

International Ophthalmology

And a Perspective on
Medical Missions



Global Community

Ophthalmology

In the Tropical and Missions Setting

Kenn Freedman MD PhD
Department of Ophthalmology

No financial interests in anything
mentioned here

Tropical and Missions Ophthalmology

1. *Types of Vision Loss and Eye Disease*
2. *Optical Errors*
3. *External Eye Disease*
4. *Infectious Eye Disease*
5. *Eyelid Problems*
6. *Orbital Disease*
7. *Strabismus and Amblyopia*
8. *Eye Trauma*

Examination in the Missions Setting

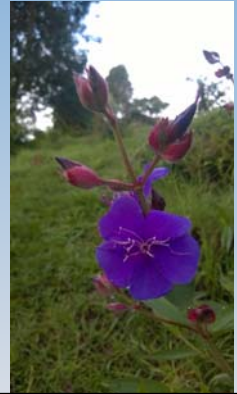
10. *Basic Set of Eye Exam Tools*
11. *Basic Eye Presentations*

Vision loss and Cataract Surgery

12. *Causes of Severe Visual Loss*
13. *Examination and Triage*
14. *Cataract Surgery Technique*

Medical Missions

15. *Experiences*
16. *Philosophy*
16. *Motivations*
17. *Strategies*



Blindness

**1 in every 25 people in world
(around 280 million)
are visually impaired or blind.**



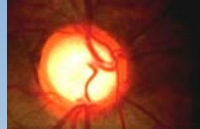
Loss of Vision

- Refractive Error

- Cataract



-
- Glaucoma



- Optic Nerve Disease

- Retinal Disease



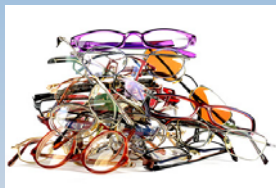
- Ocular Trauma



Loss of Vision

- Refractive Error
#1 cause of visual impairment

- Cataract



Fitting Glasses

Limitations of
Donated Glasses

Systems for
making simple
glasses on field

<http://www.prweb.com/releases/2013/sight-ministries-donation>

Loss of Vision

- Refractive Error
- Cataract



uab.edu – Ben Roberts

Screening
patients



Cataract Surgery

Camps

Mission Hospitals



Eye Disease

Loss of Vision

- Refractive Error
- Cataract
- Pterygium

More readily treatable



- Congenital Defects
- Corneal Disease
- Amblyopia
- Retinal Disease
- Glaucoma
- Optic Nerve Disease

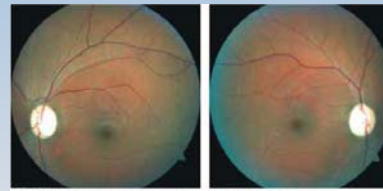


Fig. 1. Funduscopy of patient 1, showing bilateral optic atrophy and normal retinas.

Cataract Blindness

- 1 in every 25 people in world (~285 million) are visually impaired or blind
- Cataract, after refractive error, is the second most common cause of reversible blindness
- 90% of these are in less developed countries



Commentary: Alan Robin MD, et al JAMA Ophthalmology 2017; 135:2

Cataract Blindness

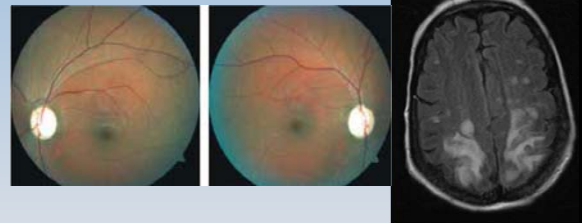
- Vision loss → decreased productivity, decreased self worth, associated with living alone and mental illness
- Primarily associated with aging- but other factors include: DM, malnutrition, etc.
- Roughly 95% probability of having improved vision after Cataract Extraction



Commentary: Alan Robin MD, et al JAMA Ophthalmology 2017; 135:2

Non-Cataract Blindness

- Some forms not so easily correctable
- Macular Degeneration
- Glaucoma
- Retinal Detachment
- Congenital Maldevelopment
- Corneal Opacification
- Optic Atrophy
- Cortical Blindness
- Results of Ocular Trauma



