Successful Protein Expression and Purification

QIAGEN®

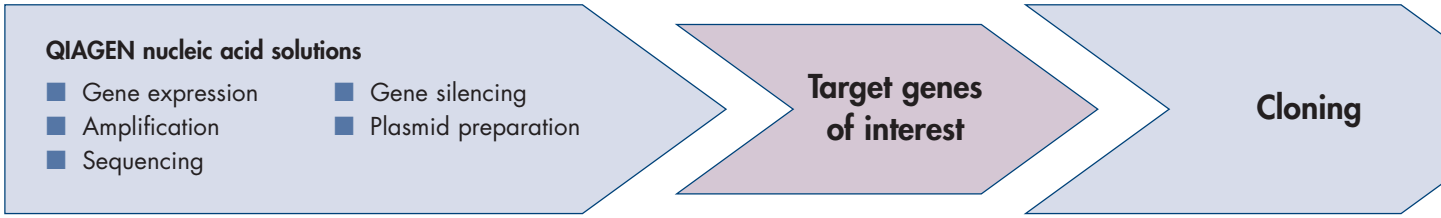
Sample & Assay Technologies

QIAGEN® technologies make proteins available to all

Modern techniques in molecular biology help to provide answers to important scientific questions, such as identification of genes involved in specific cellular processes. Furthermore, these techniques enable target genes to be cloned for expression and detailed analysis of recombinant proteins.

You can produce the amount of protein you need for your downstream applications — which include protein assay, protein binding/interaction studies, antibody generation, structural analysis, expression library screening, screening engineered enzymes, and comprehensive studies of proteins identified in gene expression analysis. And QIAGEN products help you optimize each critical success factor at every step.

High-quality recombinant proteins from your gene of interest



QIAGEN protein solution	■ QIAgenes — Optimized expression of human genes
Success factors	■ Fast access to optimal construct ■ Error-free full-length open reading frame ■ Enhanced protein yields
Additional products	■ pQE expression vectors* ■ Products for PCR and plasmid preparation*

* Find more information at www.qiagen.com.

QIAGEN automated solutions

Expression	Purification	Detection and assay
■ EasyXpress® products for cell-free protein expression	■ Ni-NTA matrices for His-tagged proteins	■ Anti·His Antibodies and Antibody Conjugates ■ *Strep*-tag Antibody
■ Fast access to multiple proteins ■ Posttranslational modification ■ Functional expression of membrane proteins	■ High yields and purity ■ Robustness of purification process ■ Protein activity ■ Scalability	■ High sensitivity ■ High specificity ■ Reliable protein interaction assay
■ Transfection reagents*	■ *Strep*-Tactin® matrices for *Strep*-tagged proteins*	■ HisSorb Strips and Plates* ■ Ni-NTA, *Strep*-Tactin Magnetic Beads*

* Find more information at www.qiagen.com.

QIAgenes:* Easy access to high-yield expression of human proteins — in *E. coli*, insect, and mammalian cells

Lack of sufficient amounts of protein often slows down or makes structural and functional analyses of proteins impossible. Expression of optimized genes helps to overcome this obstacle by improving codon usage and avoiding mRNA secondary structure or motifs that interfere with the transcription/translation process (internal ribosomal binding sites, sequence repeats etc.).

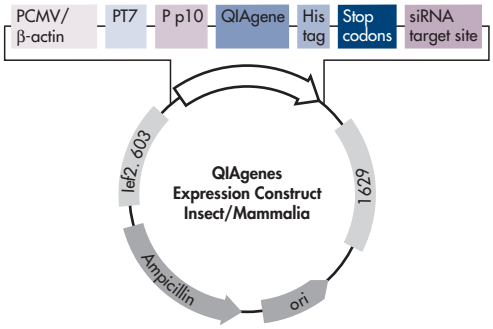


Figure 1. Elements within QIAgenes Expression Constructs Insect/Mammalia.

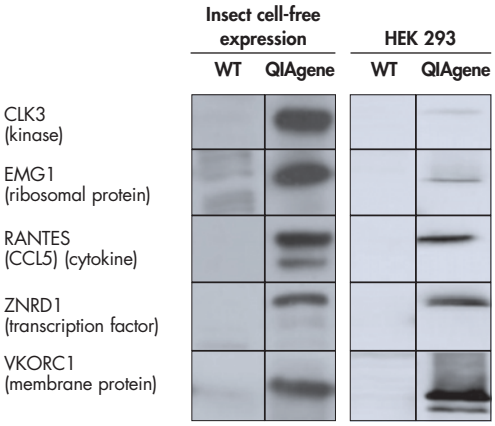


Figure 2. Optimized protein-coding sequences increase yields: Optimized QIAgenes Insect/Mammalia and wild-type (**WT**) coding sequences of the indicated proteins were cloned to generate QIAgene Expression Constructs and expressed in parallel, either in vitro using the EasyXpress Insect Kit II (**insect cell-free expression**) or in vivo in HEK 293 cells (**HEK 293**). Expression levels were visualized after separation of crude lysates by SDS-PAGE and western blotting using Penta·His Antibodies and chemiluminescent detection. **CLK3**: CDC-like kinase 3; **EMG1**: EMG1 nucleolar protein homolog; **RANTES (CCL5)**: chemokine (C-C motif) ligand 5; **ZNRD1**: zinc ribbon domain containing 1; **VKORC1**: vitamin K epoxide reductase complex, subunit 1.

