THE HEALTH QUARTERS
QUARTERLY NEWSLETTER
ISSUE 4 | MARCH 2022

ESCO Healthcare "Discovery to Delivery"

Strengthening cGMP compliance for Pharmaceutical Drugs and Biologics Manufacturing

Esco Healthcare presents the fourth (4th) issue of its quarterly newsletter, featuring its all-encompassing technologies and solutions for the manufacturing and processing of pharmaceutical drugs and biological products.

In this issue, the HQ highlights on strengthening the core of cGMP compliance in accordance with optimizing the client's manufacturing process.

Take A Minute!

Want to sharpen your wits and test your thinking skills?

Professor VacciXcell is investigating who contaminated the stem cell culture. Can you help him find the culprit?

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Visit our websites via links below:

Esco Pharma - www.escopharma.com
Esco TaPestle Rx - www.escotapestlerx.com
Esco VacciXcell - www.escovaccixcell.com
Esco Aster - www.escoaster.com

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HQ Breakthrough

Esco Aster Joins the World Vaccine Congress for the 6th Time

Singapore – On Apr. 18-21, Esco Aster, a vertically integrated contract research (CRO), contract development and manufacturing organization (CDMO), will exhibit onsite in the upcoming **World Vaccine Congress (WVC) in Marriott Marquis Washington DC, USA**. After all the restrictions of the past two years as the COVID-19 pandemic hit, Esco Aster is seeing a return to the much-awaited conference with a new lineup of bioprocessing tools to display.

Of the company's recent development for its Tide Motion product portfolio, Esco Aster will launch the latest version of the **CelCradle™ and CelCradle X® system**. What's unique in the newest CelCradle™ design, is its standalone control tower equipped with a **21 CFR Part 11-compliant software** and adapting its single use bottle with different types of macroporous carriers. The bottles can be pre-packed with either BioNOC™ II, BioMESH®, or BioNOC D™. Automated pH, DO control and monitoring have also been made easier with its upgraded CelFeeder design feature. This eliminates the manual checking of pH levels for monitoring thus saving both labor and time.

Not only the CelCradle™ system gets a fresh look, but Esco Aster also improved the CelCradle X® and executed the following features:

A standalone cGMP compliant, closed, automated bioreactor for a variety of adherent cell culture applications especially, autologous cell therapy.

Incubator designed with low temperature control which is mostly needed for producing aquaculture vaccines.

Both the CelCradle™ and CelCradle X® continue to utilize the **unique tide motion principle** for alternate exposure of cells to aeration and nutrition. As a linearly scalable outcome, the units are equipped with an automated harvesting system for harvesting live whole cells, intracellular viruses, and more.

Esco Aster will also highlight the success of the recently published study in the **international, peer-reviewed journal, Vaccines,** which discusses the **production of high-titer Hepatitis C Virus in the Tide Motion system**.

Hepatitis C virus (HCV) is a pathogen responsible for causing blood-transferred infections associated with chronic liver diseases. A reported estimate of 58 million people, worldwide, are living with chronic HCV infection, and 1.5 million new infections and 300,000 HCV-related deaths in a year. To date, there is still no licensed vaccine that can protect an individual against chronic HCV infection.

High-Titer Hepatitis C Virus Production in a Scalable Single-Use High Cell Density Bioreactor

Date of publish: February 7, 2022
Journal: Vaccines
https://escoaster.com/Library/publications

Furthermore, the vaccine development based on whole virus as well as the area of research for ultrastructural and immunogenicity studies, require high-titer virus production.

In the recent published study, HCV was produced in human hepatoma-derived Huh7.5 cells through the high cell density bioreactor, CelCradle™. It was observed that the highest virus yields were obtained upon two medium exchanges. The laboratory scale bioreactor system allows recirculation mode, with the inclusion of media reservoir bottles, responsible for 100% medium replenishment that is significant in virus production for a higher viral titer yield. Moreover, this study also demonstrated the infectivity titers levels with the peak of up to 7.2 log10 focus forming units (FFU)/mL, accumulated virus yields of up to 5/9 x 1010 FFU, and a cell specific virus yield of up to 41 FFU/cell from a single CelCradle™ system.

These findings highlight the packed-bed Tide Motion system's capability in virus production, providing high virus titers for applications such as HCV vaccine production. The laboratory scale, packed-bed Tide Motion bioreactor, can be linearly scaled up to larger vessels, offering a platform for larger scale HCV vaccine development.

Through the years, Esco Aster has launched timely innovations that has helped solve a number of challenges in the bioprocessing industry. WVC is an event format that comprises a series of panel sessions and exhibitions with thousands of attendees worldwide. With so much to show throughout the four (4) days, we look forward to welcoming you there.

