Preventing & Treating Cervical Cancer in Low-Resource Settings

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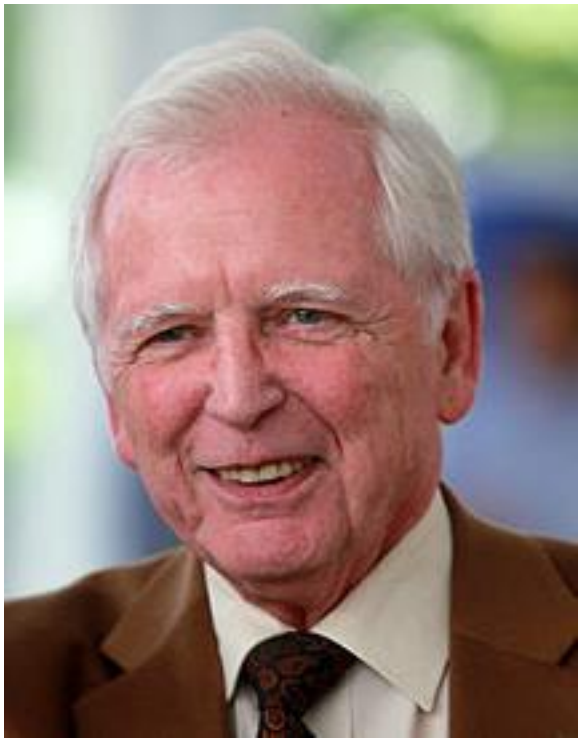
Cervical Cancer is Preventable

- **Known Etiology:**
  - **Human Papillomavirus (HPV)**
- **Prevention:**
  - **HPV Vaccination**
- **Screening:**
  - **Pap Test, HPV DNA Testing, VIA**
- **Treatable Pre-Invasive Phase:**
  - **Cervical Cone/LEEP/Cryotherapy**
  - **Takes ~10y to progress from pre-invasive disease to cancer**



Dr. Harald zur Hausen
Nobel Prize, 2008

Cervical Cancer

United States:

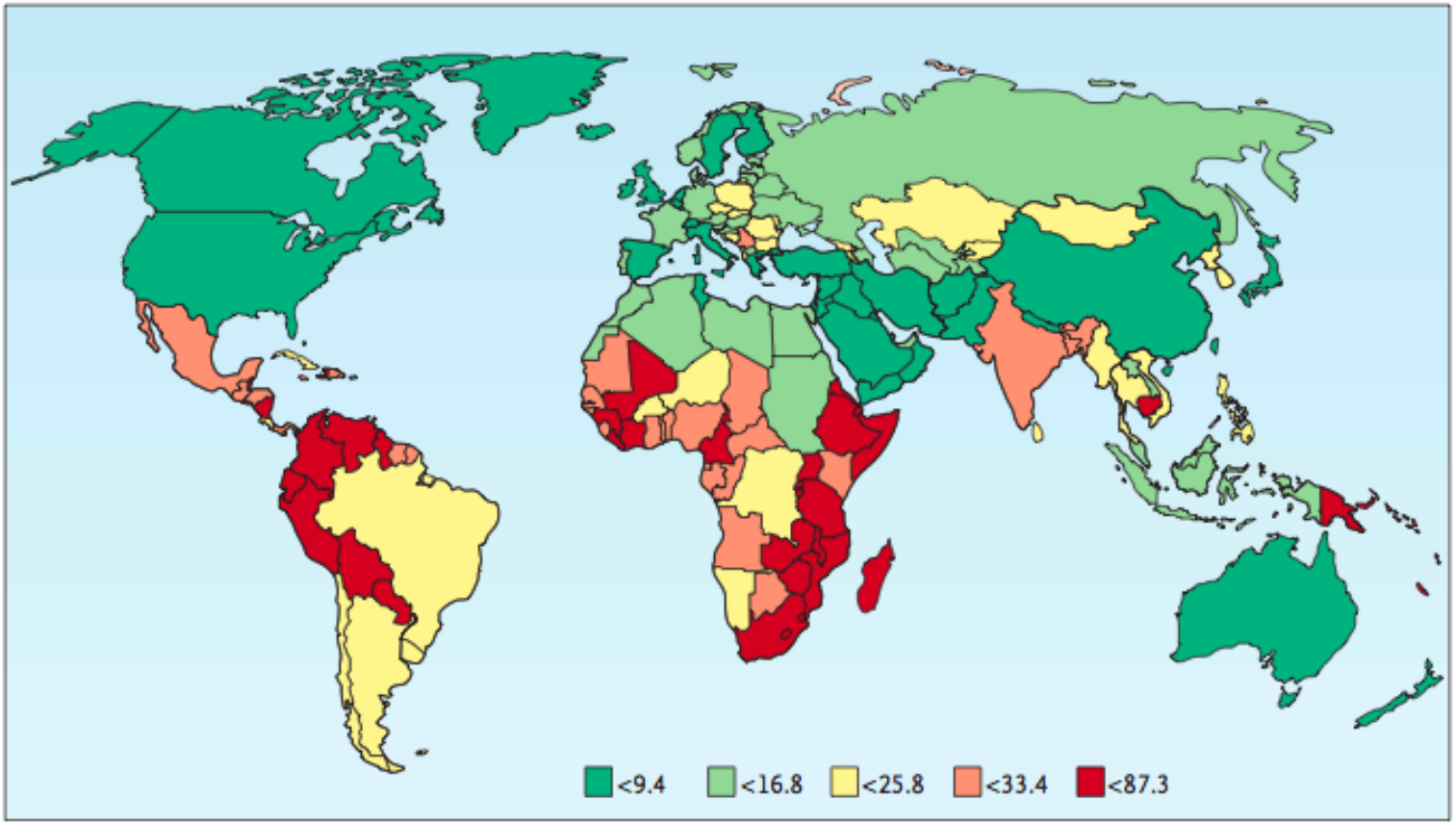
- **Estimated 12,900 new cases and 4,100 deaths per year**
- **14th most frequent cancer among women**

