Product Profile

EchoLUTION Blood DNA HiYield & Blood DNA Micro Kits

- for single-step spin column-based purification of genomic DNA
- flexible input – 200 µl to 1 ml or 5 to 60 µl liquid blood & dried blood spots

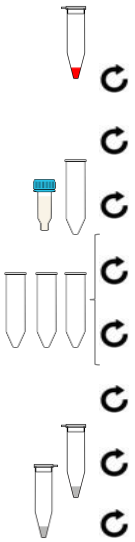
Genomic research and DNA analyses such as PCR and NGS require a suitable amount of high-quality genomic DNA as starting material. BioEcho strives to improve traditional sample preparation workflows by providing faster and more convenient procedures that lead to superior results. Our novel technology allows to prepare higher amounts of gDNA of unmet purity with minimal hands-on interaction at a fraction of the time plus in an eco-friendly manner.

EchoLUTION Blood DNA Kits provide – compared to common *bind-wash-elute* methods

- **Convenient DNA extraction –** flexible blood input from 200 µl – 1 ml or from 60 µl blood and dried blood spots
- **Superior downstream performance in PCR and NGS –** Inhibitor-free highly pure DNA for reliable results
- **Improved yields –** up to 2-fold increased amount of gDNA
- **Faster preparation –** half the hands-on time, fewer steps
- **70% less plastic waste, no toxic chemicals –** the sustainable way

Faster preparation time & fewer steps

Silica *Bind–Wash–Elute*

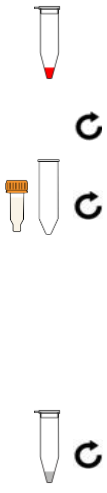


1. Prepare buffers and reagents.
2. Add protease and lysis buffer to blood. Mix.
3. Incubate.
4. Short spin.
5. Add ethanol, vortex.
6. Short spin.
7. Transfer sample to column.
8. Centrifuge.
9. Transfer to new tube. Add wash buffer 1.
10. Centrifuge.
11. Transfer to new tube. Add wash buffer 2.
12. Centrifuge.
13. Transfer to new tube.
14. Centrifuge.
15. Transfer to new tube. Add elution buffer, incubate.
16. Centrifuge. DNA is in eluate 1.
17. Transfer to new tube. Add elution buffer, incubate.
18. Centrifuge. DNA is in eluate 2.

19-20. Optional 3rd elution step.

7 minutes hands-on time per sample
8 centrifugation steps

EchoLUTION Blood DNA Micro/HiYield* Kit



1. *Add TurboLyse protease & buffer to blood. Mix.
2. Incubate.
3. Add solution CS.
4. Short spin.

meanwhile:
Prepare column.
Centrifuge.

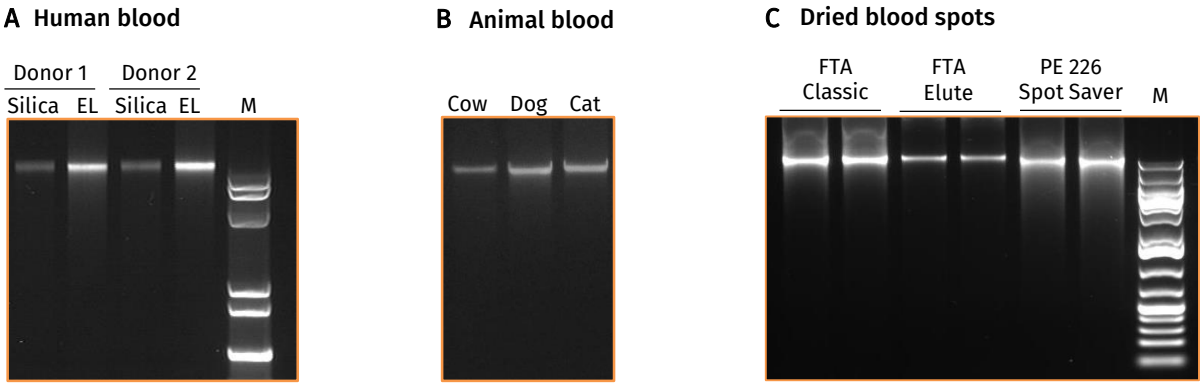
5. Transfer sample to column.
6. Centrifuge. DNA is in eluate.

