Yaohabio
耀海生物

PROFESSIONAL MICROBIAL EXPRESSION SYSTEM

CRDMO SERVICES PROVIDER

- ☐ RECOMBINANT PROTEINS/PEPTIDES
- ☐ SINGLE-DOMAIN ANTIBODIES
- ☐ RNA PRODUCTS
- ☐ RECOMBINANT VACCINES
- ☐ RECOMBINANT PLASMIDS

CONTENTS

ABOUT YAOHAI BIO-PHARMA

Yaohai Bio-Pharma, China's first and largest biologics CRDMO (Contract Research, Development, and Manufacturing Organization): focused on microbial expression systems. Yaohai Bio-Pharma is established in China Medical City (CMC) in August 2010.We provide customized end-to-end solutions for diverse modalities, covering DNA design and synthesis, microbial strain engineering and construction, as well as drug substance manufacturing at GMP or non-GMP levels. Our services span across a wide range of products, including recombinant proteins, peptides, polypeptides, enzymes, single-domain antibodies (sdAbs), plasmid DNA and mRNA, glycopolymers, and virus-like particles (VLPs), all of which are available fill and finish products.Yaohai is an industry leader with the finest technical expertise to meet global clients' clinical and commercial needs in biological drugs, biosimilars, vaccines, and diagnostics for human and veterinary use.

Adhering to the service concept of " Serving with heart creates the future together", we persevere in invigorating global new drug development with the mission of "Establishing global standards, boosting new drug development process, and achieving a healthy life."

Yaohai Bio-Pharma

THE LEADING CRDMO, EMPOWERING AND ACCELERATING NEW DRUG DEVELOPMENT PROCESS

12 years+

Diligent Development Pioneering development

- Microbial expression systems
- CRDMO services
- A national high-tech enterprise

100+

Project Experience

100+ CRDMO projects successfully delivered

150+

Successful Audits

successfully passed NMPA inspection

200+

Global Clients

Investigating projects from multiple world-renowned companies and strategic partner companies

300+

Project in Reserve

100 Clinical Phase projects
200+ Commercial production projects

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CRDMO SERVICES

C

- Contract customization services

R

- Single-domain antibody recombinant expression and purification
- mRNA UTR/IRES sequence-based screening
- CircRNA trial sample preparation and activity evaluation
- Establishment of analytical method
- Recombinant protein trial sample preparation
- Host bacteria screening
- LNP (Lipid Nanoparticle) preparation

D

- Microbial strain engineering and construction
- Primary cell bank construction
- Fermentation process development
- Purification process development
- Formulation process development
- Pilot scale-up
- Pilot production
- Quality specification establishment
- Analytical method development
- Process sample testing
- IND application

M

- MCB/WCB construction
- Strain stability study
- API and excipients testing
- Analytical method transfer, verification, validation
- GMP production of drug substance (Phase I, II, and III)
- GMP production of drug product (Phase I, II, and III)
- Release testing of intermediates, drug substances, semi-finished product and finished product
- Preparation of standard /reference substance and structure characterization
- Industrialized production
- Stability study
- Biologics License Application support

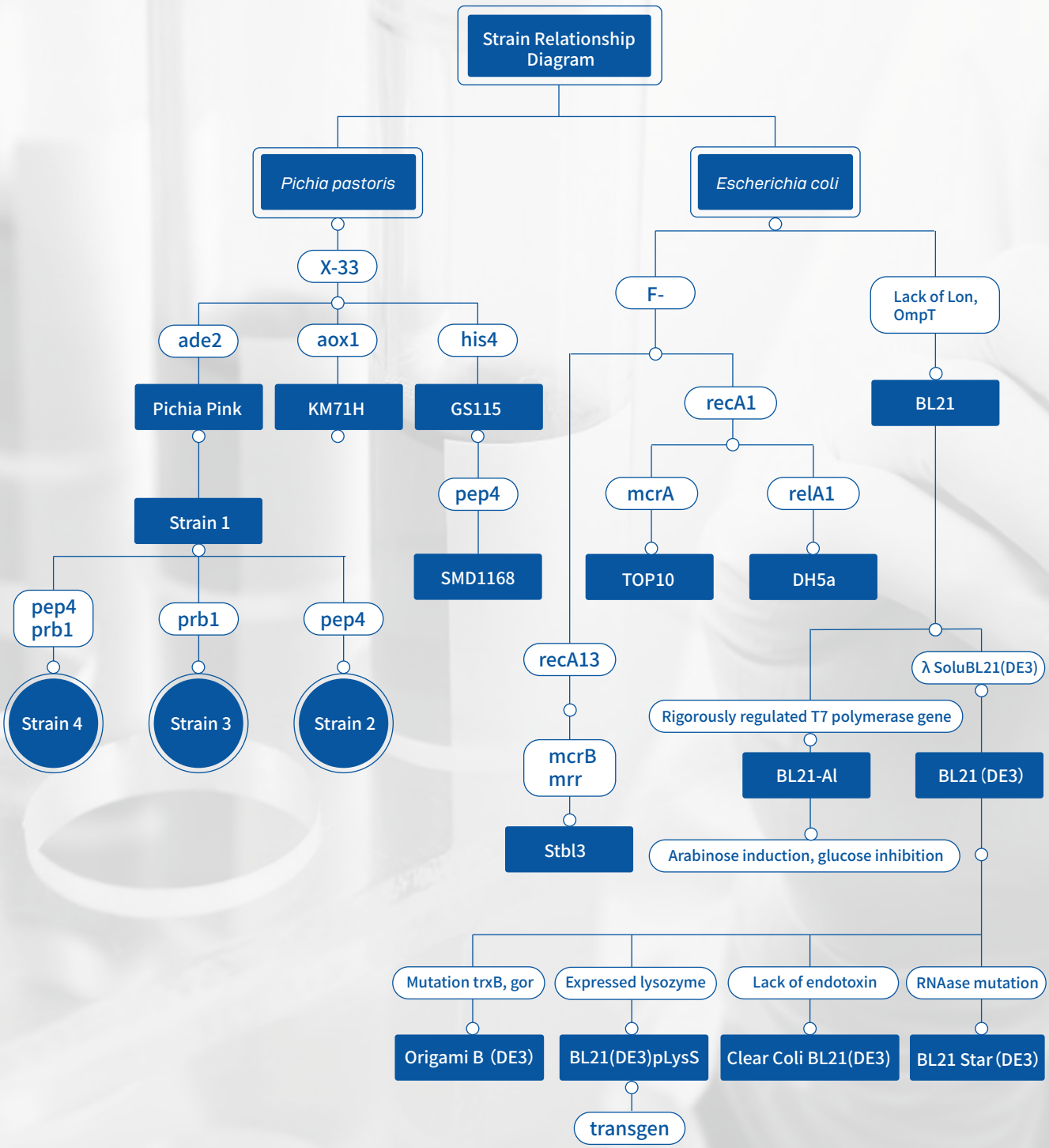
O

- Optimized Comprehensive Services

Scientific Sample Customization → **Customized R&D services**

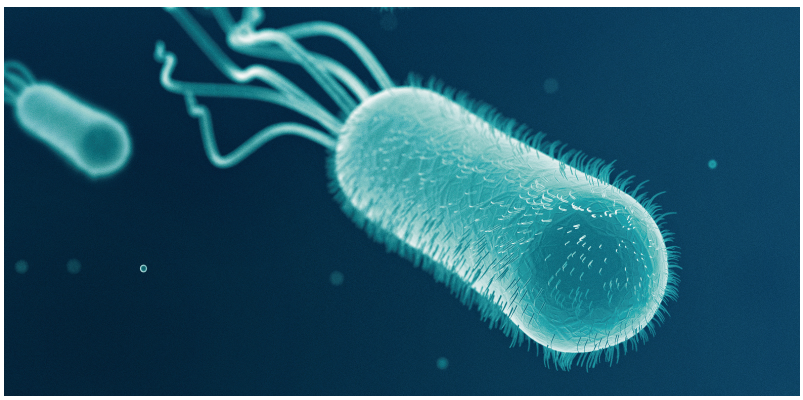
Commercialized / Customized Production Lines → **Customized Production Services**

STRAIN RELATIONSHIP



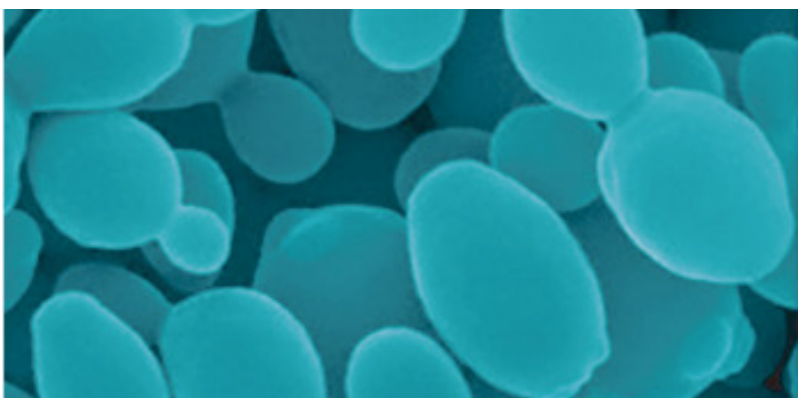
E. coli

K-12 strains & derivatives (DH1.DH5a. RV308,W3110,MG1655,JM109,BW25113...)
B strains(BL21,BL21(DE3)，BL21(DE3) pLysS,BL21(DE3) Rosetta...)



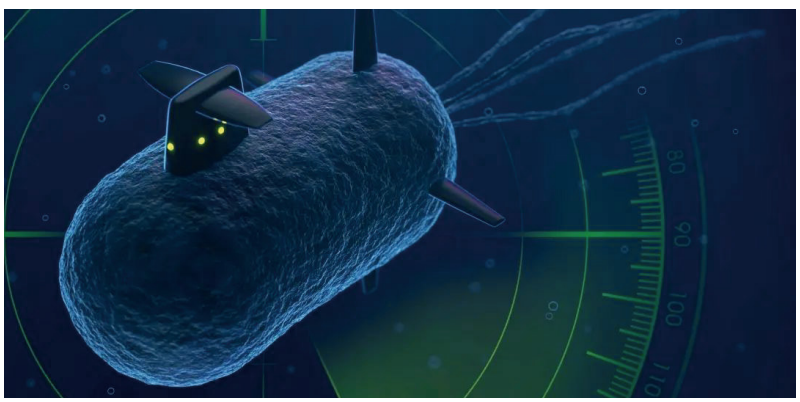
Yeast

*Pichia pastoris, Hansenula polymorpha, Saccharomyces cerevisiae,*etc.



Tailor constructed Strains

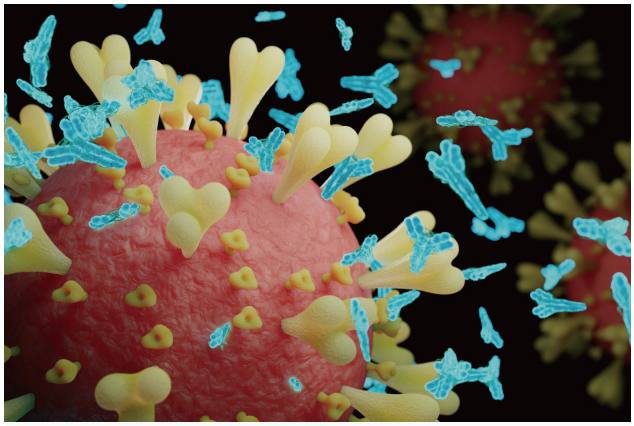
Other microbe/microbiota/microbiome provided by clients
Customized strains



SCOPE OF SERVICES

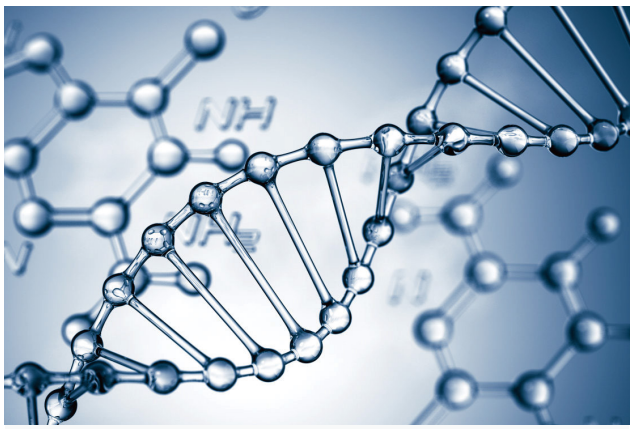
Recombinant Proteins/Polypeptides

- Provide services from strain bank construction, process and analytical method development, cGMP production to aseptic filling of drug product
- The fermentation scale ranges from 2 to 2000L
- Support recombinant polypeptides/ proteins, recombinant antibodies (antibody fragments), and recombinant vaccines (VLP), etc.



