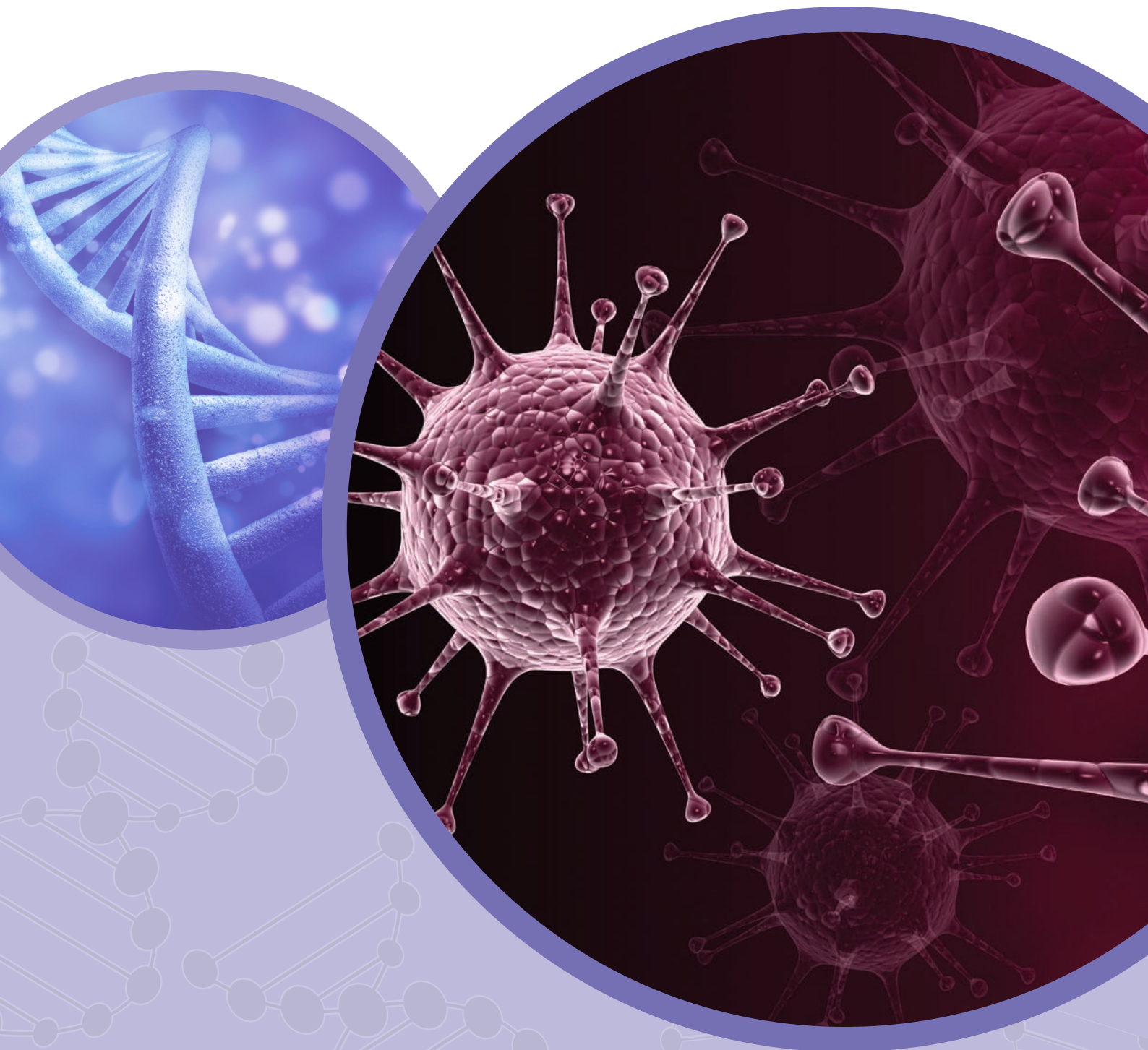


## STI Multiplex Array

*Rapid, simultaneous detection of 10 sexually transmitted infections*



# STI Multiplex Array

Rapid, simultaneous detection of 10 sexually transmitted infections

## Introduction

The STI Multiplex Array rapidly screens for the presence of 10 different STIs simultaneously from one patient sample. The assay is based on a combination of multiplex PCR, probe hybridisation and chemiluminescence detection to allow screening of viral, bacterial and protozoan STIs.