Ocular Trauma

Globe – e.g. Corneal abrasion; Foreign Body

Ocular Contusion

Corneal or Scleral Rupture or laceration – OPEN GLOBE

Chemical, Thermal, Ultraviolet



Eyelids - e.g. lacerations, lacrimal system, burns



Orbital - hemorrhage, Foreign Body, Fractures



Basic Eye exam kit

1. Your Hands
2. Snellen chart
3. Near card
4. Cover / Pinhole Occluder
5. Anesthetic drops
6. Dilating Drops
7. Fluorescein strips
8. Penlight , Blue Filter
9. Magnifiers, Loupes, Portable Slip Lamp
10. Direct ophthalmoscope, Panoptic Scope, portable Indirect Ophthalmoscope



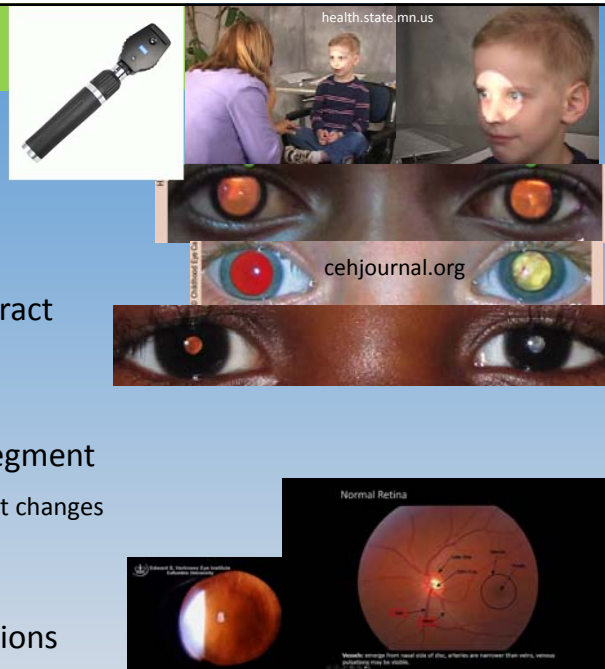
Uses for the Direct Ophthalmoscope

Coaxial Light Source!

- Red Reflex – useful for:
 - Eye Trauma evaluation
 - Pediatric Screening: Asymmetry: RB, Cataract
 - Cataract Detection
- Set on **+6** for magnified view of Anterior Segment
 - e.g. Cataract changes against red reflex – e.g. oil droplet changes

Fundus - **Limited** – but can look for:

Disk edema, Hemorrhages, Venous Pulsations



Refractive Errors Equipment Options

- Eye Chart
- Near Card
- Retinoscope
- Basic Trial lens set or Lens Rack
- Sets of basic plus (and minus) glasses
- “Portable” Phoropters



3 Presentations

Red Eye



“White” Eye



Swollen Bulging Eye



Penlight Ophthalmology

- ✓ Eyelids – red or swollen?
- ✓ Sclera / Conjunctiva - injection
- ✓ Cornea – clear or opacified?

Sometimes the shock of being brought to someone in need in unfamiliar surroundings keeps you from thinking rationally – so maybe these will help.

"Red Eye"

- **Blepharitis (Eyelids Red)**

Allergic, Viral – Herpetic, Molluscum, Staphylococcal

- **Conjunctivitis**

Allergic, Viral (e.g. URI), Adenoviral

STD: Chlamydial, Gonococcal

Bacterial: Staphylococcal, Haemophilus

- **Keratitis – Corneal Ulcers**

Herpetic, Bacterial, Fungal and Acanthamoeba

- **Uveitis – Anterior / Posterior**

- **Acute Elevated IOP – Uveitic, Post-op, Infectious**

RED EYE CONCEPT:

Not all red injected eyes are conjunctivitis and the majority of conjunctivitis is not bacterial

Am I seeing?

- Red Eyelids or Injected Conjunctiva
- Diffuse injection or Ciliary Injection
- Papillae or Follicles
- Discharge – Serous or Purulent
- Eyelid, Conjunctival or Corneal Lesion



"White Eye"

Am I seeing?

- Corneal Infiltration
- Corneal Scarring
- Tumor of Conjunctiva?
- Pterygium
- Opacity behind pupil
Cataract or RB?