Single-domain Antibodies

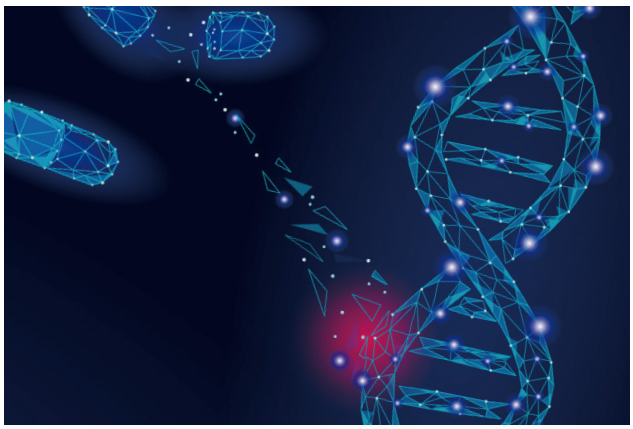
- *E.coli* expression system
- *Yeast* expression system, and mammalian cell expression system
- Multivalent single-domain antibodies
- Expression Production quantities μg to kg
- The fermentation scale ranges from 7 to 2000L



Nucleic Acid Drugs

Process development:

- Sequence design and optimization
- Gene synthesis
- IVT
- Purification
- mRNA quality control
- The customized mRNA and CircRNA services



Cell and Gene Therapy

Available services:

- GMP, GMP-like, nonGMP

According to customized requirements:

- Multi-phase pre-research
- Investigator-Initiated Trial / IND registration and application
- Clinical research
- Commercial production

CRO SERVICES

R&D Direction

Enzymes, plasmids, mRNA, CircRNA, long chain nucleic acid drugs, single-domain antibodies, recombinant proteins/polypeptides and many other categories

Service Contents

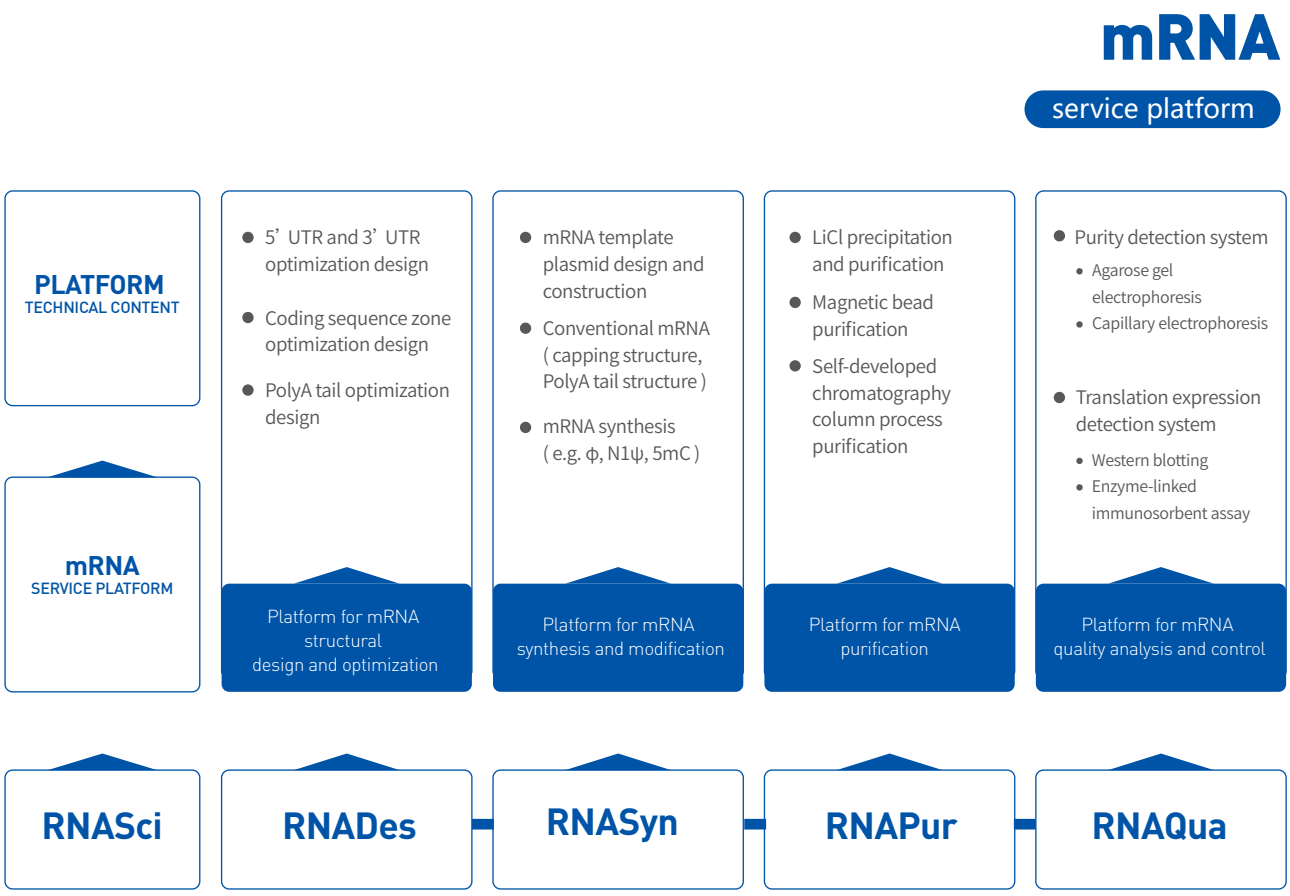
Service Contents

Biological raw material development:

- enzymes
- plasmids
- mRNA
- CircRNA
- long chain nucleic acid drugs
- single-domain antibodies
- recombinant proteins/polypeptides

mRNA CRO Service Platform

Our research level sample preparation platform "RNASci" mRNA) consists of four major technological modules. RNADes (mRNA structural design and optimization platform), RNASyn (mRNA synthesis and modification platform), RNAPur (mRNA purification platform), and RNAQua (mRNA quality analysis and control platform), **which covers the whole life cycle of mRNA design to sample formation.**



PLATFORM FEATURES

Highly expressed natural & modified UTR

- Natural UTR libraries and diversified UTR source selections are established to match the appropriate UTR sequence for different products;
- 5'UTR optimization for more efficient transcription of templates;
- Internationalized PolyA tail structural design strategy;
- Well-developed codon optimization methods and special optimization needs performed by the professional AI algorithm team.

Superior capping process for transcription and improvement of application activity

- Highly productive and stable capping process with a capping efficiency of >95%;
- PolyA tail integrated transcription formation, with more uniform distribution;
- Diversified mRNA modified nucleotides effectively reduce the adverse immune response of mRNA in human;
- Flexible plasmid template design to meet client's specific needs.

General & self-developed chromatography process, providing diversified purification methods

- Diversification:
  A comprehensive purification solution consisting of tangential flow filtration+multiple chromatography packing can effectively remove impurities from mRNA crude products for high quality applications;
- General & self-developed purification process:
  Well-developed LiCl precipitation+magnetic bead purification+chromatography purification solution; Completely self-developed, chromatography purification solution can effectively remove impurities in mRNA preparation.

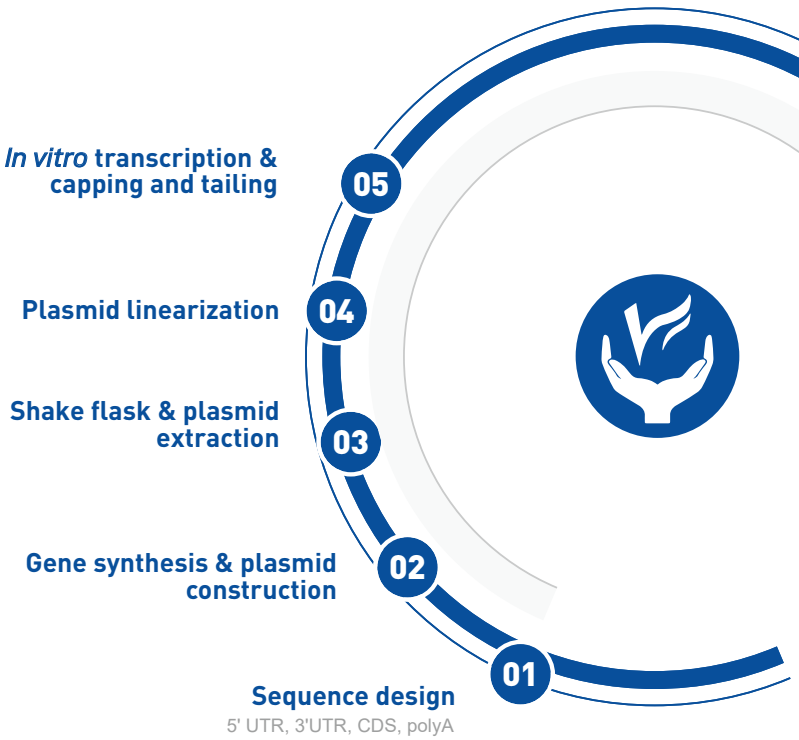
Comprehensive quality control platform to meet the quality control needs of each research phase

- Meet the general QC requirements for scientific-grade concentration and purity;
- Meet the special QC needs such as mRNA translation test, capping rate, and tail distribution, etc.

One-stop Solution

ONE STOP SOLUTION >>>

Sequence design and optimization >>> Gene synthesis >>> Recombinant plasmid preparation >>> Linearized template preparation >>> IVT >>> mRNA purification >>> mRNA quality control and analysis



mRNA
PROCESS FLOW

CAPPING METHOD

Enzymatic method

Plasmid linearization, IVT, purification, capping, secondary purification

Co-transcription

Plasmid linearization, IVT (clean cap), purification

Service Details

Yaohai Bio-Pharma can provide various mRNA products and customized synthesis services of mRNA at a scientific level; routine upgrades to service content are made to meet different custom-tailored experimental or project needs.

Customized mRNA services
Design and construction of mRNA template plasmids
Classical mRNA (cap structure, PolyA tail structure) preparation
Preparation of modified nucleotide mRNA (pseudouridine, N1-methyl pseudouridine, 5-methyl cytidine)
Tandem expression of mRNA preparation services for two genes
Other customized mRNA preparation services

mRNA products	Specification
mRNA-eGFP (Transfection Control)	10μg/100μg/500μg
mRNA-1273 (Moderna Vaccine)	10μg/100μg/500μg
mRNA-162b2 (Pfizer Vaccine)	10μg/100μg/500μg
mRNA-Luciferase (Transfection Control)	10μg/100μg/500μg
mRNA-mCherry (Transfection Control)	10μg/100μg/500μg
mRNA-IL2 (growth factor)	10μg/100μg/500μg
mRNA-IL4 (growth factor)	10μg/100μg/500μg
mRNA-IL22 (growth factor)	10μg/100μg/500μg
mRNA-OVA (Immune adjuvant)	10μg/100μg/500μg
mRNA-Cas9 (gene-editing tool)	10μg/100μg/500μg

Service Advantages

Integrated service process

From front-end sequence design and optimization, Gene synthesis to terminal mRNA synthesis and quality control analysis

High quality structural design and optimization platform

Professional mRNA structural design and optimization, Facilitate efficient mRNA expression

Well-developed purification platform

General & self-developed combination purification process
Provide high quality mRNA preparation services

Customized mRNA products

Flexible and diverse options,
Meet the needs of different experiments/projects

QC standard

mRNA

	Test items	Test Method	Quality Specification
Identification	pH	USP <791>	7.0±0.5（TE）
	Appearance	USP <1>, USP <790>	Clear, and colorless
	Sequencing	sanger	Consistent with the reference sequence
	RNA length	AGE	Molecular weight marker alignment
	RNA length	Capillary electrophoresis (CE)	Molecular weight marker alignment
Purity	A260/A280	UV detection	1.8 - 2.1
	Capping Efficiency	CE	> 95%
	Purity	CE	> 95%
	dsRNA	ELISA	< 0.006%
	Endotoxin	USP <85>	< 10EU/mg
	Residual Protein	CDE	≤1%

Supercoiled Plasmids

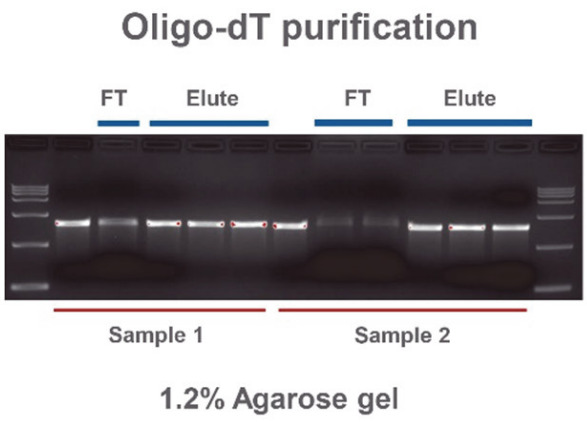
Test items	Test Method	Quality Specification
Plasmid concentration	UV detection	≥ 1mg/ml
Purity	UV260/280	1.8-2.0
Plasmid identification	Enzyme digestion	Matching the restriction enzyme fragments
Supercoil ratio	CE	≥ 85%
Endotoxin	USP <85>	<10EU/mg
Residual host protein	ELISA	≤ 1%
Residual host genomic DNA	Q - PCR	≤ 1%
Residual host RNA	RT - PCR	≤ 1%