QIAgenes Expression Kits offer easy access to increased protein expression through:

- Expression-optimized genes — powered by GENEART®
- Genomewide human ORFs ready cloned into expression vectors
- Synthetic cDNA with guaranteed sequence identity
- His tag for Ni-NTA affinity purification
- Easy ordering online through GeneGlobe (www.geneglobe.com)

Using optimized sequences, expression success and expression yields were significantly increased compared to the expression of wildtype sequences (Figure 2).

Proteins expressed with QIAgenes Expression Kits are compatible with:

- Ni-NTA purification technology
- EasyXpress cell-free protein expression kits
- Subcloning of individual domains (Table 1)
- TagZyme™ mediated N-terminal His tag removal (*E. coli* kits)
- C-terminal directed biotinylation for interaction studies (*E. coli* kits)
- siRNA rescue experiments (Insect/Mammalia kits)

Table 1. pQE vectors for subcloning QIAgenes

Vector	Promoter	Tag	Expression system
pQE-T7 vectors	T7	C- or N-terminal 10x His tag	*E. coli*, EasyXpress *E. coli* Kits
pQE-T7-TriSystem vectors	T7, p10, CMV/β-actin	C- or N-terminal 10x His tag or without tag	Insect cells, mammalian, EasyXpress Insect Kits

For detailed information about QIAgenes, please visit www.qiagen.com/goto/QIAgenes.

* Powered by GENEART — the gene of your choice®

Fast access to multiple proteins — with EasyXpress

Whether you require expression of a target gene identified, for example, in gene expression analysis or expression of a number of different mutations or truncated forms of a gene, the EasyXpress System enables cell-free protein expression, delivering your protein in just a few hours (Figure 3). For proteins with no posttranslational modifications or for which posttranslational modifications are not required, we recommend using the EasyXpress *E. coli* system; the EasyXpress Insect system is the system of choice for expression of eukaryotic proteins with posttranslational modifications and expression of membrane proteins.

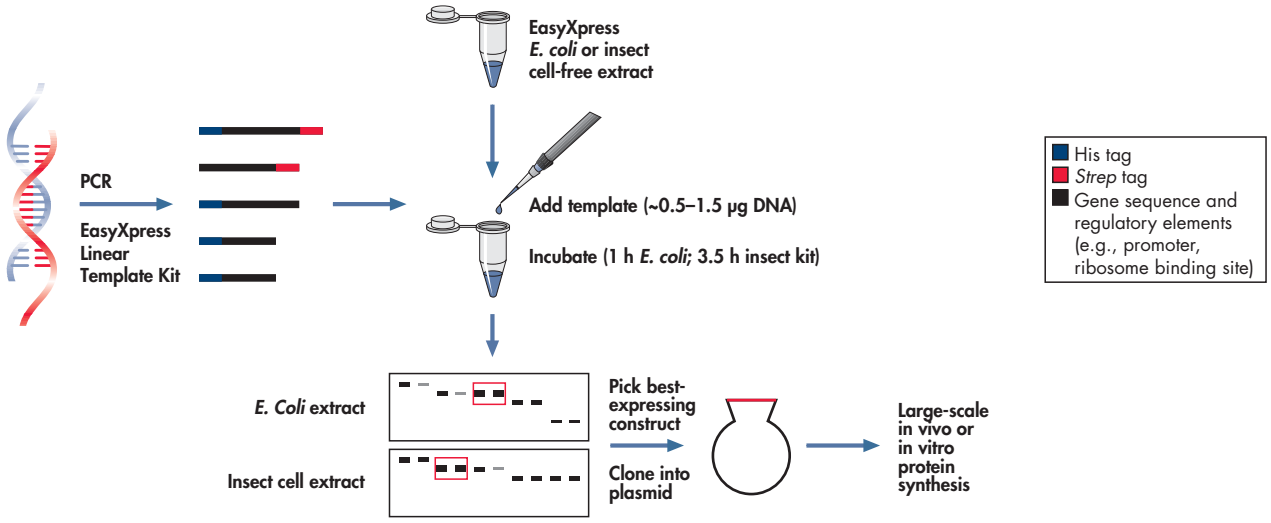


Figure 3. From multiple genes to multiple proteins in a single day using PCR products.

Using the EasyXpress System means:

- No expensive instrumentation for cell-free synthesis
- You can test and produce your QIAgene quickly and easily (Figure 2)
- Easy evaluation of different mutants, truncations, or tag variants (Figure 3)
- An open system allowing addition of various reagents, e.g., co-factors, detergents (see Table 2)
- Up to 1 mg (*E. coli* kits) or 50 µg (Insect Kit II) protein/ml reaction

Table 2. Reagents compatible with EasyXpress *E. coli* cell-free expression reactions*

Reagent	Effect
Detergents	Solubilize proteins
Redox buffer	Formation of disulfide bridges
Hydroxyectoine, D-sorbitol, glycine betaine, L-carnitine, glycerol	Stabilize proteins
Metal ions (e.g., Ca^{2+}, Co^{2+}, Cu^{2+}, Fe^{2+}, Zn^{2+})	Act as enzyme cofactors

* For recommended working concentrations please refer to the *EasyXpress Protein Synthesis Handbook*.

Expression of modified eukaryotic and membrane proteins

A broad range of eukaryotic proteins require posttranslational modifications (PTMs) or signal peptide cleavage to display full functional activity. The EasyXpress Insect Kit II, a unique eukaryotic cell-free expression system, enables expression of eukaryotic proteins — including membrane proteins — with PTMs (Table 3).

