



# SwiftX™ DNA – Re-thinking the use of magnetic particles

# SwiftX™ DNA – what is the difference?

## Classical purification kits:

1. Lysis of cells or particles
2. Binding of nucleic acids to magnetic particles
3. Removal of cell debris
4. Elution of nucleic acids

## SwiftX DNA (*tissue, swabs, cells*):

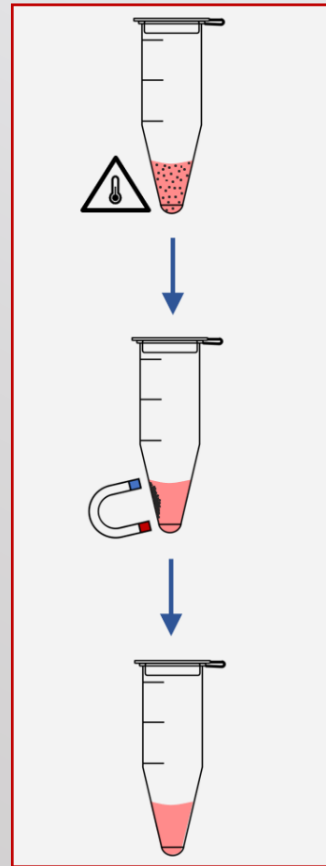
1. Lysis of cells and viruses
2. Binding of cell debris to magnetic particles

The difference is:

**Reverse Purification**

# SwiftX™ DNA – Protocol 1

tissues, cells,  
swabs



Heat-driven lysis of cells  
and virus particles

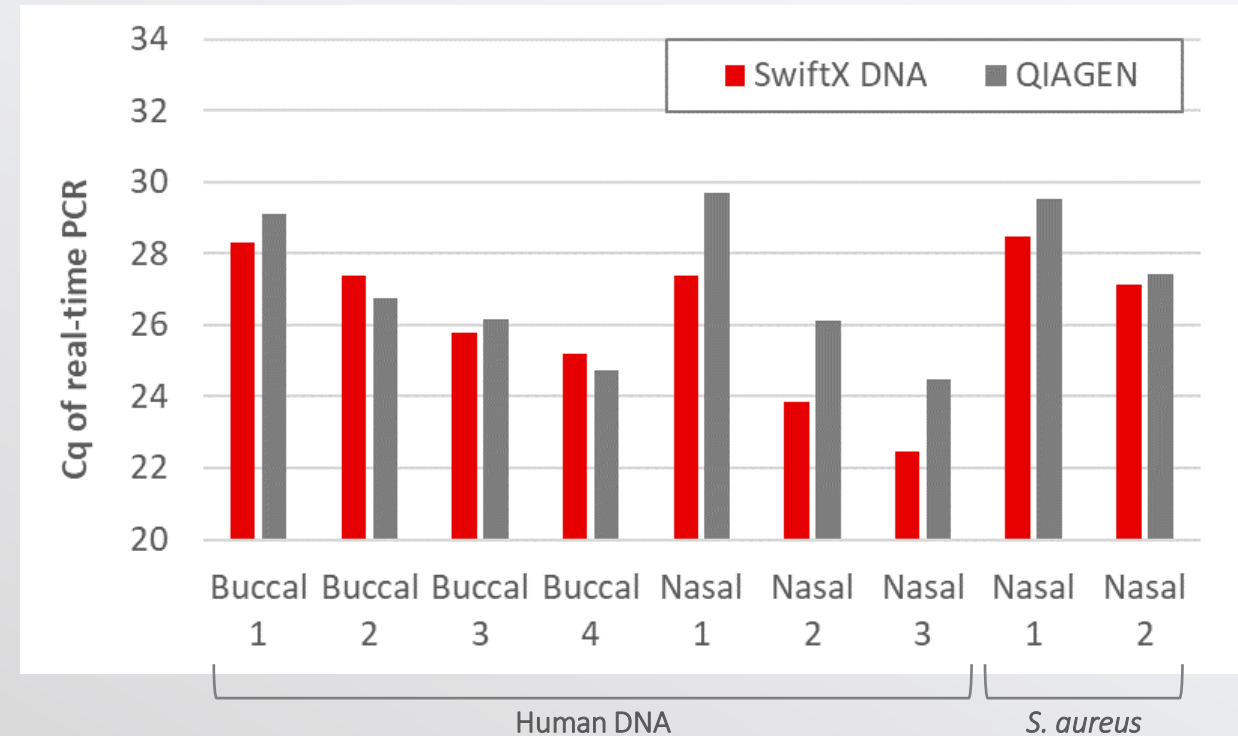
Binding of cell debris  
to magnetic particles

