion 2***
*Daniel **TING***
14:28 ***Clinical validation of diabetic retinopathy screening using artificial intelligence by the Chilean healthcare system***
*Jose Tomas **ARENAS-CAVALLI***
14:37 ***Profile and prevalence of macular diseases using low cost fundus imaging in rural North India***
*Gaurav **MATHUR***
14:46 ***REST – An Innovative Rapid Eye Screening Test***
*Jan Bond **CHAN***
14:55 ***Taking Eye Care to Rural Population with a Robotized Stereoscopic Teleophthalmic Slit Lamp Biomicroscope***
*Mukesh **TANEJA***
15:04 ***FORUS for Detection of Macular Diseases by Trained Optometrist to Save Eye SIGHT (FORESIGHT)***
*Gaurav **MATHUR***
15:13 ***Proof of concept for TeleVision: Acute triage for anterior segment disease.***
*Dharmendra (dave) **PATEL***
15:22 ***Effect of Training Ophthalmologists by Cybersight in China***
*Qing **LU***

FREE PAPER SESSION 2

15:45 - 17:15 Grand Ballroom
*Chair(s): Carol **CHEUNG***

15:45 ***Pushing the envelope on distance learning: creation of the global classroom***
*Danny **HADDAD***
15:54 ***Agreement on diabetic retinopathy grading in fundus photographs by allied ophthalmic personnel as compared to ophthalmologist at a community setting in Nepal***
*Raba **THAPA***
16:03 ***Assessment of patients' knowledge towards teleophthalmology in Singapore.***
*Preethi **JEYABAL***
16:12 ***Discussion 1***
*Preethi **JEYABAL***
16:17 ***The first year of government funded optometry facilitated teleophthalmology in Australia***
*Mirna **HUNTER***
16:26 ***Discussion 2***
*Mirna **HUNTER***
16:31 ***Role of remote monitoring of diurnal variation in the diagnosis and follow-up of open angle glaucoma in a tertiary health care centre***
*Mayuresh **NAIK***
16:40 ***Tele-Ophthalmology - Creating a paradigm shift in Diabetic Retinopathy Screening in India.***
*Tamilarasan **SENTHIL***
16:49 ***Comparison of the screening efficiency of epiretinal membrane using confocal scanning laser ophthalmoscope imaging and color fundus camera in elderly people.***
*Yanjiao **HUO***
17:58 ***Based on Tele – Ophthalmology Technique to Facilitate Diabetic Eye Disease Screening Model Construction under the Support of World Diabetes Federation (WDF)***
*Haisheng **ZHAO***
17:07 ***Factors influencing successful implementation of DR Telescreening at Diabetolgist clinics – First experience!***
*Deependra **SINGH***

SUBMITTED PROGRAM- E-POSTER

DEEP LEARNING

Performance of a deep learning algorithm for detecting late age-related macular degenerationon fundus photographs by different levels of manual grading complexity
*First Author: Yu **JIANG***
*Co-Author(s): Robert **CHANG**, Mingguang **HE**, Yifan **HE**, Chimei **LIAO**, Wei **MENG***

GLAUCOMA

Role of remote monitoring of diurnal variation in the diagnosis and follow-up of open angle glaucoma in a tertiary health care centre
*First Author: Mayuresh **NAIK***
*Co-Author(s): Harindersingh **SETHI***

Validation of a Deep Learning Algorithmfor Detection of glaucomatous optic neuropathyon Retinal Fundus Photographs in A Population-based Study
*First Author: Zhixi **LI***
*Co-Author(s): Mingguang **HE**, Yifan **HE**, Wei **MENG***

OCULOPLASTICS, ORBITS

Electronic stethoscope orbital auscultation in teleophthalmology
*First Author: Sunil **MOREKER***

OPTICS, REFRACTION CONTACTS

Relationship between treatment zone decentration and peripheral corneal height difference in children with orthokeratology treatment
*First Author: Yang **XIAO***
*Co-Author(s): Zhouyue **LI***

PEDIATRIC OPHTHALMOLOGY, STRABISMUS

Barriers and Facilitators for an Innovative School-based Vision Screening Model in China
*First Author: Chimei **LIAO***
*Co-Author(s): Feng **CHEN**, Ran **LIU**, Liqiong **XIE**, Jian **ZHANG***

Correlation of Visual Acuity Screening in Preschool Children between Personal Computer Software Jaeb Visual Acuity Screener (JVAS) and Tumbling E.
*First Author: Karinca **ARUNDINI***
*Co-Author(s): Irawati **IRFANI**, Iwan **SOVANI***

RETINA, VITREOUS

Computer-aided diagnosis based on enhancement of degraded fundus photographs
*First Author: Kai **JIN***
*Co-Author(s): Dahong **QIAN**, Shaoze **WANG**, Juan YE, Mei **ZHOU***

Diabetic Nephropathy and Risk of Diabetic Retinopathy in Asian Indians: The Singapore Indian Eye Study
*First Author: Chee Wai **WONG***
*Co-Author(s): Sabanayagam **CHARUMATHI**, Sieh Yean **KIEW**, Tien Yin **WONG***

Spontaneous closure of Micro Macular hole
*First Author: Yuanfei **ZHU***
*Co-Author(s): Hongbo **CHENG**, Jieting **SHE**, Tieying **ZHAO***

To Compare the efficacy of posterior subtenon triamcinolone with intravitreal triamcinolone and ranibizumab in cases of macular oedema in cases of retinal vein occlusion.
*First Author: Anurag **NARULA***
*Co-Author(s): Shilpa **SINGH***

TELE-OPHTHALMOLOGY

Diabetic Conjunctivopathy Smart Phone Selfie Photography for Screening for Diabetic Eye

Disease
*First Author: Sunil **MOREKER***

The Effectiveness of A Deep Learning Algorithm for Glaucomatous Optic Neuropathy on Retinal Fundus Photographs by Different Levels of Manual Grading Complexity
*First Author: Feng **CHEN***

The Singapore Integrated Diabetic Retinopathy Programme (SiDRP)
*First Author: Haslina **HAMZAH***
*Co-Author(s): Ecosse **LAMOUREUX**, Gavin **TAN**, Tien Yin **WONG***

Watsapp for vision hop-Effectiveness of Diabetic Retinopathy screening in camp settings using unorthodox means.
*First Author: Abhishek **ONKAR***

SUBMITTED PROGRAM- VIDEOS

ARTIFICIAL INTELLIGENCE

Auto-Diagnosis by AI
*First Author: Wei **MENG***

TELE-OPHTHALMOLOGY

Wireless Smartphone Videography for Ocular Surgery System
*First Author: Jan Bond **CHAN***

ARTIFICIAL INTELLIGENCE

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom

Artificial Intelligence for Automated Detection of Referable and Sight-threatening Diabetic Retinopathy, Glaucoma Suspect (GS) and Age-related Macular Degeneration (AMD)

*First Author: Daniel **TING***
*Co-Author(s): Wynne **HSU**, Mong **Li LEE**, Gilbert **LIM**, Gavin **TAN**, Tien Yin **WONG***

Purpose: To evaluate the diagnostic performance of deep learning system (DLS) in detection of referable DR, GS and AMD
Methods: This is a non-randomized comparative study, evaluating three novel DLS systems in detecting referable DR, GS and AMD, developed using 111,694 images, 125,189 images and 70, 986 images, respectively. On the clinical validation set consisting of 68, 932 images, we calculated the area under curve (AUC), sensitivity and specificity of DLS in detecting referable DR, GS and AMD. Referable DR was defined as moderate non-proliferative DR (NPDR) or worse, including diabetic macular edema (DME) and un-gradable images; referable GS is defined as vertical CDR 0.8 and above, local neuro-retinal rim thinning, focal notching, disc haemorrhage, retinal nerve fibre layer defect while referable AMD is defined as geography atrophy and neovascular AMD.
Results: The AUC, sensitivity and specificity were 0.94, 91% and 91% for referable DR; 0.83, 88% and 87% for referable GS and; 0.90, 80%, 79% for AMD. The positive predictive value for DR, GS and AMD were 0.10, 0.16 and 0.02, respectively whereas for negative predictive value, they were all 0.99 for 3 conditions. The repeatability of all tests was 100%.
Conclusions: DLS provides superior performance in detecting common and sight-threatening eye diseases in the national DR screening program. Such approach will have important clinical significance as this will enable the DR screening exercise to be much more comprehensive, benefiting those non-referable DR patients with signs of glaucoma or AMD to seek earlier treatment and prevent visual impairment.

