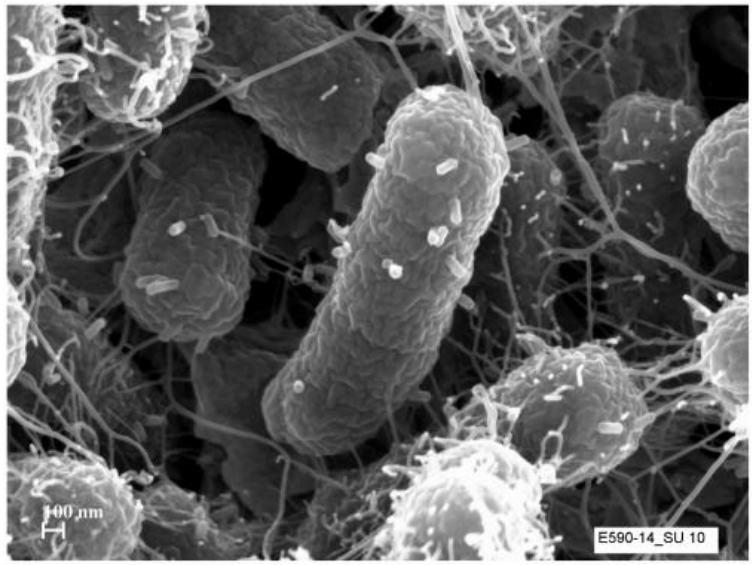
bluephage®

Viral indicators for Safety

Safe water for a better world

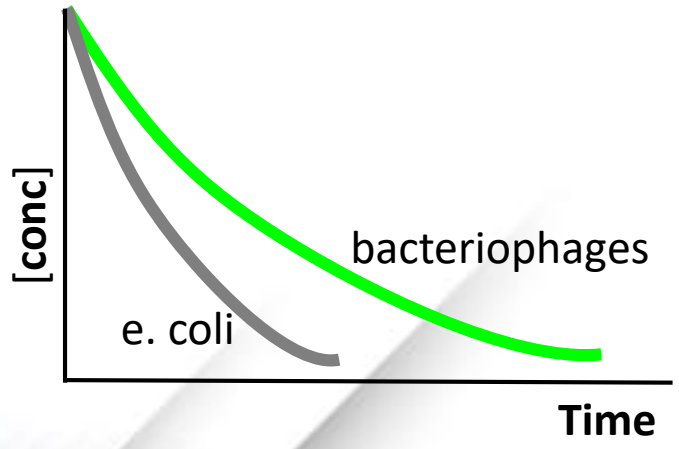
Introduction



- The use of traditional bacterial indicators in the treatment and surveillance of water has allowed high levels of health and life quality which are very important in the last century
- However, these **bacterial indicators are limited** and **can not detect** the presence of **viral pathogens**.

Main characteristics of virus

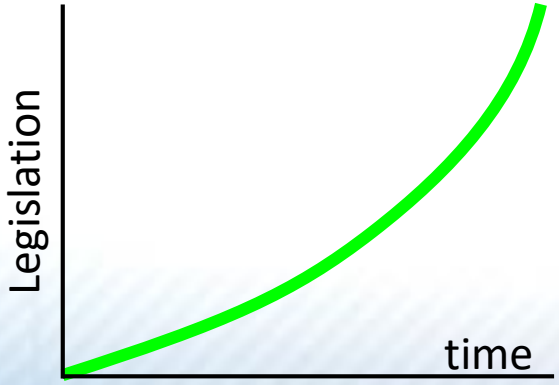
- 50 x smaller than bacteria
- More abundant and persistent in the environment
- More resistant to treatments
- Viruses reproduce faster than bacteria



Regulation (1/2)

- In the last years, bacteriophages (viruses infecting bacteria) have been progressively incorporated into water quality control regulations, biosolids, food and sanitation processes and equipment as the most appropriate viral indicators
- Some national and international water regulations are already including the measurements of bacteriophages