Cleared lysate ready for  
downstream application

- Add *Buffer DL & Beads A*
- 5-10 minutes at 95°C
- Lyses viruses, bacteria, parasitic protozoa, animal & human cells
- 1 minute magnetic separation
- Removal of cell membranes, proteins and other impurities
- Realtime PCR, isothermal amplification
- Genotyping, DNA arrays
- Sequencing

# SwiftX™ DNA – Direct and rapid extraction of:

- Swabs (e.g. buccal<sup>(12)</sup>, nasal<sup>(12)</sup>, pharyngeal<sup>(12)</sup>, rectal)
- Pre-concentrated cells<sup>(9,12)</sup>
- Dried blood spots, blood cards
- Tissue samples (e.g. skin<sup>(1,3)</sup>, muscle, liver, brain<sup>(2)</sup>)
- Fine-needle aspirates<sup>(3)</sup>
- Tissue fluid<sup>(3)</sup>, cerebrospinal fluid
- Hair follicles, tongue scrapings



## References

1. Chowdhury *et al.* (2020) *Trop. Med. Infect. Dis.* 5: 95
2. Schlottau *et al.* (2017) *Virology Journal* 14: 184
3. Gunaratna *et al.* (2018) *Parasites & Vectors* 11: 665
4. Mondal *et al.* (2016) *Parasites & Vectors* 9: 281
5. Ademowo *et al.* (2019) *Trans. R. Soc. Trop. Med. Hyg.* 113: S59
6. Burke *et al.* (2016) *J. Microbiol. Methods* 129: 103
7. Archer *et al.* (2020) *Molecules* 25: 4175
8. Hansen *et al.* (2019) *Diagnostics* 9: 36
9. Wende (2014) NDWG Annual Meeting
10. Rostron *et al.* (2019) *Parasite & Vectors* 12: 514
11. WO2017067942A1
12. Internal data
13. Frimpong *et al.* (2021) *Acta Tropica* 216: 105847
14. Archer *et al.* (2022) *PLOS NTD*

# SwiftX™ DNA – One kit two protocols

## SwiftX DNA (*solid samples*):

Lysis of cells or particles  
Binding of cell debris to magnetic particles

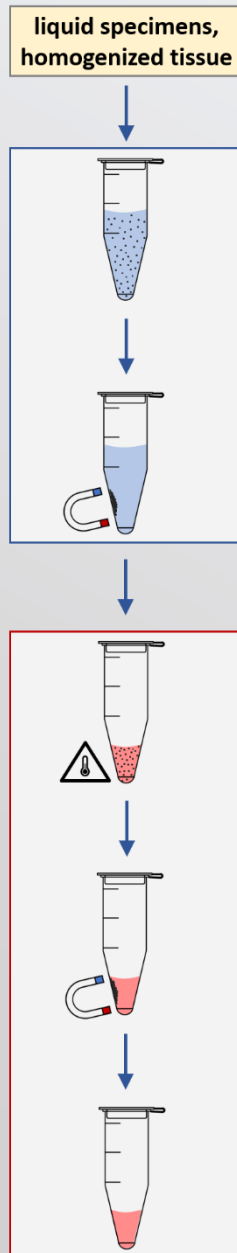
## SwiftX DNA (*liquid samples*):

Binding of cells to magnetic particles  
Removal of non-cellular matter

**Concentration  
of cells**

Lysis of cells or particles  
Binding of cell debris to magnetic particles

# SwiftX™ DNA – Protocol 2



Binding of cells to magnetic particles

Removal of non-cellular matter and cell concentration

Heat-driven lysis of cells and virus particles

Binding of cell debris to magnetic particles

Cleared lysate ready for downstream application

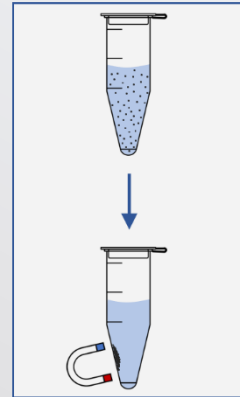
- Add *Buffer EN & Beads A*
- 3 minutes incubation
- Binds bacteria, parasitic protozoa, animal & human cells
- 1 minute magnetic separation
- Removal of liquid including impurities
- Add *Buffer DL*
- 5-10 minutes at 95°C
- Lyses viruses, bacteria, parasitic protozoa, animal & human cells
- 1 minute magnetic separation
- Removal of cell membranes, proteins and other impurities
- Realtime PCR, isothermal amplification
- Genotyping, DNA arrays
- Sequencing

