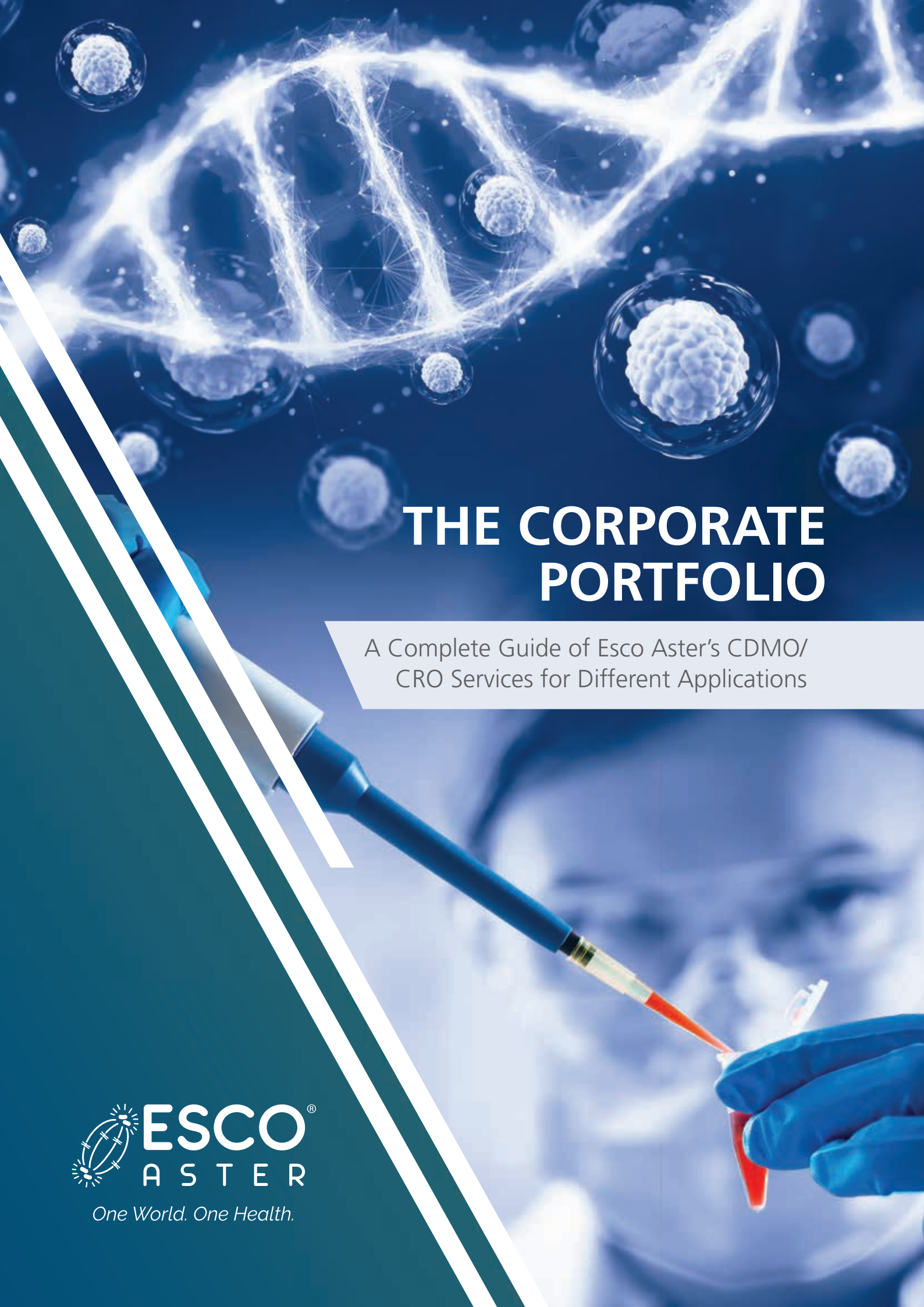


THE CORPORATE PORTFOLIO

A Complete Guide of Esco Aster's CDMO/ CRO Services for Different Applications

ESCO® ASTER

One World. One Health.

ABOUT US

Esco Aster is a vertically-integrated contract research (CRO), contract development and manufacturing organization (CDMO), and a subsidiary of Esco Life Sciences group which has a rich 41-year history in life sciences, medical, and healthcare.

From Early-stage Discovery to Commercial Development

1978 - Esco Life Sciences Group was established.

2002 - Started providing process development (PD) services to clients.

2008 - Converted bench processes into closed systems.

2013 - Broadened Tide Motion applications from vaccines to biotech, biologics, and therapeutics.

2017 to PRESENT - An independent subsidiary from Esco Life Sciences Group and continuously bioengineers new Tide Motion platforms for different applications with Esco solutions or protocols.

Being the first mover in scalable biomanufacturing platforms and services

We are founded and deeply rooted by scientists enabling fellow scientists to translate their benchwork into life-saving diagnostics, medicines, therapies, cosmeceuticals, and cellular agriculture, at affordable prices for self-sufficiency of the country.

We make complex manufacturing simple via our proprietary best-in-class continuous manufacturing platforms providing a reliable and linearly scalable outcome with a track record of being used in 7 commercial human and animal health vaccines.

We continuously invest in meeting unmet clinical needs by unlocking manufacturing bottlenecks for current and new platform modalities.

Together, we are working on an interconnected one health approach to bring your next molecule into the clinic and life.

Join us for the world we are making redefining food and medicine for the current and future generations to come.

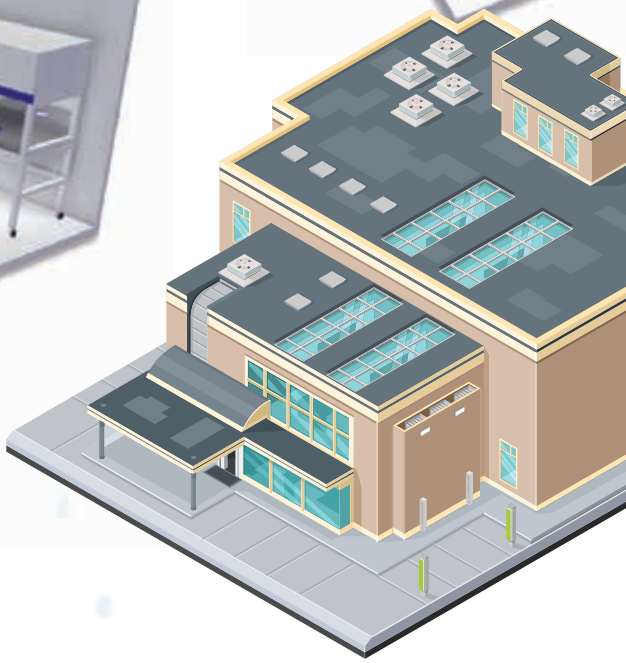
Esco Aster.
One World. One Health.

ESCO ASTER
MISSION AND VISION

To be the leading cGMP CDMO globally in adherent bioprocessing/ continuous processing using flow chemistry utilizing our own in-house proprietary/patented platforms and accelerate the discovery to delivery process of vaccines (human, animal, cancer), oncolytic viruses, cell/gene therapy, tissue engineering, mabs/recombinant proteins, diagnostics, small molecules, cosmeceuticals, peptides, biopolymers, bioscaffolds, and cosmetics/fast-moving consumer goods (FMCG).

As a Contract Research (CRO) and Contract Development Manufacturing Organization (CDMO) in Singapore, with presence in the United States - Esco Aster has forged closer networks with Singapore Health Sciences Authority (HSA), National Medical Products Administration of China (NMPA), Indonesia National Agency for Food and Drug Control/Badan Pengawas Obat dan Makanan (BPOM), Korea, Taiwan and US Food and Drug Administration (FDA), UK Medicines and Healthcare Products Regulatory Agency (MHRA) and Pharmaceutical Inspection Co-operation Scheme (PIC/S) global alliance.

BelloCell™ is used in laboratory scale production of adherent cells. The BelloCell™ bottles are single-use which is essential when culturing viruses for vaccine production or other biologics. This system is placed inside a CO_2 incubator for oxygen transfer, pH control and temperature control.



TideXcell® is a pilot or production scale bioreactor that offers an advanced process control over BelloCell™. This system has its own incubator with integrated HEPA and VOC filters and can be controlled and monitored using the 21 CFR part 11 compliant Siemens HMI/PLC.

Batch Mode in TideXcell®

Perfusion Mode in TideXcell®

Batch System

Useful for batch and semi-batch operation where process components are easily traceable

Continuous System

Useful for continuous operation where process components are easily traceable

BelloCell™ is a single-use benchtop bioreactor perfect for culturing high-density yield cells. It is also used as a seeding platform before scaling up to TideXcell®. This system allows the seeding of uniform concentration of cells to BioNOC™ II (a macrocarrier), while controlling the physiological conditions in the cell culture medium.

