

THE LAB CYCLE

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SCIENCE SPEAKS

COVID-19 Vaccines: What You Need to Know

COVID-19 vaccines are generally concurred to be the most effective in sustainably controlling the pandemic. It is after all proven that while countermeasures such as social distancing, universal face covering, and frequent handwashing are effective, it is not completely reliable and does not often work if disregarded. For that reason, the best way to avoid being infected by the virus is to be vaccinated. *Continue at page 2.*

IN THE BLUELIGHT

Purchasing Decisions: Reliability and Credibility at Par

Many aspects are considered when making purchasing decisions. Laboratory equipment are investments expected to work long-term and pay off what they are worth. So before striking a deal, here are some features and factors one must account for. *Continue at page 5.*



UP AND ABOUT

How Does Gene Therapy Work?

Gene Therapy is the introduction of genetic material into a host cell to treat or prevent disease. It uses sections of DNA (usually genes) to replace the mutated gene and change the expression of protein(s) critical to the development and progress of the disease. In some cases, the whole or part of a gene is defective or missing from birth, or a gene can change or mutate during adult life. Any of these variations can disrupt how proteins are made, which can contribute to health problems or diseases. Scientists can now modify genes or replace faulty genes with healthy ones to potentially treat, cure, or prevent a disease or medical condition. *Continue at page 9.*

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COVID-19 Vaccines: What You Need to Know

COVID-19 vaccines are generally concurred to be the most effective in sustainably controlling the pandemic. It is after all proven that while countermeasures such as social distancing, universal face covering, and frequent handwashing are effective, it is not completely reliable and does not often work if disregarded. For that reason, the best way to avoid being infected by the virus is to be vaccinated. Since effective COVID-19 vaccines have been developed and are being allocated globally, it is important that everyone understands the advantages of the vaccines and their potential mild side effects. Inadequate knowledge and misinformation will lead to unnecessary fear causing more inconvenience. Vaccines are scientifically proven to provide more benefits than drawbacks.

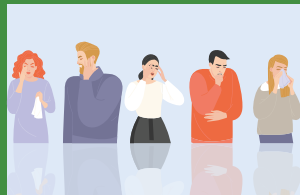
How safe are the COVID-19 vaccines?

COVID-19 vaccines are proven to have shown a high level of efficacy on to the widespread controlled trials on people of different ages, ethnicities, and medical conditions. The vaccines are further proven to be safe and efficient as they met the U.S. Food and Drug Administration's (FDA) strict scientific qualifications to enable emergency use authorization (EUA). European Medicines Agency (EMA) and Health Sciences Authority (HSA) have also authorized the emergency use of COVID-19 vaccines that have passed the criteria for efficacy and safety.

Who should get vaccinated?



People at least 12 years of age and older.*



People with underlying medical conditions and with increased risk of severe diseases.



Vulnerable pregnant women with a higher risk of exposure.



Breastfeeding women with a higher risk of exposure.

**For now, only the Pfizer-BioNTech COVID-19 vaccine can be administered to young teens aged 12-15.*

Who should not get vaccinated?



People with severe allergic reaction (anaphylactic) to any ingredient of the COVID-19 vaccines.



Children below 12 years of age. Vaccinations for children are yet to be developed and are only in progress.

What are the benefits?

The COVID-19 vaccines provide disease protection by eliciting an immune response to the SARS-CoV-2. Developing immunity through vaccination reduces the risk of contracting the illness and its repercussions. If you are exposed to the virus, this immunity will help you fight it. According to studies, vaccinated people who become infected have mild to moderate cases of COVID-19 compared to those who are not vaccinated. As a result, once fully vaccinated, your risk of hospitalization and death due to COVID-19 is nearly eliminated.

Getting vaccinated can also protect the people around you as you are less likely to infect others. This is especially important to protect people who are at a higher risk of severe illness from COVID-19, such as healthcare providers, older or elderly adults, and people with underlying medical conditions.

