THE LAB CYCLE

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SCIENCE SPEAKS

Animal Conservation: The Key to Saving Earth's Biodiversity

Our planet is currently facing an extinction crisis and a rapid decline in animal biodiversity. Its drastic loss is caused by none other than human activities, such as land conversion, overexploitation, and pollution. With or without knowledge of their actions, humans are destroying animals' natural habitats and resources for livelihood. Agriculture, for example, is a major use of land. According to the data gathered in 2018 by the Food and Agriculture Organization of the United Nations (UN FAO), 1.56 billion hectares of land, which is half of the world's habitable land, is used for agriculture alone. *Continue at page 2.*

IN THE BLUELIGHT

Ensure Equipment Safety with Esco Services

Laboratory equipment must be serviced and tested regularly to ensure safety, optimal performance, and compliance with international standards, regulations, and good manufacturing practices. Not following the recommended maintenance schedule may cause an increased downtime, lower efficiency, shorter shelf life, and more expensive service costs. Esco Lifesciences understands the hustle of laboratory work life, which is why we have NSF, TÜV-NORD, NEBB, IFBA, and CETA-CNBT Certified Service Engineers who have extensive training and experience in providing services to various equipment globally. *Continue at page 6.*

UP AND ABOUT

Cell Culture: Safety Practices and Solutions

Cell culture is the removal of a cell from certain organisms so cells can be cultivated in an artificial environment. It is an essential tool in cellular and molecular biology that helps in understanding the aging process of the cells, their reaction to drugs and toxic compounds, and cell mutation— including the transformation of healthy cells into cancer cells. It is also significant in producing vaccines and therapeutic proteins. *Continue at page 9.*

WHAT'S INSIDE?

SCIENCE SPEAKS
- Animal Conservation: The Key to Saving Earth's Biodiversity.....2
- Location Guidelines for Airflow Containment Equipment.....4

IN THE BLUELIGHT
- Ensure Equipment Safety with Esco Services.....6

UP AND ABOUT
- Copper (Cu) vs. Silver (Ag): Which Has Better Antimicrobial Properties?.....7
- Cell Culture: Safety Practices and Solutions.....9

EINESCO'S ZONE
- EinesComic: Laboratory Slip-ups.....12

Animal Conservation: The Key to Saving Earth's Biodiversity

Our planet is currently facing an extinction crisis and a rapid decline in animal biodiversity. Its drastic loss is caused by none other than human activities, such as land conversion, overexploitation, and pollution. With or without knowledge of their actions, humans are destroying animals' natural habitats and resources for livelihood. Agriculture, for example, is a major use of land. According to the data gathered in 2018 by the Food and Agriculture Organization of the United Nations (UN FAO), 1.56 billion hectares of land, which is half of the world's habitable land, is used for agriculture alone.

Why Is Animal Biodiversity and Its Conservation Important?

Biodiversity refers to the variety of all living organisms in our natural world. A healthy environment and a balanced ecosystem are important to support human life. All direct human benefits that are essential for survival like food, water, and shelter come from nature. World Wildlife Fund's (WWF) 2020 The Living Plant Report with indicators provided by the Zoological Society of London (ZSL) shows an alarming average drop of 68% in almost 21,000 wildlife populations from 1970 to 2016. The irresponsible consumption and usage of these resources put the plant's biodiversity at risk of deterioration and loss. This is a clear indication of human altercation effects and a huge signal for humans to act in combating biodiversity loss. To preserve and rebuild biodiversity, analyzing threats and looking for innovative solutions are needed. And this is where animal conservation efforts come into play.

In situ vs. *Ex situ* Conservation

Conservation methods can be classified into two basic types: *in situ* and *ex situ*. Both are significantly different but are complementary solutions to the conservation of biodiversity. ***In situ* conservation** utilizes the natural habitat of the species in study, whereas ***ex situ* conservation** involves sampling outside of their natural habitats such as zoos, captive breeding facilities, aquariums, gene banks, and laboratories.

