

Novel Technology to Reduce Risk of Viral Transmission in Enclosed Occupied Environments and Room Disinfection in Unoccupied Spaces

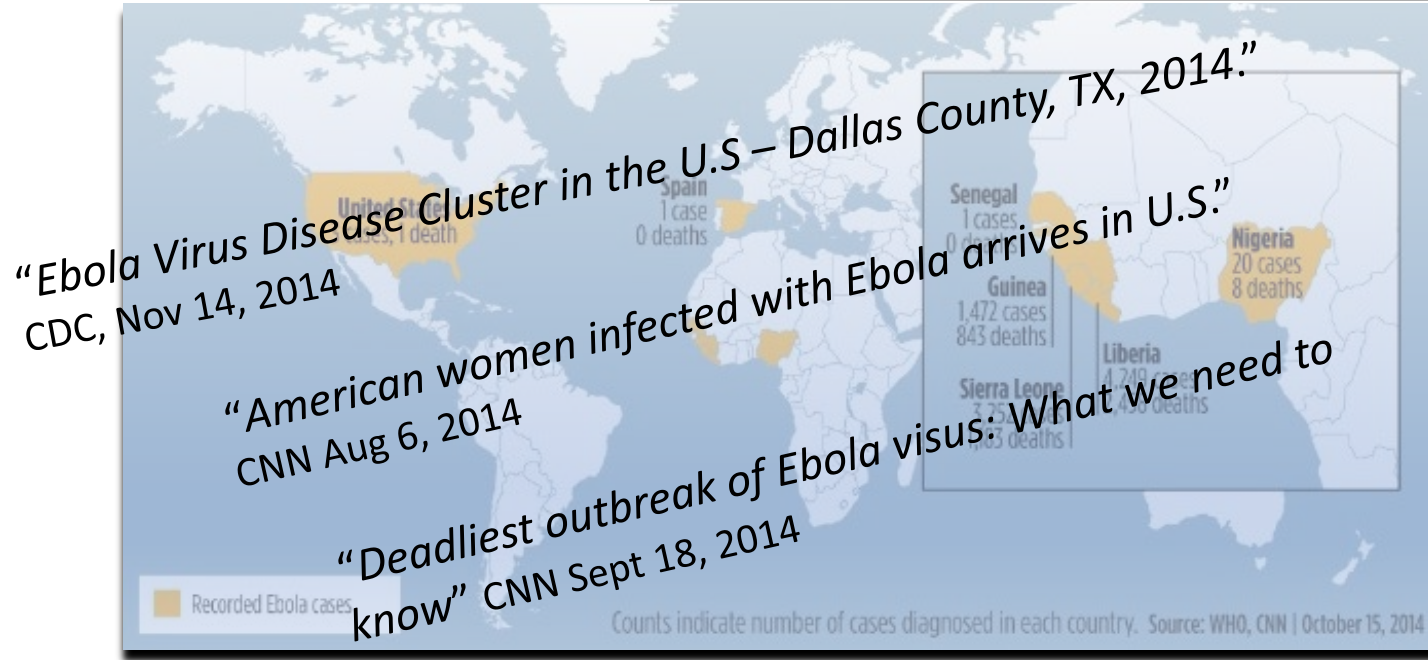
Summary Slides

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2014 Ebola Outbreak in West Africa



- ❑ Events identified need to improve preparedness for and treatment of suspected and confirmed patients with Ebola
- ❑ Lack of universal understanding on handling contaminated waste generated by Ebola patients (either before or after hospital admission)

Regional Treatment Network for Ebola and Other Special Pathogens

Chlorine Dioxide Generation Device

- ClO_2 generated via controlled liquid-to-liquid feed of activator and precursor
- ClO_2 is dispersed from a concentrated ClO_2 aqueous solution
- Integrated algorithm of PID controller controls generation & dispersion rates based on sensor feedback-loop
- Redundant safety features to ensure gas concentration doesn't exceed set point



1st Generation Prototype

- Position device on floor in center of room
- Seal room HVAC vents, doors, and windows
- Select treatment level (sanitize or disinfect)
- Operate unit via Bluetooth
- Run Cycle
 - Conditioning to 65-75% RH)
 - Disinfection
 - Neutralize
 - Reports cycle completion profile
- Unseal room

Full-Scale Testing

□ Efficacy Testing

- Followed guidelines of EPA room fumigation protocol
- Non-porous substrates (glass, aluminum, stainless steel)
- Porous (wood subflooring, carpet, fabric)
- MS2 & Phi6 bacteriophage, *S. aureus*, *P. aeruginosa*, *S. enterica*, *E. coli*, *K. pneumonia*
- Organic and inorganic test soils
- Position coupons throughout test chamber
- Assay for complete kill

Results of 300 ppmvh Efficacy Test

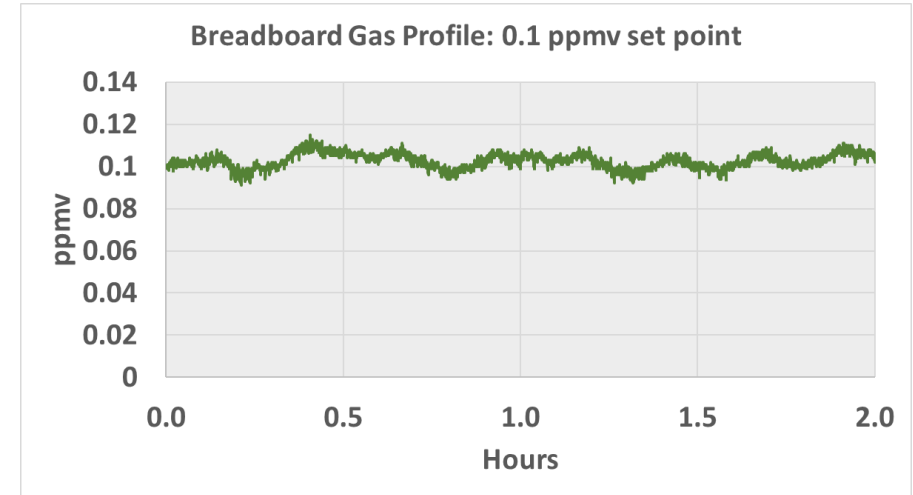
Organism	Matrix	Complete Kill	Comment
Phi6	Aluminum	3 of 3	---
	Carpet	3 of 3	---
	Wood	0 of 3	3-4 LR
	Fabric	3 of 3	---
<i>S. aureus</i>	Aluminum	3 of 3	---
<i>P. aerug.</i>	Aluminum	3 of 3	---
Total		15 of 18	---



Temperature and RH controlled retrofitted 1169 ft³ ISO-container

Bioaerosol Efficacy @ 0.1 ppm

- ❑ EPA bioaerosol challenge protocol used as guide
 - 6-jet collision nebulizer; SKC Biosamplers
- ❑ Breadboard prototype development continues
- ❑ Automated 0.1 ppmv control established
- ❑ Efficacy tests demonstrating increase rate of bioaerosol decay versus natural decay



Results at 0.1 ppm

MS2 Bioaerosol	D-value
Natural Bioaerosol Die-off (no ClO2)	58 minutes
Bioaerosols exposed to 0.1 ppmv ClO2	30 minutes