A new study has also shown expectant mothers who receive the COVID-19 vaccine develop antibodies to the virus, which they pass on to their unborn baby via the placenta. It was also discovered that mothers pass antibodies to their newborns via breast milk. This suggests that the newborns have some immunity to the virus, which is especially important given that young children are unable to receive the vaccine.

Lastly, vaccination is the final step in battling the pandemic. To slow the spread of the virus, public health measures such as wearing a mask, social distancing, and handwashing must still be observed. We should maintain these precautions until enough people, particularly the most vulnerable members of our community, have been immunized.

What are the possible side effects?

Experiencing mild-to-moderate side effects after vaccination is a common reaction of the body. These side effects can range from muscle aches to minor fevers, which are expected and would usually go away after a few days. It indicates the production of antibodies, which are the first line of defense against infection. In other words, mild side effects are considered a good thing because they show that the vaccine is working and the immune system of the body is reacting to it.



Pain at the injection site



Chills



Fever



Fatigue



Headache



Muscle pain



Nausea



Drowsiness

Disclaimer: Side effects may vary with the type of COVID-19 vaccine.

COVID-19 vaccines could cause uncommon side effects such as severe allergic reactions. Although these situations are rare, it is important to observe and monitor the first 15 to 30 minutes after the vaccine was administered. There has also been a rare occurrence of blood clots after vaccination. The European Medicines Agency (EMA) estimated that around 5 out of 1 million people are at risk of experiencing a blood clot after vaccination. This has made many people concerned about whether they would receive the vaccine or not. According to the early findings from the University of Oxford, there is a greater risk of cerebral blood clots from COVID-19 than from post-vaccination. Clearly, the benefits outweigh the risk. With the vaccines only recently being administered, there has not been enough time to observe their long-term effect. If any unexpected reactions occur after vaccination, they should be reported to the doctor or any medical expert.

Myth busters about COVID-19 vaccine

With the ongoing distribution and administration of COVID-19 vaccines, there is a lot of misinformation circulating regarding their safety. It is important to counter-check the accuracy of any information to prevent the spread of these misconceptions. Here are some of the truths about popular COVID-19 vaccine myths.

MYTHS	FACTS
Vaccines were rushed and are not safe.	The vaccines were developed fast but did not skip any health testing. The available vaccines are safe and are expected to cause only mild side effects.
The vaccine will give you COVID-19.	Authorized vaccines do not contain any live virus and will not cause COVID-19.
You do not need the vaccine if you already had COVID-19.	It is advised to still get the vaccine even after being sick with COVID-19 to avoid possible re-infection and the severe health risks associated with it.
The vaccine will alter your DNA.	Vaccines only work to aid the body's immune response. Therefore, it cannot affect or alter DNA in any way.
You do not need a face mask after receiving the vaccine.	Wearing a mask and physical distancing should still be practiced even after receiving the vaccine. It is still possible to get infected after vaccination, but the vaccine will prevent moderate to severe cases of COVID-19.



Vaccinations are already taking place all over the world, yet vaccine hesitancy is still on the horizon. It should be clear that vaccines are safe but can cause minor side effects, which should not cause too much worry. They produce protection against disease and are our best chance to end the COVID-19 pandemic sooner than later.

References:

- [1] CDC. May 2021. COVID-19 Vaccine Information for Specific Groups. <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/specific-groups.html>
- [2] CDC. March 2021. Possible Side Effects After Getting a COVID-19 Vaccine. <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/expect/after.html>
- [3] CDC. April 2021. Safety of COVID-19 Vaccines. <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/safety-of-vaccines.html>
- [4] CDC. April 2021. Myths and Facts About COVID-19 Vaccines. <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/facts.html>
- [5] COVID-19 Vaccine: Myth Versus Fact. April 2021. <https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/covid-19-vaccines-myth-versus-fact>
- [6] Koirala, A, Jin Joo, Y. et.al. June 2021. Vaccines for COVID-19: The current state of play. https://www.researchgate.net/publication/342297761_Vaccines_for_COVID-19_The_current_state_of_play
- [7] Mayo Clinic. May 2021. COVID-19 vaccines: Get the facts. <https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/coronavirus-vaccine/art-20484859>
- [8] MU Healthcare. What are the Benefits of Getting the COVID-19 Vaccine. <https://www.muhealth.org/our-stories/what-are-benefits-getting-covid-19-vaccine>
- [9] Torjesen, I. April 2021. Covid-19: Risk of cerebral blood clots from disease is 10 times that from vaccination, study finds. BMJ. <https://doi.org/10.1136/bmj.n1005>
- [10] U.S. Food and Drug Administration. Coronavirus (COVID-19) Update: FDA Authorizes Pfizer-BioNTech COVID-19 Vaccine for Emergency Use in Adolescents in Another Important Action in Fight Against Pandemic. <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-pfizer-biontech-covid-19-vaccine-emergency-use>
- [11] WHO. March 2021. Side Effects of COVID-19 Vaccines. <https://www.who.int/news-room/feature-stories/detail/side-effects-of-covid-19-vaccines>
- [12] WHO. March 2021. Safety of COVID-19 Vaccines. <https://www.who.int/news-room/feature-stories/detail/safety-of-covid-19-vaccines>
- [13] WHO. October 2020. Coronavirus disease (COVID-19): Vaccines. [https://www.who.int/news-room/q-a-detail/coronavirus-disease-\(covid-19\)-vaccines](https://www.who.int/news-room/q-a-detail/coronavirus-disease-(covid-19)-vaccines)

Purchasing Decisions: Reliability and Credibility at Par

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Comfortable low noise at 55 dBA

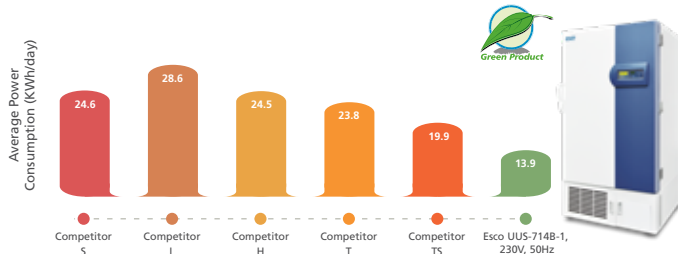


QUALITY

In quality assurance, diagnostics, and research laboratories, every tick and tock of the clock counts. Downtime due to equipment failure may lead to mishaps such as sample degradation, hazard exposure, and income loss. Hence, having efficient and reliable equipment is of paramount importance. It must be designed with high-quality materials and engineering excellence to deliver exceptional results. Compliance with international safety standards and certifications is also to be reckoned with as it assures the safety and efficiency of the product used.

ERGONOMIC

Laboratory professionals are at risk of exposure to various occupational hazards, and some of which may be brought by environmental discomfort. Some manufacturers have started producing equipment designed to give users comfort to prevent work-related musculoskeletal disorders, especially on equipment with procedures involving sitting for an extended period. Another danger to look out for is the noise emitted by equipment as it may lead to permanent hearing loss. Choosing equipment with low-noise emission conserves the health of all the laboratory staff. Make sure to look for these ergonomic features.



ENERGY-SAVING

Machinery constitutes at least 10% to 50% of the total energy consumed in a laboratory. Adding energy-saving to your choosing criteria would help you save big in the long run. Energy-efficient equipment takes less capital for it to run. The use of LED lighting, DC-ECM blowers in airflow cabinets, an efficient refrigeration system for cold storage are some of the technologies used to lower power consumption in the lab.

AFTER-SALES SERVICE

Service must not end upon delivery. It is important to require your supplier for an extensive network of service support from installation to decommissioning. Lab personnel must be equipped with equipment knowledge and basic troubleshooting skills. Knowing who to call during equipment downtime saves you from the trouble of looking for technicians.