Understanding variation of threats is key to improving species recovery. *In situ* may have been the ideal method as it retains animals' way of living in their natural environments, but these measures have limitations and are often not enough to study animal species. Hence, making *ex situ* strategy at the forefront of biodiversity conservation as it provides more opportunities to study animal species. Here are the advantages of *ex situ* conservation:

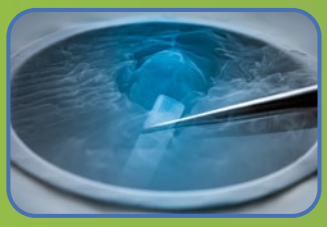
- Longer lifetime and breeding activity
- Genetic techniques can be used
- Captivity breeds can be reintroduced into the wild

Types of *Ex situ* Conservation

Zoo. Animals are managed in enclosures or open areas. Zoological parks are usually available for public display where endangered animal species may also breed to increase their numbers. Not only do people enjoy them, but it also serves as a source of information for education and research purposes.

Captive Breeding. Samples of animal species are captured in the wild especially those with vulnerable and threatened populations. It is an intensive management with improved enclosure design under expert care. The goal is to ensure survival of the species against extinction.

Aquarium. It is a vivarium in which water-dwelling animals are kept. Marine species are often victims of overexploitation by humans. Freshwater habitats are also the target of damming, resulting in fish species degradation.



Gene Bank. Gene study is vital to understanding pathology and molecular genetics of a species. Genome resources can be preserved short-term or long-term through cryopreservation that stores material at -196°C or freeze drying.

Integration of Engineering Control Equipment in Animal Conservation

Animal Research Workstations play an important role in animal behavioral studies and animal breeding for biodiversity enrichment. They provide operator, animal, and environmental protection during the course of research. These workstations protect the operator from exposure to allergens and other potentially hazardous materials, as well as the animals inside the enclosure from exposure to airborne particulates.

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Scan the QR code for the guide in selecting the right animal workstation based on specific application needs.

Earth's biodiversity is extremely important to human lives and the health of natural systems. Hence, it is only fair that humans take forward and seek nature's welfare for their own before it is too late.

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Location Guidelines for Airflow Containment Equipment

Working in the laboratory may include handling hazardous samples such as chemicals, microorganisms, and drug compounds— all of which pose a threat to human health and the environment. An airflow containment equipment provides operator and sample protection from hazards by means of calculated airflow velocity, airflow direction, and filtration system. To guarantee optimum performance, it is vital to have these cabinets installed in proper location sites.

Due to the low face velocity of the cabinets, external airflow disturbances such as a door opening, a person walking, an air conditioner, or a fan can cause disruption and turbulence inside the cabinet's work zone. Therefore, these cabinets must be installed or positioned in a way that optimally protects the airflow.

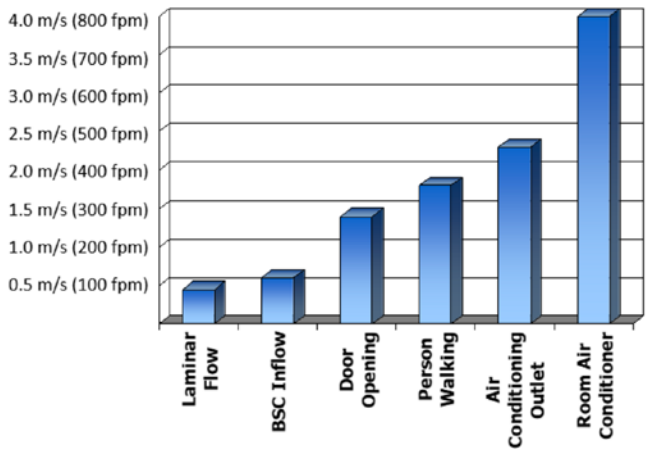
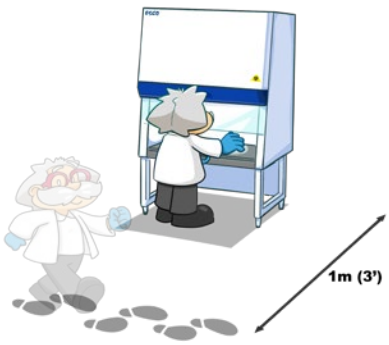


Fig. 1 Comparison of face velocities of equipment vs. airflow disturbances

Protect the airflow! Follow these tips for the proper location of your containment devices.

