

# More than Meets the Eye.

Next Generation RNA Extraction





### Discover the World of RNA

There are solutions for every scientist's problems, no matter what the application is. Zymo Research provides kits for a variety of biological samples including cultured cells, solid tissues, FFPE, whole blood, plasma, serum, urine, viruses, insects, microbes, yeast, plants, stool, soil, and swabs. The only limiting factor is your imagination.

Every kit is specially designed to address unique sample types to ensure the highest quality RNA is ready for all sensitive downstream applications including Next-Generation Sequencing, RT-qPCR, arrays, hybridization, etc.

# **Highly Cited**



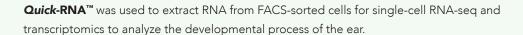
#### **CRISPR-Cas9**

Cpf1 is a Single RNA-Guided Endonuclease of a Class 2 CRISPR-Cas System (Zetsche B et al. 2015)

**Direct-zol™ RNA** facilitated discovery of a novel CRISPR endonuclease, Cpf1, allowing fine-tuning and increased flexibility for genome editing.

#### Single Cell Analysis

Single-cell RNA-Seq resolves cellular complexity in sensory organs from the neonatal inner ear (Burns JC et al. 2015)





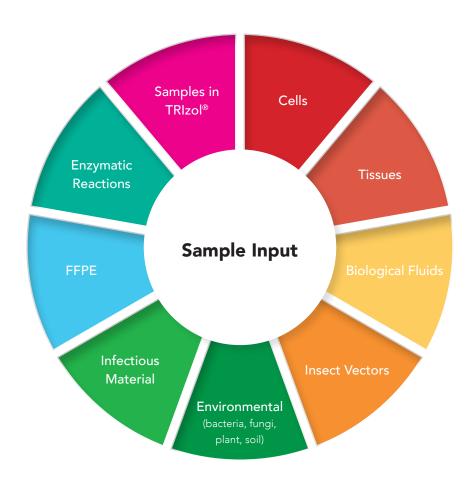


#### **Next-Gen Sequencing**

Total RNA-seq to identify pharmacological effects on specific stages of mRNA synthesis (Boswell SA et al. 2017)

**RNA Clean & Concentrator™** was used to clean-up a RNA-Seq library prepared for downstream Illumina sequencing to study transcription and pre-mRNA processing.

# **RNA Solutions for any Application**



- 2 3 RNA from any Sample in TRIzol®: Direct-zol™ RNA Kits
- 4 5 RNA from any Cells & Tissue: Quick-RNA™ Kits
  - **6 DNA/RNA Co-Purification:** Quick-DNA/RNA™ Kits
  - **7 RNA Clean-up:** RNA Clean & Concentrator™ Kits
  - **8 Viral DNA/RNA Extraction:** Quick-DNA/RNA™ Viral Kits
  - 8 Pathogen DNA/RNA Extraction: Quick-DNA/RNA™ Pathogen Kits
  - 9 Environmental RNA: Environmental RNA Kits
  - **10** Blood and Biological Fluids RNA: Quick-RNA™ Blood Kits
  - 11 Cell-free RNA: Quick-cfRNA™ Kits
  - **12 FFPE RNA Extraction:** Quick-DNA/RNA<sup>™</sup> FFPE Kit
  - 13 RNA Isolation Products

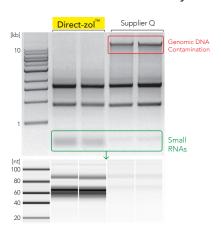


### **Direct-zol™ RNA Kits**

(Samples in TRIzol®: cells, tissues, biological fluids)

- Easy Handling: No phase separation or precipitation steps.
- NGS-Ready: Ultra-pure RNA without phenol carryover. No DNA contamination (DNase I included).
- Non-Biased: Complete RNA recovery without miRNA loss.

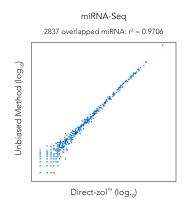
#### NGS-Ready RNA from TRIzol® in 7 Minutes



High-quality, intact, small and large RNA are efficiently recovered using a Direct-zol $^{\mathbb{N}}$  RNA kit compared to using a Supplier Q kit. RNA is DNA-free and ready for all downstream applications, including NGS.

