DESAIR
DESINFECCIÓN DEL AIRE

A NEW THREAT? SUPERBUGS AND HOW TO DEAL WITH THEM

AN URGENT SOLUTION TO COMBAT SUPERBUGS IN THE ABSENCE OF EFFECTIVE MEDICINES

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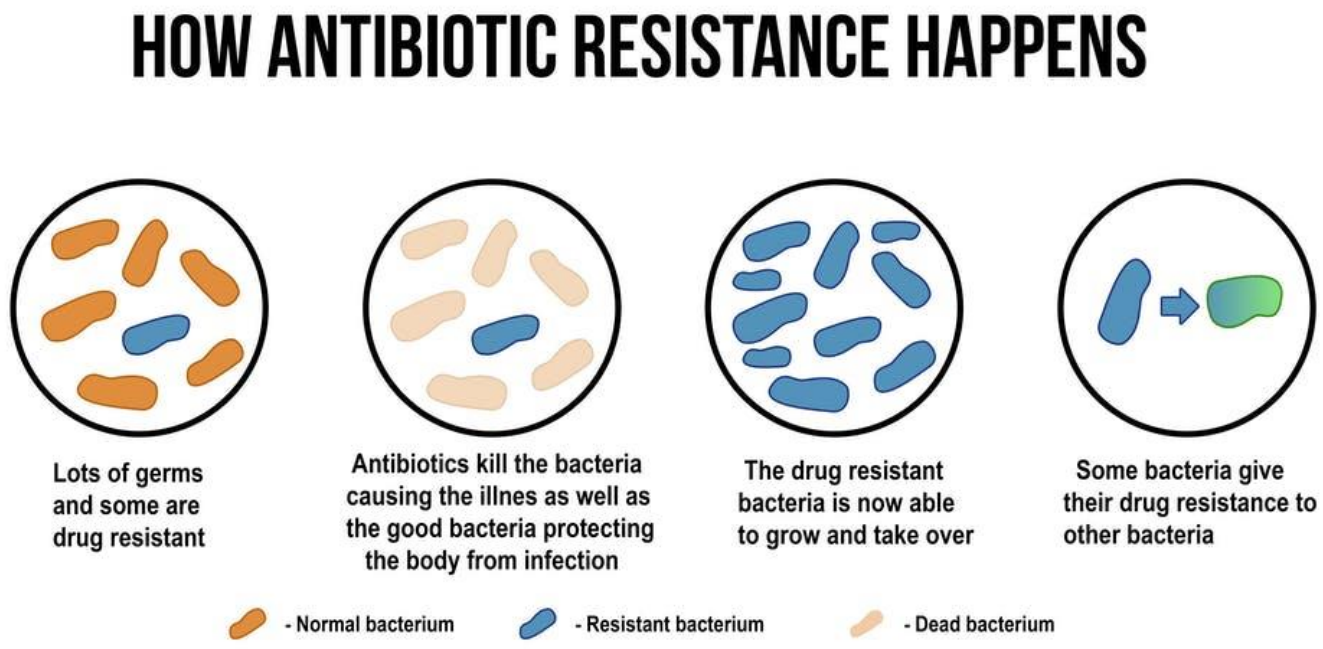
The world says to be in for a major new problem – **SUPERBUGS.**

As the experience of the past two years has shown, not all diseases can be treated quickly. The spread of COVID-19 and the widespread outbreak of pandemic have taught us a lesson that we need to be prepared in advance to protect our health.

Dealing with various diseases is a time-consuming stage. After a particular period, a solution is found in the form of vaccines and medicines that can help the human body.

BUT IT'S NOT THAT SIMPLE WITH SUPERBUGS!