Downstream Processing Formulation and Filling

Vial QC and Sterility Testing

Cold Storage

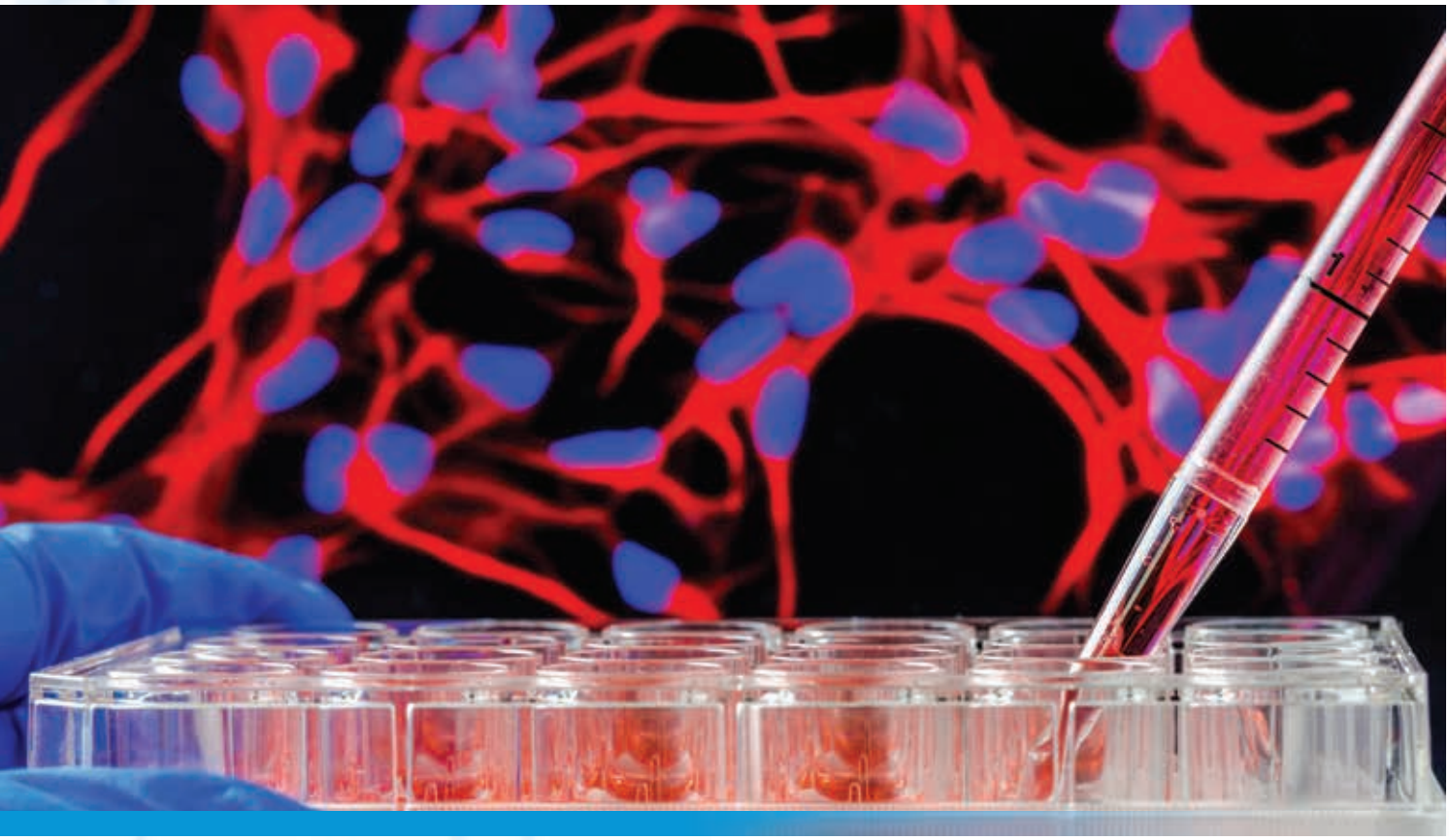
The TideXcell® Harvesting System (TXLHS) utilizes the same conventional cell harvest concept by enzymatic treatment that could digest and detach cells from attached substrates.

DISCOVERY
FROM PRECLINICAL TO CLINICAL

As a full-range services partner, we support our global clients from early-stage discovery to market approvals of clients' products.

DEVELOPMENT
FROM CLINICAL TO COMMERCIAL

As a multicultural high-performing organization with established strong credibility, we have a stable operational model that delivers optimal level of performance whilst ensuring consistent cGMP manufacturing of safe, cost-effective, and reliable products.



CELL LINE CREATION SERVICES

Producer cell lines are the key components for any scientific research and are widely utilized for vaccine manufacturing, antibody production, testing drug metabolism and cytotoxicity, genetics, synthesis of biological compounds, and many more.

Cell lines can be created from immortal cells such as CHO, HEK 293, SF-9/SF-21, with necessary vectors to transform them into high producing clones or from primary tissue (healthy and tumor) / primary source (e.g., fibroblast, blood) of human or animal origin.

Our Process

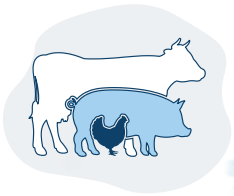
Esco Aster, internally, via our collaborator has VERO MCBs/WCBs and Avian cell line from quails with FTO except as used for poxviruses.

We will otherwise create cell lines from global cell banks such as ATCC / ECACC, clients' RCBs, industrial biotech company cell lines or from academic/research institutes

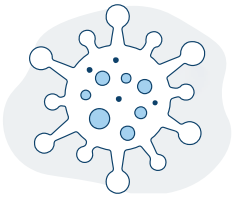
Our Services

Esco Aster provides Cell Line Creation Services to ensure the best clone(s) or stem cells can be used for your research, tissue engineering, virus, cell therapy, extracellular vesicles, and cellular agriculture. We specialize, and are best-in-class, in accelerated adherent cell line creation and development in conjunction with our adherent cell banking, characterization, testing and storage services. Our services are also employed in the following areas:

Human Donor Sourcing

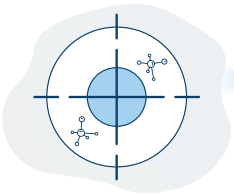


Animal Donor Sourcing

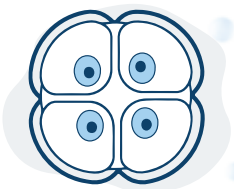


Stable Cell Lines (mAbs/Viral Vector)

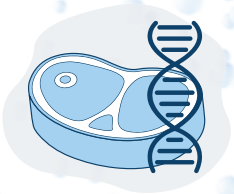
Allogenic and Autologous Cell Therapy (MSCs/Fibroblasts)



Immunotherapy



Induced Pluripotent Stem Cell (IPSCs)