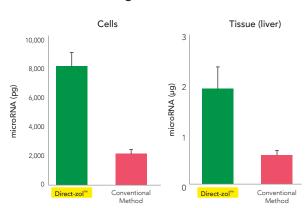


#### Non-Biased miRNA Recovery



RNA purified from TRIzol® using Direct-zol™ RNA compared to an unbiased method (mirVana™, Ambion). Data is highly correlated (2837 overlapped miRNA:  $r^2=0.9706$ ). Analysis was performed using miRNA-Seq (MiSeq®, Illumina).

#### **Highest Yields**



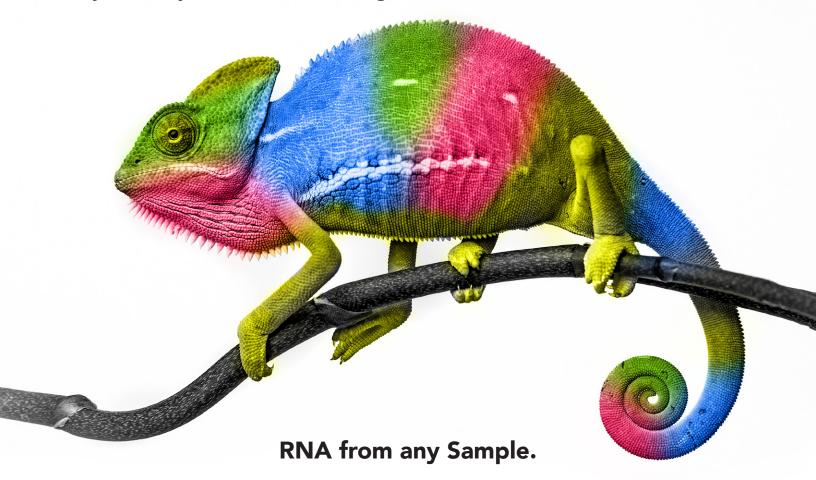
Direct-zol™ RNA kits recovered ~4-fold more miRNA (<40 nt) than conventional methods. miRNA purified from cells and tissue were quantified using Bioanalyzer small RNA chip.

Product	Cat. No.	Size	Binding Capacity	Minimum Elution	(Animal) Cells	Tissue
Direct-zol™ RNA Miniprep Plus Kit	R2070, R2071* R2072, R2073*	50 preps 200 preps	100 µg	50 μΙ	≤ 10 <sup>7</sup>	≤ 50 mg
Direct-zol™ RNA Miniprep Kit	R2050, R2051* R2052, R2053*	50 preps 200 preps	50 µg	25 μΙ	≤ 5 x 10 <sup>6</sup>	≤ 25 mg
Direct-zol™ RNA Microprep Kit	R2060, R2061* R2062, R2063*	50 preps 200 preps	10 µg	6 µl	≤ 10 <sup>6</sup>	≤ 5 mg
Direct-zol™ -96 RNA Kit	R2054, R2055* R2056, R2057*	2 x 96 preps 4 x 96 preps	10 µg	10 μΙ	≤ 106	≤ 5 mg
Direct-zol™ -96 MagBead RNA Kit	R2100, R2101* R2102, R2103*	96 preps 4 x 96 preps	10 µg	50 μΙ	≤ 106	≤ 5 mg

<sup>\*</sup> Supplied with TRI Reagent®

Compatible with samples stored in TRIzol®, TRI-Reagent®, RNAzol®, QIAzol®, and all other acid-guanidinium-phenol reagents.

