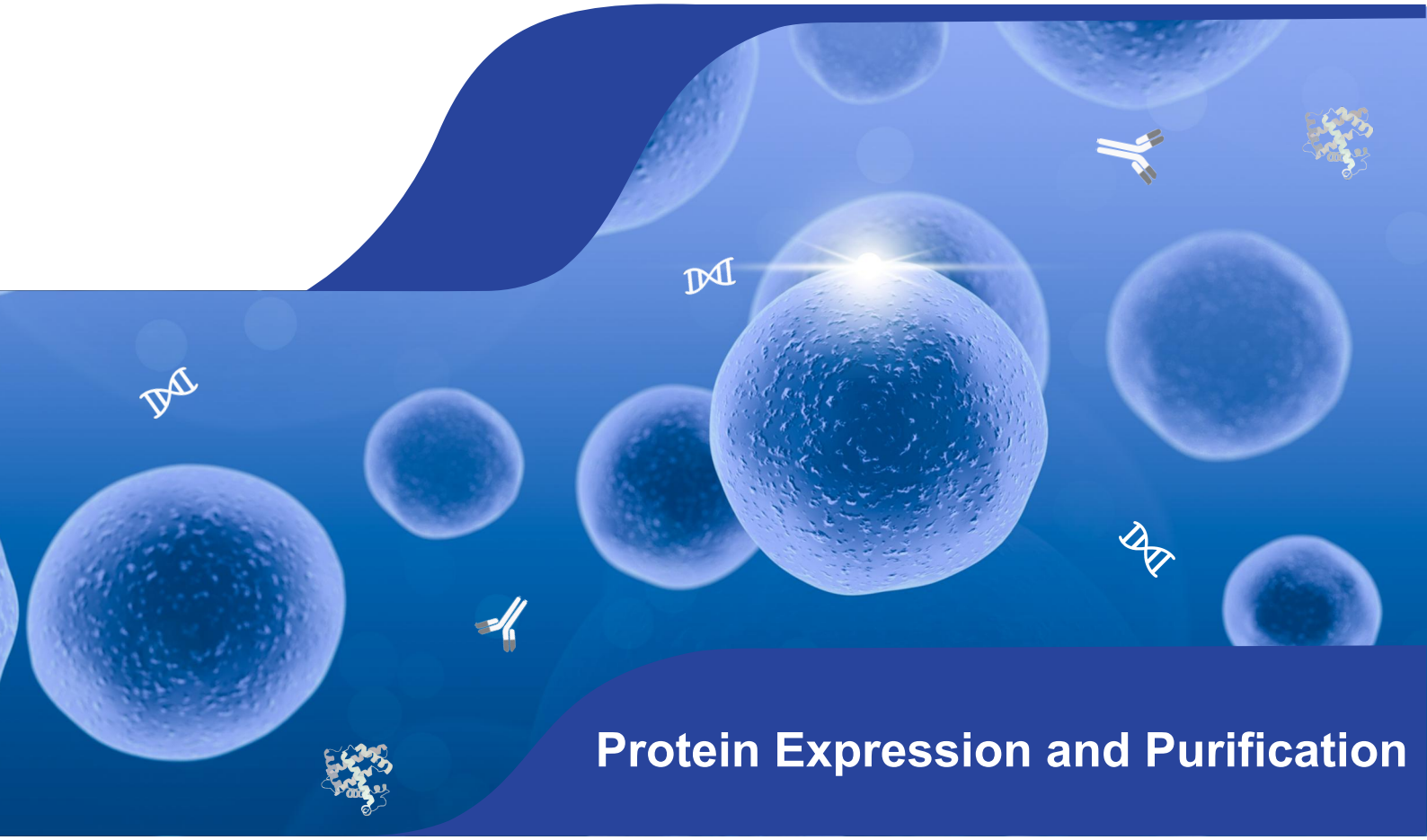
GENCEFE



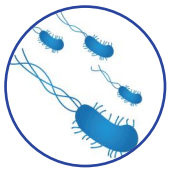
Protein Expression and Purification

GenCefe Biotech's protein production team is composed of technical experts with years of experience in protein expression and purification. With stable production capacity and in-house R&D capabilities, we can provide one-stop solutions from codon optimization, gene synthesis, to protein expression and purification.

In addition to providing protein expression and purification services with four conventional expression systems of bacterial, yeast, insect cell, and mammalian cell, we have also developed a patented cell free expression technology, which is suitable for the production of difficult proteins such as toxic proteins and membrane proteins.

Comprehensive Expression Systems

Cell-Free



Bacterial

Yeast

Insect Cell

Mammalian Cell

Gene-to-Protein Solutions

Sequence analysis and codon optimization → Gene synthesis and subcloning → Protein expression with selected expression system → Protein purification and QC

GenCefe Protein Platform

Service Advantages

Seamless One-Stop Solution: our proven gene synthesis platform and proprietary codon optimization technology ensure optimal protein expression.