Esco Lifesciences offers only cost-effective equipment with an equitable value that our customers can truly rely on. In fact, we have installations worldwide, a testament to the craftsmanship and customer service we offer. Investing in Esco is surely a win-win choice. (Related article: *Esco Scientific: The Global Life Science Tool Provider on page 6*)

References:

- [1] I2SL: Resources - Tool Kit - Energy-Efficient Laboratory Equipment Wiki. (n.d.). <https://www.I2SL.org/>. May 12, 2021, from <https://www.I2SL.org/resources/toolkit/wiki.html>
- [2] Occupational Safety and Health Administration. (n.d.). Occupational Noise Exposure - Overview. <https://www.osha.gov/noise>
- [3] Penkala, S., El-Debal, H., & Coxon, K. (October 2018). Work-related musculoskeletal problems related to laboratory training in university medical science students: A cross sectional survey. www.ncbi.nlm.nih.gov. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6206935>

Esco Scientific: The Global Life Science Tool Provider

As a leading producer of life science tools, Esco Scientific offers a complete range of equipment solutions needed for sample preparation, analysis, cultivation, and storage. We take pride in supplying world-class equipment to various laboratories, hospitals, and universities. From ensuring operator's safety to protecting sample's integrity, we make certain that our products are designed with efficiency, quality, and comfort in mind. Esco also offers installation and maintenance services, making it a one-stop-shop for most laboratory requirements.

Here are some recent global installations of Esco Scientific products:

NORTH AMERICA



2 units of Labculture® Class II Type A2 Biological Safety Cabinet installed at Stanford University in California, USA

*Image courtesy of Andrew Brodhead
<https://news.stanford.edu/2020/12/04/look-inside-stanfords-expanded-biosafety-level-3-bsl3-lab/>*

EUROPE



More than 15 units of Airstream® Vertical Laminar Flow Cabinet installed at Biosynex in Strasbourg, France



4 units of Airstream® Class II Biological Safety Cabinet and 8 units of Celculture® CO₂ Incubator installed in Italy

Image courtesy of Omicron Italia Srl

MIDDLE EAST



1 unit of Airstream® Class II BSC and 1 unit of Isotherm® Laboratory Oven installed at Abdali Hospital in Amman, Jordan

ASIA



1 unit of Airstream® Class II Biological Safety Cabinet installed at Philippine Textile Research Institute



2 units of HP Series Laboratory Refrigerator installed at Cagayan Valley Medical Center in the Philippines



1 unit of HP Series Laboratory Freezer and 1 unit of Ascent™ Max Ductless Fume Hood installed at Naresuan University's Center for Animal Research in Thailand



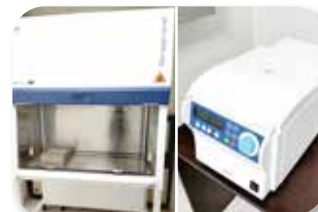
1 unit of Frontier® Duo Ducted Fume hood installed at Chiang Mai University's Faculty of Veterinary Science in Thailand



1 unit of Versati™ Micro Refrigerated Centrifuge and 1 unit of Aeris® Thermal Cycler installed at the Bangladesh Oceanographic Research Institute



3 units of Airstream® Class II Biological Safety Cabinet and 3 units of Airstream® Laminar Airflow cabinets installed at Eskayef Pharmaceuticals in Bangladesh



Multiple units of Streamline® Class II Biological Safety Cabinet, Airstream® Laminar Flow Cabinet, and Versati™ Micro Refrigerated Centrifuge installed at Labaid Diagnostic in Gulshan, Bangladesh

We are committed to delivering innovative solutions and making human lives safer and healthier. Contact us to know how we can be part of your laboratory!



SCAN HERE

Esco Philippines, Inc. Celebrates 10 Years of Excellence

Esco Philippines, Inc. (EPI) marks its tenth anniversary this year. With such a milestone, EPI is pleased and honored to have provided world-class laboratory equipment to hospitals, laboratories, and various industries nationwide.

Founded in April 2011, the company has grown from five to ninety-nine skilled employees at different locations in Luzon, Visayas, and Mindanao. The continuous expansion signifies its commitment to make customers' needs the top-notch priority among any other.