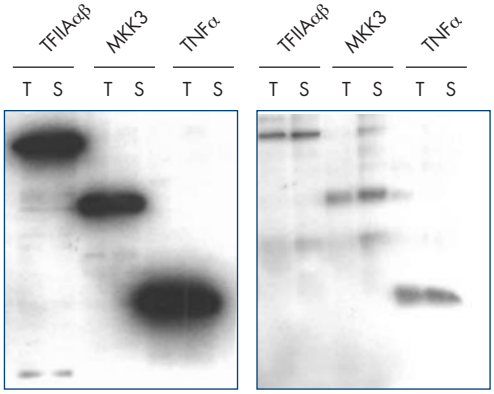


Figure 4. The indicated *Strep*-tagged protein was synthesized using 500 ng PCR product as expression template in reactions carried out according to manufacturers' instructions. 2.5 µl aliquots (EasyXpress) or 12.5 µl (RRL system) of total reaction or supernatant were loaded per lane and visualized using a *Strep*-tag antibody and chemiluminescent detection. **TFIIAαβ**: Human transcription factor II, alpha and beta subunits; **MKK3**: Human dual specific mitogen-activated protein kinase 3; **TNFα**: Human tumor necrosis factor alpha. Total (**T**) and the soluble (**S**) fraction.

Table 3. Comparison of the EasyXpress Insect Kit II and RRL-based kits

Criterion	EasyXpress Insect Kit II	RRL-based kit (Supplier P)
Yields	Up to 50 µg/ml (fully active protein)	3–6 µg/ml
Posttranslational modifications	Glycosylation, signal peptide cleavage, phosphorylation in homogenous lysates without the need for further additives	Requires additional purchase of Canine Pancreatic Microsomal Membranes
Lot-to-lot reproducibility	Good, due to easily controllable production of homogenous insect cell lysates	Poor, due to mixed system (Rabbit reticulocytes and canine microsomes) produced from individual animals
Handling	Lysate easy to pipet, all components stay in solution, even on ice	Lysate contains red precipitates (hemoglobin) that make accurate pipetting difficult and may distort photometric assays

Table 4. Overview of EasyXpress Kits for cell-free protein expression

Application	Kit	Protein yield	DNA template/promoter	Possible labels
Construct screening, functional studies	EasyXpress Protein Synthesis Kits	Up to 1 mg/ml reaction	Circular plasmid, PCR product/T7, strong *E. coli*	Biotin*
Construct screening, functional studies, immunization	EasyXpress Protein Synthesis Maxi Kit	Up to 1 mg/ml reaction	Circular plasmid, PCR product/T7, strong *E. coli*	Biotin*
True site-specific labeling for protein–protein interaction studies	EasyXpress Site-Specific Biotin Kit	Up to 150 µg/ml reaction	Circular plasmid, PCR product with Amber stop codon/T7, strong *E. coli*	Biotin
Labeling for X-ray or NMR studies	EasyXpress Mega Kit, EasyXpress NMR Kits	Up to 10 mg/kit	Circular plasmid/T7, strong *E. coli*	Selenomethionine, isotopically labeled amino acids
Construct screening, functional studies of posttranslationally modified proteins	EasyXpress Insect Kit II	Up to 50 µg/ml reaction	Linearized plasmid, PCR product/T7, strong *E. coli*	Biotin*
Non-radioactive protein detection	EasyXpress Random Biotin Kit	Up to 1 mg/ml reaction	In combination with EasyXpress *E. coli* and insect-cell lysates	
Generation of PCR products for use as expression templates	EasyXpress Linear Template Kit		Compatible with EasyXpress *E. coli* and insect-cell lysates	

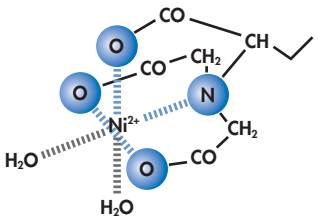
* In combination with the EasyXpress Random Biotin Kit. For more information, visit www.qiagen.com/goto/EasyXpress.

Ni-NTA for the highest purity proteins

Purification of His-tagged proteins with Ni-NTA follows — as usual for QIAGEN purification products — a simple bind-wash-elute procedure (Figure 5). Due to the structure of NTA and its tight binding of nickel ions (Figure 6) proteins can be eluted in high yields with high purity (Figure 7). You can run several cycles without stripping and reloading the resin, which reduces also Ni^{2+} waste. The purification process itself is very robust and allows the use of a broad range of reagents, meaning you can use the specific conditions your proteins need to stay active to purify them (Table 5).

Ni-NTA — the world's most cited affinity purification resin

- Highest purity of protein after a single purification step (Figure 7)
- Minimal nickel leaching resulting in highly pure proteins and avoiding recharging and toxic waste (Figure 6)
- High yields of up to 50 mg/ml Ni-NTA resin or up to 2 µg/µl magnetic bead suspension (Figure 8)
- Broad reagent compatibility with the only resin that is compatible to 10 mM DTT (Table 5)



Ni-NTA

Figure 6. Ni-NTA gives you highly pure proteins. In Ni-NTA resins nickel ions are bound via four coordination sites. Nickel ions bound to IDA-based resins are only bound via three coordination sites and can be lost more easily. Empty charged coordination sites will function like ion-exchange matrices that can bind un-tagged contaminating proteins.

