XCMR®

BIODEFENSE SOLUTIONS

Imagine if we could proactively prevent respiratory infections without wearing a mask…

Introduction

XCMR is a medtech company with a **bold** vision to revolutionize infectious disease protection paradigms by leveraging UVC energy

The Problem: Airborne Biothreats

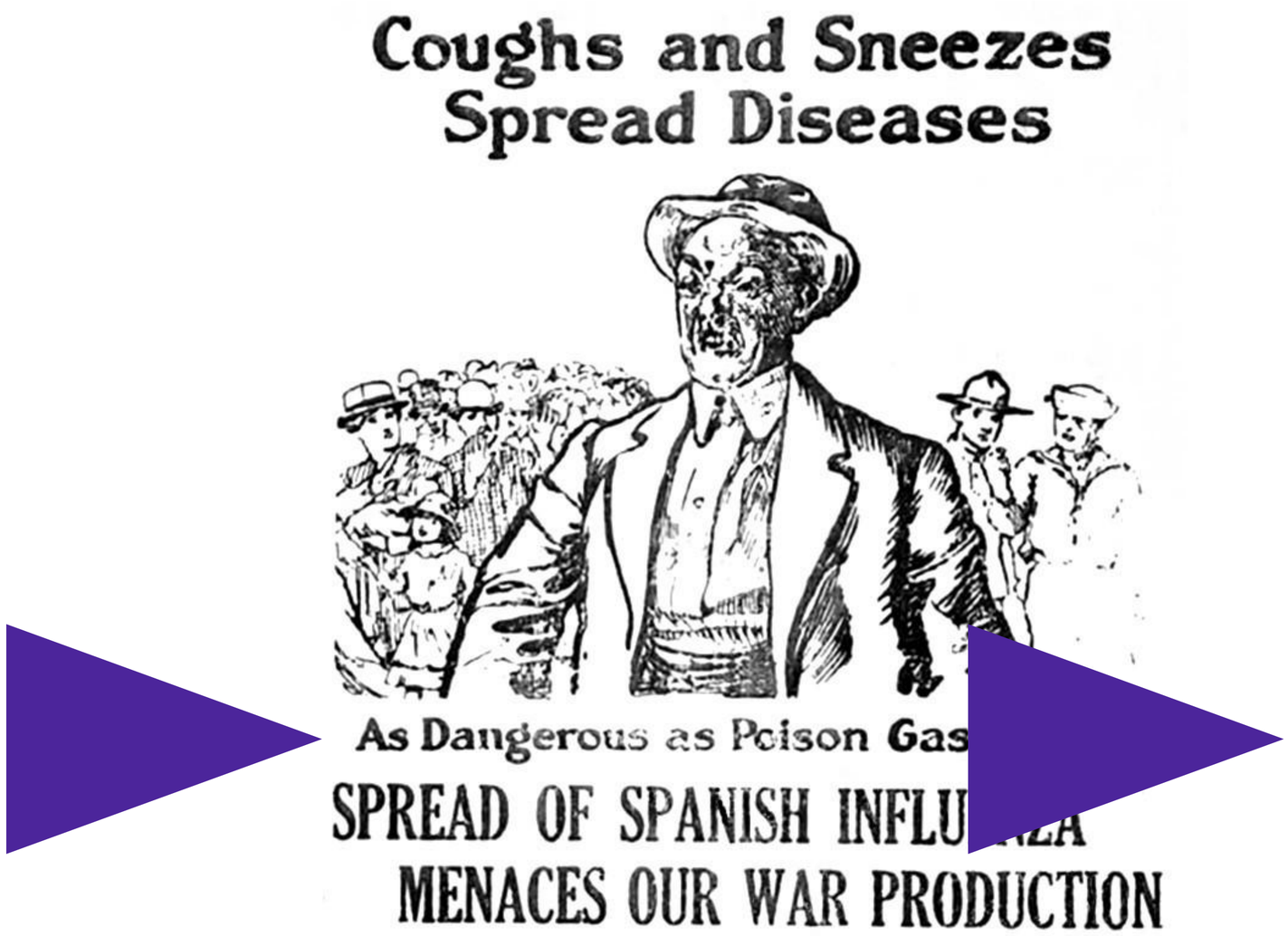
- Significant impact on public health, economic growth, and national security.
- Personal protective equipment (PPE) and decontamination methods are outdated.
- Pharmaceutical interventions are reactive mechanisms, not preventative.
- Critical need for innovative, real-time respiratory protection for individuals and disinfection of confined air spaces and surfaces.

Quick History Lesson

The **1918–1920 flu pandemic**, also known as the **Great Influenza epidemic** or by the common misnomer **Spanish flu** caused by the H1N1-A virus.

The **COVID-19 pandemic (2020)**,

Even then, Chem/Bio threats were known



High-tech Mitigation Strategies - 1918

HEALTH ORDER DOOMS LODGE HALL COBWEBS

Grip Ban on All Meetings Until Places Are Renovated; 21 Theaters Reopen.

GRIP VIGILANCE STILL NEEDED

Dr. Robertson Warns Against Relaxing Precaution, Despite Wane of Epid-mic

'OPEN-FACE' SNEEZERS TO BE ARRESTED

Orders to arrest any person indulging in the "open face" sneeze or cough in

POLICE RAID SALOONS IN WAR ON INFLUENZA; KEEP CHURCH WINDOWS OPEN

Stringent New Orders Are Issued for Preventing Spread of Epidemic; Police Ambulances Are Drafted; 100,000 Doses of Vaccine on Way.

1,613 NEW CASES SHOW DECREASE IN CITY; DOWNSTATE HIT WORST

FLU CURFEW TO SOUND FOR CITY SATURDAY NIGHT

Persons Not on Business Expected to Quit the Streets at 9 o'Clock.

