

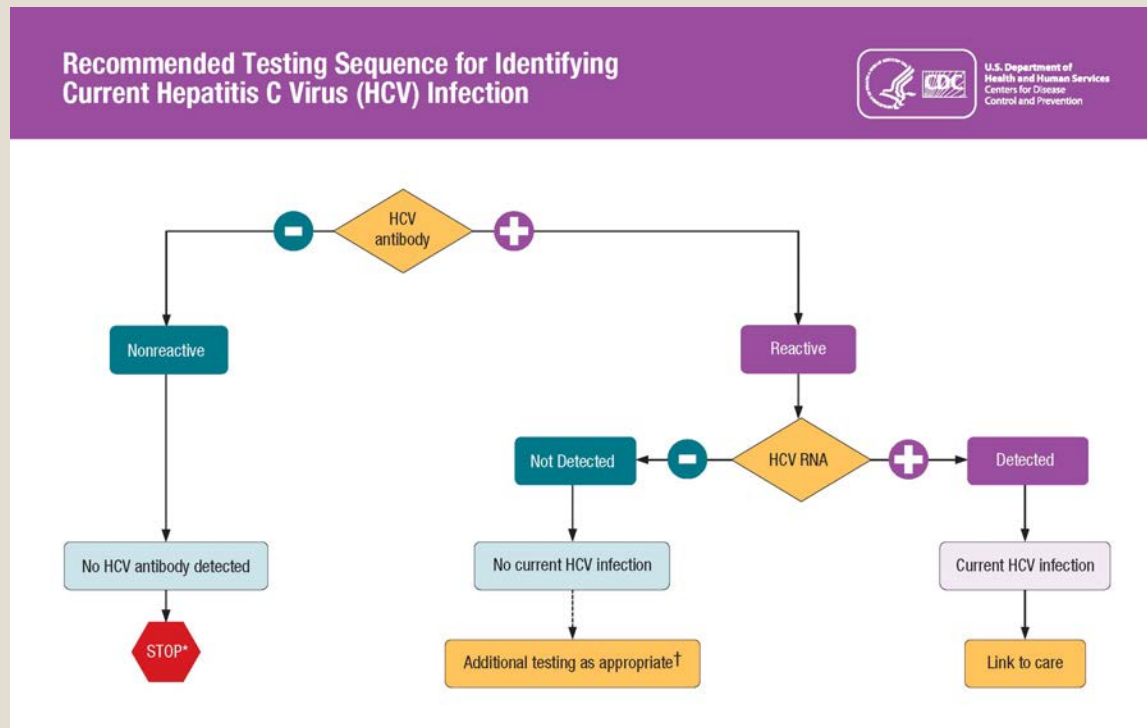
A Tube with Thermally Removable Barrier for Single Tube, Two-Stage Polymerase Amplification

Marissa Hsu, Electrical Engineering, Johns Hopkins University
Advisor: Dr. Haim H. Bau, MEAM, University of Pennsylvania



HCV Testing: Current

- Multi-test screening:
 - *Antibody HCV Test*
 - *HCV RNA Nucleic Acid Test (NAT)*



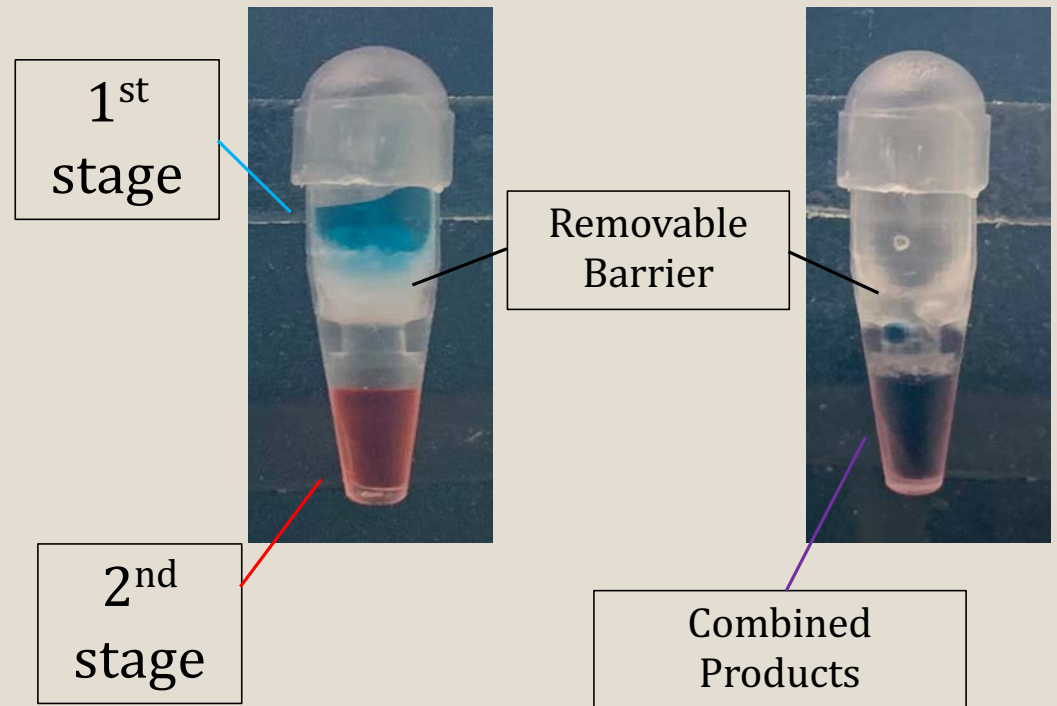
Goal: Create an apparatus that can be used in developing countries

<i>Point-of-Care Diagnostics</i>	HCV Screening Today	Our Proposed Design
Simple	x Requires trained personnel	<ul style="list-style-type: none"> ✓ In a single tube ✓ Visual colorimetric detection
Highly Sensitive	✓ Standard RT-PCR assay	✓ Two-Stage Polymerase Amplification
Inexpensive	x \$\$\$\$ Thermocycler	✓ \$ Heat block
Rapid	x Receive results in a few days or weeks	✓ Receive results in ~2 hours



Two-Stage Polymerase Amplification in a Single Tube

- Thermally removable barrier made from docosane



Acknowledgments

- Dr. Haim H. Bau
- Qingtian Yin & Youngung Seok
- SUNFEST: Dr. Sue Ann Bidstrup Allen & Julia Falcon
- National Science Foundation (NSF)



Penn
UNIVERSITY of PENNSYLVANIA



Images:

- HCV Flow Chart: <https://www.cdc.gov/hepatitis/hcv/profresourcesc.htm>
- Heat Block:
<https://www.thermofisher.com/order/catalog/product/88870001#/88870001>
- Visual Colormetric Detection with pH Sensitive Dye:
<https://www.neb.com/products/m1800-warmstart-colorimetric-lamp-2x-master-mix-dna-rna#>