

CASE STUDY:

A comparison of Arcis Ultra-Fast Sample Prep with 3 commercial DNA extraction kits

Rapid DNA extraction for bacterial cultures of *Pseudomonas aeruginosa* and sputum samples from patients with cystic fibrosis.

For this case study, a panel of 10 clinical isolates were selected (Table 1) which form part of an international panel of *P. aeruginosa* isolates.
(De Soyza et al., 2013).



Summary:

The Arcis DNA Prep Kit was compared with three commercially available DNA extraction kits. This study shows that the Arcis DNA Prep Kit compares favourably with existing DNA extraction solutions, and offers unparalleled benefits in terms of turn-around time and simplicity.

This independent evaluation was carried out by Dr. J. Fothergill and Y. Hilliam, Institute of Infection and Global Health, University of Liverpool

Results:

Results: Sample Prep Time

The comparator kits all require instrumentation such as centrifugation and heating, the processing times range from 20 minutes to 4 hours. The Arcis DNA Prep Kit requires no instrumentation and takes three minutes from start to finish (Figure 1).

Figure 1: DNA yield Vs Sample Processing Time



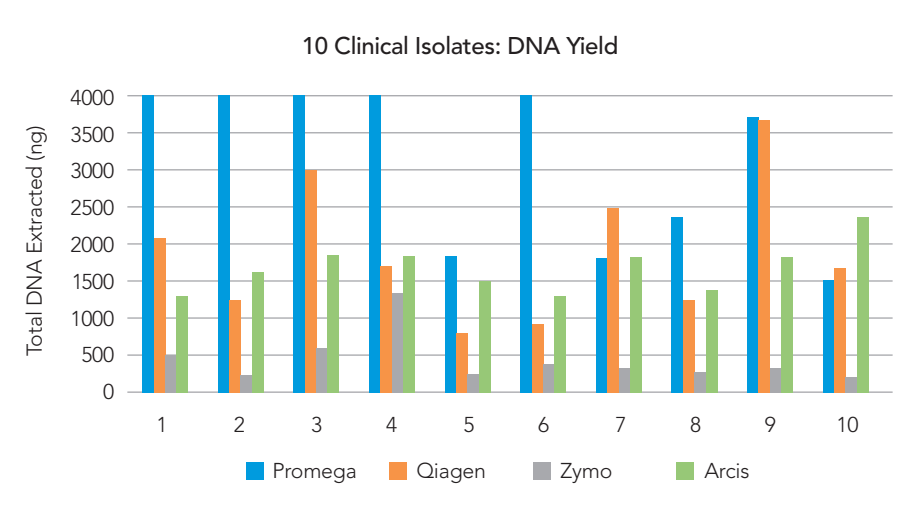
Results: DNA Yield

The total DNA extracted from each kit was assessed using the Qubit System (Table 1). Promega kit yielded the most DNA however results were found to be highly variable. Large amounts of DNA was extracted from some of the isolates but this was not consistent. This is also the most labour intensive and time consuming kit. The Arcis kit was comparable to the Qiagen kit but DNA is obtained in 3 minutes compared to 60 minutes for the Qiagen system (Figure 2).

Table 1: DNA yield for the panel of bacterial clinical isolates as measured by Qubit system

Isolate	Total DNA extracted (ng)			
	Promega	Qiagen	Zymo	Arcis
1	13200	2097	485	1308
2	6760	1253	240	1625
3	5243	3003	605	1866
4	9400	1713	1350	1841
5	1840	805	255	1500
6	8897	930	385	1317
7	1823	2490	340	1825
8	2370	1250	280	1387
9	3727	3690	340	1825
10	1517	1680	220	2374

Figure 2: DNA yield for the panel of bacterial clinical isolates as measured by Qubit system



*Isolates 1,2,3,4,6 cropped for illustration (see Table 1 for total yield)

