510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY

A. 510(k) Number:

K190515

B. Purpose for Submission:

To obtain clearance for additional specimen types, throat and rectal swabs on Aptima Combo 2 Assay (Panther System)

C. Measurand:

Chlamydia trachomatis (CT) and/or *Neisseria gonorrhoeae* (GC) ribosomal RNA (rRNA)

D. Type of Test:

Nucleic acid amplification assay

E. Applicant:

Hologic, Inc.

F. Proprietary and Established Names:

Aptima Combo 2 Assay (Panther System)

G. Regulatory Information:

1. Regulation section:

   21 CFR 866.3393: Device to detect nucleic acids from non-viral microorganism(s) causing sexually transmitted infections and associated resistance marker(s)

2. Classification:

   Class II

3. Product codes:

   QEP: Nucleic Acid Detection System For Non-Viral Microorganism(s) Causing Sexually Transmitted Infections
   LSL: DNA-Reagents, Neisseria
   MKZ: DNA Probe, Nucleic Acid Amplification, Chlamydia

4. Panel:

   Microbiology (83)

H. Intended Use:

1. Intended use(s):

   The Aptima Combo 2 Assay is a target amplification nucleic acid probe test that utilizes target capture for the *in vitro* qualitative detection and differentiation of ribosomal RNA (rRNA) from *Chlamydia trachomatis* (CT) and/or *Neisseria gonorrhoeae* (GC) to aid in the diagnosis of chlamydial and/or gonococcal disease using the Panther System as specified.

   On the Panther System, the assay may be used to test the following specimens from symptomatic and asymptomatic individuals: clinician-collected endocervical, vaginal, throat, rectal, and male urethral swab specimens, clinician-collected gynecological specimens collected in the PreservCyt Solution, patient-collected vaginal swab specimens,[1] and female and male urine specimens.

   [1]Patient-collected vaginal swab specimens are an option for screening women when a pelvic exam is not otherwise indicated. The Aptima Multitest Swab Specimen Collection kit has not been evaluated for home use.

2. Indication(s) for use:

   Same as Intended Use.

3. Special conditions for use statement(s):

   For Prescription Use

4. Special instrument requirements:

   Panther System

I. Device Description:

The Aptima Combo 2 Assay is a target amplification nucleic acid probe test that utilizes target capture, transcription mediated amplification, and dual kinetic assay technologies for the *in vitro* qualitative detection and differentiation of rRNA from CT and/or GC to aid in the diagnosis of chlamydial and/or gonococcal disease using the Panther System.

The current Aptima Combo 2 Assay is similar to the APTIMA Combo 2 Assay originally cleared (K111409) for use on the Panther System. There are no changes to the APTIMA Combo 2 Assay catalog numbers (303094 and 302923) and accessories. The ‘Aptima Multitest Swab Specimen Collection Kit” (catalog number PRD-03546) cleared for use to

collect the vaginal swab specimen with the cleared Aptima Combo 2 Assay is required to collect the throat and rectal swab specimens.

J. Substantial Equivalence Information:

1. Predicate device name(s):

   Aptima Mycoplasma genitalium Assay

2. Predicate 510(k) number(s):

   DEN180047

3. Comparison with predicate:

Table 1: Similarities between Predicate Device and Aptima Combo 2 Assay

Similarities		
Item	**Predicate Device**	**Subject Device**
	Aptima Mycoplasma genitalium Assay (DEN180047)	**Aptima Combo 2 Assay (Panther System) (K190515)**
Device Class	II	II
Technology/ Detection	Target Capture (TC), Transcription-mediated Amplifiction (TMA), Hybridization Protection Assay (HPA)	Same
Assay Results	Qualitative	Same
Instrument System	Panther System	Same

