



HiMedia Laboratories:

Providing Sustainable and Affordable
Serum-Free Media for Vaccine Production

- Dr Vishal G Warke

Director, Cell Biology & Immunology

Overview of the Presentation

The presentation has been split into three segments.

Part A



**HiMedia
Introduction**

Part B



**Media Solution for Vaccine
Production by HiMedia**

Part C



**A need for sustainable approach
toward vaccine production**



Part A:

HiMedia Introduction

The HiMedia Brand

A Leading BioSciences Company in the Service of Humankind for **50 years**

Top 3

Amongst Top 3 Global
Powdered Media
Manufacturers

+30000

More than
30000 SKU'S

+365000 T

More than 100 Tons
media produced per
day

Global Presence



- **15 Manufacturing Locations in India**
- Exporting to over 150 countries worldwide
- **335 + Global Channel Partners**
- Offices & Warehouses in India, Germany and USA

State of Art Infrastructure

HiMedia Laboratories – New Headquarters – Thane C40



State of Art Infrastructure



Media Manufacturing Facility



Protein Hydrolysate
Manufacturing Plant



R&D Facility

Upcoming cGMP Facility as per Industry Standard 5.0 (June, 2023)



- Animal free
- Antibiotic free
- QBD integrated process with the help of PAT
- Integrated by IOT & Data Analytics

OUR CAPABILITIES



01

Advanced Technology

- Cryogenic milling
- Automated filling lines
- End to end traceability
- IOT
- In-House developed and controlled setups

02

Manufacturing Capacity

- Powder media:
20,000kg/batch
- Liquid media:
2000L/batch
- 100 tons per day:
36,500 tons/annum

03

Customization Flexibility

- Customized formulations
- Customized packaging

04

Bulk Packing Capacity

- Powder media: In drums
(3kg, 5kg, 10kg, 15kg, 20kg,
25kg & to 50kg)
- Liquid media: In bags
(up to 50L bags)

Our Strengths in Production

Our Quality Checkpoints



Raw Material Testing

Identity, purity and quality

- HPLC Analysis
- FTIR Analysis
- GC
- Potentiometric Analysis
- Amino acid Analyzer
- UV spectrophotometer
- Polarimeter



In process Testing Controls

Critical Process Parameters (CPP)

- Particle size analysis
- Particle size distribution
- Principle Component Analysis
- Homogeneity Analysis



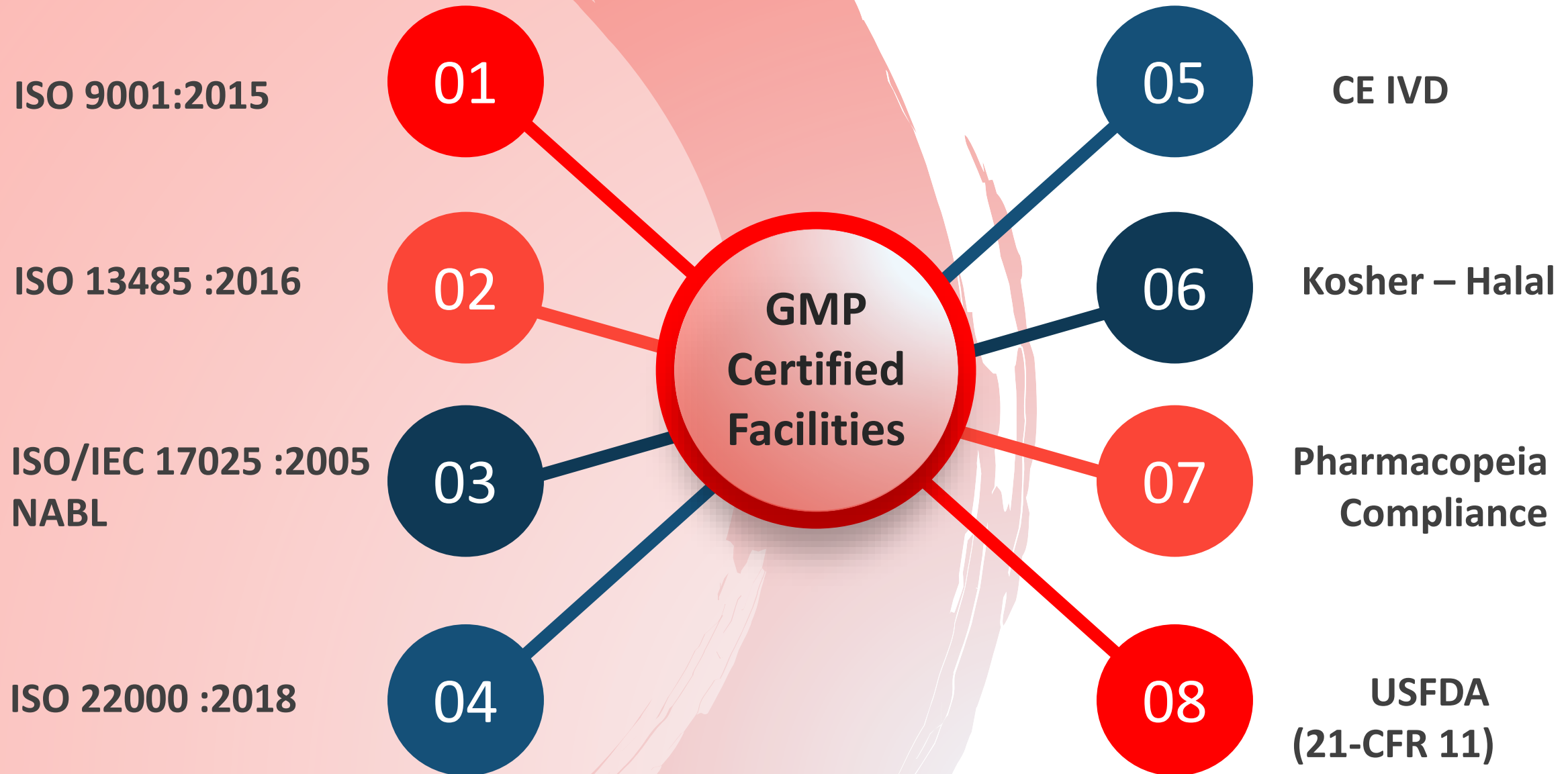
CQA

Finished Product Testing

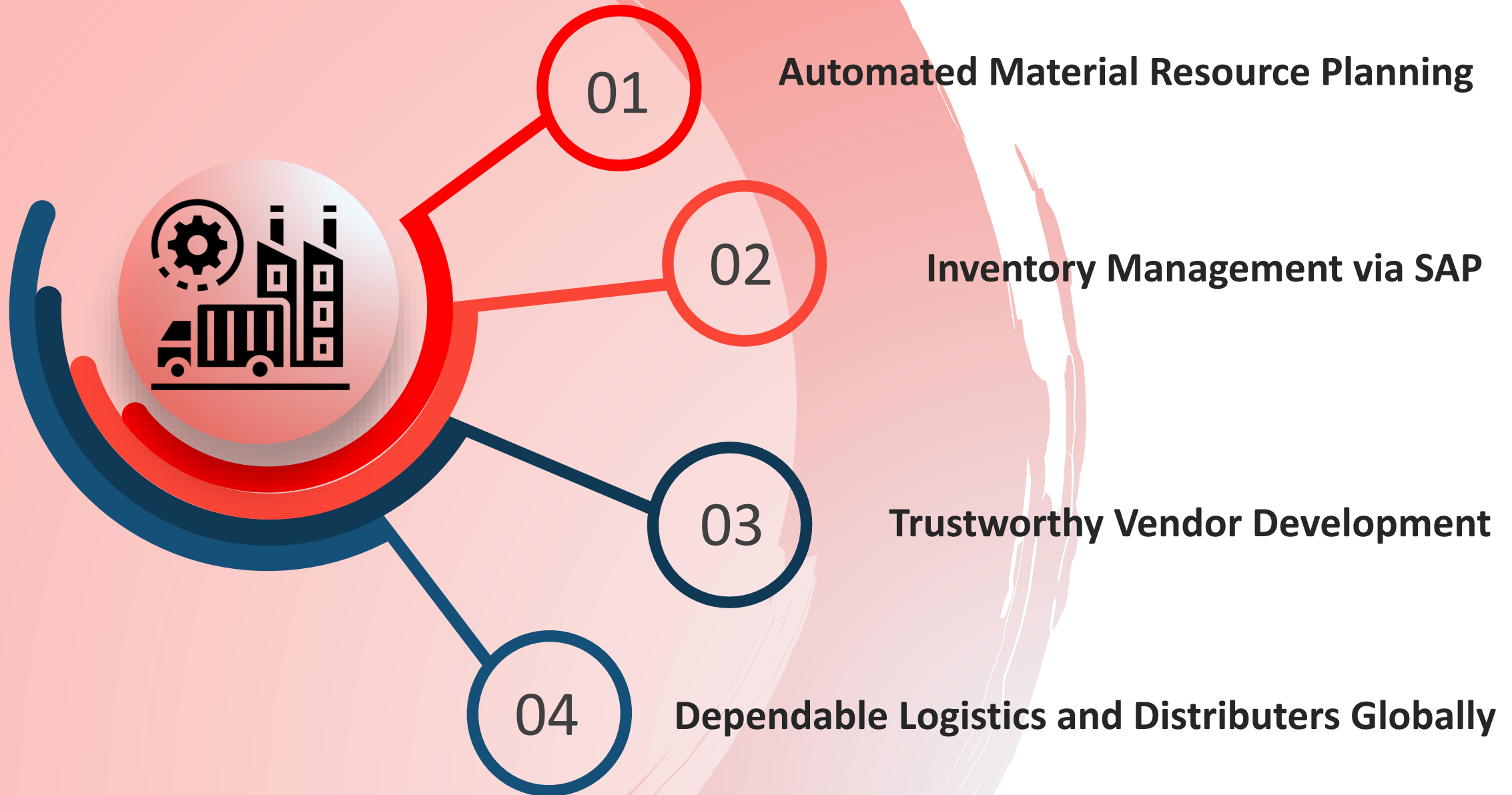
Critical Quality Attributes (CQA)

- Application specific testing
- Serial Subculture
- Endotoxin
- Moisture Analysis