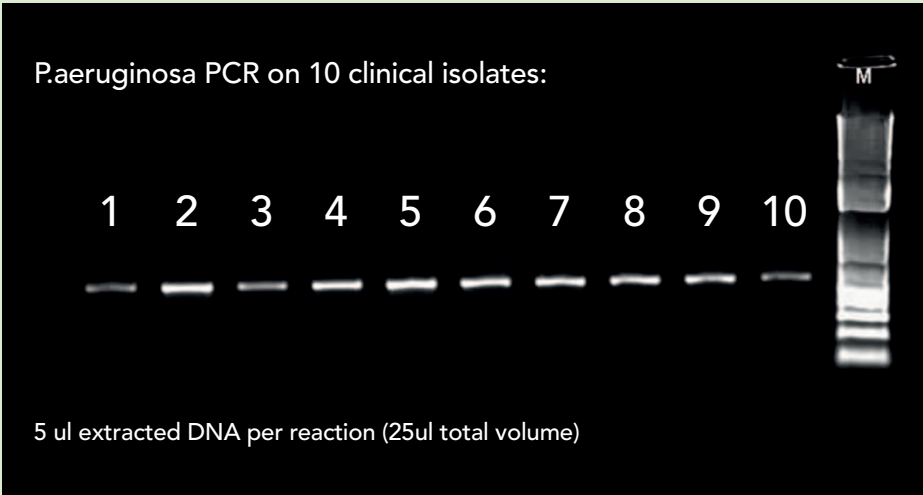




Results:
PCR on clinical isolates

PCR was used to verify that the DNA obtained was amplifiable and of sufficient quality for molecular investigations. The DNA gave a single band of the correct size following end point PCR (Figure 3).

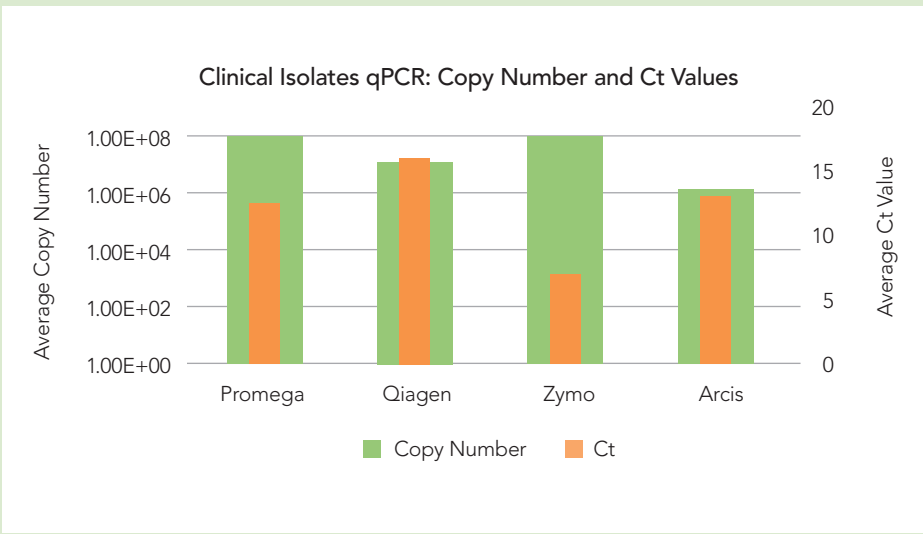
Figure 3: PCR results from samples processed using the Arcis DNA Prep Kit



Results:
qPCR on clinical isolates

qPCR was used to verify that the DNA was suitable for use in real-time quantitative PCR with sybr green. Ct values and copy number assessments are shown in Figure 4. The Arcis system was shown to be comparable in performance with the other commercial kits.