Table 2: Differences Between Predicate Device and Aptima Combo 2 Assay

Differences		
	Predicate Device	**Subject Device**
Item	**Aptima Mycoplasma genitalium Assay (DEN180047)**	**Aptima Combo 2 Assay (Panther System) (K190515)**
Intended Use	The Aptima Mycoplasma genitalium assay is an *in vitro* nucleic acid amplification test (NAAT) for the qualitative detection of ribosomal RNA (rRNA) from *Mycoplasma genitalium* on the fully automated Panther system. It is intended for use as an aid in the diagnosis of *M. genitalium* urogenital infections in male and female patients suspected of *M. genitalium* infection. The assay may be used to test the following specimens: clinician-collected and self-collected vaginal swabs (in a clinical setting), clinician-collected endocervical swabs, female and male urine, clinician-collected male urethral swabs, and self-collected penile meatal swabs (in a clinical setting). For females, a vaginal swab is the preferred specimen type due to higher clinical sensitivity for detecting *M. genitalium* than other specimen types; however, female urine or clinician-collected endocervical swabs may be used as alternative specimens when vaginal swab specimens are not available. If female urine or clinician-collected endocervical swab specimens test negative, testing with a vaginal swab may be indicated, if *M. genitalium* infection is suspected.	The Aptima Combo 2 Assay is a target amplification nucleic acid probe test that utilizes target capture for the *in vitro* qualitative detection and differentiation of ribosomal RNA (rRNA) from *Chlamydia trachomatis* (CT) and/or *Neisseria gonorrhoeae* (GC) to aid in the diagnosis of chlamydial and/or gonococcal disease using the Panther System as specified. On the Panther System, the assay may be used to test the following specimens from symptomatic and asymptomatic individuals: clinician-collected endocervical, vaginal, throat, rectal, and male urethral swab specimens, clinician-collected gynecological specimens collected in the PreservCyt Solution, patient-collected vaginal swab specimens,[1] and female and male urine specimens. [1]Patient-collected vaginal swab specimens are an option for screening women when a pelvic exam is not otherwise indicated. The Aptima Multitest Swab Specimen Collection Kit has not been evaluated for home use.
Assay Targets	*Mycoplasma genitalium* rRNA	*Chlamydia trachomatis* (CT) and/or *Neisseria gonorrhoeae* (GC) rRNA

Differences		
	Predicate Device	**Subject Device**
Item	**Aptima Mycoplasma genitalium Assay (DEN180047)**	**Aptima Combo 2 Assay (Panther System) (K190515)**
Specimen Types	Female specimens: • Vaginal swab • Endocervical swab Male Specimens: • Penile meatal swab • Urethral swab • Urine	Female specimens: • Vaginal swab • Endocervical swab • Gynecological specimens in PreservCyt solution • Urine • Throat swab • Rectal swab Male Specimens: • Urethral Swab • Urine • Throat swab • Rectal swab

K. Standard/Guidance Document Referenced (if applicable):

Not applicable

L. Test Principle:

The Aptima Combo 2 Assay utilizes target capture, transcription-mediated amplification, hybridization protection assay, and dual kinetic assay for specimen processing to amplify target rRNA and detect the amplicon, respectively. Please refer to the decision summaries of K111409, K132251, and K180681 for detailed description.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Reproducibility and within laboratory precision studies were previously reviewed and described in K111409 and K132251.

b. Linearity/assay reportable range:

Not Applicable; this is a qualitative assay.

c. *Traceability, Stability, Expected values (controls, calibrators, or methods):*

Specimen stability study evaluated throat and rectal swab specimens. CT and GC were spiked into CT and GC negative rectal and throat swab pools at concentration slightly above the LoD. The prepared samples were stored at -70ºC, -20ºC, 4ºC, and 30ºC for upto 60 days. A minimum of 10 replicates were tested for each panel member at each timepoint. A total of 39 runs with a total of 1,566 tests performed. The results showed that all spiked samples were at least 95% positive for CT and GC in throat and rectal swabs at all storage conditions.

Specimen stability of urogenital specimens and controls were previously reviewed and described in K111409 and K132251.

d. *Detection limit:*

The Limit of detection (LoD) was determined by testing dilutions of of two serovars of CT and two strains of GC separately in CT and GC negative throat and rectal swab pools. A minimum of 20 replicates were tested at each concentration. Testing was performed on two Panther Systems. The LoD of the Aptima Combo 2 Assay for CT is 0.007 IFU/mL and for GC is 0.10 CFU/mL in both throat and rectal swabs for both tested CT serovars and GC isolates.

LoD study for urogenital specimens was previously reviewed and described in K111409 and K132251.

e. *Analytical specificity:*

Cross-reactivity
Microorganisms commonly found in the pharynx and/or rectum, and microoragnisms closely related to either CT or GC were evaluated for cross-reactivity in this study.

The study included 44 microorganisms including bacteria, viruses, and parasites tested at $1x10^6$ units/mL or the highest concentration possible. At least 10 replicates of each panel member were tested with one lot of reagents. The Aptima Combo 2 Assay did not generate a false positive test result with any microorganism listed in Table 3.