The curfew will ring or, rather, blow in Chicago tomorrow night. Promptly at 9 o'clock the whistles of

DRAFT MEN TO BE FIRST INOCULATED FOR "FLU"

'NONESSENTIAL' CROWDS BARRED IN EPIDEMIC WAR

Churches and Saloons Exempt; Conventions, Athletics, Parties Hit.

FREE DOCTOR

Influenza victims unable to pay for a doctor can obtain one by calling Main 447, Local 108, day or night.

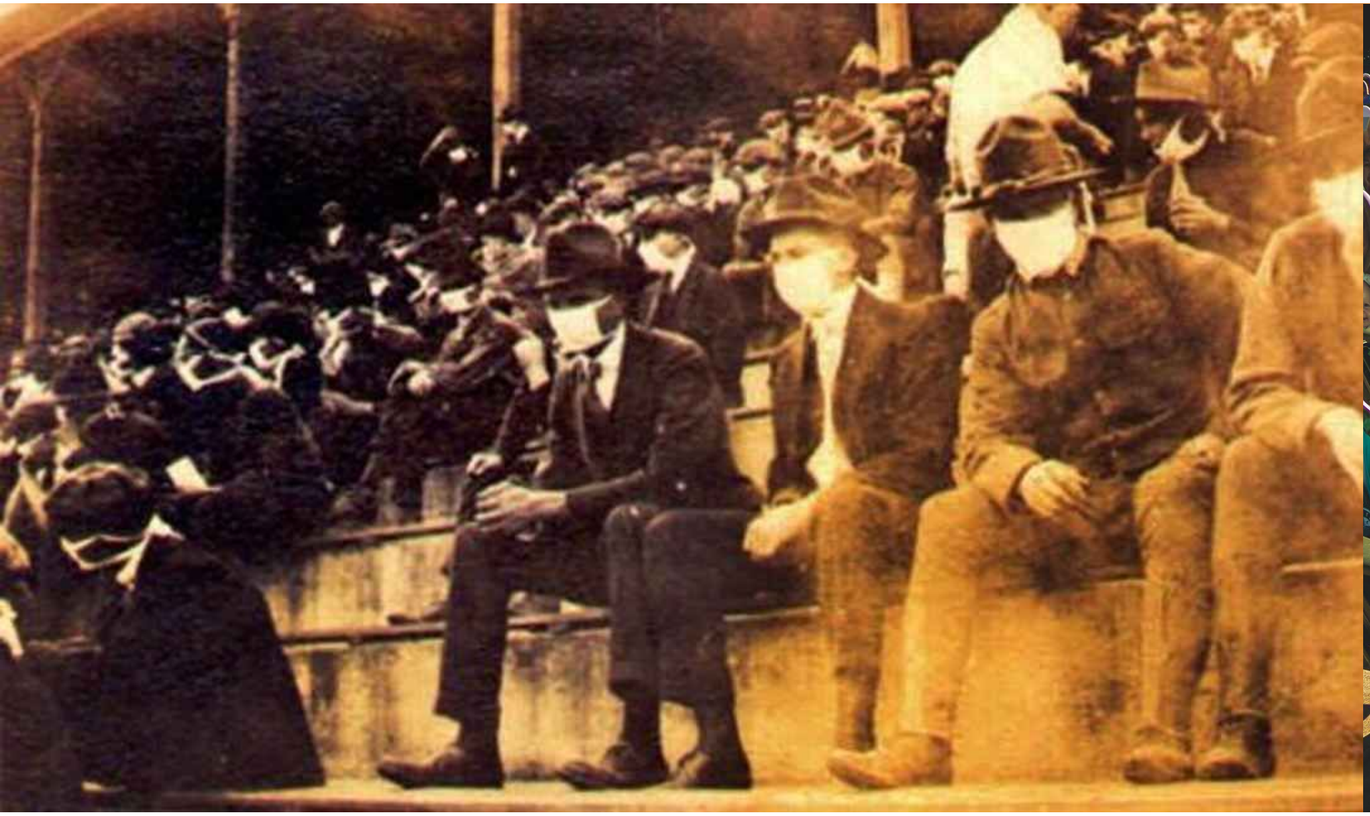
CHURCH WINDOWS MUST STAY OPEN, SAYS ROBERTSON

Health Department Gives Out New Rules in Fight on Influenza.

CHICAGO DEP'T. OF HEALTH - CUT 400

We’ve come a long way in 100+ years

What did we learn?