During the COVID-19 pandemic, EPI responded to the call and have supplied suitable equipment to aid healthcare facilities with five hundred installations all over the country. In the last four years, they have partnered with organizations and provided more than ten thesis subsidy grants as support to realize scientific researches. EPI is also proud to have conducted hundreds of seminars and webinars to different institutions to promote safety awareness inside the laboratory.

Esco Philippines, Inc. has gained a trustworthy reputation throughout the years. With the help of its partners and collaborators, it has leveraged resources and extended its reach to widen the impact of their goal and advocacy—to spread safety awareness and improve lives through science.

“

Esco is excellence.

Esco Philippines is always at their best to be outstanding. Providing the best and reliable service for their products.

”

MANUEL B. ALONZO III, RMT
Business Unit Head
Zafire Distributors, Inc.



“

Esco is world class.

Esco Philippines ensures (bio) safe environment for laboratorians and the community. They are committed in bringing innovative, advanced & quality products that meet the global (bio) safety standards and state of the art requirements of every research laboratory.

”

MARIAN DE LEON
Chairperson
National Research Council of the
Philippines, Biological Sciences Division



“

Esco is standard.

What I like most about Esco Philippines is the line of relevant world class quality products and services they are offering.

”

**GERALDINE B. DAYRIT,
RMT, MSc, PhD**

Department of Medical Microbiology,
College of Public Health,
University of the Philippines Manila



“

Esco is superb.

I highly recommend Esco because of its world class high quality products and excellent service. They provide top of the line equipment at par with global standards to ensure your safety in the laboratory.

”

JOEL C. CORNISTA, MSc, SMPAM
President

Philippine Society for Microbiology, Inc.
(PSM)



“

Esco is solid.

I choose Esco because their laboratory products, marketing, sales team, and customer support are all solid, a.k.a reliable and dependable.

”

GIL M. PENULIAR, PhD
Public Relations Officer

Philippine Society for Microbiology, Inc.
(PSM)



“

Esco is professional.

Esco is a leader in innovations. It keeps the scientific community updated on latest technology and also maintains good relationships and presence in its network. I choose Esco because it is the best out there.

”

JOSE RONILO FLORES

Institute of Biological Sciences,
University of the Philippines,
Los Baños



Business Development Manager Ninoy Cahayon, extends his gratitude to all customers, business partners, and colleagues: "I want to thank my exceptional, hardworking, and talented colleagues, who have been providing excellent service to our customers from the very start and showing their solicitude for the country."



SCAN HERE

"Kasama mo tungo sa kalusugan at kaligtasan ng bawat Pilipino."

(We are with you towards a healthy and safe Filipino community.)

- Esco Philippines, Inc.



NINOY CAHAYON

Business Development Manager
Esco Philippines, Inc.

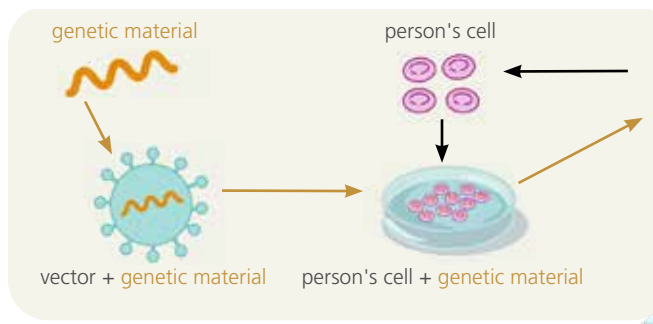
How Does Gene Therapy Work?

Gene Therapy is the introduction of genetic material into a host cell to treat or prevent a disease. It uses sections of DNA (usually genes) to replace the mutated gene and change the expression of protein(s) critical to the development and progress of the disease. In some cases, the whole or part of a gene is defective or missing from birth, or a gene can change or mutate during adult life. Any of these variations can disrupt how proteins are made, which can contribute to health problems or diseases. Scientists can now modify genes or replace faulty genes with healthy ones to potentially treat, cure, or prevent a disease or medical condition.