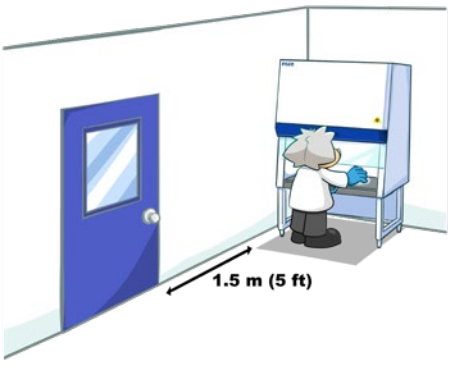
- If possible, an initial site assessment must be done. This will provide an overview of the facility's available space and will enable the engineers to plan for the installation and placement of the cabinets.
- Cabinets should never be placed in line with a doorway or a window that can be opened.
- Ensure that there are no room air diffusers, fans, extractors, or vents, placed directly towards the opening of the Biological Safety Cabinets, Laminar Flow Cabinets, and Fume Hoods.
- The position of the cabinet should satisfy the spatial requirements (e.g., vision, lighting, and convenience of access) of the operator and people working nearby.

Position Requirements

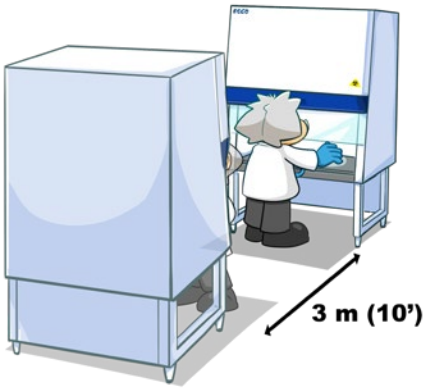


Allow at least 1.0 meter (3') clearance from the front of the cabinet to any pedestrian traffic routes, thoroughfares, or walkways.

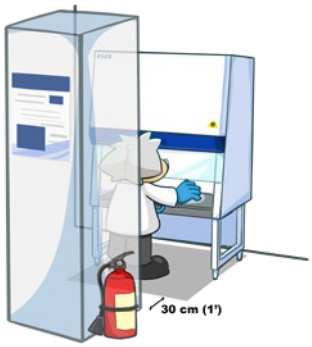
Allow at least 30 cm (1') clearance on both sides of the cabinet. There should be adequate space left for cleaning the sides of the cabinet and for carrying out decontamination procedures. There should be unobstructed access to the main power supply point(s).



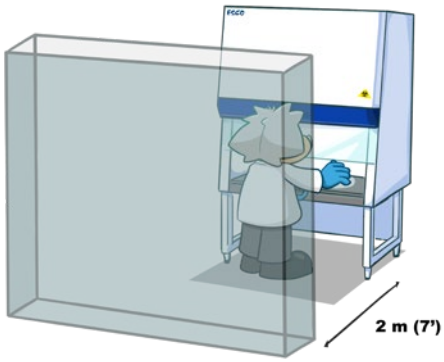
Do not position the cabinet where the distance between the aperture and any doorway is less than 1.5 meters (5′) or the distance between the side panel and any doorway is less than 1.0 meter (3′). Door openings cause substantial air turbulence. If the door is fitted with air transfer grills, operator protection factor testing may be carried out to determine suitable reduced clearance.