Low & Middle Income Countries (LMICs):

- **1st or 2nd leading cause of cancer death among women**
- **>400,000 women dying per year**

Torre *et al*, *CA Cancer J Clin*, 2015
Siegel *et al*, *CA Cancer J Clin*, 2015
Globocan 2015

Inequity of Cervical Cancer



Incidence of Cervical Cancer Worldwide.
Numbers indicate cases per 100,000 population.

85% of cervical cancer cases occur in the developing world

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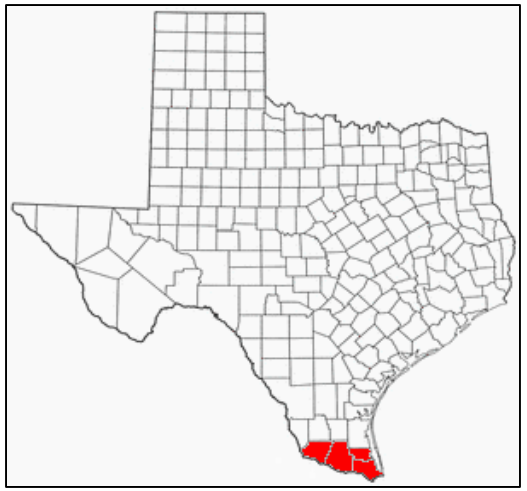
Texas-Mexico Border

Rio Grande Valley:

- **Population of ~1.3 million**
- **90% of population is Hispanic**
- **40% below the poverty line**
- **<5% of eligible women are receiving cervical cancer screening**
- **LEEP services for only available one day per month (Gyn from UTMB travels to RGV)**
- **31% higher cervical cancer rates**



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Houston, Texas

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HPV Vaccine in the USA

- **Recommended for girls and boys between at ages 11-12y (Gardasil, Cervarix, Gardasil9)**
- **3 doses over 6 months**
- **93-98% efficacy in prevention of cervical dysplasia/cancer if not previously infected**
- **Very safe**
- **Vaccines do not affect disease or infection present prior to vaccination**
  - **Need to give prior to onset of sexual activity**

Slade *et* al., *JAMA*, 2009
Vaccine Adverse Event Reporting System (VAERS)
Scheller *et al.*, *JAMA*, 2015

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HPV Vaccination Rates - USA

- **Females:**
  - **1 dose = 60.0%**
  - **3 dose series completion = 39.7%**
- **Males:**
  - **1 dose = 41.7%**
  - **3 dose series completion = 21.6%**
- **Australia, Canada, UK HPV vaccination >70%**
- **USA Hepatitis B vaccination rates >90%**