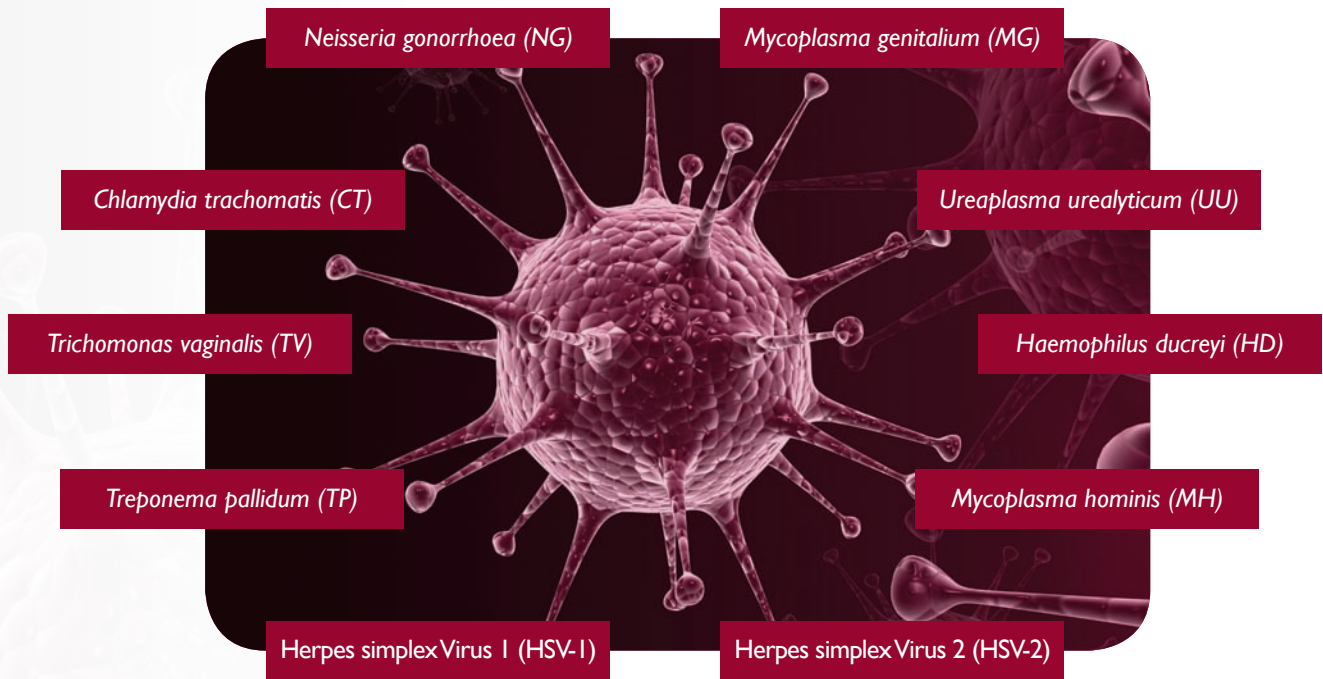
The simultaneous detection of these infections provides a comprehensive profile for each patient, enabling the clinician to decide on the best treatment options, potentially decreasing antibiotic misuse and the risk of the infection spreading. The STI Multiplex Array is optimised for use on the Evidence Investigator Analyser, which utilises the revolutionary Biochip Array Technology.

340 million

In Europe, over 340 million new cases of sexually transmitted bacterial and protozoal infections occur every year<sup>18</sup>



## The STI Multiplex Array detects 10 STIs in one sample



**Chlamydia trachomatis (CT):** The number of new cases worldwide of Chlamydia trachomatis in adults aged 15-49 was estimated to be 105.7 million in 2008.<sup>1</sup> Due to its possible subclinical nature, chlamydia may remain undiagnosed for years, which increases its rate of transmission. If left undiagnosed and untreated, it can lead to pelvic inflammatory disease (PID)<sup>2</sup>, which may increase the risk of ectopic pregnancy<sup>3</sup> or reduce fertility in both sexes.<sup>4</sup>

**Neisseria gonorrhoea (NG):** whilst not as common as chlamydia, it still infects over 100 million people annually<sup>5</sup> and may lead to the same complications as chlamydia.<sup>6</sup> Recent cases of gonorrhoea in numerous countries have shown it to be cephalosporin resistant.<sup>7</sup>

