Magen Blood DNA Extraction Kit

Introduction

Blood samples contain rich DNA, including mitochondrial DNA, genomic DNA, circulating DNA (mostly released into blood after tumor cell apoptosis) in white blood cells, as well as parasitic viral or microbial DNA. These DNA are important parameters in clinical testing or diagnosis, which are also valuable materials for medical research. There are three main issues with extracting DNA from blood samples:

1. The sample is highly infectious, posing great harm to operators and the environment.
2. The source of DNA is complex and a portion of the nucleic acid, such as viral DNA or free DNA, may be lost during the operation, leading to downstream detection failure;
3. Blood sample contains a large amount of impurities and inhibitory factors.

Currently there are many methods available for extracting DNA from whole blood samples, such as phenol chloroform extraction, salting out method, etc. However, these methods require pre-treatment of blood sample, which removes red blood cells and isolate white blood cells in the first step. Due to the requirement that it cannot inactivate or kill pathogens during the process of removing red blood cells, the waste liquid (red blood cell lysate) and consumables may be contaminated by pathogens and become infectious, posing a danger to the entire laboratory environment and operators. In addition, during the process of removing red blood cells, useful nucleic acid information such as viruses, microorganisms, or circulating DNA is also lost, leading to experiment or detection failures.

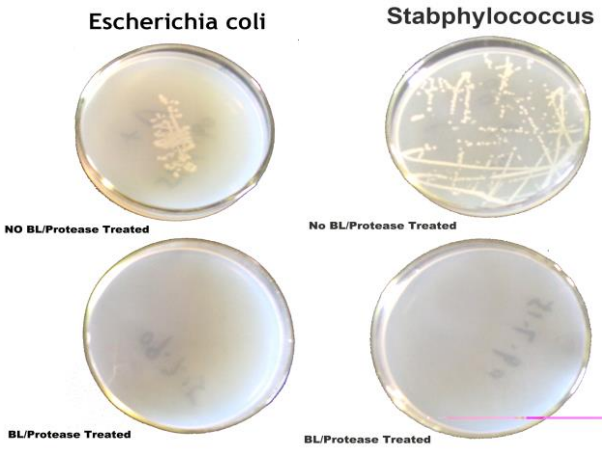
The HiPure Blood DNA Kits series provided by Magen Company uses silica gel column purification technology, which can directly lyse whole blood samples without the need for white blood cell separation. Whole blood samples are directly mixed with lysates and proteases, resulting in the inactivation of pathogens, greatly reducing the infectivity, environmental pollution, and the chance of operators being infected. Due to the direct lysis and digestion of samples, except lymphocyte DNA, other circulating DNA as well as DNA from viruses and microorganisms, can also be recovered.

This product series is suitable for extracting total DNA from liquid samples such as whole blood, serum, plasma, saliva, and body fluids. The HiPure Blood DNA Kits series includes:

Product Name	Sample type	Sample amount	Column
Blood DNA Mini Kit	Anticoagulant/serum/ plasma/saliva/cell culture medium, body fluids, etc.	250μl	1.5ml
Blood DNA Midi Kit		2ml	15ml
Blood DNA Maxi Kit		10ml	50ml
Blood DNA 96 Kit		200μl	96 plate

Rapid inactivation of viruses and bacteria by lysate/Proteinase K

Take 2ml E.coli and Staphylococcus aureus bacterial solution cultured overnight, 2ml Lambda bacteriophage culture solution, add 2ml Buffer AL and 100μl Proteinase K, treat at 70℃ for 10 minutes. Take 50μl bacterial digestion solution, diluted with 0.5ml sterilized water, pour into LB plate, and incubate for 12-16 hours. Take 50μl bacteriophage culture solution, diluted with 0.5ml sterilized water, infect Escherichia coli, and culture for 12 hours. The results showed that after 10 minutes of treatment with Buffer AL/Proteinase K, E. coli and Staphylococcus that were extremely difficult to lyse were killed and inactivated (see the following figure); Lambda bacteriophages were also killed without the appearance of plaque.