3 /*5 minutes hands-on time per sample
3 /*4 centrifugation steps

*HiYield: starts with incubation in Erythrocyte Lysis Buffer followed by centrifugation and removal of supernatant.

The innovative EchoLUTION workflow increases the convenience of genomic DNA preparation significantly. Isolate your gDNA from blood to unmet purity in a fraction of time compared to traditional Silica *bind-wash-elute* procedures. The EchoLUTION principle is independent of a membrane binding capacity: the DNA remains untouched and all of it flows through the column in a single step, whereas impurities and RNA are held back.

Consistently high yields



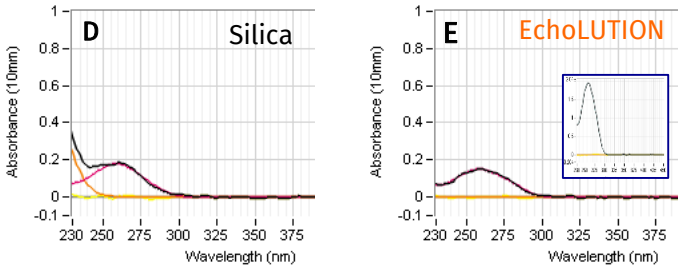
Whole blood collected from donors using EDTA-treated tubes was extracted and analyzed by agarose gel electrophoresis. **A**, 60 µl human blood from donors 1 and 2 were purified using either a Silica-based kit from Supplier Q or the EchoLUTION Blood DNA Micro Kit (EL). **B**, DNA was purified from 60 µl blood (cow, dog, cat). **C**, genomic DNA was prepared with the EchoLUTION Blood DNA Micro Kit from 5 punches each of blood samples dried on the indicated card types (in duplicates). **A – C**, 6 µl of the 100 µl elution fractions each were loaded onto the gel.

Sample	Amount	Yield (µg DNA)
Human whole blood	60 µl	0.8 – 1.8 µg
Cat whole blood	60 µl	1.0 – 1.5 µg
Dog whole blood	60 µl	1.0 – 1.5 µg
Cow whole blood	60 µl	0.2 – 0.5 µg
Chicken whole blood	5 µl	~10 µg
Dried blood spots[1]	5 punches[1]	1.0 – 5.0 µg

[1] 5 punches (Ø 3 mm) from dried blood cards coated with 100 µl human whole blood. EchoLUTION Blood DNA Kit has been tested with cards from various suppliers (*Indicating FTA Classic, a)*, *FTA Elute Micro, b*); PE *226 Spot Saver Card, c; 100% cellulose, d*). Yield varies with type of dried blood card used.

Genomic DNA extracted with the EchoLUTION principle provides higher yields compared to Silica *bind-wash-elute* procedures: more efficient enzymatic sample lysis and the avoidance of – naturally incomplete – adsorption, washing and desorption steps contribute to an increased target recovery. The EchoLUTION Blood DNA Micro Kit works consistently well with blood of various origin (see Fig.s A, B, C).

Significantly greater purity



Criterion	Silica	EchoLUTION	Optimum
A_{260nm}/A_{280nm}	2.45	1.83	1.8 – 2.0
A_{260nm}/A_{230nm}	0.57	2.20	2.0 – 2.2

Purity assessment of Silica and EchoLUTION gDNA fractions. Undiluted DNA obtained from whole blood (donor 1, **A**) was spectrophotometrically analyzed. Impurities are solely detected in Silica elution fractions (D; E: measurement of a 10x concentrated elution fraction)