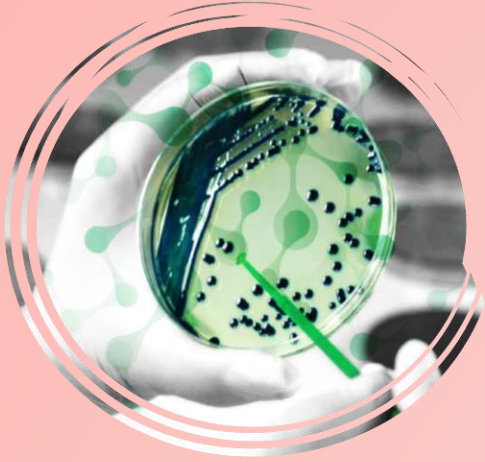
Our Regulatory Compliances



Our Supply Chain Expertise



Our Business Verticals



Microbiology



Cell Biology



Plant Tissue Culture



Molecular Biology



Hydroponics
Soilless Farming



Chemicals &
Biochemicals



Consumables &
Equipment



CELL BIOLOGY DIVISION

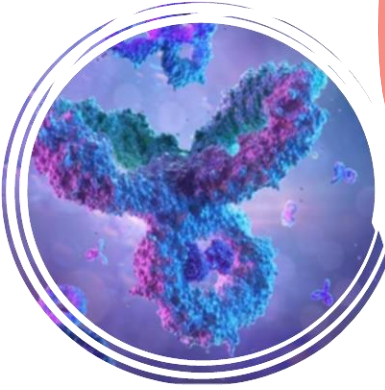
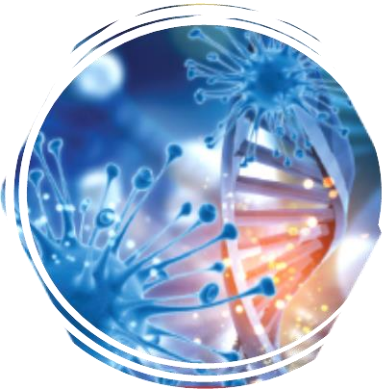


Our Product Range

Media

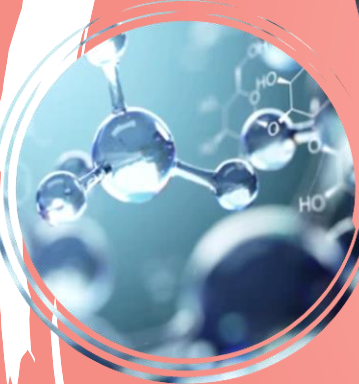
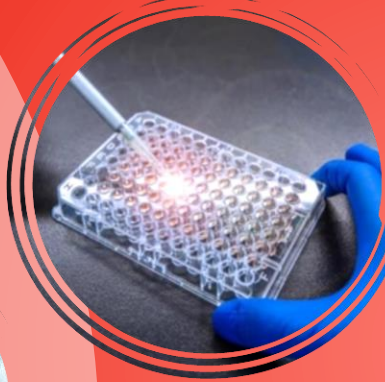


Viral Vaccine Platform

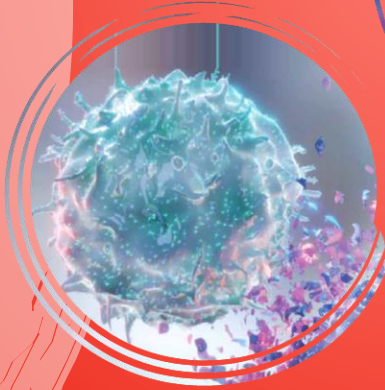


BioProduction Platform

Cell Analysis & Detection Solutions



Cell Culture Tested Chemicals



Stem Cells & Primary Cells



Filtration Solutions



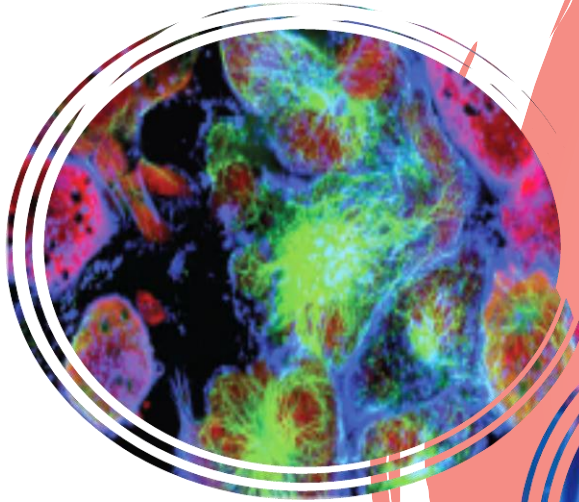
Consumables



Advanced Instruments

Our Services

ATCC (In India)



Skill Development Modules



Custom Service Platform





Part B:
Media Solution for Vaccine
Production by HiMedia

Viral Vaccine Platform

Accelerate Your Viral Vaccine Development with our complete range of vaccine specific media



MEDIA

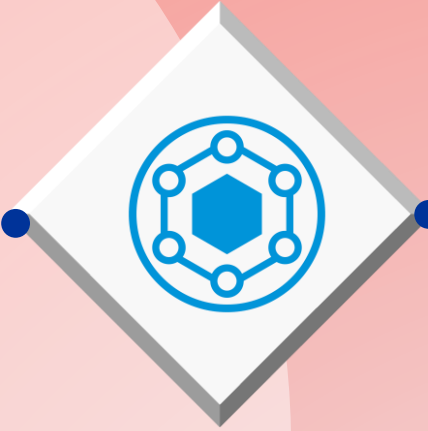
We offer wide range of Serum-free and animal component-free medium for Human Viral Vaccine & FMD Vaccine

Human Viral Vaccine

- CELLin1™
- HEKin1™

FMD Vaccine

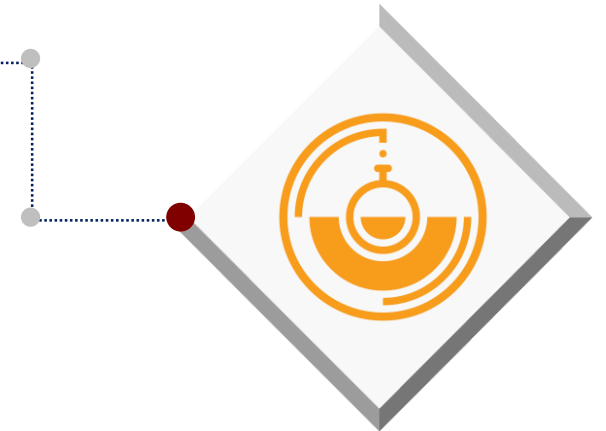
- BHKin1™
- GMEM



CHEMICALS

We offer Multicompendial chemicals that meets Pharmacopeia Testing Specifications.

- Chemicals meeting USP 41-NF 34, EP 9.0, JP 17 and BP 2016 testing specifications
- Complete Technical Dossier available