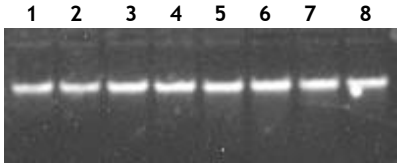


1. HiPure Blood DNA Mini Kit (D3111)

1.1. Extraction of anticoagulant whole blood DNA from healthy individuals

Take 8 healthy anticoagulant whole blood samples of 250μl, extract using HiPure Blood DNA Mini Kit. After extraction, the purity and yield were measured by Nanodrop 2000, and the results were as follows. OD260/OD280 was approximately 1.80-1.88, and OD260/OD230 was approximately 1.4-2.2, indicating a high purity of the purified DNA. The DNA yield of human blood was approximately 6-10μg/0.25ml. Take 3μl purified DNA, analyzed

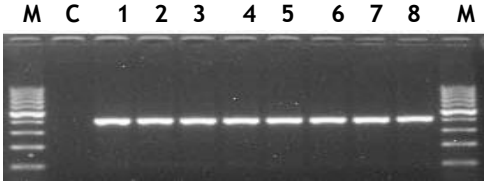
with 0.8% agarose gel 80V electrophoresis for 30 minutes and take photos. The electrophoresis results show that the DNA band obtained by this method is single, complete, and not degrade.



Sample	Conc. μg/μl	A260	A280	260/280	260/230	Yield μg
1	0.0625	1.25	0.678	1.84	1.97	6.25
2	0.0682	1.363	0.751	1.81	1.61	6.82
3	0.0933	1.865	0.998	1.87	2.07	9.33
4	0.091	1.82	0.994	1.83	1.67	9.1
5	0.0871	1.742	0.939	1.85	2.04	8.7
6	0.0954	1.907	1.059	1.8	1.38	9.5
7	0.0683	1.367	0.748	1.83	1.79	6.83
8	0.0718	1.436	0.788	1.82	1.88	7.18

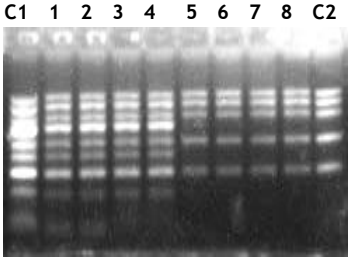
1.2 Extraction of serum DNA with HBV:

Take 8 serum samples from hepatitis B virus carriers of 0.25ml, then extracted by HiPure Blood DNA Mini Kit. Select a pair of specific primers (about 400 bp) of hepatitis B virus, take 10% DNA as the PCR template, and detect hepatitis B virus for 35 cycles. The results of 2% agarose gel electrophoresis were as follows. As shown in the figure, HiPure Blood DNA Mini Kit can efficiently recover virus DNA



1.3 Extraction of circulating DNA in serum, plasma, and blood

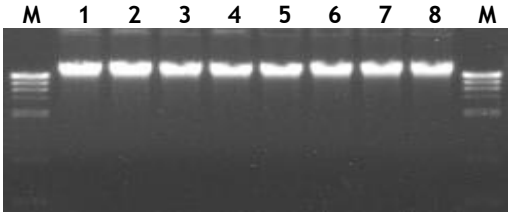
Blood samples usually contain circulating DNA, which typically comes from tumor apoptotic cells or normal apoptotic cells, which is an excellent source for tumor detection. Take 10μl CL5000 DNA Marker (C1) and HT II DNA Marker (C2), dilute them with serum to 250μl, and then extracted by HiPure Blood DNA Mini Kit. As shown in the figure, this scheme can efficiently recover various DNA fragments, with the minimum detectable fragment currently being 100bp.