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom

Drishti: An Artificial Intelligence based Platform for detecting Diabetic Retinopathy in Retinal Data

*First Author: Ameya **JOSHI***
*Co-Author(s): Bharath **CHELUVARAJU**, Kiran **MADAN**, Tathagato RAI **DASTIDAR**, Abhishek **VAHADANE***

Purpose: Diabetic retinopathy (DR) is a major cause of loss of vision in the world, especially in developing countries. We, therefore, propose a device and modality agnostic artificial intelligence (AI) based solution for detecting pathologies corresponding to DR in fundus images and Optical Coherence Tomography (OCT) scans for remote screening using our cloud platform.
Methods: We propose an AI and cloud based solution for concurrent analysis of fundus images and OCT scans, to provide a complete visualization of DR related pathologies. Ophthalmic images are ingested into our cloud platform from a remote workstation. They are analyzed to first localize various pathologies such as hard exudates, hemorrhages, neovascularization in fundus images and cysts/hard exudates in OCT scans, using a hierarchical system of U-net based deep neural networks and adaptive image processing. These localized pathologies are further sub-classified using an ensemble of convolutional neural networks, to predict presence of DR. The analysis can then be visualized on our web platform.
Results: We have achieved precision of 86.87% and recall of 90.45% for DR suggestive pathologies and precision of 78.04% and a recall of 82.58% on detecting diabetic retinopathy in a set of 240 fundus images from two fundus cameras- Topcon TRC-NW8F and Forus 3Nethra Classic. We also detect hard exudates in 200 OCT scans from a Spectralis OCT scanner with a precision and recall of 76.55% and 62.55% respectively.
Conclusions: Drishti has been found to be a helpful system for analysis and visualization of DR and the corresponding pathologies in fundus images and OCT scans.

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom

Factors influencing successful implementation of DR Telescreening at Diabetolgist clinics – First experience!

*First Author: Deependra **SINGH***
*Co-Author(s): Gaurav **MATHUR**, Ajay **SHARMA**, Saurabh **SONI***

Purpose: To retrospectively analyze the factors that influence the success of Diabetic Retinopathy (DR) Telescreening project at Diabetolgist clinics.
Methods: 40 low cost Fundus Cameras were installed at 40 Diabetolgist clinics at 15 different cities across northern India during March 2014 to Jan 2015. Retrospective analysis of these DR Telescreening projects was done. Successful implementation was defined when a Diabetolgist clinic reached a threshold number of clicks per month. The factors that could influence the success of these projects were analyzed. These factors were patient volume of the clinic, Nature of clinic – Indoor Vs exclusive clinics, specialization focus of the clinic, whether comprehensive care was offered, Charge for Telescreening service, Urban or semi-urban status, Age and qualification of the Physician, Availability of Eye Clinic or hospital in Vicinity, Interaction of Eye Surgeon or Retinologist with Physician. **Results:** At 2years 5 out of 40 Diabetolgist clinics could achieve success. The three factors that were common at clinics with successful implementations were – Clinics offering comprehensive care to diabetics, Clinics focused on Diabetics and Clinics with regular interaction with Eye Surgeon or Retinologists. 4 out of these 5 successful implementations was at clinics charging for the service. Only 1 out of 28 clinics that offered Telescreening as free service could achieve success.**Conclusions:** Implementation of DR Telescreening is more likely to be successful at clinics focused on comprehensive diabetic care with regular interactions with eye care providing teams and also if the service is not provided absolutely free of charge.

DEEP LEARNING

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom

Clinical validation of diabetic retinopathy screening using artificial intelligence by the Chilean healthcare system

*First Author: Jose Tomas **ARENAS-CAVALLI***
*Co-Author(s): Ignacio **ABARCA**, Fernando **BERNUY**, Rodrigo **DONOSO**, Maximiliano **ROJAS***

Purpose: To determine the clinical validity of the computational tool named DART for automated detection of diabetic retinopathy (DR) in digital retinographies for its incorporation in national screening programs. The specific objective is to obtain and assess, together with the relevant actors of the Chilean public health care network, of the statistical indicators established in the literature.
Methods: Observational study to measure the accuracy of the automated system in 1,123 cases of patients treated in the national DR screening program, comparing it with the evaluation by ophthalmologists. **Results:** Sensitivity of 94.9% (confidence interval - CI - 95%, 91.4%-97.1%) at a specificity of 75.7% (95% CI, 74.7%-76.4%) for the operating point chosen in the ROC curve, which yielded an area under the curve of 0.912. The positive predictive value of the system was 53.2% (95% CI, 51.3%-54.5%) and the negative predictive value was 98.1% (95% CI, 96.8%-98.9%). Included diabetic population had a prevalence of 22.5% DR and an average of 63 years of age (standard deviation: 12.7).
Conclusions: For its results, equivalent to the evaluation by ophthalmologists according to standards for DR screening tests, the automated system is in condition to be implemented in the healthcare network. Thus, a tool is available to cope with one of the greatest ophthalmological challenges in the world today. In collaboration with the authority and regulators, it is hoped to adapt the screening programs to facilitate an agile adoption of this inter-institutional innovation in telemedicine.

GLAUCOMA

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom

Role of remote monitoring of diurnal variation in the diagnosis and follow-up of open angle glaucoma in a tertiary health care centre

*First Author: Mayuresh **NAIK***
*Co-Author(s): Harindersingh **SETHI***

Purpose: To elucidate the role of remote monitoring of diurnal variation in the diagnosis and follow-up of open angle glaucoma in a tertiary health care centre
Methods: 500 age and sex-matched patients from the outreach-centre under the purview of our tertiary health care centre were selected as part of our pilot programme for remote monitoring of diurnal variation. They were randomly divided into two groups of 250 :,Group A : Underwent diurnal

ABSTRACTS- FREE PAPERS

variation using Schiotz tonometer,Group B : All 250 patients were brought to our tertiary health care centre,,After diagnosis and after 3 weeks of initiation of anti-glaucoma medications , the total number of glaucoma cases in both groups were combined and again randomly divided into two equal groups C and D.,Group C : Underwent diurnal variation using Schiotz tonometer,Group D : All patients were brought to our tertiary health care centre,Statistical analysis was done independent t-test to enumerate the cases of glaucoma diagnosed by both methods.(power of study 80% at p>0.05)
Results: There was no statistical significance(p=0.78) between the two groups A and B regarding the number of diagnosed cases of glaucoma.,,There was no statistical significance (p=0.34) between the two groups c and D regarding the number of cases of glaucoma on follow-up.
Conclusions: Remote monitoring of diurnal variation is a very effective method not only in the diagnosis but also in the follow-up of open angle glaucoma in out-reach centres especially in developing countries with minima access to tertiary health care centre

MEDICAL EDUCATION

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom

Pushing the envelope on distance learning: creation of the global classroom

*First Author: Danny **HADDAD***
*Co-Author(s): Amelia **GEARY**, Daniel **NEELY,** Jonathan **SCOLLARD***