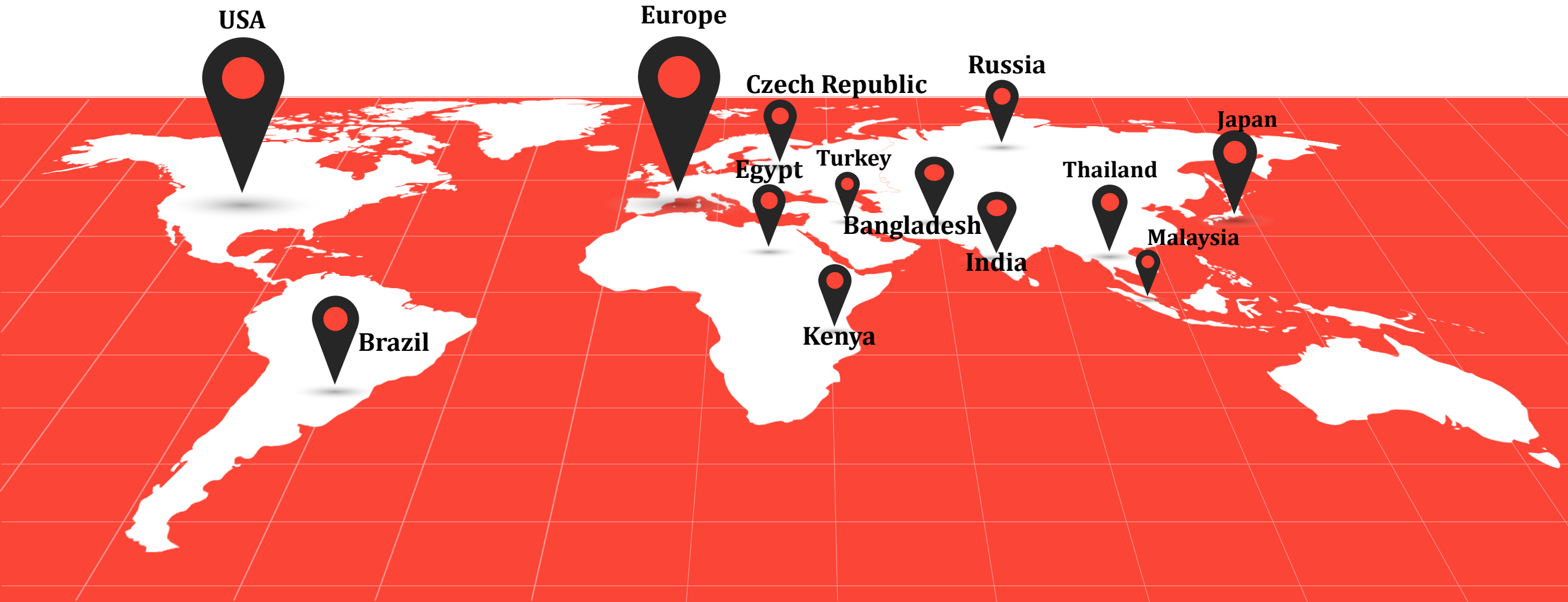
CONSUMABLES

Upstream vaccine development and manufacturing needs with our

- HiFactory
- Roller Bottles
- Erlenmeyer flasks
- PET & PETG
- & others

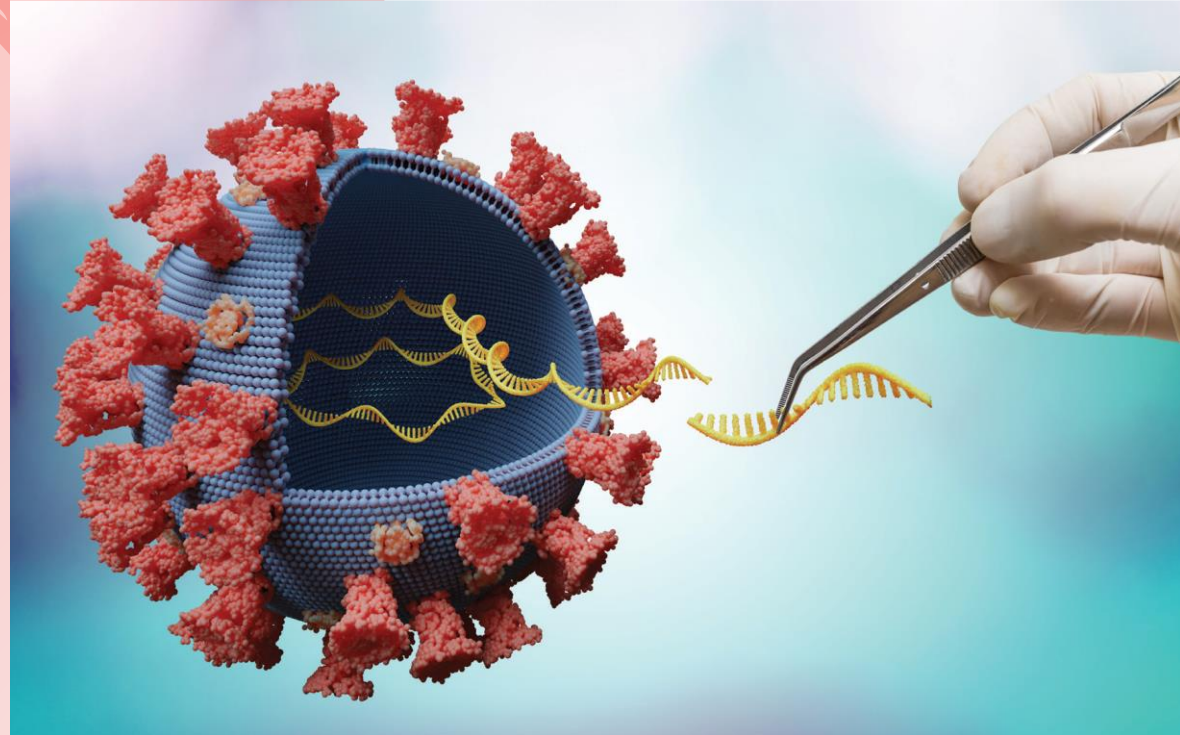
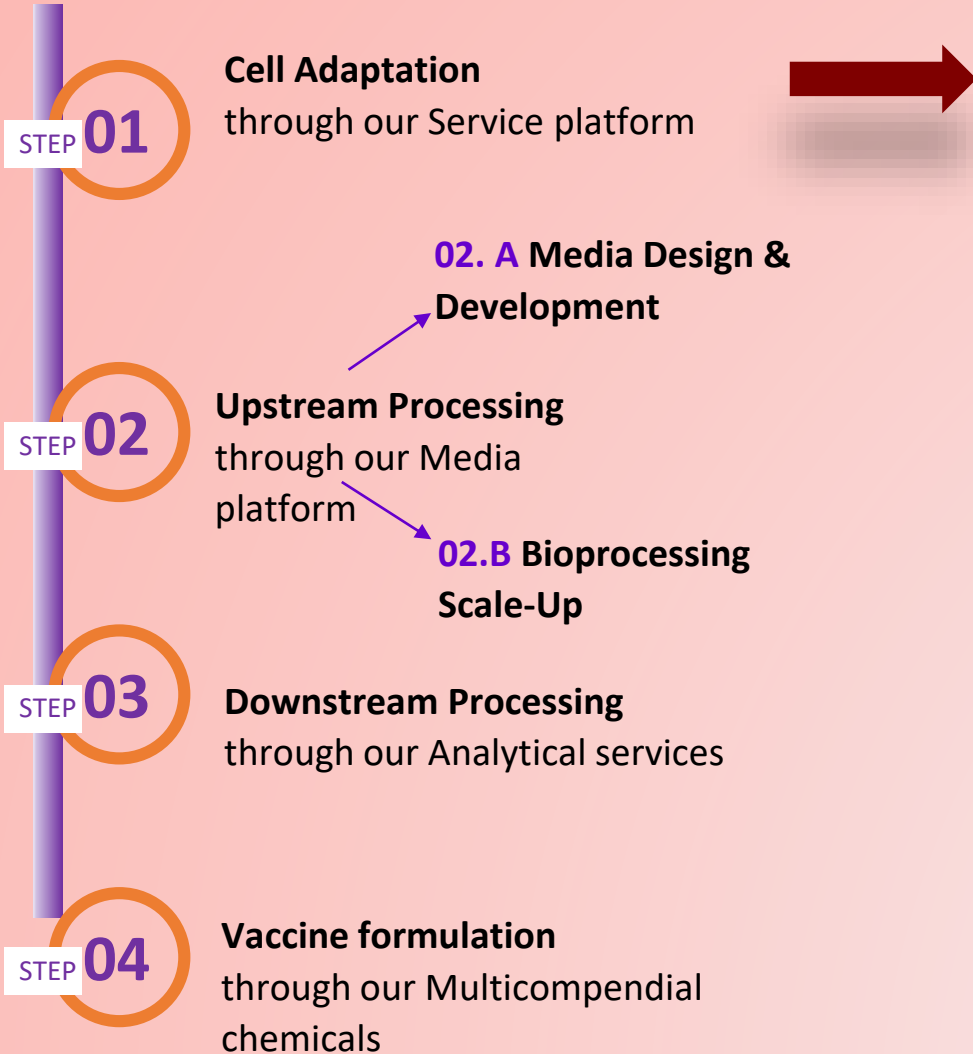
HiMedia – Global Supplier

Key Vaccine Accounts



Assisting you at every step of Viral Vaccine Production

Speeding up your progress while minimizing risk and improving cost effectiveness



Human Viral Vaccine

CELLin1™

Serum free and animal component free medium optimized for production of inactivated COVID-19 vaccines and other viral vaccines using VERO, PK-15, MDCK and MDBK cells

HEKin1™

Serum free and animal component free medium fully optimized for production of HEK-based recombinant COVID-19 vaccine.

FMD Vaccine

BHKin1™

BHKin1™ media is specifically designed to enhance the growth of cells for FMDV vaccine production.

GMEM

GMEM media is designed to enhance the growth of cells for FMDV vaccine production in serum condition.

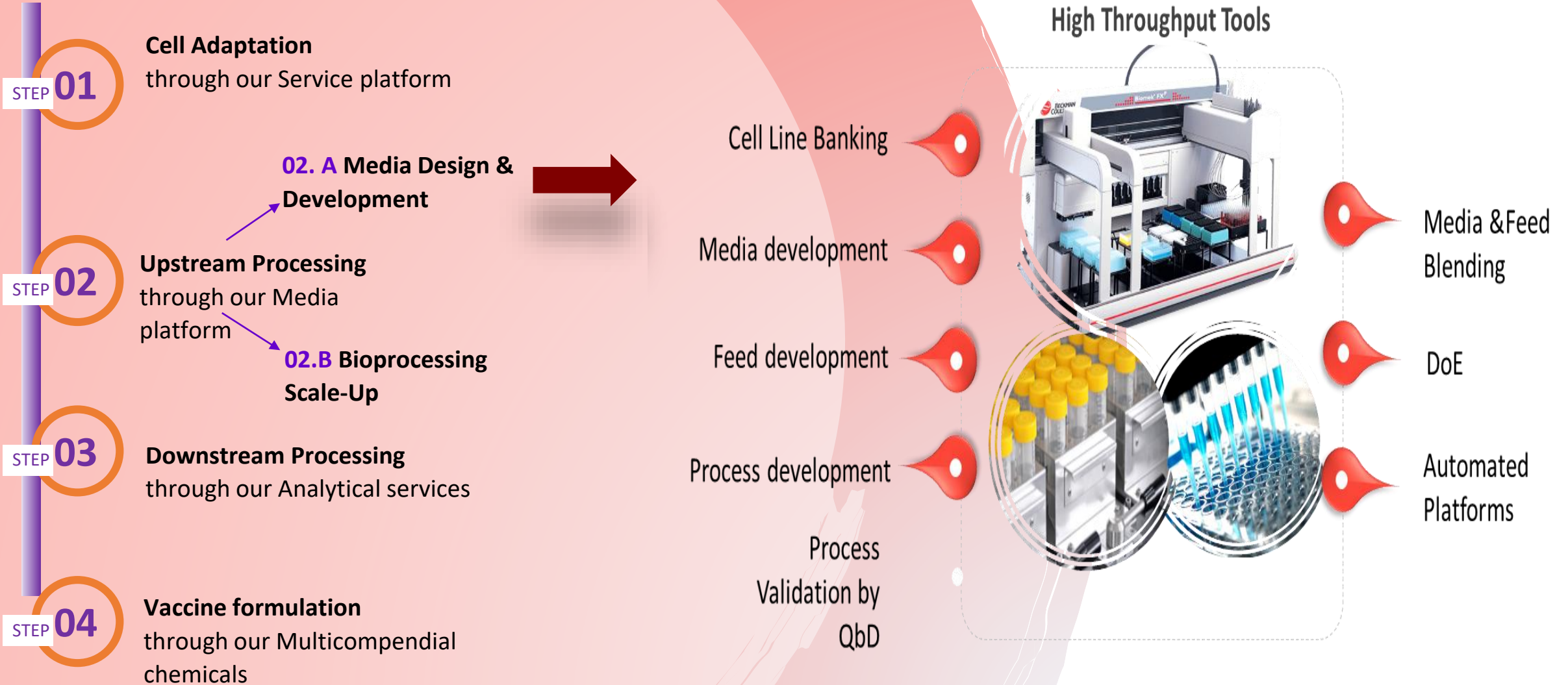
Avian Vaccine

PrimaVac™

Chicken embryo fibroblast medium is widely used for the initial isolation and propagation of viruses and the production of avian vaccines.