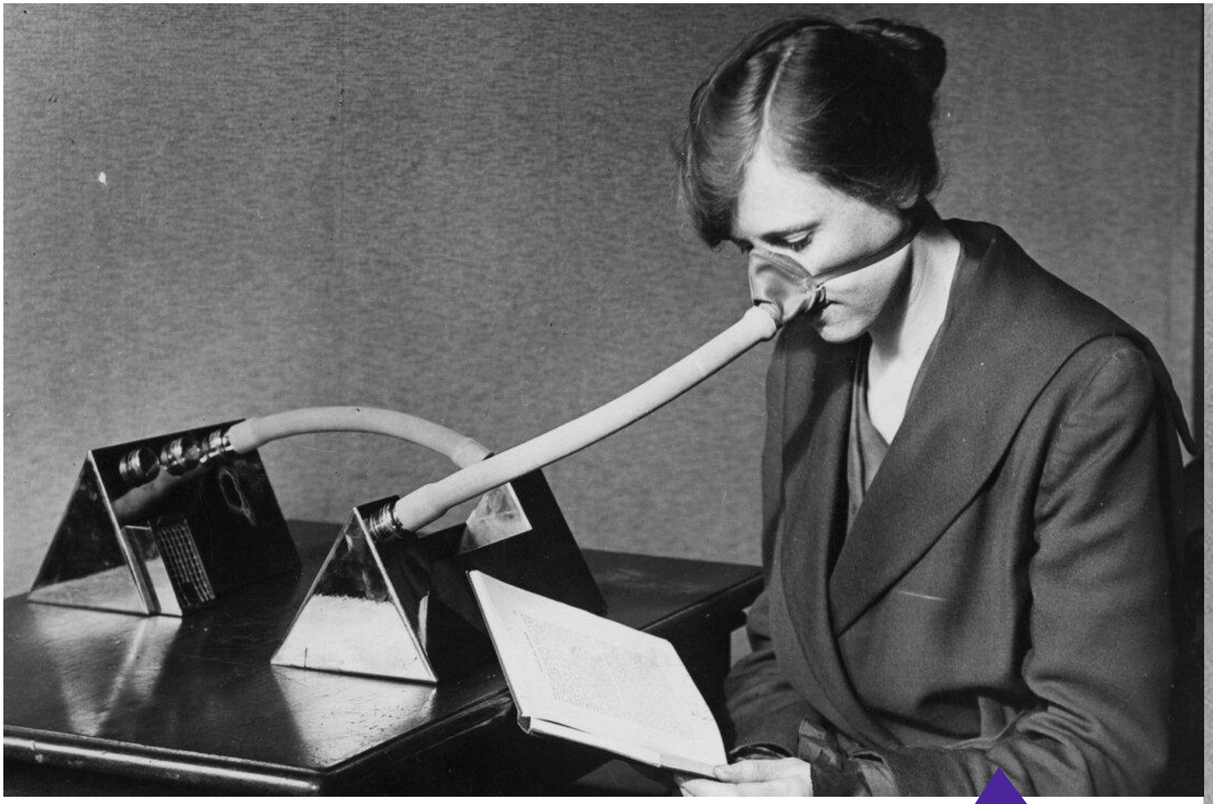


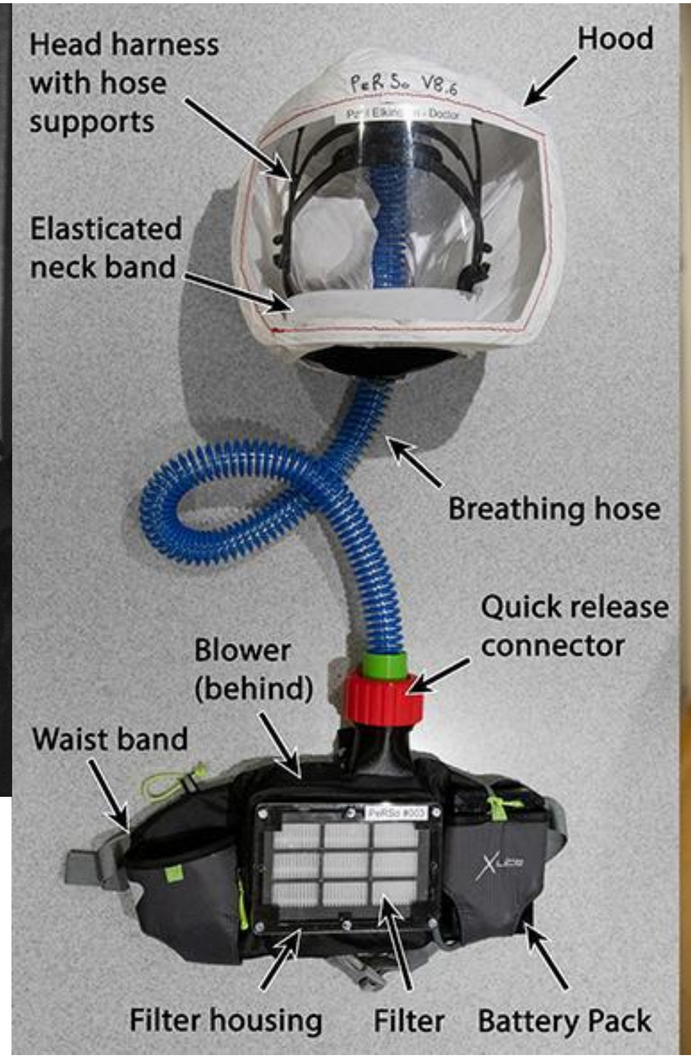
That we still don’t like masks

1918

2020

But after 100 years of innovation…





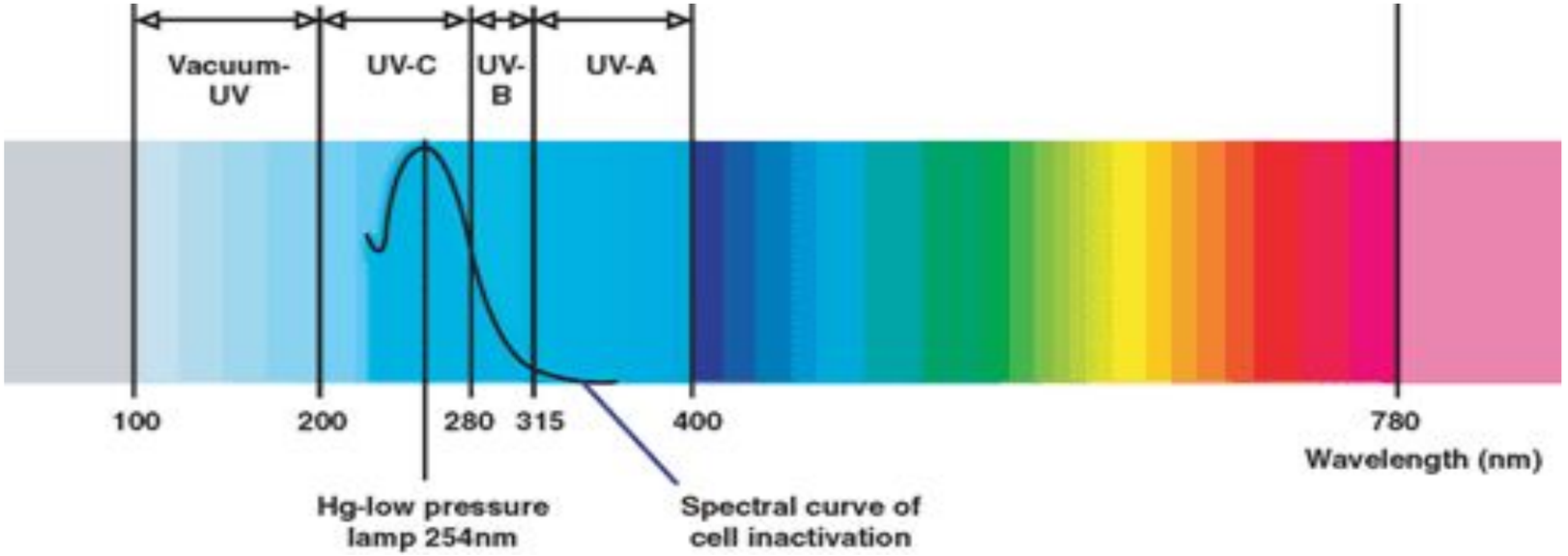
Did we win?

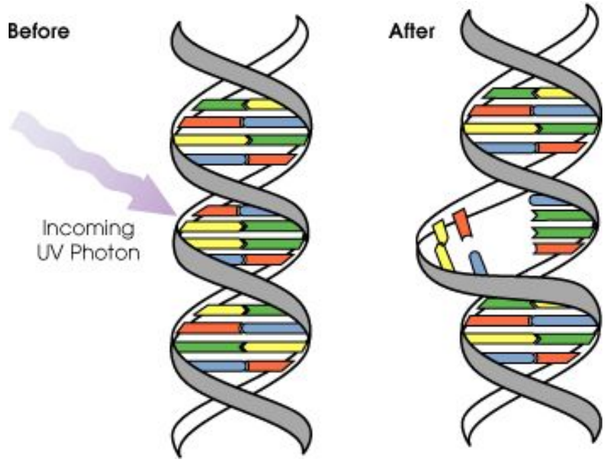
Current Solutions

Description	Drawbacks
Conventional Respirators	Requires noisy and inefficient fans, high maintenance, cost, bulky, high-power requirements, filters, outdated technology
Personal Protective Equipment (PPE)	Masks generally not worn correctly, uncomfortable, relative lack of efficacy, no protection to others, physical barrier only-no inactivation, environmental/medical waste from single use