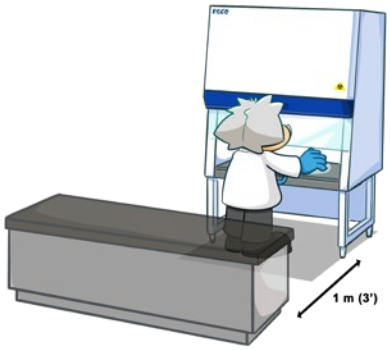
Safety cabinets should not be installed in positions where there is a likelihood of interference from other laboratory equipment. The distance from the aperture to the aperture of an opposing cabinet, fume cupboard, etc. should be more than 3 meters (10′) for safe operation.



As with walls, any large obstruction such as a pillar or column projecting beyond the plane of the front aperture should not be within 30 cm (1′) of the sides of the cabinet.



Do not position the cabinet in a location where there is an opposing wall (or other obstruction likely to affect airflow) within 2 meters (7′) of the front aperture.



A projecting bench will help minimize traffic in front of the cabinet and anyone working at the bench is unlikely to have a significant effect on the airflow as long as the front of the bench is situated at least 1 meter (3′) from the side of the cabinet.

Exhaust Requirements

A clearance of at least 30 cm (1′) is recommended between the highest point of the cabinet and the ceiling. If the distance is less than 30 cm (1′), the airflow alarm system may need re-calibration.

For proper exhaust filter leak scanning purposes, a minimum clearance of 50 cm is recommended.

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Setting up your laboratory? Contact us for more tips and recommendations.

IN THE BLUELIGHT

Ensure Equipment Safety with Esco Services

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As the global leading service provider, Esco Lifesciences is certified to recognized international standards such as:

- North America (NSF 49)
- Europe (EN 12469, TÜV tested)
- Japan (JIS K3800)
- Australia (AS 2252.2)
- China (SFDA YY0569)

Our engineers specialize not only in Esco products and services but also in **other brands** of equipment, including clean air and containment installations.

Services Offered

Re-certification and preventive maintenance

- Biosafety cabinet
- Laminar flow cabinet
- PCR cabinet
- Animal research workstation
- Ducted and ductless fume hood
- Powder weighing balance enclosure
- Laboratory oven and incubator
- CO_2 incubator
- Laboratory refrigerator and freezer
- Ultra-low temperature freezer
- PCR thermal cycler
- Autoclave*
- Water bath*
- Digital thermostation*
- Glass thermometer*
- Muffle furnace*

Supply and installation

- UV lamp
- Fluorescent lamp
- Filters (HEPA, ULPA, Carbon, V-bank)

Decontamination and troubleshooting

- Biosafety cabinet
- Laboratory decontamination

Validation

- Pharmaceutical equipment
- Medical equipment
- Cold storage equipment
- General laboratory equipment

Filter replacement

- Airflow cabinets

Certification

- Pharmaceutical equipment
- Medical equipment
- Airflow cabinets
- Cleanroom products
- Powder containment unit
- Autoclave*
- Water bath*