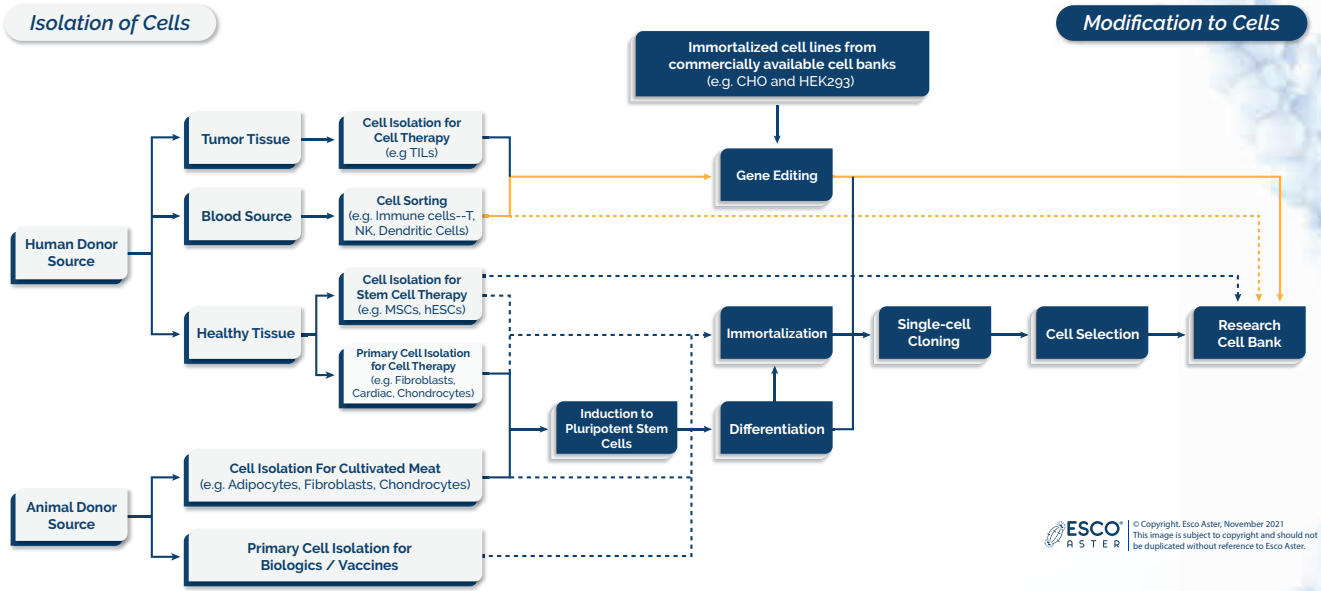


Cultivated Meat

Our Cell Line Creation Workflow

Workflow for Cell Line Creation:
Starting from Tissue Banking Activities

Workflow for Cell Line Creation:
Starting from Cell Source



STRAIN ENGINEERING/DEVELOPMENT SERVICES

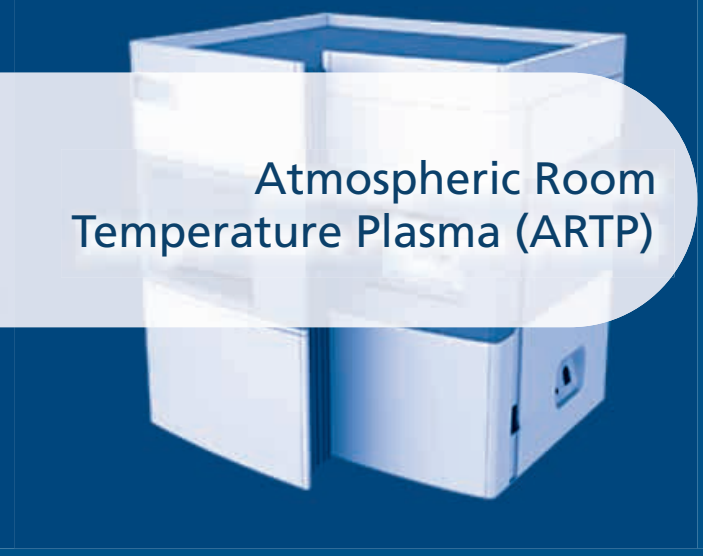
The expression of active and high-quality recombinant proteins, single-domain antibodies (nanobodies, Jotbodies) milk proteins, human milk oligosaccharides, plasmids, enzymes, and other biopharmaceuticals is a crucial step in biopharmaceutical drug development, where activity and level of expression of proteins largely depend on the characteristics of the cell factory, the microbial strains.

Therefore, there is an inherent need to screen as many variables as rapidly as feasible to find an optimal and robust microbial strain to achieve a higher level of expression or biomass yield.

Our Advantage

Utilizing **Atmospheric Room Temperature Plasma (ARTP)** technology which uses low-pressure plasma to randomly mutate the bases in DNA offers the advantage of high mutation rates, shorter processing time and environmental friendliness compared to other mutagenesis approaches like UV light, α-rays, β-rays, γ-rays, X-rays, and chemical mutagenesis.

On the other hand, the **Microbial Microdroplet Culture (MMC)** system is designed to rapidly screen thousands of strains to identify the optimal production strain with improved phenotypes.



Atmospheric Room Temperature Plasma (ARTP)

Atmospheric room-temperature plasma (ARTP) has been successfully developed as a helpful mutation tool for mutation breeding of various microbes, plants, and animals by genetic alterations. It is equipped with the traditional source of low-pressure gas discharge plasma with low-temperature plasma jet and uniform discharge and high chemical activity particle concentration characteristics.

The instrument has a high mutation rate, compact structure, easy operation, high safety and fast mutagenesis. A mutagenesis operation can obtain a large-capacity mutagenesis library that significantly increases the intensity and capacity of strain mutation. The combination of ARTP technology enables rapid and efficient evolutionary breeding of organisms.

Microbial Microdroplet Culture (MMC)

The microbial fermentation process in conventional techniques are typically labour-intensive, low throughput, and poorly parallelized. Therefore, the methods are considered inefficient for optimization. The development of automated, modular microbial cell micro-cultivation systems, mainly employing droplet microfluidics, has gained attention for their high-throughput, highly parallelized and efficient cultivation capabilities.

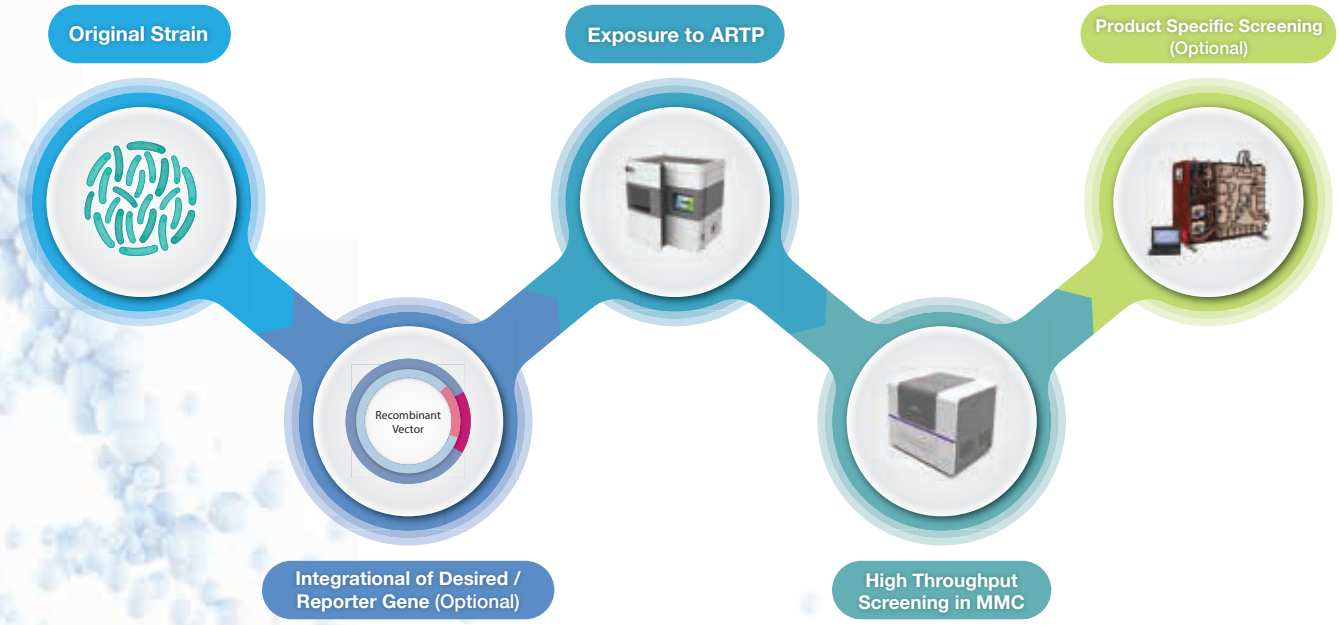
Microdroplet culture (MMC) system is an intelligent, automated, high-throughput microbial culture instrument designed based on droplet microfluidic technology. Each microfluidics chip contains up to 200 droplets which volume is only 2 μL.

Microorganism can be cultured and transferred as the process as follows:

- Formation of microdroplet containing cells, reagents, and soluble growth factors
- Cycling microdroplets for cell incubation and OD_{600} monitoring
- Splitting and fusing microdroplets to renew the medium for subculture and add a chemical agent

Microorganisms can be continuously cultured for as long as 15 days or 100 generations with MMC. Good performance strains can be screened according to the production status.

Workflow for Strain Improvement and High-throughput Screening (HTS)

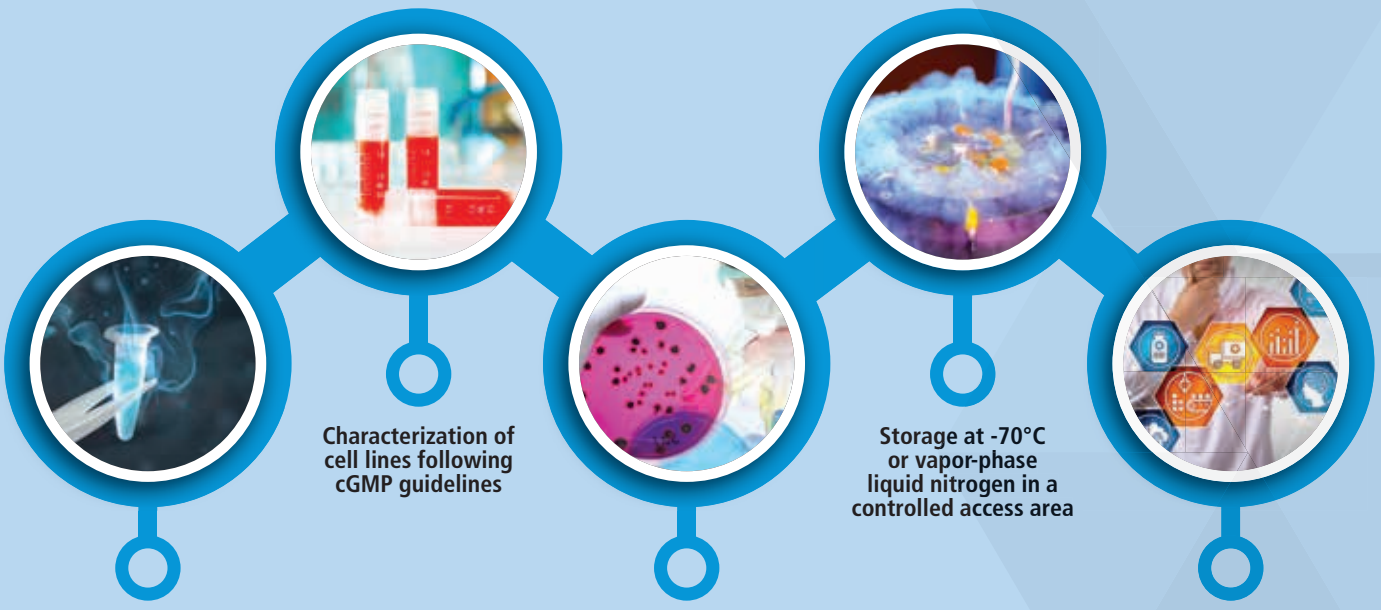


MASTER CELL / **MICROBIAL** BANKING

Cell banking provides a common starting source for each manufactured lot of product which is well-characterized and assures that an adequate supply of equivalent cells exist for use during the entire lifespan of the product. Several kinds of cell banking such as master cell bank (MCB), working cell bank (WCB), and end of production cell bank (EoPCB) service are provided following cGMP regulatory standards and guidelines (ICH, U.S. FDA, EMA, and NMPA).