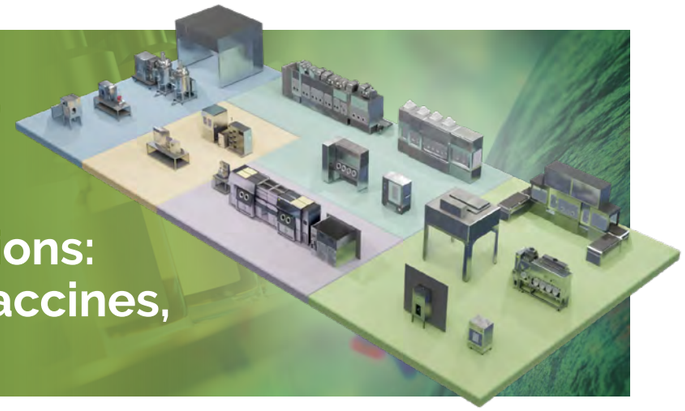
Grab your tickets to the leading vaccine congress through here:

https://secure.terrapinn.com/V5/step1.aspx?E=10550&_ga=2.104730944.1730050778.1643355368-1046054811632385419

Have questions? Send us a message at mail@escoaster.com

Figure 1. Esco Aster booths in the World Vaccine Congress throughout the years.

Insight Scoop



cGMP Cleanroom Solutions: COVID-19 RDs, mAbs, Vaccines, and Antiviral OSDs

The race for the most promising strategies to fight against the COVID-19 pandemic continues. The need for effective public health interventions and reliable treatments that can overturn the surge has led to the development of several drugs as potential candidates for improving patient outcomes.

With the highest hopes of treating infections at an early stage, the process of finding significant clinical evidence suggesting novel indications to currently approved drugs, aka drug repurposing, has been highly considered. In such cases, drugs are being combined to take up all the molecules that have been dosed safely to humans to be available for a variety of screening assays. It is said to be a cost-effective drug development technique that could be made available to treat coronavirus patients on a much quicker timescale than new therapies.

As the battle with viral infection is still ongoing, the COVID-19 vaccine is effective from a preventive and long-term perspective as it helps individuals develop immunity with minimal risks of adverse events. A vaccine is a biological substance that stimulates the body to respond and produce antibodies in the presence of a foreign invader such as a virus. An antibody is a protein that is produced naturally by B cells in the immune system. Its main mechanism is to bind to unique parts of the virus and block its entry into a cell to fight infection or control an infection from developing into a disease. The majority of licensed vaccines are administered via subcutaneous (SC) or intramuscular (IM) injection.

Commonly, these antibodies occur naturally post-exposure to vaccination or infection, but they can also be engineered synthetically in a laboratory. Laboratory-made antibodies are called monoclonal antibodies (mAbs) which are administered via intravenous infusion or injection.

Despite the latest improvements, many countries continue to face challenges with an unmet need for earlier treatment. Early detection could have a significant benefit in preventing severe cases and the need for hospitalization. Thus, with continuous research of potential game-changer approaches, the use of oral solid dosage (OSD) antiviral drugs has emerged. The first-ever antiviral pill for the treatment of COVID-19 was manufactured by Merck & Co's called Molnupiravir. The clinical data has shown promising effects at a high percentage rate when taken as an onset treatment or when the virus is still replicating. This drug increases the frequency of viral RNA mutations and impairs virus replication.

COVID-19 Prevention and Treatment Approaches

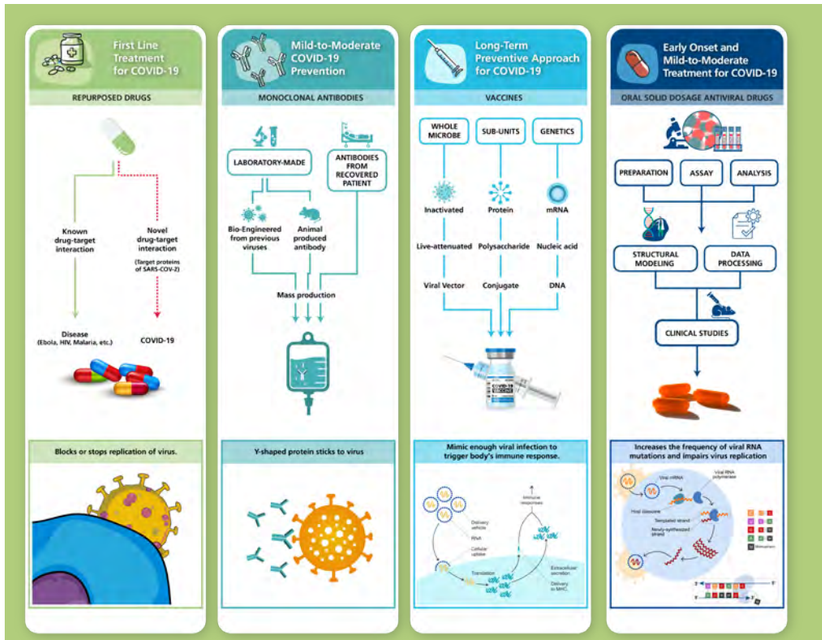


Figure 2. Four-Pathway treatment approach against COVID-19

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cGMP Manufacturing Facilities

As per FDA cGMP and aseptic guidelines, there are two (2) clean areas of particular importance to sterile drug product quality:

Critical Area

This area is deemed critical because the sterilized drug product within this area is vulnerable to contamination and will not be subsequently sterilized in its immediate container. Hence, strict controls of the surrounding environment must be in place to maintain product integrity and sterility.

