



Innovative Screening Models and Their Impact on Global Eye Health

--- introduced by ---

Ian Wishart

The Fred Hollows Foundation



ABOUT US



WHO WE ARE

The Fred Hollows Foundation is an international development organisation focusing on blindness prevention and Indigenous Australian health. We are independent, not-for-profit, politically unaligned and secular.



OUR VISION

We see a world in which no person is needlessly blind and Indigenous Australians exercise their right to good health.



OUR INSPIRATION

We are inspired by the life and work of Professor Fred Hollows, an internationally acclaimed eye surgeon and an activist for social justice who championed the right of all people to high-quality and affordable eye care and good health.



OUR VALUES

Our values of integrity, empowerment, collaboration, and action underpin every aspect of our work both in Australia and around the globe.



Innovative Screening Models and Their Impact on Global Eye Health

Alan L. Robin, MD

Johns Hopkins University,
University of Michigan,
and Board of Aravind Eye
Foundation

IS THERE A NEED FOR INNOVATIVE SCREENING?

1. How many of you are over 40?
And not had your eyes dilated in last two years?
2. How many of you are over 60?
And not had a dilated exam in last year?
3. How many of you are DIABETIC?
And not had a dilated exam in last year?
4. How many of you have a family history of glaucoma?
And not had an eye exam in the last year?
5. How many of you have never had a dilated examination of your eyes?

***Treatable* Causes of Global Moderate to Severe Visual Impairment/Blind: 2015**

- Refractive Error 152.3 million
- Cataract 60 million
- Glaucoma 6.9 million
- Diabetic Retinopathy 2.6 million

ALL ARE UNNECESSARY

Blind: What Does It Really Mean?

VIDEO

The Costs Of Blindness



I see fine – *Crisis Driven*

- White hair and white eyes
- Multifactorial
 - Education
 - Gradual Processes
 - Access to care
- Who comes to screenings?



Why The Problem?

To paraphrase Steve Jobs:

- "People don't know what they want [*need*] until you show it to them."

The 100 greatest Steve Jobs quotes. By Stephan Nale.
Oct 2012 Permalink. Available at:
www.complex.com/tech/2012/10/steve-jobs-quotes/unintended-consequences



So Just Educate & Scare



**Smoking
increases
the risk of
blindness**

*Get help to stop smoking:
consult your doctor or pharmacist*

India:– Ideal For Disruption

“+” & “-”



The NEW ENGLAND JOURNAL of MEDICINE

Perspective
JULY 2, 2015

INTERNATIONAL HEALTH CARE SYSTEMS

India's Aspirations for Universal Health Coverage

K. Srinath Reddy, M.D., D.M.

- Weak regulatory systems
 - Fail to enforce quality cost or quality
- Many receive inappropriate, unethical, or inadequate care
- Few with insurance
- Most self-employed