### Adjust to your surroundings.

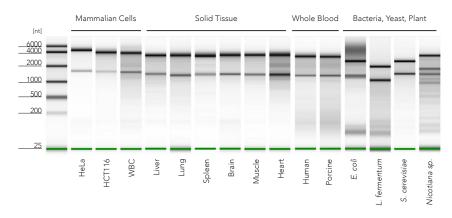


### Quick-RNA™ Kits

(cells, tissues, biological fluids)

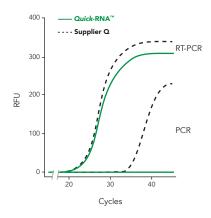
- Broad Range: Extract total RNA (including small/micro RNA) from any sample.
- DNA-Free: Genomic DNA removal column and DNase I included.
- **NGS-Ready:** RNA is ready for all downstream applications including Next-Gen Sequencing, RT-qPCR, hybridization, etc.

#### Universal Sample Compatibility



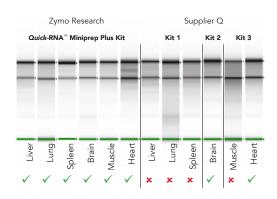
The  $\mathit{Quick}$ -RNA $^{\bowtie}$  Miniprep Plus Kit is universal and accommodates any sample input including cultured cells, any tissue, whole blood, tough-to-lyse samples, etc.

#### **DNA-Free RNA**



RNA isolated with Quick-RNA $^{16}$  is DNA-free compared to using Supplier Q. Total RNA was isolated from  $10^6$  human epithelial cells (with in-column DNase treatment for both kits, n=3).

#### NGS-Ready RNA



High-quality RNA was consistently isolated with the *Quick*-RNA <sup>TM</sup> Miniprep Plus Kit (left), but not with Supplier Q kits (right). Quality was assessed using the Agilent 2200 TapeStation® system; red = low quality.

Product	Cat. No.	Size	Binding Capacity	Minimum Elution	(Animal) Cells	Tissue	Sample Inputs
<i>Quick</i> -RNA™ Microprep Kit	R1050 R1051	50 preps 200 preps	10 µg	6 μΙ	≤ 10 <sup>6</sup>	≤ 5 mg	Low input; LCM
<i>Quick</i> -RNA™ Miniprep Kit	R1054 R1055	50 preps 200 preps	100 µg	50 μΙ	≤ 10 <sup>7</sup>	≤ 50 mg	Cells; Soft Tissue
Quick-RNA™ Miniprep Plus Kit	R1057 R1058	50 preps 200 preps	100 µg	50 µl	≤ 10 <sup>7</sup>	≤ 50 mg	Cells; Any Tissue; Whole Blood
<i>Quick</i> -RNA™ Midiprep Kit	R1056	25 preps	1 mg	200 μΙ	≤ 10 <sup>8</sup>	≤ 100 mg	Cells; Soft Tissue
Quick-RNA™ 96 Kit	R1052 R1053	2 x 96 preps 4 x 96 preps	10 µg	25 μΙ	≤ 106	≤ 5 mg	Cells; Soft Tissue

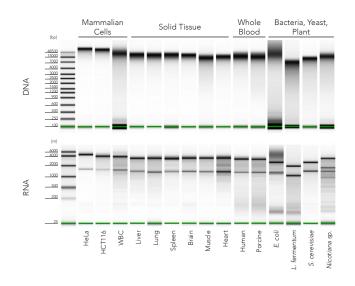
### Quick-DNA/RNA™ Kits

(cells, tissues, biological fluids, LCM\*)

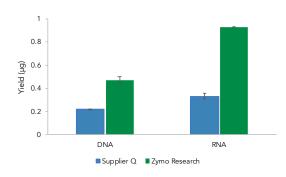
- Highest Yields: Efficient isolation of genomic DNA and total RNA (including miRNA) from any sample source.
- **NGS-Ready:** DNA/RNA is ready for all downstream applications including Next-Gen Sequencing, RT-qPCR, hybridization, etc.
- Single-Cell Detection: Ready for high-sensitivity assays down to a single-cell (6 µl elution volume).

#### Universal Sample Compatibility

The Quick-DNA/RNA™ Plus technology is universal and accommodates any sample input including cultured cells, any tissue, blood, tough-to-lyse samples, etc.