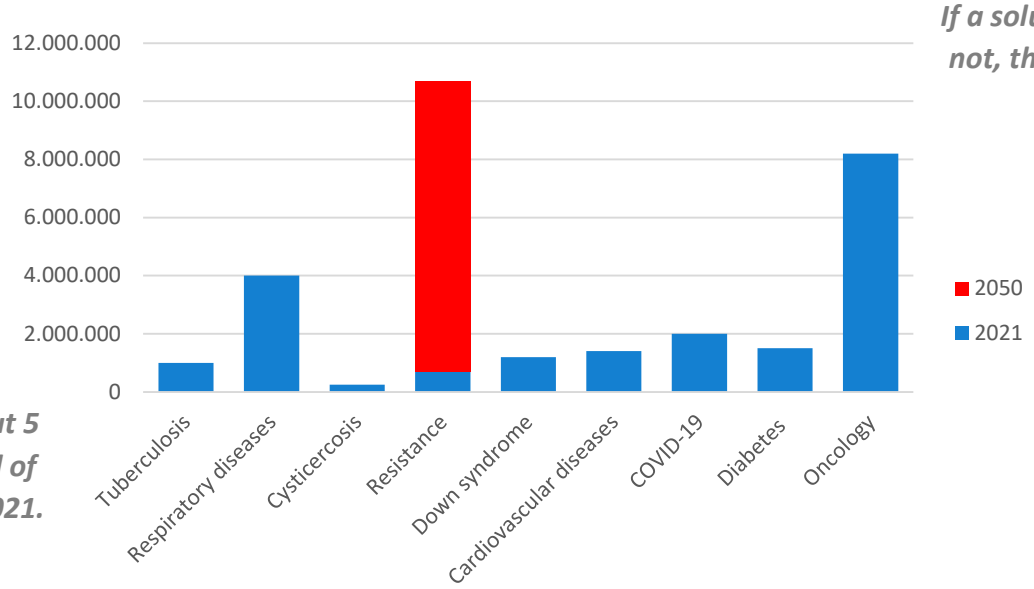
Superbugs (supermicrobes) are micro-organisms that are resistant to several antibiotics at once, and sometimes **to all existing antibiotics**[1]. They have learned to resist even the strongest and most rarely used medicines. It should be noted that there almost have been **no new antibiotics since the 1980s**[2].



CDC. "Vital Signs: Epidemiology and Recent Trends in Methicillin-Resistant and in Methicillin-Susceptible Staphylococcus Aureus Bloodstream Infections - United States | MMWR." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 8 Mar. 2019.

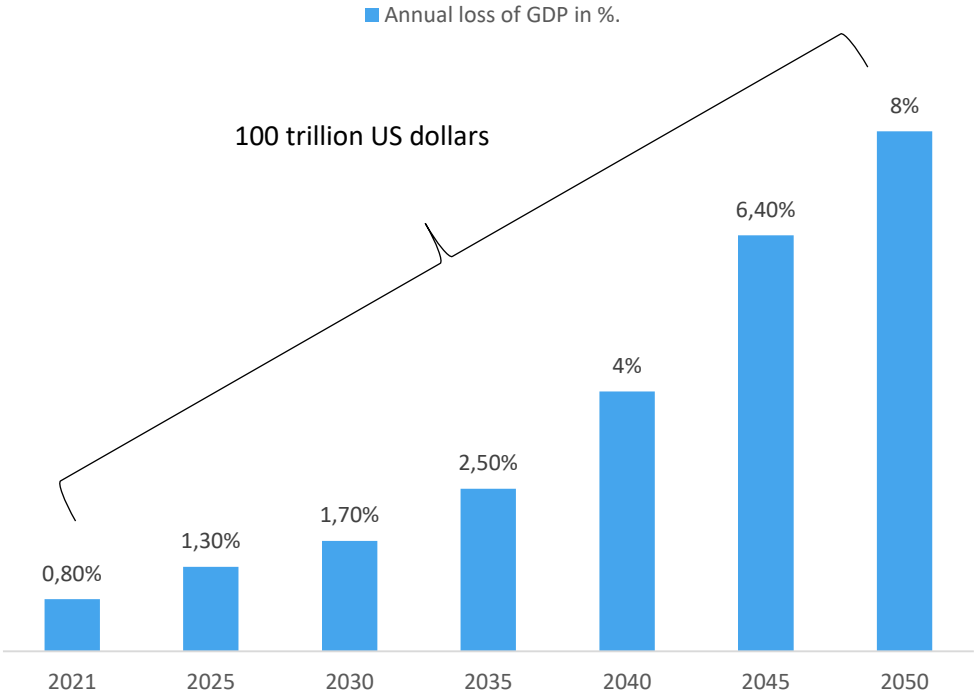
Turning to the statistics from 2016 on the spread of such superbugs done by researchers at the British Institute of Antibiotic Resistance Research, it is worth noting that by 2050 we will have approached the frightening figure of **10 million deaths annually**[3].

If a solution appears, and if not, the number of deaths may double



For reference, about 5 million people died of Covid-19 in 2020-2021.