Our cGMP-compliant cell bank can preserve a large volume of cell lines, microbial cells, and other biologics for the manufacture of commercially available therapeutics. We ensure that all samples collected either on the field or on our biobank are carefully processed and transported using the best techniques for preservation.

Our Capabilities



Manufacturing of MCB and WCB for mammalian cell line and microbial cell line

Characterization of cell lines following cGMP guidelines

Quality Assurance

Storage at -70°C or vapor-phase liquid nitrogen in a controlled access area

Shipment

VECTORS
PRODUCTION SERVICE

We work with you to produce large-scale viral stocks using serum-free media in a closed system, such as an isolator for your project. Our macrocarriers in our Tide Motion bioreactors provides a high surface area 3D cell culture. This enables a cost-effective, labor-reducing, and time saving production of viral vectors in producer cell lines. Cell lines such as HEK293T adapts well in Tide Motion bioreactors, reaching a higher cell density for sustained cell growth to allow high titer vector stocks harvested.

- Efficient, large-scale production of lentivirus, retrovirus, adenovirus-associated, adenovirus stocks compared to cell factories and other 2D culture systems.

* *Actual results may vary, depending on viral vectors used and transfection reagents/ techniques adopted. We advise client to seek our advice and recommendations whereas appropriate.*

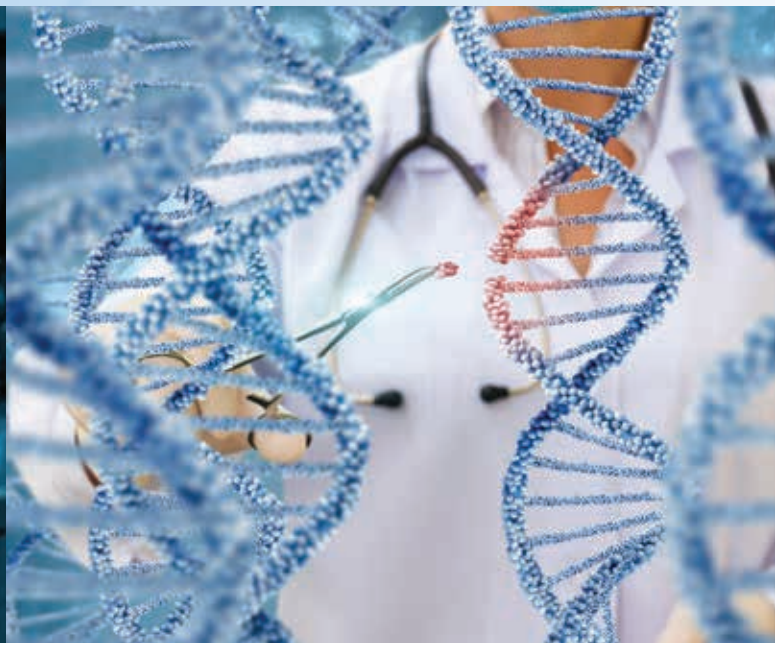
RECOMBINANT PROTEIN EXPRESSION AND PRODUCTION SERVICES

Recombinant protein is a form of protein that is artificially made using recombinant DNA technology. It is made to be produced in large quantities, to be used throughout biomedical science, and to be manufactured for useful industrial applications.

Eukaryotic systems, specifically mammalian and insect cells, are very viable culture expression systems for the production of both monoclonal antibodies and recombinant proteins. Our laboratory uses highly productive cell lines such as Chinese hamster ovary cells (CHO) and SF-9 cells which stably express antibodies/ recombinant proteins which have been subjected to process optimization techniques for more improved expression and consistent high yield protein production.

Our capabilities ensure a seamless workflow that inludes

- Engineering of Expression Vectors
- Host Cell Transfection
- Clone Selection
- Single Cell Clone Isolation and Expansion
- Cell Banking
- Evaluation of Growth Characteristics and Process Optimization



The advantages of the CHO cell culture system are:

- High cell density achievable in our Tide Motion Bioreactors
- Survival in serum-free media during the production phase
- Rapid and high protein yields – up to several hundred mgs/L

Besides CHO lines, we also use HEK 293 lines which are grown to high densities and in turn, offer:

- Small-scale construct screening
- Transient transfection or stably integrated genes
- Rapid and high protein yields – up to several hundred mgs/L

For Baculovirus expression system using SF-9 cells, we employ consistent and high protein yield with post-translational modification (PTMs). They are as follows:

- Cloning of transfer vectors
- Generating a recombinant bacmid
- Production of P1 virus stocks
- Virus amplification
- Virus Titer Determination - Plaque Assay
- Cell expansion and infection with baculovirus
- Protein purification

Our services include enhancing the maximum yield process through optimization of:

- Time of Infection
- Multiplicity of Infection (MOI)
- Cell Density at the Time of Infection
- Cell Density at the Time of Harvest
- Insertion of Kozak sequences, signaling peptides (to enhance production and secretion of protein) and fusion tags for ease of purification in the transfer vector

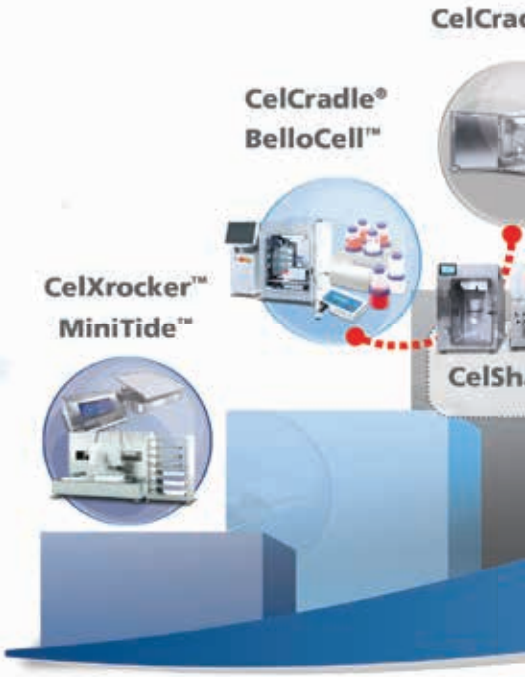
UPSTREAM PROCESSING DEVELOPMENT SERVICE

With our in-depth understanding of the Asian market, we adopt a customisable approach in delivering sustainable risk-adjusted returns to our clients.

We support an integrated approach to service delivery to increase viral expression titer, multiplicity of infection (MOI), and increase cell viability at high-density cultures. On the average, we have obtained up to $5x10^9$ (for mammalian cell lines) and $2x10^8$ for stem cell lines.

We are the industry's leaders and expert in Upstream Processing (USP) development using our Tide Motion™ bioreactors.

Ability to Scale-out or Scale-up cGMP and GMP (13485).