Aravind Eye Care System – Physical locations

Filter

Collapse

Base Hospital

Show All

Level of Care

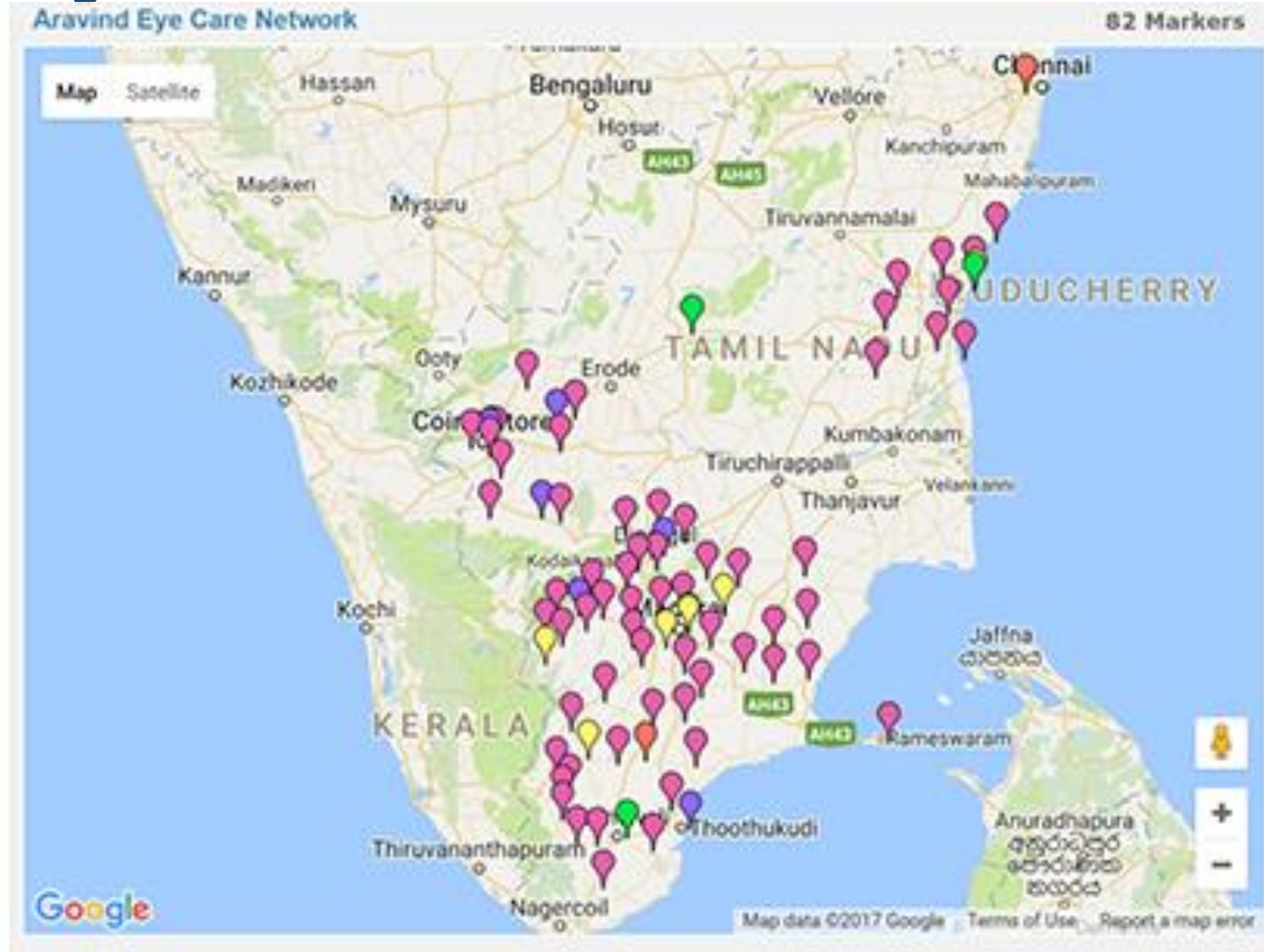
Show All

SET MARKER

Show the remaining markers

Marker

-  Tertiary Centres
-  Upcoming Hospitals
-  Vision Centre
-  Secondary and Surgery Centre
-  Community and City Clinics



In 1976

11 Beds



Specialty Care
Research
Training
5 Tertiary Care Centers

1000 - 2000 patients



Cataract Services
Specialty Diagnosis
6 Secondary Care Centers

150 - 400 patients



Comprehensive
Eye Examination
Minor procedures
6 Community Eye Clinics

100 - 150 patients



Comprehensive
Eye Examination
62 Primary Care Centers

20 - 25 patients

Aravind in 2016-17....

4.4 million Outpatient Examinations



463,125 Surgical, Laser & Intra-vitreous Inj. Procedures

600,000 Prescription Spectacles dispensed



50% for free / steeply subsidized



Built On “*Woman Power*”



Previous Approach: Rural Eye Care

- Principles:
 - Reaching the unreached
 - Removing barriers
 - Community participation
- Impact:
 - Creating access
 - Growing the awareness



Screening Eye Camps

Present problems in Eye Care Services



Only 7% of people with eye problems in village accessed care from eye camps

VISION CENTERS: Specific Objectives

- To **cost effective provide primary eye care**
- Permanent facilities with easy access.
- **Create awareness** about eye care in the community and **influence health seeking behavior.**

Aravind Vision Centers



Towards Universal Eye Care



Contribution of 61 vision Centres to service Delivery in a year (2016-17)

Description	Total	
Total Number of Vision Centres	61	Population 4.0 million
Patients Reached (Outpatients - New)	299,975	7.5% of the population
Total outpatient visits	524,269	
Cataract surgery done	16,341 (64% acceptance)	CSR: 3,600
Spectacles delivered	66,557 (85% acceptance)	12% of the Total OP
Specialty referral to the base hospital	24,412 (68% acceptance)	8% of the New OP
Tele consultations per day	1,691 at Aravind	28 per VC

Specialty patients referred from vision centres and registered at base hospital (16 Madurai vision centres)

Year	IOL	Cornea	Glaucoma	Retina	Orbit	Pediatric	Uvea	Total	Growth
2013	1,389	987	364	556	292	532	170	4,290	
2014	1,482	1,199	487	838	375	595	244	5,220	22%
2015	2,439	1,633	593	838	466	740	462	7,171	37%
2016	3,006	1,655	1,042	1,495	744	802	433	9,177	28%

Economic Impact: for each patient

To the Hospital	No	Transport	Other Expenses	Lost Wages	Total
	In INR				
Patient	1	25	50	100	175
Patient attendant	1	25	50	100	175
Total		50	100	200	350
To the Vision Centre					
Patient	1	10	20	50	80
Patient attendant	0.5	5	10	25	40
Total		15	30	75	120
Rupees Saved	Rs. 230 (roughly Rs. 50 lakhs for the 25,000 patients)				

Can't solve them

FIRST THE SIMPLE ISSUES

2.5 Billion Need Glasses: But No Access 625 Million Can't Learn/Work Due Lack of Glasses



The New York Times

A Simple Way to Improve a Billion
Lives: Eyeglasses

It's the biggest health crisis you've never heard of. Doctors, philanthropists and companies are trying to solve it.

May 5, 2018 *New York Times* Sunday Edition

Issues

- Awareness (asymptomatic)
- Financial (Exam/Spectacles)
- Conflicting Commitments (other more urgent issues)

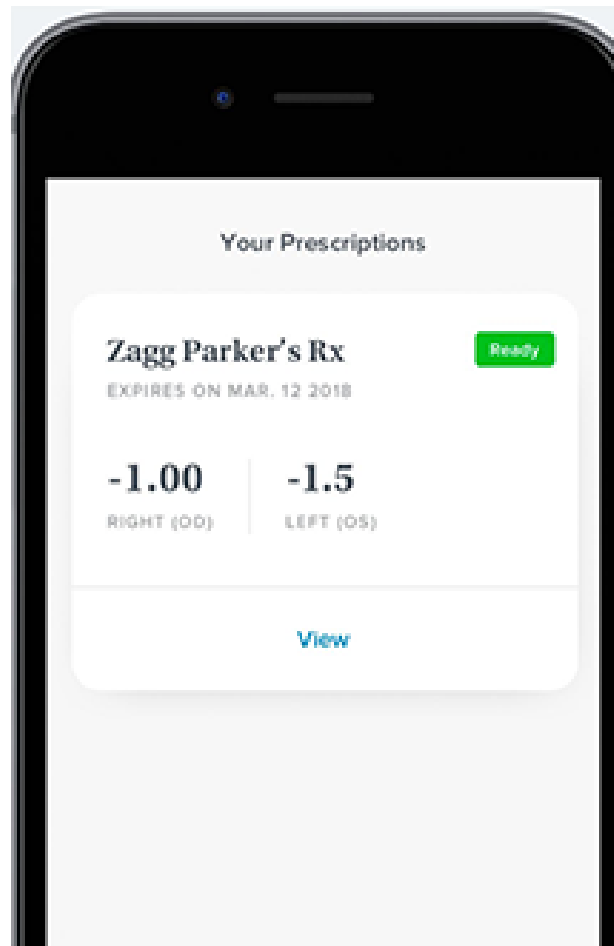
SCHOOL SCREENING PROGRAM ASPIRATIONS & GOALS