Purpose: Globally, there is inequitable access to well-trained eye surgeons. As it currently stands, there are not enough ophthalmologists and health workers with specialization in eye health to meet the growing need for surgical services. Low and middle-income countries are disproportionately affected.
Methods: To target global need, Orbis conducted a global learning needs analysis to inform the development of broad-reaching, low-cost and effective solutions to develop competent surgeons in low-resource countries. In our analysis, we considered programmatic needs, sources for content, global learner cadres and instructional technologies among other variables.
Results: Orbis utilized the analysis results and consultations with subject-matter experts to build interactive, live and self-paced educational opportunities and products designed to meet the learning, technology and cultural needs of global eye health workers. This included reimagined program curricula to offer blended learning and live teaching that covered lectures, case discussions and live surgical mentorship – all delivered through distance learning and Orbis's device-agnostic telemedicine platform. In the first year of the program, Orbis trained more than 1,300 eye health professionals in 117 countries at an annual cost of approximately $14 per learner (excluding initial course development costs).
Conclusions: Once the initial content is developed, the operational costs of providing distance learning is far lower than traditional hands-on medical education programs. It allows the delivery of education to areas traditionally excluded, including: low-resource, conflict zones or areas with low concentration of health workers, by capitalizing on the explosive growth of smartphone technology and related infrastructure advancements.

RETINA, VITREOUS

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom

Agreement on diabetic retinopathy grading in fundus photographs by allied ophthalmic personnel as compared to ophthalmologist at a community setting in Nepal

*First Author: Raba **THAPA***

Purpose: To assess the accuracy of diabetic retinopathy (DR) grading in fundus photographs by the allied ophthalmic personnel (AOP) as compared to ophthalmologist at a community setting in Nepal
Methods: Fundus photographs of known diabetes subjects attending for DR screening were graded by two types of AOPs (AOP1 were the trained retinal photographer, AOP2 were the eye health worker trained on DR screening) and ophthalmologist. Agreement for DR grading by the AOP as compared to ophthalmologist was assessed using kappa coefficient (k).
Results: Fundus photographs of 864 eyes of 435 subjects with diabetes were evaluated in the study. The agreement was substantial for detection of normal versus abnormal retina by both the AOP 1 and AOP 2. For normal versus abnormal macula, the agreement was substantial for AOP 1 and moderate for AOP 2. The agreement for grading macular exudates, retinal hemorrhage, venous

beading ranged from moderate to substantial for both the AOPs. There was overall substantial agreement for diagnosing cases with or without DR and CSME by both the AOP 1 and AOP 2. The agreement ranged from fair to moderate for diagnosing other stages of NPDR by both the AOPs.
Conclusions: With further training, AOPs could be utilized for screening of diabetic retinopathy using fundus photography, and referral of vision threatening retinopathy for prompt treatment in a community in resource limited countries. Such type of DR screening could be enhanced through the development of cost effective tele-ophthalmology set up in low and middle income countries.

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom

Comparison of the screening efficiency of epiretinal membrane using confocal scanning laser ophthalmoscope imaging and color fundus camera in elderly people.

*First Author: Yanjiao **HUO***

Purpose: To determine the positive results of confocal scanning laser ophthalmoscope (cSLO) based retinal imaging and traditional color fundus camera in screening epiretinal membrane (ERM) in elderly people.
Methods: 184 retired staffs from certain company (363 eyes) were included in this study, 153 were men (304 eyes) and 31 were women (59 eyes). Mean age was 74.35 years (range, 47-92 years). All subjects were underwent fundus imaging using cSLO technology and traditonal color fundus camera and Cirrus high definition optical coherence tomography (HD-OCT). The imaging quality of two technologies were analyzed and compared according to the evaluation standards. The positive accordance rate was used to compare between two modes fundus imaging (cSLO technology and traditional color fundus camera) and HD-OCT.
Results: In 363 eyes, The positive number of screening ERM using HD-OCT was 122 eyes (33.6%); the positive number of traditional color fundus camera was 33 eyes (9.1%) ; the positive number of cSLO imaging was 76 eyes (20.9%). The HD-OCT positive accordance rate of screening ERM using traditional color fundus camera and cSLO technology were 27.0% vs. 62.3%. The HD-OCT positive accordance rate of screening ERM using cSLO technology was significant higher than traditional color fundus camera (X2=30.81, p<0.001).
Conclusions: The HD-OCT positive accordance rate of screening ERM using cSLO technology was higher than traditional color fundus camera in elderly people.

TELE-OPHTHALMOLOGY

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom

Assessment of patients' knowledge towards teleophthalmology in Singapore.

*First Author: Preethi **JEYABAL***
*Co-Author(s): Hao **LEI**, Petrina **TAN**, Lennard **THEAN***

Purpose: Singapore 's ageing population and prevalence of chronic eye conditions may stress existing outpatient service. There is a need to develop new cost-efficient and safe methods of eye-care delivery.,Major drivers for teleophthalmolgy are high volume demand,need for clinical expertise and socioeconomic burden on healthcare by conventional services.,Recent advances in telecommunications has allowed tele-ophthalmology and provision of quality eye care in rural areas. The purpose of our study is to assess patients' perceptions towards tele-ophthalmology in a developed country like Singapore.
Methods: Cross sectional study. Self-administered questionnaires were prepared in 3 different languages (English, Chinese and Malay) . Patients for ophthalmology outpatient appointments were given the questionnaires. Patient demographics were collected.
Results: Two hundred patients (53% males) completed the questionnaires. Mean age was 55 (range: 17 to 89). 88.8% of patients have never heard of teleophthalmology before and 97.2% of patients have never done videoconference before. 58.3% of patients felt that teleophthalmology techniques would be useful in Singapore, although 73.6% were not sure for which eye condition. Disadvantages include lack of human interaction (59.7%), inability to understand doctors(45.8%) and loss of patient confidentiality(30.5%). 65.3% patients felt It should be cheaper than conventional services. No association was found between age, gender, education, and occupation, with knowledge levels and attitude towards teleophthalmology.

ABSTRACTS- FREE PAPERS

Conclusions: Meagre knowledge and exposure to teleophthalmolgy in a developed country highlights the need for more patient education methods. The openness and eagerness to accept this new technique is a favourable sign to confidently embark on further innovations and expansions.

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom

Based on Tele – Ophthalmology Technique to Facilitate Diabetic Eye Disease Screening Model Construction under the Support of World Diabetes Federation (WDF)

*First Author: Haisheng **ZHAO***

Purpose: To set up a screening pattern for diabetic eye diseases with cooperation from county-level hospitals with the support of WDF based on tele-Ophthalmology technique, to construct a county-township-village network to improve the prevention of curable eye diseases at basic levels.
Methods: Project designation and exactly executed include screen and refer patients through the tele-consultation system, train grass-roots doctors, conduct public education and publicity.
Results: Consulting and treating complicated cases on-line through the tele-ophthalmic system has been achieved. Train three ophthalmologists for each cooperative hospital in the county level have been realized. Training 100 grass-roots doctors from community health centers and township and village level health centers in each county for ophthalmologic and diabetic knowledge has been finished.
Conclusions: The network with county-level hospitals for diabetic eye diseases by SHEH based on Tele – Ophthalmology Technique is a cost-effective way for patients living in basic levels to access medical treatment for diabetic eye diseases. Both medical technology and human resource capacity in cooperated hospitals have been improved due to this project.