Chemical Decontamination	Compounds can be dangerous, create VOCs, hard to apply, can damage surfaces, air not treated
Pharmaceutical Interventions	Antibiotics mostly used to treat infection, not prevent, resistance, require time to develop

XCMR's Solution: UVC ($200 \lesssim \lambda \lesssim 280\ nm$)

- Disrupts DNA/RNA replication
- Damages protein at $\lambda \lesssim 240\ nm$
- Human Safe $200 \lesssim \lambda \lesssim 230\ nm$ (Far UVC)





UVC is clean, efficient, agnostic to pathogen, and Far UVC (222nm) safety opens the door for radical innovation in UVC as a medical countermeasure against infectious diseases.

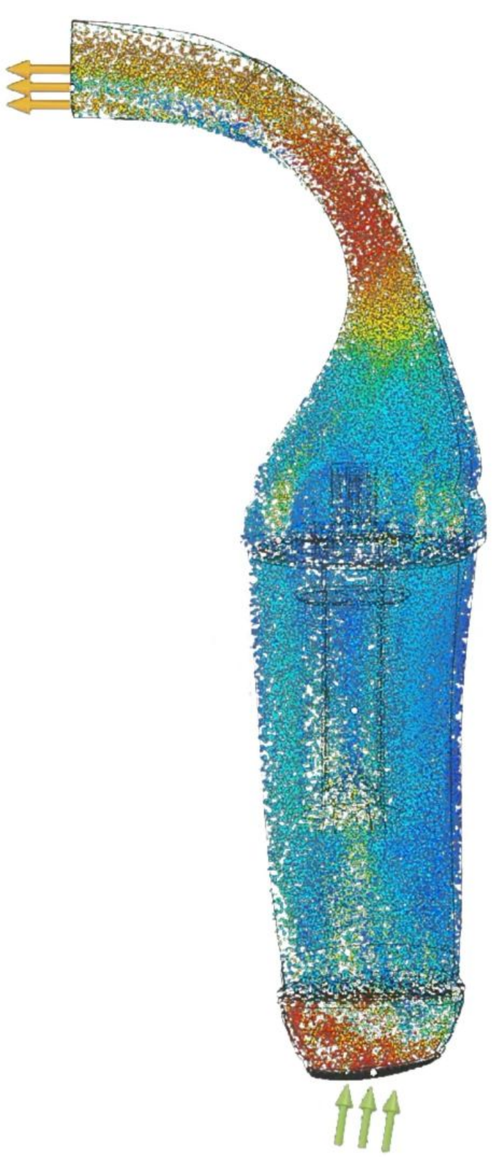
XCMR's Unique Approach: Near-Field Infection Protection (NIP)™