- **ASPIRATIONS:**

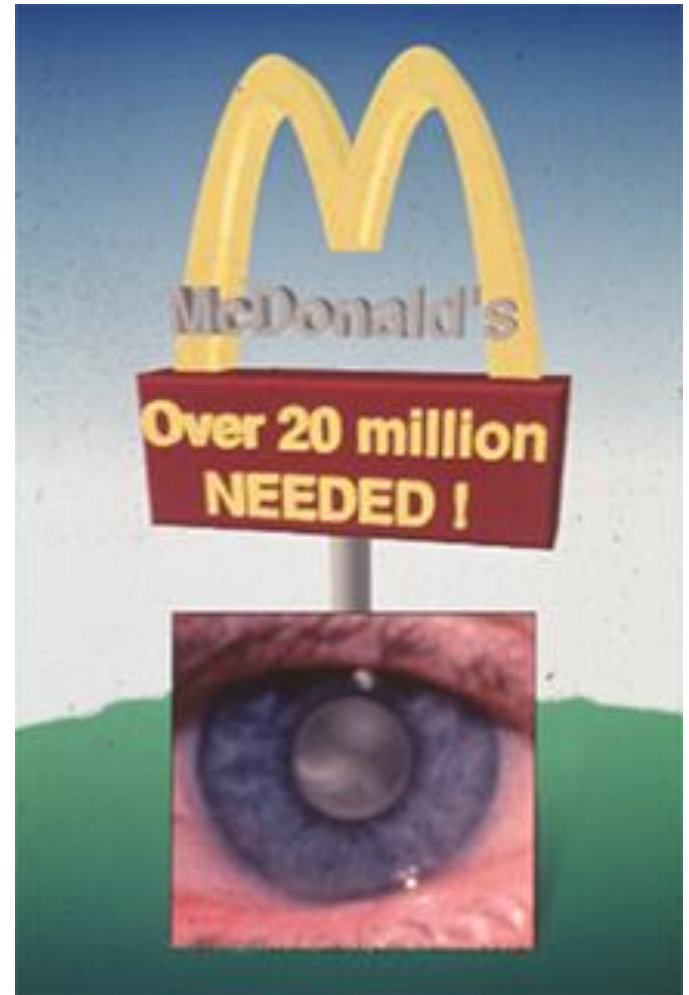
- **GOALS:**

Increase the number of children screened from 500,000 to one Million a year by 2020.

Self Refraction: Smart Phone

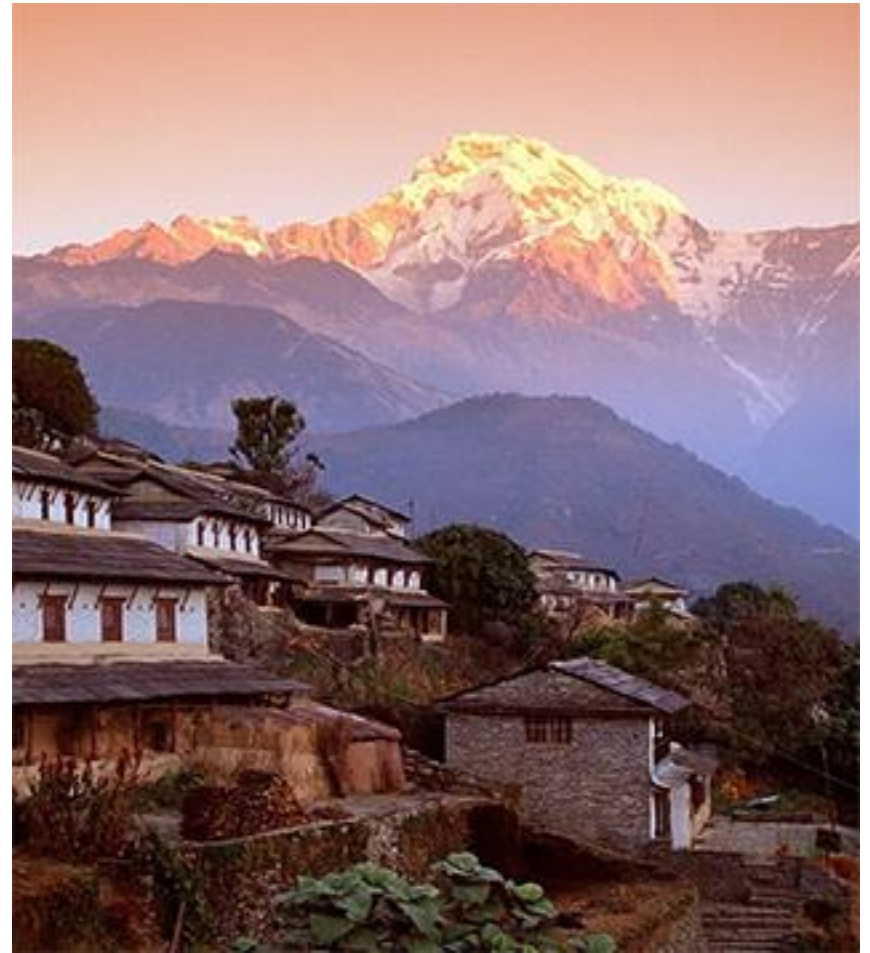


- Marketing, education, and social involvement
- Resource allocation
- Uptake



The Problem

- Both *Glaucoma* & *Diabetes* are leading causes of blindness but both are commonly either not diagnosed or misdiagnosed.
- Costs of missed cases are high



Screening: A Passé Concept



American Journal of Epidemiology
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Vol. 134, No. 10
Printed in U.S.A.