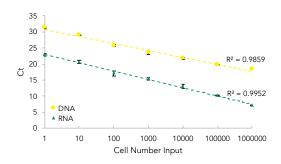


#### **Highest Yields**



DNA and total RNA recovery is higher using the Quick-DNA/RNA $^{\text{TM}}$  Microprep Plus Kit compared to a Supplier Q kit. Nucleic acids were extracted from 50K HeLa cells (n=2).

#### Single-Cell Detection



HeLa cells were titrated down to a single cell, and DNA and total RNA were extracted using the Quick-DNA/RNA $^{\text{\tiny{M}}}$  Microprep Plus Kit. Analysis by RT-qPCR shows high linear recovery of DNA & RNA down to the single-cell level (n=2).

Product	Cat. No.	Size	Binding Capacity	Minimum Elution	(Animal) Cells	Tissue	Format
<i>Quick</i> -DNA/RNA <sup>™</sup> Microprep Plus Kit	D7005*	50 preps	10 μg	6 μΙ	≤ 10 <sup>6</sup>	≤ 5 mg	Column
Quick-DNA/RNA™ Miniprep Kit	D7001	50 preps	50 µg	25 μΙ	≤ 5 x 10 <sup>6</sup>	≤ 25 mg	Column
Quick-DNA/RNA™ Miniprep Plus Kit	D7003	50 preps	100 µg	50 μΙ	≤ 10 <sup>7</sup>	≤ 50 mg	Column
Quick-DNA/RNA™ MagBead Kit	R2130 R2131	1 x 96 preps 4 x 96 preps	20 µg	50 μl	≤ 10 <sup>6</sup>	≤ 5 mg	Magbead

<sup>\*</sup> Compatible with Laser Capture Microdissection samples.

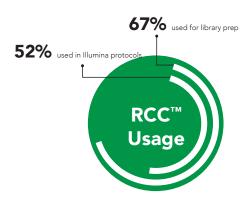
### RNA Clean & Concentrator™ Kits

(any RNA, enzymatic reactions, TRIzol® aqueous phase)

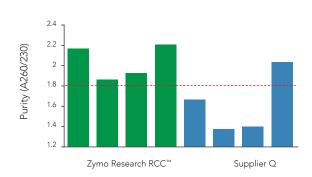
- **NGS-Ready:** RNA is ready for all downstream applications including Next-Gen Sequencing, RT-qPCR, hybridization, etc.
- Ultra-Pure: Eliminate contaminants and inhibitors in 5 minutes.
- Maximum Recovery: Recover >90% and elute in as little as 6 μl.

#### Widely Used for NGS

Based on cited journal articles, 67% of all RNA Clean & Concentrator  $^{\text{\tiny TM}}$  (RCC  $^{\text{\tiny TM}}$ ) kits are used for library prep, and 52% of the same set of citations are used for Illumina protocols and workflows.

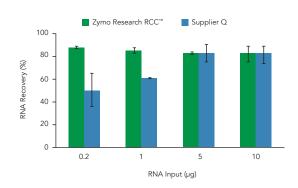


#### Ultra-Pure



RNA was cleaned-up using the RCC $^{\text{\tiny{M}}}$  kit and a Supplier Q kit (n=4). RNA purity (measured by A260/230) was greater than 1.8 for the RCC $^{\text{\tiny{M}}}$  kit but not for the Supplier Q kit.

#### High Recovery Rate



Increasing amounts of RNA was cleaned up using the RCC $^{\infty}$  kit and a Supplier Q kit (n=2). RCC $^{\infty}$  provides higher yields and more consistent recovery when compared to the Supplier Q kit.

Product	Cat. No.	Size	Binding Capacity	Minimum Elution
RNA Clean & Concentrator™-5 Kit	R1013*, R1015 R1014*, R1016	50 preps 200 preps	10 µg	6 μΙ
RNA Clean & Concentrator™-25 Kit	R1017 R1018	50 preps 100 preps	50 µg	25 μΙ
RNA Clean & Concentrator™-100 Kit	R1019	25 preps	250 µg	100 μΙ
ZR-96 RNA Clean & Concentrator™-5 Kit	R1080	2 x 96 preps	25 μg	10 μΙ
RNA Clean & Concentrator™ MagBead Kit	R1081 R1082	10 ml 50 ml	10 µg	10 μΙ

<sup>\*</sup> Supplied with DNase I.