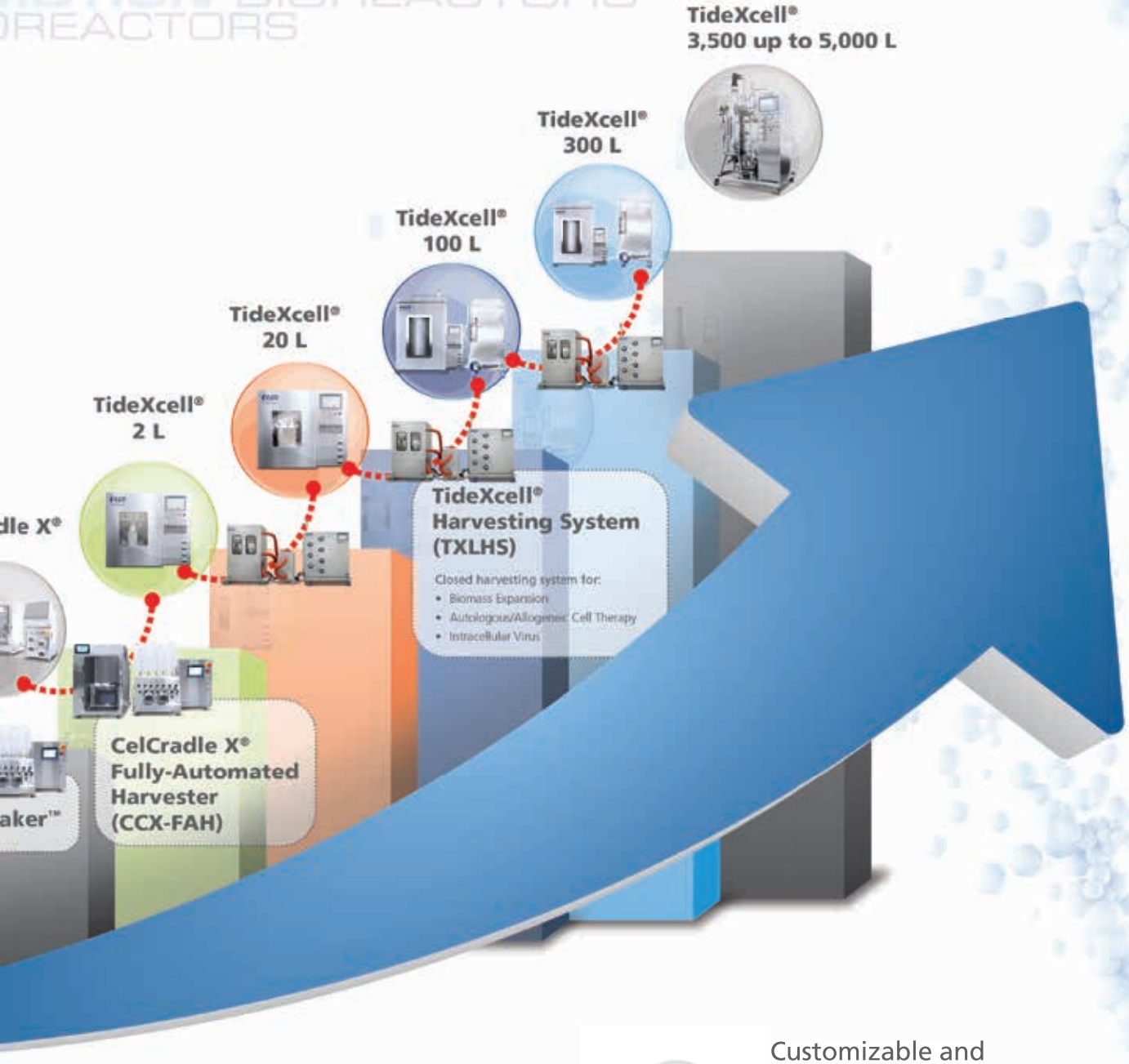


1. CHO library suits the expression of recombinant proteins, monoclonal antibodies, and biosimilars implemented with our proprietary bioreactors in a small footprint

2. Bioprocess optimization using Design-of-Experiments methodology in optimizing cultivations and unit operations

3. Animal component free media adapted to USP processes and lowering impurities

BIOREACTORS



5 Customizable and reprogrammable fed-batch, continuous, and perfusion mode(s) in hypoxia and/or anaerobic conditions

4 Robust proprietary technology platform that is scalable up to 5,000 liters packed-bed volume capacity

SUSPENSION CULTURE SERVICES

Our suspension services can be used for various cell culture applications such as bacteria, insect cells, and mammalian cells in batch, fed-batch, and perfusion modes. We utilize single-use cell bags of up to 50 L capacity allowing an easy set-up with no cleaning required and less susceptible to issues such as cross-contamination. The various advantages of the system include convenience, reliability, flexibility, and versatility.

Key Applications

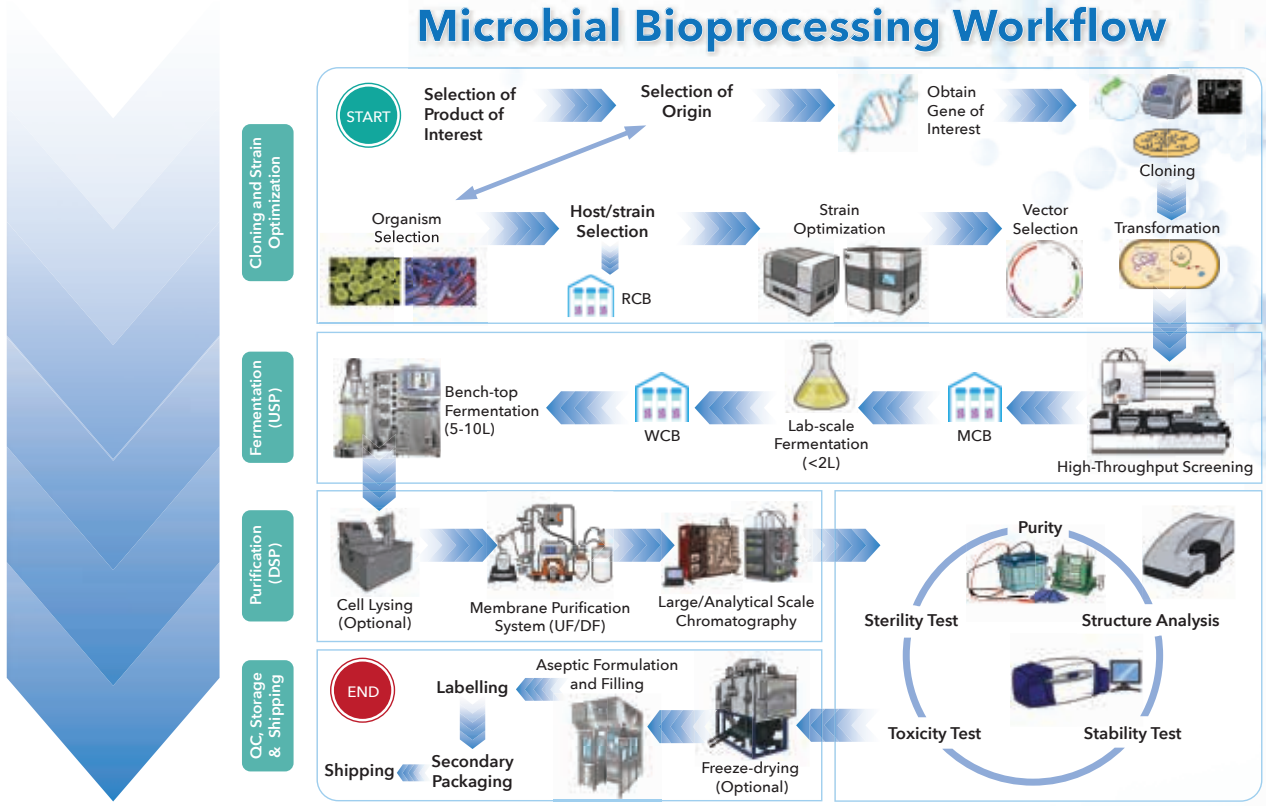
- Monoclonal Antibody (mAbs) Production
- Hybridoma Cell Culture
- Insect Cell Culture
- Cellular Agriculture

FERMENTATION SERVICES

Esco has vast experience in bioreactor designing and offering fermentation service to the clients for different cell lines. A series of bioreactors and bioprocessing equipment of laboratory (5 L-10 L) to manufacturing scale are utilized for the following services:

- Strain Development and Optimization
- Recombinant DNA Technology
- Microbial Fermentation (e.g. Bacteria, Yeast)
- Large-scale Contract Fermentation (50 L)
- Fermentation Process Optimization for Expression/Production of:
  - Recombinant Proteins
  - Peptides
  - Enzymes
  - Active Pharmaceutical Ingredients (APIs)
  - Biomass Generation
  - Cellular Agriculture
  - Alternative Proteins
- Fermentation Process Validation

Overview of the Esco Aster's Microbial Bioprocessing Workflow:



DOWNSTREAM PROCESSING
DEVELOPMENT SERVICE

We have a modular setup to optimise efficiency in obtaining a pure and high concentration of your product whilst recovering as much as 80% product of interest (POI) with minimal waste. Our bioengineers propose the most feasible downstream processing systems (DSP)* tailored for your project development.

A. FILTRATION SERVICES

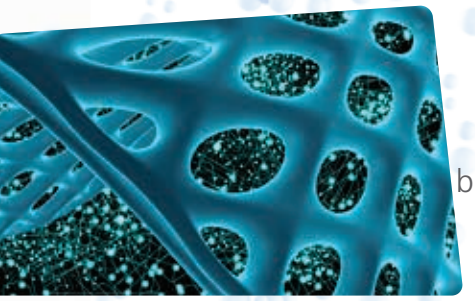
We incorporated tangential flow filtration systems (TFF) as a first downstream concentration/ purification step in different pipelines:

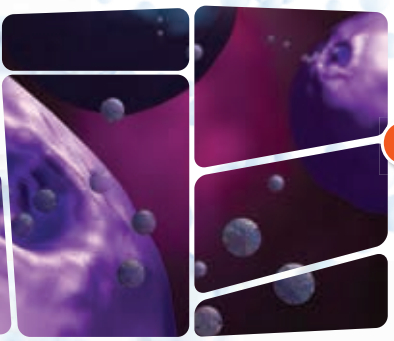
Microfiltration: Applications where the harvested cells are the final product, TFF combined with a clarification step will consolidate the final downstream platform.