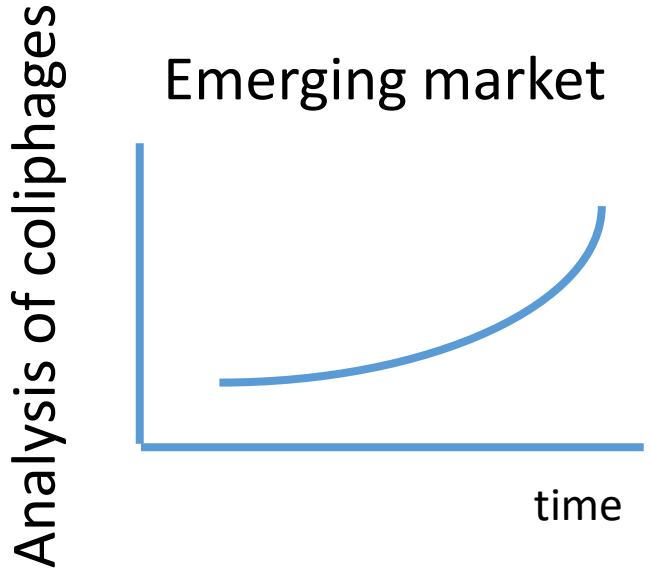
Country	Biosolids	Groundwater	Recreational water	Drinking water	Reclaimed water	Integrity membranes & UV	Direct Potable reuse	Aquaculture
Australia	2012		2008 *(Emerging interest)*	2011	2010 Queensland			
Canada	2012		2008	2001 (Quebec, F-specific)				
USA		2006	2018		2011 (North Caroline)	2006	2015	FDA & Interstate Shellfish Sanitation Commission, 2015
Colombia	2014							
EU				*Draft*	*Draft*			
France					2014			
Italy	Draft							



Regulation (2/2)

World Health Organization

The WHO recommends the use of coliphages like a parameter to control the microbiology of the water



Governmental institutions and international associations are increasing their vigilance with viral control in water and food

Standard Methods available for coliphages analysis

- Standard methods for detection and quantification of coliphages in water **are more than 20 years old:**
  - **International Organization for Standardization (ISO)** methods: 10705-1, 10705-2, 10705-3 and 10705-4
  - **United States Environmental Protection Agency (US EPA)** methods: 1601 and 1602
- Standard methods are:
  - **Multi-step processes** that require several preparation and calibration of medium and biological material
  - **Results** available after **>48h**

Value proposition

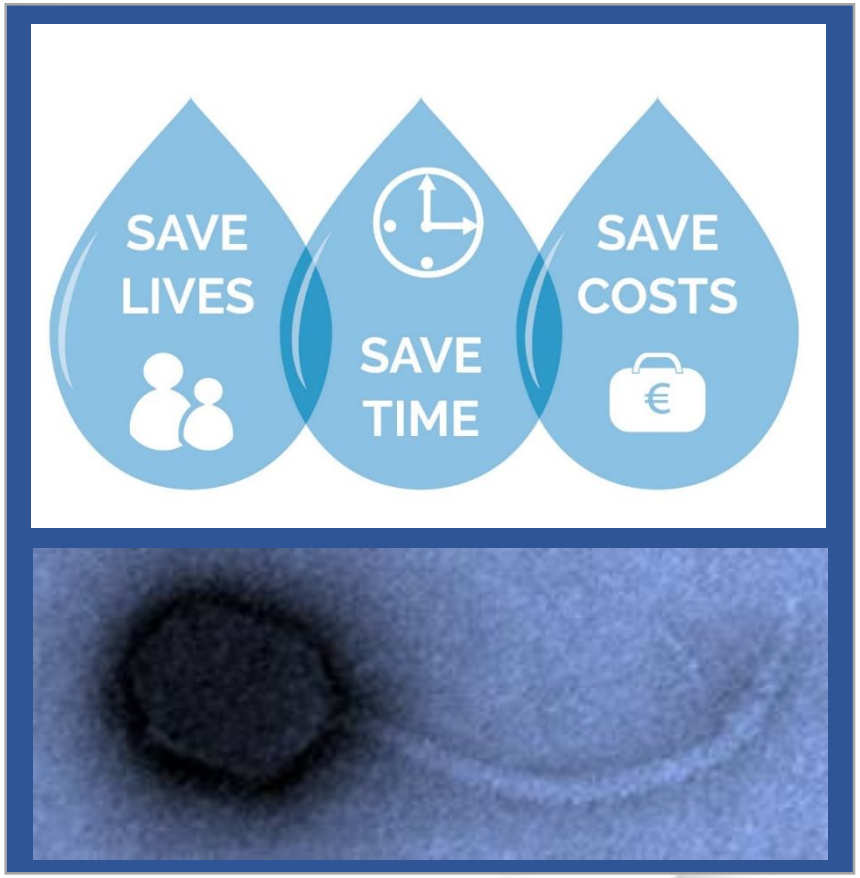
COLIPHAGE

The perfect surrogate as viral Indicator
The most reliable indicator:

- Size
- Abundance
- Persistence
- Resistance

A New Paradigm:

BLUEPHAGE's ground-breaking viral indicator test based on coliphages will change water quality testing as we know it

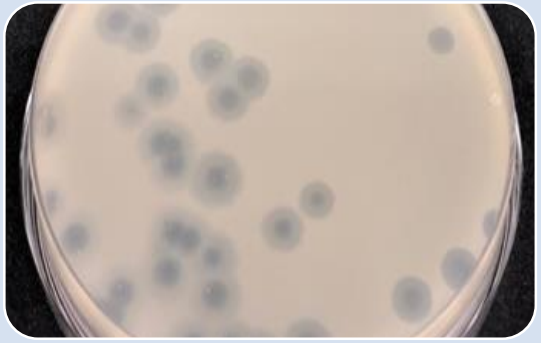


Bluephage's portfolio (1/6)

Bluephage has developed:

- **1st generation kits (Easy kits):** aim to facilitate the detection and quantification of coliphages according to standard methods

- **2nd generation kits (Rapid kits):** based in a new patented technology, they are easier to perform than standard methods and have a higher sensitivity than current commercialized products.



Easy kits

Designed to provide solutions to customers, who by local regulation, will perform coliphage analysis following ISO or US-EPA standard methods

Rapid kits

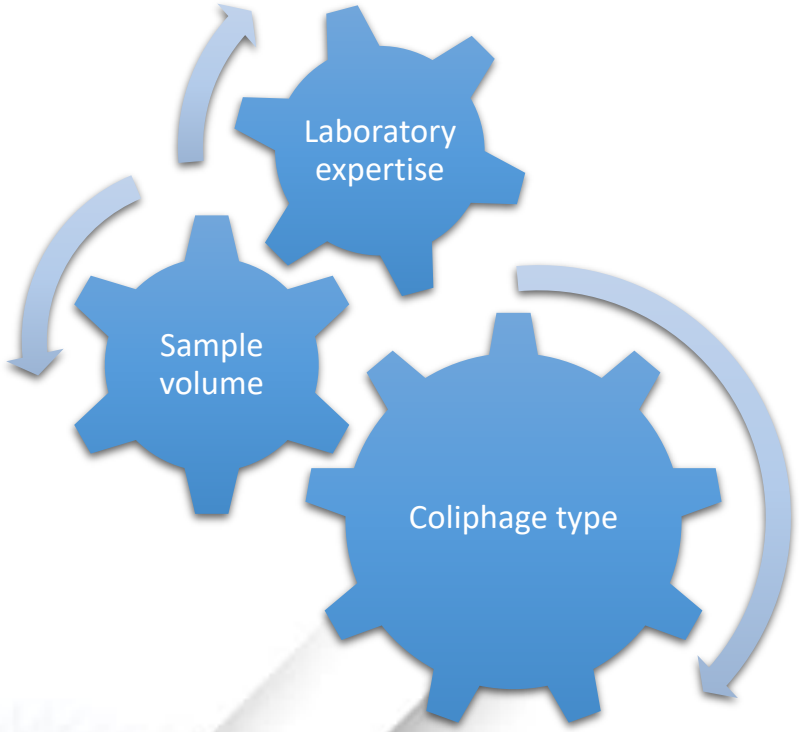
Using a colorimetric reaction, the patented technology allows detection and quantification of coliphages without the need of overnight culture plating

Bluephage's portfolio (2/6)

Bluephage has a wide portfolio of products to provide solutions to a customers in different countries:

Product diversity is based on combinations of 3 different factors:

Coliphage type	Somatic
	F-Specific
	Totals
Sample volume	1 mL
	100 mL
Laboratory expertise	Biological material (BM)
	BM + fungible material and mediums
	BM + fungible material and mediums + plating plates