Differential Diagnosis

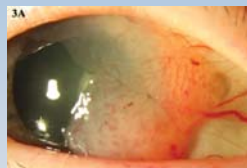
Corneal Inflammation / Ulcer

Corneal Opacification

- Exposure
- Xerophthalmia - Deficiencies
- Infection
- Congenital / Development Malformation
- Trauma

Tumors and Growths

- External - SCCA
- Internal - RB



Bacterial Corneal Ulcers

- Pathophysiology: disruption of corneal epithelium*
- recent herpetic infection, immunocompromised, CTL wear
- Pathogens: *Streptococcus*, *Pseudomonas*, *Staphylococcus*, *Enterobacteriaceae* (including *Klebsiella*, *Enterobacter*, *Serratia*, and *Proteus*)
- Typical Signs: Corneal Epithelial Defect and Infiltrate
Anterior Chamber WBC, Hypopion possible
- Lab: Corneal Scraping for –
Gram, Giemsa or Acid Fast Staining and Culture if possible
- Treatment Options:
Topical: “Fortified” Tobramycin (14mg/ml) and Cefazolin (50mg/ml) alternating q1h
Alternative: 4th Generation Fluoroquinolones: moxifloxacin, gatifloxacin
Research: 1.5% Povidine Iodine??



<http://abcd-vision.org/>

Fungal Corneal Ulcers

- Etiology: Organic Trauma, Superinfection
- Pathogens: Filamentous – e.g. *Fusarium*, *Aspergillus*
Yeast – *Candida*
- Typical Signs: Feathery infiltrates, Satellite lesions
- KOH Prep – to aid in diagnosis
- Treatment Options:
Topical: Voriconazole 1% (more for yeast)
Natamycin 5% or Amphotericin (0.15%)(filamentous)



emedicine.medscape

Bacterial and Fungal Corneal Ulcers

Treatment Options

Topical: intensive drops – q1-2 h and taper for 5-7 days. If not responding consider:

Intra-corneal (stromal) injections

Oral antifungals*

Collagen crosslinking (UV)

} More controversial



emedicine.medscape

If not responding or threatened **perforation of the cornea** then consider surgical options:

- PK or DALK (corneal transplantation)
- Gunderson Flap (conjunctival)

* Oral voriconazole may not be helpful in all case, but in *Fusarium* keratitis might be of benefit as an adjunct.

Trachoma

Infectious etiology: Chlamydia trachomatis

*Prevention – Community Medicine
Community Development*

Conjunctivitis

Repeated exposure → scarring of eyelids → Trichiasis, Entropion



From MicrobeWiki, the student-edited microbiology resource

Slide share

Eventual Corneal Scarring and Vision Loss

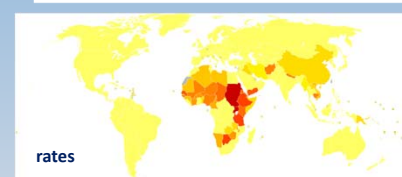
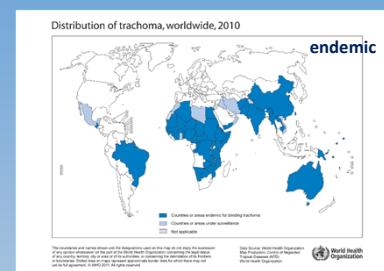
Endemic in multiple countries

Management:

Community and Environmental

Antibiotic – topical and oral (tetracycline, azithromycin)

Surgical – Eyelid (entropion repair), Corneal



Age-standardised disability-adjusted life year (DALY) rates from **Trachoma** by country (0-600 per 100,000 inhabitants). WHO 2004

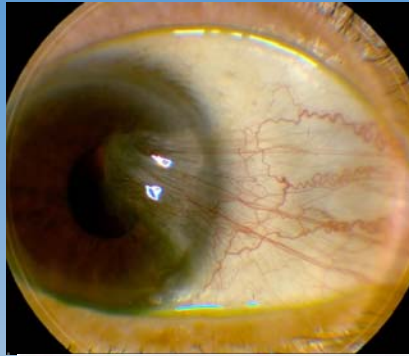
Pterygium

Causes

Sun Exposure (UV)
Chemical or Physical Trauma
Recurrence after surgery

Signs and Symptoms

Chronic Red Eye
Decreased Vision
Fleshy* Growth
Usually from Medial (Nasal) Side



Nasal and Temporal



Pterygium Surgery

Procedure

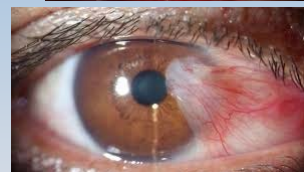
1. Dissection – sharp or semi-sharp blade (Gill, Tooke)
2. Control Bleeding
3. Excision of underlying Tenon's
4. Smoothing of Corneal Surface
– sharp blade or diamond burr.
5. Coverage of bare sclera
– adjuvant therapy