Ultrafiltration (UF)/Diafiltration (DF):

a. Applications where the final product are biological, such as:
- Extracellular Vesicles (EVs)/Exosomes
- Viruses as Intermediate Products (CAR-T)
- Protein Purification

b. Applications where the final product are synthetic nanoparticles such as:
- Biocompatible Polymer Particles
- Liposomes
- Polysaccharides





We provide an upstream to downstream bioprocessing and end-to-end modular approach that are able to achieve suitable concentration/purification factors to meet your final product specifications.

- **Number cells/ml:** Recovery yields of as much as 87% depending on the product of interest
- **Nanoparticles/ml:** Recovery yields that enable the production of nanoparticles in concentrations required to meet biological outcomes in clinical studies
- **Identity, Potency, Morphology:** Cell viability and proliferation as much as 98%
- **Purity:** Removal of protein impurities and microcarriers to meet quality attributes for final product

Note: *DSP development is not limiting to single-use concentrators or chromatography or microfluidics-size exclusion methods. We advise clients to seek our advice and value-added services in conjunction to USP development.*

B. PREPARATIVE CHROMATOGRAPHY

Esco has capabilities in the downstream purification of wide range of biologics like recombinant proteins, viruses, virus-like particles (VLPs), and monoclonal antibodies (mAbs) using different chromatographic techniques based on the requirement of the product of interest.

These techniques include:

- Affinity Chromatography (e.g. antibody, specific group, tagged group)
- Ion Exchange Chromatography
- Multimodal Column Chromatography
- Hydrophobic Interaction Chromatography
- Reverse Phase Chromatography
- Size Exclusion Chromatography

With these, we offer specific services in downstream bioprocessing such as:

- Optimization of process variables using Design of Experiment (DoE) analysis
- Process development for the production of biologics (e.g. viral vaccines, recombinant proteins, viruses, VLPs, antibodies)
- Scale-up and scale down of the bioprocessing platform from laboratory to industrial scale
- Access to bioprocess expertise with dedicated scientist(s)

ANALYTICAL TESTING
AND VALIDATION SERVICES

Nowadays, the biopharmaceutical industry relies on analytical service providers to come up with an excellent platform for core testing needs so they can back up their internal resources at their best.

At Esco Aster, we understand the importance of providing a robust platform to support our clients during process development and product manufacturing. To meet industry needs for high-quality, rapid, cost-effective, and top-of-the-line services, we are now offering extensive analytical expertise, including:

- Analytical Method Development, Validation and Transfer Bioassay
- Product Characterization and Biochemical Comparability Reference Standard Characterization
- Pre-formulation Studies
- Final Product Stability Studies
- Forced Degradation Studies

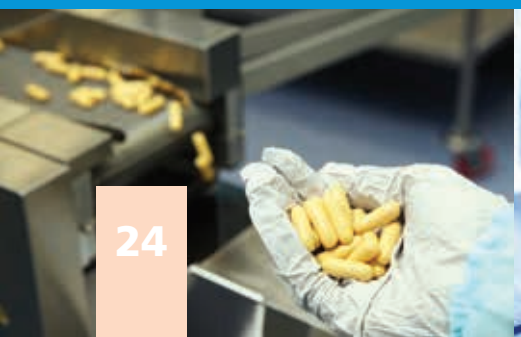
- Sterility Testing
- Product-related Impurity Testing
- Microbiology Testing
- Particulate Matter Testing
- Nanoparticle Characterization
- Process Characterization/Validation:
  - Characterization of Cells
  - Cell Bank Characterization
  - Process Limit Studies
  - Product-specific Assay Validations
  - Process Performance Consistency Studies
  - Evaluation of DNA Reduction
  - Stability of Process Intermediates
  - Cleaning Validation
  - Sterile Process Validation

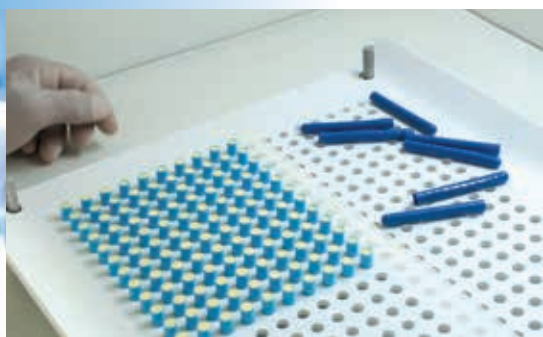
(BIO)POLYMER
ENCAPSULATION SERVICES

For those customers that require enhancing the half-life and stability of their final drugs or bioactives, Esco Aster offers a cutting edge encapsulation technology based on biocompatible polymers, polysaccharides, and other macromolecular or lipid-based carriers.

Our scientific and bioengineering teams have the knowledge and years of experience to support our clients with different encapsulation approaches during R&D, drug development and manufacturing for several applications, namely:

- Encapsulation of Fat-Soluble Compounds
- cGMP- compliant Nanoparticle Purification using Tangential Flow Filtration Systems
- Research and Development: Plain and Encapsulated Liposomes, Polymersomes, Polymer Nanoparticles and other Formulations
- Customized Surface Modification of Nanocarriers
- Custom Formulations
- Encapsulation of Small Molecules, Therapeutic Agents, Bio-actives and Nucleic Acids
- Encapsulation of Vitamins and Supplements
- Nanoparticles Production Process Control
- Analytical and Characterization Services: Analysis and Reporting





OTHER
CUSTOMIZED SERVICES

Our manufacturing facilities are built in accordance to PIC/s and upcoming HSA CTGTP guidelines. Our facilities are ready for batch, recirculation, and perfusion in single-use bioreactors or stainless steel fermenters. Our USP and DSP platforms, when used in conjunction with an integrated quality control system, total quality management and Supervisory Control and Data Acquisition (SCADA) deliver the best-in-class manufactured products. All this, combined with our talented bioprocessing scientists, we develop the full process validations, product characterization and production for all clinical trial phases.

- Formulation development studies, including conditioned media for cosmetics or wound healing purposes
- Transdermal and topical emulsion-based formulation development
- Inhalation and nasal formulation development
- Oral-dispersing film and sustained-release development
- Customized homogenizing needs for oral tablets
- Drug substance and excipient development
- Micro-/ Nano-encapsulation technologies for tasting or smelling masking, increase bioavailability
- Shelf-life and stability testing under accelerated conditions for pharmaceutical or skin products
- 3D *in vitro* technologies for cosmetic products testing
- 3D *in vitro* lung efficacy studies for compounds/ ingredients testing
- 3D organoids using miniaturized bioreactors for diseases modelling
- Technology transfer and process validation
- Compilation of regulatory dossier and documentation to a regulatory body of interest

CONTINUOUS FLOW PROCESS SERVICES

As an emerging contract development and manufacturing organisation (CDMO), we have focused our attention on continuous flow processes. We have the expertise, local collaborations and state-of-the-art facilities to address your process requirements pertaining to Active Pharmaceutical Ingredient (API) synthesis or multistep synthesis of functional organic molecules.

SPECIALIZATION:

- Synthetic Route Scouting
- Chemical Process Safety Assessment
- Process Optimization