A Population-based Evaluation of Glaucoma Screening: The Baltimore Eye Survey

James M. Tielsch,¹ Joanne Katz,¹ Kuldev Singh,² Harry A. Quigley,¹ John D. Gottsch,³
Jonathan Javitt,⁴ and Alfred Sommer^{1,5}

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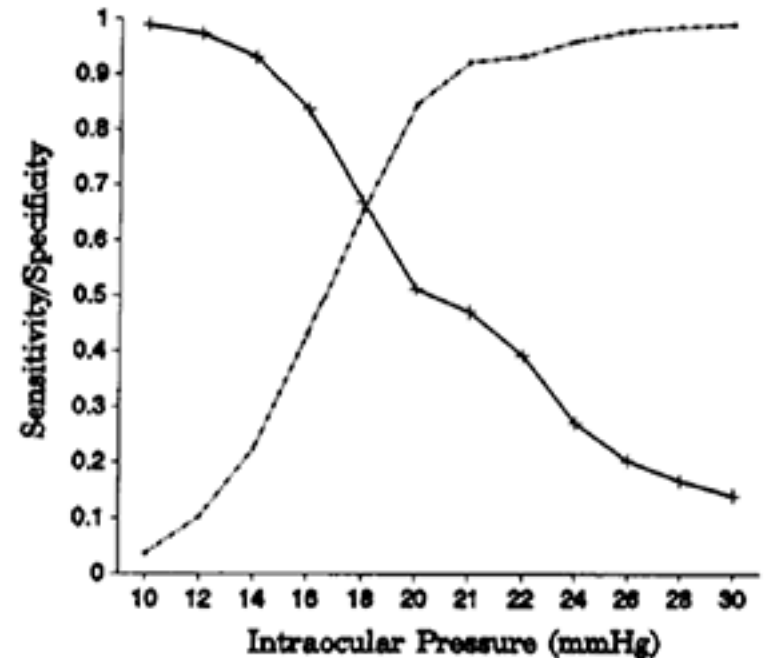


FIGURE 1. Sensitivity and specificity curves for varying cutoff points for intraocular pressure: Baltimore Eye Survey, 1985–1988. —, sensitivity; • - •, specificity.

Tonometry: IOP > 21 mm Hg: 47% Sensitivity & 92% Specificity

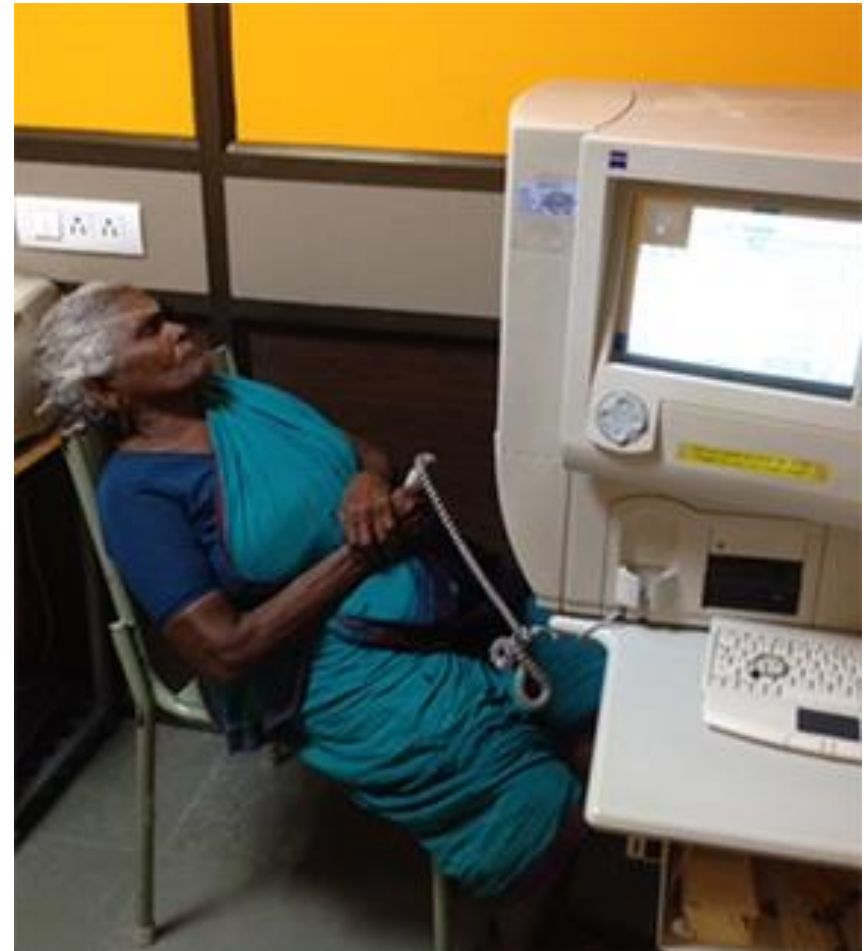
Humphrey Perimeter

A Large Space Invaders Gam

- Not easy to carry in your purse or backpack

Full Field 120:

- Only 50% can complete in 7 min 16 seconds/eye
- However a suggestion of the value of suprathreshold perimetry:
In **St. Lucia sensitivity 86%**, **specificity 84%**
 - Mason et al: *Ophthalmology* 1989;96: 1363-1368.



Undetected Glaucoma

Previously Undetected Glaucoma in Prevalence Studies		
Barbados	51%	Chennai Glaucoma Study 98.5%
Melbourne	60%	Andhra Pradesh Study 92.6%
Rotterdam	53%	Aravind Comprehensive Eye Study 93.0%
Blue Mountains	51%	