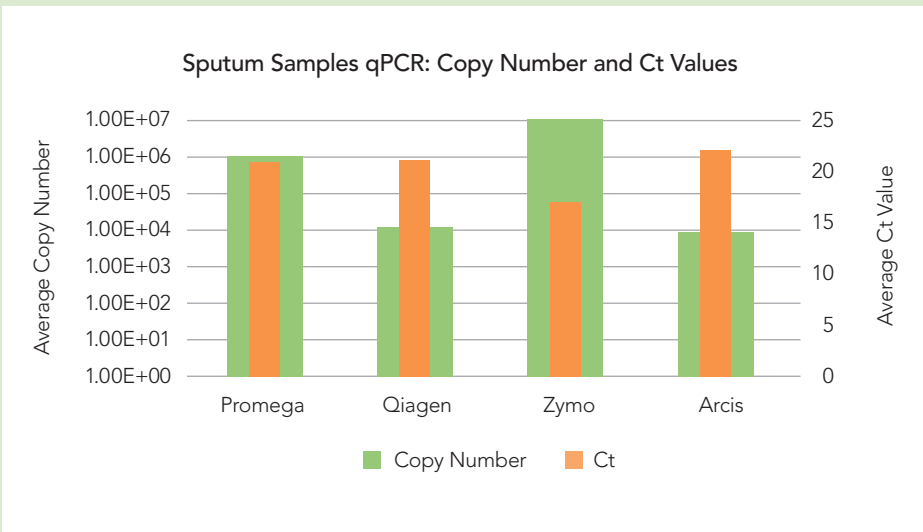
Figure 4: qPCR results for the Arcis DNA Prep Kit and comparator systems (clinical isolates)



Results:
qPCR on challenging samples

The Arcis DNA Prep Kit was challenged with a traditionally difficult sample matrix: a panel of 10 sputum samples from cystic fibrosis patients. In terms of copy number and Ct values the Arcis DNA Prep Kit performed as well as the 3 comparator systems (Figure 5).

Figure 5: qPCR results for the Arcis DNA Prep Kit and comparator systems (sputum samples)



Method:

The following kits were used as comparators to the Arcis system:

- Promega Wizard gDNA extraction kit – Solutions based DNA extraction with step including cell lysis and protein precipitation.
- Qiagen QIAamp Mini DNA kit – column-based kit
- Zymo Research Universal DNA extraction kit – column-based kit

Conclusion:

This case study highlights how the Arcis DNA Prep Kit can dramatically accelerate pre-analytical sample prep without compromising the quantity and quality of genomic material.

The Arcis DNA Prep Kit is supplied as a ready-to-use kit for application on a wide range of sample types including whole blood, plasma, urine, buccal swabs, bacteria and parasites. The DNA released is immediately suitable for downstream molecular investigations.



To order the Arcis DNA Prep Kit
please contact us today

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CASE STUDY: FORENSICS

A simple ultra-fast sample processing method for forensic samples



Introduction

Processing forensics-relevant samples presents a number of challenges to existing nucleic extraction systems. Obtaining genetic material is often a time consuming and inefficient process, with different extraction solutions required for different sample types.

Currently, sample preparation systems consist of multi-step manual or robotic methods which involve instrumentation such as heaters and centrifuges, or expensive integrated platforms. Hence, there is a need for a simplified method which can deliver amplifiable genetic material with greatly

reduced turn-around time and is applicable to many downstream investigations.

The Arcis Sample Prep Kit is a ready-to-use kit comprising two pre-filled tubes allowing rapid amplification of genomic DNA from a variety of samples including whole blood, bacteria, viruses and animal cells or tissues.

In 3 minutes, with no prior sample preparation, the Arcis Sample Prep Kit allows you to go from cells to downstream nucleic acid investigations without the need for isolation or purification.

Applications

The Arcis Sample Prep Kit has been successfully trialled at a range of industrial and academic settings, using the following technologies:

- End-point PCR
- qPCR (SYBR and probe-based)
- Isothermal Amplification (LAMP)
- Sequencing (Sanger, Pyro and Next-Generation)
- DNA fragment analysis (3500 Genetic Analyzer)

The following human sample types have been processed using the Arcis system:

- Whole blood • Dried Blood • Contaminated Blood
- Plasma
- Urine
- Sputum
- Buccal swabs
- Hair follicles