2. HiPure Blood DNA Midi Kit (D3113)

2.1 Extraction of anticoagulant whole blood DNA from healthy individuals

Take 8 healthy anticoagulant whole blood samples of 2ml, extract by HiPure Blood DNA Midi Kit. After extraction, the purity and yield were measured by DU640 ultraviolet spectrophotometer, and the results were as follows. OD260/OD280 was approximately 1.7-1.9, OD260/OD230 was approximately 1.8-2.2, indicating a high purity of the purified DNA. The DNA yield of human blood was approximately 40-60μg/2ml. Take 10μl purified DNA, analyzed with 0.8% agarose gel 80V electrophoresis for 30 minutes, use Lambda DNA/Hind III Marker as the control, and take photos. As shown in the figure, the genomic DNA obtained using this kit has good integrity, no tailing phenomenon, and the fragments are all larger than 23KB.



Sample	A260	A280	A230	A260/280	Yield μg
1	0.1403	0.0773	0.0851	1.82	61.73
2	0.1386	0.0745	0.1123	1.86	60.98
3	0.0875	0.0456	0.0564	1.92	38.50
4	0.0956	0.0503	0.0843	1.90	42.06
5	0.1045	0.0610	0.0785	1.71	45.98
6	0.1058	0.0563	0.0548	1.88	46.55
7	0.1024	0.0563	0.0647	1.82	45.05
8	0.1151	0.0596	0.0896	1.93	50.64

F&Q

1. What mechanism does this product use to reduce infectivity?

This kit does not require any pre-treatment of blood, just mixing the blood with Buffer BL and protease. Buffer BL and proteases can quickly lyse and inactivate viruses and microorganisms, greatly reduce the infectivity of blood, making it safer and faster for operators. In addition, the waste liquid and collection tubes can be discarded together to reduce the infectivity of fungi and spore microorganisms which are difficult to be inactivated.

2. What is the lowest segment that this kit can recover? Can it be used to extract free nucleic acids from blood?

Experiments have shown that this kit can bind DNA fragments as low as 100bp. It can be used to recover free nucleic acids from samples such as blood, serum, and plasma. If you need to recycle smaller free nucleic acids from blood samples, please contact us.

3. What is the yield when extract from 2ml blood?

Generally, when extract DNA from 2ml healthy human whole blood samples, the yield is approximately 45-65μg. Some patients' blood samples can reach up to 90μg.

4. What is the yield of DNA in serum and plasma?

Due to the fact that serum and plasma only contain trace amounts of nucleic acids, which come from free nucleic acids formed by apoptotic cells, the DNA yield in serum and plasma is very low. When extracting from 2ml serum or plasma, the yield is generally only around 1-500ng/ml.

5. What are the factors that affect DNA purity?

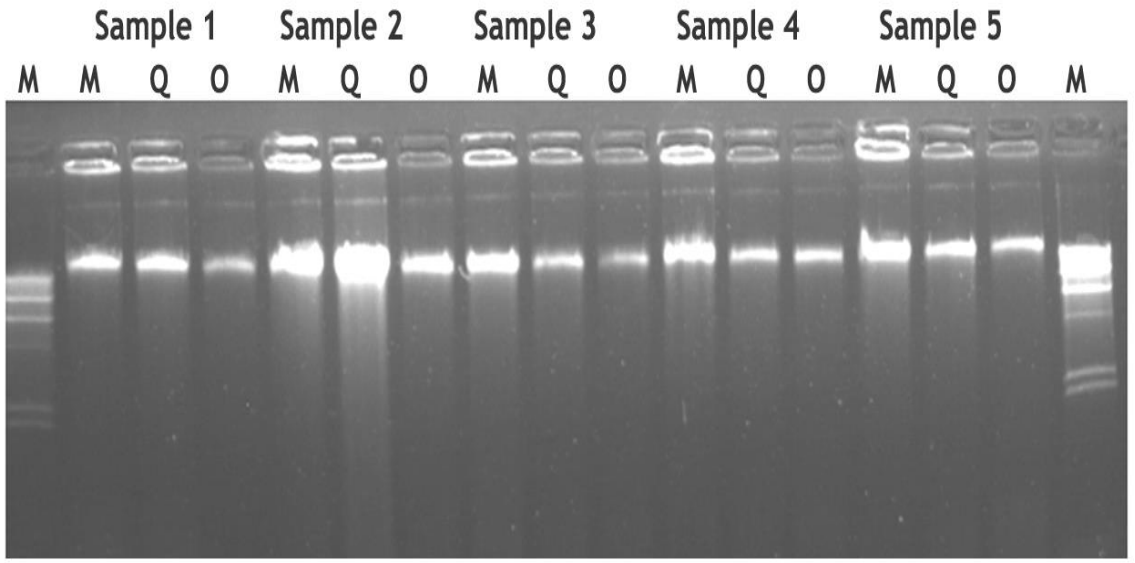
After adding Buffer BL, it must be thoroughly vortex mixed. The activity of proteases is very important, and the dissolved proteases must be stored separately. Repeated freezing and thawing will reduce their activity. The storage conditions of blood must be normal. Do not place at room temperature for more than 1 day, at 2-8℃ for more than a week. Abnormal storage can lead to small clots in blood samples, which affects the purity.