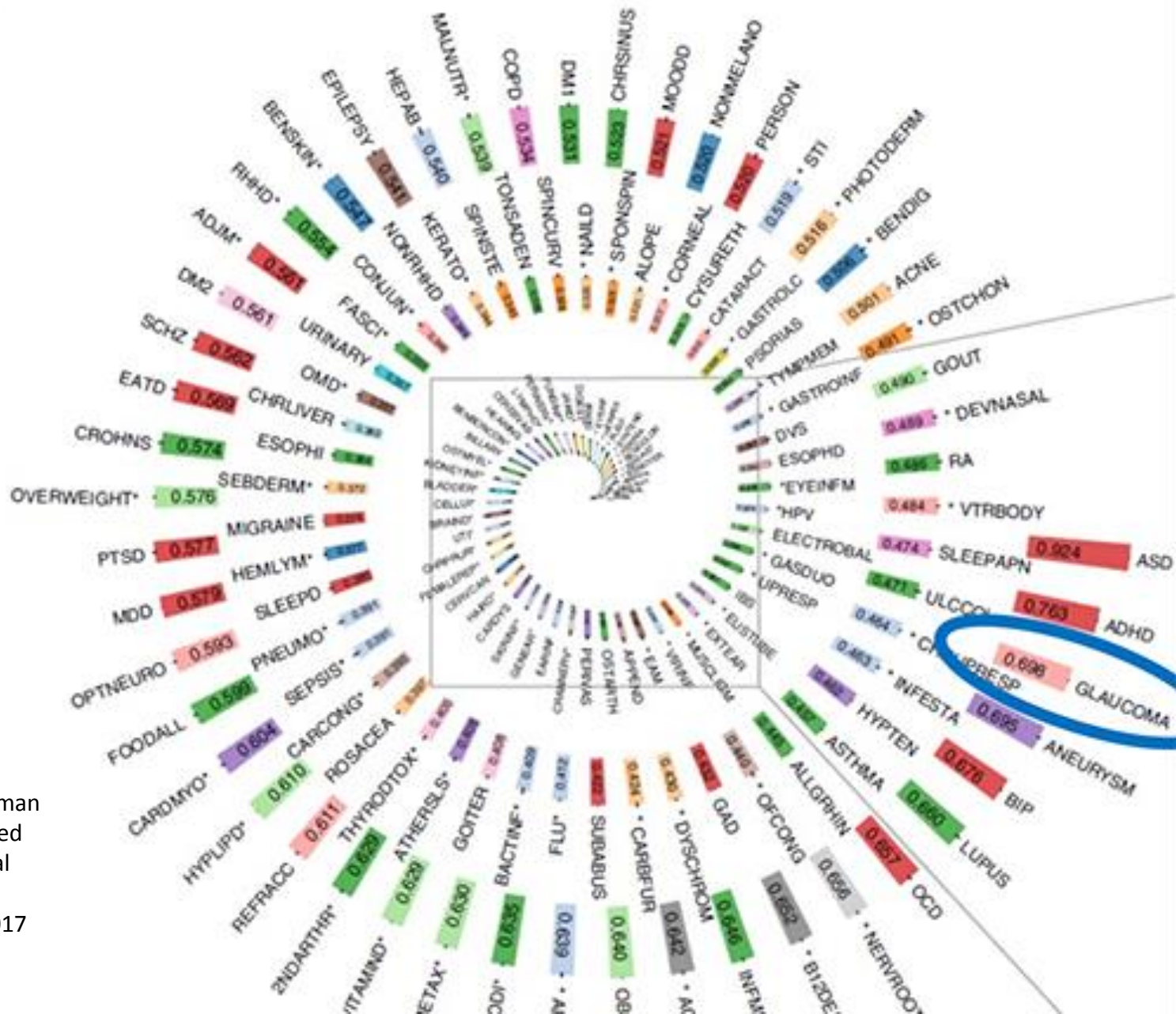
Glaucoma Identified in Community Eye Screening

Unit of Aravind Eye Care Jan – Dec 2010	Patients Screened in Community Outreach	Persons diagnosed with any Glaucoma (Percent of total OP seen)
Madurai	104 231	1057 (1.01%)
Tirunelveli	49 977	627 (1.22%)
Coimbatore	76 680	242 (0.30%)
Pondicherry	63 820	347 (0.50%)
Total for AECS	294 708	2273 (0.7%)

Ideal Screening

- ***Screen For Those Who Will Go Blind or Disabled In A Few Years***
- Highly Sensitive
- Portable
- Inexpensive
- Not limited to a single test
- Relatively quick and painless

HERITABILITY: FAMILY HISTORY IS PACKAGED GENOMICS SUMMARY



Diabetes: An Enormous Global Problem

- By 2030: Will afflict > 439 Million Worldwide
 - Increase from **6.4% to 7.7%** of population
 - 69% increase in developing countries
 - 20% increase in developed countries
- Task of detecting and evaluating retinopathy is enormous

Diabetes In Kids: Increasing!

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Incidence Trends of Type 1 and Type 2 Diabetes among Youths, 2002–2012

CONCLUSIONS

The incidences of both type 1 and type 2 diabetes among youths increased significantly in the 2002–2012 period, particularly among youths of minority racial and ethnic groups. (Funded by the National Institute of Diabetes and Digestive and Kidney Diseases and the Centers for Disease Control and Prevention.)

So What Are The Facts? How Do We Do?

High Prevalence of Retinopathy in Kids



AMERICAN ACADEMY™
OF OPHTHALMOLOGY



Incidence and Risk Factors for Developing Diabetic Retinopathy among Youths with Type 1 or Type 2 Diabetes throughout the United States

Sophia Y. Wang, MD,¹ Chris A. Andrews, PhD,^{1,2} William H. Herman, MD, MPH,^{3,4,5}
Thomas W. Gardner, MD, MS,^{1,2} Joshua D. Stein, MD, MS^{1,2,6}

Less Than 1/2 Get Screened

JAMA Ophthalmology | Original Investigation

Ophthalmic Screening Patterns Among Youths With Diabetes Enrolled in a Large US Managed Care Network

Sophia Y. Wang, MD; Chris A. Andrews, PhD; Thomas W. Gardner, MD, MS; Michael Wood, MD;
Kanakadurga Singer, MD; Joshua D. Stein, MD, MS

CONCLUSIONS AND RELEVANCE Despite possessing health insurance, many youths with diabetes are not receiving eye examinations by 6 years after initial diagnosis to monitor for DR. These data suggest that adherence to clinical practice guidelines is particularly challenging for racial minorities and youths from less affluent families.