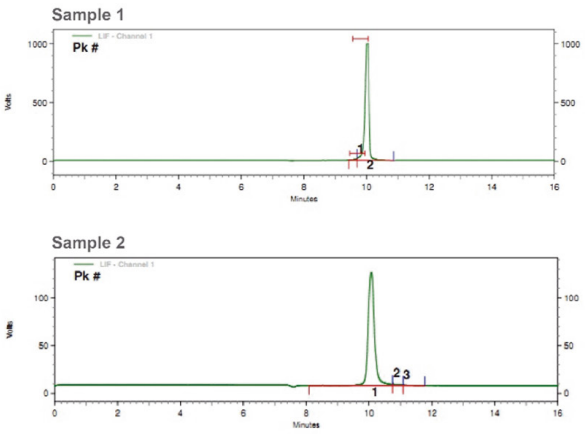
Linearized plasmids

Test items	Test Method	Quality Specification
pH	pH USP <791>	7.0±0.5（TE）
Appearance	USP <1>, USP <790>	Clear, and colorless
Plasmid concentration	UV spectrometry	0.5-1mg/ml
Purity	UV260/280	1.8-2.0
Plasmid identification	Plasmid sequencing	Consistent with the reference sequence
Linearized plasmid ratio	CE	≥ 90%
Residual host protein	ELISA	< 10EU/mg
Residual host genomic DNA	Q-PCR	≤ 1%
Residual host RNA	RT-PCR	≤ 1%
Endotoxin	USP <85>	≤ 1%

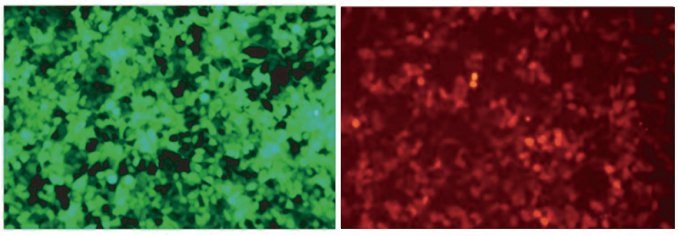
mRNA Purification Cases and Cell Evaluation

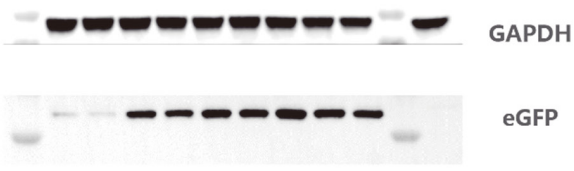
Yaohai Bio-pharma provides various purification methods, including self-developed chromatography purification process to prepare mRNA products with high quality and high purity according to the different project needs of clients. The mRNA products of Yaohai Bio-Pharma are well expressed in cells.





Removal of various small-molecule process-related impurities using Oligo-dT purification, with a mRNA product purity of >95%
The dsRNA in the catalogue mRNA products detected by the dsRNA detection kit (ELISA) is <0.006%





The well-expression of the catalogue mRNA products transfected with 293T in Yaohai Bio-Pharma

CRO services of CircRNA innovative therapy

The CRO services of CircRNA innovative therapy in Yaohai Bio-Pharma consists of four major technological modules:

- RNADes (CircRNA design and optimization platform)
- RNASyn (CircRNA synthesis and modification platform)
- RNAPur (CircRNA purification platform)
- RNAQua (CircRNA quality analysis and control platform)

CircRNA Scientific Research Level Sample Preparation

CircRNA structural design and optimization platform

- Permuted intron-exon (PIE) RNA circularization
- Code sequencing, Internal Ribosome Entry Site optimization design

CircRNA synthesis platform

- CircRNA template
- Synthesis of CircRNA with high circularization rate (>80%)

CircRNA purification platform

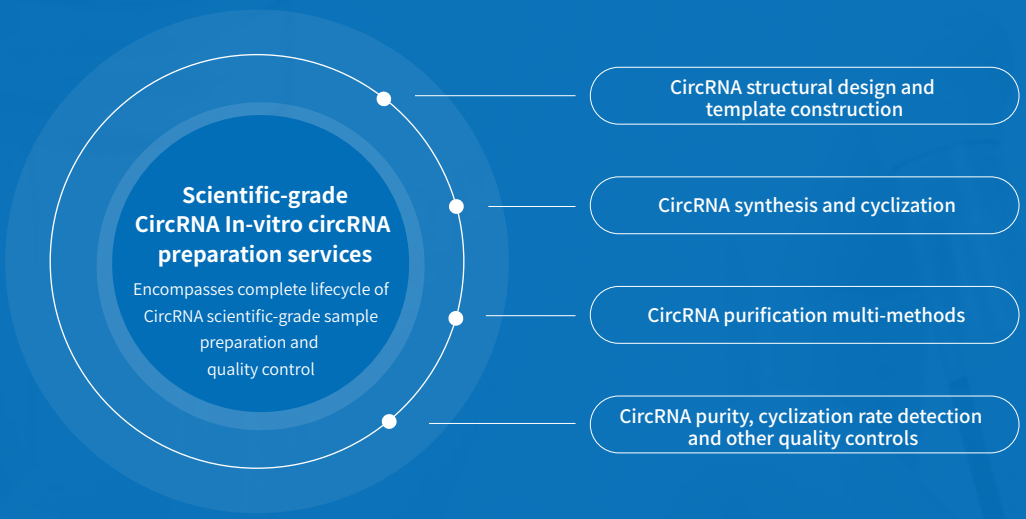
- Conventional experimental purification solutions
- Purification process using chromatography column

CircRNA quality analysis and control platform

- Multiple purity testing solutions
- Efficient circularization detection protocol

Service Content

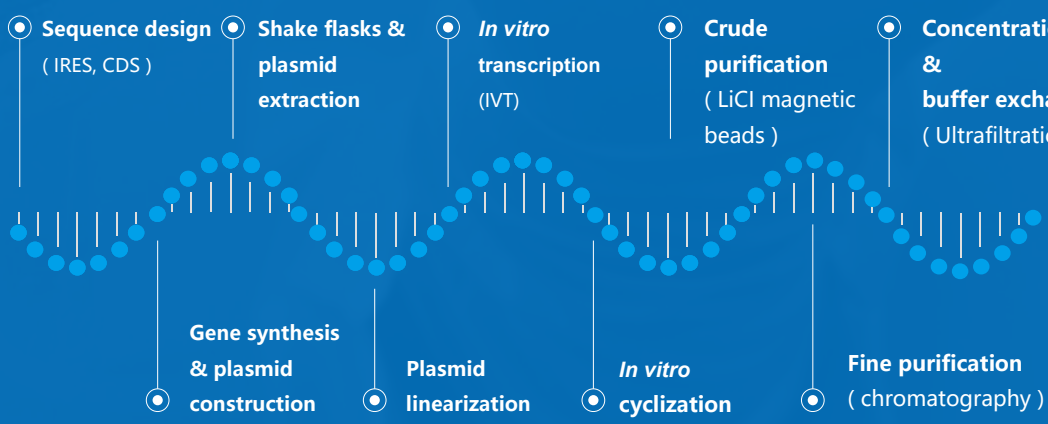
Clients provide gene sequences or amino acid sequences, and we will provide CircRNA customized services according to the needs of clients, including CircRNA sequence structural design and optimization, in vitro transcription template construction, CircRNA cyclization and purification, dimensionality, and cyclization rate identification, as well as high quality CircRNA products and services.



Catalogue CircRNA Products

CircRNA Products	Specification
Circ-eGFP	10μg/50μg/100μg
Circ-luciferase	10μg/50μg/100μg
Circ-mCherry	10μg/50μg/100μg
Circ-OVA	10μg/50μg/100μg
Circ-IL2	10μg/50μg/100μg
Circ-Cas9	10μg/50μg/100μg

CircRNA Process Flow



Technology Platform Advantages

RIGOROUS PRODUCTION PROCESS

Strict quality control methods

Detection solutions with highly efficient circularization rate

GOOD TECHNOLOGY

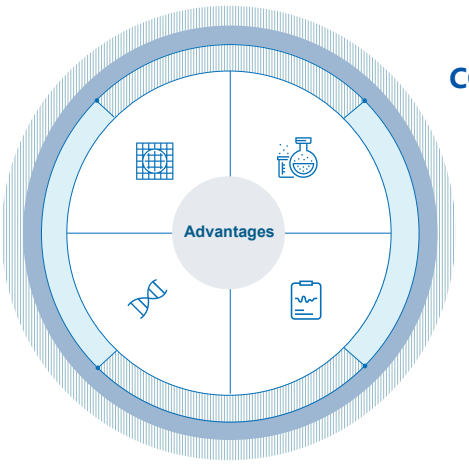
CircRNA preparation service with a size of 50-3000 nt

STABILITY

One week after transfection of cells

Fluorescent protein expression can be detected

With high stability



COMPREHENSIVE SERVICE

- One-stop service from sequencing to finished product
- Provide linearized RNA cyclization service

HIGH EFFICIENCY

HPLC method

Validated by RT-PCR and other methods

With a cyclization rate of >80%

CUSTOMIZATION

Customized RNA cyclization service according to client requirements

FLEXIBILITY

Well self-developed chromatography purification process

Diversified purification methods

Meet the needs of different experimental applications

CERTIFIED TECHNICAL EXPERTS

PhD-led senior technical team

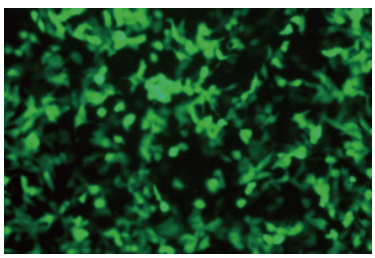
Advanced experimental equipment and strict quality assurance team

Fast response to meet client's delivery requirements

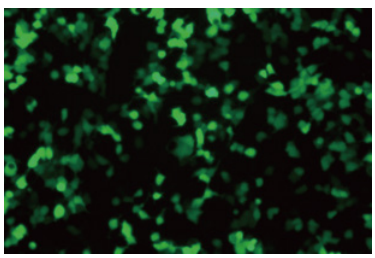
Case Study

Cellular Evaluation

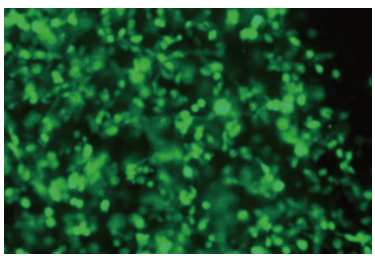
CircRNA-eGFP prepared in vitro is efficiently and stably expressed, and strong fluorescence signal can still be detected one week after transfection of cells.



CircRNA - eGFP (24h)



CircRNA - eGFP (48h)



CircRNA - eGFP(72h)

CRO Services for Single-domain Antibodies

Our CRO services offer clients a one-stop solution for single-domain antibody production. From strain construction to the expression, purification, and large-scale production of multifunctional single-domain antibodies, our services are tailored to meet the diverse experimental or project requirements of our clients.

Full ecological recombinant expression system

E.coli expression system
Yeast expression system
Mammalian cell expression system

Diversified single-domain antibodies types

Monovalent single-domain antibody
Multivalent single-domain antibodies

Well-developed purification platform

Complete purification platforms
Combined

From μg to kg

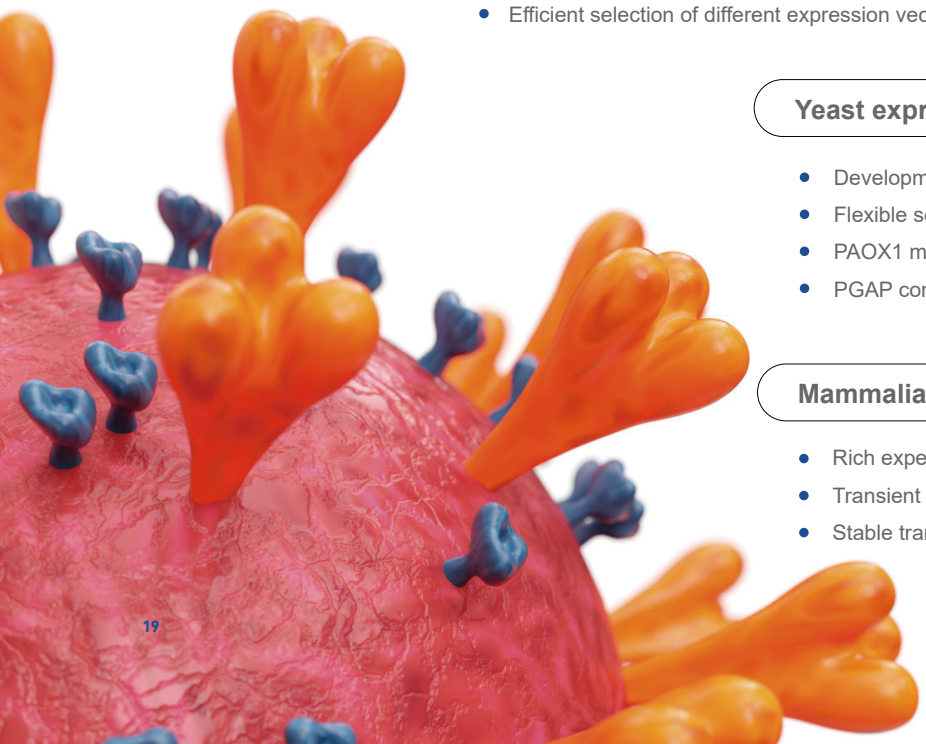
The maximum expression level of single domain antibodies can reach up to 10g/L

Full Ecological Recombinant Expression System

Yaohai Bio-Pharma has established a full ecological recombinant expression system for single-domain antibodies. The existing expression systems include: E. coli expression system, yeast expression system (*pichia pastoris*), mammalian cell expression system which are created using a variety of expression host strains.