Risk Factors for **Recurrence**:

- Young Age
- Previous Excision,
- Temporal Pterygium
- Broad Based Pterygium

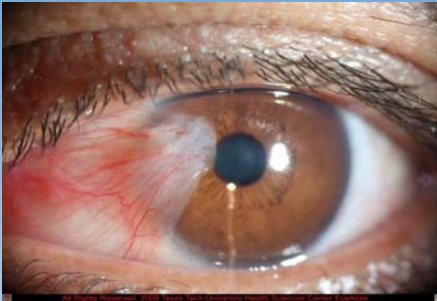


eyemackay.com



Timing of Surgery

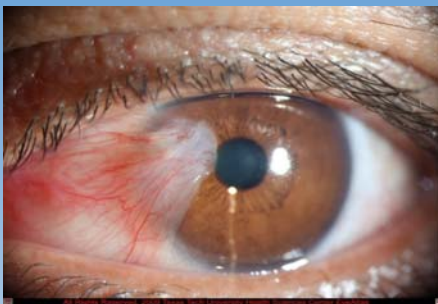
Which pterygium would you excise first?



Don't wait too long –

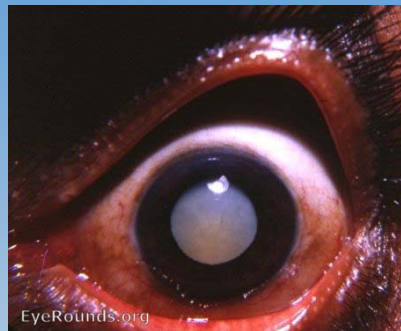
Excision before irreversible corneal scarring over the visual axis.

Which would you treat first?



Advancing Pterygium
Don't wait too long –

Excision before irreversible corneal scarring over the visual axis.

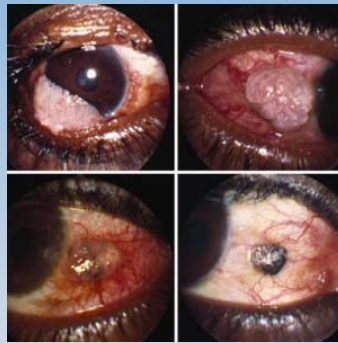
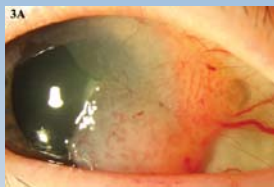


Dense Cataract

Visual Recovery for most part not dependent on timing of surgery

Ocular Surface Squamous Neoplasia - OSSN

CIN - Conjunctival Intra-epithelial Neoplasia (CIS – Carcinoma in Situ)
 SCCA – Squamous Cell Carcinoma (Invasive)



Clinical Signs of OSSN

- Leukoplakia
- Highly Vascular
- Raised
- Irregular Borders
- **Pigmentation possible**

Often involves the cornea

Treatment can involve:

- 1) Excisional biopsy
- 2) Topical chemotherapy (e.g. 5-FU)

<http://iceh.lshtm.ac.uk/>

“Swollen Bulging Eye”

Am I seeing?