The EchoLUTION workflow is based on aqueous solutions only – chaotrophic reagents such as phenol, guanidinium (Gu-HCl; GITC), or organic solvents are not required. Since wash steps are never complete, Silica preps consequently contain trace amounts of these substances as impurities (D), whereas EchoLUTION samples are highly pure (E). This is confirmed by the OD ratios, where BioEcho eluates typically show values within the optimum range and Silica is frequently off. Silica-prepared target quantification by spectrophotometric analysis can be misleading, since some of the co-purified impurities (e. g., RNA or small DNA fragments) absorb at 260 nm, too. Consequently, DNA yield and purity of Silica-based purifications are frequently overestimated (see Fig. F). Applying these DNA fractions into PCR or NGS reactions may lead to compromised results, whereas EchoLUTION purified DNA result in superior downstream performance (see qPCR Fig. G).

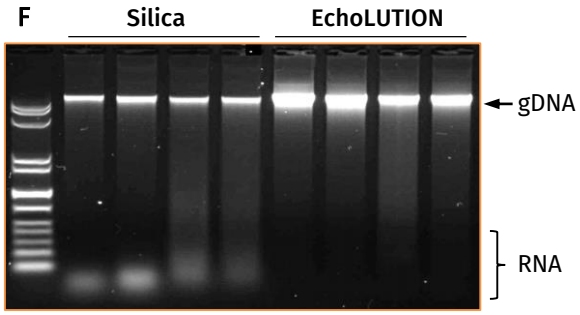
Silica kit gDNA yields tend to be overestimated:

OD readings indicate a 2-fold higher yield using the Silica kit (Table). However, gel analysis reveals an at least **2-fold higher gDNA yield with EchoLUTION**. Co-purified RNA or other molecules absorbing at 260 nm add significantly but falsely to measured Silica kit yields. Here, the Silica gDNA yield is ~2 µg in contrast to the measured 6.7 µg.

Table: OD readings

Sample	Silica	EchoL.
1	5.9	4.1
2	8.2	3.3
3	6.8	2.9
4	5.8	3.3
Ø Yield	6.7 µg	3.4 µg

F

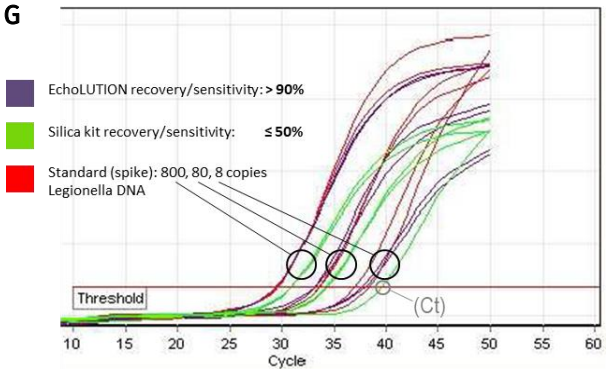


DNA was purified from rat brain

Superior downstream performance

DNA from human blood prepared using the EchoLUTION Blood DNA Micro Kit is detected with high sensitivity in downstream applications such as NGS or quantitative PCR. In an infection diagnostics type of lab work, Legionella pathogen DNA EchoLUTION-purified from human blood is 2-4 fold more sensitively detected (ΔCt 1-2) than when prepared using a Silica kit (compare purple vs. green traces in Fig. G).

G



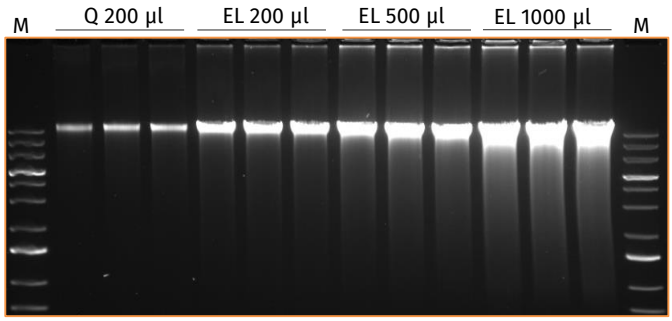
Threshold Cycle (Ct) definition:
ΔCt = 1: 2-fold recovery/sensitivity
ΔCt = 2: 4-fold recovery/sensitivity

8, 80, and 800 copies of Legionella DNA were spiked into aliquots of a human blood sample and the DNA purified using the EchoLUTION Blood DNA Micro Kit (purple) and a Silica kit (green). Aliquots of the obtained elution fractions were applied to qPCR detection of a Legionella amplicon. The corresponding spike amounts were used as recovery controls (red). Superposition of red and purple traces reflects high (>90%) target recovery or sensitivity of detection when using the BioEcho kit.