Activities conducted in this area include manipulation (e.g., aseptic connections, sterile ingredient additions) of sterile materials before and during filling and closing operations.

Considerations on particle count are significant as these can potentially contaminate a product extraneously or biologically by serving as a vehicle for microorganisms. In line with FDA's cGMP/aseptic guidelines, the recommended appropriate air cleanliness level in the critical area is ISO Class 5 as per ISO 14644-1:2015.

Air cleanliness in accordance with ISO 14644-1 is classified based on the maximum number of allowable particle concentration per cubic meter.

Table 1. ISO Classes of air cleanliness by particle concentration. From ISO 14644-1:2015.

ISO CLASS	Maximum allowable particle concentrations (particles/m³)					
	0.1 µm	0.2 µm	0.3 µm	0.5 µm	1 µm	5 µm
1	10					
2	100	24	10			
3	1 000	237	102	35		
4	10 000	2 370	1 020	352	83	
5	100 000	23 700	10 200	3 520	832	
6	1 000 000		102 000	35 200	8 320	293
7				352 000	83 200	2 930
8				3 520 000	832 000	29 300
9				35 200 000	8 320 000	293 000

Supporting Clean Areas

Supporting clean areas can serve various functions. Usually, these areas are where non-sterile components, formulated products, in-process materials, equipment, and container/closure are prepared, held, or transferred.

Air classification for supporting clean areas depends on the nature of the activities conducted here. The US FDA recommends that the immediate area adjacent to the aseptic processing line meets ISO Class 7 (minimum) standards under dynamic conditions. Manufacturers can also classify this area as ISO Class 6 or maintain the entire aseptic filling room at ISO Class 5. However, an area classified at an ISO Class 8 air cleanliness level is appropriate for less critical activities (e.g., equipment cleaning).

The higher the ISO classification is assigned to an area, the more expensive operation costs will be. Due to the increased number of HEPA/ULPA filters, power consumption of blowers, and HVAC to accommodate the required air room classes.

cGMP-Compliant Cleanrooms

Cleanrooms are areas intended to provide a high level of cleanliness for processing sterile/aseptic and non-sterile products to ensure product quality, safety, and process efficiency.

Depending on the operational requirement, cleanroom environments are controlled and with a defined number of particles per unit volume of air. To achieve this control, High-Efficiency Particulate Air (HEPA) and Ultra-Low Particulate Air (ULPA) filters are used to trap and limit the number of particles being introduced into the cleanroom. In addition, air velocity is also maintained at a certain level [typically at 0.45 m/s (90 fpm) ± 20% as per regulatory aseptic guidelines] to ensure that there is a sufficient number of air changes per hour (ACPH) within the controlled space.

The conditions above will help mitigate the risk of contamination while providing a suitable environment to carry out the required processes. Other relevant physical parameters might also be controlled as required, e.g., temperature, humidity, air pressurization, sound and vibration, and electrostatic discharge.

Manufacturing Key Approaches Against COVID-19

Due to the high medical need for COVID-19 treatment, researchers, manufacturers, and contract development & manufacturing organizations (CDMO) focus their efforts on ramping up the capacity of developing novel drugs with its four-way strategies. However, the complexity and risks involved require specific know-hows.

Each process step requires the adaptation of equipment to optimize production. Choosing cGMP-compliant equipment will gain the advantage in the regulatory transition from clinical trials to manufacturing and quality control processes.

With its wide range of innovative and turnkey solutions, Esco Pharma aims to provide enabling technologies that comply with the internationally accredited GMP in hopes of developing the most promising strategies and solutions in the future perspective.

Partner with Esco Pharma today and guarantee optimal processing with high quality and cost-effective engineering solutions.