- Chemosis,
- Eyelid Edema
- Proptosis or other displacement
- Large Globe

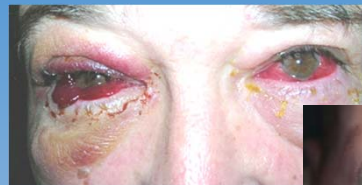
Differential Diagnosis

Severe Conjunctivitis

Orbital Inflammation, Cellulitis
 Adjacent Sinus Inflammation or Mass

Orbital Tumor

Buphthalmos – e.g. Glaucoma, Congenital Anomaly



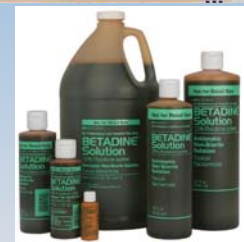
Imaging – e.g. CT orbits

Referral for Hospital
 Consultation and Treatment

Eye Treatment Kits

Basics – Medical

1. Irrigating Solution- Saline - NS, LR, D5- 1/2NS
2. BSS (Balanced Salt Solution – EYE)
3. Artificial Tears / Lubricating Eye Drops
4. Antibiotic Drops – e.g. Polytrim, Fluoroquinolones ...
5. Antibiotic Ointment – e.g. Erythromycin, Bacitracin
6. Steroid / Antibiotic drops and ointment??
7. Oral antibiotics (e.g. Amoxicillin, Keflex, Ciprofloxacin)
8. Syringe and Needles (25G, 27G, 30G)
9. Betadine Solution (5%)



Basic Eye Therapy

1. Tape and Eye Patches and Shields
2. Shampoo (baby shampoo – Lid Hygiene)
3. Medications:
 - Topical Anesthetic
 - Artificial Tears (Lubricant – preserved or NP)
 - Topical Antibiotic – drops and ointment
4. OTC Reading Glasses
5. Donated Glasses – already read



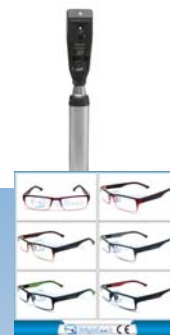
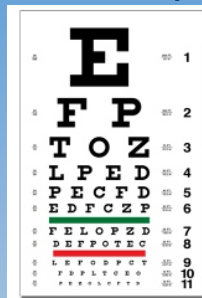
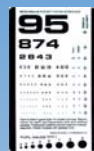
Refractive Errors and Treatment

- Main Obstacles:
 - 1) Obtaining the refraction
 - 2) Obtaining the correct glasses



Refractive Errors Equipment Options

- Eye Chart
- Near Card
- Retinoscope
- Basic Trial lens set or Lens Rack
- Sets of basic plus and minus glasses



- Portable Phoropter



Near Card Numbers	Snellen Chart at 20' and at 10'	
20/800	20/50	20/100
20/400	20/25	20/50
20/200	20/13	20/25

Refractive Errors and Treatment

- Working with limited resources
- Working in limited space, facility
- Refraction and Estimations
- Presbyopia
- Spherical Equivalent
- Donated Glasses
- **Portable devices** - EyeNetra, Retinoscopy
- **ReSpectacle.org** – catalog for donated glasses
- *some international form?*



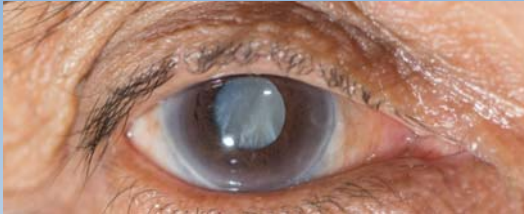
Cataract Blindness

- Screening patients
 - Flashlights
 - Near Cards
- Probability of Successful outcome - ~95%
 - 5% - complications
 - unseen retinal or optic nerve disease



Tests for good candidate

- good Pupil Reaction and no RAPD



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Tests for surgical candidate

Pupil Reaction RAPD



Causes for a + RAPD

- Retinal Damage
 - Ischemia
 - Inflammatory
 - Severe Retinal Detachment
 - Trauma
- Optic Nerve Damage
 - Ischemia
 - Optic Neuritis
 - Prolonged high ICP
 - Trauma

Cataract Surgery Primer Small Incision Cataract Extraction

Phacoemulsification
– only really an option when in a
hospital or urban setting

Steps:

- 1) Peritomy
- 2) Corneal Incision
- 3) Opening of Lens Capsule
- 4) Preparation for Removal of Nucleus of Lens
- 5) Extraction
- 6) Cortical Clean up
- 7) Placement of IOL
- 8) Removal of Viscoelastic
- 9) Closure on Conjunctiva over self sealing wound