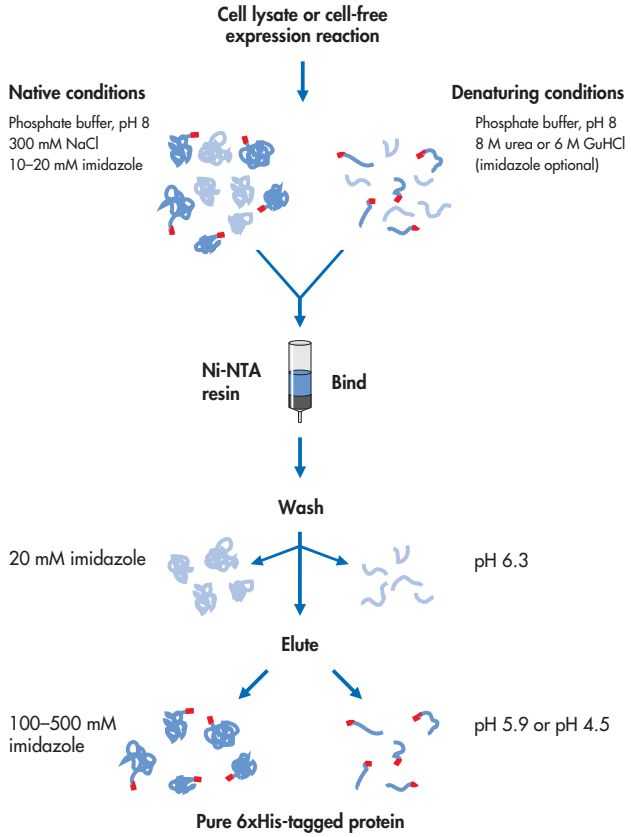


Figure 5. Bind-Wash-Elute purification with Ni-NTA under native (left) and denaturing (right) conditions.

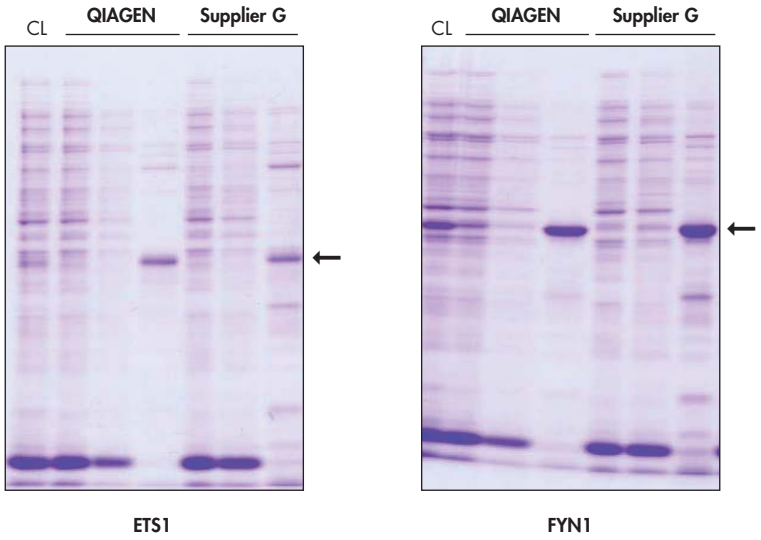


Figure 7. Ni-NTA outperforms a competitor resin for efficient one-step purification of His-tagged proteins. The indicated proteins (arrowed) were expressed in *E. coli* using a QIAgenes Expression Construct. Proteins were purified in parallel from cleared cell lysate using either Ni-NTA Superflow or a nickel resin from supplier G. These two proteins were part of a trial in which 21 of 24 proteins were purified at higher purity on Ni-NTA than on the resin from supplier G. **CL**: Cleared lysate. Each set of three lanes shows from left to right: flow-through, wash, and elution fractions.

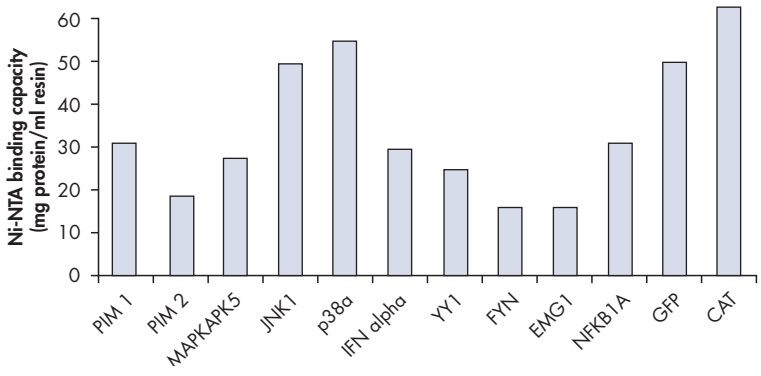


Figure 8. Binding of various His-tagged proteins to Ni-NTA. Binding was performed in batch procedures and proteins quantified using the Bradford method.

Table 5. Reagents compatible with the 6xHis-Ni-NTA interaction*

Denaturants	Detergents	Reducing agents	Others	Salts	For long-term storage
6 M Gu·HCl	2% Triton X-100	20 mM β-ME	50% glycerol	4 M $MgCl_2$	Up to 30% ethanol
8 M Urea	2% Tween® 20	**10 mM DTT**	20% ethanol	5 mM $CaCl_2$	or 100 mM NaOH
	1% CHAPS	20 mM TCEP	20 mM imidazole†	2 M NaCl	
	30 mM LDAO				
	20 mM DDM				
	51 mM OG				

* A more extensive table can be found at www.qiagen.com/goto/Ni-NTAcompatibility.