Clearly, such mortality among the population will result in a huge GDP loss for all countries in the world, which could amount to **100 trillion dollars in total**[4].



In 2017, WHO published a list of 12 bacteria that urgently require new antibiotics to fight[5].

"The most critical group of all includes multidrug resistant bacteria that pose a particular threat in hospitals, nursing homes, and among patients whose care requires devices such as ventilators and blood catheters. They include Acinetobacter, Pseudomonas and various Enterobacteriaceae (including Klebsiella, E. coli, Serratia, and Proteus). They can cause severe and often deadly infections such as bloodstream infections and pneumonia"[6]

Dr. Marie-Paule Kieny, Assistant Director-General for Health Systems and Innovation, WHO

Bacteria constantly **mutate to become resistant to antibiotics**. Microbes adapt extremely quickly to these medicines, even in huge concentrations [7].

"Beneficial" mutations are transmitted by bacteria to each other.

Hospitals are the main "incubators" of superbugs: here powerful antibiotics are routinely used, and populations of immune microbes are growing. **Agriculture** also contributes to the development of bacterial resistance: there, antibiotics are widely used to prevent disease and accelerate animal growth. There is also a high spread of superbugs in **various types of closed spaces** as educational centers, public places, offices, and municipal facilities, where it is more likely that the superbugs will be transmitted by airborne droplets in the presence of an infected individual.

"While more R&D is vital, alone, it cannot solve the problem. To address resistance, there must also be better prevention of infections and appropriate use of existing antibiotics in humans and animals, as well as rational use of any new antibiotics that are developed in future"[8]

Professor Evelina Tacconelli, head of the Division of Infectious Diseases at the University of Tübingen and main contributor to the list, has been a key contributor to the list

Speaking of the problem, it is worth thinking about how we can protect ourselves from superbugs if medicines prove ineffective.

Ultraviolet light (UV-C) is a preventative and effective measure to combat superbugs before they enter the body. As these superbugs are airborne and do not cause harm to health before they enter the body, it is necessary to carry out constant disinfection of the air – and UV-C technology will help in this.

"Prevention is better than cure" – Hippocrates

Ultraviolet (UV) disinfection has been used in everyday human life for many decades. The practical use of ultraviolet germicidal disinfectors has been accompanied by a number of major historical developments.

1801
UV rays were discovered by the German scientist I. Ritter

1877
Doyne and Blount proved the bactericidal effect of UV radiation

1892
Harry Marshal Ward proved that the UV part of the electromagnetic spectrum destroys pathogenic bacteria

1904
Richard Koeh created the first mercury-quartz lamp, which serves as a powerful source of bactericidal disinfection

1920
The first laboratory tests of UV radiation in the fight against respiratory infections were carried out, which showed a successful result

1930
Ultraviolet began to be actively used in medicine

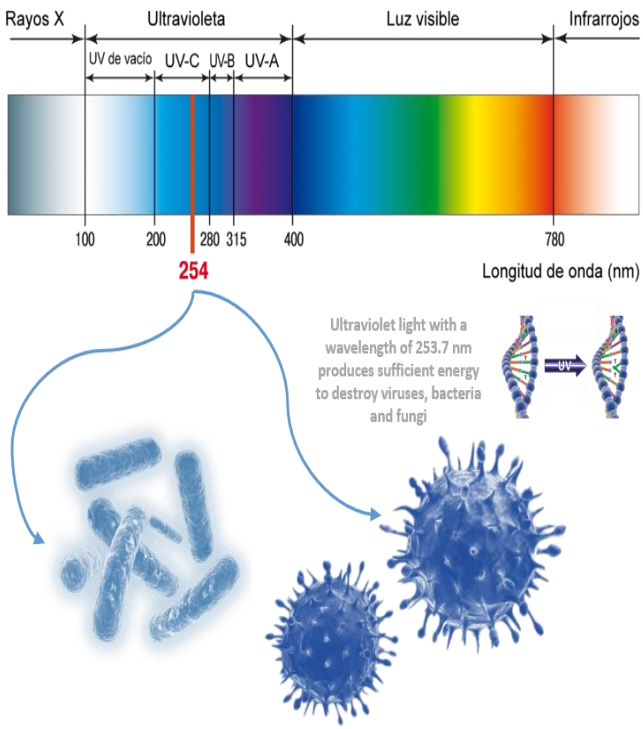
1936
In the United States, ultraviolet radiation was first used to sterilize air in a surgical operating room