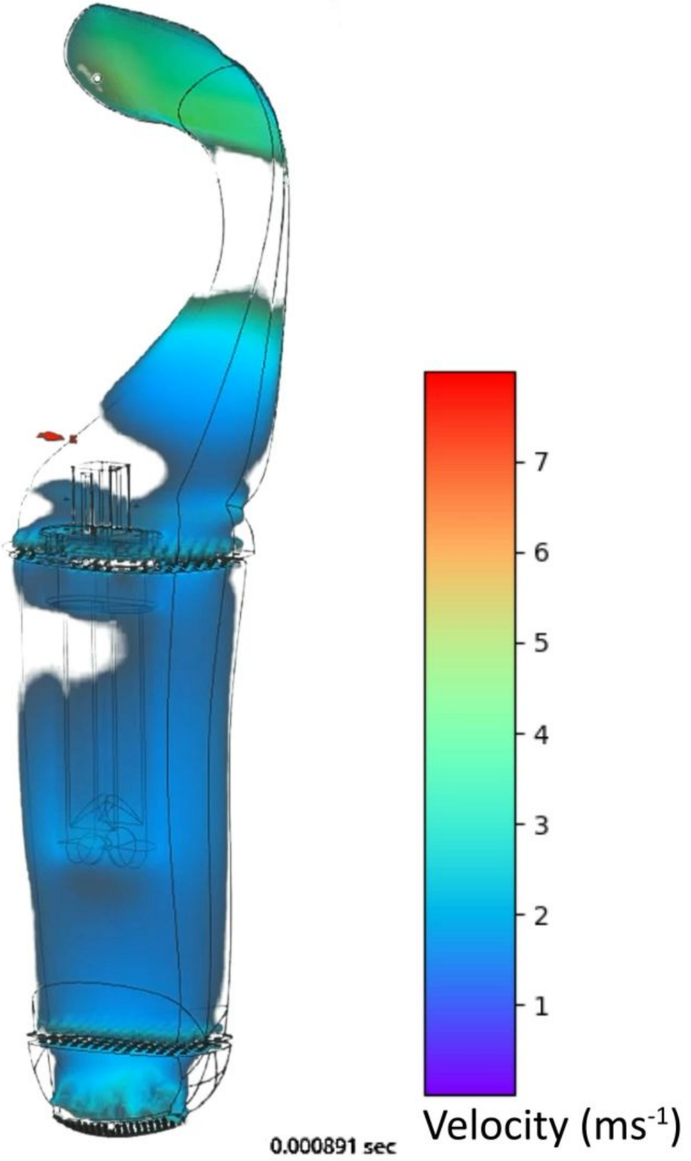
- Creates a biosafety barrier against aerosol transmission in close-contact environments
- Follows the 'breather' and thus the source
- Extends to mobile biodefense, incorporating UVC into wearable (e.g., PPE/respiratory), portable and stationary devices (e.g., decontamination of wounds, surgical sites, and other surfaces)

- Works with existing 'built' environments (IoT cloud)
- Constrained volumes at close range (conducive to rapid prototyping)