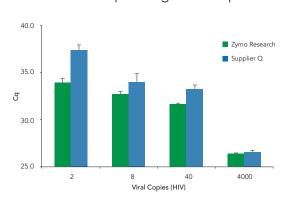
### Quick-DNA/RNA™ Viral Kits

(plasma, serum)

- Sample Input: Compatible with plasma/serum, cell culture media, biological fluids, swabs, feces.
- Streamlined Workflow: Sample inactivation and easy one-step lysis enables fast processing.
- **High-Sensitivity:** Optimized for low viral copy detection for Next-Gen Sequencing and RT-qPCR.

#### High-Sensitivity Viral Detection from Plasma

The *Quick*-RNA™ Viral Kits ensure high-sensitivity viral detection compared to the Supplier Q kit. Viral RNA was isolated from plasma samples. Data shows the mean (+/- SD) of triplicate RT-qPCR measurements.



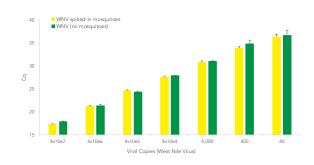
# **Quick-DNA/RNA™** Pathogen Kits

(insect vectors, tissues)

- Sample Input: Compatible with vectors (mosquitoes, fleas, ticks) and tissues (mammals, birds).
- Streamlined Workflow: Sample inactivation and easy one-step lysis enables fast processing.
- **Reliable Detection:** Optimized for pathogen (virus, bacteria, protozoa) detection for Next-Gen Sequencing and RT-qPCR.

#### Inhibitor-free Detection in Mosquitoes

Hard-to-lyse and inhibitor-rich mosquito vectors were homogenized using ZR BashingBeads<sup>™</sup> and purified using the *Quick*-DNA/RNA<sup>™</sup> Pathogen Kit. Ultra-pure, inhibitor-free West Nile Virus nucleic acids (spike-in) were detected by RT-qPCR down to 40 viral copies.



Product	Cat. No.	Size	Binding Capacity	Minimum Elution	Input Amount	Format
<i>Quick</i> -RNA <sup>™</sup> Viral Kit	R1034	50 preps	10 µg	6 µl	≤ 200 µl	Column
(for plasma/serum, biological fluids)	R1040	2 x 96 preps	10 µg	10 µl	≤ 200 µl	Plate
Quick-DNA/RNA™ Viral Kit (for plasma/serum, biological fluids)	D7020 D7022 R2140	25 preps 2 x 96 preps 96 preps	50 µg 10 µg 10 µg	35 μl 10 μl 50 μl	≤ 200 µl ≤ 200 µl ≤ 400 µl	Column Plate Magbead
Quick-DNA/RNA™ Pathogen Kits	R1042	50 preps	50 μg	25 μl	≤ 10 mg	Column
(for insect vectors and tissues)	R2145	96 preps	10 μg	50 μl	≤ 10 mg	Magbead

Additional sizes available (see Page 13)

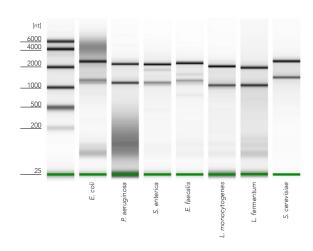
### **Environmental RNA Kits**

(bacteria, fungi, plant, soil)

- High-Quality: Extract high-quality total RNA (including small/micro RNA) from any environmental sample.
- **Homogenization:** Ultra-high density BashingBead<sup>™</sup> technology for complete disruption and sample lysis.
- **Inhibitor-Free:** RNA is ready for all downstream applications including Next-Gen Sequencing, RT-PCR, microarray, etc.