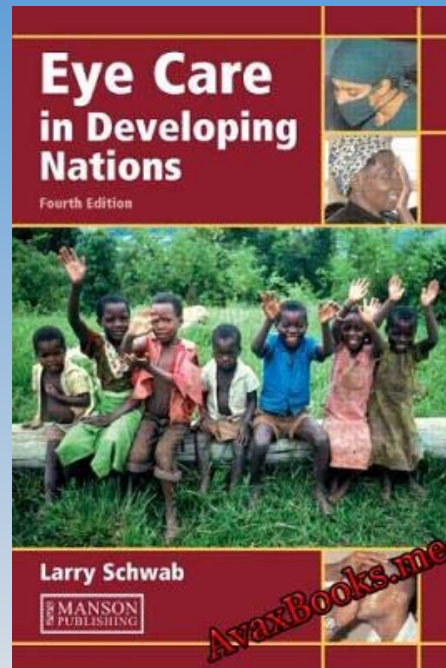


Community Development

- Working with existing medical community
- Western Influence – be careful
- Masters in Public Health- Can be helpful
- Not seeing all disease from clinical perspective only
– but a broader one



Can download PDF
for free



A little of my story

**4th Year Medical Student
Guatemala March 1989**

**Decision to do
Ophthalmology**



**Ophthalmology Residency:
1990-1993**

**Private Practice
1993-1995**

Guatemala 1995

**Orphanage in Villa Nueva
Medical and Surgical**



**Fellowship
Neuro-ophthalmology
and Oculoplastics
1995-1996**

**Albany Medical
Center, NY**



**Private Practice
1996 – 2000
Central Georgia**



**Volunteer Faculty with
Mercer Medical School**



**Texas Tech University Health
Sciences Center**

**Department of Ophthalmology
and Visual Sciences**

**Faculty:
2000 - Present**



Tarahumara Indians

**Sierra Madre
Chihuahua Mexico**

**Eye, Medical and
Dental Clinics**

**Support Missionaries
And local churches**



Med
Students





2001 to 2012



Family members
Medical Students
Residents
Fellow Faculty



Freedom to integrate Professional and Spiritual Life

2008 My wife and I interviewed

Sabbatical Year - Visiting Professor

Important Questions to ask yourself?



C.S. Lewis

**Compartmentalization?
Secular vs. Sacred?**

***Are you adding missions to
your schedule or
are you on a mission?***

***"One need only contemplate the difference it no doubt
would have made in the impact of C. S. Lewis had he
withdrawn from the university to go into "full-time
Christian ministry."***

From Daryl McCarthy

Teaching Abroad Values



To bring **glory to God** in all situations

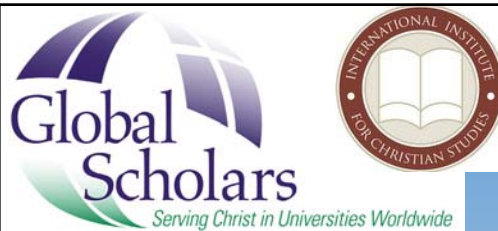
View every issue from **perspective** of the Lordship of Christ

To **respect** the culture of the host country and citizens

To teach and perform every task with **excellence**

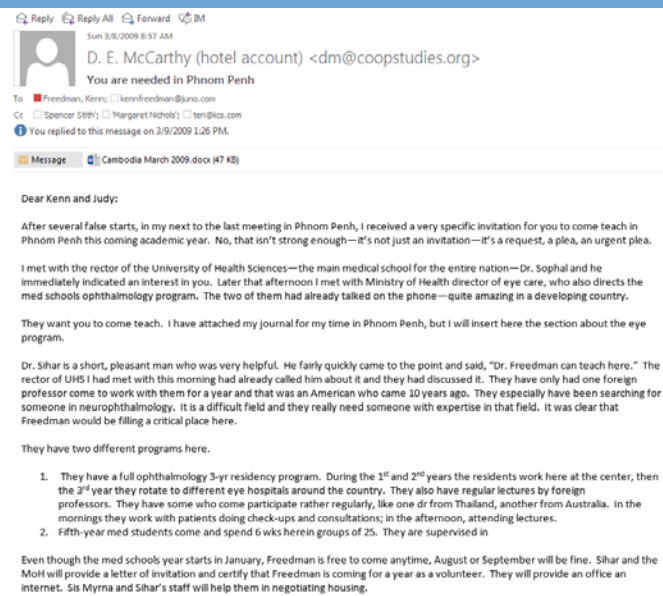
To make worship, prayer and God's Word the **priority** of each day

To **love** students and colleagues and welcome them in our home



March 2009
The email →

Cambodia???