**Haemophilus ducreyi (HD):** the causative agent of chancroid. Around 7 million cases are reported annually.<sup>14</sup> Ulcers caused by HD facilitate in the transmission of HIV.<sup>15</sup>

**Herpes simplex 1 & 2 (HSV-1 & HSV-2):** both viruses can cause genital infection. HSV infection facilitates the transmission of HIV and may accelerate progression of the disease.<sup>8</sup>

**Treponema pallidum (TP):** the causative agent of syphilis. The past decade has seen a rise in the almost forgotten 'historic disease',<sup>9</sup> with over 12 million new cases reported each year.<sup>10</sup> Although spread through sexual contact, it is frequently passed to an unborn child, where it can cause congenital syphilis, high rates of still birth and increased infant mortality rates.<sup>11</sup> Early diagnosis can result in effective treatment.

**Mycoplasma hominis (MH):** implicated in a variety of complications such as bacterial vaginosis (BV) and urethritis, it plays a role in preterm delivery, preterm rupture of foetal membranes and post-partum fever.<sup>12</sup> As mycoplasma are resistant to many commonly prescribed antibiotics, correct diagnosis as the etiological agent of infection is critical.

**Ureaplasma urealyticum (UU):** found in the reproductive tract of women without any clinical symptoms, UU has been associated with preterm delivery, preterm rupture of foetal membranes and been found to invade amniotic fluid.<sup>12</sup>

**Trichomonas vaginalis (TV):** the cause of the trichomoniasis infection that infects the vagina and urethra, it is almost always transmitted by sexual contact. TV can cause genital inflammation which increases the risk of spreading other STIs such as HIV.<sup>13</sup>

**Mycoplasma genitalium (MG):** implicated in urethritis, cervicitis and salpingitis<sup>16</sup> and adverse pregnancy outcome.<sup>17</sup>

## Why use the STI Multiplex Array?

Through the use of simultaneous multiplex testing, smaller sample volumes are required. Instead of limiting the amount of information available, more information can be reported thus ensuring a complete profile of all pathogens present.

By using BAT, spatial separation between assays allows for simple interpretation of results.

The STI Multiplex Array provides excellent precision, specificity, sensitivity and accuracy for STI diagnosis, which ultimately results in a reduced risk of false reporting and the number of unnecessary confirmatory tests.

## STI Multiplex Array Protocol

Save time and cost associated with single infection detection

### Step 4 Detection

Imaging and result processing by Evidence Investigator analyser



### Simultaneous STI testing

The STI Multiplex Array screens for 10 STIs simultaneously for detection within 5 hours



### Step 3 Hybridisation

Amplicon hybridisation/conjugation to biochip array - each biochip can detect 10 STIs



### Step 2 Amplification

Single tube multiplex PCR reaction

**Step 1  
Extraction**  
Genomic DNA is extracted from urine or urogenital swab samples





## Clinical significance of the STI Multiplex Array

STIs and related complications represent a significant public health issue in both developed and developing countries. Many infections are asymptomatic and remain undiagnosed, increasing the risk of unhindered spread. STIs may induce serious complications that reduce fertility, increase risk of ectopic pregnancies and infant mortality. Existing technologies or screening programmes do not meet the social or clinical need.

Randox has developed this multiplex PCR assay coupled to Biochip Array Technology to provide a rapid, efficient and reliable clinical solution to STI detection. Simultaneous screening for multiple STIs will identify specific viral, protozoan and bacterial pathogens, permitting targeted antibiotic/anti-viral therapy. This will also identify secondary infections, which may otherwise remain undiagnosed.

## Benefits of the STI Multiplex Array

### To the patient

- STI Multiplex Array rapidly screens for the presence of 10 STIs simultaneously, identifying both primary and secondary infections in one sample

### To the laboratory

- Save time and cost associated with single infection detection
- Ability to test DNA from multiple sample matrices
- Rapid turnaround time from sample to result in less than 5 hours
- Added specificity due to combination of stringent PCR and array hybridisation
- 54 patient samples can be processed simultaneously, with multiple runs possible in one working day
- Detection of asymptomatic co-infections
- Reduced sample requirements

500 million new infections of curable sexually transmitted infections (syphilis, gonorrhoea, chlamydia and trichomoniasis) occur annually, therefore early and accurate detection is critical<sup>19</sup>

## Performance characteristics

### Assay Specificity and Sensitivity

Assay specificity and sensitivity for each pathogen was determined through testing clinical samples (Table 1) with the exception of HD where reference strains were used.

