Virustatic® Shield™ AVM96

Anti-viral 360° degree Protective Face Mask

Product summary

Virustatic Shield - Innovation development

A decade of methodical research, design, development and testing led to the innovations embodied in the Virustatic Shield™ antiviral face covering. The product's novel design is built on breakthrough findings on the efficacy of patented Viruferrin™ protein coating compound applied onto breathable hydrophilic fabrics that bind and render influenza viruses inert on contact.

Viruses are carried by airborne droplets ejected from the mouths of infected people through breathing, speaking and coughing. Inhaled virus particles are adsorbed by respiratory mucus, binding to receptors on the cell surface in the upper and lower respiratory system, causing infection.

Wearing Personal Protective Equipment (PPE) face masks in clinical situations, and 'face coverings' or 'cloth masks' when in public, are key parts of a larger strategyiv supported by the World Health Organisationv (WHO), the UK Governmentvi , and the US Center for Disease Control (CDC) to reduce the spread of viruses during a by establishing barriers between infected and uninfected individuals.

Problems with face masks and coverings

It has been observed that when wearing certified 'face fit' Personal Protective Equipment (PPE) masks, increased pressure caused by exhaling – and particularly coughing and sneezing – displaces the mask from the face leading to air leakage around its perimeter.xiv Surgical-type medical masks have been shown to leak exhaled air, and with coughs and sneezes, contaminated particles are redirected and forced sideways out of the mask. These masks also leak strong downwards or backwards jets.

The material in these existing masks are hydrophobic and are designed to provide a barrier so that liquid particulates or splatter, such as mucus and blood, are caught on the surface of the mask. The pathogens in particulates and splatter remain live on the surface of the mask and can go on to cause infection when the mask is touched, removed and disposed.

According to the authors of a wide study of research on facemasks titled "Face masks for the public during the covid-19" published on April 9, 2020, in the British Medical Journal, "None of the studies mentioned above tested the makeshift cloth masks that CDC has recommended. To our knowledge, there are no trials of cloth masks in the general public. A three arm trial of cloth masks versus surgical masks versus "standard practice" in preventing influenza-like illness in healthcare staff found that cloth masks were the least effective."

The solution: Virustatic Shield

Virustatic Shield is a breathable antiviral face covering designed for prolonged wear and handling. It has a protective role in both clinical care and community settings against the transmission of airborne viruses, bacteria and fungi.

Virustatic Shield uses a hydrophilic material tested for superior virus block-and-keep capabilities, coated with Viruferrin™ – a patented compound containing natural proteins including lactoferrin and sialic acid – that adds additional protection by binding and capturing viruses on the surfaceii of the material before they are inhaled.

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The Virustatic Shield is not PPE and should not be compared with PPE masks as it is a face covering. The material's high breathability sustains a low pressure drop even when sneezing and coughing, stopping the ingress and egress of the influenza viruses as the air inhaled and exhaled takes the path of least resistance. This unique action offers protection in both directions. It does not require any fit-testing and, unlike the face-fit masks, protection is not compromised for those with stubble or facial hair.

The Viruferrin™protein coating's antimicrobial peptides have a cationic property which disrupt and inactivate the influenza virus contained in the mucus aerosol droplets which are usually small enough (<3 µm) to pass through material used in existing masks.xviii The lactoferrin protein in Viruferrin™ is well known for its cationic action against viruses and bacteria.xix Viruses are fragile protein molecules, wrapped in a protective layer of protein, known as the viral envelope. This protective viral envelope is negatively charged.xx Viruferrin™ is cationic (positively charged) and disrupts the negatively charged viral envelope. Tests on the Virustatic Shield materials demonstrated that this cationic action is responsible for up to 35% viral inactivation through the mask. (See appendix).

MeSH Pharmacological Classification designates the lactoferrin in Viruferrin™ as an 'Anti-Infective Agent'.xxi It classifies as a substance that either prevents infectious agents or organisms from spreading, or, kills infectious agents in order to prevent the spread of infection.
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The science

For the last 12 years, Virustatic Limited has been developing and testing protein coatings against strains of influenza virusix to establish the optimum combination of material and protein coating that would deliver the highest performing pandemic mask to combat influenza. Influenza was the chosen virus as it was widely considered as the most likely next pandemic.