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom

Effect of Training Ophthalmologists by Cybersight in China

*First Author: Qing **LU***

Purpose: To assess the effect of live tele-ophthalmic training by an international tele-ophthalmic platform Cybersight for Chinese ophthalmologists.
Methods: Cybersight is a tele-ophthalmic platform owned by Orbis. An international retina specialist was invited to do retinal surgery training in Shenyang, China in April, 2017. The 3-day live video lectures were given through Cybersight. A survey was carried out after the training. The survey contents include how you rate the live lectures, how you rate the quality of the videos/audios, would you like to attend such live lectures again, which topics you will like to attend in the future.
Results: A total of 109 individuals or groups attended at least part of the lectures over the 3-day period. Most of them are from county or prefecture level hospitals around China. 100% respondents rated the live lectures as excellent or very good, 100% respondents rated the quality of video/audio as good or more. 83% would like to attend such live lectures again, 17% will not do it. Retina, optometry and strabismus are the most interesting live lecture topics in the future.
Conclusions: Live online training model saves the expense and time for Chinese ophthalmologists from counties and prefectures attending the high level training. Due to language barrier of county level doctors, they have difficulties to use the Cybersight website in English. It will be helpful to attract more county level doctors if providing Chinese option in an international tele-ophthalmic website.

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom

FORUS for Detection of Macular Diseases by Trained Optometrist to Save Eye SIGHT (FORESIGHT)

*First Author: Gaurav **MATHUR***
*Co-Author(s): Ajay **SHARMA**, Deependra V **SINGH***

Purpose: To study the efficacy of trained optometrists in identifying macular abnormality through low cost fundus imaging in primary eye care centers in rural north India
Methods: All subjects reporting to five rural eye centers in north india with age above 30 year were included. Fundus images were taken by optometrist using 3netra Fundus Camera (FORUS, Forus Health Pvt. Ltd, Bangalore India) and sent for reporting to retina specialist. Rigorous weekly workshops were also conducted to train an optometrist to identify and diagnose macular diseases. Of the total data collected, a subset of

images were graded by optometrist and retina specialist as either normal or abnormal. Percentage agreeability was calculated using Cohen's kappa
Results: A total 4000 eyes were imaged. Of the 3500 gradable eyes 265 eyes had macular abnormalities. The major cause of macular abnormalities were AMD and Diabetic retinopathy. Of the total eyes evaluated 2000 eyes were selected randomly and analyzed by single retina specialists and optometrist. 13.6% of fundus images were over diagnosed (false positives) by optometrists, 0.82% images were underdiagnosed (false negatives) and 83.15% (agreeability) were correctly identified as normal or abnormal
Conclusions: Teaching and training optometrists can become an effective way of early and effective management of retinal diseases in areas where accessibility and feasibility of retina specialist are an issue. It also helps to foray with concepts on Vision centers and rural camps, where optometrist can use this machine to click pictures, diagnose abnormalities, take opinion from specialist and send referrals immediately and accordingly

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom

Profile and prevalence of macular diseases using low cost fundus imaging in rural North India

*First Author: Gaurav **MATHUR***
*Co-Author(s): Ajay **SHARMA**, Deependra V **SINGH***

Purpose: To determine the profile and prevalence of macular diseases among self-reporting subjects at rural eye centers across North India using low cost fundus imaging.
Methods: All subjects reporting to five rural eye centers over a period of 6 months with age above 30 year were included in the study. Fundus imaging was done with 3netra Fundus Camera (FORUS, Forus Health Pvt. Ltd, Bangalore India).Fundus images were taken by optometrist at the primary centers and sent for reporting to retina specialist at referral centers on a daily basis. Grading of Diabetic retinopathy, Diabetic maculopathy and Age related macular degeneration (AMD) was done according to International grading criteria.
Results: Of the 4000 eyes imaged 89.27% were gradable. Of the gradable eyes 265 eyes (8.85%) has macular abnormalities. The major cause of macular abnormalities were AMD (4.14%) and diabetic retinopathy (3.67%).As many as 88.59% of macular diseases were due to AMD and diabetic Retinopathy. Diabetic retinopathy prevalence was about 18 % in the population suffering from diabetes mellitus.
Conclusions: Most rural population travel long distance to receive speciality care which is expensive and inconvenient. Delays in receiving care may be a potential factor resulting in loss of vision that could have been saved. This model of tele-screening helps to evaluate the macular diseases that need timely management

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom

Proof of concept for TeleVision: Acute triage for anterior segment disease.

*First Author: Dharmendra (dave) **PATEL***
*Co-Author(s): Ashraf **GAFFAR**, Peter **PALLAGI***

Purpose: Ocular emergencies that require Ophthalmology consultations require time and can be costly. In order to reduce time to diagnosis and minimize medical costs, we have developed a device (TeleVision) that can be utilized to successfully obtain, transmit and visualize the anterior segment and adnexa for immediate triage and consultation. This process can be integrated with existing electronic medical records (EMR) and is secure.
Methods: A new device was developed to use with an iPhone or iPod to obtain high resolution images of the eye and adnexa. This required developing appropriate adaptor which incorporated a light source and filters to eliminate reflections and distortions for macro imaging. In addition, a secure mechanism had to be established to protect and maintain patient privacy per Health Insurance Portability and Accountability Act (HIPAA) regulations. Numerous variations of attachments were investigated and tested with a final version which is portable and rechargeable meeting our objectives.
Results: The TeleVision device was tested with 12 subjects (24 eyes) to determine speed, resolutional and security of image transmittal. All images were high quality with quick transmission rates. The process met all HIPAA standards to secure patient information and transmitted within our firewall.
Conclusions: A portable and secure device which can cost less that $300 USD can be deployed in clinics and emergency rooms to facilitate transmission of anterior segment images. This process can optimize use of consultants and avoid lengthy delays in patient care. Future consideration to develop posterior segment imaging would

further expand the evaluation of retinal disorders as well.

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom
REST – An Innovative Rapid Eye Screening Test
*First Author: Jan Bond **CHAN***

Purpose: To determine the agreement and correlation of visual acuity between Rapid Eye Screening Test (REST) app and Early Treatment Diabetic Retinopathy Study (ETDRS) tumbling 'E' chart.
Methods:A visual acuity tool was designed for Android and iOS users based on ETDRS. A pilot study was conducted involving 101 subjects. Visual acuity of each subject was tested using ETDRS chart and crossover to REST at 3 meters or vice versa.
Results: Mean visual acuity using ETDRS was 0.086 ± 0.194 for right eye (RE) and 0.085 ± 0.196 for left eye (LE) while REST measurement was 0.091 ± 0.182 for RE and 0.098 ± 0.203 for LE. There was significant and strong direct correlation between visual acuity using ETDRS and REST in both eyes (RE: $r = 0.829$; $p < 0.001$, LE: $r = 0.871$; $p < 0.001$). The 95% limits of agreement between the two charts was ±0.11 LogMAR for right eye and ±0.10 LogMAR for left eye. Time taken for REST was significantly shorter than ETDRS ($p < 0.001$).
Conclusions: REST is accurate and time-saving, thus potentially ideal for mass screening in remote area.