#### High-Quality RNA

High-quality total RNA was isolated from different microbial species including Gram-negative bacteria (*E. coli, P. aeruginosa, S. enterica*), Gram-positive bacteria (*E. faecalis, L. monocytogenes, L. fermentum*), and yeast (*S. cerevisiae*) using the *Quick-RNA*<sup>™</sup> Fungal/Bacterial Miniprep Kit. RNA was visualized using the Agilent 2200 TapeStation® system.

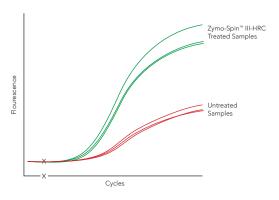


#### Complete Homogenization



State-of-the-art BashingBeads  $^{\!\scriptscriptstyle{\mathrm{M}}}$  are ideal for disrupting tough-to-lyse organisms when paired with bead mills or high speed cell disrupters.

#### Inhibitor-Free



Quick-RNA<sup>™</sup> Environmental Kits removed PCR inhibitors using the Zymo-Spin <sup>™</sup> III-HRC Filter. RNA was isolated from a *Nicotiana sp.* leaf, spiked with humic acid, with and without the Zymo-Spin <sup>™</sup> III-HRC Filter. RT-qPCR detected early amplification for the filter treated samples compared to the untreated samples ( $c_p = 30$  vs. 31).

Product	Cat. No.	Size	Binding Capacity	Minimum Elution	Input Amount
Quick-RNA™ Fungal/Bacterial Miniprep Kit (for Gram-negative/positive bacteria, yeast, fungi)	R2014	50 preps	50 µg	25 µl	50 - 100 mg wet weight
Quick-RNA™ Plant Miniprep Kit (for leaves, stems, buds, flowers, fruit, seeds)	R2024	50 preps	50 µg	25 µl	≤ 150 mg
Quick-RNA™ Tissue/Insect Microprep Kit (for insect and arthropod specimens, tissues)	R2030	50 preps	10 µg	6 µІ	≤ 10 mg
Quick-RNA™ Fecal/Soil Microbe Microprep Kit (for feces, soil, sludge, sediments)	R2040	50 preps	10 µg	6 µІ	≤ 250 mg

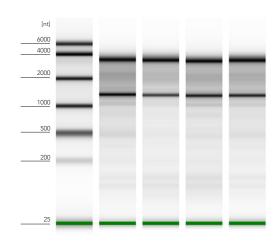
### Quick-RNA™ Blood Kits

(fresh or anticoagulated blood, blood cells)

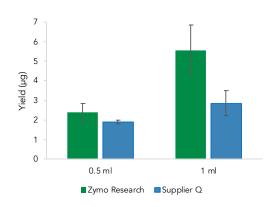
- Superior Yields: Recover total RNA (including small/micro RNA) without sample loss.
- **Protection:** Worry-free blood sample storage at ambient temperatures for up to 30 days.
- High-Quality: RNA is ready for all downstream applications including Next-Gen Sequencing, RT-PCR, etc.

#### High-Quality RNA

High-quality RNA was extracted from human whole blood using the *Quick*-RNA™ Whole Blood Kit. Blood was stored in DNA/RNA Shield™ at ambient temperatures for two days prior to extraction (n=4). RNA was visualized using the Agilent 2200 Tapestation® system.

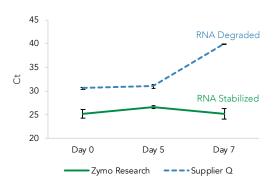


#### Superior Yields



Amount of RNA extracted from 1 ml of human whole blood was significantly higher using the Quick-RNA $^{\text{\tiny M}}$  Whole Blood Kit vs the Supplier Q kit (n=3).

#### Protection



RT-qPCR shows the Zymo Research workflow stabilizes RNA, while the Supplier Q workflow leads to degradation. Whole blood was stored up to 7 days at ambient temperatures and extracted at the indicated time points using the Zymo Research or Supplier Q preservatives and workflows.