The Manchester Institute of Biotechnology at The University of Manchester (MIB) along with another leading UK University and the VisMederi University in Italy were engaged by Virustatic Limited over a 12-year period, to test and develop a novel virus-binding strategy that could be applied to different surfaces.

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The Development

The work undertaken was conducted across five distinct phases:

Phase 1 – Concept & Prototype Development – MIB & Leading London University

Phase 2 – Application Development – MIB

Phase 3 – Material and Coating Performance Combinations – MIB

Phase 4 – Live Influenza Testing for Material & Coating Evaluation – Leading London University

Phase 5 - Live SARS-CoV-2 (virus behind Covd-19) - VisMederi Univeristy Italy

Virustatic Shield is the commercial product resulting from these five phases of scientific research, development, design and testing.

Key Features

- ✓ Antiviral coating neutralises more than 96% airborne viruses
- ✓ Cuts risk of cross contamination from saliva droplets
- ✓ Prevents and protects against airborne virus transmission
- ✓ Hygienic fabric coating disables virus, so your Shield is safe to touch
- ✓ Protects your critical virus infection points: mouth, nose, ears
- ✓ Protein coating continues to protect for 3 washes (hand wash)
- ✓ UK Researched, developed and manufactured
- ✓ Natural fabric for breathability
- ✓ Multi layer anti-counterfeit security
- ✓ Non hazardous disposal
- ✓ Designed for comfort
- ✓ Easy fit for all ages

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virustatic® SHIELD

Virustatic Shield - How it works

Our single-layer Viruferrin ™ coated Virustatic Shield filters and blocks up to 98% of airborne viruses with the following modes of action:

Cationic Action
Viruses within very small aerosol particles (<1 µm) which can pass though the weave/pores of the fabric are disrupted by peptides which are both highly positive and highly negative. They will ionically or cationically disrupt the virus's spike protein and viral envelope. The proteins selected for the Virustatic Shield, such as the cationic molecule lactoferrin, interacts through its positively charged cluster in the N-terminal region of N-lobe with the anionic part (lipid A) of lipopoly-saccharide (LPS), a component of the outer membrane of Gram-negative bacteria. This interaction damages the bacterial and viral membranes.

Hydrophilic Dispersion
The Virustatic Shield is hydrophilic and adsorbs liquid from the mucous aerosol. This induces the mucus components to phase separate and the pH decrease to become more acidic. In a desiccated mucus aerosol, the physic-chemical changes which occur affect the viability if any pathogens contained within it and thus affects the efficiency of transmission of infectious disease by droplets and aerosols. In comparison, medical and existing masks are hydrophobic and stay viruses and pathogens stay active within mucus aerosol and these masks are nothing but an infective formite.

Inertial Impaction
Inertia works on large, heavy particles suspended in the flow stream. These particles are heavier than the fluid surrounding them. As the fluid changes direction to enter the fibre's space, the particle continues in a straight line and collides with the media fibres where it is trapped and held.

Diffusion
Diffusion works on the smallest particles. Small particles are not held in place by the viscous fluid and diffuse within the flow stream. As the particles traverse the flow stream, they collide with the fibre and are collected.

Interception
Direct interception works on particles in the mid-range size that are not quite large enough to have inertia and not small enough to diffuse within the flow stream. These mid-sized particles follow the flow stream as it bends through the fibre spaces. Particles are intercepted or captured when they touch a fibre.

Sieving
Sieving, the most common mechanism in filtration, occurs when the particle is too large to fit between the fibre spaces

Van der Waals forces
These forces include attractions and repulsions between atoms, molecules and surfaces as well as other intermolecular forces

Binding
If live viruses are still active after desiccation, the Viruferrin ™ protein coating on the Virustatic Shield will bind to the proteins on the virus's spike membrane which immobilises the virus and renders it inert. However the principle advantage in binding is the protein's ability to bind to pathogenic bacteria such as streptococcus.