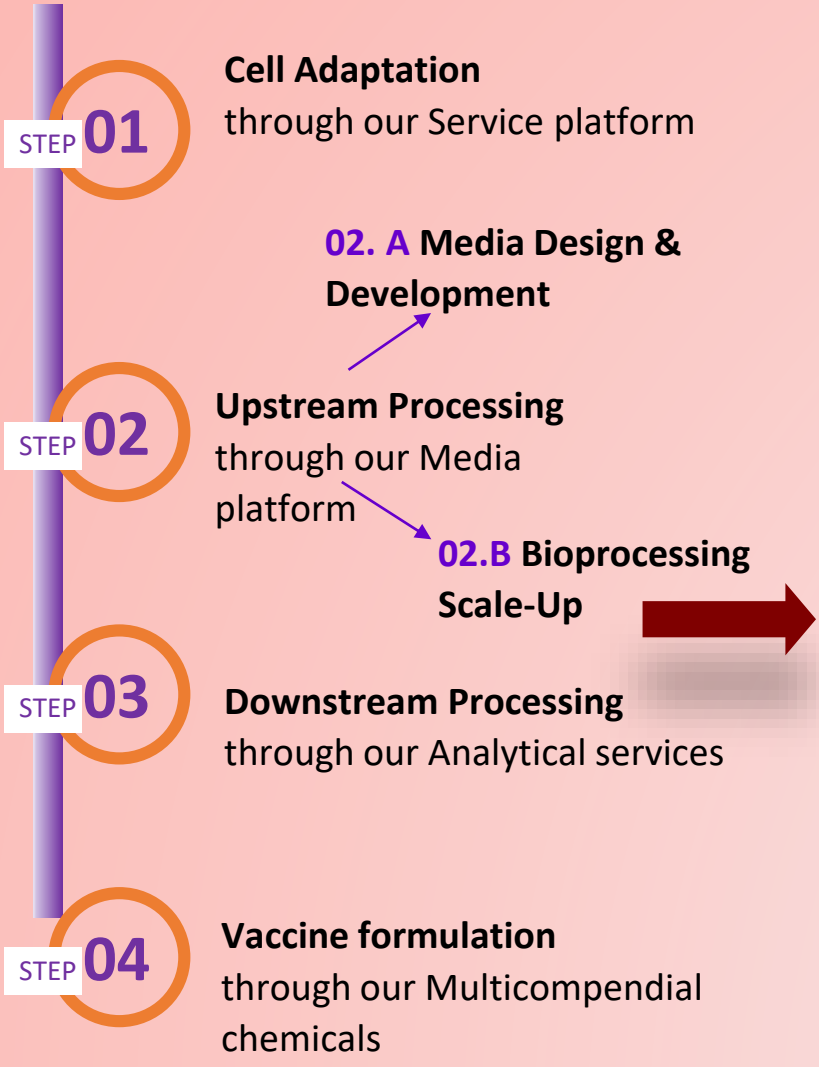
Assisting you at every step of Viral Vaccine Production

Speeding up your progress while minimizing risk and improving cost effectiveness



Assisting you at every step of Viral Vaccine Production

Speeding up your progress while minimizing risk and improving cost effectiveness



Scale I:
High throughput screening (10 – 15ml)

01

Accuracy by Automization
Screening of >1000 media combinations in Bioreactor tubes



Scale II:
Growth Factor Optimization (50ml)

02

Top-Down Approach
Screening of >500 media combinations in shake flasks to identify critical growth factors



Scale III:
Lab scale bioreactors (0.4L- 1L)

03

Process Optimization
Process control at Lab scale bioreactors for productivity



Scale IV:
Complete Process Optimization (10L)

04

Process Validation
Suitability analysis for quantitative and qualitative productivity of the process for commercial application

*Optimized Medium and Feed...
Assurance of high productivity*



Scale V : Pilot Scale Plant in-situ sterilizable Bioreactor System (50L)

Assisting you at every step of Viral Vaccine Production

Speeding up your progress while minimizing risk and improving cost effectiveness

STEP 01

Cell Adaptation
through our Service platform

02. A Media Design & Development

STEP 02

Upstream Processing
through our Media platform

02.B Bioprocessing Scale-Up

STEP 03

Downstream Processing
through our Analytical services

STEP 04

Vaccine formulation
through our Multicompendial chemicals



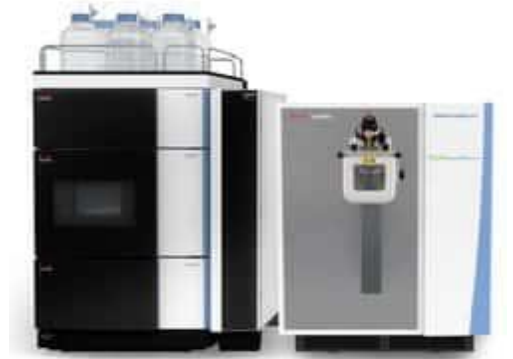
NOVA BioProfile Flex 2 Biochemical Analysers



Sykam Amino Acid Analyser



ÄKTA pilot 600 bench-top chromatography system



Orbitrap 240



Shimadzu UHPLC



Shimadzu ICPMS with Digestor

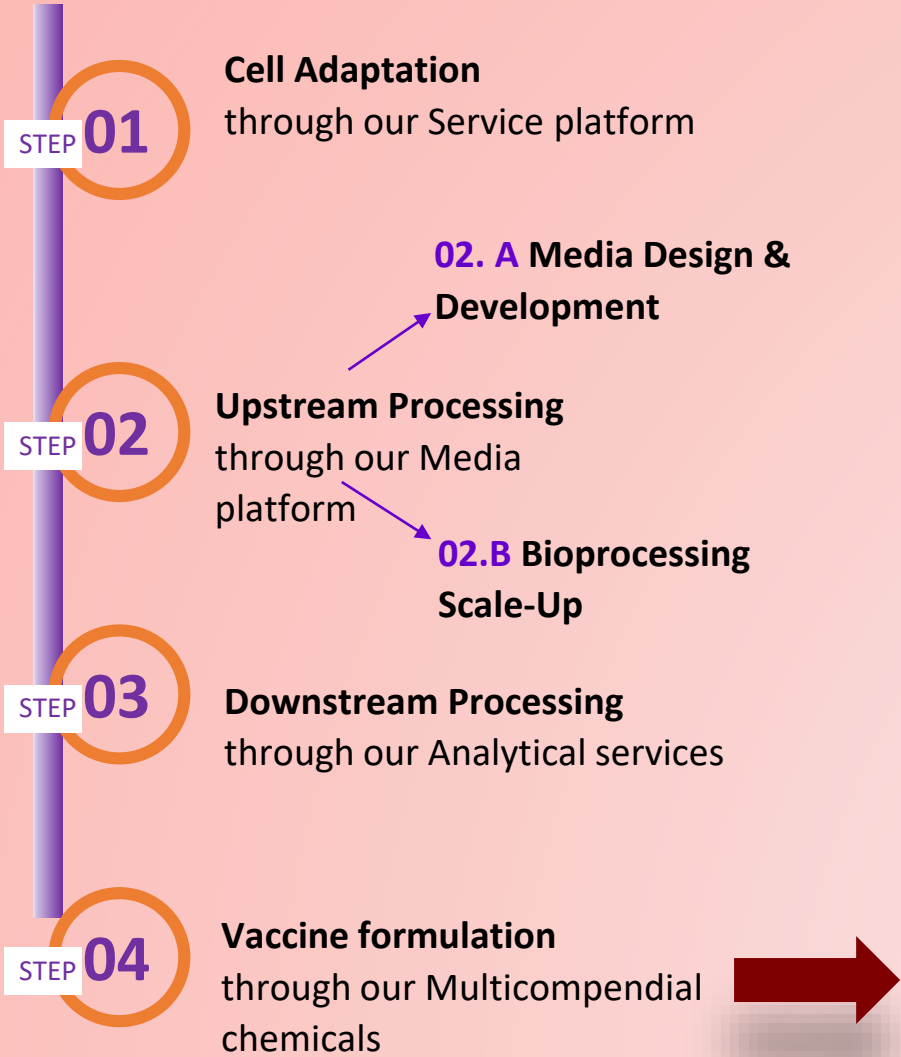


Shimadzu Nexera UHPLC & LCMS 8045

Assisting you at every step of Viral Vaccine Production

Speeding up your progress while minimizing risk and improving cost effectiveness

Multicompendial Biochemicals



Safe
Reliable
Traceable



HiMedia is one of the leading suppliers of a comprehensive range of chemicals & specialty chemicals, which apart from analytical testing undergo cell culture tests to verify their suitability in cell culture applications. We provide a series of Multicompendial Biopharmaceutical grade chemicals.



Amino Acids



Cryopreservatives



Bio Chemicals & Components



Antibiotics



Vitamins



Detergents



Carbohydrates



Biological Buffers

Vaccine
Manufacturing

Biosimilar &
Biomolecular
Production

Excipients

Process
Intermediates

HEKin1™

Media for Human Viral Vaccine Production

HEKin1™ for Recombinant COVID-19 Vaccine Production

Serum free and animal component free medium fully optimized for production of HEK-based recombinant COVID-19 vaccine.