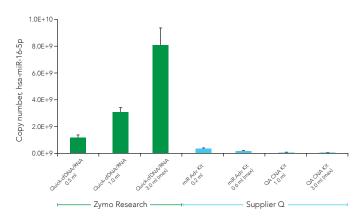
Product	Cat. No.	Size	Binding Capacity	Minimum Elution	Input Amount
Quick-RNA™ Whole Blood Kit (compatible with EDTA, citrate, and heparin blood)	R1201	50 preps	10 µg	6 μΙ	≤ 1 ml
Quick-DNA/RNA™ Blood Tube Kit (for use with the DNA/RNA Shield™ - Blood Collection Tube)	R1151	50 preps	100 µg	100 μΙ	3 ml blood
DNA/RNA Shield™ – Blood Collection Tube (collect and stabilize 3 ml blood in vacuum tubes): isolate up to 30 ug DNA and 30 ug RNA	R1150	50 tubes	-	-	_

## Quick-cfRNA™ Serum & Plasma Kits

(serum, plasma, saliva, cerebrospinal fluid, amniotic fluid)

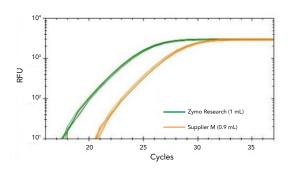
- Quick & Easy: Simple spin-column based isolation. No phenol/chloroform or precipitation.
- Highest Yields: Efficient isolation of total cell-free RNA. Recover up to 515 times more microRNA.
- Ultra-Pure: Ready for RT-qPCR, Next-Gen Sequencing, nCounter®, etc.

#### Highest Recovery of Cell-Free miRNA



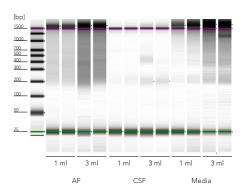
Cell-free RNA recovery scales proportionally with sample input using the Quick-cfDNA/cfRNA $^{TM}$  Serum & Plasma Kit. Cell-free RNA yields from the same plasma donor (61y-F) show linear and efficient recovery of plasma microRNA (hsa-miR-16-5p) when analyzed by RT-qPCR.

#### Ultra-Pure & Ready for RT-qPCR



The *Quick*-cfRNA<sup>™</sup> Serum & Plasma Kit results in high purity and recovery of plasma microRNA (hsa-miR-16-5p) based on RT-qPCR analysis.

#### Compatible with Various Biological Fluids



Amniotic fluid (AF), cerebrospinal fluid (CSF), or spent HeLa cell culture media (Media) were used to isolate cell-free nucleic acids using *Quick*-cfDNA/cfRNA™ Serum & Plasma Kit. Endogenous cell-free DNA from each sample type was visualized using the Agilent 2200 Tapestation® system.

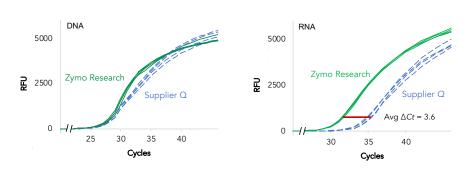
Product	Cat. No.	Size	Binding Capacity	Minimum Elution	Input Amount
<i>Quick</i> -cfRNA™ Serum & Plasma Kit	R1059	50 preps	10 µg	6 µl	≤ 1 ml
Quick-cfDNA/cfRNA™ Serum & Plasma Kit	R1072	50 preps	10 µg	6 µІ	≤ 3 ml

### Quick-DNA/RNA™ FFPE Kits

(fixed & embedded tissues)

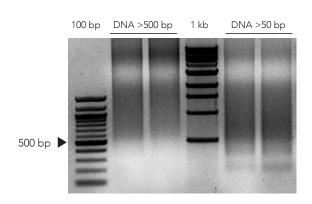
- Easy Processing: Includes Deparaffinization Solution for simple paraffin removal. No xylene necessary.
- Improved Recovery: Optimized Proteinase K digestion ensures maximum recovery.
- **High-Quality:** Non-crosslinked DNA and DNA-free RNA are ready for all downstream applications including PCR, Next-Gen Sequencing, etc.