1937
For the first time such an ultraviolet lamp was used in an American school

1994
A group of Russian scientists have patented the **DESAIR closed-type air disinfector, which is a recirculator with an ozone-free lamp**

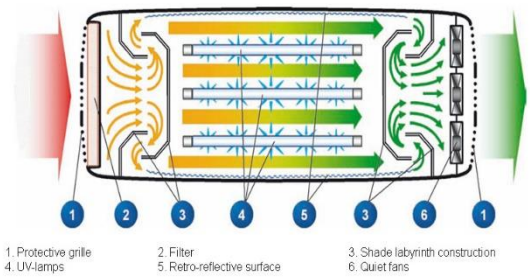
2020
The newest D-50 model is made of anodized aluminum with a patented coating of nano silver particles on the body with 99.99% disinfection effectiveness

UV-C is currently widely used for disinfecting water, filtering air and sterilizing surfaces by utilizing wavelengths of light between **200 – 280 nanometers**. The technology can help in the fight against drug-resistant superbugs[9]. Exposing pathogens to UV-C within the air conditioning system **breaks down the molecular structure of the DNA, neutralizing them**. Recent medical trials suggest the use of UV-C could be even more effective as it has been shown to cut the transmission of four major superbugs by up to 30%. Researchers focused on four drug-resistant organisms: MRSA, vancomycin-resistant enterococci (VRE), C. difficile and Acinetobacter[10].



Thus, given the effectiveness of ultraviolet against superbugs, we **simply** need air disinfection equipment with UV technology that can work without harming living organisms [11].

DESAIR is a solution developed using shortwave ultraviolet technology for sterilizing indoor air. **DESAIR equipment eliminates viruses, bacteria and fungi in the air**. The device's ultraviolet radiation peak is 253.7 Nm. It is the 253.7 Nm ultraviolet light that emits enough energy to break down the structure of nucleic acids and proteins at the molecular level and reach the DNA and RNA of viruses, bacteria, and fungi[12].



Our solution allows air to circulate inside the equipment, first passing through a dust-retaining G4 filter and then – through a UV light chamber where micro-organisms are inactivated[13]. This sterilisation method has been confirmed by scientific research for decades and has been used effectively to disinfect the air.

The newly developed D-50 is made of anodised aluminium with a patented coating of nano-silver particles to increase its effectiveness.

The effectiveness of DESAIR equipment in the elimination of bacteria, viruses, and fungi has been confirmed by numerous laboratory tests performed by an accredited laboratory - **Industrial Lab R.Reig, S.L.**[14] The study was conducted in a room of 35 cubic meters and with 1000 liters of contaminated air (i.e. 7 infected persons in an enclosed space).

VALIDATION STUDY OF THE ANTIVIRAL ACTIVITY OF DESAIR D-50[15]: **The "DESAIR D-50" equipment has shown outstanding antiviral activity (100%).**

Reduction rate: DESAIR D-50

Sample number	Reduction rate of the concentration of COVID-19 (%)
pretreatment	-
20 minutes after treatment	**100**
40 minutes after treatment	**100**

VALIDATION STUDY OF THE ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY OF DESAIR D-50[16]: The "DESAIR D-50" equipment **has shown a reduction rate of more than 92%** for **environmental aerobic bacteria** and **a reduction rate of more than 83% for environmental fungi**.