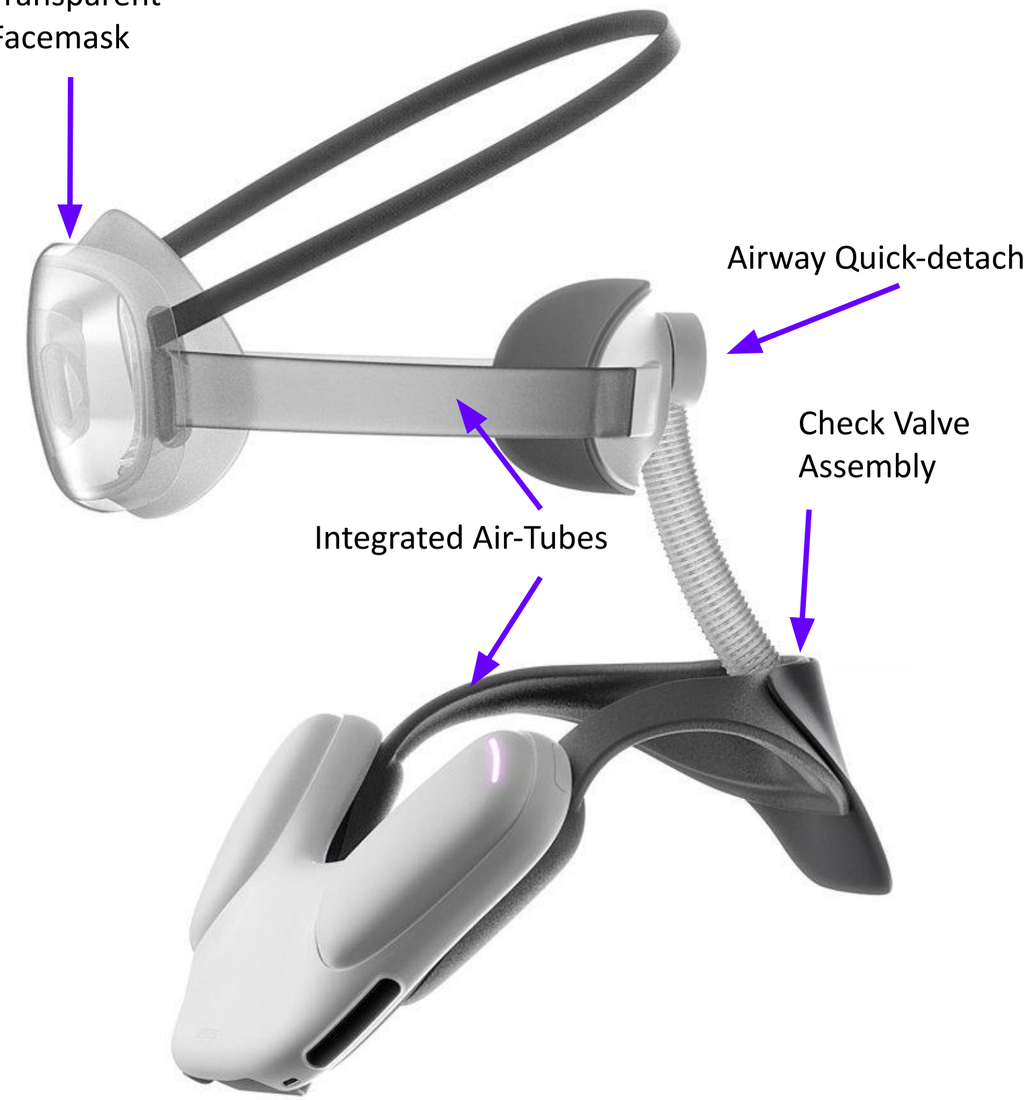
CFD Modeling of Prototype Designs

- Flow velocity path lines and contours at 90 l/min inhalation flow
- Lagrangian particle tracking for reactor