E.coli expression system

- Development experiences of 20+ products
- Flexible selection of different *E.coli* hosts
- Efficient selection of different expression vectors



Yeast expression system *(pichia pastoris)*

- Development experiences of 20+ products
- Flexible selection of different pichia pastoris hosts
- PAOX1 methanol induced expression system
- PGAP constitutive expression system

Mammalian cell expression system

- Rich experience in single-domain antibodies development of 5+products
- Transient expression single-domain antibodies
- Stable transformation strain expression single-domain antibodies

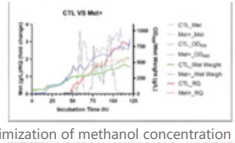
CRO Services for Single-domain Antibodies

The client supplies the gene sequence (or amino acid sequence) for the nano-antibodies and selects the desired expression host cells, while Yaohai Bio-Pharma offers comprehensive services that encompass gene synthesis, nano-antibody expression, purification, and production to cater to the client's customized nano-antibody needs.

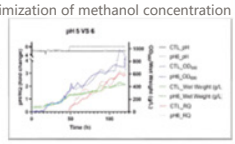
Steps	Services	Period	Delivery
Construction of single-domain antibodies expressed engineering strains (selection from yeast, *E.coli* or mammalian cells)	*E.coli* expression system (cytoplasmic or periplasmic space expression) *Pichia pastoris* expression systems (either methanol-induced expression system PAOX1 or constitutive expression system PGAP) Mammalian cell expression system (single-domain antibodies expression by transient or stable transfection)	1 week - 2 weeks for *E.coli* (excluding gene synthesis period) 2 weeks - 3 weeks for *Pichia pastoris* 1 week - 2 weeks for transient mammalian cells, and about 2 months for stable transformation strains	Purification of the obtained single-domain antibodies, purification single-domain antibodies assay report SDS-PAGE, SEC-HPLC (optional), RP-HPLC (optional) and CE-SDS (optional) purity analysis methods
Small-scale expression purification (labeling)	For the expression of single-domain antibodies by the constructed engineering strains, purify 1L expression volume of protein. (labeling is recommended).	2 weeks - 3 weeks	
Large-scale expression purification	For large-scale fermentation of nano-antibody samples, the expression and purification of the fermented nano-antibodies are simultaneously carried out.	5 weeks - 8 weeks	

Production process development » **Large-scale production** » **Purification system** » **Quality analysis system**

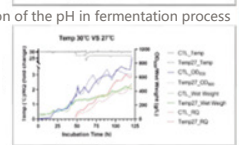
- The optimal fermentation is achieved by single-factor optimization of methanol concentration and fermentation temperature and pH in the fermenter
- The higher yield of expressed single-domain antibodies fermentation is achieved by optimizing the combination of optimal conditions for single-domain antibodies fermentation.
- Rich experience in purification of nanobodies
- Flexible combination of various purification methods, such as affinity chromatography, ion chromatography, hydrophobic chromatography, etc.
- Quality analysis system assurance
- Diversified quality analysis methods
- Rich experience and purity assurance



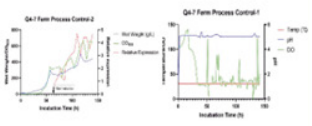
Optimization of methanol concentration



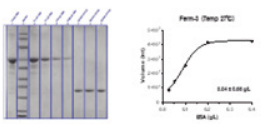
Optimization of the pH in fermentation process



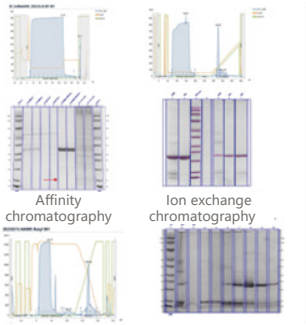
Optimization of the temperature in fermentation process



Fermentation process optimization



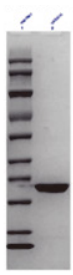
Single-domain antibodies fermentation yield



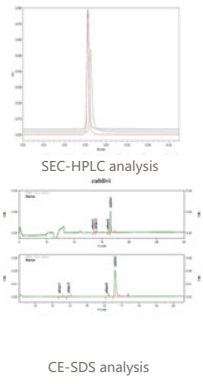
Affinity chromatography

Ion exchange chromatography

Hydrophobic chromatography



SDS-PAGE gel analysis

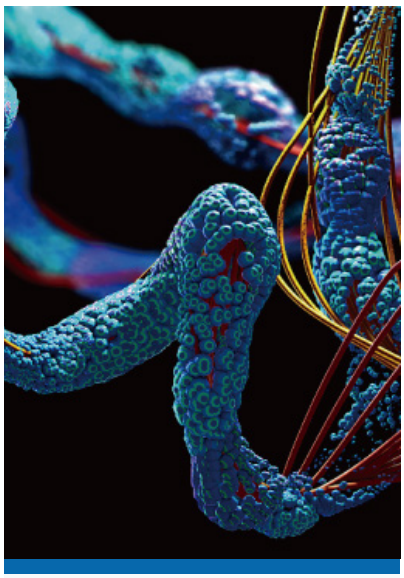


SEC-HPLC analysis

CE-SDS analysis

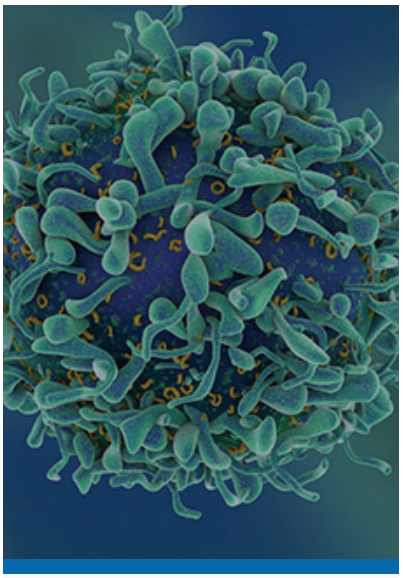
CDMO SERVICES

Yaohai Bio-Pharma, a dedicated CRDMO service provider specializing in microbial expression systems, offers comprehensive one-stop biopharmaceutical services. We focus on three key technological domains: recombinant proteins, nucleic acid drugs, and nano-antibodies. We provide efficient and flexible CRDMO services to global biotechnology companies, including process development, IND-CMC pharmaceutical research, GMP production of clinical samples, NDA submission, and MAH commercialization. Our services aim to assist clients in realizing the entire process from DNA to commercial production.



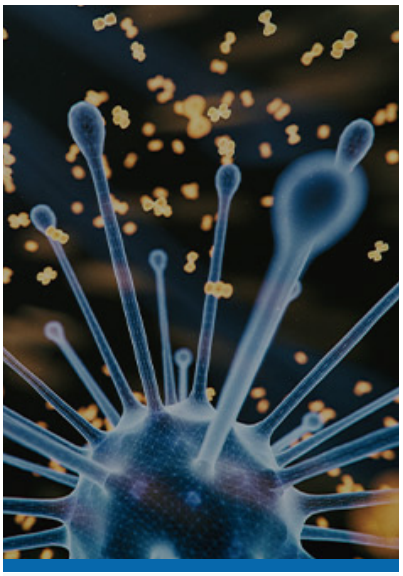
Recombinant Protein

One-stop CDMO services for recombinant proteins and peptides



Nucleic Acid Drugs

Focus on plasmids, mRNA/CircRNA and other long chain nucleic acid drugs to accelerate the process from basic scientific research to clinical application



Single-domain Antibodies

Comprehensive reconbinant nano-antibodies expression system, providing integrated and end-to-end nano-antibody CDMO services.

One-stop CRDMO services

DRUG DISCOVERY	PRECLINICAL RESEARCH	CLINICAL RESEARCH	COMMERCIALIZATION
Trial sample preparation services (mRNA、CircRNA、Single-domain antibodies)	Microbial strain engineering and construction / cell bank construction Process development Process transfer Formulation development Analytical method development Preclinical sample preparation Registration application and consulting services Stability study Regulatory support	Process transfer Process scale-up Clinical sample production Stability studies Release testing Regulatory support	Process characterization Process validation Product production Stability studies Release testing Regulatory support
	· 2L · 50L · 500L · 10L · 100L · 1000L · 30L · 200L · 2000L	· 50L GMP · 500L GMP · 100L GMP · 1000L GMP · 200L GMP · 2000L GMP	· 50L GMP · 500L GMP · 100L GMP · 1000L GMP · 200L GMP · 2000L GMP

Rich project experience

More than 100 projects have been served, covering preclinical research, clinical phase I, II and III, including multiple registration projects for China-MNPA, US-FDA, and Australia-TGA.

Professional team

Veteran CDMO execution team supported by senior industry professionals are dedicated to each project to guarantee efficient and collaborative project management

One-stop service

Provide one-stop service from process development to commercial production

Compliance service

All QA/QC personnel have undergone strict GMP training and guidance to meet the standards of the new version of GMP. We can accurately assess the compliance of analytical methods and quality release standards, allowing us to swiftly complete the transfer and validation of analytical methods. We ensure rigorous quality control throughout the project.

Comprehensive production line

Five independent GMP-grade custom production lines that cover fermentation scales from 50-2000L. Our precision equipment can provide clients with crude and refined product. Independent production lines can be dedicated for specified client use.

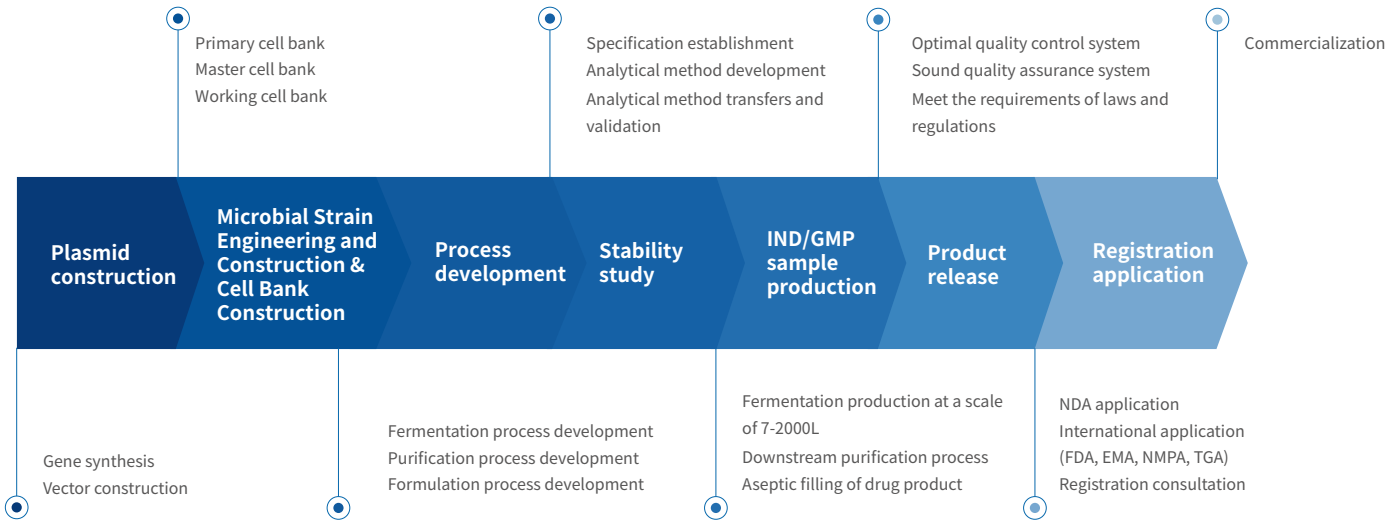
MICROBIAL FERMENTATION

RECOMBINANT PROTEIN CDMO SERVICES OVERVIEW

In the field of recombinant protein services, Yaohai Bio-Pharma can provide one-stop services of CMC:

- Recombinant proteins
- Cytokines
- Vector proteins
- Recombinant polypeptides
- Enzymes
- Allergens
- VLPs
- Vaccines

Recombinant Protein CDMO Services Cover The Full Cycle of Product Development



Types of Recombinant Protein Expression Services

Yaohai Bio-Pharma has an integrated CMC development and cGMP production process to produce recombinant proteins, plasmids, and DNA fragments using *E. coli* and yeast expression systems.