Equipment assessment/site visit

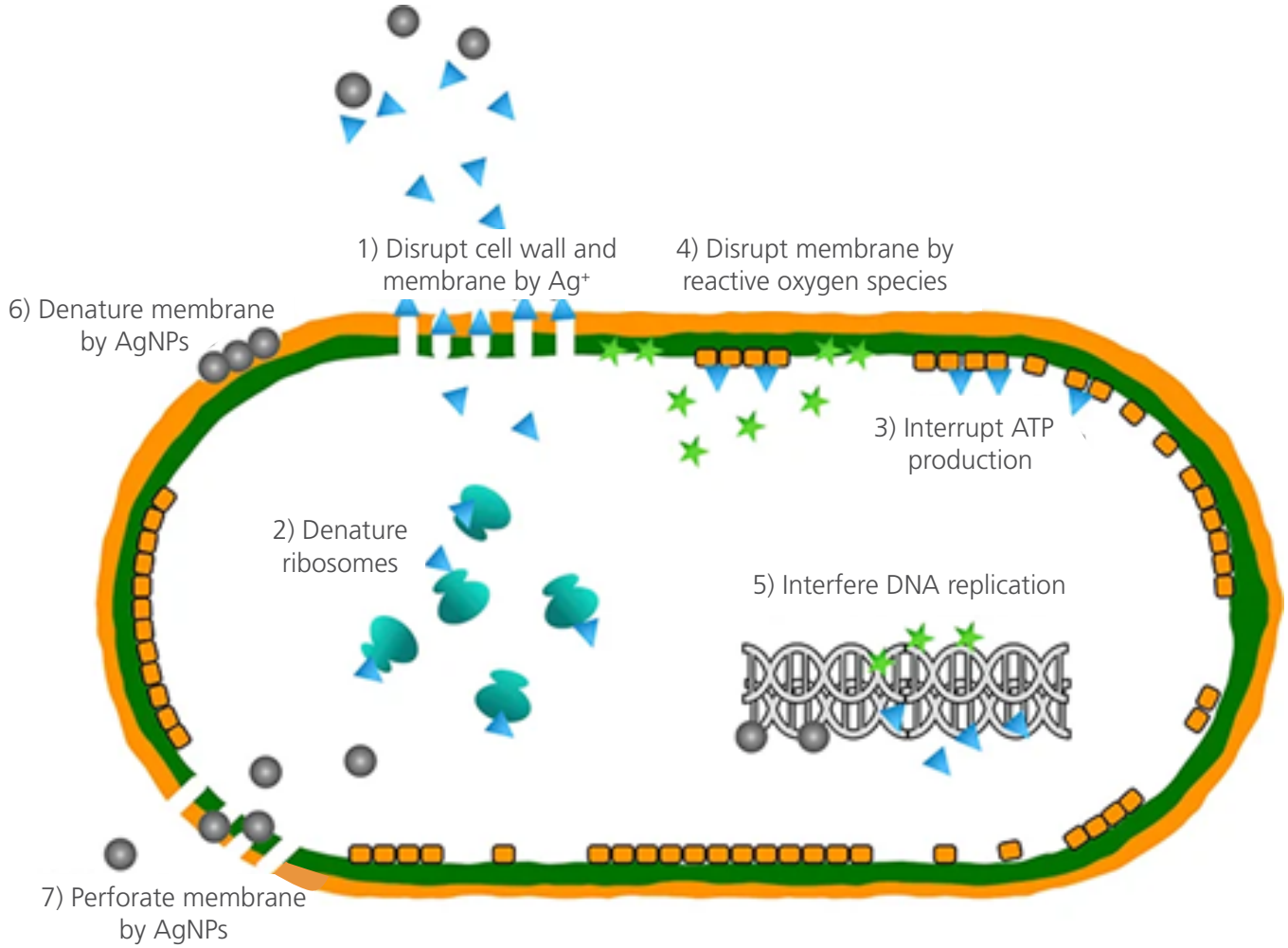
We are with you in keeping your laboratory, products, and personnel safe. Contact us for service inquiries!

LEARN MORE **CONTACT US**

**Product not available in Esco Lifesciences*

Copper (Cu) vs. Silver (Ag): Which Has Better Antimicrobial Properties?

Copper (Cu) and Silver (Ag) are well-studied for their antibacterial properties establishing their potential to eradicate a wide spectrum of infectious pathogens. Mechanism-wise, both are known to effectively inactivate microbes through ionization where copper and silver ions attach to bacteria causing cell wall disruption and eventual bursting of the membranes, but which one propounds a more promising germicidal effect?