GENE THERAPY CAN BE PERFORMED BOTH INSIDE AND OUTSIDE OF THE BODY

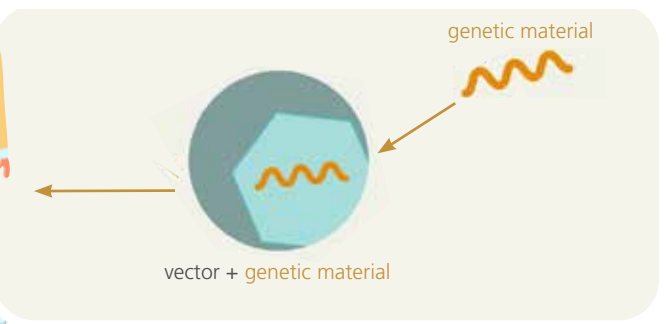
EX VIVO

Ex vivo gene therapy refers to the process where the targeted cells are removed and genetically altered outside of the body before transplanting them back in.

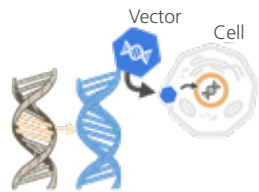


IN VIVO

In vivo gene therapy refers to direct or systemic administration (intravenous) to the patient wherein the targeted cells remain in the body.



THREE TYPES OF GENE-BASED THERAPIES



1 GENE REPLACEMENT This technique gives the cells a new, working copy of the missing or non-working gene.

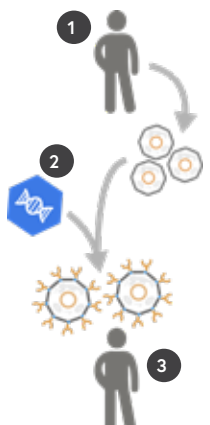
This vector carries the gene into the nucleus of specific cells. Afterward, the gene may become part of the cell's DNA or it may stay separated. It is then used to make the protein that is missing or in short supply. When the vector is no longer needed, it is eliminated from the body.

2 GENE EDITING This technique inserts, removes, changes, or replaces specific pieces of a person's existing DNA.

To treat diseases, scientists are exploring ways to edit pieces of DNA at precise spots along the gene. The goal of gene editing is to change the existing gene and correct mutations where they occur. CRISPR is the most common type of editing. It is used to change DNA sequences and affecting gene function.



3 CAR-T CELL THERAPY CAR-T stands for chimeric antigen receptor (CAR) T-cell therapy. This technique involves changing a person's own immune cells to recognize and fight-off cancer cells inside the body.



1. The T cells are taken from a person's blood.
2. In the laboratory, gene replacement therapy (or gene editing through CRISPR) is used to add a new gene to T cells. This new gene adds a special receptor (CAR) to T cells to make CAR-T cells. CAR-T cells can bind to and attack certain cancer cells.
3. Large numbers of the CAR-T cells are manufactured in the lab and once enough has been produced, the cells are put back into the body to fight certain cancers.

Disclaimer: These three types (transgene expression, CRISPR editing, and CAR-T) could be combined in some methodologies.

WHAT'S THE DIFFERENCE?

	Gene Replacement	Gene Editing	CAR-T Cell Therapy
Places a new, working gene inside the nucleus of the cell	✓	✓	✓
Uses viral vectors to deliver genes into cells	✓	✓	✓
Directly edits DNA to correct its code		✓	
Removes cells from the body for modification		✓	✓
Is being studied in human clinical trials	✓	✓	✓
Is a treatment mechanism with FDA approval	✓		✓

Source: Explore Gene Therapy

Legend: ✓ YES ✓ POSSIBLE

Gene therapy holds the promise to transform medicine and create options for patients who are living with difficult, and even incurable diseases. To produce the gene therapy product in the safest and most effective way, the laboratory should be well-equipped with top-of-the-line equipment. Some key equipment for gene therapy research includes:



BIOLOGICAL SAFETY CABINETS

To provide operator protection during gene editing and to protect cultures and genes from outside contaminants.