Scalability for use in shake flasks



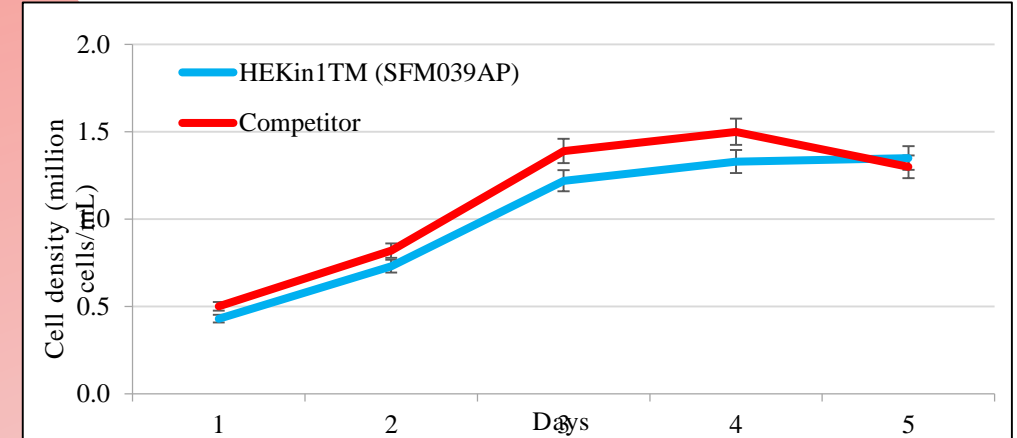
Supports high cell density, culture longevity and increased yield



Save time with simplified purification and downstream processing

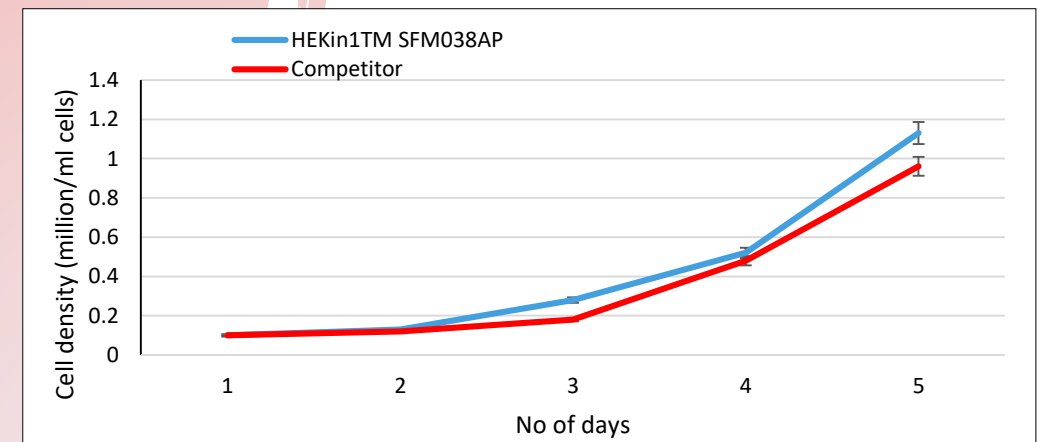
Product Performance

For Suspension Culture



HEK293 cells adapted to suspension culture were inoculated in SFM039AP & Competitor medium, in 50ml bioreactor tubes with the density of 0.5×10^6 cells/ml. Cells were cultured at 37°C, 5% CO₂, for 5 days

For Adherent Culture



HEK293 cells adapted to adherent culture were inoculated in SFM038AP & competitor medium, in surface treated T12.5 flasks. Cells were cultured at 37°C, 5% CO₂, for 5 days.

CELLin1™

Media for Human Viral Vaccine Production

CELLin1™ for Inactivated COVID-19 Vaccine Production

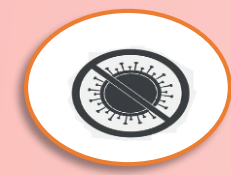
Serum free and animal component free medium optimized for production of inactivated COVID-19 vaccines and other viral vaccines using VERO, PK-15, MDCK and MDBK cells



Completely defined system eliminates variability



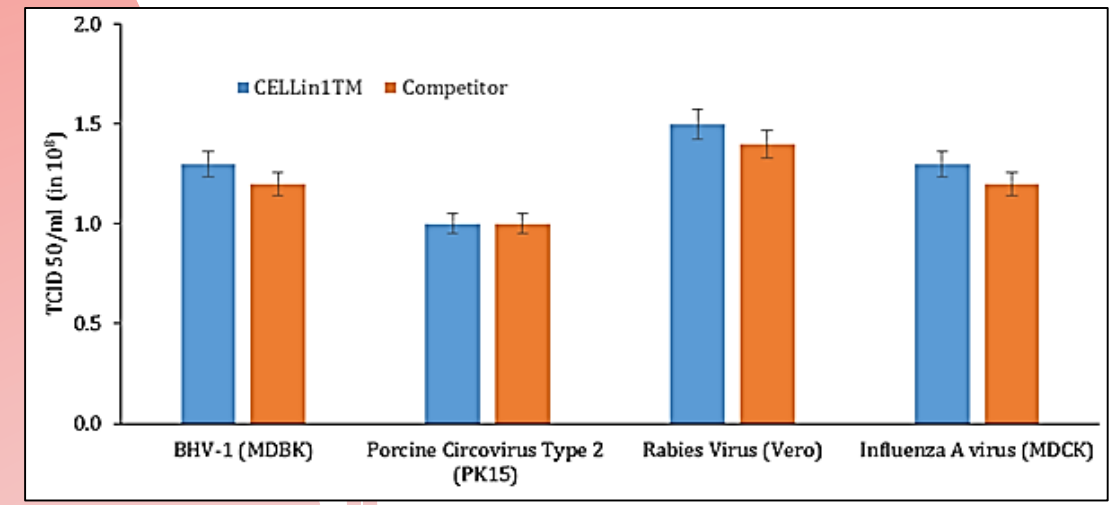
Consistent performance improves reproducibility



Decreased possibility of contamination by adventitious agents

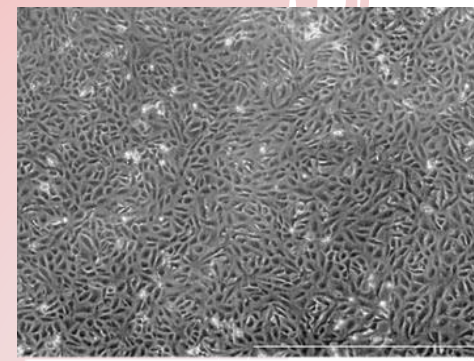
Product Performance

Optimum Virus Productivity

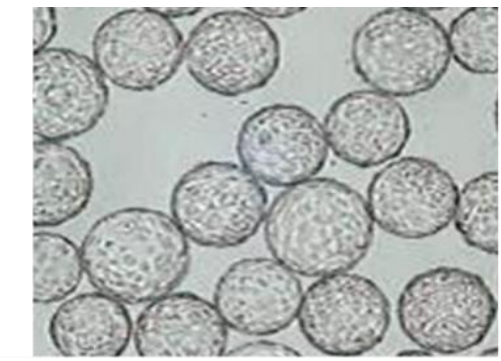


Ability to support 2D and 3D culture expansion

Suitable for production format of your choice



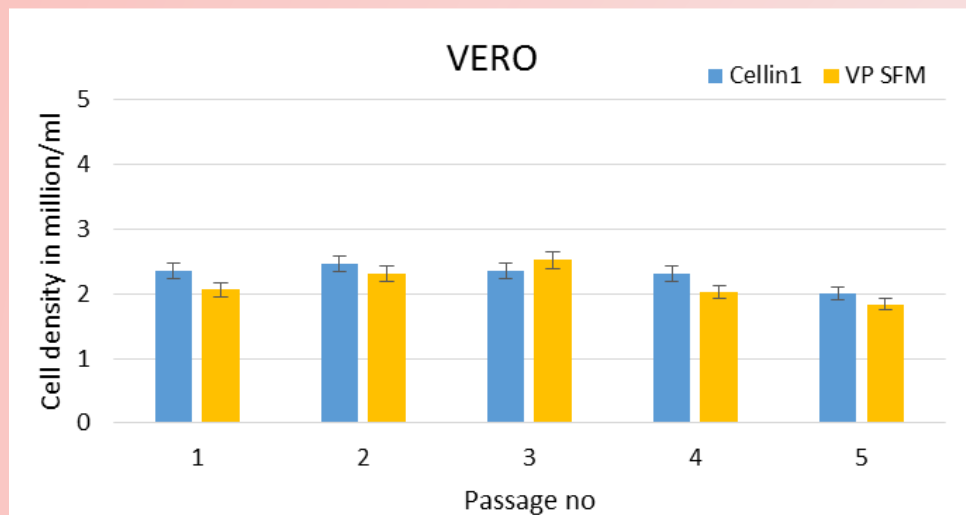
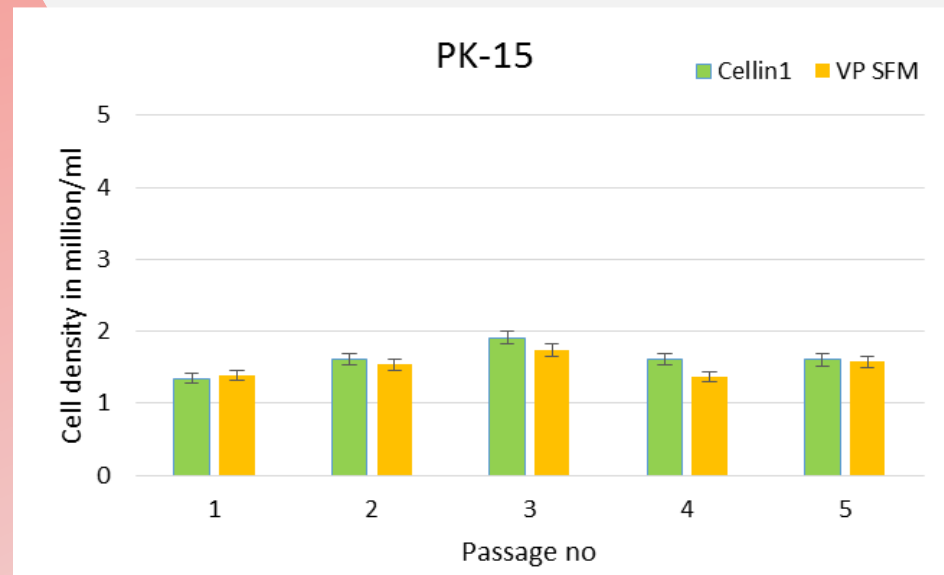
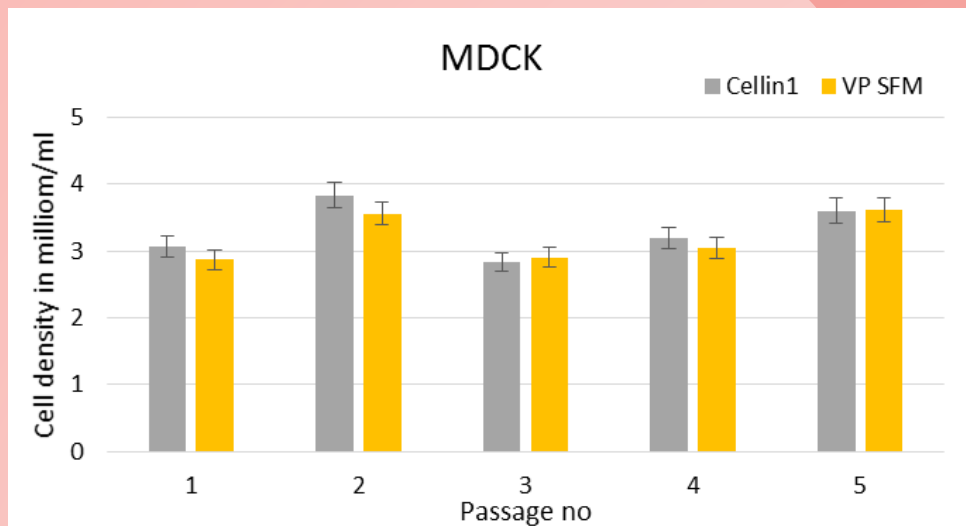
Vero cells grown in HiFactory (TCP204) using CELLin1™ (SFM036AP)
2D Culture



Vero cells grown on Microcarrier beads using CELLin1™ (SFM036AP)
3D Culture

Product Performance

Consistent Cell Growth



MEDIA CUSTOMIZATION

High-performance cell culture media tailored to your needs....