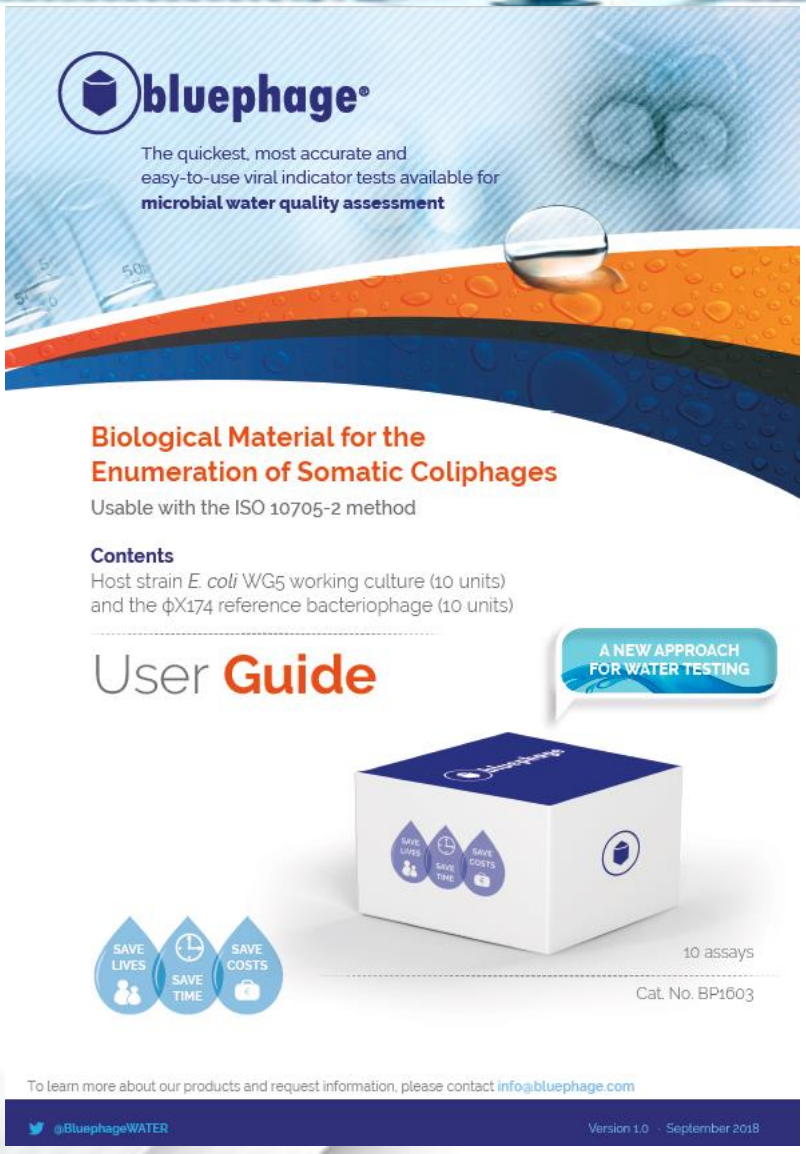


Bluephage's portfolio (3/6)

1st generation kits: Biological Material

Consist on the biological material of the kit, bacterial host strain and viral positive control already calibrated and ready to use:

- BP1603: enumeration of somatic coliphages according to ISO 10705-2 method
- BP1608: enumeration of somatic coliphages according to US-EPA 1601 and US-EPA 1602 methods
- BP1613: enumeration of F-specific coliphages according to ISO 10705-1 method
- BP1618: enumeration of F-specific coliphages according to US-EPA 1601 and US-EPA 1602 methods



Bluephage's portfolio (4/6)