***** No school-based vaccination program in USA**

Centers for Disease Control, MMWR, 2015

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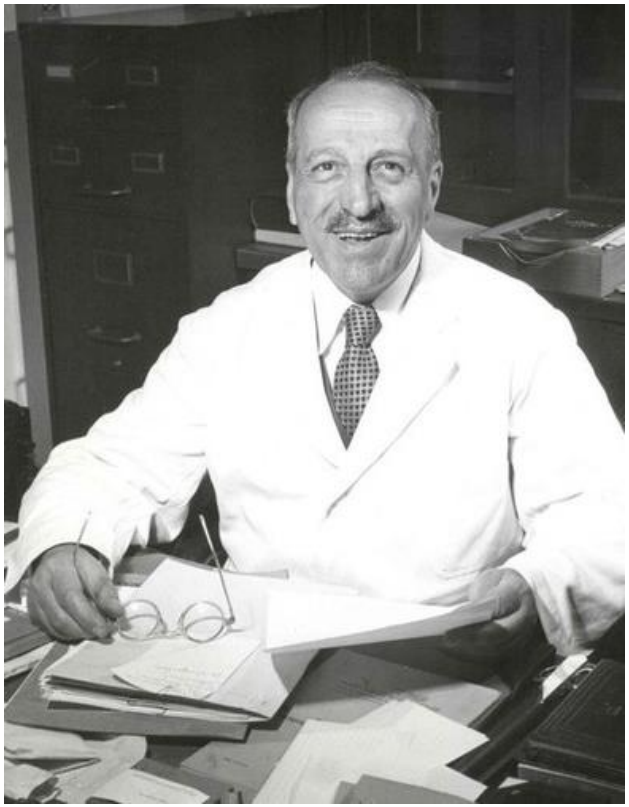
Why We Still Need Screening

- **Poor vaccination rates in the USA and vaccine not available in many countries**
- **Vaccines do not treat pre-existing HPV infections**

***Screening will be necessary for the foreseeable future and still recommended after vaccination**



Dr. George Papanikolaou
1883 - 1962

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Cervical Cancer Prevention in USA

Three Clinical Visits:

1. **Pap test +/- HPV testing**
2. **Colposcopy with cervical biopsies if abnormal Pap**
3. **If significant precancerous lesions (<5%) - conization/LEEP/cryotherapy**

   - Removal or ablation of precancerous lesion

**** Pathology/lab services required at each step**

**** Not feasible in low resource settings**

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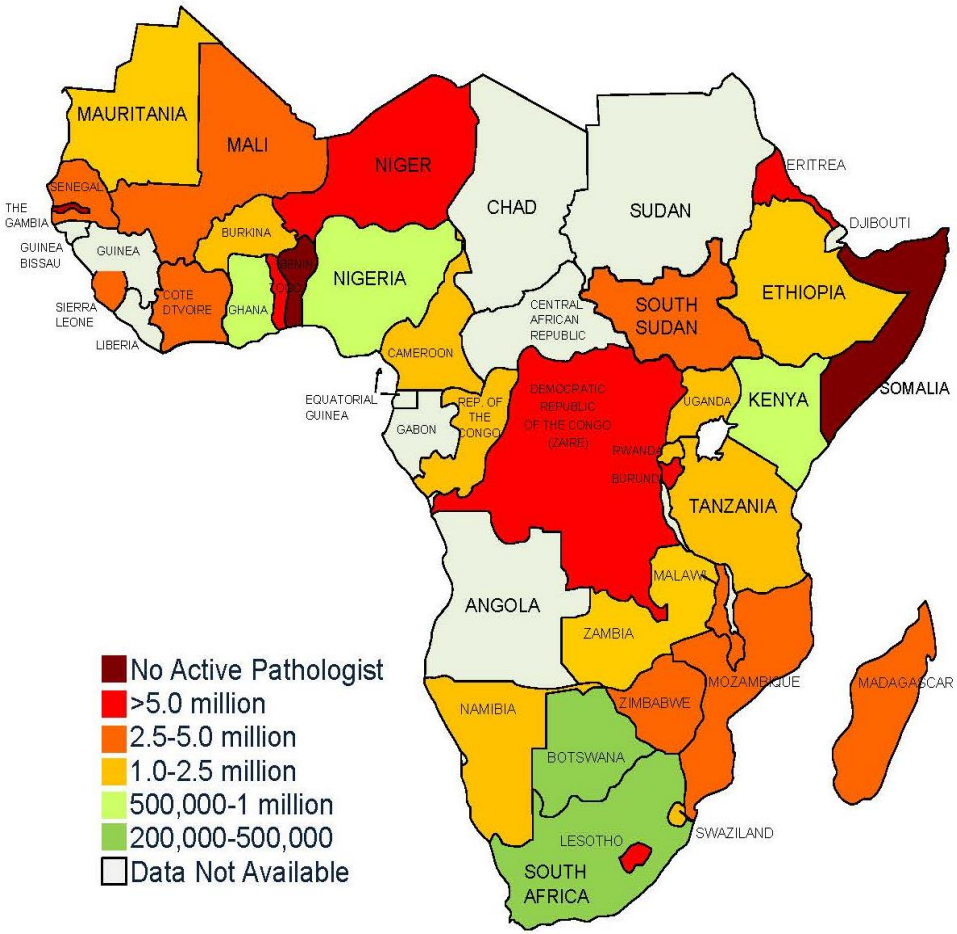
Availability of Pathologist