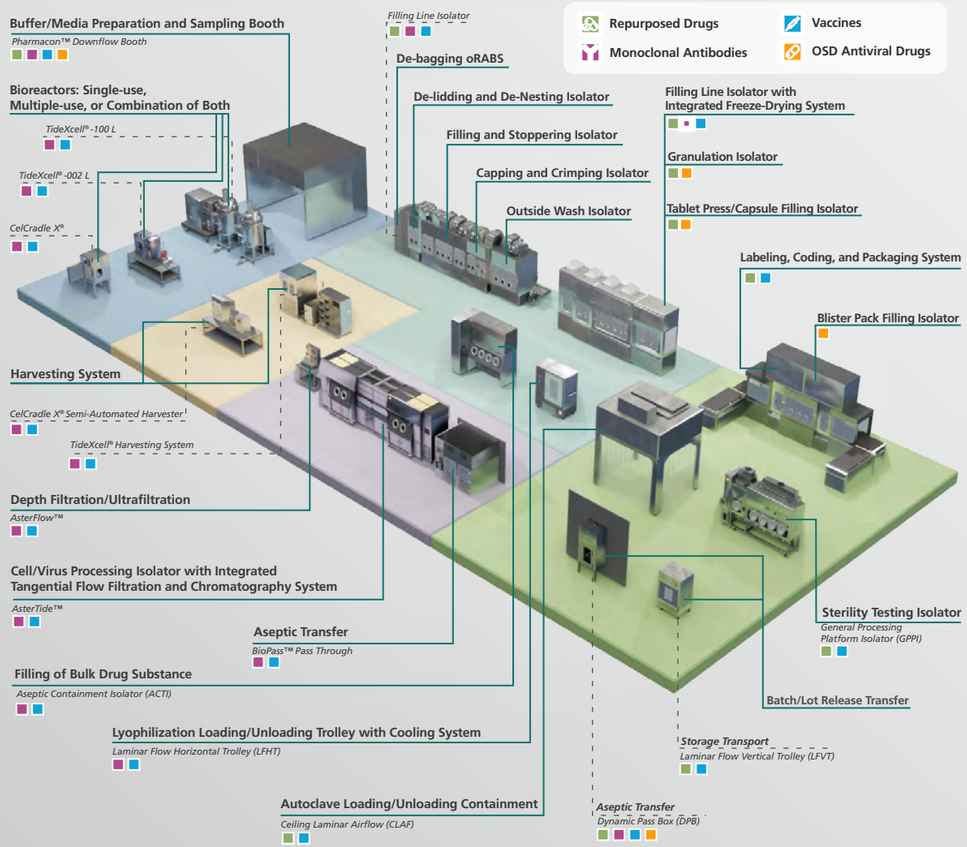
References

1. Brande, D., Milholland, D., & Haycocks, N. (2017). Why is 90 FPM Considered Standard for Cleanroom Airflow? ISPE. Retrieved from: https://ispe.org/pharmaceutical-engineering/march-april-2017/why-90-fpm-considered-standard-cleanroom-airflow
2. Channel News Asia (2021). Merck COVID-19 pill sparks calls for access for lower income countries. Retrieved from: https://www.channelnewsasia.com/world/merck-covid-19-pill-sparks-calls-access-lower-income-countries-2250266
3. COVID-19 Prevention Network. (n.d.). The Science of COVID-19 Vaccines and Antibodies. Retrieved from: https://www.coronaviruspreventionnetwork.org/coronavirus-vaccine-and-antibody-science/
4. Cumbers, John (2020). Timeline Shows 3 Paths To COVID-19 Treatment And Prevention (Infographics). Forbes. Retrieved from: https://www.forbes.com/sites/johncumbers/2020/03/25/timeline-shows-3-paths-to-COVID-19-treatment-and-prevention-infographic/?sh=259975ad4789
5. Institute of Environmental Sciences and Technology. (2001). FED-STD-209E. Retrieved from: https://www.iest.org/Standards-RPs/ISO-Standards/FED-STD-209E
6. International Organization for Standardization. (2015). ISO 14644-1:2015, Cleanrooms and associated environments - Part 1: Classification of air cleanliness by particle concentration (2nd ed.). ISO 2015.
7. Naughton, P. (2019). History of Cleanrooms. ASHRAE Journal. Retrieved from: https://www.ashrae.org/file%20library/technical%20resources/ashrae%20journal/125thanniversaryarticles/38-54_naughton_historical_v2.pdf
8. Ramirez, J., Sharpe, L., & Peppas, N. (2017). Current state and challenges in developing oral vaccines. Advanced Drug Delivery Reviews, 114, 116-131. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6132247/
9. U.S. Department of Health and Human Services. (2004). Guidance for Industry: Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice. Food and Drug Administration. Retrieved from: https://www.fda.gov/media/71026/download
10. Vaccines Europe. (2020). How are vaccines produced? Retrieved from: https://www.vaccineseurope.eu/about-vaccines/how-are-vaccines-produced

Table 2. Cleanroom Classifications. From History of Cleanrooms by Philip Naughton, 2019, ASHRAE Journal, p. 50.

CLEANROOM CLASSIFICATIONS										
U.S.A. 209A,B	U.S.A. 209C	U.S.A. 209D	U.S.A. 209E	BRITAIN BS 5295	AUSTRALIA AS 1386	FRANCE AFNOR X44101	GERMANY VOI.2083	JAPAN JACA	EU GMP	ISO STANDARD
										ISO Class 1
						-	0			ISO Class 2
	1	1	M1.5	C	0.035	-	1	3	-	ISO Class 3
	10	10	M2.5	D	0.35	-	2	4	-	ISO Class 4
100	100	100	M3.5	E or F	3.5	4 000	3	5	A/B	ISO Class 5
	1 000	1 000	M3.5	G or H	35	-	4	6	-	ISO Class 6
10 000	10 000	10 000	M5.5	J	350	400 000	5	7	C	ISO Class 7
100 000	100 000	100 000	M6.5	K	3 500	4 000 000	6		D	ISO Class 8
										ISO Class 9

COVID-19 Solutions: Esco's Presence in Manufacturing of Repurposed Drugs, Monoclonal Antibodies, Vaccines, and Oral Solid Dosage Antiviral Drugs



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cGMP Equipment Capabilities

Upstream: Inoculum/Culture Preparation
- **Bioreactors – Single Use or Multiple Use or Both**
  Note: For cGMP compliance, bioreactors (e.g., CelCradle X®) may be integrated in a Cell Processing Isolator.
- **Buffer/Media Preparation and Sampling Booth**
  Contained Weighing and Dispensing of Raw Materials