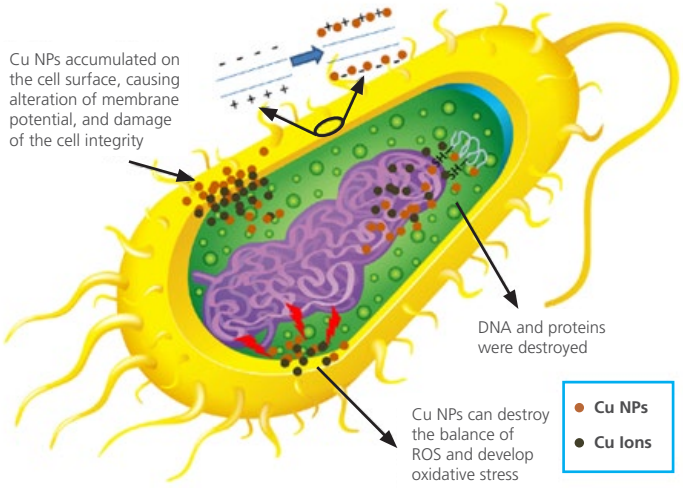
Ag Nanoparticles Antibacterial Mechanism (Yin et. al)

Silver's efficiency as an antibacterial agent has been evident for centuries. In the form of silver nanoparticles (Ag NPs), its application in various biomedical devices has advanced significantly. Silver nanoparticles' efficacy depends on varying factors: nanoscale size and the large ratio of surface area to volume.

Application-wise, it can be incorporated into various fields such as dentistry (e.g., acrylic resins for dentures, orthodontic treatment adhesive materials, and titanium coating in dental implant treatment), therapeutics (e.g., surgical mesh, wound dressing, artificial joint replacements, and curative catalyzing wound healing), medical imaging, and molecular diagnostics.

Similar to silver, copper's antimicrobial effect has also been known and utilized for ages. In 2600 BC, Egyptians were the first to mention copper's antimicrobial effects where it is used to purify drinking water and cure chest wounds. Copper was also mentioned in first-century medical writing as an important drug for medical practitioners treating venereal disease and chronic ulcers.

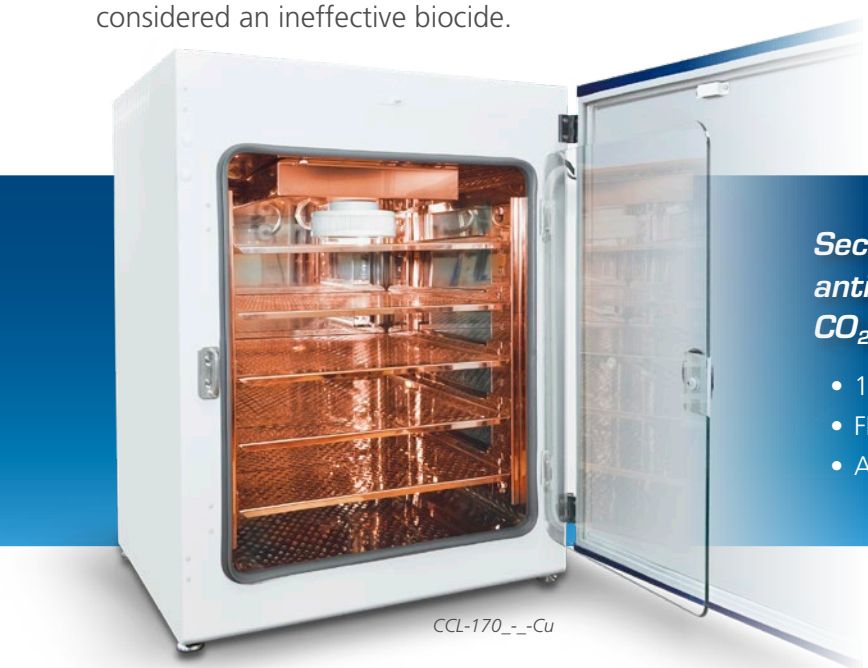
Regardless of the documented benefits, interest in copper was reduced due to the limited effectiveness evidence, and significantly affected by the eventual discovery of antibiotics.



Ag Nanoparticles Antibacterial Mechanism (Makvandi et. al)

Presently, copper has managed to regain its place in multiple applications backed by several copper compounds possessing antimicrobial abilities such as copper carbonate, copper iodide, and copper thiocyanate. Application varies as some are plied to treat lumber, for ships coatings inhibiting mollusk growth, while there are others that can be found in face creams as well as wound dressings. In the clinical setting, copper has also been proven effective in averse antibiotic-resistant bacteria like MRSA. Its biocidal effect relies on several factors: concentration, exposure time, humidity, and temperature.