Number of People per Pathologist:

- UK: 15,108*
- US: 19,232**

*Royal College of Pathologists, 2012
**Anatomic and Clinical Pathologists, AAMC, 2007

Adesina *et al.*, *Lancet Oncology*, 2012

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Visual Inspection with Acetic Acid (VIA)

- **Low cost**
- **Performed by Primary Health Workers**
- **Can combine VIA with treatment (cryotherapy or LEEP) for a single visit "See & Treat" approach**
- **31% decrease in cervical ca mortality**
- **False positive results leading to overtreatment, increased cost and patient concern**

Shastri *et al.*, *JNCI*, 2014

High-Resolution Microendoscope (HRME)

- **Novel cervical visualization technique**
- **Developed by Dr. Rebecca Richards-Kortum and team at Rice University**
- **Assesses morphologic features typically evaluated by pathologists in-vivo in real-time:**
  - **N/C ratio, nuclear size, atypia, pleomorphism**
- **Eliminates the need for colposcopy, cervical biopsies and pathology services**

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HRME

- **Proflavine (topical contrast agent that stains nuclei) is placed on cervix**
- **A fiber-optic probe is applied**
- **Fluorescence from the proflavine-stained epithelium is transmitted back to the HRME**
- **Image is displayed on a computer screen in <u>real-time</u> allowing for "See & Treat"**

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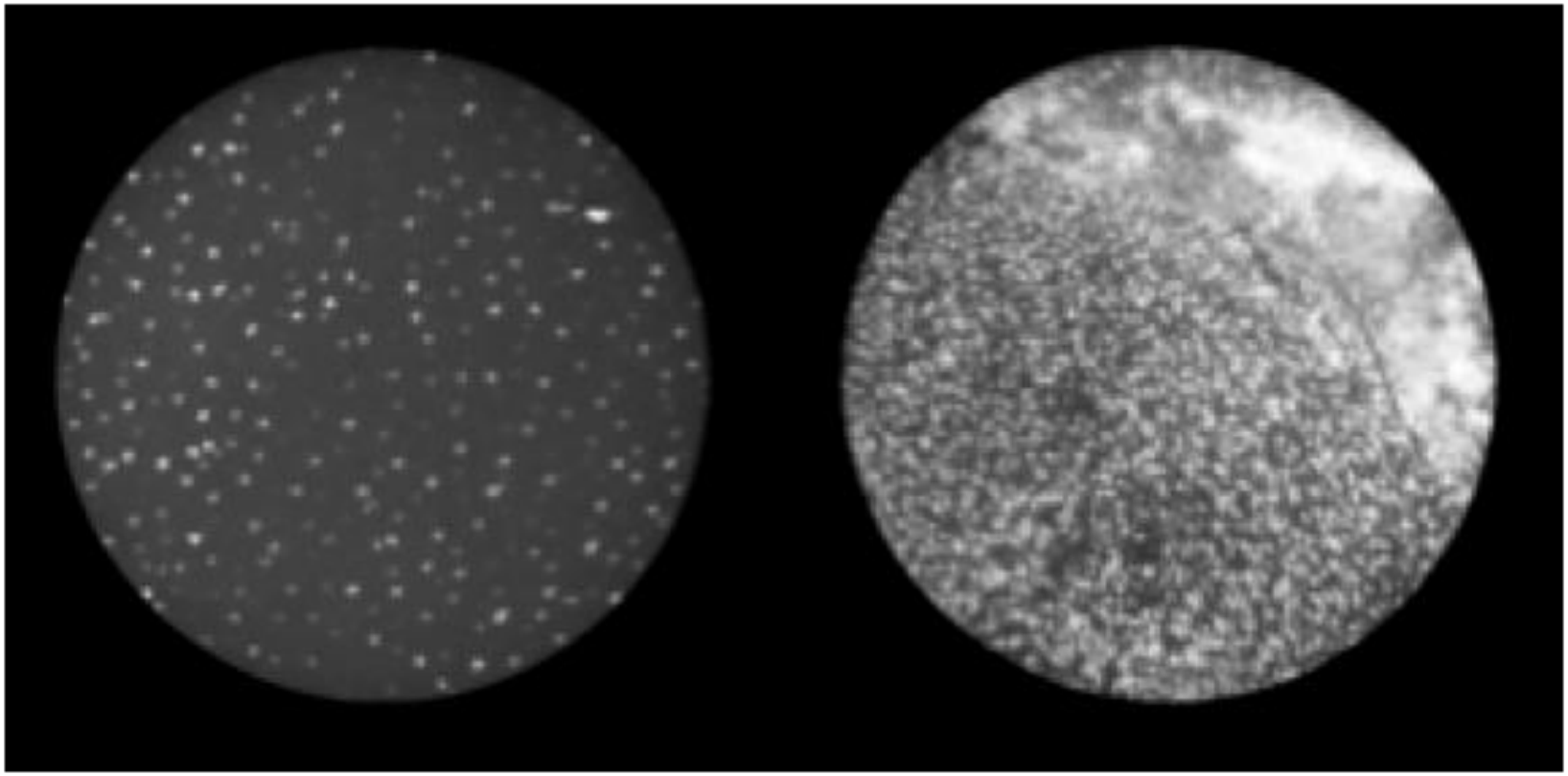
HRME - Normal vs. CIN2/3