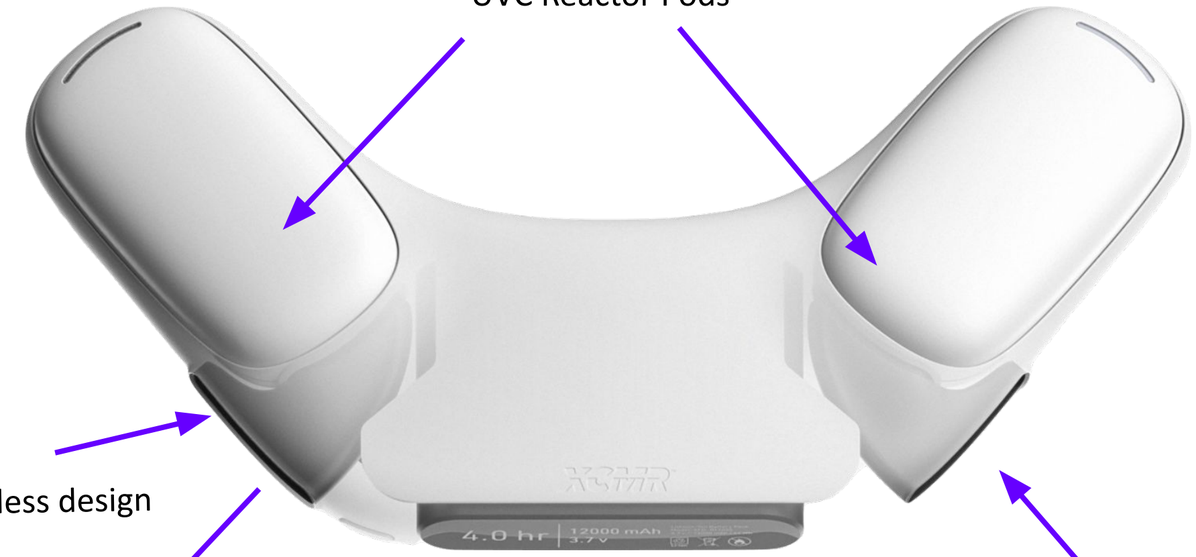


SFD Product Design



+

Part of
Capgemini Invent

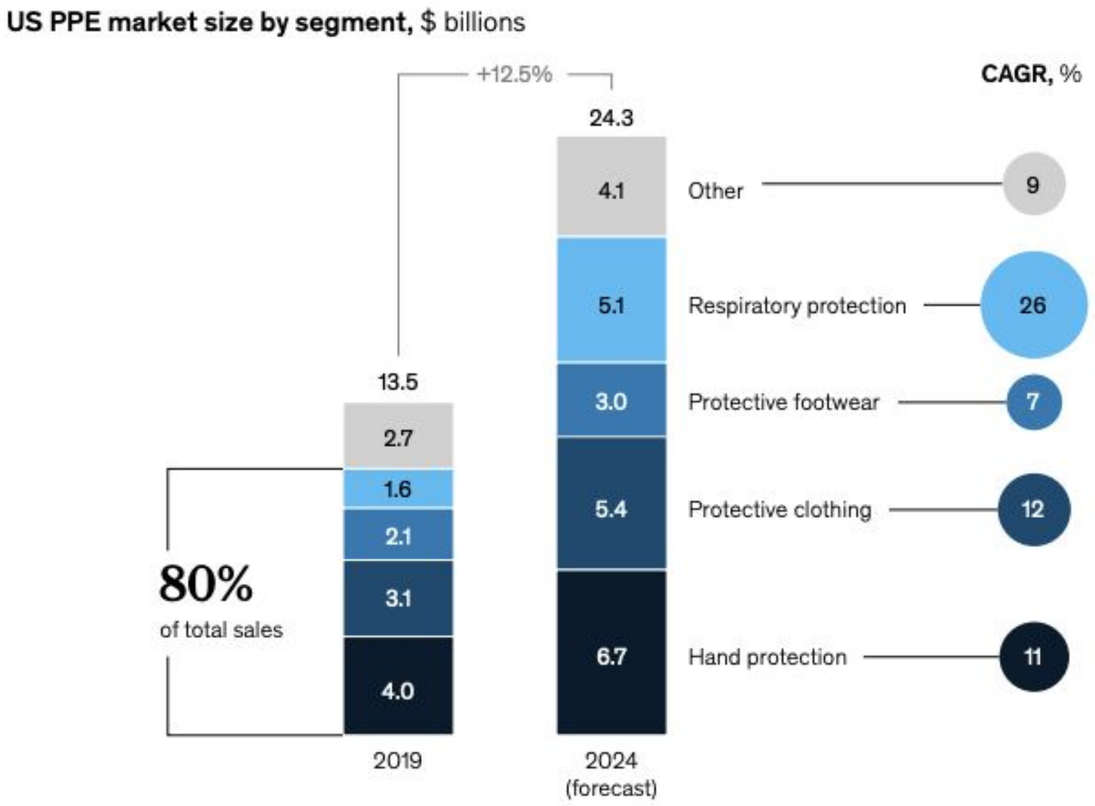


DESIGN ARCHITECTURE | AIRFLOW

- ambient air
- disinfected air
- exhaled air

Targeted Near-Field Applications

Next-generation respiratory PPE



Source: McKinsey 2021

Surgical Site Infection (SSI) Control

XCMR Near-Field UVC Devices

Consumer, Health care and Military applications/verticals

Powered by Team of Experts

Industry recognized multidisciplinary science and business team skilled in photochemistry reactor theory, UV radiation and disinfection processes, fluence rate fields, computational fluid dynamic (CFD) modeling, microbiology, aerosol science, IoT, data science, infectious disease and medical devices -
with more than and 43,000 academic literature citations.

Ken Kelley,
Chairman/co-founder

Richard Rasansky,
CEO/co-founder

Ernest R. Blatchley III, PhD
Principal Scientist

Chris Bowers, PhD
Modeling/Simulations

Wayne Bryden, PhD
Research Fellow

Joel Ducoste, PhD
Principal Engineer

Joe F. Edwards
Executive Advisor

Chris Jones,
Sr. Technical Engineer

Karl Linden, PhD
Principal Scientist

Richard Martinello, MD
Chief Medical Advisor

Tom McCreery,
Innovation Fellow

Deb Mosca, PhD
VP Life Science Affairs

Eric Prast,
VP Prod Engineering

Ben Robertson. PhD,
Sr Dir, Test Method Dev

Eric Snelgrove,
VP Policy/Gov Affairs

HON Andy Weber,
Senior Fellow

Partners & Collaborators

XCMR™

University of Colorado Boulder

COLUMBIA
COLUMBIA UNIVERSITY
CENTER FOR
RADIOLOGICAL RESEARCH

PURDUE UNIVERSITY®

NC STATE UNIVERSITY

Nortech™

USHIO

3M

frog Part of Capgemini Invent

Uviquity

NICHIA

ZeteoTech

EDEN PARK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AIR FORCE RESEARCH LABORATORY

DEPARTMENT OF ENERGY · UNITED STATES OF AMERICA

EPA United States Environmental Protection Agency

AFRL
THE AIR FORCE RESEARCH LABORATORY

U.S. DEPARTMENT OF ENERGY

XCMR®

BIODEFENSE SOLUTIONS

"*The only reliable way to defend against a pandemic-class agent is to prevent infection*" -
MIT Professor Kevin Esvelt, 2022