Comprehensive Expression Systems: Our proprietary cell-free expression system, combined with bacterial, yeast, insect cell, and mammalian cell expression systems, providing you with the most comprehensive selection of expression systems.

Flexible Service Options: protein expression levels ranging from micrograms, milligrams to gram levels, with the purity of up to 98% and above.

Technical Support: experienced technical team, professional sequence analysis and project design, and timely update and communication of project progress.

Codon Optimization

GenCefe has introduced advanced artificial intelligence (AI) technology into codon optimization and independently developed the Codon Optimization Tool to assist your research and applications with more optimized algorithms.

Case Study: 7.4-Fold increase in eukaryotic protein expression in *E. coli*

The three clones containing optimized SKN-1 gene showed a 6-fold, 7.2-fold, and 9-fold increase separately, with an average of 7.4-fold increase, over the clones containing wild-type.

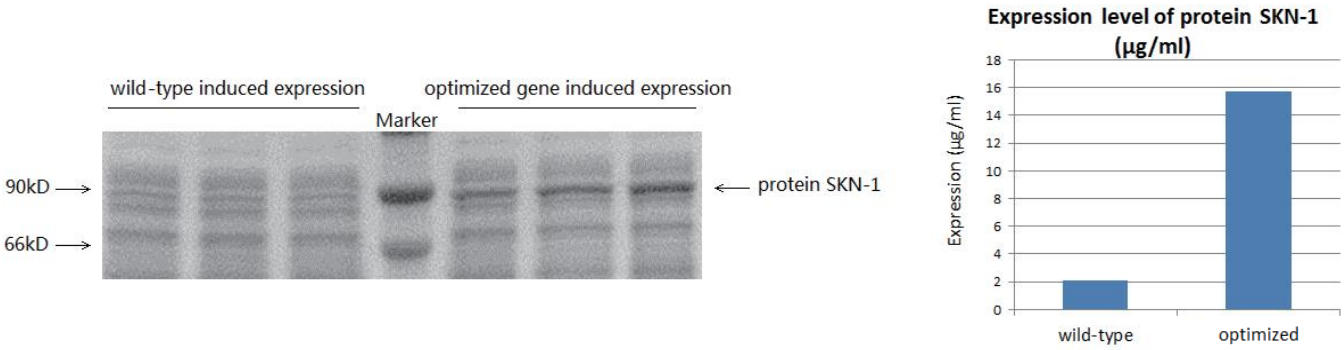


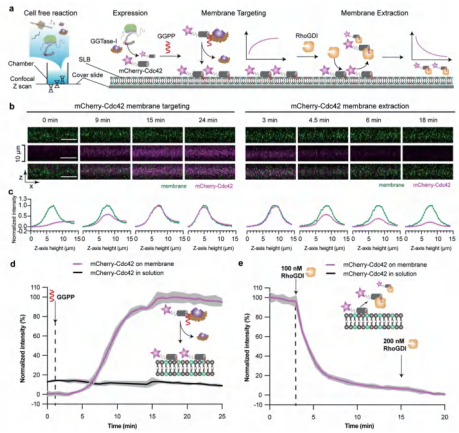
Figure: Left: Protein electrophoresis of bacteria lysate expressing wild-type and optimized SKN-1 gene. Right: protein quantitation by Western Blot.

Cell-Free Protein Expression

GenCefe CFPS (Cell Free Protein Synthesis) platform is led by Lei Kai, co-founder of GenCefe. Dr. Kai is a world-renowned CFPS expert and he holds 28 patents and published more than 20 SCI papers in related fields.

- Our cell-free scientific team has rich experience in production of GPCRs, ion channel proteins, aquaporins, transport proteins, etc.
- We provide customized solutions to meet customers individual needs

Case Study



Dr. Kai's team developed an innovative cell-free expression system, and successfully reconstituted the prenylated polarity hub Cdc42 and its regulatory protein in vitro, implementing a key membrane switch.

Ref: Kai L, Sonal, Heermann T, et al. Reconstitution of a reversible membrane switch via prenylation by one-pot cell-free expression[J]. ACS Synthetic Biology, 2022, 12(1): 108-119.

Service Types

- Cell-Free System Development
- Membrane Protein Preparation
- Optimization of Membrane Protein Expression System
- Cell Extraction Preparation
- Full-Length Membrane Protein
- Membrane Protein Product Development

Service Specifications

Step	Description	Deliverables
Project Evaluation	Project analysis and design based on protein information submitted by customers	Evaluation report
Pilot Expression	Gene synthesis & codon optimization (optional) Cell-free expression system design Pilot expression and detection	Pilot expression data Purified protein
Scale-up Production	Scale up protein expression according to customer's requirement	Purified protein CoA

Bacterial Expression

Bacterial expression system is the most commonly used and most economical protein expression system. With a clear genetic background, the bacterial expression system is easy to cultivate and transform. Its main advantages include high expression level, fast growth cycle and low cost.