STRAIN CONSTRUCTION	LAB SCALE PROCESS DEVELOPMENT	PILOT SCALE UP AND PRODUCTION	QUALITY ANALYSIS AND CONTROL
Services	**Services**	**Services**	**Services**
• Gene synthesis • Plasmid construction • Strain construction • Vial target proteins and assays • Strain preservation and testing • Strain bank construction	• Optimization and verification of fermentation conditions • Scale-up and verification of 30L fermentation process • Purification process development, optimization and verification • Scale-up and verification of 30L purification process	• Analytical method development, validation and verification • Analysis and release testing of iintermediates , finished drug substances from lab to production scale • Stability study • Release testing for strain bank and testing for raw materials and excipients	• Pilot-scale process optimization and scale-up production • IND application of batch production • Clinical phase I-III sample production • Industrialized production • Standard substance preparation
Service features	**Service features**	**Service features**	**Service features**
• Highly efficient screening of high expression strains within four weeks at the earliest • Selection of a variety of host strains and expression vectors, with codon analysis and optimization • One-stop service from gene sequencing to stable strain delivery by experienced technical team	• Provide optimization and screening of more than 10 parameters and complete fermentation process development within 1.5 month at the earliest • With various types of fermenters and bioreactors, fermentation of different vectors with high-density fermentation can be satisfied • Establish the evaluation, optimization and control strategies of fermentation and purification process parameters based on the concept of Quality by Design (QbD) • Build a high-throughput chromatography media screening platform and introduce DOE design for rapid process optimization	• With fermentation processes at a scale of 30L-50L-200L-1000L-2000L, matched by purification and drug product scale, the needs of different projects can be satisfied • 20+ pilot-scale up and production projects have been completed, including pilot-scale up, IND sample preparation, clinical phase I & II sample preparation, with extensive project experiences	• Rich experience in quality research, with several projects successfully passing on-site inspections by NMPA • The laboratory is equipped with a variety of chromatography techniques and assays to meet different types of compounds • With a high-quality management system, the quality management and risk management throughout the whole process of experimental projects, as well as the compliance with the corresponding requirements of NMPA and FDA can be ensured

Advantages of Recombinant Protein Service Platform

01 Integrated recombinant protein process development capability

With comprehensive and diversified recombinant protein process development experience, including: recombinant polypeptides, cytokines, carrier proteins, recombinant enzymes, allergens, VLPs, vaccines, and other types of recombinant proteins.
Advanced process development concept: The critical quality attributes (CQA) of the product are studied to establish the critical process parameters (CPP) through DoE based on the requirements of QbD (Quality by Design), which ensure robustness of process and meet the product quality requirements.
Well-developed platforming process: Well-developed label-free protein process development capability reduces the process steps, improves protein purity, and ensures the process impurities and residual product impurity conforming to the requirements. Platform-based process can rapidly response to the project needs and shorten the process development time.

02 Rich project experience

Recombinant protein CRDMO services

+ 5 IND clinical approval letter.

+100 successfully serviced recombinant protein CMC projects

Professional team

Our experienced and reliable CRDMO service team, with extensive experience in various recombinant protein projects, focuses on innovative process routes. We swiftly address process challenges and reduce R&D costs.

Professional PM project management team proficiently masters the project management of the whole life cycle of biologics development, can identify and manage the project critical path, identify, control and manage the project risks.

03 Comprehensive production capacity

Large-scale preparation service at a scale of 50L-100L, 200L, 500L, 1000L and 2000L, etc.
2 production lines of drug products (vial lyophilized powder/injection, pre-filled cartridge).

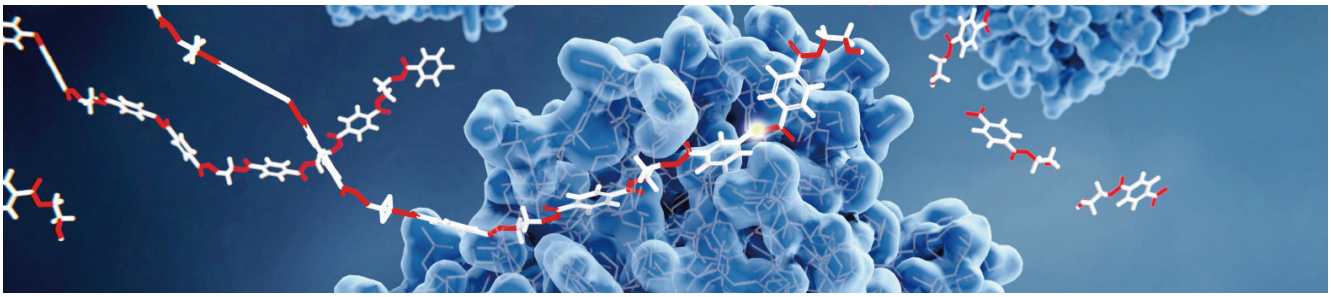
04 Optimal Project Management System

Provide a full range of quality management service, with professional and standardized service system, and the whole cycle complies with the requirements of the new edition of pharmacopoeia and GMP related guidelines.

05 One-stop CRDMO services

Provide one-stop service from strain construction to commercial production, covering all stages of preclinical, clinical phase I, II, III and production process.

Cases of Recombinant Protein CDMO Services



Recombinant human interleukin-2 services

Target product: Recombinant human interleukin-2

Expression system: *E.coli*

Before process optimization

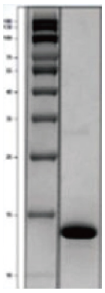
Process issues such as low expression of target protein, poor purification,bacterial endotoxin exceeding pharmacopeia standard (out of range 10EU per 1 million IU).

After process optimization

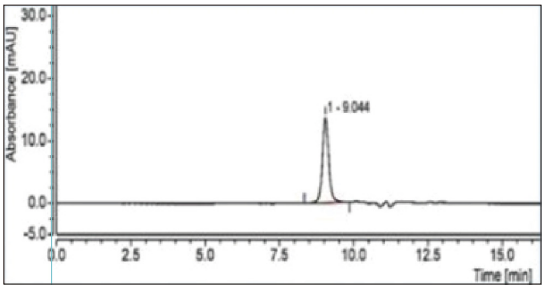
Yaohai Bio-Pharma utilizes the *E.coli* prokaryotic expression system for the expression and purification of target proteins.

- Bacterial endotoxin<1EU/mg
- Purity >98%
- Yield of target protein>10mg/g cell

Relevant SEC-HPLC quality analysis
The results of SDS-PAGE analysis are shown in the figure



SDS-PAGE analysis



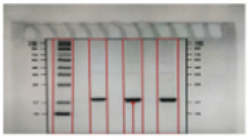
SEC-HPLC quality analysis

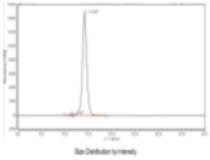
VLPs services

After process optimization

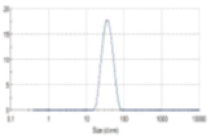
Leveraging Yaohai Bio-Pharma mature recombinant protein technology, we have swiftly completed the process optimization, significantly reducing the R&D cycle, accelerating project progress, and exceeding client expectations.

- Short process development cycle: process optimization can be completed within 2-4 months
- High success rate: platform-based process, with a success rate of 100%
- Bacterial endotoxin<1EU/mg
- Purity >99%





SEC-HPLC
PURITY99.6%



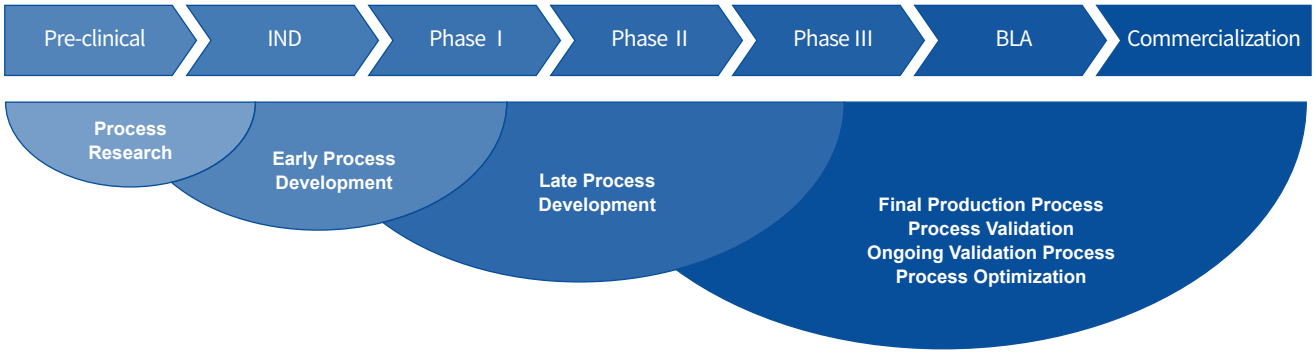
NUCLEIC ACID DRUGS

PLASMID CDMO SERVICES

Overview of Plasmid CDMO Services

Yaohai Bio-Pharma commits to providing one-stop plasmid CDMO services, has established a GMP-compliant circular plasmid production platform and a linearized plasmid production platform, with well-developed production process and GMP production experience, and can provide clients with integrated CDMO services:

- Plasmid construction
- Strain bank construction
- Process development
- Quality analytical methods development
- Stability study
- Non-clinical research plasmid production to clinical plasmid GMP production
- IND application
- Clinical trials to commercial production



SERVICES

- PLASMID CONSTRUCTION
- STUDY ON STORAGE AND STORAGE STABILITY OF STRAIN
- DEVELOPMENT AND VALIDATION OF ANALYTICAL METHODS
- STRAIN CONSTRUCTION AND SCREENING
- DEVELOPMENT AND OPTIMIZATION OF FERMENTATION PROCESS
- HUNDRED-MILLIGRAM PLASMID PRODUCTION PREPARATION AND DETECTION[GMP-LIKE]
- ESTABLISHMENT OF STRAIN BANK [PCB/MCB/WCB]
- DEVELOPMENT AND OPTIMIZATION OF PURIFICATION PROCESS
- PRODUCTION AND RELEASE OF GMP PLASMID
- TEST AND PASSAGE STABILITY STUDY OF STRAIN BANK
- PROCESS VERIFICATION
- STUDY ON PLASMID STABILITY
- WRITING OF REGISTRATION MATERIALS

Plasmids at Different Levels

Yaohai Bio-Pharma can provide plasmids at multiple levels of complexity to meet the needs of different stages of pre-research, IIT, IND application, clinical research and commercial production.

Plasmid production of non-registration clinical research level (IIT)

Development and production of plasmids for non-registration clinical research level

Overall solution for plasmid clinical application (IND)

Plasmid development and production of gene cell therapy and nucleic acid drug for clinical registration and application

GMP production of plasmids at clinical level

Clinical samples and commercial GMP production for gene cell therapy and nucleic acid drugs

Plasmid level	Scale	Applications	Preparation conditions
Plasmids at research level	1-500mg	Preclinical research	Process development laboratory
GMP-like plasmids	100mg-5g	Non-registration clinical/preclinical research	GMP workshop
GMP plasmids	100mg-5g	IND application/phase I-III/commercial production	GMP workshop

Plasmid Process Development Platform

The plasmid process development platform of Yaohai Bio-Pharma, adopting the Quality by Design (QbD), possesses comprehensive capabilities in CMC process development and optimization, analytical method development, and quality control. It supports the preparation of research-grade plasmids under non-GMP and GMP-like conditions, providing plasmid vector services that meet various needs.

Fermentation purification systems are ranged to meet the multi-scalar needs from laboratory development to GMP production.

		Laboratory	Pilot scale up	GMP production
Fermentation system	Equipment	Quadruple fermenter	Fermentation system*2	Tofflon fermentation system*5
	Scale	2L/7L*4 sets	20L/30L fermentation system*1 50L/69L fermentation system*1	50L-100L-200L-500L-1000L-2000L
Ultrafiltration system	Equipment	Fluxs tangential flow membrane filtration system	Hollow fiber / Membrane Cartridge	Fully automated ultrafiltration system
	Scale	50ml-5L	100ml-30L	5L-60L
Chromatography system	Equipment	AKTA(pure/Avant)	RJBIO LPLC 180G	Gradient chromatography system
	Scale	9L/H	3L/H-180L/H	60L/H、180L/H、600L/H

Plasmid Process Development Platform

With GMP plasmid production and process development workshops, Yaohai Bio-Pharma can provide plasmid production services at different stages of non-registration clinical research, IND application, clinical research, and commercial production.