Conclusions: Youths with T1DM or T2DM exhibit a considerable risk for DR and should undergo regular screenings by eye-care professionals to ensure timely DR diagnosis and limit progression to vision-threatening disease. *Ophthalmology* 2017;124:424-430 © 2016 by the American Academy of Ophthalmology

#1 – Remote Locations



#2 – High Volume Cataract-Centric Eye Camps



Who Does Screening

- Trained Assistant
- No Need High Level Training – Just Directed Training.

(J Am Acad Dermatol 2012;66:687-8.)

Utilizing hairdressers for early detection of head and neck melanoma: An untapped resource

Neda Roosta, BA,^a Michael K. Wong, MD, PhD,^b and David T. Woodley, MD,^a
on behalf of the Norris Comprehensive Cancer Center Melanoma Working Group
Los Angeles, California

1st Vision: Pixelated ETDRS – On iPad

OD



OS



2nd: The Camera



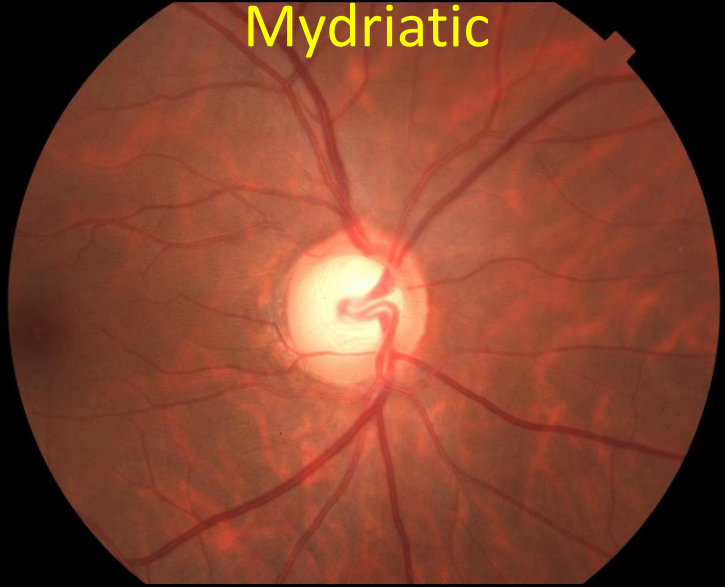
3rd: The Visual Field



All Digitally Transmitted



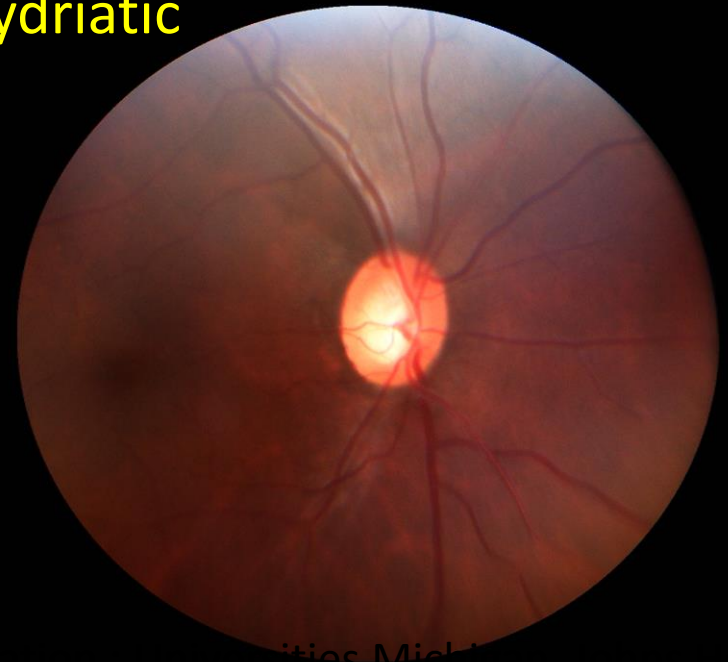
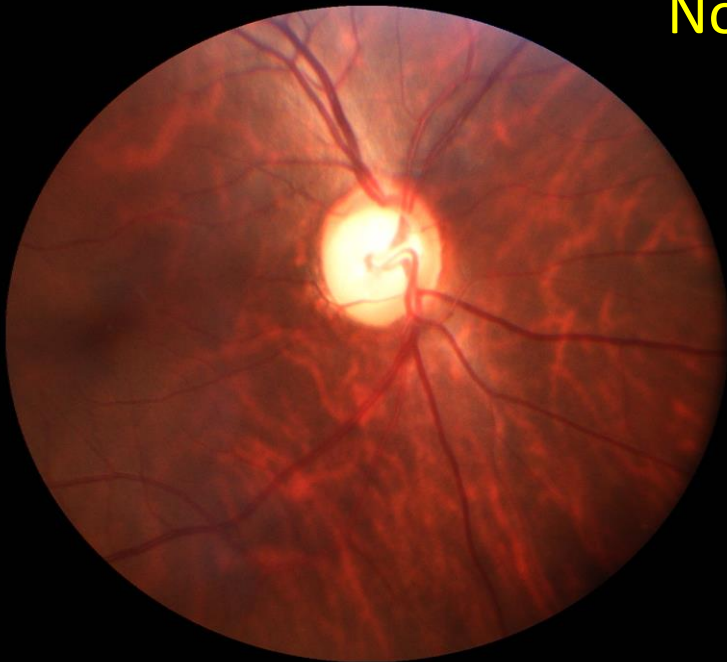
Mydriatic



'Gold Standard'