Flexibly create your own HiMedia custom cell culture medium to suit your needs



**Add or remove
components**



**Change a
concentration**



**Switch
packaging**



**Select from cGMP
or non-GMP**



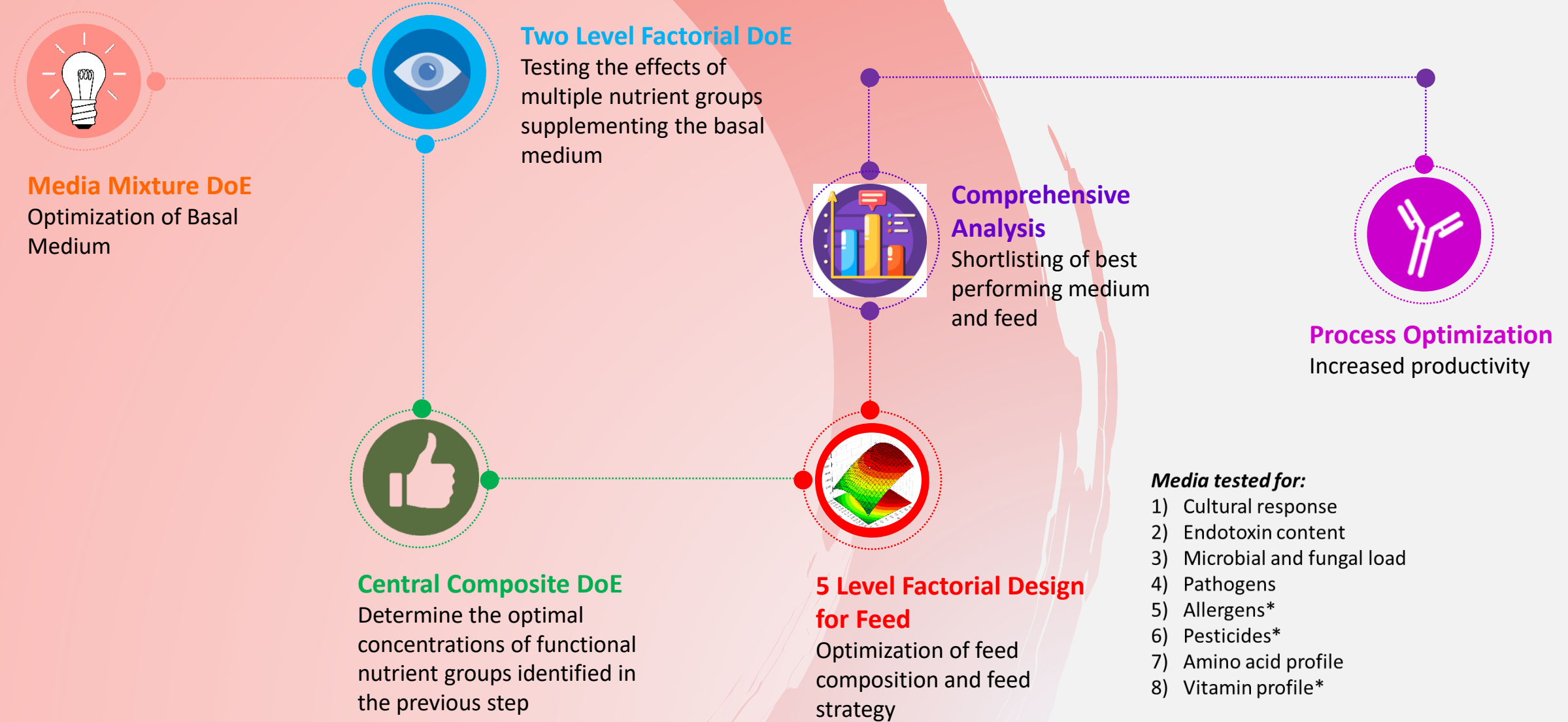
**Choose QC
tests**



**Select and
Compare**

Media Development & Optimization

Design of Experiments (DoE): A Multivariate Data Acquisition Tool



Media tested for:

- 1) Cultural response
- 2) Endotoxin content
- 3) Microbial and fungal load
- 4) Pathogens
- 5) Allergens*
- 6) Pesticides*
- 7) Amino acid profile
- 8) Vitamin profile*

**Method development in process*

Scale Up Optimization



Scale I:
High throughput
screening (10 – 15ml)

01

Accuracy by Automization

Screening of >1000 media combinations in Bioreactor tubes



Scale II:
Growth Factor
Optimization (50ml)

02

Top-Down Approach

Screening of >500 media combinations in shake flasks to identify critical growth factors



Scale III:
Lab scale bioreactors
(0.4L- 1L)

03

Process Optimization

Process control at Lab scale bioreactors for productivity



Scale IV:
Complete Process
Optimization (10L)

04

Process Validation

Suitability analysis for quantitative and qualitative productivity of the process for commercial application

Optimized Medium and Feed...

Assurance of high productivity

Scale Up Optimization

Scale V : Pilot Scale Plant in-situ sterilizable Bioreactor System (50L)



Allied Products For Vaccine Industries

A



Adjuvants

- Aluminum hydroxide
- Aluminum phosphate
- Potassium aluminum sulphate (alum)
- Cetyl trimethyl ammonium
- White mineral oil

P



Preservatives

- Thiomersal
- Phenoxyethanol
- Benzethonium chloride

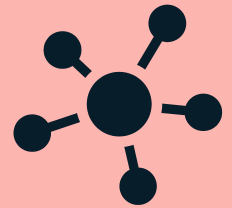
S



Stabilizers

- Sugars e.g. lactose and sucrose
- Amino acids or their salts e.g. glycine
- Monosodium glutamate
- Gelatin Povidone (Plasdone C)
- Polysorbate 80
- Span 80

D



Chemicals for inactivation of Viruses

- Beta-Propiolactone
- Bromoethyl amine hydrobromide
- Formaldehyde sol, 35%
- Glutaraldehyde, 50%

Multicompendial Biochemicals

Biochemicals Meeting Pharmacopoeial
Testing Specifications

Complete Technical Dossier (CTD) Available

Safe
Reliable
Traceable

Quality Matters !

Cell Culture Grade
Chemicals

Multicompendial
Biochemicals

VERSION [0.0]
APRIL 7, 2017

PRODUCT DOSSIER

PRODUCT CODE: TC150
PRODUCT NAME: D-(+)-MANNOSE

HIMEDIA LABORATORIES PVT. LTD.
A-516, SWASTIK DISA BUSINESS PARK, VIA VADHANI INDL
EST., LBS MARG, MUMBAI 400 086, INDIA

HIMEDIA LABORATORIES PVT. LTD.

CONFIDENTIAL

LIST OF DOCUMENTS

Sr. No.	Description
1	Product Dossier Summary
2	Annexure I: Manufacturing Process Flow Chart
3	Annexure II: Product Packing and Labeling Specifications
4	Annexure III: Declarations
5	Annexure IV: Other Certifications
6	Annexure V: Method of Analysis (Chemical Tests)
7	Annexure VI: Method of Analysis (Cell culture test)
8	Specification Sheet
9	Certificate of Analysis (COA)
10	Material Safety Data Sheet (MSDS)
11	Product Stability Data
12	Source Change Intimation

HiMedia is one of the leading suppliers of a comprehensive range of chemicals & specialty chemicals, which apart from analytical testing undergo cell culture tests to verify their suitability in cell culture applications. We provide a series of Multicompendial Biopharmaceutical grade chemicals.