Jul 16, 2017 (Sun) 14:00 - 15:30
Venue: Grand Ballroom
Taking Eye Care to Rural Population with a Robotized Stereoscopic Teleophthalmic Slit Lamp Biomicroscope
*First Author: Mukesh **TANEJA***
*Co-Author(s): Momin **KHALEELULLAH**, Jean-marie **PAREL**, Varsha **RATHI**, Ashutosh **RICHHARIYA**, Sriharsha SAI **NAGA***

Purpose: The purpose of this project is to integrate the community care by taking eye care to rural populations in remote locations with tele-ophthalmic stereoscopic slit lamp biomicroscope with a real time interface between patients and ophthalmologists, thereby bridging the geographical and economic divide.
Methods: The regular Slit lamps have been robotized with precision stepper and servo motors to motorize all the slit lamp functions. The robotized slit-lamp can be operated from any remote location with an internet connected computing device. On-screen virtual controls give access to all the slit-lamp features such as magnification, X-Y-Z movement, slit controls and digital calipers. Real-time, 3-D stereoscopic viewing on any monitor is achieved with simple prismatic spectacles.,Eight such systems have been built and installed at one Tertiary care center, three secondary care centers and a four primary care centers of our hospital network
Results: 260 Patients have been examined and cross consultations have been done between patients and ophthalmologists across the cities and villages with these teleophthalmic slit lamps. The overall experience of the patients and examiners with the teleophthalmic systems have been encouraging. The only one hindrance has been the fluctuations in internet bandwidth and latency, which caused difficulty to communicate occasionally.
Conclusions: Successful testing of these teleophthalmic slit lamp demonstrated that it is feasible to use this technology to provide rapid and accurate three dimensional examination of the anterior segment of the eye in patients with visual problems, for screening and cross consultations in urban and rural regions, thereby integrating the community eye care.

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom
Tele-Ophthalmology - Creating a paradigm shift in Diabetic Retinopathy Screening in India.
*First Author: Tamilarasan **SENTHIL***

Purpose: With more than 70 Million Diabetic Patients , and only 20000 Ophthalmologists, there was dire need for innovation in Diabetic Retinopathy Screening space in India. We innovated using Teleophthalmology, wherein Fundus screening was provided at the level of a General Physician or Diabetologist. What started a small experiment has now grown to 160 Centers PAN India and is reaching out to more than 10000 patients a month. The purpose of the presentation is to showcase the viable Teleophthalmology model which has been successful in India.
Methods: We set up a low cost Indian Fundus Camera in Diabetes Centers and General Hospitals, train the staff in these centers to take up Fundus Images and we have developed our own

customised software to upload images in the cloud. Our team of 20 Ophthalmologists can log in from anywhere across the country and provide the results for the screening. The diabetologist takes a print out of the report and refers patients with Retinopathy to Local Ophthalmologists.
Results: We have reached out to 20 States of India and in 160 Locations. More than 200000 patients have been screened and around 18% have been detected with Retinopathy and referred to Ophthalmologists. Monthly around 10000 patients are being screened now.
Conclusions: Teleophthalmology is the way forward in Diabetic Retinopathy Screening and when viable business models can be incorporated, this can help in prevention of blindness due to Retinopathy.

Jul 16, 2017 (Sun) 15:45 - 17:15
Venue: Grand Ballroom

The first year of government funded optometry facilitated teleophthalmology in Australia

First Author: Mirna ***HUNTER***
Co-Author(s): Angela ***AICKEN****, Stephen* ***COPELAND****, Angus* ***TURNER***

Purpose: In an attempt to improve access to specialist medical opinion for populations in rural and remote areas, the Australian Government's Medicare program formally recognised and started subsidising optometry-facilitated video-consultations with ophthalmologists back in September 2015. Lions Outback Vision, based at the Lions Eye Institute in Western Australia provides a daily telehealth clinic for those regions where outreach ophthalmology services are also provided. This retrospective audit presents the first year data for this initiative in Western Australia.
Methods: A retrospective audit of all videoconferencess referred by optometrists and conducted at Lions Outback Vision from 1 September 2015 to 31 August 2016. The outcome measures included: patient age; gender; Aboriginal and Torres Strait Islander status; attendance; referring optometrist's location; ocular structural and functional studies; surgical case rates; working diagnoses and outcomes and management plans and attendance rates.
Results: 709 video consultations were booked in the study period. The non-attendance rate was 4.6% (33). Of the 676 video consultations 51% (348) required direct surgical booking. The most common diagnoses were cataract (42%), glaucoma (12%), macular degeneration (5%),and diabetic retinopathy (4%). Further clinic assessment was required for diagnosis or management plans in 18% (120). 79% (15) of optometry practices in the included regions participated in telehealth during the study period.
Conclusions: Since the introduction of the new Medicare item number, there has been widespread uptake with optometrists acting as primary assessors and initiating teleconsultations with ophthalmologists in the Lion's Outback Vision service regions. Telehealth services have greatly augmented outreach ophthalmology services in Western Australia.

ABSTRACTS- FREE PAPERS

DEEP LEARNING

Performance of a deep learning algorithm for detecting late age-related macular degenerationon fundus photographs by different levels of manual grading complexity

*First Author: Yu **JIANG***
*Co-Author(s): Robert **CHANG**, Mingguang **HE**, Yifan **HE**, Chimei **LIAO**, Wei **MENG***

Purpose: To evaluate the performance of a custom deep learning algorithm for detecting late age-related macular degeneration (AMD) and also assess it among the images with different levels of complexity on manual grading.
Methods: 24000 retinal fundus photographs was used to establish a cloud-source clinical labeling system for AMD. Some trained ophthalmologists classified AMD into absent, early or intermediate, late dry , late wet and poor image quality after training workshop. Each image has a conclusive classification until at least 3 clinicians had consistent outcome ,and calculated a complexity index which was classified into Group1 (equal to 1), Group 2 (0.75~<1), Group 3 (0.6~<0.75) and Group 4 (<0.6).4000 images were randomly selected excepting the training set and used to assess a custom deep learning convolutional neuron network (CNN) system. The area under receiver operator characteristic curve (AUC), sensitivity and specificity was calculated for the classification on late dry and wet AMD by different complexity index.
Results: For Group 1,the sensitivity, specificity and AUC were 96.0% (24/25), 97.7%(383/392) and 0.969, respectively.For Group 2,the sensitivity, specificity and AUC were 89.1% (98/110) , 91.4% (768/825) , and 0.907, respectively.For Group 3,the sensitivity, specificity and AUC were 80.2% (69/86) , 85.3% (388/455) and , 0.828 respectively.For Group 4,the sensitivity, specificity and AUC were 68.09% (32/47) , and 72.8% (83/114) and 0.705, respectively.
Conclusions: The custom CNN system perform reasonably well in classifying late AMD,however, the accuracy was reduced among the “complex” images- experts also have controversial opinion.This experiment also highlights the drawback of subjective grading in AMD automated classification.

GLAUCOMA

Role of remote monitoring of diurnal variation in the diagnosis and follow-up of open angle glaucoma in a tertiary health care centre

*First Author: Mayuresh **NAIK***
*Co-Author(s): Harindersingh **SETHI***

Purpose: To elucidate the role of remote monitoring of diurnal variation in the diagnosis and follow-up of open angle glaucoma in a tertiary health care centre
Methods: 500 age and sex-matched patients from the outreach-centre under the purview of our tertiary health care centre were selected as part of our pilot programme for remote monitoring of diurnal variation. They were randomly divided into two groups of 250 :,Group A : Underwent diurnal variation using Schiotz tonometer,Group B : All 250 patients were brought to our tertiary health care centre,,After diagnosis and after 3 weeks of initiation of anti-glaucoma medications , the total number of glaucoma cases in both groups were combined and again randomly divided into two equal groups C and D.,Group C : Underwent diurnal variation using Schiotz tonometer,Group D : All patients were brought to our tertiary health care centre,Statistical analysis was done independent t-test to enumerate the cases of glaucoma diagnosed by both methods.(power of study 80% at p>0.05)
Results: There was no statistical significance(p=0.78) between the two groups A and B regarding the number of diagnosed cases of glaucoma.,,There was no statistical significance (p=0.34) between the two groups C and D regarding the number of cases of glaucoma on follow-up.
Conclusions: Remote monitoring of diurnal variation is a very effective method not only in the diagnosis but also in the follow-up of open angle glaucoma in out-reach centres especially in developing countries with minima access to tertiary health care centre

Validation of a Deep Learning Algorithmfor Detection of glaucomatous optic neuropathyon Retinal Fundus Photographs in A Population-based Study