Harvest: Product Extraction
- **Harvest System**
  Product harvest such as live whole cells or intracellular virus
- **Depth Filtration Systems**

Downstream: Purification
- **Product Filtration**
- **Ultrafiltration Concentration**
  Product will undergo series of filtration, then cell washing and concentration

Upstream to Downstream Process: End-to-end Bioprocessing System
- **Cell/Virus Processing Isolator with Integrated Tangential Flow Filtration and Chromatography system (with built-in Semi-Automated Harvester)**
  Fully-automated system for bioprocessing

Product Formulation: Bulk Drug Substance
- **Formulation Isolator**
  Optional to formulate Bulk Drug Substance with freeze-drying process
- **Bulk Drug Substance Isolator**
  Fill Bulk Drugs Substance into mother container, frozen and stored for drug product filling

Fill & Finish: Drug Product Manufacturing
- **Filling Line Isolator with Integrated Compounding, Formulation, Filling and Finish System**
  System integration capability for non-sterile (e.g., tablets/capsules) or sterile (e.g., vials/ampoules) preparations.
- **Lyophilization Loading/Unloading Trolley with Cooling System**
  Maintain the temperature during transport, loading, and unloading from filling line to freeze-dryers. Options between manual or integrated within the filling line.
- **Filling Line Isolator with Integrated Freeze-Drying System**
  Mother liquid container is provided with filtered air for continuous sterile/aseptic filling into container of vial, syringe, cartridge, IV bag
- **Granulation Isolator**
  Integration of granulator system in Isolator with optional built-in mechanical equipment (e.g., elevated platforms, lift tables, and drum tippers/lifters).
- **Tablet Press Isolator**
  Integrated tablet press machine with optional built-in washing line system in Isolator.

Quality Control (QC) and Packing
- **Sterility Testing Isolator**
  Sterile QC/QA inspection process
- **Labeling, Coding, and Packaging System**
  Contained labelling and packaging of drug product in aseptic/sterile environment
- **Blister Pack Filling Isolator**
  Customizable to be fully integrated with primary and secondary packaging system.
- **Batch/Lot Release Transfer**
  Aseptic/sterile transfer or transport between controlled environment

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Project Genesis

Cell Processing Isolator: Choosing the Right Isolator for Cell Therapy

Cell processing is moving towards commercial production by scaling up and through multiple means of increasing the capacity of laboratory processes. Automated systems are now available for some of the cell manipulations that are traditionally carried out manually. Some processes, however, still do not have the available option for closed system automation.

The traditional means of using biosafety cabinets (BSCs) to provide product and operator protection in this application are more commonly found and suited in the initial research and development stage. However, the scale-up of this equipment proposes a possible hurdle. Companies opt to have a room filled with BSCs for multiple processes.

In a scale-up production, the environment in which cell therapies are handled must follow the current Good Manufacturing Practices (cGMP). There are two available options for the environment to isolate an aseptic biopharmaceutical process:

1. **An open system like Biosafety Cabinet providing Grade A environment placed in a Grade B Cleanroom.**
2. **A closed system like the Isolator delivering a Grade A environment in a Grade C or D cleanroom.**

These setups do not only mean an area of defined ventilation or filtration system. It includes the specific type of gowning for the personnel, regular training of personnel, and all the related standard operating procedures (SOPs) carried out for the application.

Compared to traditional sterile pharmaceuticals, all cell therapy application cannot be terminally sterilized. Therefore, rigorous quality control is paramount in production regardless of the batch size or product type. Whether it is a patient-specific autologous therapy or a large-volume batch of an allogenic, off-the-shelf product, the entire process must be carried out aseptically. All the processes including final product quality control testing must be done in a manner and area that assures sterility and efficacy.

Considerations in Selecting the Right Isolator

The following factors are to be considered in deciding for the right isolator:

1. Process/Method

Cell processes or methods vary widely among different products. The common cell expansion also makes use of different technologies. The isolator must allow routine processes to be carried out in an efficient manner while all together eliminating the risk of contamination.

2. Equipment Integration Capability, Machinery, and Robotics

Depending on the process, the isolator's physiological requirements and design may vary. Isolators may be integrated with multiple sets of equipment such as incubator, centrifuge, and microscope, among others.

The area of pharmaceuticals in which robotics are commonly used is in the aseptic fill-finish process. Semi-automated or fully automated filling machines may be integrated within an isolator system.

Note: Esco Pharma can customize isolators integrating client's process equipment. For more information, contact the local office near you today.

3. Ergonomics

Typically, cell therapy processes are carried out in a long-term duration. The ergonomics of an isolator must allow manual manipulations to be carried out efficiently and comfortably.

4. Instrumentation

The design of the isolator must have the ability to pass samples and data from all the instruments and equipment within the isolator and allow connection into the possible building management system.

5. Environment

Isolators can provide product, operator, and environment protection. Depending on the characteristic of samples handled, an isolator may operate in negative and/or positive pressure with a single pass or recirculating airflow regime. It can be designed with a fully integrated bio-decontamination system. It is also capable of providing special conditions such as inert environment and/or temperature and relative humidity-controlled system, depending on the requirements.