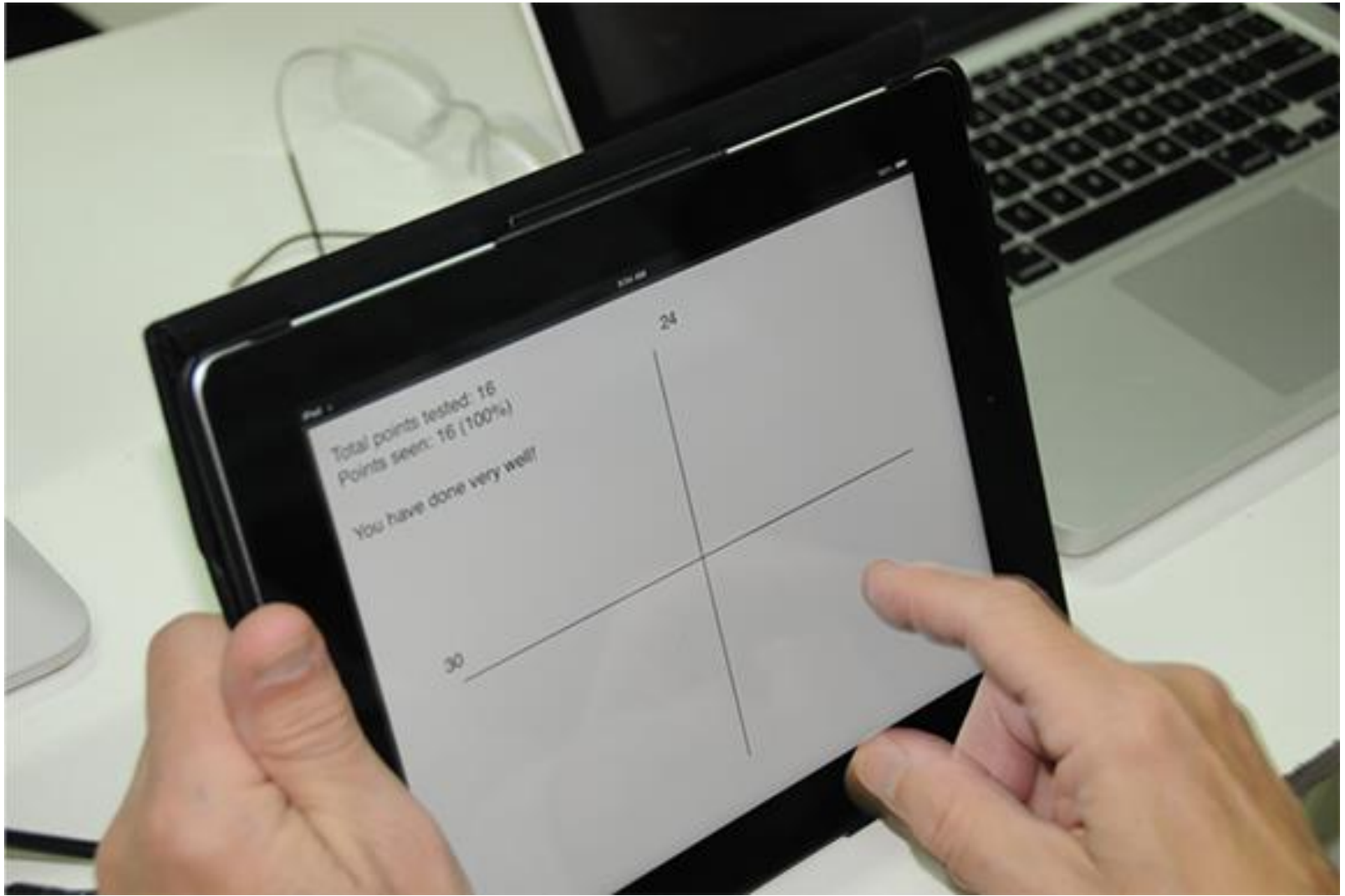


Non Mydriatic

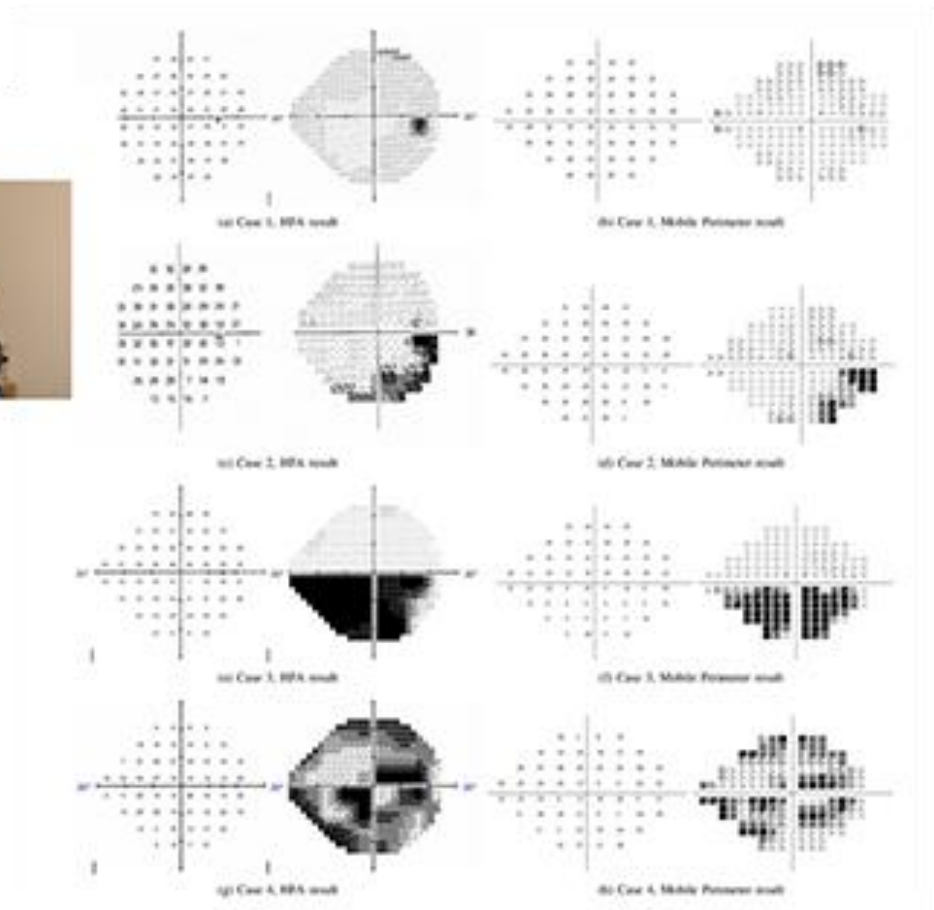


Tester: Naïve To Perimetry and Apple

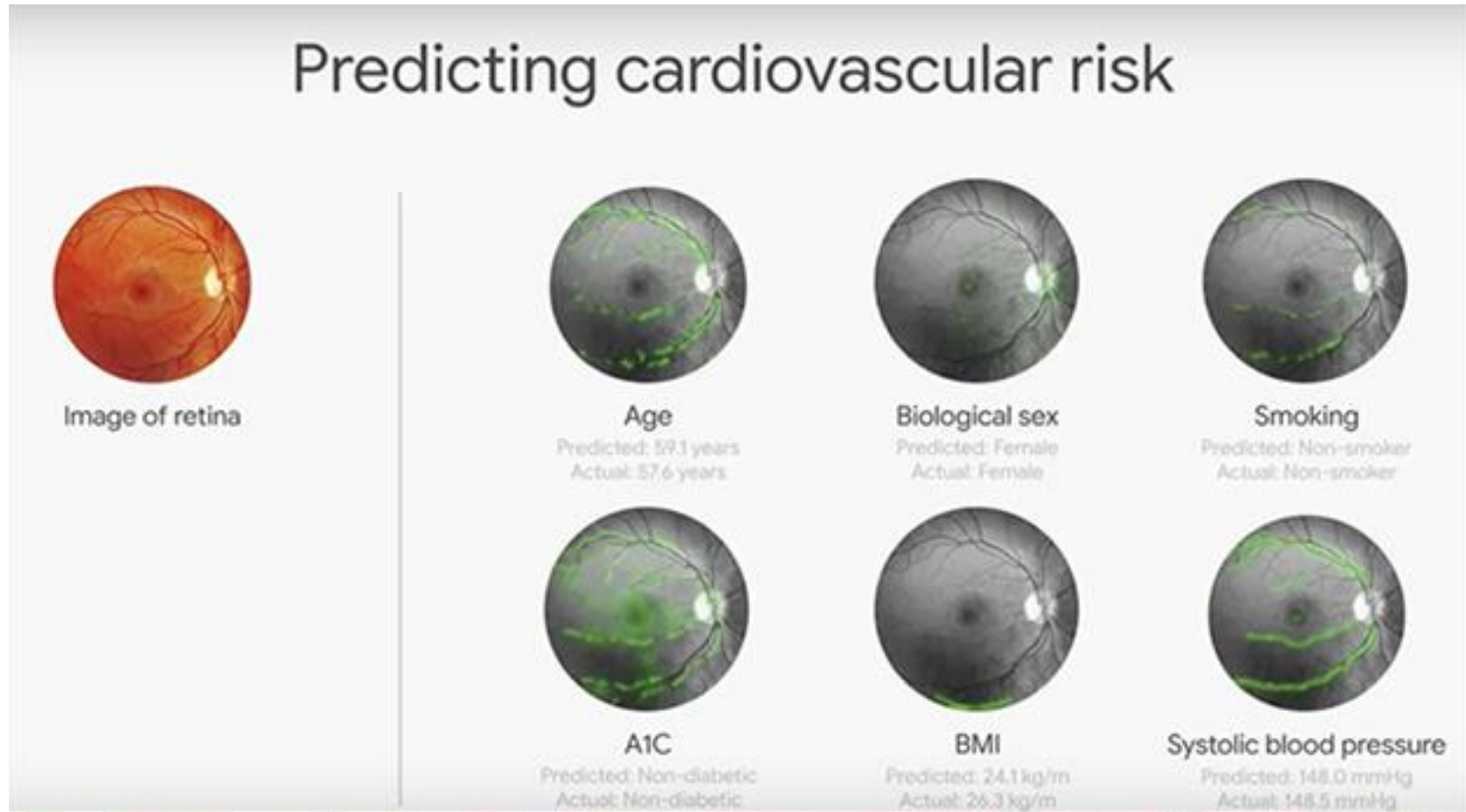