† Can be used at low concentrations (20 mM) to inhibit nonspecific binding and, at higher concentrations (>100 mM), to elute the His-tagged protein from the Ni- NTA matrix.

The faster way to purer proteins with Ni-NTA Superflow™ Cartridges

Fast Protein Liquid Chromatography (FPLC™) is the method of choice for rapidly purifying milligram amounts of protein (e.g., for structural studies). QIAGEN Ni-NTA cartridges — available in 1 ml and 5 ml bed volumes — are compatible with all commonly used FPLC systems (Table 6).

Table 6. Ni-NTA Cartridge specifications

	1 ml Ni-NTA Cartridges	5 ml Ni-NTA Cartridges
Matrix	Highly cross-linked, 6% agarose	
Binding capacity	Up to 50 mg His-tagged protein	Up to 250 mg His-tagged protein
Recommended flow rate	1 ml/min	5 ml/min
Maximum flow rate	10 ml/min	40 ml/min
Maximum back pressure	0.5 MPa, 5 bar	
Column dimensions (i.d. x h)	6.7 mm x 28.0 mm	14.7 mm x 29.8 mm
Suitable for	FPLC, ÄKTA™, and BioLogic systems, Vision workstation, HPLC instruments, or manual purification using a syringe.	
Cartridge connectors	1/16" (inlet); M 6 (outlet)	

Ni-NTA Superflow Cartridges include:

- Cartridges containing Ni-NTA — for high yields of high-purity proteins
- Robust construction allowing high maximum flow rates (Table 6)
- Removable screw-top lid for easy maintenance

Table 7. Ni-NTA available in any format

Product	Protein yield	Applications	Automation option
Ni-NTA HisSorb Plates	Up to 0.3 µg/well	Oriented binding of His-tagged proteins	Can be used in combination with standard plate readers
Ni-NTA Magnetic Agarose Beads	Up to 2 µg/µl suspension (5%)	Purification from dilute lysates or high-throughput applications	BioSprint® 96, BioRobot® instruments, QIAsymphony® SP
Ni-NTA Spin Columns	Up to 300 µg/ spin column	Low-throughput expression screening	QIAcube®
Ni-NTA Fast Start Kit	Up to 25 mg per prep	Complete purification kit for beginners	
Ni-NTA Agarose*	100 µg – 100 mg	Batch and gravity-flow column purification	
Ni-NTA Superflow Columns	Up to 75 mg/column	Automated and gravity-flow column purification	BioRobot instruments
Ni-NTA Superflow Cartridges*†	Up to 50 mg (1 ml cartridge) or 250 mg (5 ml cartridge)	Purification using FPLC system or syringe	All commonly-used FPLC instruments
Ni-NTA Superflow*	5 mg – production scale	Batch and FPLC column purification	BioRobot instruments

* Also available as uncharged NTA products.

† FPLC-compatible cartridges also available for purification of *Strep*-tagged, phospho-, and glycoproteins and serum depletion. Visit www.qiagen.com/goto/cartridges for more information.

For more information about Ni-NTA matrices, visit www.qiagen.com/goto/Ni-NTA.

QIAcube

QIAsymphony SP

Let your instrument do your protein sample preps for you

Whether you want micrograms of protein for expression screening, or milligrams for X-ray crystallography (Table 8), QIAGEN offers instruments and chemistries for highly reproducible sample preparation, so you can use your time for more challenging research.

QIAGEN automated solutions offer:

- Highly reproducible processing and cross-contamination-free pipetting (Figure 10)
- Fully automated solutions on QIAcube and QIAsymphony SP for highest convenience
- Scalable solutions for purifying micrograms to milligrams of pure proteins (Table 8)

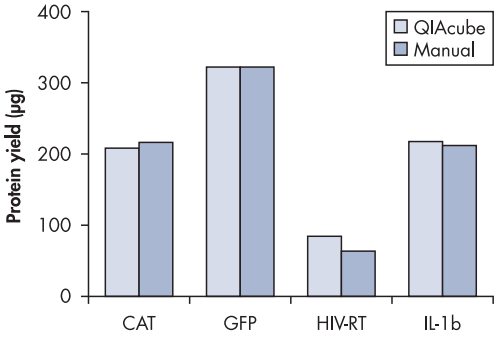


Figure 9. Similar yields from automated and manual procedures. The indicated proteins were purified under native conditions from cleared *E. coli* cell lysates in duplicate using Ni-NTA Spin Columns either in an automated procedure on the QIAcube or manually. The average total yields from the duplicate preparations were determined using the Bradford method. **CAT**: Chloramphenicol acetyl transferase; **GFP**: Green fluorescent protein; **HIV-RT**: Human immunodeficiency virus reverse transcriptase; **IL-1b**: Interleukin-1 beta.

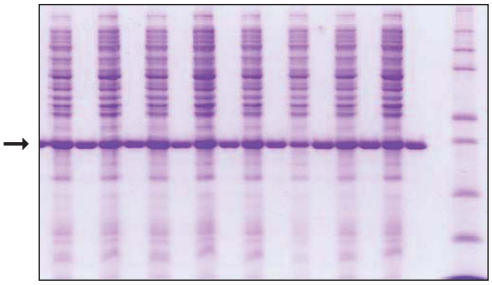


Figure 10. High, reproducible yields of His-tagged GFP from *E. coli* cultures. His-tagged green fluorescent protein (GFP, arrowed) was purified from 5 ml *E. coli* cultures using the QIAsymphony Ni-NTA Denaturing Kit. Pairs of samples show crude lysate and eluate fractions. Average yield was 161 µg per well with a CV of 5.28% (8 out of 24 samples shown).