*First Author: Zhixi **LI***
*Co-Author(s): Mingguang **HE**, Yifan **HE**, Wei **MENG***

Purpose: This study is to report the performance of a custom convolutional neuron network (CNN) on detecting the glaucomatous optic neuropathy (GON) in a population-based study conducted in South China.
Methods: A total of 1,015 subjects with retinal fundus photos collected with Cannon (CX-1) in were identified from the Liwan Eye study, a population-based study conducted in Liwan District, Guangzhou. All images from Liwan Eye Study were clinically classified into with and without glaucoma based on the best available data including visual field, fundus photo, IOP per the ISGEO definition. A custom convolutional neural network (CNN) algorithm was developed and further trained using a retrospective data set of 32 000 fundus photos and the clinical labeling collected from a cloud-sourcing system attended by more than 20 ophthalmologists. Main outcomes measures:The performance of CNN was assessed in refer to the ISGEO clinical grading. Area under the receiver operating characteristic curve (AUC), sensitivity, and specificity were used to present the accuracy data.
Results: Among the 2021 gradable fundus photos collected from 1015 subjects, 64 images were classified as with glaucoma, 1957 without glaucoma. The custom CNN system achieved sensitivity 92.2% (58/64), specificity 90.3% (1767/1957) and AUC of 0.904.
Conclusions: This custom CNN system performs reasonably well among the images collected from Liwan Eye Study. Further studies are required to replicate this result among the images collected from different ethnic groups and with different fundus camera or even on slightly different disease definitions.

OCULOPLASTICS, ORBITS

Electronic stethoscope orbital auscultation in teleophthalmology

*First Author: Sunil **MOREKER***

Purpose: To report initial data of electronic stethoscope graph and sound recordings of orbit and eye for teleophthalmology
Methods: Study Design : Observational study.,We used an electronic stethoscope for recording sounds from the eye routinely in all cases presenting to eye out patient department. The phonogram sound and recordings from the eye recorded by electronic stethoscope were recorded in the iPad. Various cases like carotid artery stenosis with ocular hypoperfusion syndrome , papillodema due to Cerebral veinous sinus thrombosis , traumatic optic nerve injury and orbital lesions were auscultated and sounds and graphs recorded
Results: Patients of papillodema showed low beat rate and low amplitude on recordings on electronic stethoscope but after surgical treatment in form of optic nerve sheathotomy the electronic stethoscope picked up auscultation sounds of central retina, artery pulsations which matched the heart beats . Patients of glaucoma with intra ocular pressure of 50 mm Hg showed lower amplitude and rate of pulsations in recordings but post glaucoma surgery with shunt , the electronic stethoscope picked up pulsations of central retina artery which matched heart beats. In traumatic optic nerve injury too the pulsations were absent and picked up after endoscopic decompression , much before vision recovered. Orbital tumours both vascular and nonvascular were auscultated and bruits and murmurs were recorded.
Conclusions: Electronic Stethoscope can record central retina, artery pulsations and give vital clues about prognosis of patients. Since patients come to our hospital from far , an electronic sthetoscooe recording of patients onsite is important in teleophthalmology

OPTICS, REFRACTION CONTACTS

Relationship between treatment zone decentration and peripheral corneal height difference in children with orthokeratology treatment

*First Author: Yang **XIAO***
*Co-Author(s): Zhouyue **LI***

Purpose: To compare the magnitude of treatment zone decentration between eyes with minimally peripheral corneal height difference (LPCHD) (≤30μm) and eyes with higher peripheral corneal height difference (HPCHD) (**>** 30μm) after one month of spherical or toric orthokeratology (Ortho-k) lenses.
Methods: Spherical Ortho-k was fitted in 39 eyes with LPCHD at 8-mm chord. In eyes with HPCHD

ABSTRACTS- E-POSTERS

at 8-mm chord, 32 participants were fitted with toric Ortho-k and 29 participants with spherical Ortho-k randomly. In all eyes, corneal topography data (Medmont E300) were obtained at baseline and after 1 month of lens wear. The amount of treatment zone decentration relative to vertex normal determined from tangential subtractive maps was analyzed using IPP6 software. Treatment zone parameters including magnitude and direction of decentration were analyzed.
Results: After one month of lens wear, the mean magnitude of treatment zone decentration in eyes with LPCHD (0.49±0.19 mm) was significantly less than that in eyes with HPCHD (0.69±0.37 mm) (P=0.003), both fitted using spherical Ortho-k, whereas, in eyes with HPCHD fitted using toric Ortho-k, the magnitude of treatment zone decentration (0.47±0.21 mm) was not significantly different from that in eyes with LPCHD fitted using spherical Ortho-k (P=0.625).
Conclusions: Eyes with HPCHD will increase amounts of treatment zone decentration in spherical Ortho-k, whereas toric Ortho-k may help to reduce the amount of treatment zone decentration in eyes with a corneal height difference of higher than 30 µm at 8-mm chord.

PEDIATRIC OPHTHALMOLOGY, STRABISMUS

Barriers and Facilitators for an Innovative School-based Vision Screening Model in China

*First Author: Chimei **LIAO***
*Co-Author(s): Feng **CHEN**, Ran **LIU**, Liqiong **XIE**, Jian **ZHANG***

Purpose: School-based screening is a good way to detect early vision dysfunctions. While it has been proved that the accuracy of screening could be achieved after brief training to teachers, its widespread acceptability, barriers and facilitators for implementation are still unknown. This study aims to explore perceived barriers and facilitators in the school-based screening model, of which the training, monitoring, data reporting, and referral is facilitated by an online management system.
Methods: A qualitative research approach using semi-structured interviews was conducted with stakeholders during screening site visits from December 2016 to January 2017: 8 hospital managements and 9 screening teachers. Common coding techniques and the constant comparative method were used in data analysis.
Results: 7 broad factors were drawn to classify the barriers and facilitators for implementation in China, which were: (1) Individual factors (e.g. motivation, ability), (2) organizational influence on implementation (e.g. expertise, facilities, organizational turbulence, structure), (3) parents and children's attitude and behavior (e.g. awareness, perspectives to screening, compliance, behavioral routines), (4) economic and political support for execution (e.g. policies, funding, profits), (5) a set of administrative variables (e.g. attitude, resource, training), (6) the influence of social background (e.g. culture of education, knowledge to eye disease) and (7) the use of online data management system (accessibility, usability and advantage in practice).
Conclusions: This study provided a context for understanding barriers and facilitators to implementing school-based screening in China. In addition, the study suggests possible elements for successful implementation.

Correlation of Visual Acuity Screening in Preschool Children between Personal Computer Software Jaeb Visual Acuity Screener (JVAS) and Tumbling E.

*First Author: Karinca **ARUNDINI***
*Co-Author(s): Irawati **IRFANI**, Iwan **SOVANI***

Purpose: The aim of this study was to determine agreement value of visual acuity screening in preschool children between using computerized application JVAS and tumbling E.
Methods: This was a correlation study between JVAS and tumbling E. Subjects selected by multistage random sampling and met the inclusion criteria were examined using JVAS and tumbling E at intervals of 10 minutes in the same room by a refractionist. The difference between the results of the two charts was determined with chi-square McNemar test and the agreement value were analyzed using Kappa index method.
Results: Kappa index 0,296 showed a poor agreement in visual acuity screening in preschool children between using computerized application JVAS and tumbling E, and showed statistically significant difference (p=0,00). There

was a moderate agreement in the age group of 4 years with the results of Kappa index 0.459 and p = 0.500.
Conclusions: There was no agreement in visual acuity screening in preschool children between using computerized application JVAS and tumbling E.