Table 1. Randox STI Multiplex Array sensitivity and specificity data

Pathogen	True Positive	False Positive	True Negative	False Negative	Sensitivity (%)	Specificity (%)
CT	105	1	192	1	99	99
NG	17	3	279	1	94	99
HSV1	44	0	252	3	94	100
HSV2	24	2	274	0	100	99
TP	5	0	295	0	100	100
TV	3	1	296	0	100	100
MH	28	7	196	6	82	97
MG	3	2	232	0	100	99
UU	25	2	203	7	78	99
HD	1* culture	0	236*	0*	100*	100*

\*reference strains were used

Clear advantage of multiplexing for STIs using the Randox kit is shown (Table 2), where there is evidence of significant co-infection in clinical samples.

Table 2. Rates of co-infection in clinical sample cohort

Pathogen	Total Infections	Single Infections	Two Infections	Three Infections	Four Infections	Total Co-Infections	% Co-Infections
CT	105	81	21	3	0	24	23
NG	17	13	4	0	0	4	24
HSV1	44	28	10	5	1	16	36
HSV2	24	19	3	2	0	5	21
TP	5	5	0	0	0	0	0
TV	3	3	0	0	0	0	0
MH	28	7	12	8	1	21	75
MG	3	0	2	0	1	3	100
UU	25	6	12	6	1	19	76
HD	0	0	0	0	0	0	-

### On the basis of this data, Randox have found:

- 1 in 3 tests for HSV-1 has at least one additional infection otherwise missed by routine single pathogen detection methods
- 1 in 4 tests for gonorrhea has at least one additional infection
- 1 in 5 tests for chlamydia has at least one additional infection



## Gender-specific sensitivity and specificity data summary

Table 3 provides evidence of maintained multiplex PCR sensitivity (a) and specificity (b) between gender and across sample matrices.

Table 3(a). Sample matrix **sensitivity** summary

Pathogen	FGS	MGS	UCS	Urine	RES
CT	97	-	100	100	100
NG	-	-	100	100	100
HSV1	90	100	95	100	-
HSV2	100	100	100	-	100
TP	-	100	100	-	-
TV	-	-	-	-	-
MH	94	-	75	67	-
MG	-	-	100	100	100
UU	93	-	82	75	-

FGS Female genital swabs  
MGS Male genital swabs  
UCS Unclassified swabs  
RES Rectal swabs

Table 3(b). Sample matrix **specificity** summary

Pathogen	FGS	MGS	UCS	Urine	RES
CT	100	100	100	100	100
NG	100	100	100	97	100
HSV1	100	100	100	100	100
HSV2	99	100	100	100	100
TP	100	100	100	100	100
TV	100	100	100	100	94
MH	93	100	95	100	100
MG	100	100	99	100	100
UU	99	100	98	99	100

FGS Female genital swabs  
MGS Male genital swabs  
UCS Unclassified swabs  
RES Rectal swabs

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# Evidence Investigator

Multiplexing...proven, perfected, evolved

The Evidence Investigator is a semi-automated, benchtop biochip analyser which offers complete patient profiling.

## *Save time and costs*

Multiplexing reduces time, labour and reagents associated with multiple individual tests

## *Increase throughput*

For greater laboratory efficiency

## *Consolidation*

Of immunoassays and molecular diagnostics, improving laboratory efficiency

## *Result traceability*

Chain of custody features and bar coded reagents

## *No hidden costs*

Package includes imaging module, PC and imaging software, thermoshaker, biochip carrier handling tray and barcode scanner

## *Ease of operation*

Straightforward testing procedure, ready-to-use biochips and minimal sample handling

## *Extensive QC*

Internal quality controls ensure all key assay steps have been performed correctly i.e. amplification

## *Retrospective reporting*

Enabling additional analysis of previously captured sample data



## Ordering Details

Description	Size	Cat. No.
STI Multiplex Array	108 Biochips	EV3779A & EV3779B
Evidence Investigator Analyser		EV3602
Evidence Investigator Analyser		EV3602

\*Note: Extraction reagents are not included

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