Table 8. QIAGEN automated solutions for protein

Instrument	Chemistry	Protein yield	Time per run
QIAcube* (12 samples)	Ni-NTA Spin Kit	Up to 300 µg His-tagged protein per column	Approx. 30 min
	Qproteome® Albumin/ IgG Depletion Kit	Up to 0.8 mg protein per column	Approx. 30 min
QIAsymphony SP (up to 96 wells)	Ni-NTA Magnetic Beads	Up to 500 µg His-tagged protein per well	2.5 h
BioRobot Protein System (96 samples)	Ni-NTA Magnetic Beads or *Strep*-Tactin Magnetic Beads	Up to 50 µg His-tagged protein or 10 µg *Strep*-tagged protein per well	1 h
	Ni-NTA Superflow 96 BioRobot Kit	Up to 10 mg His-tagged protein per well	2.5 h
BioSprint 96 (96 samples)	Ni-NTA Magnetic Beads or *Strep*-Tactin Magnetic Beads	Up to 400 µg His-tagged protein or 60 µg *Strep*-tagged protein	2 h

* The continuously expanding range of QIAcube protocols has now grown to almost 80 standard protocols. For an up-to-date list of protocols, visit www.qiagen.com/MyQIAcube. To find out more about QIAGEN's automated solutions, visit www.qiagen.com/goto/automation.

Highly sensitive detection of His-and *Strep*-tagged proteins

QIAGEN antibodies enable highly sensitive and specific detection of His- and *Strep*-tagged proteins (Figures 11–13). For various downstream applications such as western blot, dot blot, immunoprecipitation, immunohistochemistry, ELISA, immunolocalization, and FACS (Table 9).

All QIAGEN antibodies are:

- Mouse monoclonal antibodies, free from viruses, mycoplasma, and contaminating immunoglobulins
- Highly specific, displaying no cross-reactivity with host-cell proteins (Figure 11 and 12)
- Available in bulk quantities upon request

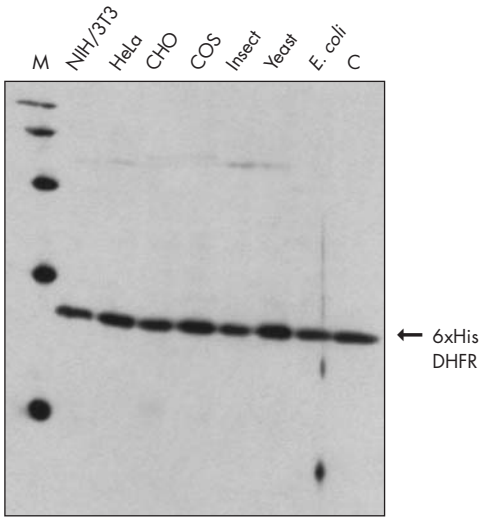


Figure 11. Negligible cross reaction in any expression system. His-tagged DHFR (3 ng) was added to 1 µg of the indicated cell lysate, separated by SDS-PAGE, transferred to membrane by western blotting, and detected in a chemiluminescent procedure using the Penta·His HRP Conjugate. **M**: 6xHis Protein Ladder; **C**: control (purified DHFR, no lysate).

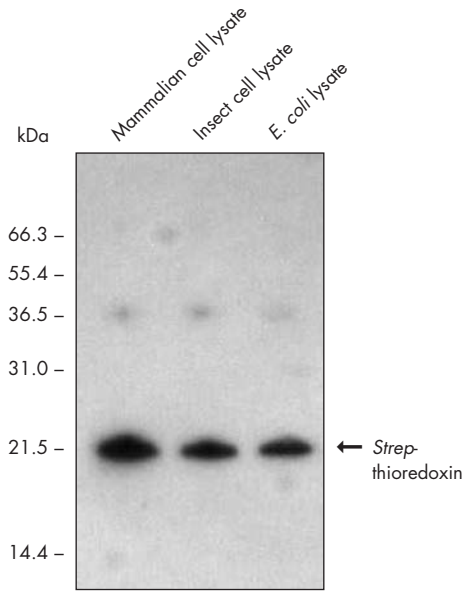


Figure 12. Highly specific detection of *Strep*-tagged proteins in any expression system. Purified *Strep*-tagged thioredoxin (10 ng) was mixed with crude cell lysate from mammalian (NIH-3T3), insect (Sf9), and bacterial (*E. coli*) cells (each 10 µg total protein). After electrophoresis and western transfer, the *Strep*-tagged protein was detected using the *Strep*-tag Antibody and chemiluminescent detection.