- Energy-efficient DC-ECM blower that provides stable airflow to ensure operator safety and aseptic cell culture.
- ULPA filter that is 10x safer than HEPA filter, provides a cleaner ISO Class 3 work zone to prevent gene contamination.
- Large performance envelope which provides the widest margin for operator and gene protection.
- Antimicrobial coating with silver ions that reduces bioburden and prevents cell culture contamination.
- Raised arm rest to comfortably place arms without grille blocking and to preserve air barrier.
- One-piece interior wall with curved corners for easy cleaning of gene therapy processing residues.
- Centered and angled-down controller that is easy to operate from a sitting position.
- UV decontamination to inactivate random nucleic acid contaminants.

CO₂ INCUBATORS

To maintain an optimal environment for the growth of the mammalian cells used in gene therapy.

- Direct heating enables rapid temperature recovery within ≤5 minutes while an air jacket provides isolation against ambient temperature fluctuations.
- Excellent CO₂, humidity, and temperature uniformity using VentiFlow™ forced convection system.
- ULPA filter that is 10x more efficient than HEPA filter, creating an ISO Class 5 chamber within 11 minutes of the door closing.
- Advanced heat-resistant Infrared (IR) CO₂ sensor that is not affected by water vapor, pressure, and high temperature.
- Validated 90°C moist heat decontamination that deactivates normally resistant fungi, bacterial spores, and vegetative cells.
- Easy to remove interior components with rounded corners for quick and thorough surface decontamination.
- User-friendly control panel with large temperature, relative humidity, CO₂, and O₂ display combined with LCD to navigate the menu.

References:

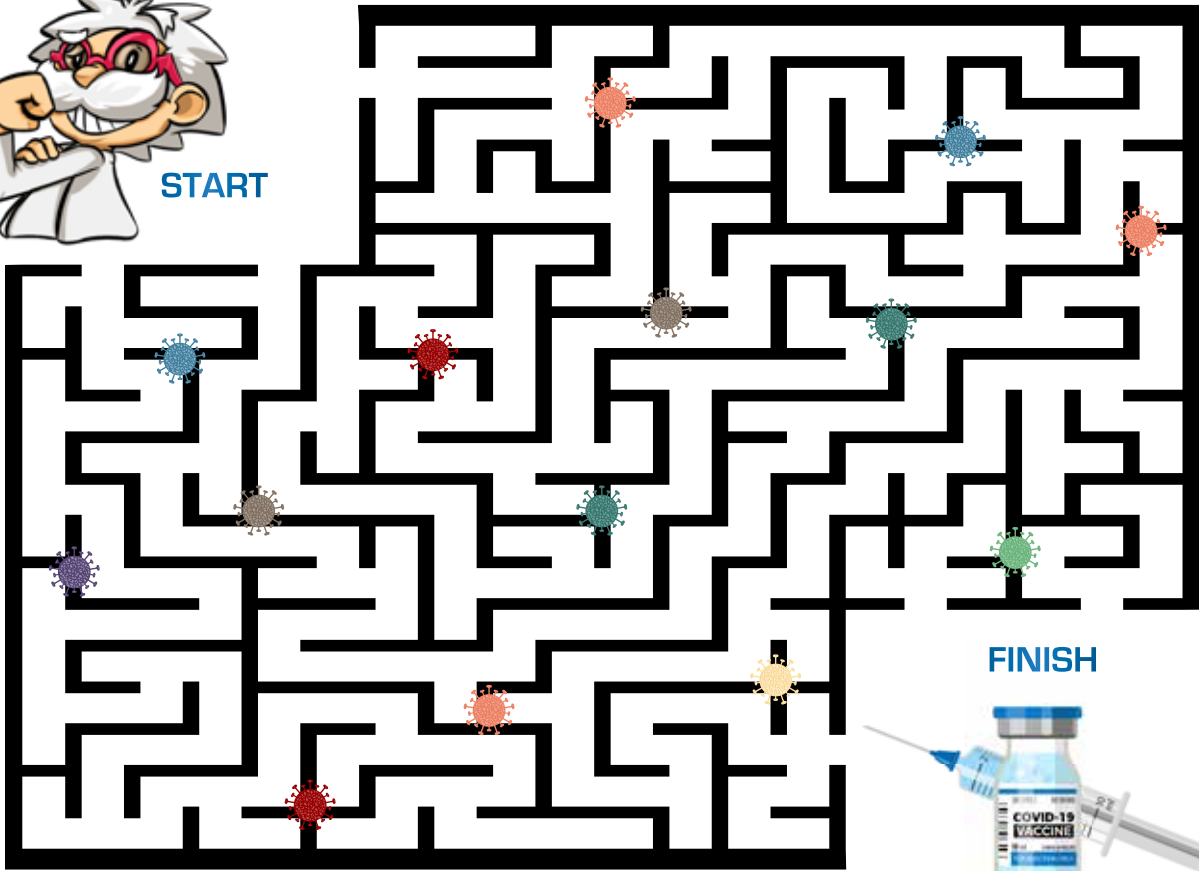
[1] ASGCT – American Society of Gene & Cell Therapy. (n.d.). Gene Therapy Basics. <https://patienteducation.asgct.org/gene-therapy-101/gene-therapy-basics>