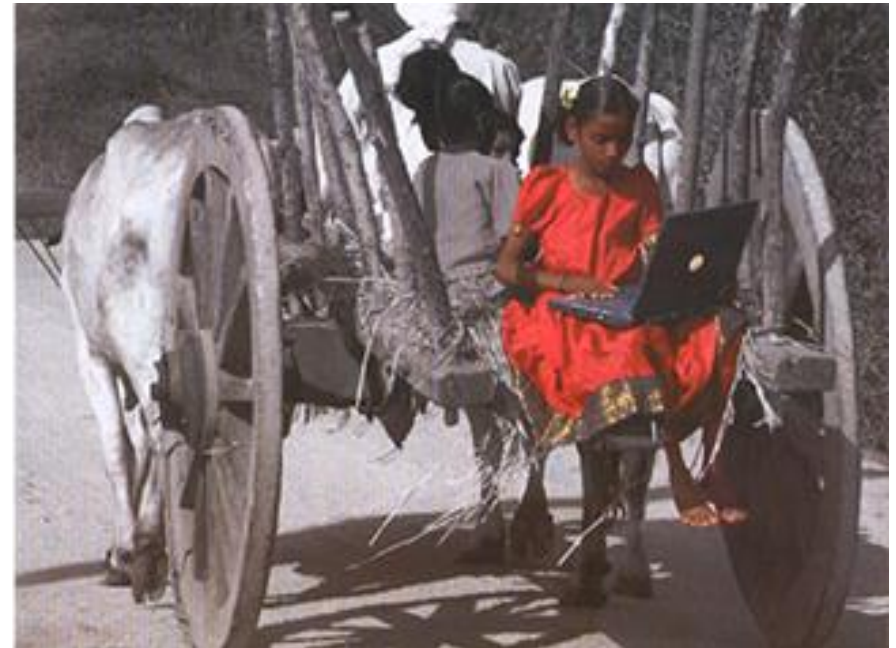
The Future



AI: The Eye Is The Window to The Soul: Predict 5 year risk of MI or Stroke



Times Are Changing–Innovation Is Crucial–Think Outside the Box!



IMPACT