01

With five independent production lines of drug substances and two automatic aseptic production lines of drug products, enabling utomatic aseptic production of injection (vial), lyophilized powder and pre-filled cartridges

02

Provide plasmid production at different scales from 30-2000L to meet the production needs of research, lab-scale and pilot-scale production

03

GMP production workshop, meeting the standards of FDA, EMA, and NMPA

04

International mainstream automated fermentation, ultrafiltration and purification system

05

Unidirectional design of personnel flow, material flow and sample flow to avoid cross-contamination

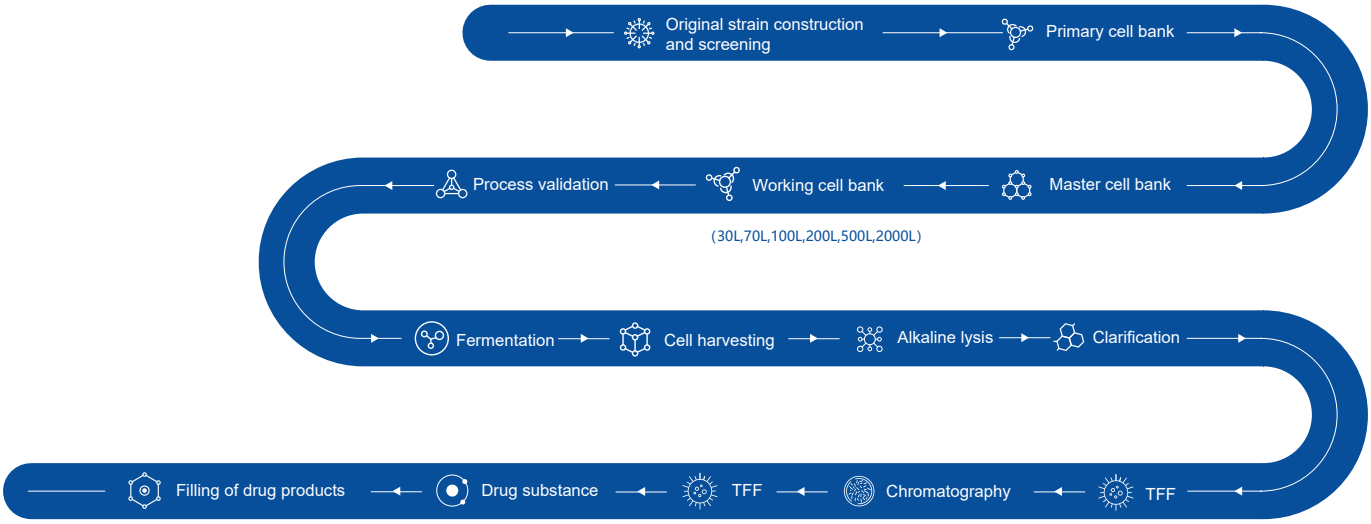
Plasmid Process Development
GMP Production Process of Plasmids

Supercoiled plasmid process development flow

- Recombinant plasmids
- Genetically stable strain screening
- Microbial cell bank construction (PCB/MCB/WCB)
- Genetic passage and storage study
- Fermentation process development/optimization
- Purification process development/optimization
- Process scale-up study and validation

Application types	Naked plasmid products, DNA vaccines/DNA drugs, viral vector constructs (LV/AAV), viral vaccines, LcDNA
Preparation conditions	Lab-scale plasmid preparation under non-GMP/GMP-like conditions
Scale	GMP-like plasmid sample preparation at a scale of 100 mg

Supercoiled Plasmid Production Process



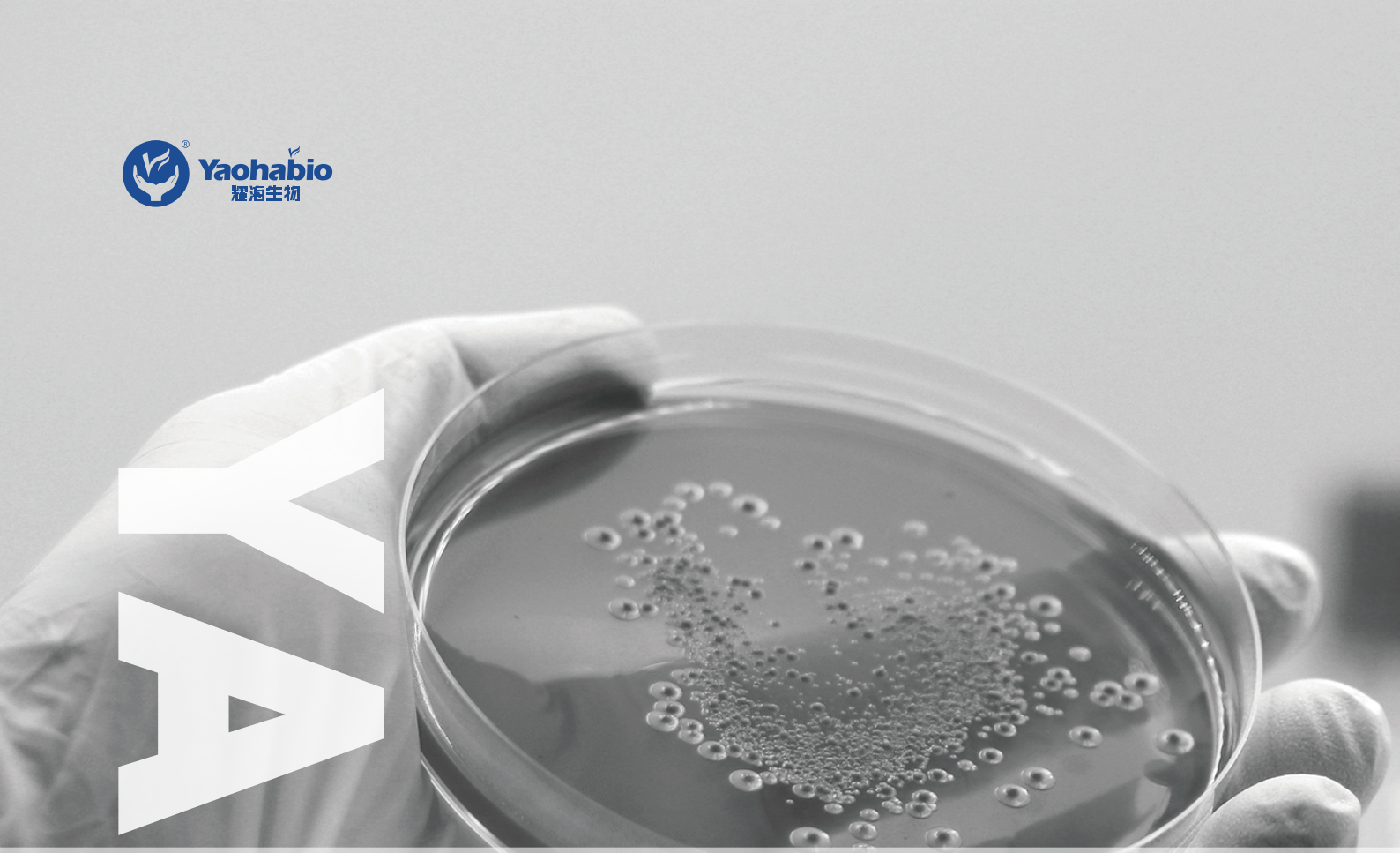
High-density fermentation

In-line lysis process

Two/three-step chromatography

IND Project Progress Overview

Development of plasmid project cycle	Month	1				2				3				4			
Milestones	Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Recombinant strain construction	4	●	●	●	●												
Microbial cell bank construction and passage stability	5					●	●	●	●	●							
Lab-scale plasmid development and verification	4						●	●	●	●							
Analytical method validation	4								●	●	●	●					
GMP plasmid production, testing and release	4												●	●	●	●	
Long-term stability study (as per protocol)	N / A																→

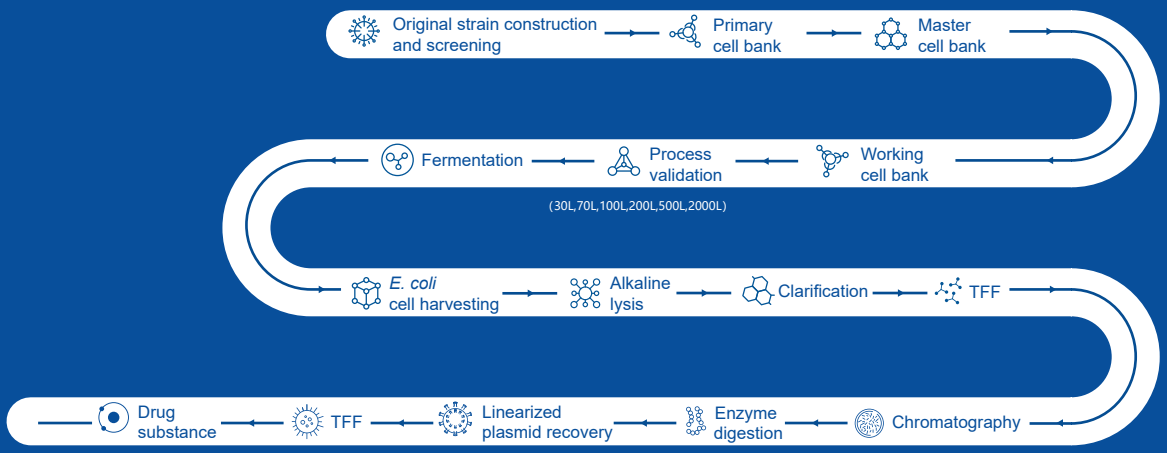


Linearized Plasmid Process Development Flow

- Recombinant plasmids
- Genetically stable strain screening
- Microbial cell bank construction(PCB/MCB/WCB)
- Passage stability study
- Fermentation process development/optimization
- Supercoiled plasmid purification process development/optimization
- Enzyme digestion and linearization plasmid purification process study
- Process scale-up study and validation

Provide GMP-like linearized plasmid sample preparation at a scale of 100 mg

Linearized Plasmid Generation Process Flow



High-density fermentation | In-line lysis process | Two/three-step chromatography

IND Project Progress Overview

Development of plasmid project cycle	Month	1				2				3				4			
Milestones	Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Recombinant strain construction	4	●	●	●	●												
Microbial cell bank construction and passage stability	5					●	●	●	●	●							
Lab-scale plasmid process development and validation	5						●	●	●	●	●						
Analytical method validation	4								●	●	●	●					
GMP plasmid production, testing and release	5												●	●	●	●	●
Long-term stability study (as per protocol)	N / A																→

Testing Standards

Supercoiled Plasmid

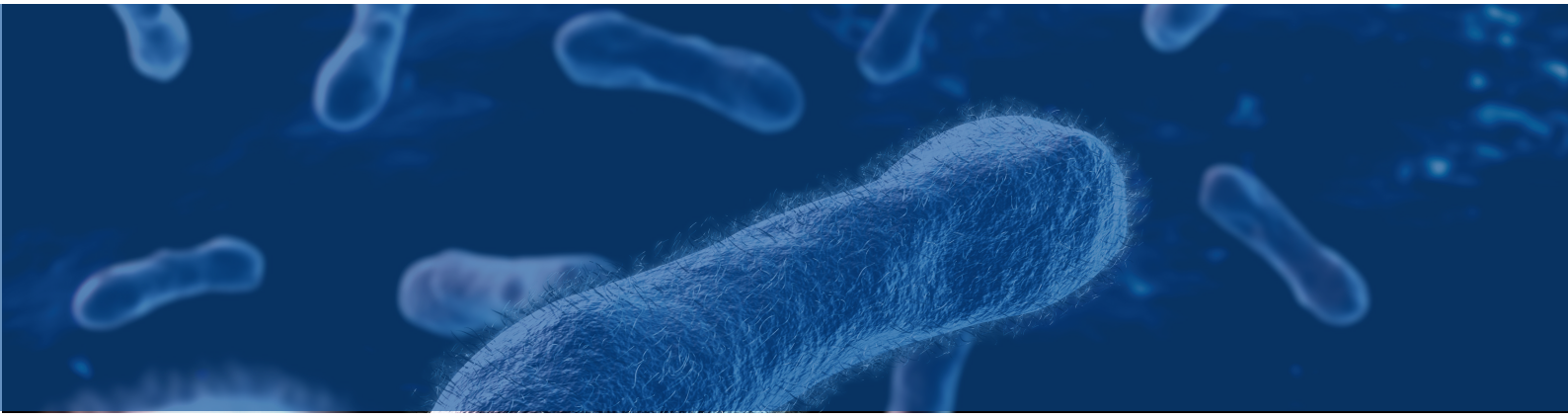
Test Items	Test Method	Specification
pH	pH determination method	7.2±0.5
Appearance	Visual method	Colorless clear liquid
Plasmid concentration	UV method	N/A
Plasmid identification	Sanger sequencing	Consistent with theoretical sequence
Plasmid assay	Restriction nuclease method	Consistent with the theoretical chromatogram
Plasmid purity	UV260/UV280	1.8~2.0
Supercoil ratio	CE	＞80%

Test Items	Test Method	Specification
Residual host genomic DNA	Q-PCR	＜0.2%
Host cell protein	ELISA	＜0.1%
Residual host RNA	qRT-PCR	＜50μg/mg
Endotoxin	Gel method	＜10EU/mg
Antibiotic residues	ELISA	＜50ng/mg
Sterility	Direct inoculation/ film filtration	Meet the requirements