Summarily, copper is observed to be effective at varying levels of humidity and temperature, which is due to copper's two ionic states which are Cu^{+} and Cu^{2+} compared to silver having one, Ag^{+}. On the other hand, studies show that silver's antimicrobial property is best if present in a wet environment but at room temperature and nominal humidity of 20%, its antimicrobial activity is almost inexistent. Hence, at the lack of moisture, silver is considered an ineffective biocide.



CCL-170_-_-Cu

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Cell Culture: Safety Practices and Solutions

Cell culture is the removal of a cell from certain organisms so cells can be cultivated in an artificial environment. It is an essential tool in cellular and molecular biology that helps in understanding the aging process of the cells, their reaction to drugs and toxic compounds, and cell mutation— including the transformation of healthy cells into cancer cells. It is also significant in producing vaccines and therapeutic proteins.

In the field of science and research, cell culture has opened new possibilities and discoveries. Its esteemed importance is a product of its complex process but there are risks that come along with it. Human and animal cell subjects are to be handled with utmost caution as they may contain viruses or mutagenic reagents that constitute risks to other samples and the researchers. Safe practices in a cell culture laboratory need to be carried out. Below are the DOs and DON'Ts when handling cell culture:

The DOs

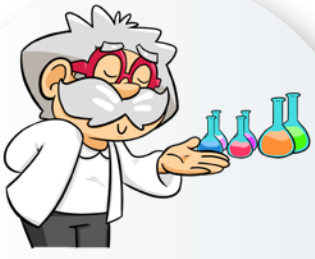
1 *Proper handwashing (on entrance and exit)*

2 *Wear complete personal protective equipment (gloves, closed shoes, lab coat).*

3 *Decontaminate the work surfaces before and after the experiment using a suitable disinfectant.*

4 *Check all media and reagents prior to use.*

5 *Properly dispose of all waste.*



6 *Provide separate bottles of media for each cell line in cultivation.*

7 *Follow the laboratory guideline.*

8 *Label all the samples clearly.*

9 *Examine cultures and media daily for the presence of contaminants.*

10 *Ensure that the equipment is being cleaned and maintained regularly.*

The DON'Ts

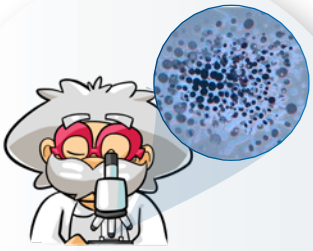
1 *Avoid frequent use of antibiotics in culture medium.*

2 *Avoid waste pile-up, especially within the biological safety cabinet and incubators.*

3 *Avoid eating, drinking, and smoking.*

4 *Do not handle cells from unknown sources in the main cell culture suite.*

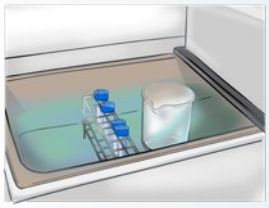
5 *Do not keep cell lines in culture unless they are returned to frozen stock.*



6 *Prevent the cell culture from getting totally confluent.*

7 *Avoid letting the culture media expire.*

8 *Don't let necessary equipment pass calibration schedule.*



9 *Avoid water baths from becoming dirty.*

10 *Avoid prolonged storage of the culture and CO_2 incubator door opening.*

Cell Culture Solutions

Apart from knowing the DOs and DON'Ts of cell culture operations, choosing the right and long-lasting equipment to accompany you in your processes is also critical. Having the right tools can help you boost your productivity and improve your A-game. Esco Lifesciences offers a wide variety of products to equip your laboratory. From CO_2 Incubators, Biological Safety Cabinets, Laboratory Refrigerators and Ultra-low Freezers, Centrifuges, Orbital Shakers, Microplate Shaker/Incubator, Laminar Flow Cabinets, and up to Bioreactors. We also offer Cell Culture Media and Supplements, as well as a Cell Culture Monitoring System, to ensure that your cells grow in optimal conditions.