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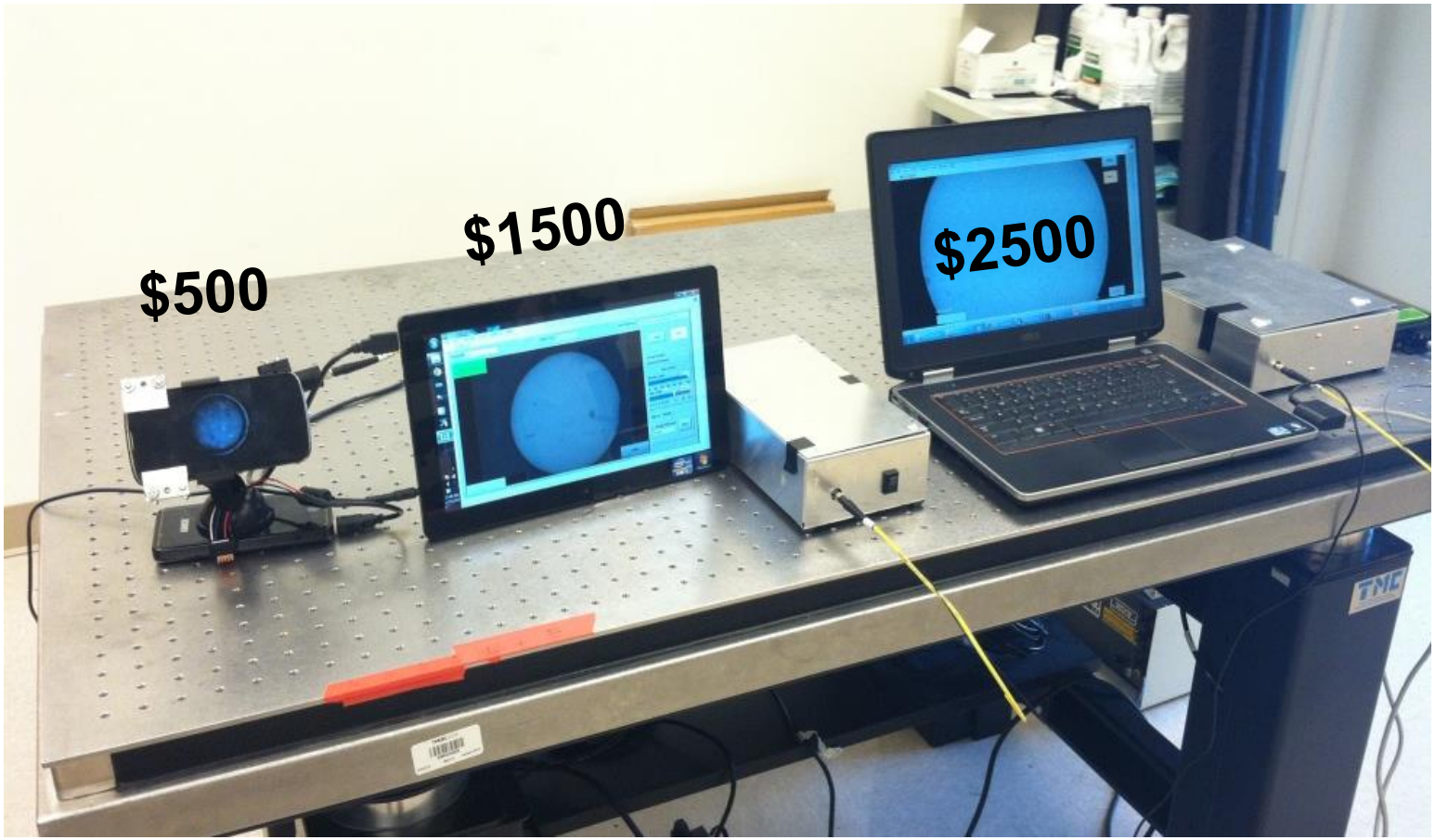
Reducing Size and Cost