1st generation kits: Easy kits for processing 1 mL of sample

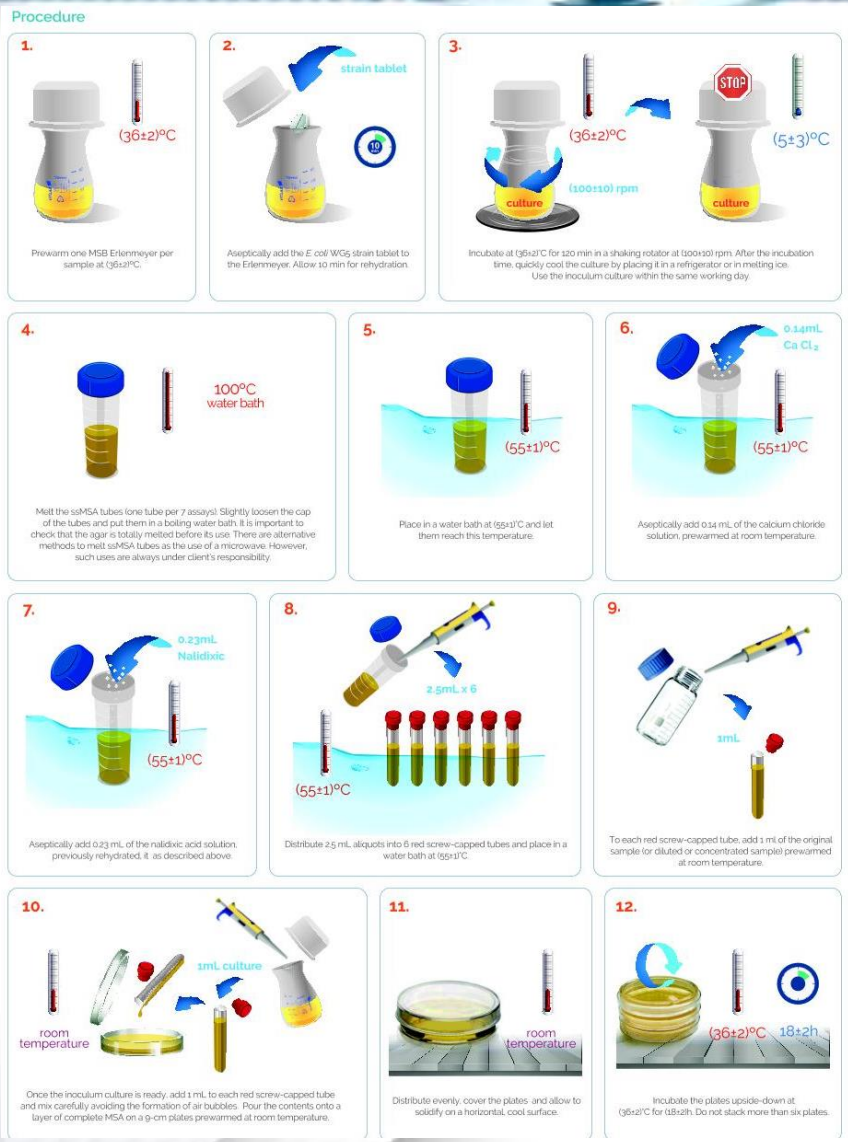
The kit contains the bacterial host strain and viral positive control already calibrated and ready to use. It also contains all the fungible material and mediums to perform the coliphage analysis:

The kit allows the enumeration of coliphages in 12 easy steps and in a maximum of 24h

The kit can be purchased with or without the plates for the overnight culture.

Bluephage codes:

- Without plates: BP1601, BP1606, BP1611, BP1616
- With plates: BP1602, BP1607, BP1612,BP1617



Bluephage's portfolio (5/6)

1st generation kits: Easy kits for processing 100 mL of sample

The kit contains the bacterial host strain and viral positive control already calibrated and ready to use. It also contains the all the fungible material and mediums to perform the coliphage analysis:

The kit allows the enumeration of coliphages in 11 easy steps and in a maximum of 24h

The kit can be purchased with or without the plates for the overnight culture.

Bluephage codes:

- Without plates: BP1604, BP1609, BP1614, BP1619
- With plates: BP1605, BP1610, BP1615,BP1620

Bluephage's portfolio (6/6)