# SwiftX™ DNA – Protocol 3

Additional wash step  
for complex liquids  
such as whole blood



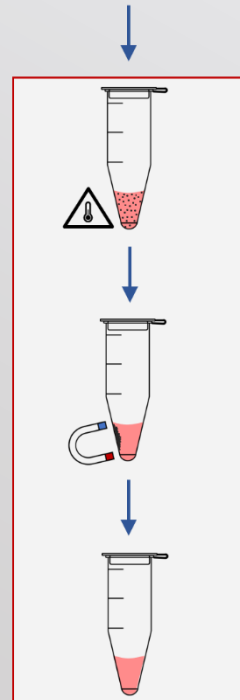
liquid specimens,  
homogenized tissue



Binding of cells to magnetic particles

**Note:** red blood cells do not bind to the magnetic particles

Removal of none-cellular matter and cell concentration



Heat-driven lysis of cells and virus particles

Binding of cell debris to magnetic particles

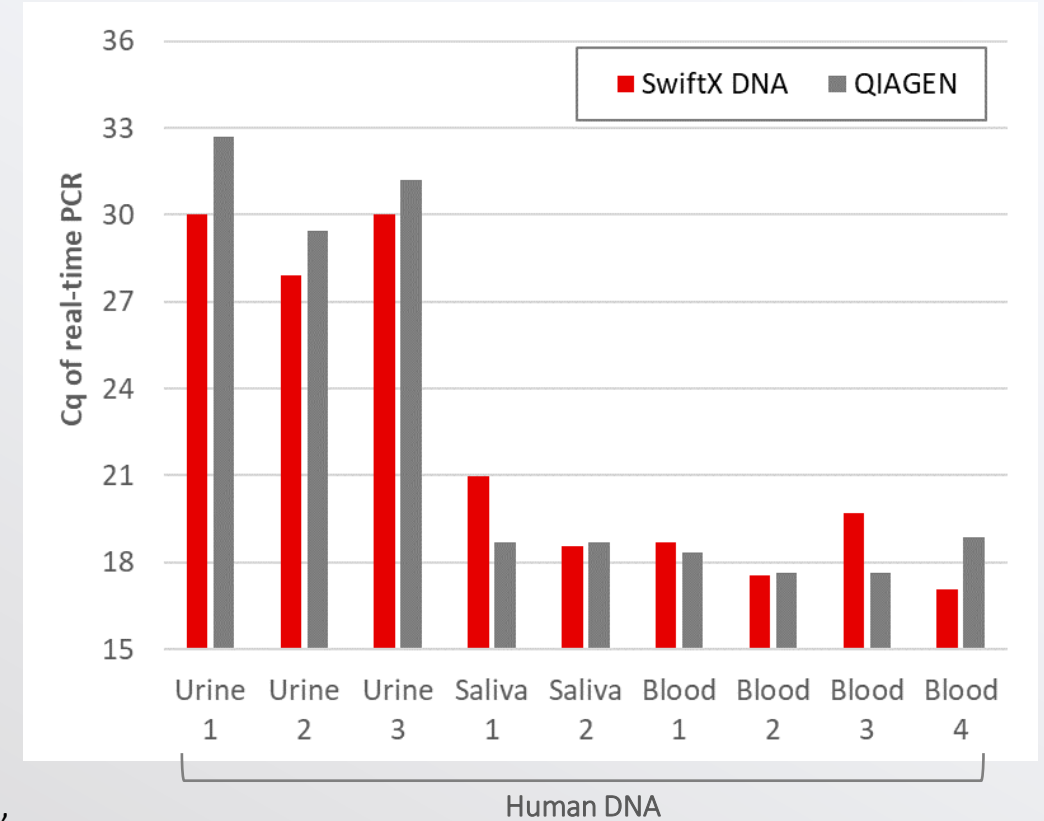
Cleared lysate ready for downstream application

# SwiftX™ DNA – Cell concentration and rapid extraction of:

- Whole blood<sup>(4,5,6,11,12)</sup> (up to 200µL sample)
- Urine<sup>(7,10,13)</sup> (up to 1mL sample)
- Saliva<sup>(12)</sup>, throat washes
- cells in culture medium<sup>(12)</sup>, samples in transport media<sup>(12)</sup>
- Homogenized tissue suspensions<sup>(2)</sup>
- Vaginal lavage<sup>(14)</sup>, liquid-based cytology media<sup>(12)</sup>