Cell Processing Isolator

Esco Pharma's Cell Processing Isolator (CPI) is designed to provide an ergonomic and practical cGMP compliant solution for the production of cell therapies. The CPI is designed to isolate the process to ensure operator safety, without compromising the product quality. It also provides the unidirectional/laminar airflow delivering a sterile environment (ISO Class 5/Grade A) that is required in carrying out aseptic processes.

As a fully cGMP-compliant isolator and an aseptic containment system, it is capable of automated pressure hold testing and of automated bio-decontamination. It can also be equipped with a glove leak tester to allow individual testing of the glove's integrity. By standard, the internal material of construction is made with stainless steel 316L equipped with passthrough chambers. It may also be equipped with Rapid-Transfer-Ports (RTPs). This design allows the introduction and removal of samples in a controlled material flow without the risk of introducing contaminants into the internal chamber or allowing the products to escape the isolator.

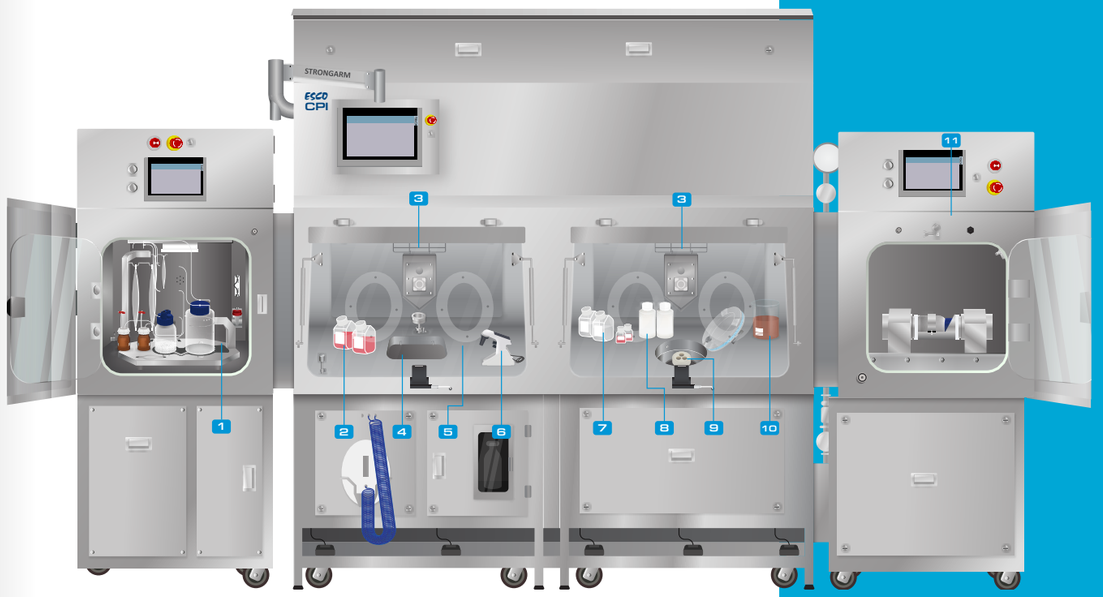
A CPI is also equipped with environmental monitoring capabilities such as temperature sensors, relative humidity sensors, and pressure sensors. Continuous particle monitoring systems and viable/microbial air samplers can also be integrated.

The CPI is an integrated system that can combine several types of equipment into one isolated solution. This setup offers increased sterility with a reduced risk of contamination, thus increasing patient safety. The CPI can be custom-designed to suit individual customer requirements (see Figure 1). Depending on the client's requirements, the following are the common sets of equipment that are integrated into a CPI:

- CO_2 Incubator
- Centrifuge
- Microscope
- Refrigerator and/or Freezer
- Peltier Wells
- Bioreactor
- Harvesting Systems
- Filtration Systems
- Laminar Airflow Cabinet
- Biosafety Cabinet
- Laboratory Shaker

Choosing the correct system like the cell processing isolator can provide multiple advantages. As we develop and customize the equipment and the processes. It is also critical to note that the cost and schedule are always the major drivers in equipment selection. The key in the selection of an isolator is to find a machine, process, and system that best fit your process and product.

Cell therapies are capable of giving terminal patients an opportunity to survive. At the end of the day, considerations must be made based on the added value that a piece of equipment or upgrade brings about to one's services.