2nd generation kits: rapid kits

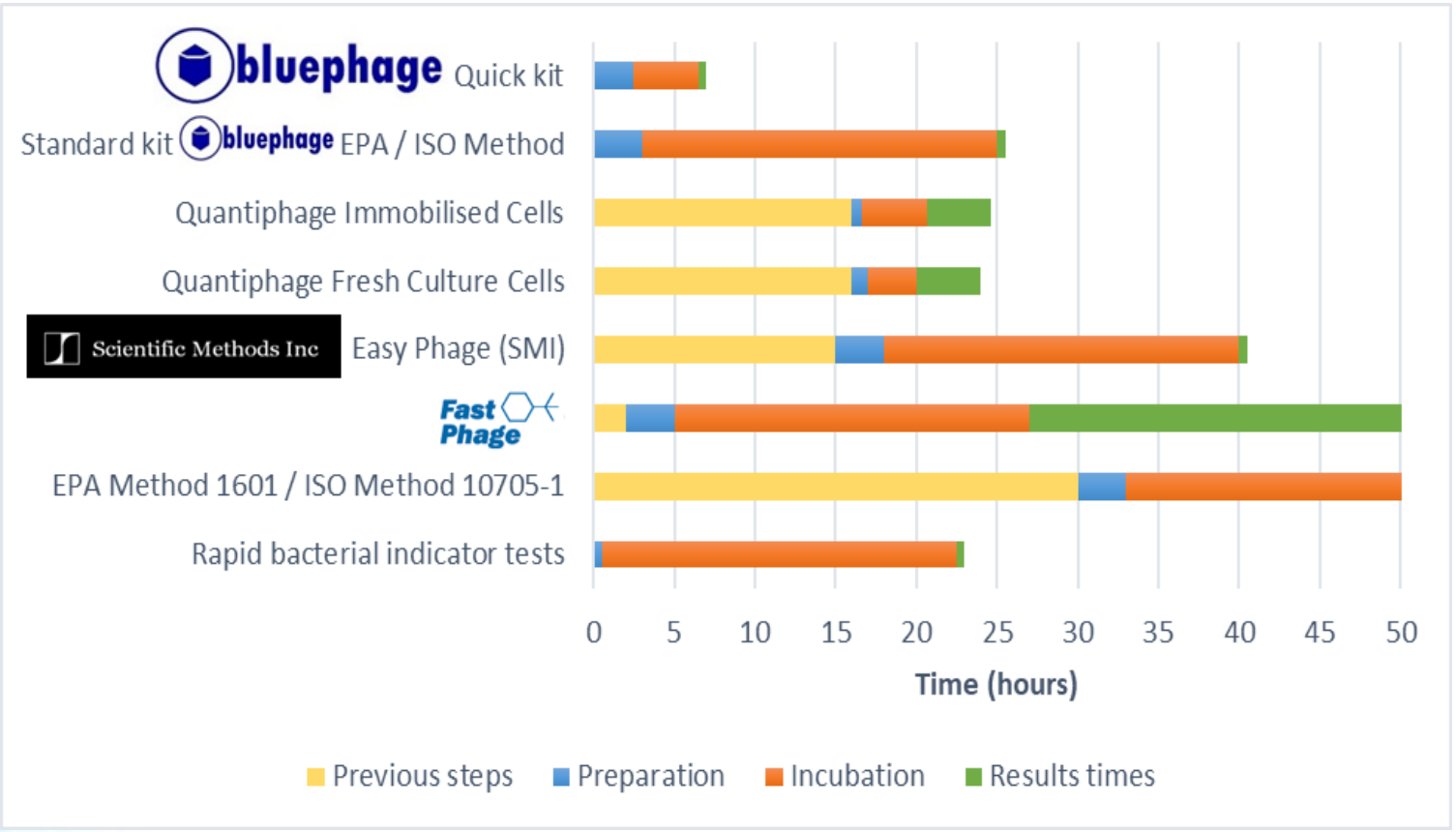
The rapids kits are still not commercially available, but have already been validated at a laboratory scale. The company is expecting to launch them during the 3rd quarter of 2019

Kit characteristics:

- Detection limit of 1 pfu*/mL
- Detection speed of:
  - 10 pfu/ml in 2:30h
  - 1 pfu/mL in 3:30h
  - Longest detection time of 5h
- Detection of coliphages visual, change of colour of the medium

*pfu; Plaque formit unit

Competitive advantages



Bluephage is

The **fastest**
results **in hours**

The **simplest**

lower number of
components and steps

The **easiest**

just visualize **a color**

Underlying Magic

Our lab kit technology **dramatically reduces the time to incubate** and **provides more accurate results in an easy to use format.** We improve upon widely accepted culture-based methods, the gold standard in lab techniques.

1. **Disruptive product**
2. **Easy to use** Without previous steps required and no specific equipment
3. **High sensitivity** detection → 1 **PFU**
4. **Quick results** below 5 hours *preliminary results can be obtained in less than 3 hours*
4. **Reliability** – **Bluephage Quick kit** has demonstrated **equivalent results** as compared with **ISO standardized methods**
5. **Patented** Technology (US & EU)
6. **Save costs**