#### Improved Recovery



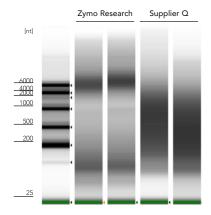
DNA & RNA isolated using the Quick-DNA/RNA $^{\text{M}}$  FFPE Kit are high quality and consistently outperforms RNA isolated using a Supplier Q kit (Avg  $\Delta$ Ct = 3.6) as depicted by the RT-PCR amplification curves (n=4).

#### High-Quality FFPE DNA



Equivalent amounts of DNA resolved in a 1% agarose/TAE/EtBr gel show binding conditions may be adjusted with the  $\textit{Quick-DNA}^{\text{\tiny{M}}}$  FFPE Kit to selectively isolate DNA >50 bp or >500 bp. 100 bp and 1 kb DNA ladder shown.

#### High-Quality FFPE RNA



RNA isolated with the <code>Quick-RNA</code> FFPE Kit is higher quality (left) compared to a Supplier Q kit (right). Quality assessed using the Agilent 2200 TapeStation $^{\circ}$  system.

Product	Cat. No.	Size	Binding Capacity	Minimum Elution	Input Amount
Quick-DNA™ FFPE Kit	D3067	50 preps	25 μg	25 μΙ	≤ 25 mg
Quick-RNA™ FFPE Kit	R1008	50 preps	50 µg	25 μΙ	≤ 25 mg
Quick-DNA/RNA™ FFPE Kit	R1009	50 preps	50 µg	25 μΙ	≤ 25 mg

# **RNA Isolation Products**

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Product	Cat. No.	Size
Quick-DNA/RNA™ Viral Kit	D7020 D7021	25 preps 100 preps
Quick-DNA/RNA™ Viral 96 Kit	D7022 D7023	2 x 96 preps 4 x 96 preps
Quick-DNA/RNA™ Viral MagBead Kit	R2140 R2141	1 x 96 preps 4 x 96 preps
Quick-DNA/RNA™ Pathogen Miniprep Kit	R1042 R1043	50 preps 200 preps
Quick-DNA/RNA™ Pathogen MagBead Kit	R2145 R2146	1 x 96 preps 4 x 96 preps
Quick-RNA™ Fungal/Bacterial Microprep Kit	R2010	50 preps
Quick-RNA™ Fungal/Bacterial Miniprep Kit	R2014	50 preps
Quick-RNA™ Plant Miniprep Kit	R2024	50 preps
Quick-RNA™ Tissue/Insect Microprep Kit	R2030	50 preps
Quick-RNA™ Fecal/Soil Microbe Microprep Kit	R2040	50 preps
Quick-RNA™ Whole Blood Kit	R1201	50 preps
Quick-DNA/RNA™ Blood Tube Kit	R1151	50 preps
Quick-cfRNA™ Serum & Plasma Kit	R1059	50 preps
Quick-cfDNA/cfRNA™ Serum & Plasma Kit	R1072	50 preps
Quick-RNA™ FFPE Kit	R1008	50 preps
Quick-DNA/RNA™ FFPE Kit	R1009	50 preps
ZR Urine RNA Isolation Kit™	R1038 R1039	20 preps 50 preps
YeaStar™ RNA Kit	R1002	40 preps
ZymoBIOMICS® RNA Miniprep Kit	R2001	50 preps
ZymoBIOMICS® DNA/RNA Miniprep Kit	R2002	50 preps
ZymoBIOMICS® DNA/RNA MagBead Kit	R2135 R2136	1 x 96 preps 4 x 96 preps
Pinpoint™ Slide RNA Isolation System I	R1003	50 preps
Pinpoint™ Slide RNA Isolation System II	R1007	50 preps
Zymoclean™ Gel RNA Recovery Kit	R1011	50 preps
ZR small-RNA PAGE Recovery Kit™	R1070	20 preps

<sup>\*</sup> Supplied with TRI Reagent  $^{\! \oplus}.$ 



The Beauty of Science is to Make Things Simple®







### The **BEAUTY** of **SCIENCE** is to Make Things **SIMPLE**®