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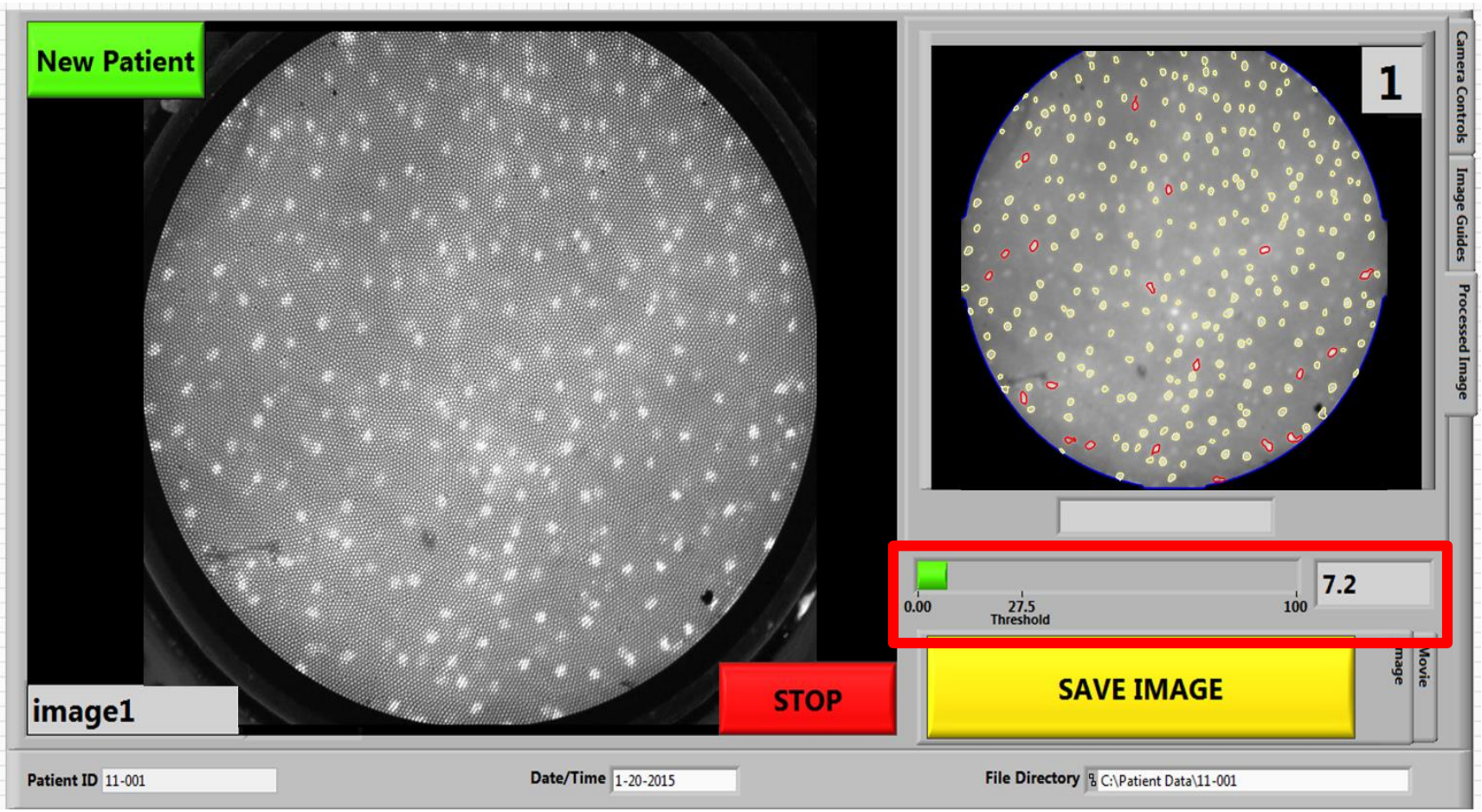
HRME - Objective Interpretation