Exploratory Trip June 2009

Obstacles:

- Support Letter
- Physical Exams, Immunizations
- Family Members – Medical Issues
- Arranging for Sabbatical Year
- Presentations to Church and my Department
- Housing in Phnom Penh
- Airline Tickets for Six!

Be still before the Lord and wait
patiently for Him.

Psalm 37:7





Overwhelming



The Lord's Provision





Cambodia - Medical

1979 - 39 doctors left,
One ophthalmologist survived

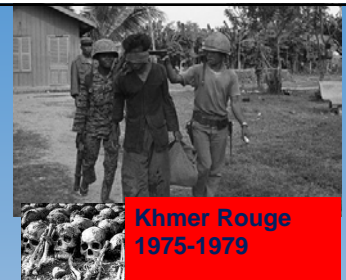
Present - "eye doctors" - no real subspecialists

Health Care Expenditure \$4/year

Infant Mortality 66/1000

Child (<5) Mortality 83/1000

Literacy 74%

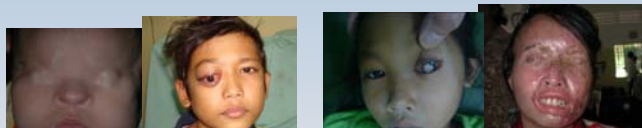


**Khmer Rouge
1975-1979**

**Genocide
2 Million**

**Years of Civil
War until 2000**

The Killing Fields



More Commonly Encountered Conditions

Congenital Abnormalities
Leukocoria: RB and other
Trauma – Chemical and Optic Nerve
CSR, but not ARMD
Myasthenia Gravis



*Teaching in Clinic,
Operating Room
and Classroom*







Cambodian Ophthalmological Society
December 18-19 2009, June 25-26 2010
Phnom Penh, Cambodia

*For I am the Lord your God
 who takes hold of your right
 hand and says to you,
 Do not fear, I will help you*
 Isaiah 41:13



Cambodian (Khmer) Church





Christmas and New Year Holidays



Angkor Wat





2010



Monkey Bite- Rabies Definitely Endemic in Cambodia



Visas Expiring

Rabies?

IRS Audit

Losing Health Insurance

*The Lord is my light and my
salvation, whom shall I fear*

Psalm 27:1





*What a blessing to
my family*



Crazy! ?

... no... Normal

Most of the World



“Types” of Medical and Eye Missions

Clinical Outreach and Education

1. Quick: 2-3 day Clinics/ Screenings
2. Short: 1-2 week - Clinic / Surgical Camp
3. Short Term: 2- 4 weeks
 - Surgical Camp
 - Volunteer Missions Hospital – *maybe some teaching*
4. “Long” Term: 6 months to 2 years – clinical *and teaching*
5. Career – Clinical *and teaching*

Ophthalmic Subspecialties and Missions

Clinical / Camp Setting

1. Refraction
2. Cataract and Anterior Segment
3. *Oculoplastics*
4. *Strabismus*

Could be Frustrating:

Glaucoma
 Neuro-Ophthalmology
 Retina
 Uveitis
 Corneal and Refractive Surgery

– for reasons of technical support
and follow-up care:

Academic Setting

All specialties needed!

Subspecialists Critically needed in Developing Nations

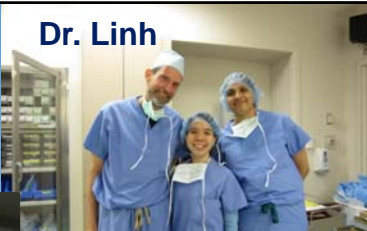
Teaching in the International Setting

1. Many institutions and governments are looking for professionals
2. In most cases you can teach in **English**
3. *Opportunities are vast*
4. *Wide diversity of experiences and adventures*
5. **All sub - specialties**