Amino Acids



Cryopreservatives



Bio Chemicals &
Components



Antibiotics



Vitamins



Detergents



Carbohydrates



Biological Buffers

Vaccine
Manufacturing

Biosimilar &
Biomolecular
Production

Excipients

Process
Intermediates

We Assure you

Customized Flexibility

- Customized bulk pack size available

Regulatory Compliance

- TSE-BSE, Allergen, GMO, Metal Catalyst, Melamine, Kahal/Kosher, Residual Solvents(upon request)
- Dossier available

Supply chain

- Warehousing of chemicals for timely dispatch as per your schedule

Manufacturing Controls

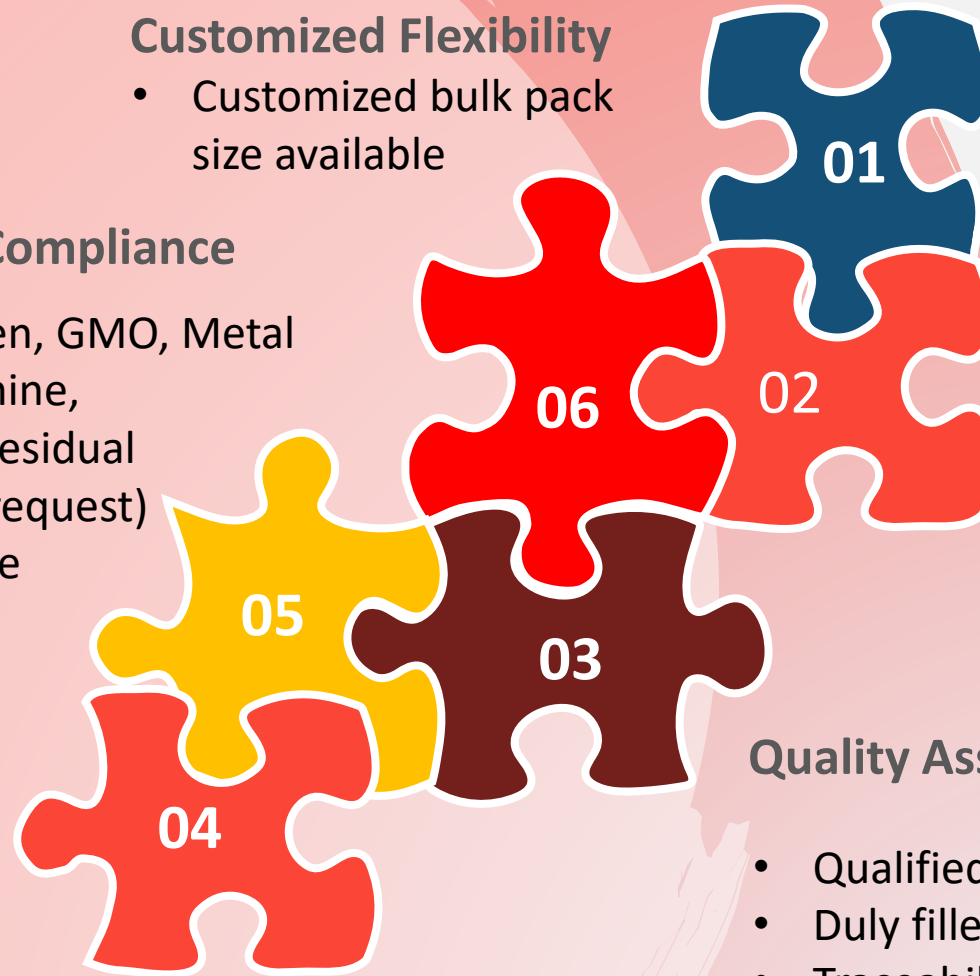
- Manufactured in GMP facilities
- Lot-to-Lot consistency
- Standardized primary and secondary packaging

Quality Control

- Tested as per USP 41-NF 36, EP 9.0, JP 17, BP 2016, and IP 2018 testing specifications.
- Additional Tests- Endotoxin, Bioburden, Microbial Load test.

Quality Assurance

- Qualified Vendors
- Duly filled vendor questionnaire (VQ)
- Traceability from raw material to end products



Our COA as per
the asked
specifications



HiMedia Laboratories Pvt. Ltd.



CERTIFICATE OF ANALYSIS

TC550M
Aluminium hydroxide, dried gel
Meets USP 41-NF 36, EP 9.0, JP 17, BP 2016 and IP 2018 testing specifications

CAS No. : 21645-51-2
Molecular Weight : 121.95
Molecular Formula : AlO_xP
Lot Number : **0000492201**
QC Test Date : 24.07.2021
Expiry Date : 31.07.2025
Store at : $15^\circ - 30^\circ\text{C}$

TEST	SPECIFICATIONS	RESULTS
Appearance (JP, USP)	White, amorphous powder	Complies
Appearance (EP, BP)	White or almost white, amorphous powder.	Complies
Appearance (IP)	A white, light, amorphous powder	Complies
Solubility (JP)	Practically insoluble in water, in ethanol (95) and in diethyl ether. Most of it dissolves in dilute hydrochloric acid and in sodium hydroxide TS	Complies
Solubility (EP, BP)	Practically insoluble in water. It dissolves in dilute mineral acids and in solutions of alkali hydroxides.	Complies
Solubility (USP)	Soluble in dilute mineral acids and in solutions of fixed alkali hydroxides; insoluble in water and in alcohol	Complies
Solubility (IP)	Dissolves in dilute mineral acids and in excess of caustic alkali solutions. Insoluble in water and in ethanol (95%)	Complies
pH (4% in water at 25°C) : (USP,IP)	NMT 10.00	Complies
Identification (JP)	The supernatant liquid responds to the qualitative tests for aluminum salt.	Complies
Identification A, FTIR : (USP)	Matches with the standard pattern	Complies
Identification B (USP)	The solution responds to the tests for Aluminium	Complies
Appearance of solution (BP, EP)	Solution S is not more opalescent than reference suspension II and not more intensely coloured than reference solution GY6	Complies
Acidity or alkalinity (JP)	The supernatant liquid is neutral	Complies
Chloride (JP)	NMT 0.284%	Complies
Chloride (EP, BP)	NMT 1.00%	Complies
Chloride (USP)	NMT 0.85%	Complies
Chloride (IP)	NMT 1.25%	Complies
Sulfate (JP)	NMT 0.480%	Complies

TEST	SPECIFICATIONS	RESULTS
Sulfate (BP, EP)	NMT 1.00%	Complies
Sulfate (USP)	NMT 0.60%	Complies
Sulfate (IP)	NMT 1.20%	Complies
Nitrate (JP)	No brown-colored ring is produced at the zone of contact.	Complies
Heavy metals (JP)	NMT 0.001000%	Nil
Heavy metals (BP, USP,IP)	NMT 0.006000%	Nil
Arsenic (JP,IP)	NMT 0.000500%	Nil
Arsenic (BP, EP)	NMT 0.000400%	Nil
Arsenic (USP)	NMT 0.000800%	Nil
Acid-consuming capacity (JP)	The volume of 0.1M hydrochloric acid VS consumed is not less than 250 mL/g of dried aluminum hydroxide gel.	Complies
Alkaline impurities (BP, EP)	Any pink colour disappears on the addition of 0.3 mL of 0.1M hydrochloric acid	Complies
Acid-neutralizing capacity (USP)	min. 25.0 mEq/g	Complies
Neutralizing capacity (EP, BP,IP)	NMT 35.0 mL of 0.1M sodium hydroxide is required	Complies
Microbial contamination : TAMC (BP, EP)	NMT 1000cfu/gm	Complies
Microbial contamination : TYMC (BP, EP)	NMT 100cfu/gm	Complies
Assay (Zinc acetate Titration, as Al_2O_3) : JP	NLT 50.00%	55.02%
Assay (Zinc sulfate titration, as $\text{Al}(\text{OH})_3$) : USP	NLT 76.50%	78.75%
Assay (EDTA titration, Al_2O_3) : (EP, BP)	47.00% - 60.00%	51.34%
Assay ($\text{Pb}(\text{NO}_3)_2$ Titration) : IP	47.00 - 60.00%	51.34%

Status of the material : **APPROVED**

Neha Saini

Department, Quality Control
Animal Cell Culture

Reena Puri

Department, Quality Assurance
Animal Cell Culture

Harshant Malankar

Manager, Quality Assurance
Chemical Division

This is to certify that this lot passes and conforms to the above mentioned tests and specifications. User must ensure suitability of the product in their application prior to use.

This document has been produced electronically

Complete Technical Datasheet



Technical Datasheet

Aluminium hydroxide, dried gel

Meets USP 41-NF 36, EP 9.0, JP 17 and BP 2016 testing specifications

Product Code: TC550M

Product Description :

Molecular weight: 78
CAS No.: 21645-51-2

Quality Control:

Appearance (JP)

White, amorphous powder

Appearance (EP, BP)

White or almost white, amorphous powder.

Solubility (JP)

Practically insoluble in water, in ethanol (95) and in diethyl ether.

Solubility (EP, BP)

Practically insoluble in water. It dissolves in dilute mineral acids and in solutions of alkali hydroxides.

pH (4% in water at 25°C) : (USP)

NMT 10.00

Identification (JP)

The supernatant liquid responds to the qualitative tests for aluminum salt.

Identification A (USP)

Matches with the standard pattern

Identification B (USP)

The solution responds to the tests for Aluminium

Appearance of solution (BP, EP)

Solution S is not more opalescent than reference suspension II and not more intensely coloured than reference solution GY6

Acidity or alkalinity (JP)

The supernatant liquid is neutral

Chloride (JP)

<= 0.284%

Chloride (EP, BP)

<= 1.00%

Chloride (USP)

<= 0.85%

Sulfate (JP)

<= 0.480%

Sulfate (BP, EP)

<= 1.00%

Sulfate (USP)

<= 0.60%

Nitrate (JP)

No brown-colored ring is produced at the zone of contact.

Heavy metals (JP)

<= 0.0010%

Heavy metals (BP, USP)

<=0.0060%

Arsenic (JP)

<= 0.0005%

Arsenic (BP, EP)

<= 0.0004%

Arsenic (USP)

<= 0.0008%

Acid-consuming capacity (JP)

The volume of 0.1M hydrochloric acid VS consumed is not less than 250 mL/g of dried aluminum hydroxide gel.

Alkaline impurities (BP, EP)

Any pink colour disappears on the addition of 0.3 mL of 0.1M hydrochloric acid

Acid-neutralizing capacity (USP)

Min. 25.0 mEq/g

Neutralizing capacity (EP, BP)

NMT 35.0 mL of 0.1M sodium hydroxide is required

Microbial contamination : TAMC (BP, EP)

NMT 1000.00 cfu/gm

Microbial contamination : TYMC (BP, EP)

NMT 100.00 cfu/gm

Assay (Zinc acetate Titration, as Al₂O₃): JP

NLT 50.00%

Assay (Zinc sulfate titration, as Al(OH)₃: USP

NLT 76.50%

Assay (EDTA titration, Al₂O₃) : EP, BP

47.00 -60.00

Storage and Shelf Life:

Store below 30°C away from bright light.

Shelf life is 48 months.

Use before expiry date given on the product label.

Revision : 01/ 2023

Disclaimer :

User must ensure suitability of the product(s) in their application prior to use. Products conform solely to the information contained in this and other related HiMedia™ publications. The information contained in this publication is based on our research and development work and is to the best of our knowledge true and accurate. HiMedia™ Laboratories Pvt Ltd reserves the right to make changes to specifications and information related to the products at any time. Products are not intended for human or animal or therapeutic use but for laboratory, diagnostic, research or further manufacturing use only, unless otherwise specified. Statements contained herein should not be considered as a warranty of any kind, expressed or implied, and no liability is accepted for infringement of any patents.