RETINA, VITREOUS

Computer-aided diagnosis based on enhancement of degraded fundus photographs

*First Author: Kai **JIN***
*Co-Author(s): Dahong **QIAN**, Shaoze **WANG**, Juan **YE**, Mei **ZHOU***

Purpose: Retinal imaging is an important and effective tool for detecting retinal diseases. However, degraded images caused by the aberrations of the eye can disguise lesions, so that a diseased eye can be mistakenly diagnosed as normal. In this work, we propose a new image enhancement method to improve the quality of degraded images.
Methods: A new method is used to enhance degraded-quality fundus images. In this method, the image is converted from the input RGB color space into LAB color space and then each normalized component is enhanced using CLAHE (contrast-limited adaptive histogram equalization). Human visual system-based fundus image quality assessment, combined with diagnosis by experts, is used to evaluate the enhancement.
Results: The study included 191 degraded quality fundus photographs of 143 subjects with optic media opacity. Objective quality assessment of image enhancement (range 0-1) indicated that our method improved color retinal image quality from an average of 0.0773 (variance 0.0801) to an average of 0.3973 (variance 0.0756). Following enhancement, AUCs (area under curve) were 0.996 for the glaucoma classifier, 0.989 for the DR (diabetic retinopathy) classifier, 0.975 for the AMD (age-related macular degeneration) classifier, and 0.979 for the other retinal diseases classifier.
Conclusions: The relatively simple method for enhancing degraded-quality fundus images achieves superior image enhancement, as demonstrated in a qualitative human visual system-based image quality assessment. This retinal image enhancement may, therefore, be employed to assist ophthalmologists in more efficient screening of retinal diseases and the development of computer-aided diagnosis.

Diabetic Nephropathy and Risk of Diabetic Retinopathy in Asian Indians: The Singapore Indian Eye Study

*First Author: Chee Wai **WONG***
*Co-Author(s): Sabanayagam **CHARUMATHI**, Sieh Yean **KIEW**, Tien Yin **WONG***

Purpose: There are few studies of the relationship between diabetic nephropathy (DN) and diabetic retinopathy (DR). We examined the associations between DN with incident DR and DR progression.
Methods: Of the 3400 subjects (40-80 years) who participated in the baseline Singapore Indian Eye Study (SINDI; 2007-2009), 2200 attended the 6-year follow-up visit (2013-2015). DR was assessed using retinal photographs in both visits. DN was defined using a triple-marker panel including serum creatinine-based estimated glomerular filtration rate (eGFRcr), cystatin C-based calculations (eGFRcys), and urine albumin-to-creatinine ratio (UACR), and also by single or dual-markers (eGFRcr + UACR). The associations between different definitions of DN with incident DR and progression of pre-existing DR were examined using multivariable modified poisson regression models adjusted for age, BMI, gender, duration of diabetes, HbA1c, and systolic blood pressure.
Results: DR incidence was 19.8% and DR progression occurred in 9.2% of individuals over a period of 6 years. Triple-marker-defined DN was significantly associated with both incident DR (Risk ratio (RR) 2.70, 95% confidence interval (CI) 1.18-6.14, p = 0.018) and DR progression (RR 8.32, 95% CI 3.25-21.28, p<0.001). Dual-marker-defined DN was associated with progression of DR (RR 4.71, 95% CI 2.26-9.85, p < 0.001), but not with incident DR (RR 1.94, 95% CI 0.82-4.60, p = 0.13). Single-marker-defined DN was associated with neither incident DR nor DR progression.
Conclusions: DN, defined with a triple-marker panel including cystatin C-based eGFR in addition to creatinine-based eGFR and UACR, was strongly associated with increased risk and progression of DR.

Spontaneous closure of Micro Macular hole

*First Author: Yuanfei **ZHU***
*Co-Author(s): Hongbo **CHENG**, Jieting **SHE**, Tieying **ZHAO***

Purpose: To evaluate anatomic features and functional outcome in patients with spontaneously closed micro macular hole (MH).
Methods: 5 eyes of 5 patients who achieved spontaneous closure of micro MH were studied. Medication included brinzolamide (three times per day), mouse nerve growth factor for injection (30ug,daily, i.m.),trivitamins B tablets (two tablets, three times per day) , difrarel (3 tablets,twice a day). All patients were followed up from 3 months to 2 years. The anatomical outcome of the procedure was evaluated by optical coherence tomography (OCT).Best-corrected visual acuities (BCVA) in log MAR units were compared to evaluate functional outcome.
Results: 5 patients with mean age 54.8 ± 7.8 years, median BCVA logMAR 0.3 , and a mean base diameter of 148.8 ± 89.3µm.The MH closed spontaneously 1 month to 10 months after the initial examination. Mean BCVA improved from log MAR 0.3 preoperatively to log MAR 0.15.Macular foveal remodeling started with bridging of the neuroretinal tissue over the optically empty space,then regained its normal configuration.4 eyes (4/5) showed persistent foveal detachment. 1 eye (1/5) with persistent vitreomacular traction reopened MH after spontaneous closure. Vitrectomy with no internal limiting membrane peel was applied and fully closure was achieved.
Conclusions: Spontaneous closure of micro MH could achieve anatomic reconstruction and improve functional outcome. Vitreomacular detachment plays an important role in hole closure.Further investigation will be need for the effectiveness of medication.

To Compare the efficacy of posterior subtenon triamcinolone with intravitreal triamcinolone and ranibizumab in cases of macular oedema in cases of retinal vein occlusion.

*First Author: Anurag **NARULA***
*Co-Author(s): Shilpa **SINGH***

Purpose: To Compare the efficacy of posterior subtenon triamcinolone with intravitreal triamcinolone and ranibizumab in cases of macular oedema in cases of retinal vein occlusion.Posterior subtenon trimcinolone is a safer and cheaper alternative and requires less preparation as compared to the remaining two methods.The only drawback was IOP rise which lasted for days to weeks,This is really an advantage for poor patiients as it is a realtively cheaper and accessible mode in developing country like ours.
Methods: 90 eyes of 90 patients attending our OPD and retina clinic having macular oedema secondary to retinal vein occlusion were diagnosed and enlisted randomly for the study.
Results: Mean reduction in CMT and improvement of visual acuity was comparable in all 3 groups.
Conclusions: Posterior subtenon triamcinolone is a safer and cheaper alternative and requires less preparation as compared to the remaining two methods.The only drawback was IOP rise which lasted for days to weeks,This is really an advantage for poor patients as it is a realtively cheaper and accessible mode in developing country like ours.

TELE-OPHTHALMOLOGY

Diabetic Conjunctivopathy Smart Phone Selfie Photography for Screening for Diabetic Eye Disease

*First Author: Sunil **MOREKER***

Purpose: To report initial data of screening of diabetic eye disease by selfie smart phone photography of conjunctival changes taken by patients
Methods: Patients took eye pictures of their own eye with smart phones with DSLR attachment with and without flash. The conjunctival pictures were evaluated for diabetic conjunctivopathy in form of microaneurysm and micrvasculopathy in form of veinous dilatation and tortuosity. The patient's sugar and retina evaluation done if conjunctivopathy found or not.
Results: All patients who had conjunctivopathy were discovered to have diabetes or pre diabetic state .Some pictures were received in form of whatsap and telegram app pictures . Some patients with more than four microaneurysms in conjunctival surface were found to have retinal microaneurysm . The sensitivity was 95 but the specificity was low at 82

Conclusions: Smart phone selfie recording of conjunctivopathy may be a sensitive tool for screening

The Effectiveness of A Deep Learning Algorithm for Glaucomatous Optic Neuropathy on Retinal Fundus Photographs by Different Levels of Manual Grading Complexity