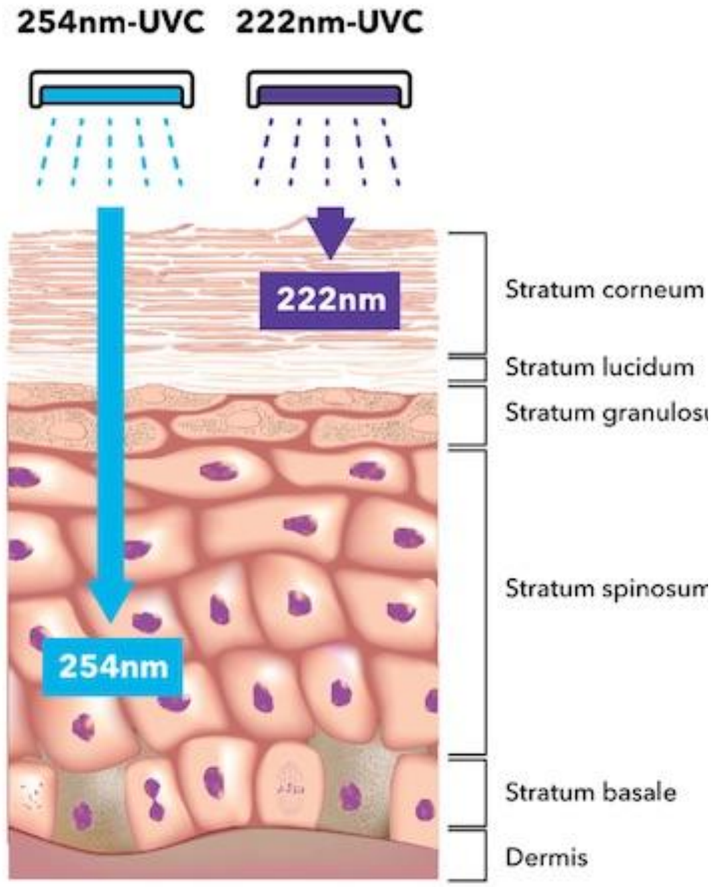
Richard A Rasansky, CEO
r@xcmr.co

Appendix

Far UVC (222nm) : Safe for Human Exposure

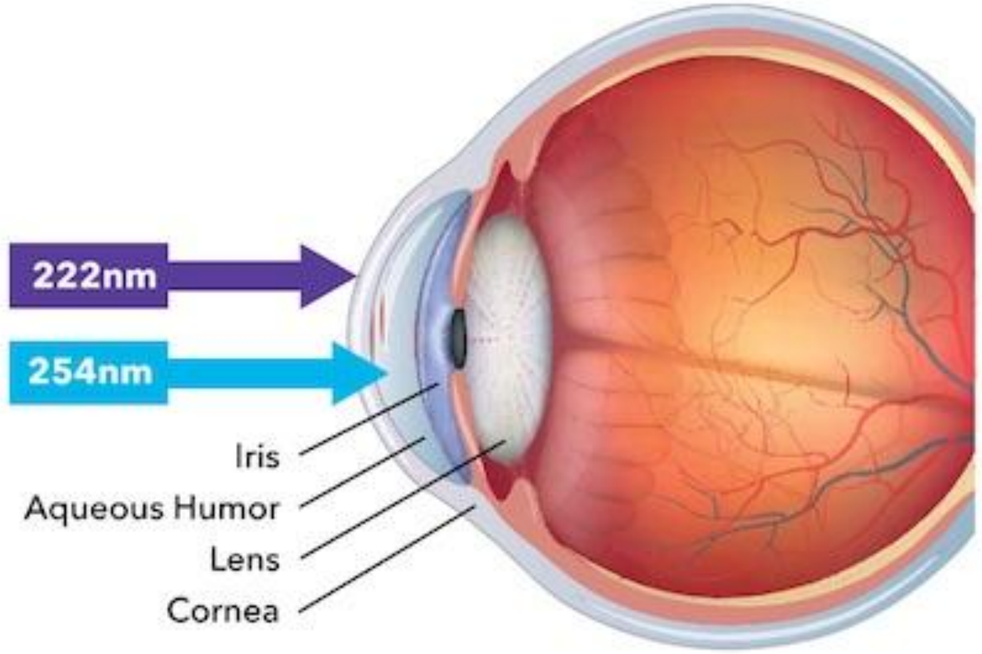
Structure of the epidermis

Penetration of epidermis of 254nm vs 222nm



Anatomy of the eye

DNA absorbance relative to wavelength

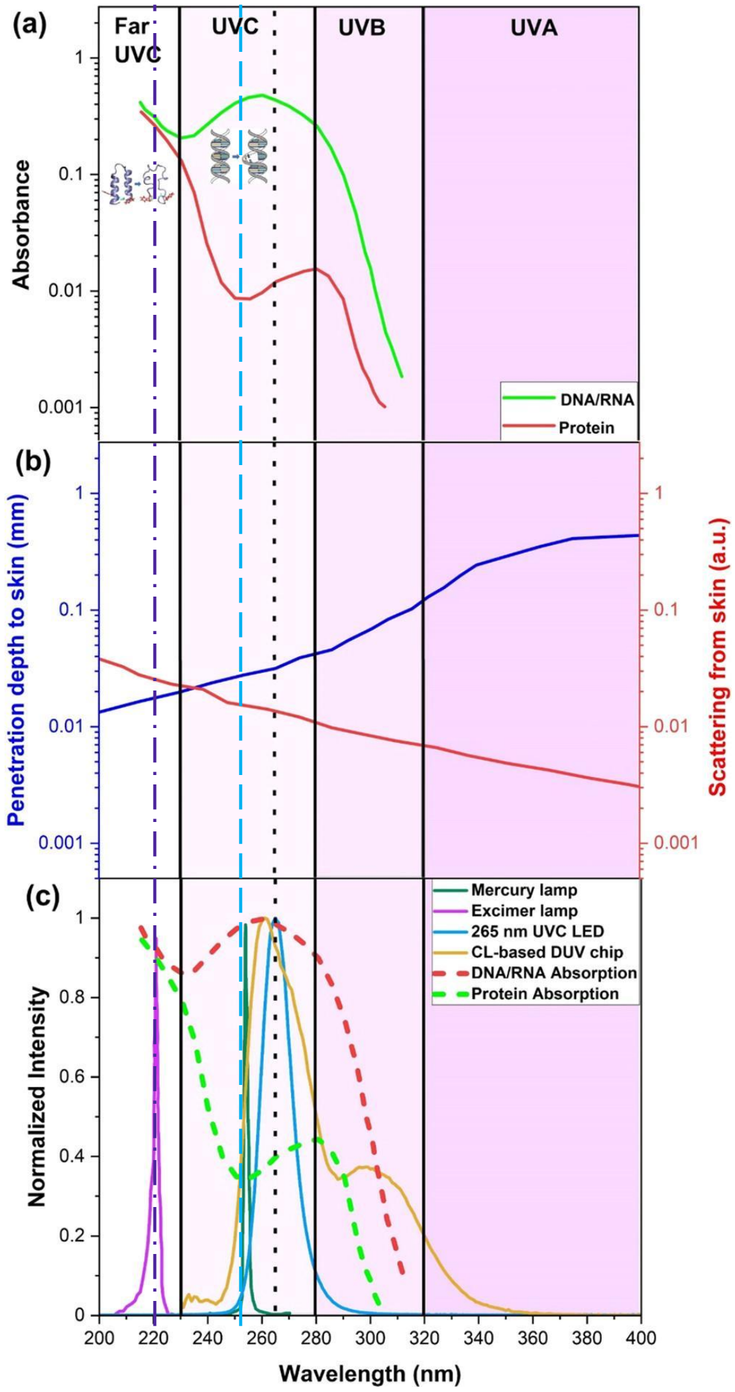


Source: https://blooloop.com/technology/in-depth/far-uvc-technology-attractions-covid-19/

UV Spectrum

222nm

254nm



Source: *ACS Photonics* 2022, 9, 5, 1513-1521

Electromagnetic Energy for Infection Transmission Resiliency (EMITR)™

- XCMR's IoT cloud platform where real-time intelligence is applied to the collection and aggregation of biosecurity data from various sources.
- Continuous application of data science, including AI and ML.
- Predictive analytics to improve visibility, response and preparedness for scaled infection transmission resiliency.
- Orchestrate and optimize performance characteristics of connected systems and devices (both 3rd party and from XCMR) for maximum collective protection.