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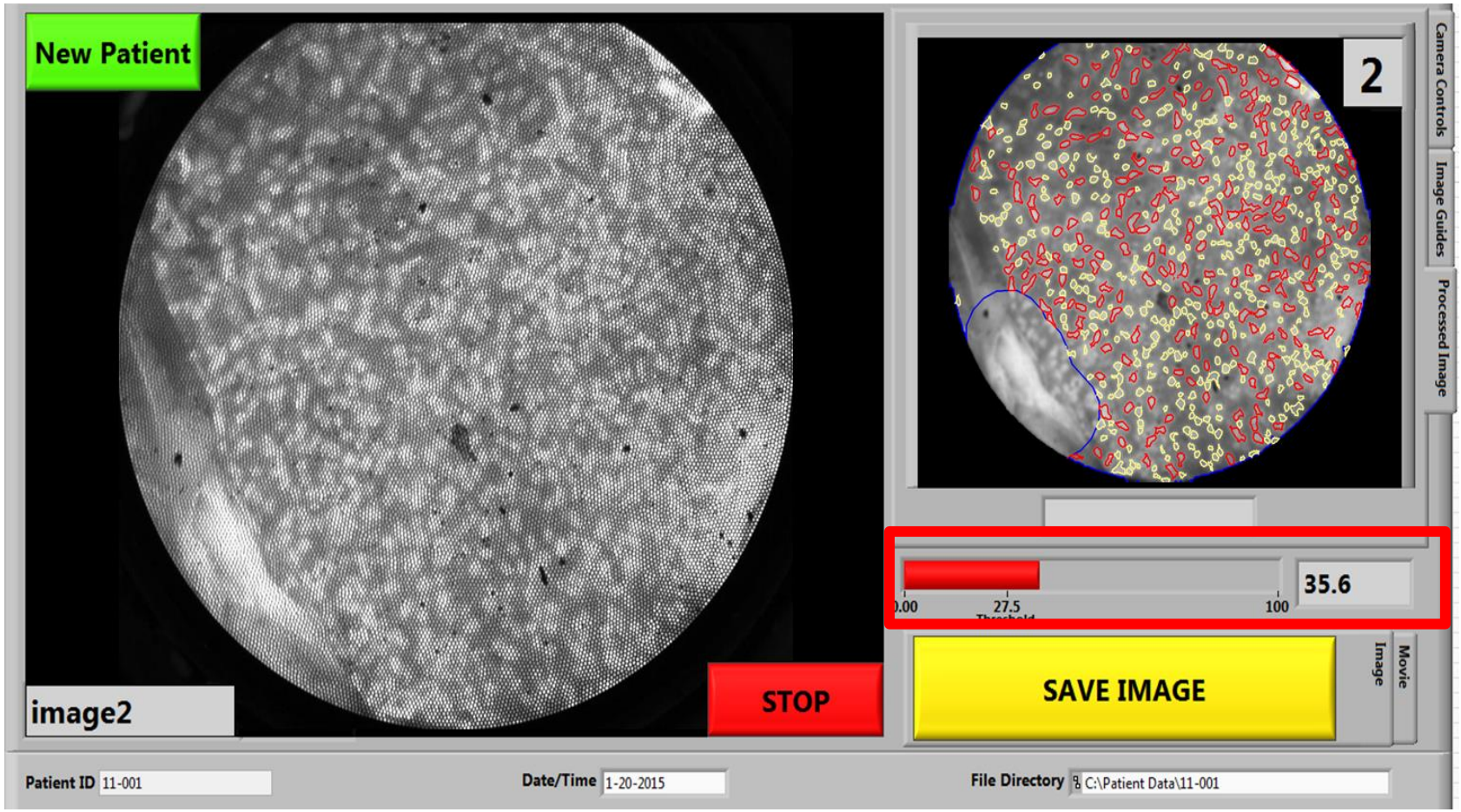
HRME - Objective Interpretation



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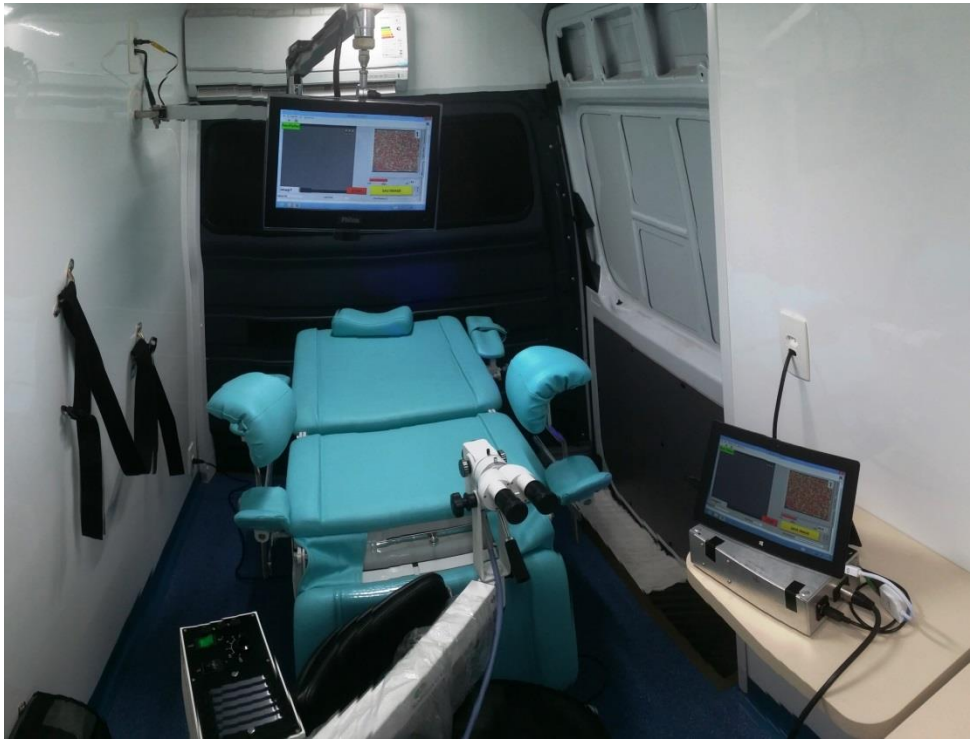
HRME in Mobile Unit