Linearized plasmids

Test Items	Test Method	Specification
pH	pH determination method	N/A
Appearance	Visual method	Colorless clear liquid
Plasmid concentration	UV method	N/A
Plasmid identification	Sanger sequencing	Consistent with theoretical sequence
Plasmid purity	UV260/UV280	1.8~2.0
Linearized plasmid ratio	CE	＞80%

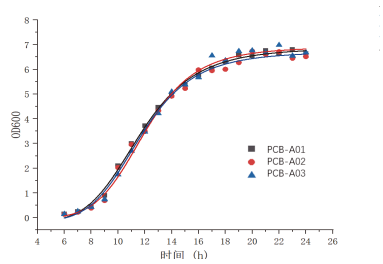
Test Items	Test Method	Specification
Residual host genomic DNA	Q-PCR	＜0.2%
Host cell protein	ELISA	＜0.1%
Residual host RNA	qRT-PCR	＜50μg/mg
Endotoxin	v	＜10EU/mg
Antibiotic residues	ELISA	＜50ng/mg
Microbial limits	Direct inoculation method/film filtration method	Conformity
Poly A length(Optional)	LC-MS	N/A



Plasmid Case Study

Good strain stability

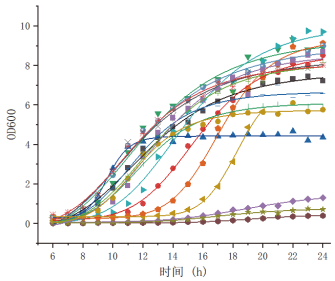
Primary Cell Bank (PCB) growth curve



PCB growth curve

Achievable DoE design of fermentation process

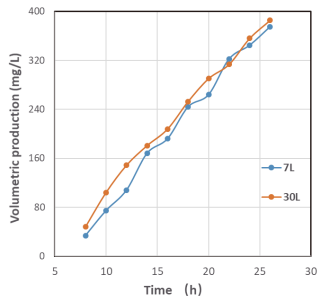
DoE design of medium screening



fermentation strain growth curve

Good stability and scalability

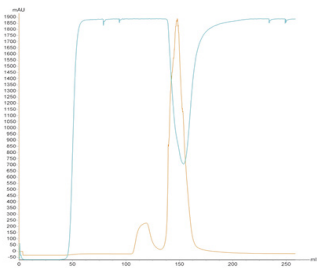
3 batches of plasmid yield at different fermentation scale of 7L and 30L



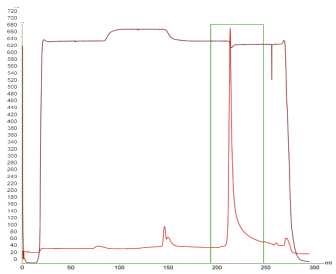
fermentation plasmid yield

Two or Three-step Purification Process

Purification chromatogram



plasmid purification:
Bastarsose 6FF chromatogram



plasmid purification:
PlasmidCap HP chromatogram

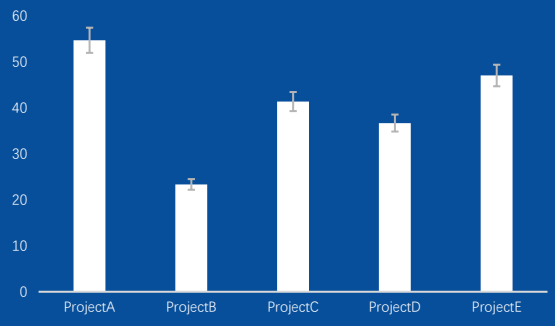
Plasmid purification platform

Recovery rate up to 54.67%

Supercoil ratio up to 97.20%

Critical residues:

HCP < 0.01%， HCD < 0.2%。



	Project A	Project B	Project C	Project D	Project E
IEC(%)	96.09	97.20	92.46	93.15	96.04
HCP(%)	< 0.1	< 0.1	< 0.01	< 0.1	< 0.1
HCD(%)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

SINGLE-DOMAIN ANTIBODIES

CDMO SERVICES

Single-domain Antibodies Full Ecological Recombinant Expression CDMO Services Platform

Yaohai Bio-Pharma offers a comprehensive one-stop CDMO solution for single-domain antibodies, providing clients with services throughout the entire life cycle. We can customize research and production from early drug findings, clinical research to commercial productions scale.

Plasmid construction

- Gene synthesis
- Vector construction

Microbial cell bank construction

- Primary cell bank construction
- Master cell bank construction
- Working cell bank construction

Process development

- Fermentation process development
- Purification process development
- Drug product process development

Stability study

- Specification establishment
- Analytical method development
- Analytical method transfers and verification

Registration and application

- IND application
- NDA
- International application* (FDA, EMA)
- Registration service consultation

Product release

- Optimal quality control system
- Sound quality assurance system
- Meet the requirements of laws and regulations

IND/GMP sample production

- Fermentation production at a scale of 7-2000L
- Downstream purification process
- Aseptic filling of drug product

Advantages of Single-domain Antibodies Services

Advanced Process Development

- A stable process with high output and yield can be achieved by determining the critical process parameters (CPP) with the critical quality attribute (CQA) as the starting point. This can be obtained through Design of Experiments (DoE) based on the concept of Quality by Design (QbD).

Rich Project Experience

- More than 100 projects completed for preclinical research, clinical phase I, II, and III, including several registration projects filed for China-NMPA, US-FDA, and Australia-TGA.

Professional Team

- Support by experienced and stable CDMO services team, with rich service and accumulated technical experiences in multiple categories of recombinant protein projects, and focus on process route innovation, quickly resolve process difficulties and reduce the R&D costs
- Professional project management team proficiently supervises biologics development endeavors, by identifying and managing project critical milestones, to preempt project risks.

Comprehensive Production Capacity

- Large-scale preparation services scale: 50L to 2000L
- 2 production lines for drug products:
  - vial-filling (sterile water for injection and lyophilized forms)
  - pre-filled syringes
  - catridge

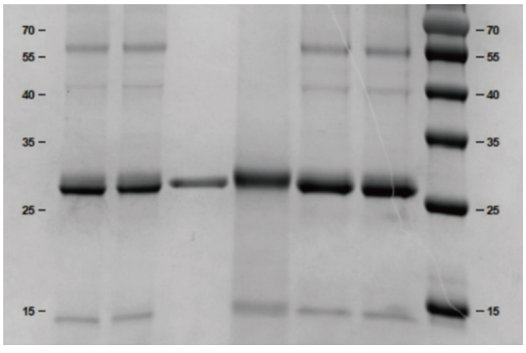
Optimal Quality Management System

- Provide a full range of quality management service, with professional and standardized service guarantee system, and the whole cycle can comply with the requirements of the new edition of the pharmacopoeia and the GMP related guidelines, to continue to deliver products with stable quality for clients.

One-stop CDMO Services

- Deliver one-stop service from strain construction to commercial production; covering all stages of preclinical research, clinical phase I, phase II, phase III and biologics production.

Single-domain Antibodies Case Study



Objective

Purity ≥95%; endotoxin <50EU/mg protein.

Developed a two-step chromatography method

Affinity chromatography: affinity using A3, with a purity of up to 94.1%;
Anion exchange chromatography: using 50HQ, with a yield of 73.9%,
and a purity of 98.1%

The process target requirements were met after the endotoxin testing.

DRUG SUBSTANCE PRODUCTION

Service Capacity

Industrial Scale

Production services of drug substances at a scale of 50L-100L, 200L, 500L, 1,000L, and 2,000L to meet the needs of different projects

Rich Technology Transfer Experience

Comprehensive technology transfer process and risk control system

Compliance Assurance

Well-established quality management system in compliance with the requirements of NMPA/FDA and EMA, and experienced quality management team

Powerful Data Management

More than 80% of production lines are intelligently operated

GMP Production and Quality Control Service Platform
—— Overview of Drug Substance Production

With the capability of a one-stop manufacturing service, Yaohai Bio-Pharma can provide clients with the services of preclinical, clinical, and marketed drug production. There are five production lines of drug substances designed based on QbD, which are compliant with the GMP requirements of NMPA, FDA, and EMA. A range of bioreactors at various sizes; 50L-100L, 200L, 500L, 1,000L, and 2,000L can be allocated to support clients' production needs at different stages of development. Relying on the international advanced production equipment, flexible production line configuration, and high standard quality system; new drug development process of the clients can be efficiently promoted.

Service Items

Strain construction under GMP system	Pilot process optimization and scale-up production
Preparation batch production of samples for IND registration and application	Production of samples at clinical phase I-III
Industrialized production	Preparation of standard substances

GMP Production of Drug Substances with High Productivity and Flexibility

- GMP-compliant production area for drug substances covers an area exceeding 10,000 square meters.
- GMP-compliant fermentation services available at various scales of 50L-100L, 200L, 500L, 1,000L, and 2,000L.
- Independent upstream and downstream production areas, supported by fully functional dedicated area specific process equipment
- Upstream: 5 production lines for drug substances, with a production capacity of 7,500L, and equipped with fermenters at different specifications
- Downstream: 5 purification production lines, equipped with low, medium and high chromatography and ultrafiltration systems, covering a wide process scale
- The plant has been reasonably designed, with qualified air conditioning system and water system (4Q) to deliver a GMP-compliant production workshop
- Advanced equipments (sourced globally) are all qualified (3Q), with PQ available; the instruments and gauges are all completely calibrated
- Supported with compliance QA, operation QA and verification team to ensure efficient implementation of quality system

DRUG PRODUCT PRODUCTION

GMP Production and Quality Control Services
—— Drug Product Production

Production Services of Sterile Drug Products

For the production of sterile drug products (DP, Drug Product), Yaohai Bio-Pharma has built a production workshop for drug product at an area of 2000 ㎡ , which can provide automated production services for sterile drug products in accordance with GMP requirements; high-tech automatic production line integrating multiple processes such as vial washing, drying, sterilization(depyrogenation), filling, lyophilization and capping. The production line meets the requirements of sterile drug products for China NMPA, EU EMA and US FDA. Yaohai Bio-Pharma is experienced in the production of sterile biological drug products and delivers high quality production services from clinical sample production to commercial production of vials and pre-filled cartridges.

For vial injections, the maximum annual output is 10 million
For vial lyophilized powder, the maximum annual output is 5 million

For pre-filled vials and cartridges, the maximum annual output is 8 million

IND, clinical phase I/II/II and commercial production

Comprehensively designed production line for injections, lyophilized powder and pre-filled vials

Category of products to be filled: recombinant proteins, polypeptides, plasmids, antibodies, vaccines and other mainstream biological products

Production Line of Vial Injection and Sterile Lyophilized Powder Drug Product

Filling Range

- 1ml-25ml

Aseptic Production Line

- Product (package material) exposure area are equipped with O-RABS system under Grade A environment protection
- Fully automatic loading and unloading system
- Fully automatic SIP/CIP system for the freeze-drying
- Equipped nitrogen-injected atmosphere protection system
- PMS monitoring system scans real-time environmental abnormalities for rapid detection

Aseptic Filling

- Vacuum stoppering method, suitable for multiple types of stoppering process requirements

Filling Accuracy

- Filling with a very high accuracy: (the filling medium is water for injection) ±0.25%

Filling Speed

- Take an example of 2 mL of vials, the maximum production speed is 300 vials/min, and the maximum lyophilized powder batch size is 37,800 vials/batch

Production Line of Pre-filled Sterile Drug Product

Filling Process

- Plunger pump, peristaltic pump, and double pump system, variable process options are available.

Filling Range

- Pre-filled vials, 1 mL and 3 mL, cartridge, 3 mL

Filling Accuracy

- The filling accuracy is within ±3% for 0.2 mL to 0.5 mL
- The filling accuracy is within ±2% for 0.5 mL to 3 mL

Production Capacity

10 Million Vials

(annual production)

Specification 1ml-25ml

Vial Injection

5 Million Vials

(annual production)

Specification 1ml-25ml

Vial lyophilized powder

8 Million Vials

(annual production)

1ml-3ml

Pre-filled Vial/cartridges

QUALITY RESEARCH PLATFORM-QC

QC-Quality Control System (GMP)

Based on the rich experience in GMP quality management, Yaohai Bio-Pharma provides clients with continuous and stable quality services through a close cooperation among the quality control (QC) team, the production and quality assurance (QA) team in the areas of testing of raw materials and excipients, intermediate process control, stability study and product release testing of biological drug product. Meanwhile, Yaohai Bio-Pharma established a sound quality control system, in compliance with the regulatory requirements, with certified quality system throughout all phases of QC testing.

Service Content

Analytical method transfer/ verification/validation

Strain bank release testing, genetic passaging stability study

Raw materials and excipients release testing

Testing and standardization of self-made standard substances

Releasing testing of intermediate products, drug substances, semi-finished products, and finished products

Stability study

Service Features

- Advanced quality analysis instruments
- Dedicated QC team----GMP trained and familiar with updated and revised GMP requirements
- Skilled in physical, chemical, biological and microbiological quality control testing methods
- Utilizing current industry specialized testing methods

Bioanalytical Testing Services

At present, Yaohai Bio-Pharma has established a mature quality testing platform in terms of physicochemical, microbiological and biochemical testing, with well-established quality control methods for different products according to their physicochemical characteristics, which can meet the release testing requirements for biological products such as recombinant proteins, peptides, and plasmid products. We also support the analytical and quality control needs throughout the lifecycle of biopharmaceuticals.