Superior DNA yield and concentration compared to *bind-wash-elute* methods

Using the EchoLUTION Blood DNA HiYield Kit, up to 20 µg highly concentrated DNA (200 ng/µl) is obtained while offering maximal flexibility with 200 µl to 1 ml blood as input. For processing sample volumes >200 µl, scientists so far had to rely on costly and inconvenient larger-scale kits (e. g., Midi/Maxi formats). These suffer under a limited binding capacity and low DNA concentration and purity. With the EchoLUTION Blood DNA HiYield Kit, lots of high-quality DNA is provided (see Fig. H and table).

H



Kit	Blood (µl)	DNA yield (µg)	DNA conc. (ng/µl)	$A_{260/280}$	$A_{260/230}$
Q	200	3.1	16	1.8	1.3
	200	4.5	45	1.7	1.8
EL	500	8.3	83	1.8	1.8
	1,000	18.4	184	1.8	2.0

Flexible blood input, high DNA yield, concentration and purity: The indicated volumes of blood (same donor, 3 replicates each) were purified using a common Silica based *bind-wash-elute* DNA purification kit (Q) or the EchoLUTION Blood DNA HY Kit (EL). **H**, 2 µl per elution fraction were loaded onto an agarose gel; key parameters were measured spectrophotometrically (Table).

Genomic research – the sustainable way !

BioEcho strives to develop sustainable, eco-friendly lab processes and reduces the amounts of plastic-based components contained per kit and consumed during the lab process as much as possible. All tedious *bind-wash-elute* steps of common Silica-based procedures are omitted, with drastically reduced plastic consumable usage and no use of hazardous materials like chaotropic salts or organic solvents being harmful for lab safety and user health. Plastic waste is reduced by 70 % with EchoLUTION kits (left) compared to a common Silica kit (right) while significant disposal costs are saved.

Waste	Silica	EchoLUTION
Hazardous liquid	80 ml	0
Plastic	540 g	170 g

Plastic waste produced from a 250 reactions Silica-based DNA kit and from an EchoLUTION kit (including kit components and consumables that are not part of the kit). Bags contained in BioEcho kits are cellophane-based.

Ordering information

EchoLUTION Blood DNA HiYield Kit	Reactions	Product No.
For single-step purification of genomic DNA from 200 µl to 1 ml liquid blood, yielding up to 20 µg of highly concentrated (200 ng/µl) pure DNA suitable for all molecular biology applications	10	010-011-010
	50	010-011-050
	250	010-011-250
EchoLUTION Blood DNA Micro Kit	**Reactions**	**Product No.**
For single-step purification of genomic DNA from up to 60 µl liquid blood (human or animal) and dried blood spots (e. g., FTA cards), yielding up to 2 µg of highly pure DNA suitable for all molecular biology applications	10	010-001-010
	50	010-001-050
	250	010-001-250

Recommended Accessories	Amount	Product No.
BioEcho Cap Puncher (for handling of EchoLUTION/EchoCLEAN spin columns)	1	050-001-001
BioEcho Grinding Pestles (for efficient grinding of cells and tissue)	100	050-004-100

BioEcho‘s growing portfolio of nucleic acid extraction kits and accessory reagents comprises further products such as DNA and RNA CleanUp and concentration kits. For more information, please refer to **www.bioecho.de**.

BioEcho Life Sciences GmbH
Nattermannallee 1
50829 Köln (Cologne), Germany

Industriestrasse 12
CH-6210 Sursee
mail@witec.ch
T 041 250 53 57