HIGH-END FACILITIES

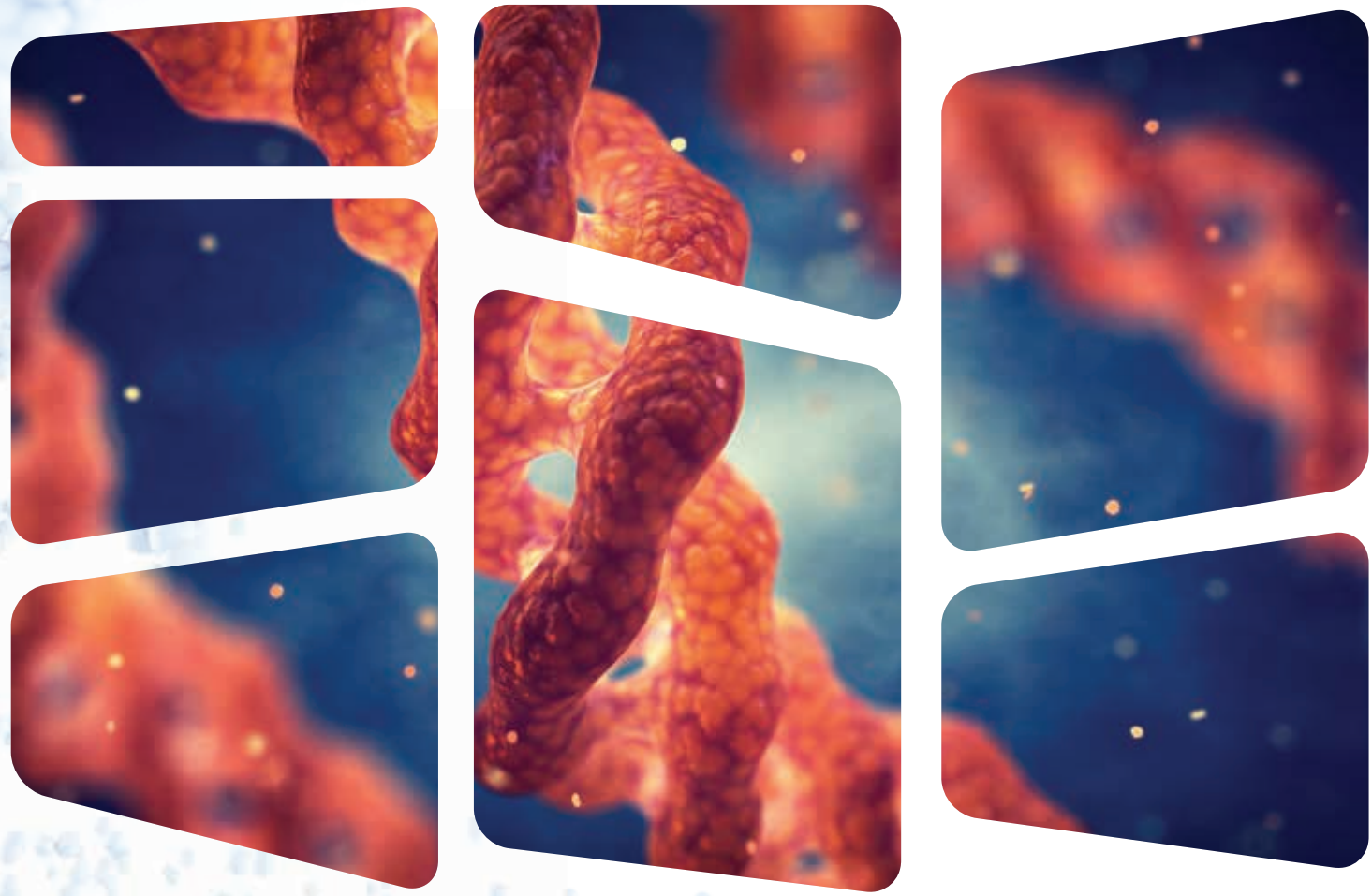
We are equipped with flow chemistry equipment, parallel reactors, high performance liquid chromatography (HPLC), flash purification systems, peptide synthesizers and can optimize/ develop batch reactions to make them suitable to run on a continuous platform. We have the facilities for the following class of reactions:

- Metal-mediated cross coupling reactions
- Substitution reactions
- Condensation reactions
- Functional group transformations and rearrangements
- Amide coupling

We are in the process of upgrading our facilities to accommodate other organic transformations.

CAPABILITIES

- Appropriate standard modules to handle different reactions and batch sizes
- Development and optimization of synthetic routes suitable for Flow Chemistry
- Streamlining and automation of multi-step reaction sequences of APIs
- Diversification of API synthesis using common key intermediates
- Establishment of a safer alternate way for hazardous reactions
- Peptide synthesis, intermediates for API, and compound libraries
- Appropriate standardized modules to handle multiple batch sizes



THERAPEUTIC PEPTIDE SERVICES

We understand that peptide development is filled with challenges. Due to hydrophilicity, peptides exhibit limited ability to cross physiological barriers and are confronted with efficient hepatic and renal clearance. Also, once inside the systemic circulation, peptides typically have rather short half-lives due to aggressive degradation by multiple digestive proteases. These aspects have led to difficult administration routes which resulted to low patient compliance.

1. **Synthetic Services:** capabilities to synthesize a broad range of therapeutic peptides/proteins through:

- A novel continuous flow approach with the latest technology
- Conventional Solid Phase Peptide Synthesis/ Liquid Phase Peptide Synthesis (SPPS/LPPS)
- Combo Technology
- Fermentation
- Recombinant DNA methodology

2. **Comprehensive Peptide Modifications:** capabilities to increase their half-lives.

- Attachment Chemistry
  - Polyethylene Glycol (PEG) Modification
  - Linkers
  - Spacers
- N-terminal and Side-chain Modification
  - PEGylation
  - Acetylation (lipopeptides)
  - Formylation)
- Peptide Stapling
  - Ring Closing Metathesis (RCM)
  - Thioether Formation
- Peptide Macrolyzation

ANTIBODY-DRUG CONJUGATE SERVICES

Our capabilities are directed towards the synthesis of payloads/lead compounds providing the design, synthesis and development of novel and stable cleavable linkers with desired properties for the overall stability, solubility, and potency of antibody-drug conjugates (ADCs).

We are unique because our biochemistry labs can either provide: (1) large molecules for small molecule companies (2) linker/payload for large molecule companies and/or (3) combination of both for virtual companies.

Our services are as follows:

- **Design and Synthesis of Chemically Cleavable Linkers**
  - Acid-cleavable Linkers
  - Reducible Disulfide Linkers
  - Exogenous-responsive Cleavable Linkers
- **Design and Synthesis of Enzyme-cleavable Linkers**
  - Dipeptide Linkers
  - Glycosidase-cleavable Linkers
  - Phosphotase-cleavable Linkers

In addition, we offer suitable methodologies for the chemical conjugation of antibodies thru the strategic attachment of (1) linkers tethered with the payload or (2) a suitable handle with a reactive functionality of which the payload can be conjugated. Our recent focus on continuous flow chemistry for the multistep synthesis of API and advanced intermediates gives us a great advantage to carry out the synthesis of payloads on a continuous platform which has the inherent advantage of a linear scale-up.

Methodologies are listed below:

- Lysine Amide Coupling
- Cystine Coupling
- Synthetic Amino Acid Incorporation by Genetic Engineering into Monoclonal Antibodies (mAbs) and Subsequent Chemical Conjugation

STEMISTRY: DEVELOPMENT AND SERVICES

Harnessing the full potential of stem cells is one of the major challenges in medicine and healthcare nowadays. Stem cells are specialised human cells that have the ability to develop into many different cell types. They have the ability to repair damaged tissues and have a great potential in various clinical applications. Over recent years, small molecules have emerged as essential tools for understanding, regulating, and manipulating stem cells—stemistry, is what they call it.

The continued interests for small molecules targeting in vivo aspects of regeneration, including adult stem cells, stem cell niches, and mechanisms of homing, mobilization, and engraftment as well as somatic cell proliferation have been the new emerging paradigm in the field of research. Esco Aster, a CDMO company, offers an integrated multi-instrumental approach that exploits the potential of several techniques to provide sound evidential support in terms of synthesis, characterization, and screening of small molecules for both phenotype-based and target-based screening.

OUR SERVICES

- Synthesis of reported small molecules and their close analogues (discrete structural modification) targeting specific cell signalling pathways (target-based screening) using modified synthetic schemes, conventional, and continuous flow chemistry methods. Able to synthesize the reported compounds up to a gram scale with high purity (>95%) based on clients' needs.
- Synthesis of a novel small molecule chemical libraries from commercial building blocks for phenotype-based screening
- Characterization studies involving observation of cell-specific phenotypes by visualization of cell morphology using appropriate methods such as Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM).
- Characterization studies involving the detection of specific marker proteins by antibody immunostaining
- Hits identification and Hit-to-Lead Studies: Transfection of cells appropriate reporter genes for initial screening of small molecules and the use of suitable imaging methods to shortlist Hits and activate reporter gene. Identification of the right molecule(s)/Lead(s) from the initial screen using immunostaining and reverse transcription polymerase chain reaction (RT-PCR) analysis.
- Lead Optimization Studies: Focused structure-activity relationship (SAR) for design and synthesis of analogues with specific structural modification based on molecular modelling studies.

As part of a growing CDMO business, we plan to extend our capabilities and services with affinity chromatography techniques, drug affinity responsive target stability (DARTS) to explore the target protein of small molecules, and the use of DNA chips or regulators (or a combination of both) in studying their effects on a particular signalling pathway.