Classification	Biochemical Testing Items	Physical and Chemical Testing Items	Microbial Testing Items
Testing items	Expression of target product	Appearance	Plasmid loss rate
	Restriction digestion mapping of plasmid	PH	Seeding LB plate
	Protein content	Visible foreign matter	Staining microscopy
	Purity	Loading	Viable bacteriocins
	Molecular weight	Particulate matters	Antibiotic resistance
	Activity test	Osmolality	Biochemical reaction
	Exogenous DNA residue	Water	Residual antibiotic
	Residual host bacterial proteins	Density	Bacterial endotoxin
	Isoelectric point	Residual organic solvent	Microbial limits
	UV spectroscopy	Optical rotation	Sterility
	Polypeptides mapping		
	Identification		

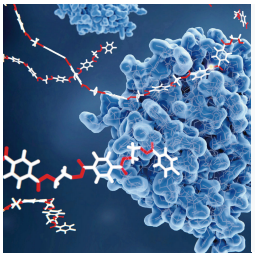
Testing Capability

At present, a variety of conventional items can be tested, with about 30 testing items, and 50 testing methods available, and the testing service capabilities is continuing to be improved.

30+ Test Items

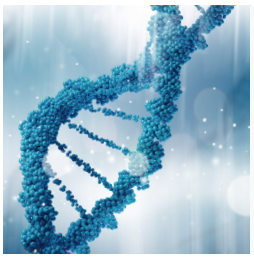
50+ Test Method

Service Capacity



Recombinant Protein Project Experience

100+ recombinant protein projects have been successfully completed, including several PEG-modified protein projects and enzyme-based product projects, with extensive experience in the full testing of recombinant protein projects.



VLPs Vaccine Project Experience

VLPs vaccine testing on multiple projects have been successfully implemented, with proficiency in the quality specification and test items of VLP particles.

Stability Study

Dozens of individual stability study projects have been successfully conducted.

Plasmid Project Experience

Many projects with therapeutic plasmids and viral vector products have been implemented, with accumulated extensive experience in HCD and HCR assays for critical projects.

Analytical Method Verification/Validation

150+ analytical method transfer/verification/validation activities have been completed.

QUALITY RESEARCH PLATFORM - QA

Service Capability

Quality management is the lifeline of Yaohai Bio-Pharma. Yaohai Bio-Pharma offers comprehensive quality management services, unwaveringly adhering to the core objective of ensuring client satisfaction. With a quality policy centered around “quality-oriented, perfect compliance, simple efficiency, unity and cooperation”, Yaohai Bio-Pharma is dedicated to providing sample preparation for IND and clinical phases that align with the requirements of the FDA, EMA, and NMPA. Furthermore, it fulfills the comprehensive quality management services mandated by the NMPA for the commercial production of drug products, ensuring the highest level of quality assurance throughout the entire process.

Establishment of Comprehensive Documentation Platform for Ten Systems

quality management	organization and personnel	premises and facilities	equipment management	materials and products
validation and verification	document management	production management	quality assurance	laboratory management

Establishment Principles Of Quality System

The quality system covers the whole life cycle of a drug product from development to commercial production.

The quality system is based on current domestic and international laws and regulations, adhering to the regulatory requirements of CMC (Chemistry, production and control) activities.

Meanwhile, it is combined with the characteristics of CDMO serives to maintain a certain degree of flexibility and meet the high expectations of clients for contract manufacturing.

Document Assurance System

Yaohai Bio-Pharma establishes a comprehensive document assurance system, which is based on GMP requirements and closely follows the company's business model to ensure that all GMP activities of the Company are covered.

Management Policy	POL
Standard Operating Procedure	SOP
Process flow, specification, inspection procedure	STP
Record, the numbering follows the requirements of SOPs and STPs, with independent review and approval process	Form

Regulatory Support

Based on business needs, the company irregularly engages renowned third-party GMP consulting firms from both domestic and international markets to provide consultation and improvement services for our quality system. Additionally, the company has experts with FDA backgrounds as consultants to assist in promptly resolving issues that arise during the operation of the quality system.

Global

Measures for Administrative of Drug Registration, Good Laboratory Practice for Pharmaceuticals, ICHQ5, Q8, Q9, Q10, Q12, Good Clinical Laboratory Practice, and Good Manufacturing Practice

Globalized

REGISTRATION & APPLICATION SERVICES

Service Overview

01 With an extensive drug registration and application team, high-quality, efficient and accurate registration support can be provided, including domestic and international IND/BLA application services.

02 The comprehensive registration and application services include CMC consulting services, guidance on registration and application strategy, assistance in completing the writing and submission of CMC-related CTD documents, assistance in communication with official agencies, guidance on site verification for development and research, organization of drug registration regulations training and conference guidance, etc.

03 With in-depth research and understanding of domestic and foreign registration-related regulations, comprehensive guidance on regulatory strategies for clients throughout the product development lifecycle can be provided.

Service Content

Registration Services

- Dedicated to CMC regulatory consulting services
- Provide guidance on CMC strategy development and gap analysis for domestic and international registration applications
- Assist in communication with regulatory agencies, response to approval comments and submission of supplemental information
- Convene scientific consultation meetings

Regulatory Support Matrix

- Global regulatory research for drug regulatory agencies
- Regulatory strategy & implementation guidance
- Sorting and interpretation of general regulations and special regulations
- Routine regulatory consultation throughout the year
- One-on-one regulatory consulting
- Project management

Writing of CMC Registration Dossier

- Writing of IND and NDA registration dossier
- Flexible and customized writing services of registration dossier

On-site Verification

- Guidance on preparation of verification materials
- Guidance on the development of on-site verification

Other Value-added Services

- Project demonstration in the process of technology development or transfer
- Process analysis on IND/NDA registration strategy
- Research and evaluation of case-by-case drug product

Service Advantages

Professional Team

Core members have more than ten years of experience in drug registration and project management, with multi-module expertise, rich professional operation experience, and strong professional support from domestic and foreign experts.

Rich Project Experience

Over 200 clients have been served, encompassing a diverse range of project types. Our team possesses extensive project experience, a solid understanding of regulatory guidelines, review requirements, and critical points of drug registration. This enables us to anticipate the key and challenging aspects of a project in advance, significantly increasing project efficiency.

Real-time Information Sharing

By being familiar with the optimal communication channels with official authorities, staying up-to-date with the latest regulatory trends in real time, and fully understanding the laws and regulations of regulatory agencies, real-time information sharing can be achieved with clients. This is based on sufficient information integration and analysis with a powerful database of regulations and document templates.

Full Life-cycle Service Management

By taking advantage of a one-stop service chain that includes the establishment of an R&D system, registration and application of IND and NDA projects, and project management, the management concept of the whole life cycle of drug products is applied throughout the project.

Optimal Project Management Strategy

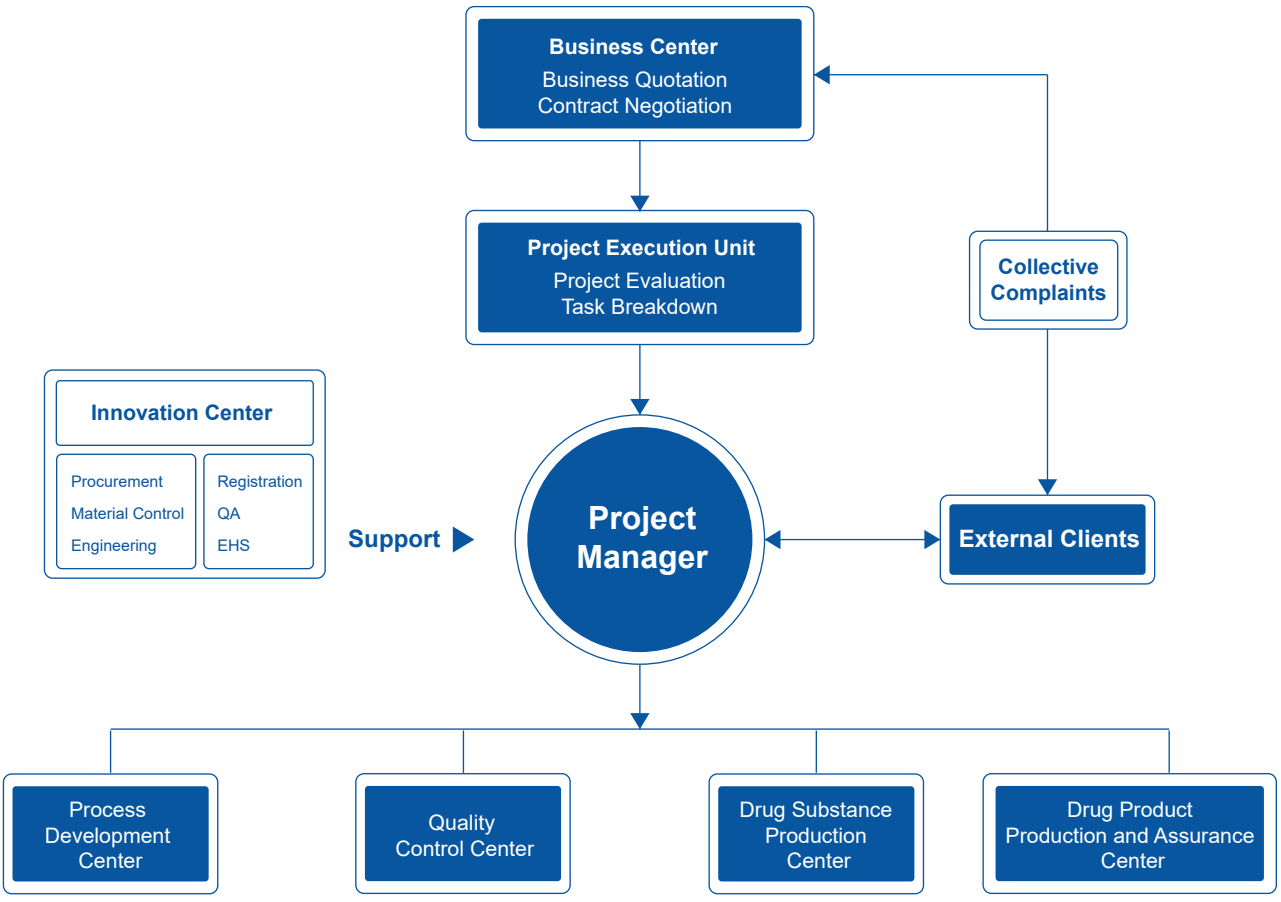
We offer planning and guidance services for the entire lifecycle of each project, propose practical suggestions, prioritize risk management and budget control, closely align with the project's actual circumstances, develop actionable solutions, and guarantee the project's quality.

Project Management & Service Process

313 SERVICE SUPPORT MODEL

“313 service support model” is adopted to provide strong implementation for project operation
Implementation of three-cycle supply chain based on the procurement center, material control center, and engineering center
Strengthen the innovation center to support technical guarantee
Three-cycle compliance based on registration department, QA and EHS
Thus to jointly maintain the project with high quality.

Service System



Service Process

PROJECT CONTACT

Project Communication
Confidentiality Agreement /
Needs Analysis

READY START UP

Contracting
Gap analysis /
Quality agreements

POST-SALE SERVICE

Follow-up Services
Assistance in Official Verification
/ Technical Consultation

ACCEPTANCE DELIVERY

Project Delivery
Deliverables Management /
Cost Settlement

EXECUTIVE CONTROL

Project Implementation
GWBS Promotion /
Process Control

SERVE **WITH HEART** & CREATE **THE FUTURE TOGETHER**

CHOOSE YAOHAI BIO-PHARMA

Project Experience

More than 100 projects have been successfully served, covering the preclinical research, and clinical phase I, II and III, including several registration projects filed for China, US FDA and Australia.

Professional Team

With experienced CRDMO services execution team supported by gradient professionals, the contracting services can be efficiently and collaboratively boosted.

Comprehensive Production Line Protection

High quality and diversified fermentation purification services can be provided with the fully automated fermentation systems at a scale of 2-7500 L.

Compliance Service

With professional, standardized and regulated service guarantee system, the whole life cycle complies with the requirements of the new edition of pharmacopoeia, GMP and other related guidelines.

Flexible Cooperation Mode

Offer customized services that cater to the specific requirements of diverse project types, ensuring quality and efficiency in delivering exceptional client satisfaction.

One-stop Service

Provide one-stop service from process development to commercial production.

CORPORATE CULTURE

Vision

To be a sustainable leader in the CDMO industry for microbial expression systems

Mission

To create global standards, facilitate the process of new drugs, and achieve a healthy life

Yaohabio
耀海生物

CRDMO SERVICES

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