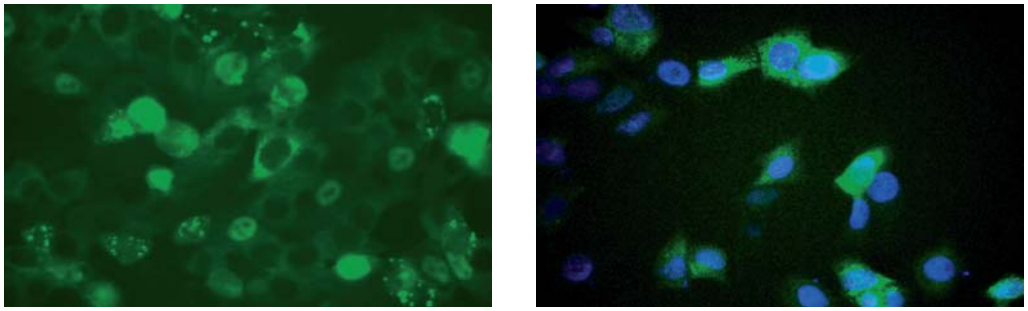


Figure 13. Direct fluorescent localization of proteins. Fluorescence micrograph (400x) of human fibrosarcoma cells transfected with a pQE-TriSystem construct encoding His-tagged decorin. Cells were fixed with 2% paraformaldehyde 24 hours post-transfection and stained using Penta·His Alexa Fluor 488 Conjugate Fixed cells were stained using Penta·His Alexa Fluor® 488 Conjugate and nuclei were counterstained with DAPI (400x).

Table 9. Antibody overview

	Penta·His Antibodies and HRP Conjugates	Tetra·His Antibodies and HRP Conjugates	RGS·His Antibodies and HRP Conjugates	Penta·His Alexa Fluor Conjugates	*Strep*-tag Antibody
Epitope	HHHHH	HHHH	RGSHHHH	HHHHH	SAWSHPGFEK
Dissociation constant, K_d (M)	$5 \times 10^{-8} – 1 \times 10^{-9}$	$1 \times 10^{-8} – 5 \times 10^{-8}$	$1 \times 10^{-8} – 5 \times 10^{-8}$	$5 \times 10^{-8} – 1 \times 10^{-9}$	$5 \times 10^{-9} – 1 \times 10^{-10}$
Applications	Western blots, dot blots, ELISA, immunoprecipitation, immunohistochemistry	Western blots, dot blots, ELISA, immunoprecipitation, immunohistochemistry	Western blots, dot blots, ELISA, immunoprecipitation, immunohistochemistry	Immunolocalization, FACS	Western blots, dot blots, ELISA, immunoprecipitation, immunohistochemistry
Sensitivity in western blots	50 pg (chemiluminescent detection); 2 ng (chromogenic detection)	50 pg (chemiluminescent detection); 2 ng (chromogenic detection)	50 pg (chemiluminescent detection); 2 ng (chromogenic detection)	n.a.	1 ng (chemiluminescent detection)
Direct detection?	HRP Conjugate enables direct detection. Secondary antibody required for Penta·His Antibody.	HRP Conjugate enables direct detection. Secondary antibody required for Tetra·His Antibody.	HRP Conjugate enables direct detection. Secondary antibody required for RGS·His Antibody.	Detection via fluorescence	Secondary antibody required

Also available:

Anti·His Antibody Selector Kit — to test for the Anti·His Antibody that best recognizes your protein

6xHis Protein Ladder — a mixture of five His-tagged proteins that serve as size markers and positive controls in detection procedures

Penta·His Biotin Conjugate — for detection using (Strept)avidin reagents

Ni-NTA Conjugates — for direct chromogenic detection of His-tagged proteins in *E. coli* lysates

More information about protein detection and assay can be found at www.qiagen.com/goto/detection.

Ordering Information

Product	Contents	Cat. no.
Cloning		
QIAgenes Expression Kit *E. coli*	QIAgenes Expression Construct, QIAgenes *E. coli* Positive Control, Penta·His Antibody, BSA-free, 4 Ni-NTA Spin Columns	Varies
QIAgenes Expression Kit Insect/Mammalia	QIAgenes Expression Construct Insect/Mammalia; QIAgenes Insect/Mammalia Positive Control; Penta·His Antibody, BSA-free; Ni-NTA Magnetic Agarose Beads	Varies
pQE-T7 Vector 1	25 µg; for subcloning QIAgenes (N-terminal 10xHis)	33013
pQE-T7 Vector 2	25 µg; for subcloning QIAgenes (C-terminal 10xHis)	33023
pQE-T7-TriSystem Vector Set 1	pQE-T7-TriSystem Vector Set 1 contains: Vector pQE-TriSystem 5, Vector pQE-TriSystem 6, and Vector pQE-TriSystem 7; 25 µg each	32953
N-Terminus pQE Vector Set	For expressing N-terminally His-tagged proteins in *E. coli*: 25 µg each; pQE-9, pQE-30, pQE-31, pQE-32, pQE-40	32915
C-Terminus pQE Vector Set	For expressing C-terminally His-tagged proteins in *E. coli*: 25 µg each; pQE-16, pQE-60, pQE-70	32903
pQE-TriSystem Vector	For parallel expression of 6xHis-tagged proteins in *E. coli*, mammalian cells, and baculovirus-infected insect cells: 25 µg pQE-TriSystem Vector DNA	33903
Expression		
EasyXpress Linear Template Kit Plus (20)	For 20 two-step PCRs: HotStar HiFidelity DNA Polymerase, buffer, RNase-free water, Q-Solution, XE-Solution, positive-control DNA, and optimized PCR primers	32723
EasyXpress Protein Synthesis Kit (20)*	For 20 x 50 µl reactions: *E. coli* extract, reaction buffer, RNase-free water, and positive-control DNA	32502
EasyXpress Protein Synthesis Mega Kit	For 2 x 5 ml reactions: *E. coli* extract, reaction buffers, amino acid mix w/o methionine, methionine, RNase-free water, gel-filtration columns, and reaction flasks	32516
EasyXpress NMR Protein Synthesis Kit†	For 2 x 5 ml reactions: *E. coli* extract, reaction buffers, amino acid mix w/o Arg, Lys, Ser, Thr, Val (supplied as individual amino acids), RNase-free water, gel-filtration columns, and reaction flasks	32526
EasyXpress Site-Specific Biotin Kit	For 5 x 25 µl reactions: *E. coli* extract, reaction buffer, RNase-free Water, biotinyl-lysyl tRNA (amber), and positive-control DNA	32602
EasyXpress Random Biotin Kit	For 60 x 50 µl reactions: 4 x 15 µl EasyXpress Biotinyl-Lysyl tRNA (Phe)	32612
EasyXpress Insect Kit II	For 20 x 50 µl reactions: Spodoptera frugiperda insect cell extract, reaction buffers, in vitro transcription reaction components, RNase-free water, gel-filtration columns, and positive-control DNA	32562