[2] Explore Gene Therapy. (n.d.). Get to Know the Different Types of Gene-Based Therapies. <https://www.exploregenetherapy.com/how-gene-replacement-therapy-is-different>

[3] Carfagno, J. July 2019. How Does Gene Therapy Work? Docwire News. <https://www.docwirenews.com/docwire-pick/how-does-gene-therapy-work/>

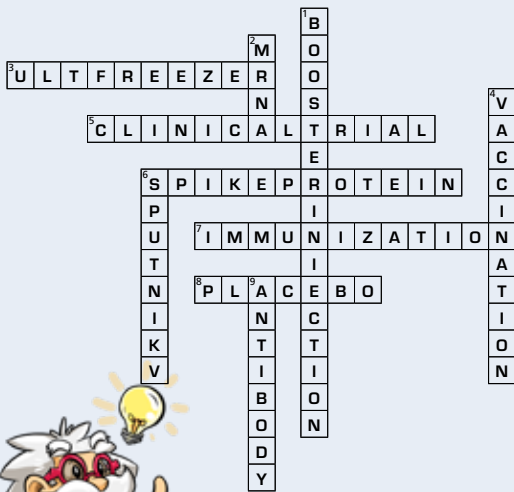
[4] U.S. Food and Drug Administration. December 2017. What Is Gene Therapy? How Does It Work?. www.fda.gov/consumers/consumer-updates/what-gene-therapy-how-does-it-work#:~:text=Gene%20therapy%20can%20be%20used,body%20that%20has%20defective%20cells

Help Dr. Einesco Find the Path to the COVID-19 Vaccine



Answers will be revealed on the next issue.

Here is the solution to last issue's The Search for the COVID-19 Vaccine!



DOWN

1. An added dose of vaccine administered to support the previously injected vaccine dose
2. Moderna and Pfizer/BioNTech vaccine type
4. It is a process of injecting the vaccine into the body
6. A Russian vaccine developed by Gamaleya Research Institute of Epidemiology and Microbiology that uses adenoviral vector
9. A protein produced as a reaction of the body to a foreign substance

ACROSS

3. Provides up to -80°C storage temperature, ideal storage for RNA-based vaccines
5. A study conducted to test the vaccine's efficacy and effects on people
6. A protein that allows SARS-CoV-2 to penetrate host cells and cause infection
7. A process done to develop a resistance to a disease wherein the body is exposed to a weakened type of the virus to trigger an immune response
8. A test substance that doesn't affect the body; an inactive drug