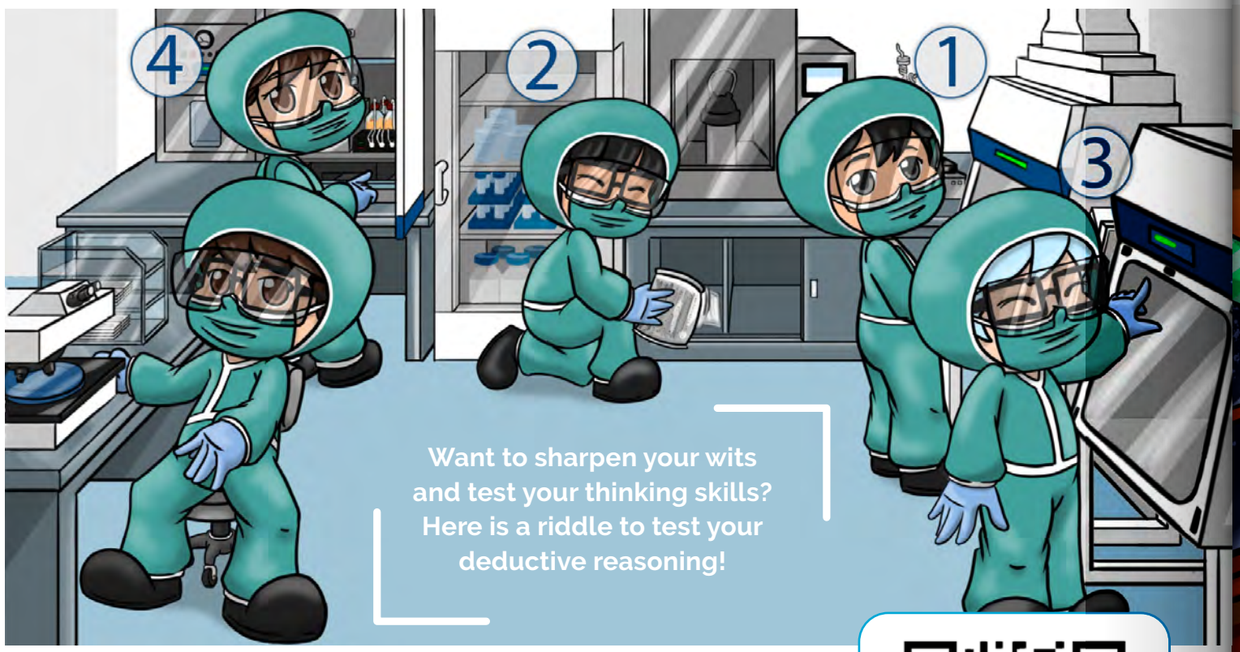


1. *CelCradle X® Unit*
2. *Reagents and media*
3. *SS Rod (for hanging of bags/ pipette and others)*
4. *Peltier well*
5. *CCX Bottle*
6. *Pipettor*
7. *Enzyme Media*
8. *Centrifuge Bottles*
9. *Centrifuge*
10. *Waste*
11. *Exit Pass Through Chamber/ CCX-FAH (Harvester)*

References

1. Bozenhardt, H. (2020, April 16). Selecting The Right Isolator For Cell Therapy Manufacturing: Considerations & Challenges. Https://www.Cellandgene.Com/. Retrieved January 28, 2022, from https://www.cellandgene.com/doc/selecting-the-right-isolator-for-cell-therapy-manufacturing-considerations-challenges-0001
2. European Medicines Agency. Advanced therapy medicinal products: Overview. (2021, December 3). Retrieved February 5, 2022, from https://www.ema.europa.eu/en/human-regulatory/overview/advanced-therapy-medicinal-products-overview
3. Meyer, D. (2021, May 27). Individual closed isolators for cell therapy. A3P - Pharmaceutical & Biotechnology Industry. Retrieved February 12, 2022, from https://www.a3p.org/en/closed-isolators-cell-therapy/
4. US Food and Drug Administration. Guidance for Industry Sterile Drug Products Produced by Aseptic Processing – Current Good Manufacturing Practice. US Department of Health and Human Services. Rockville, Md.: 2004. https://www.cellandgene.com/doc/selecting-the-right-isolator-for-cell-therapy-manufacturing-considerations-challenges-0001

TAKE A MINUTE



Want to sharpen your wits and test your thinking skills? Here is a riddle to test your deductive reasoning!

A Scientist Contaminated A Stem Cell Culture! Can you help Professor VacciXcell find the culprit?

On the 10th of January 2022, Professor VacciXcell and his peers prepared a stem cell culture, arranged, and set up all the materials, samples, and reagents needed in an aseptic manner. On the 4th day, professor VacciXcell noticed a change in the color of the media. It appeared turbid and had some sort of thin film on the topmost layer. By observation, he knew something was wrong.

Upon a more thorough investigation, it turned out it was contaminated with Mycoplasma bacteria. Now, Professor VacciXcell is scrutinizing who contaminated the cell culture. He then asked his peers, and had the following alibis:

Mr. Pharma: *"I prepared the stem cell sample. Got it from our cryogenic tank (LN2) wearing a full PPE. After this, I thawed it inside our Labculture® Class II B2 Biological Safety Cabinet in a 37°C water bath in less than a minute. After thawing, I poured it into the tube with 14 ml of media and centrifuged at 1000 RPMs for 10 minutes. I removed the supernatant. Added 2 ml of media and added to 2 T75 flasks that have 14 ml of media in it."*

Ms. Pharma: *"While Mr. Pharma is preparing and thawing the sample needed for the culture. I was helping him prepare for the materials needed: automatic pipettes, vacuum flask/aspiration device, cryogenic vials, T-flasks, 70% alcohol for disinfection, pre-warmed culture media, etc."*

Ms. TaPestle: *"On day 2, I measured the pH and glucose levels. I got 1 properly labeled T75 flask from the CelCulture® CO_2 incubator, aseptically cleansed it with 70% alcohol, and obtained a small amount of culture media under the Labculture® Class II B2 Biological Safety Cabinet while wearing a full PPE."*

Ms. VacciXcell: *"On day 3, I changed the culture medium of the 2 T75 flasks since the pH is starting to get yellowish in color which indicates acidity and decreased glucose levels. Wearing full PPE, I did the procedure under our Airstream® Class I Biological Safety Cabinet and put back the T75 flasks on the CelCulture® CO_2 incubator afterwards."*

WHO WAS THE CULPRIT?