* Other pack sizes or formats are available; please inquire.

† Kits for labeling other amino acids and for uniform labeling are also available; for more information, visit www.qiagen.com/goto/EasyXpress.

Ordering Information

Product	Contents	Cat. no.
Purification		
Ni-NTA Magnetic Agarose Beads (2 x 1 ml)*	2 x 1 ml nickel-charged magnetic agarose beads (5% suspension)	36111
Ni-NTA Spin Kit (50)	50 Ni-NTA Spin Columns, Reagents, Buffers, Collection Tubes, 1 µg Control Expression Plasmid	31314
Ni-NTA Agarose (25 ml)*	25 ml nickel-charged resin (max. pressure: 2.8 psi)	30210
Ni-NTA Superflow (25 ml)*	25 ml nickel-charged resin (max. pressure: 140 psi)	30410
Ni-NTA Superflow Cartridges (5 x 1 ml)*	5 cartridges prefilled with 1 ml Ni-NTA Superflow: for automated purification of His-tagged proteins using liquid chromatography systems	30721
Ni-NTA Superflow Cartridge (1 x 5 ml)*	1 cartridge prefilled with 5 ml Ni-NTA Superflow: for automated purification of His-tagged proteins using liquid chromatography systems	30760
NTA Superflow Cartridges (5 x 1 ml)*	5 cartridges prefilled with 1 ml NTA Superflow: for purification of His-tagged and other metal-binding proteins using liquid chromatography systems	30821
Ni-NTA Fast Start Kit (6)	For purification and detection of six 6xHis-tagged protein preps: 6 x Fast Start Columns, Penta·His Antibody, Buffers and Reagents	30600
Ni-NTA Membrane Protein Kit	For 5 detergent screenings and 5 affinity purifications: 7 detergents, buffers, Ni-NTA Superflow, Penta·His Antibody, disposable columns	30610
Strep-Tactin Magnetic Beads (2 x 1 ml)*	For micro-scale purification of *Strep*-tagged proteins: 2 x 1 ml *Strep*-Tactin-charged magnetic agarose beads (10% suspension)	36311
Strep-Tactin Superflow (2 ml)*	For batch and HPLC purification of *Strep*-tagged proteins: 2 ml *Strep*-Tactin-charged Superflow (max. pressure: 140 psi)	30001
Strep-Tactin Superflow Cartridge (1 ml)*	1 cartridge prefilled with 1 ml *Strep*-Tactin Superflow: for automated purification of *Strep*-tagged proteins using liquid chromatography systems	30120
PhosphoProtein Purification Cartridge	5 ml FPLC-compatible cartridge prefilled with PhosphoProtein Purification resin	37145
Lectin cartridges	ConA, WGA, GNA, LCH, SNA, MAL, AIL, and PNA lectins can be supplied on demand as individual 1ml or 5 ml Cartridges.	Please inquire

* Other pack sizes or formats are available; please inquire.

† Penta·His Antibodies are also available conjugated to Alexa Fluor 532, 555, and 647.

Ordering Information

Product	Contents	Cat. no.
Detection and Assay		
Anti-His Antibody Selector Kit	RGS-His Antibody, Penta-His Antibody, Tetra-His Antibody, all BSA-free, 3 µg each	34698
Penta-His Antibody, BSA-free (100 µg)	100 µg mouse anti-(H)5 (lyophilized, BSA-free, for 1000 ml working solution)	34660
Penta-His HRP Conjugate Kit	125 µl Penta-His HRP Conjugate, 5 g Blocking Reagent, 50 ml Blocking Reagent Buffer (10x concentrate)	34460
Penta-His Alexa Fluor 488 Conjugate†	125 µl Penta-His Alexa Fluor 488 Conjugate, 200 µg/ml	35310
Strep-tag Antibody (100 µg)	Mouse monoclonal antibody that recognizes the *Strep*-tag II epitope; lyophilized, for 1000 ml working solution	34850
6xHis Protein Ladder	6xHis-tagged marker proteins (lyophilized, for 50–100 lanes on western blots)	34705
Ni-NTA Magnetic Agarose Beads (2 x 1 ml)*	2 x 1 ml nickel-charged magnetic agarose beads (5% suspension)	36111
Ni-NTA HisSorb Plates (5)	5 Ni-NTA-coated, transparent 96-well plates	35061

* Other pack sizes or formats are available; please inquire.

† Penta·His Antibodies are also available conjugated to Alexa Fluor 532, 555, and 647.

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