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Training & Education

Project ECHO

Extension for Community Healthcare Outcomes

Project ECHO

Dr. Sanjeev Arora
Univ. of New Mexico

Dr. Ernest Hawk
MD Anderson

Project ECHO® MD Anderson Cancer Center

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Project ECHO

Mission:

To expand capacity to provide best practice care for common & complex diseases in rural and underserved areas through telementoring

*** Demonopolize Knowledge**

Project ECHO

- **Initiated in 2003 by Dr. Arora in response to Hepatitis C (HCV) crisis in New Mexico:**
  - **Patients in rural areas unable to travel to University specialists**
  - **Rural providers not comfortable treating HCV (complex medications, adverse effects, etc.)**
- **Identified primary care providers from 16 rural clinics and 5 prisons in New Mexico**
- **Started a telementoring program**

Project ECHO

- **Weekly teleconference**
- **Providers from the community clinics present cases (patient histories, lab results, treatment plans, challenges)**
- **Feedback and monitoring provided by the University specialists**
- **Community providers and specialists work together to provide quality care**
- **Telementoring not Telemedicine**

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Project ECHO

- **Prospective study of 407 patients with HCV**
- **Compared patients treated at the University Hospital with 21 rural clinics/prisons**
- **No difference in Hepatitis C cure rates between the two groups**
- **No difference in serious adverse events**
- **Improved patient satisfaction and physician/provider self-efficacy**

Arora, *et al*., *NEJM*, 364(23); 2011

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Project ECHO

Ongoing Telementoring:

- **Weekly 1 hour teleconferences**
- **Case presentations by local providers with feedback/discussion from specialists (45 min)**
- **Didactic session (15 min)**
- **Supplemented with hands on training/instruction**

Project ECHO

1. **Texas/Mexico Border:**
   - **Cervical dysplasia/pre-invasive disease**
2. **Latin America:**
   - **Cervical Cancer Prevention & Treatment (alternates):**
   - **Uruguay, Colombia, Mexico, El Salvador, Guatemala, Peru, Brazil**
3. **ECHO Africa:**
   - **Breast and cervical cancer management (surgery, radiation therapy, chemotherapy)**
   - **Zambia, Mozambique**


ECHO
MD Anderson Cancer Center


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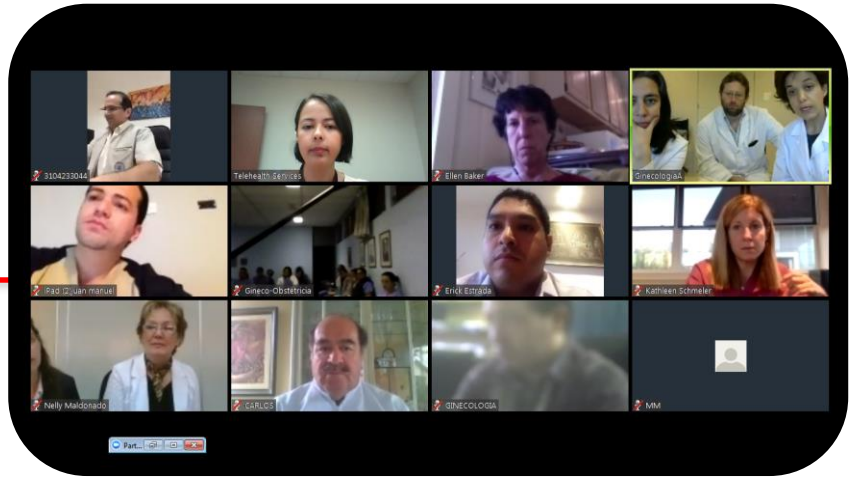
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Summary

- **Cervical cancer is preventable**
- **85% of cervical cancer cases and related deaths occur in developing countries and low-resource settings in the US**
- **Poor HPV vaccination rates in the USA**
- **Need novel screening techniques**
- **Training and education of local providers is critical to improve cervical cancer prevention and treatment – ECHO is a great model**

Vaccinate Your Kids Against HPV!

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