Genetic Profiling

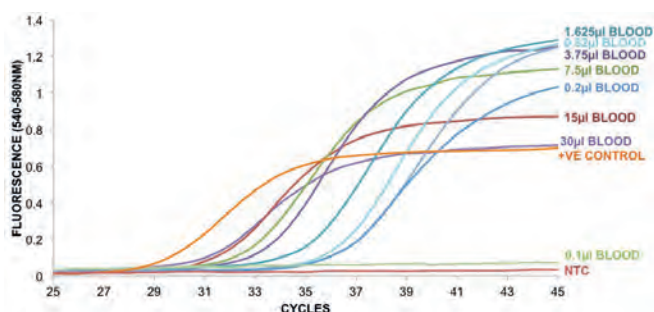
The Arcis Sample Prep Kit was used to accelerate sample processing in a panel of whole blood samples which were subjected to genetic profiling on the 3500XL Genetic Analyzer (Applied Biosystems) with Powerplex®Fusion Kit (Promega). All samples gave full or partial profiles consistent with results obtained by the existing extraction system; DNA yield and quality were shown to be comparable. Importantly, initial sample processing time was reduced from greater than 60 minutes to less than 5 minutes

Results: qPCR

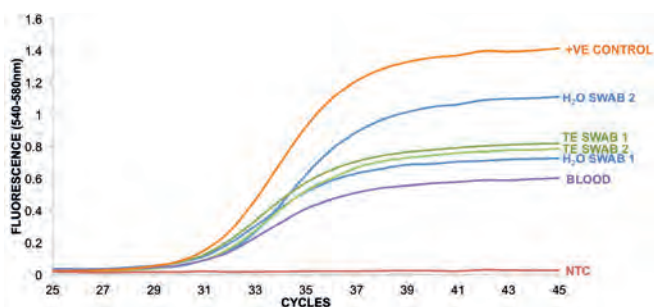
A range of forensics-relevant samples were processed using the Arcis Sample Prep Kit. Total processing time for each sample was around 3 minutes. A range of samples were tested including buccal swabs, hair follicles, and dried blood on card or swabbed from a surface.

Strong amplification curves were generated for each sample tested. For whole blood, very strong signals were generated from as little as 0.2µl starting material.

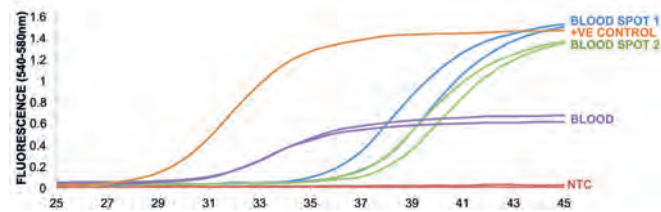
A: Analytical Sensitivity



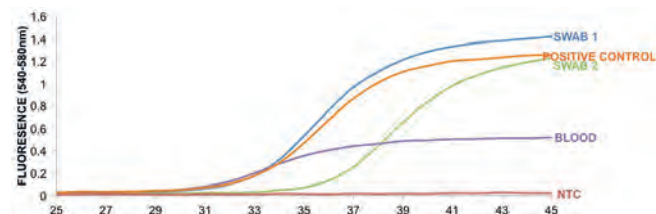
B: Dried Blood Swabs



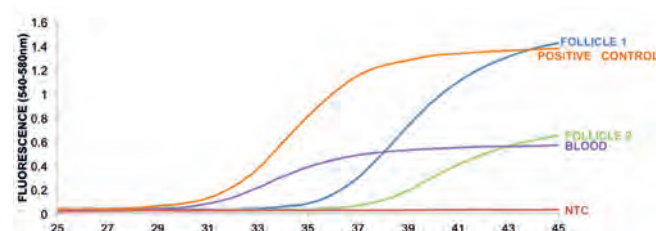
C: Dried Blood Spots



D: Buccal Swabs



E: Hair Follicles



Conclusions

The Arcis Sample Prep Kit can accelerate and simplify sample processing in a variety of settings on a range of human samples. The two-step, instrument-free protocol can increase capacity, reduce costs and increase sample prep efficiency.

To order the
Arcis DNA Prep Kit
please contact us today

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Arcis Sample Prep Kit is manufactured by Arcis Biotechnology,
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