GenCefe's experienced scientific team improves protein expression level and solubility by optimizing gene sequences, vectors, fusion tags, expression conditions and other factors that affect protein expression. We can also provide inclusion body refolding, tag removal, endotoxin removal and other services to meet customers' specific needs.

Service Advantages

- **One-stop Solution:** from gene synthesis to protein expression and purification.
- **Codon Optimization:** proprietary technology, significantly improve protein expression level and solubility.
- **Save Time and Budget:** fast turnaround in as short as 4 weeks.

Service Specifications

Step	Description	Turnaround Time	Deliverables
Gene Synthesis (optional)	• Gene synthesis and Codon optimization • Subcloning into selected vector • Plasmid preparation	~2 weeks	• 4 μg of lyophilized plasmid • Codon optimization report
Protein expression evaluation	• Transform plasmids into bacterial • Protein expression, evaluation, and optimization	~1 week	• Purified protein in required amount and purity • CoA
Scale-up expression and purification	• Scale-up protein production with optimized conditions • Purification according to required purity	~1 week	
Tag removal & Refolding (optional)	• Perform tag removal if tag-free protein is needed (upon request) • For insoluble proteins, perform refolding to improve the solubility (upon request)		
QC & Delivery	• SDS-PAGE & Western Blot (tagged protein) • Bradford assay for quantitation • Protein delivery	~1 week	

Mammalian Cell Expression

Compared with other eukaryotic expression systems, the structure and glycosylation of target genes expressed in mammalian cells are almost the same as those of natural proteins. Mammalian cells have unique advantages in the initiation, processing and secretion of proteins. It has become an ideal production platform for a variety of genetic engineering drugs, and plays an extremely important role in the discovery of new genes and the study of protein structure and function.

GenCefe's professional protein production team has established the mammalian cell expression platform to provide high-quality recombinant antibody and recombinant protein services. The turnaround time of recombinant antibodies is as fast as 3 weeks.

Protein Expression

Step	Description	Turnaround Time	Deliverables
Gene Synthesis (optional)	• Gene synthesis and Codon optimization • Subcloning into selected vector • Plasmid preparation	~2 weeks	• 4 μg of lyophilized plasmid • Codon optimization report
Protein expression evaluation	• Transient transfection • Pilot expression • Expression analysis	2-3 weeks	• Evaluation report • Purified protein (remaining after testing)
Scale-up production and QC	• Scale-up production according to customer's requirements • SDS-PAGE & Western Blot (tagged protein) • Protein delivery	3-5 weeks	• Purified protein in required amount and purity • CoA

Recombinant Antibody Production

GenCefe uses a high-yield mammalian expression system, coupled with its own series of vectors and optimized 293 series cells/CHO series cells, to quickly and efficiently produce recombinant antibodies from human, mouse, rat, rabbit and other species. We provide custom production of full-length antibodies and various forms of antibody fragments, such as scFv, Fab, VHH, bispecific antibodies, Fc fusion proteins, tandem-scfv, etc. c. We can provide large-scale production with good stability between batches.

Starting Material (provided by customer)	Services	Turnaround Time	Deliverables
Antibody sequence Antibody type Customer requirements	• Gene synthesis • Subcloning • Pilot expression • Scale-up production • QC & Delivery	Starting from 3 weeks	• Recombinant antibody • Plasmid • CoA

Insect Cell/Baculovirus Expression

Step	Description	Turnaround Time	Deliverables
Gene Synthesis (optional)	• Gene synthesis and Codon optimization • Subcloning into selected vector • Plasmid preparation	~2 weeks	• 4 μg of lyophilized plasmid • Codon optimization report
Virus generation	• Recombinant Bacmid DNA generation and transfection of insect cell • P1 stock (low titer) and P2 stock (high titer) generation, the titer of virus will be determined by quantitative-PCR	3-5 weeks	• Evaluation report • Purified protein (if remaining after testing) • Virus stock is available upon request
Expression evaluation	• Pilot expression in insect cells • SDS-PAGE and/or Western blot		
Scale-up expression & purification	• Scale-up insect cell expression and purification • QC by SDS-PAGE and/or Western blot	1-3 weeks	• Purified protein in required amount and purity • CoA

Yeast Expression

Step	Description	Turnaround Time	Deliverables
Gene Synthesis (optional)	• Gene synthesis and Codon optimization • Subcloning into selected vector • Plasmid preparation	~2 weeks	• 4 μg of lyophilized plasmid • Codon optimization report
Protein expression evaluation	• Plasmid linearization, transformation, and screening • Expression evaluation and optimization • Tag removal test (optional)	3-6 weeks	• Evaluation report • Purified protein (if remaining after testing)
Scale-up & purification	• Scale-up yeast expression and purification • QC by SDS-PAGE and/or Western blot • Refolding (optional) • Tag removal (optional)	2-3 weeks	• Purified protein in required amount and purity • CoA

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