6. Can this method obtain viral and bacterial DNA in the blood?

Yes. This method uses direct lysis method to process blood, which can obtain the total DNA of the blood sample.

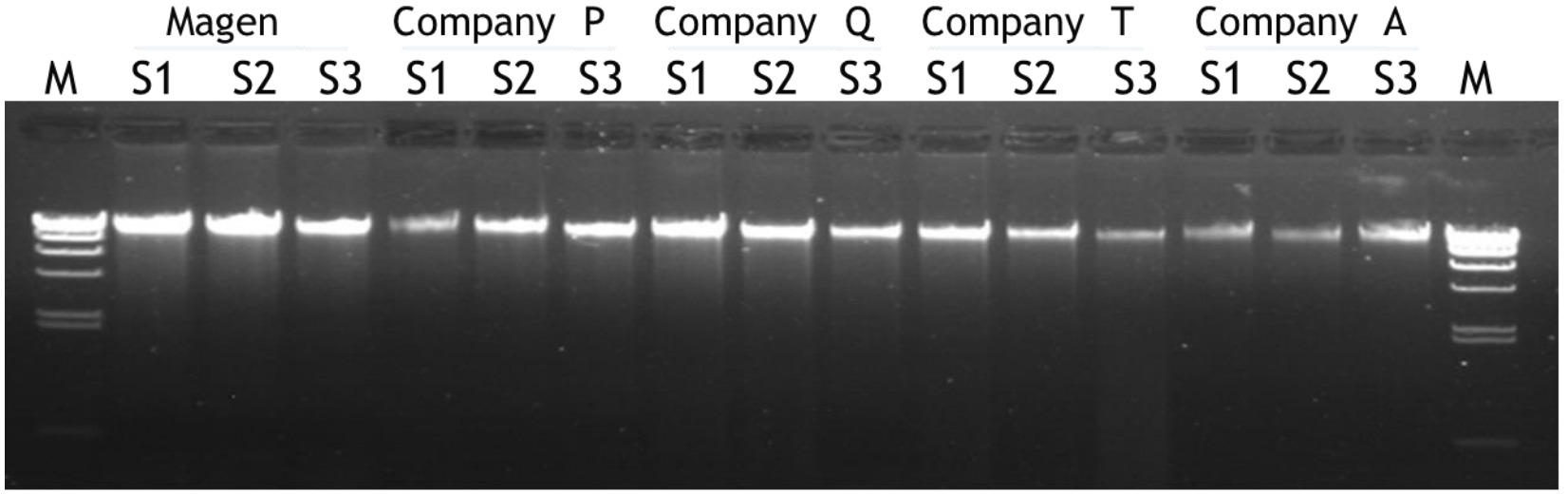
Magen HiPure Blood DNA Mini Kit
VS
Qiagen, Tiangen, Axygen, Omega Kits