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Watch 6 Tips to Prevent Cell Culture Contamination

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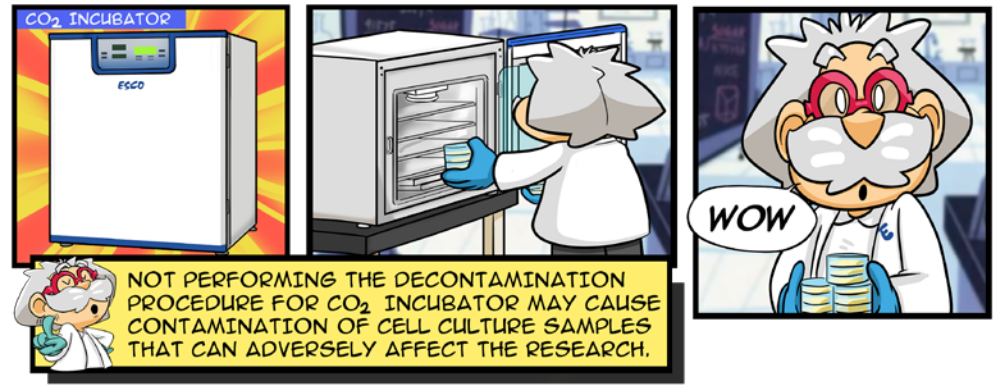
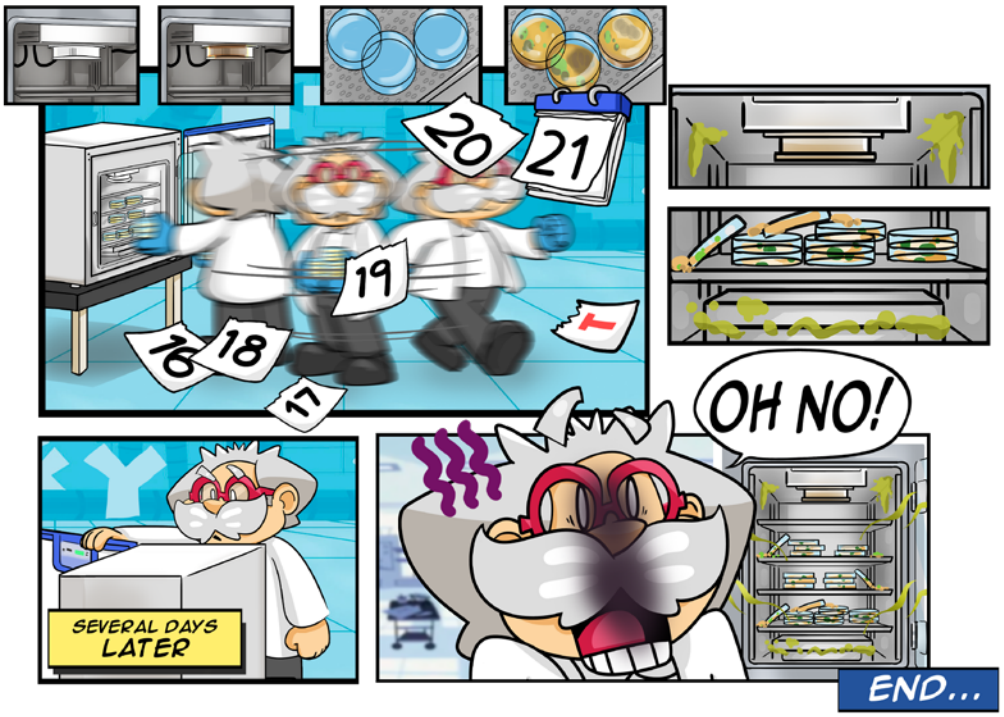
LABORATORY SLIP-UPS





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