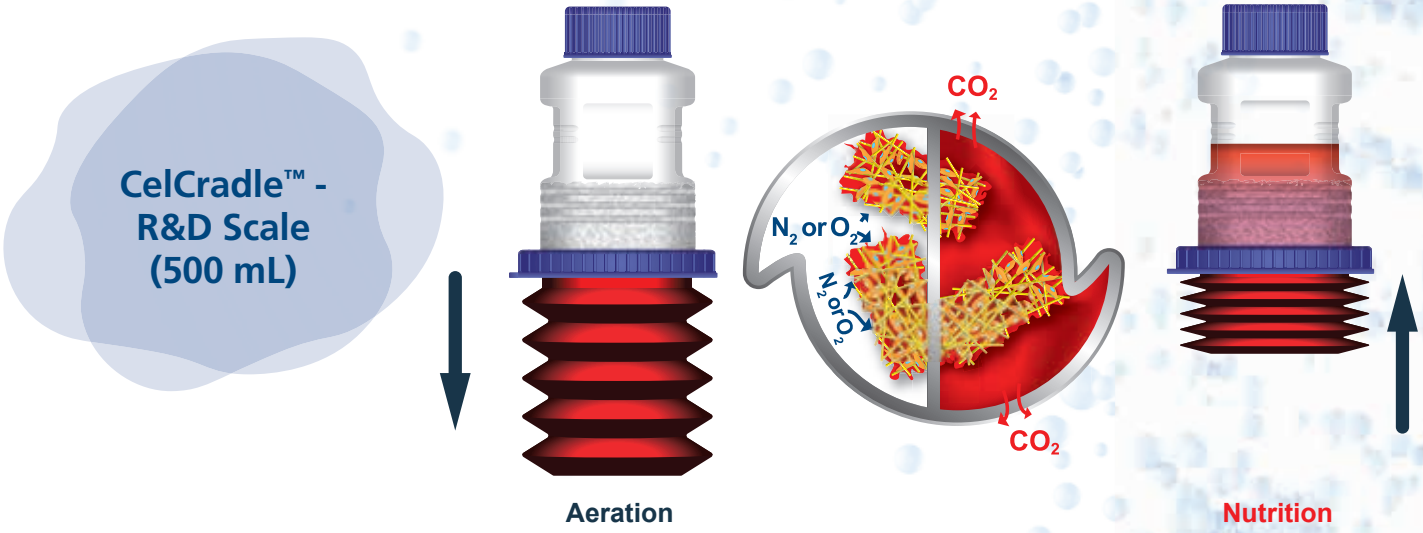
PROCESS TRANSFER SERVICES

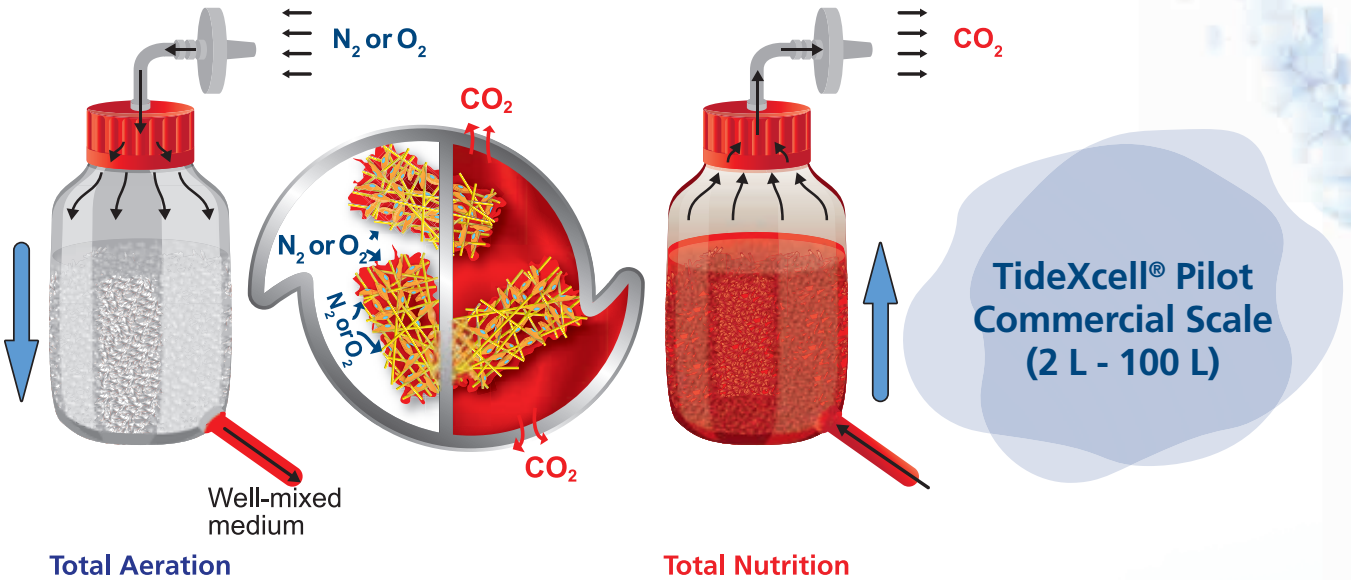
Esco Aster is the global leader in providing process transfer services to meet scale up needs of the industry. The Tide Motion® Bioreactor platform is a viable and robust solution to replace adherent cell culture systems such as 2D planar cultures, roller bottles and 3D microcarriers that are widely used to produce Phase III and commercial drug products.

From Roller Bottles to Tide Motion® Bioreactors

Many commercial biologics utilize cells such as adherent CHO for production of Erythropoietin (EPO), Ipilimumab, Interferon beta-1a and others; human and animal vaccines as well are produced using roller bottles. Tide Motion® bioreactors mimic the rolling motion of roller bottles which is an alternate emerging and submerging of cells for oxygenation and nutrient exchange.

By virtue of this, we offer a viable alternative to roller bottle culture. This could be a less expensive and time-saving as opposed to bioengineering adherent cell lines to suspension cells which may entail redoing of large-scale clinical trials and subsequent issues from a regulatory standpoint.





FILL AND FINISH SERVICE

Our fill and finish services cater to preparations in which the end product is in liquid, cell, or vial form. This production of clinical trial ready product can be done in a ready-to-use vial filling line with integrated freeze drier integrated in an isolator. The same cGMP-compliant process can be applied to client's dosage, formulation and filling requirements defined in the dossier submission package.

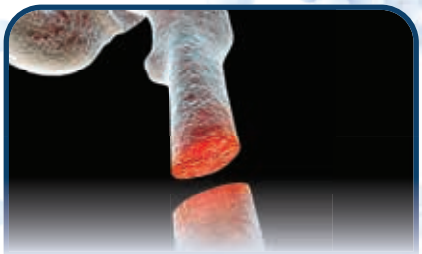
- Automatic sterile aseptic filling of liquid vials and cells cryopreserved vials ready for clinical trial or biobanking
- Various customized filling lines depending on product types
- Complete QA/QC release
- Labelling, packing, and shipping of clinical samples

STRATEGIC ALLIANCES

We adopt an innovative R&D model that encourages external industry and academia collaborations to accelerate open innovation, advance science and technology and expand market growth opportunities. We collaborate, on a global basis, to complement our CDMO value-added services. Mostly importantly, we encourage the building of new relationships to build new application notes using our tools and technologies.

Water Treatment

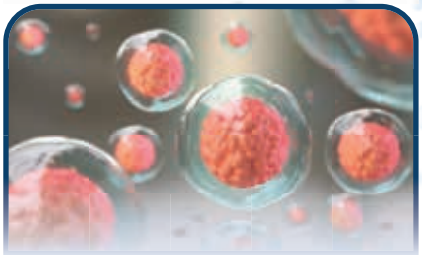
Vaccine Production



Bone Regeneration

Cellular Agriculture

- Acellular Products
- Cellular Products



Cell Lines

- Adherent Cell Lines
- Suspension Cell Lines

Biosimilars/Biobetters

Gene Therapy

- Integrative Viral Vectors
- Nonintegrative Viral Vectors
- Organic and Inorganic Vectors

Diagnostics

- mAbs for Diagnostics
- Disease Diagnostics

Cosmeceuticals

ESCO
LIFESCIENCES GROUP

1978

Esco was founded in Singapore and began to pioneer cleanroom technology in Southeast Asia

1990

Esco expanded distribution to pharmaceutical life science biotech and medical research markets

2001

Esco earned first EN 12469 cert. for BSC

2006

Esco earned onsite UL accreditation

2007

Expansion of Esco life science and medical products

2015

Esco VacciXcell was introduced

2017

Esco Aster was introduced (first CDMO company in Asia utilizing its own proprietary Tide Motion technology)

Esco Aster and Institute of Molecular Cell Biology announce a collaboration to accelerate pre-clinical development of a hand foot and mouth vaccine

Esco Aster and Bioprocessing Institute sign a Memorandum of Understanding to innovate on continuous manufacturing platform

2018

Esco Aster and National University of Singapore announced a development of single-use bioreactor-based stem cells for bone regeneration.

2019

Esco Aster continued to grow with the outfitting of a cGMP-compliant PD, GLP, Phase 1 and 2 clinical trial facility.

2021

Esco Aster received a food processing license to manufacture cell-based cultivated meat from Singapore authorities

2022

Esco Aster was awarded the stringent **ISO 22000 food safety certification**, clinching another "world's first" in the cultivated meat scene

YOUR PARTNER IN EVERY STEP

FREE

ENQUIRY

FREE

PRE-CONSULTATION

FREE

PROJECT SCOPE PRESENTATION

SERVICE AGREEMENT SIGNING

PROJECT COMMENCEMENT

PROJECT DELIVERY

PROJECT COMPLETION

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