Scan this QR Code to play the game online!

Note: Preparation of cell culture requires the use of multiple sets of equipment. In an adaptable system like the Cell Processing Isolator (CPI), exposure to a non-grade A/ ISO Class 5 external environment is limited as all the necessary equipment is fully integrated within the system.

Esco Healthcare promotes the use of CPI - fully designed to isolate your process to ensure operator safety without compromising product quality.

TAKE A MINUTE

Answers from the Previous Issue

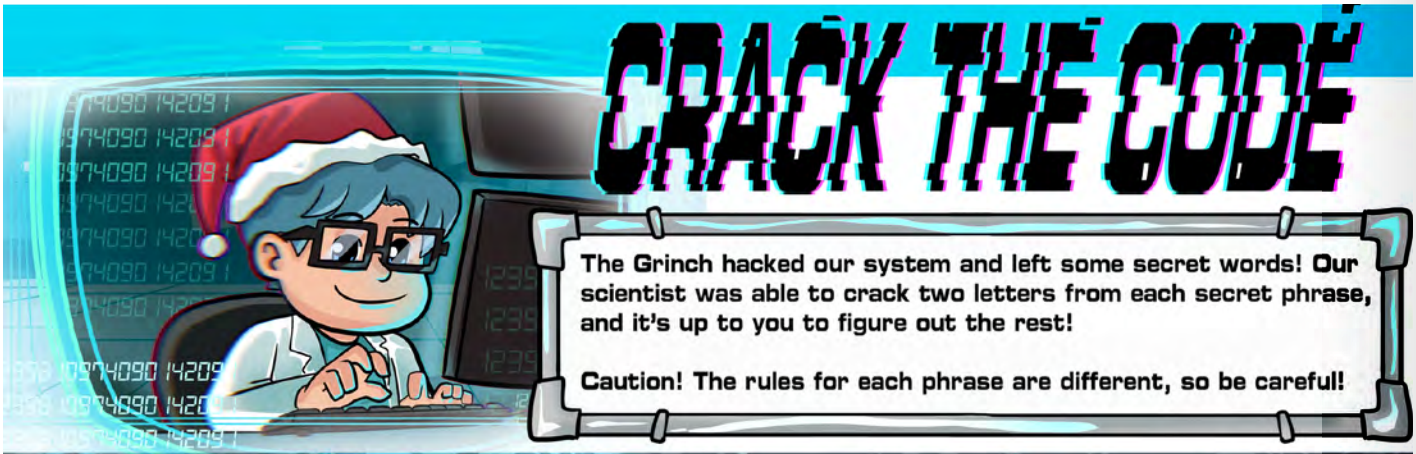
A Holiday Mesh!

We're feeling extra festive, so we have not only one, but two games to bring the holiday cheer! Stop the grinch from stealing Christmas by finding him in a game of Hidden Pictures. After that, help our scientist crack the code to solve for the Grinch's secret messages.

Hidden Pictures

The grinch is trying to steal Christmas! Help the team find stuff hidden in the Health Quarters and put a stop to his evil schemes. Catch the grinch if you can...

CRACK THE CODE



The Grinch hacked our system and left some secret words! Our scientist was able to crack two letters from each secret phrase, and it's up to you to figure out the rest!

Caution! The rules for each phrase are different, so be careful!

3 5 C C 15 C 1 12
1 7 12 9 3 15 C 14 15 12 5

Clues: 5→E, 15→U

ANSWER: Cellular Agriculture

23 24 5 15
3 5 14 14
2 11 17 14 17 7 31

Clues: 5→E, 15→M

ANSWER: Stem Cell Biology

F X O W X U H G
P H D W

Clues: F→C, P→M

ANSWER: Cultured Meat

V G Q Q S C
C P E G P C C T G P E

Clues: T→R, S→U

ANSWER: Tissue Engineering

M Z M L N V W R X R M V

Clues: L→O, X→C

ANSWER: Nanomedicine

B I K D
B C F E K C I M

Clues: K→U, K→V

ANSWER: Drug Delivery

1100 11 1100 101
101 10010 1001 10010 1 10000

Clues: 1→A, 11→C, Letters are Scrambled!

ANSWER: Cell Repair

HMgScAlFSiP
KFMgFLiHCaB

Clues: CaB → TE

ANSWER: Aluminosilicate

O L G S Q Z G K

Clues: Q→A, O→I, Look at your Keyboard!

ANSWER: Isolator

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