Extraction efficiency of different human blood samples



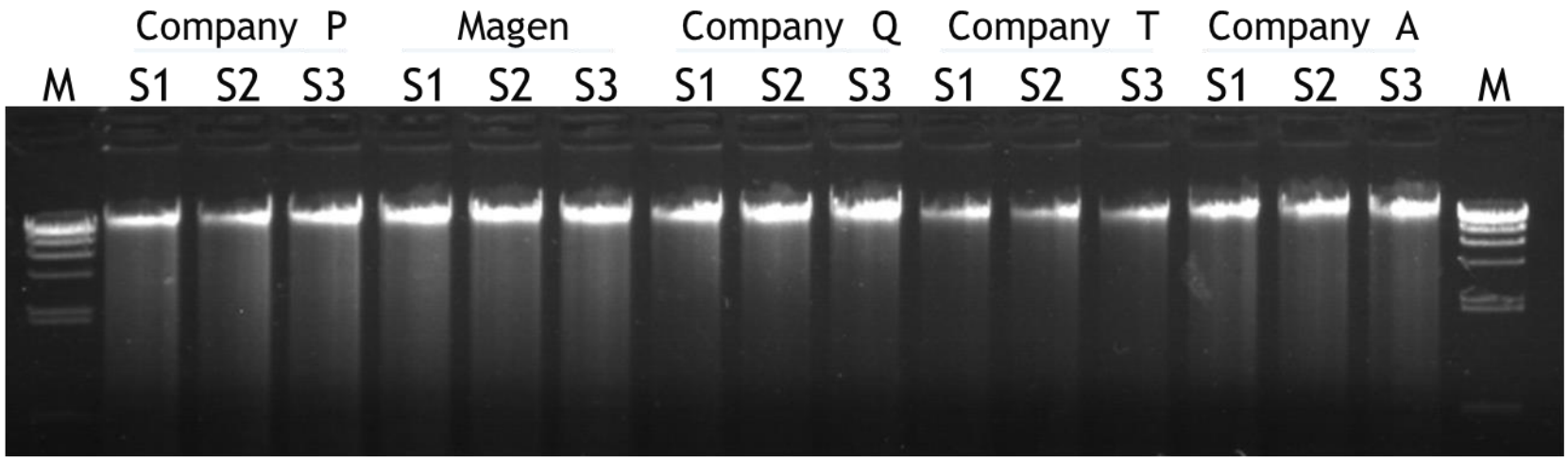
Sample	Company	Nucleic Acid Conc.	Unit	A260	A280	260/280	260/230	Yield (μg)
1	Magen	0.0720	μg/μl	1.440	0.744	1.93	1.67	7.2
	Qiagen	0.0645	μg/μl	1.291	0.667	1.94	1.24	6.45
	Omega	0.0381	μg/μl	0.762	0.383	1.99	1.50	3.81
2	Magen	0.0863	μg/μl	1.727	0.913	1.89	1.70	8.63
	Qiagen	0.1141	μg/μl	2.283	1.210	1.89	1.40	11.41
	Omega	0.0429	μg/μl	0.858	0.431	1.99	1.76	4.29
3	Magen	0.0540	μg/μl	1.079	0.574	1.88	1.24	5.4
	Qiagen	0.0326	μg/μl	0.652	0.326	2.00	1.40	3.26
	Omega	0.0298	μg/μl	0.595	0.298	2.00	1.78	2.98
4	Magen	0.0556	μg/μl	1.112	0.596	1.86	1.45	5.56
	Qiagen	0.0284	μg/μl	0.569	0.300	1.89	0.94	2.84
	Omega	0.0265	μg/μl	0.529	0.270	1.96	1.43	2.65
5	Magen	0.0626	μg/μl	1.253	0.671	1.87	1.22	6.26
	Qiagen	0.0338	μg/μl	0.676	0.335	2.02	1.01	3.38
	Omega	0.0345	μg/μl	0.689	0.350	1.97	1.59	3.45
6	Magen	0.0796	μg/μl	1.592	0.848	1.88	1.73	7.96
	Qiagen	0.0330	μg/μl	0.660	0.328	2.01	1.34	3.3
	Omega	0.0366	μg/μl	0.733	0.383	1.91	1.24	3.66

Comparison of human blood samples



M: λ DNA/HindIII ; S1, S2, S3 are blood samples from three different individuals

Comparison of pig blood samples



M: λ DNA/HindIII ; S1, S2, and S3 are blood samples from three different pigs