Observership in Neuro-ophthalmology and Oculoplastics

Dr. Linh

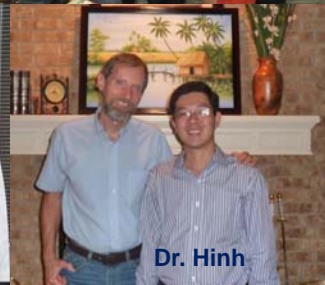


Texas Tech Physicians
of Lubbock Eye Clinic

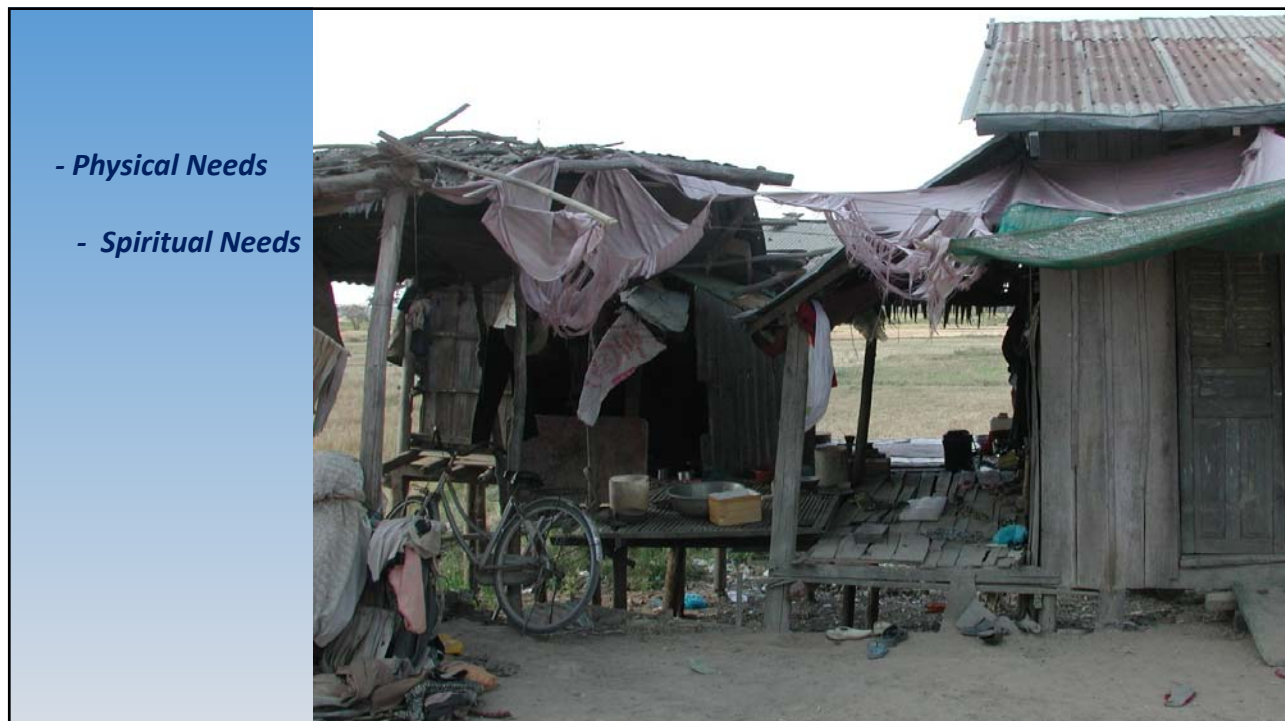
Dr. Sophal



Dr. Minh



Dr. Hinh



Questions:

*Is there something worse than
Physical Blindness?*



Eye



Brain

....Spiritual Blindness



What really is “Missions” anyway?

What attracts doctors, students to it?

What is our task?

Alleviating Suffering?

Is that the highest goal?

What are the rewards?



Motivations in Medical Missions



- ✓ To Do Some Eternal Good?
- ✓ To Teach Someone Else To Do Good
- ✓ To Do Some Good for Someone

-
- ✓ To Feel Good About Myself
 - ✓ To Make Myself Look Good

What is your Mission?

Concluding Questions

- ✓ Can I really make a difference?
- ✓ How and When will you Begin this Journey?
- ✓ Will you go it alone?
- ✓ Are you willing to go out of your comfort zone?
- ✓ Clinical Service and / or Teaching?
- ✓ What Sustains You?



*How do you respond to or,
How do you process?*



Human suffering when you encounter it?

Your own personal trials and suffering?

Where does one find the strength to continue?

Love for Humanity?

Love for God?

His Love for You?



***What will really matter
when I come to the end of my life?***

***He who has the most stuff
when he dies – wins?***

Missions / Medicine will cause you to either:

- think about what your life really means*
- to become hardened / disillusioned?*

***I Have No Greater Joy than to
hear that my Children are
walking in the Truth ...***

3 John 4