*First Author: Feng **CHEN***

Purpose: To assess the performance of a custom deep learning algorithm for detecting glaucomatous optic neuropathy (GON) and also evaluate this performance among the images with different levels of complexity on manual grading.
Methods: An algorithm for automated detection of GON developed using a training set of32000 retinal photographs was used to build a cloud-source clinical labeling system for GON. 20 trained ophthalmologists was included to clinically grade these images. The complexity index was further classified into four Groups, including Group1 (equal to 1), Group 2 (0.75~<1), Group 3 (0.6~<0.75) and Group 4 (<0.6).A separate data set of 4000 fundus photographs was randomly adopted from the data set excepting the training set.
Results: Group1 has the highest AUC (0.965) with sensitivity of 99.6% (247/248) and specificity of 93.5% (1855/1985). Group 2 showed AUC was 0.946, the sensitivity was 98.2% (165/168) and corresponding specificity was 91.1% (652/716). In group 3, AUC was 0.881with sensitivity of 82.8% (125/151) and specificity of 93.4% (407/436). AUC declined to 0.736 in group 4 while sensitivity was 66.2% (128/154) and specificity was 81.0% (100/142).
Conclusions: The custom CNN system perform reasonably good in grading GON, however, the accuracy of CNN was reduced among the "complex" images – the images with controversial classification results even among experts. This study stresses the drawback of using subjective clinician classification as "gold standard" label in the training and validation of CNN system, at least among the GON automated classification.

The Singapore Integrated Diabetic Retinopathy Programme (SiDRP)

*First Author: Haslina **HAMZAH***
*Co-Author(s): Ecosse **LAMOUREUX**, Gavin **TAN**, Tien Yin **WONG***

Purpose: Early detection of diabetes retinopathy (DR) is important to prevent blindness in many countries. In Singapore, the DR screening model used to be conducted by family physicians at primary care clinics; and is time consuming; without a standard grading protocol. We present our 6 year screening results from the Singapore Integrated Diabetic Retinopathy Programme (SIDRP).
Methods: Since 2010, SIDRP is implemented to screen DR among 120,000 persons with diabetes seen at 18 clinics equipped with non-mydriatic retinal cameras. Nurses capture dilated 2-field retinal images for each eye and send to one of 2 centralized reading centres via an online platform. Images are read by accredited non-physician graders and a report will be sent back within an hour. Abnormal images are re-read, including 10% of normal cases. Urgent referrals are reviewed by an ophthalmologist.
Results: 91,140 cases have been assessed at our reading centre. 80% of them (n=73,363) required an annual screening and the remainder (n=15,137) were referred for further eye examination. 16% of the 20% referred (n=2,906), require re-photography every 6 months. Referable DR was the main referral reason (n=4,199) which was Moderate non-proliferative DR and above, followed by patients with suspected glaucoma features (n=2,437). 2% of patients (n=2,204) had ungradable images. Our recent audit results showed the graders scored 98.9% for sensitivity and 90% for specificity for detection of eye diseases.
Conclusions: The SIDRP is an established DR screening programme which reduces cost and manpower resources. Future plans to include addition of introduction of artificial intelligence to perform primary assessment of images.

Watsapp for vision hop-Effectiveness of Diabetic Retinopathy screening in camp settings using unorthodox means.

*First Author: Abhishek **ONKAR***

Purpose: To evaluate the efficacy of real-time fundus video transmission using Watsapp for diabetic retinopathy screening in rural camps.
Methods: 400 patients attending 4 different camps were evaluated using glucometer random

ABSTRACTS- E-POSTERS

blood glucose estimation after a thorough history taking. Those aged above 40 years, with positive family history and random glucose level more than 140mg/dl were dilated after IOP measurements and torch-light assessment of anterior chamber depth. Real-time video of the fundus using smart-phone camera and +20 D lens was transmitted to the regional centre using Watsapp which instantly graded the retinopathy, if detected and reverted back with a plan of action for each patient. Comparative analysis as to the utility and cost-effectiveness of the proposed screening methodology with the standard methodology was done.

Results: Out of the 400 patients examined, 60 patients were screened for diabetic retinopathy. Out of the 60 suspects who were dilated,42 had no evidence of diabetic retinopathy, 8 had BDR, 6 had NPDR and 4 had CSME. This real-time screening was significant in terms of preventable visual disability.

Conclusions: Conforming to this unorthodox, yet logistically viable screening method and making it an integral part of camps could help detect this disease and salvage vision.

VISION REHABILITATION

Elimination of Avoidable Blindness and Visual Impairment due to Refractive Error: Who are Our Priorities in Providing Spectacles?

*First Author: Zhuoting **ZHU***
*Co-Author(s): Mingguang **HE***

Purpose: To explore who our priorities are in providing spectacles for correction of refractive error in school children to achieve the goals of Vision 2020.

Methods: Guangzhou Refractive Error Study in Children (RESC) was a population-based, cross-sectional study conducted in urban southern China. The examination included visual acuity (VA) measurements, evaluation of ocular alignment, cycloplegic refraction, anterior and posterior segment assessment. Different levels of visual impairment (VI) were defined as uncorrected visual acuity (UCVA) < 20/40, 20/50 and 20/63 in the better eye.

Results: A total of 3782 children aged 7 to 15 years were enrolled in our current analysis. The leading cause of VI among school-aged children was refractive error (97.5% to 97.8% at UCVA < 20/40, 20/50 and 20/63). The overall prevalence of refractive error, VI at different visual cutoff points were 46.2%, 23.2%, 18.4% and 13.6%, respectively. The spectacles coverage could be almost doubled to more than threefold if we prioritize providing spectacles to children with VI due to refractive error.

Conclusions: Because of significant global burden of VI due to refractive error and limited resources, our priority is to provide spectacles to visually impaired children who are in need. This could be a strong monitoring strategy to realistically achieve the goal of elimination of avoidable blindness and visual impairment in the final stage of Vision 2020.

ARTIFICIAL INTELLIGENCE

Auto-Diagnosis by AI

*First Author: Wei **MENG***

Purpose: to demonstrate how AI to identify four eye diseases with fundus photo Methods: to apply Deep learning and unique algorithm, based on on cloud computing GPU cluster , studying the domestic and international standards of ophthalmology experts
Results: High classification accuracy for four eye diseases is found with AI as following: 99.3% for glaucoma, 99.2% for cataract , 100% for AMD and 99.3% for Dr.
Conclusions: AI helps doctors or medical institutions diagnose more efficiently and accurately in the face of bulky and difficult-to-treat patients.

TELE-OPHTHALMOLOGY

Wireless Smartphone Videography for Ocular Surgery System

*First Author: Jan Bond **CHAN***

Purpose: To describe a self-made smartphone adaptor which can be attached to a surgical microscope and a smartphone telescope which can be wirelessly linked to an LED TV or monitor.
Methods: A smartphone slit lamp adaptor is built for microscope-assisted ocular surgery in which video can be recorded. For surgeries not utilising the microscope (such as those using surgical loupes), we employed a smartphone attached to a telescope for videography. Videos from both methods are then wirelessly streamed to a TV/monitor using EZCast, Google Chromecast or Apple TV.
Results: The video captured by a smartphone is comparable to conventional digital video recording. It is affordable, easy to use and highly portable.
Conclusions: Smartphone videography will be a valuable instrument in ophthalmology for both teaching and research purpose.

EXHIBITOR INDEX

EXHIBITOR		BOOTH NUMBER
Beijing Remote Horizon Group	Diamond Sponsor	C
Shanghai MediWorks Precision Instruments Co., Ltd.	Gold Sponsor	A
Guangzhou Healgoo Interactive Medical Technology Ltd. Co.	Bronze Sponsor	F
China Shine Technology CO., LTD		C
Welch Allyn Singapore		D

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