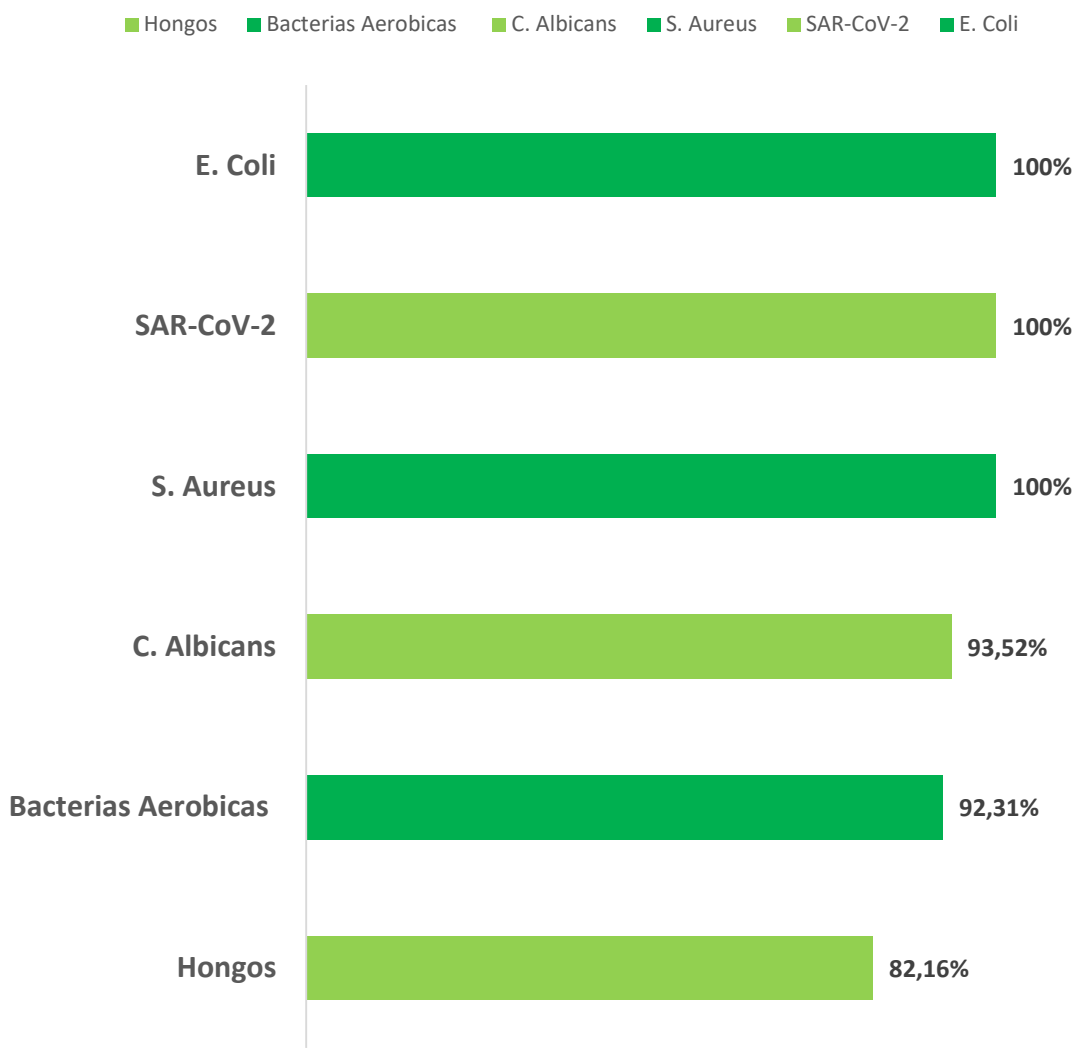
Reduction rate center of the room

Time	Reduction rate of aerobic bacteria concentration (%)	Reduction rate of fungal concentration (%)
0 to 60 min	**92,31**	**83,16**

VALIDATION STUDY OF ANTIBACTERIAL ACTIVITY (SUPERBACTERIA) DESAIR D-50[17]: The "DESAIR D-50" equipment **has shown a reduction rate of more than 93% for Candida albicans** and a **100% reduction rate for Staphylococcus aureus and Escherichia coli**.

Reduction rate center of the room

Time	Reduction rate of the concentration of **C.albicans** (%)	Reduction rate of the concentration of **S.aureus** (%)	Reduction rate of the concentration of **E.coli** (%)
0 to 60 min	**93,52**	**100**	**100**



Microbiological study of DESAIR D-50 equipment. 2020. INDUSTRIAL LAB. R. Reig, S.L.

We are about to cross the threshold of encountering another problem – this time related to superbugs.

"The rise of superbugs and allergens is one of the largest threats we face as a species today. Investment in immunology is vital in ensuring that our immune systems stay ahead of the race against microorganisms, which are evolving far quicker than traditional pharmaceuticals can keep pace with. It is important that we continue to take an innovative look at how we can adapt our environment to help prevent the spread of the most harmful pathogens - which is why this research is paramount."[18]

Immunology expert Dr. Hellmut Münch, managing director of
the Medical Enzyme Research Association

There is a solution that will definitely help prevent this disaster from spreading and that is DESAIR.

In the long run, it is important to realize that our future depends on the decisions we make today. The development of new vaccines and medicines takes decades, and we have to be prepared to protect ourselves TODAY.

DESAIR equipment with UV technology is a timely and affordable solution in the fight against various airborne diseases, including drug-resistant superbugs.

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