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CONSUMABLES

Upstream vaccine development and manufacturing needs with our

HiFactory™

Compact, multi-layered single use systems for easy scale up of cell culture.

- Made up of high clarity polystyrene
- Sterilized by electron beam (E-beam sterilization)
- Thin wall design to reduce edge effect
- Surface treated with vacuum plasma for better cell attachment Reduced risk of contamination
- Available in 4 chamber sizes - 1, 2, 5 and 10



CONSUMABLES

Upstream vaccine development and manufacturing needs with our

Roller Bottles

Large culture vessels used in research and manufacturing where large yield of cell growth and multiplication

- Available as surface-treated for adherent and non-treated for suspension cells with volume capacity 2000ml.
- Available cell growth area for adherent cells is 750cm² ,850cm² & 1900cm²
- Specially designed large knurls on the cap for easy grip
- Sterilized by gamma irradiation
- Non-autoclavable & Non-pyrogenic



CONSUMABLES

Upstream vaccine development and manufacturing needs with our

Erlenmeyer Flasks

Ideal for shaker culture applications, liquid handling and storage.

- Made from optically clear polycarbonate
- Ideal for shaker culture applications
- Flat cap used for a closed liquid tight seal. Easy grip cap is designed to be more ergonomic
- Sterilized by gamma radiation and certified nonpyrogenic

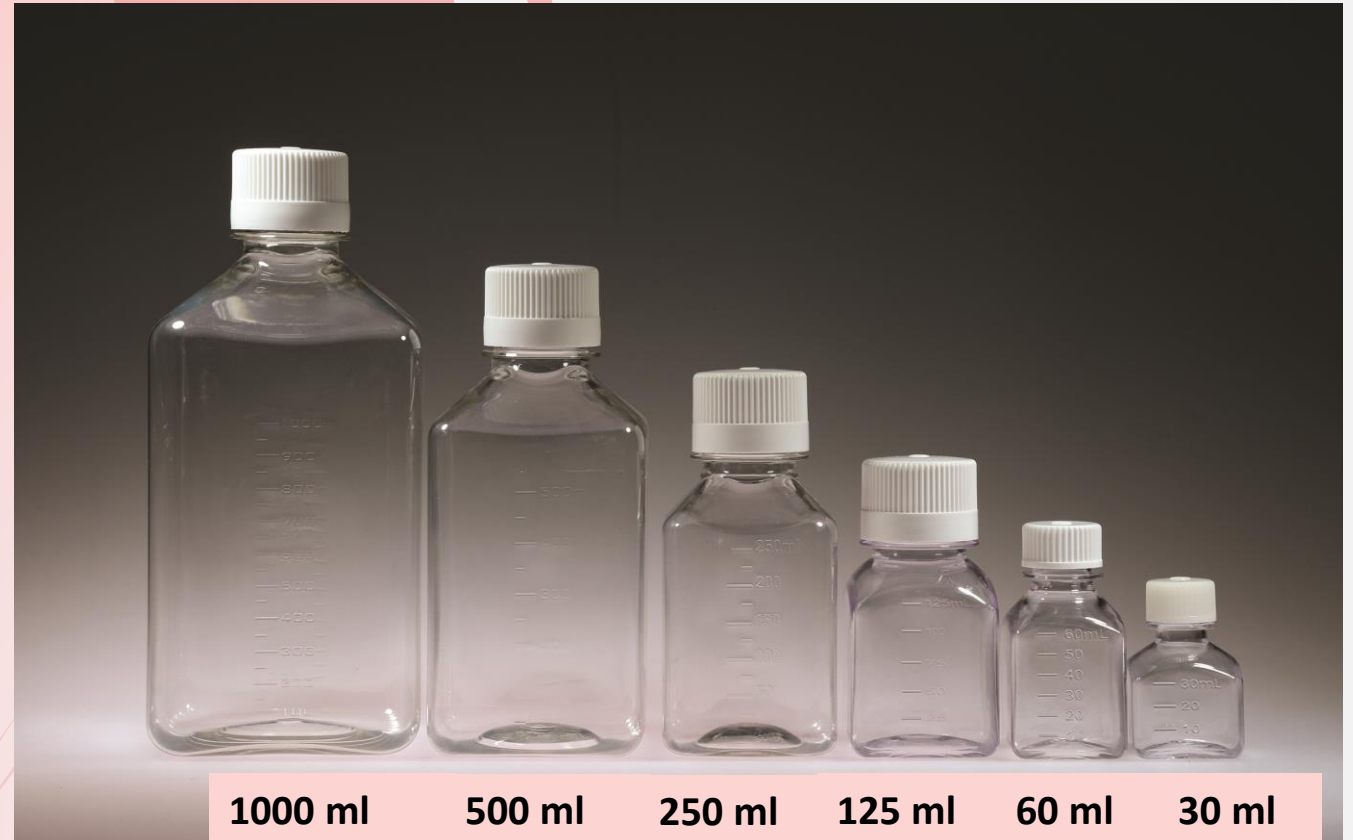


CONSUMABLES

Upstream vaccine development and manufacturing needs with our

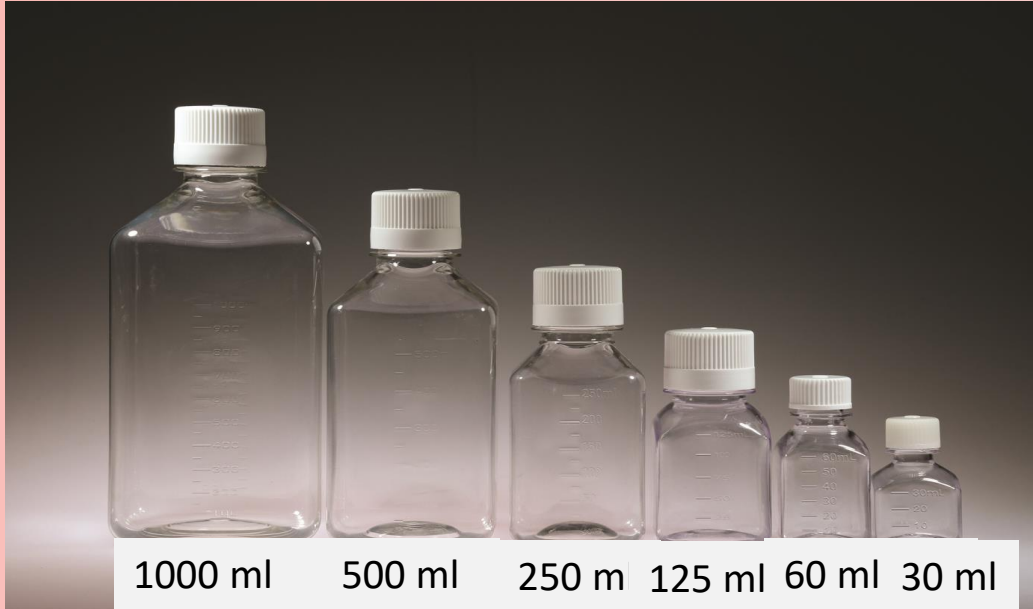
PET & PETG Bottles

All-in-One Solution for Storage of Tissue Culture Media, Sera, Buffers, Reagents & Aqueous solutions



PETG

Made from durable, break-resistant polyethylene terephthalate copolyester, glycol modified (PETG)



Six volume capacities available 30ml, 60ml, 125ml, 250ml, 500ml and 1000ml

As High As...

Available in two different polymers

Polymer A: sustains temp up to **70° C**

Polymer B: sustains temp up to **100° C**

As low as...

Frozen storage down to **-40° C**.

Choose Best. Choose Us.

Because we value your samples just as much as you do

01

STRINGENT INSPECTION AND TESTING

- ASTM standard D4991-07'
- Sterility Assurance Level (SAL) of 10-6

02

LEAK-PROOF & LEACH-PROOF SYSTEM

- Free (ADCF) virgin resins

03

INDIVIDUALLY PACKED

- For easier identification and easy opening linear tear.
- Applicable to product code: TCP269I, TCP270I, TCP271I and TCP272I.

04

VOLUME CAPACITY

- **PET:** Four volume capacities available 125ml, 250ml, 500ml and 1000ml
- **PETG:** Six volume capacities available 30ml, 60ml, 125ml, 250ml, 500ml and 1000ml

05

STACKABILITY

- Shrink-wrapped tray pack allows maximum storage and shipping space.





Part C:

A need for sustainable approach
toward vaccine production

Introduction

During the ongoing COVID-19 pandemic, the demand for vaccines has skyrocketed, and the pressure to produce them quickly and efficiently has never been higher.

However, the traditional methods of vaccine production using serum is **UNSUSTAINABLE**:

High Price

Serum can be expensive, making it challenging to scale up production. The supply of FBS can be inconsistent, and there are concerns about the traceability of the serum.

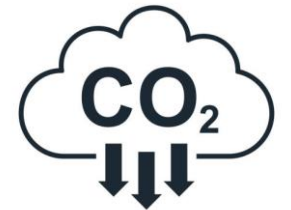


Pollution and greenhouse gas emissions

Serum production generates significant waste, including animal waste, wastewater, and packaging waste.

Unsustainable

- Carbon footprints
- Water footprints
- Energy footprints



Quality Variability

Significant batch-to-batch variation exists because serum is a complex mixture of an undefined composition of biomolecules.



Unethical

The production of serum involves cruelty to animals, such as cows, horses, and sheep.



Serum-free media and its potential benefits for vaccine production

Serum-free media is a type of cell culture media that is used to grow and maintain cells in the absence of serum.

Reduced risk of contamination



SFM eliminates the risk of viruses, bacteria, prions, and other agents,

Ecological & Friendly to Mother Earth

Reduce the production of unwanted by-products that can affect the quality of the final vaccine product



Better reproducibility & Product Quality

SFM provides a

- More consistent
- Reproducible environment for cell culture, leading to more consistent vaccine production



Cost-effective

Though seemingly expensive than traditional serum-containing media, the cost savings from reduced contamination and improved reproducibility can make it a more cost-effective option in the long run.



**Your Reliable, Dependable, Affordable
partner to meet your complete human and
animal vaccine needs**

**Thank
You**



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