## Magnetic particles-based concentration of:

- Human and animal cells (leukocytes<sup>(4)</sup>, epithelial cells<sup>(12)</sup>, nervous tissue<sup>(2)</sup>)
- Parasites (Leishmania<sup>(1,3,4)</sup>, Plasmodium<sup>(5)</sup>, Schistosoma eggs<sup>(7,10,14)</sup>)
- Bacteria (Mycoplasma<sup>(12)</sup>, Mycobacteria<sup>(8,9)</sup>, Listeria<sup>(12)</sup>, Proteus<sup>(12)</sup>, Escherichia<sup>(12)</sup>, Salmonella<sup>(5,11)</sup>, Streptococcus<sup>(6,11)</sup>, Acinetobacter<sup>(12)</sup>, Staphylococcus<sup>(11,12)</sup>, Rhodococcus<sup>(12)</sup>, Leptospira<sup>(12)</sup>, Klebsiella<sup>(12)</sup>)



## References

1. Chowdhury *et al.* (2020) *Trop. Med. Infect. Dis.* 5: 95
2. Schlottau *et al.* (2017) *Virology Journal* 14: 184
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# SwiftX™ DNA – What are potential applications

Workflow	Specimen (examples)	Target / Organism
Protocol 1	<ul style="list-style-type: none"><li>• swabs</li><li>• tissue biopsies</li><li>• low volume of fluids (serum, CSF, aspirate)</li><li>• dried blood spots</li><li>• hair follicles</li></ul>	<ul style="list-style-type: none"><li>• viruses</li><li>• intra- and extracellular bacteria</li><li>• intra- and extracellular protozoa</li><li>• animal &amp; human cells</li></ul>
Protocol 2	<ul style="list-style-type: none"><li>• urine</li><li>• saliva, throat washes, BAL</li><li>• cell cultures</li><li>• cerebrospinal fluid</li><li>• transport media</li><li>• Vaginal lavage</li><li>• Swab suspensions</li></ul>	<ul style="list-style-type: none"><li>• viruses within intact cells</li><li>• intra- and extracellular bacteria</li><li>• intra- and extracellular protozoa</li><li>• animal &amp; human cells</li></ul>
Protocol 3	<ul style="list-style-type: none"><li>• whole blood</li><li>• tissue suspensions</li><li>• liquid-based cytology media</li></ul>	<ul style="list-style-type: none"><li>• Viruses as well as intracellular bacteria and protozoa in white blood cells, epithelial cells or nerv tissue</li><li>• extracellular bacteria and protozoa</li><li>• animal &amp; human cells</li></ul>



# SwiftX™ DNA – Scientific literature and internal data

1. Extraction of Leishmania from skin biopsy (Protocol 1)
2. Concentration of Rabies virus from brain homogenate (Protocol 3)
3. Extraction of Leishmania from skin biopsy (Protocol 1)
4. Concentration & extraction of Leishmania (in monocytes) from whole blood (Protocol 3)
5. Concentration & extraction of Plasmodium & Salmonella from whole blood (Protocol 3)
6. Concentration & extraction of Streptococcus from whole blood (Protocol 3)
7. Concentration & extraction of Schistosoma eggs from urine (Protocol 2)
8. Concentration & extraction of Mycobacterium from stool (Protocol 3, pre-treatment with bead-beating)
9. Extraction of Mycobacterium from cell concentrate (Protocol 1)
10. Concentration & extraction of Schistosoma eggs from urine (Protocol 2)
11. Concentration & extraction of Salmonella, Streptococcus, Staphylococcus from whole blood (Protocol 3)
12. Concentration & extraction of
  - a) human cells from nasal and buccal swabs (Protocol 1)
  - b) human cells from saliva and urine (Protocol 2)
  - c) HPV from vaginal swabs in transport media (Protocol 2)
  - d) ASFV from oral fluid and oral-nasal swabs in transport media (Protocol 2)
  - e) human cells from whole blood (Protocol 3)
  - f) HPV from cervical swabs in LBC media (Protocol 3)
  - g) Various bacteria from cell culture (Protocol 3)
13. Extraction of Schistosoma from urine cell pellets (Protocol 1)
14. Concentration & Extraction of Schistosoma eggs from cervico-vaginal lavage (Protocol 2)



## References

1. Chowdhury *et al.* (2020) *Trop. Med. Infect. Dis.* 5: 95
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# SwiftX™ DNA – as versatile as your research



## Application to tissues and hair follicles:

Extraction efficiency can be enhanced using Proteinase K

## Application to large volume urine samples:

Sample volume can be increased up to 20 mL using additional Buffer EN

- Equal in performance to QIAGEN SpeedXtract Nucleic Acid kit (discontinued)
- Applied by scientists around the world (see academic publications)

# SwiftX™

A family of tailor-made solutions in molecular biology

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