In addition, an *in silico* analysis was performed to determine if the CT and GC specific oligonucleotides of the Aptima Combo 2 Assay could amplify and detect nucleic acid sequences from Enterovirus Type 68, Hepatitis C Virus, Influenza A H3N2, Influenza B Massachusetts/2/12, *Entamoeba histolytica*, and *Giardia lamblia*. No potential interactions were detected in the *in silico* analysis,

Table 3: Microorganisms Tested in the Aptima Combo 2 Assay

Microorganism	Test concentration	Microorganism	Test concentration
Adenovirus Type 07A	$1.00x10^5$ $TCID_{50}$/mL	Human Metapneumovirus	$1.00x10^6$ $TCID_{50}$/mL
Arcanobacterium haemolyticum	$1.00x10^6$ CFU/mL	Influenza A H3N2	$1.00x10^3$ $TCID_{50}$/mL
Bacteroides oralis	$1.00x10^6$ RNA copies/mL	Influenza B Massachusetts/2/12	$1.00x10^3$ $TCID_{50}$/mL
Bordetella pertussis	$1.00x10^6$ CFU/mL	*Legionella jordanis*	$1.00x10^6$ CFU/mL
Bordetella parapertussis	$1.00x10^6$ CFU/mL	*Legionella micdadei*	$1.00x10^6$ CFU/mL
Burkholderia cepacia	$1.00x10^6$ CFU/mL	*Moraxella catarrhalis*	$1.00x10^6$ CFU/mL
Citrobacter koseri	$1.00x10^6$ CFU/mL	*Mycoplasma pneumoniae*	$1.00x10^6$ CFU/mL
Clostridioides difficile	$1.00x10^6$ CFU/mL	Norovirus Group II	$1.00x10^6$ $TCID_{50}$/mL
Coronavirus 229E	$1.00x10^5$ $TCID_{50}$/mL	*Peptostreptococcus micros*	$1.00x10^6$ RNA copies/mL
Corynebacterium diphtheriae	$1.00x10^6$ CFU/mL	*Prevotella bivia*	$1.00x10^6$ CFU/mL
Corynebacterium pseudodiphtheriticum	$1.00x10^6$ CFU/mL	Respiratory Syncytial virus Type B	$1.00x10^5$ $TCID_{50}$/mL
Coxsackievirus B3	$1.00x10^5$ $TCID_{50}$/mL	Rhinovirus A16	$1.00x10^5$ $TCID_{50}$/mL
Echovirus Type 11	$1.00x10^5$ $TCID_{50}$/mL	*Shigella flexneri*	$1.00x10^6$ CFU/mL
Eggerthella lenta	$1.00x10^6$ CFU/mL	*Shigella sonnei*	$1.00x10^6$ CFU/mL
Enterovirus Type 68	$1.00x10^4$ $TCID_{50}$/mL	*Shigella dysenteriae*	$1.00x10^6$ CFU/mL
Epstein-Barr Virus	$1.00x10^6$ copies/mL	*Stenotrophomonas maltophilia*	$1.00x10^6$ CFU/mL
Fusobacterium necrophorum	$1.00x10^6$ RNA copies/mL	*Streptococcus anginosus group*	$1.00x10^6$ CFU/mL
Haemophilus parahaemolyticus	$1.00x10^6$ CFU/mL	*Veillonella parvula*	$1.00x10^6$ CFU/mL
Haemophilus parainfluenzae	$1.00x10^6$ CFU/mL	*Campylobacter rectus*	$1.00x10^6$ CFU/mL
Helicobacter pylori	$1.00x10^6$ CFU/mL	*Anaerococcus vaginalis*	$1.00x10^6$ CFU/mL
Hepatitis B Virus	$1.00x10^6$ IU/mL	*Entamoeba histolytica*	$1.00x10^4$ cells/mL
Hepatitis C Virus	$1.00x10^4$ IU/mL	*Giardia lamblia*	$1.00x10^4$ cells/mL

Microbial Interference

The 44 microorganisms listed above in Table 3 were also evaluated in the microbial interference study. Microorganisms were tested in the presence of CT and GC at a concentration slightly above the LoD with a minimum of 10 replicates. The results of this study demonstrated that the presence of microorganisms at concentrations listed above in Table 3 did not interfere with Aptima Combo 2 Assay in the detection of CT and GC.

Interfering Substances

Potentially interfering substances commonly found in throat and rectal swab specimens, listed in Table 4, were evaluated in the absence and presence of CT and GC at a concentration slightly above the LoD. A minimum of 10 replicates of each panel member were tested. No interference was observed with the interfering substances at the concentration listed in Table 4.

Table 4: Interfering Substances Tested in the Aptima Combo 2 Assay

Potential Interfering Substance	Target Concentration
Cold Sore Medication	5% w/v
Lip Balm	5% w/v
Hemorrhoidal Cream	5% w/v
Feces	1% w/v
Cough suppressant	5% v/v
Toothpaste	5% w/v
Mouthwash	5% v/v
Laxative suppository	5% w/v
Anti-diarrheal medication	5% w/v
Antacid	5% v/v

Please refer to the decision summary of K111409 for the crss-reactivity, microbial interference, and interfering substances data pertaining to the urogenital specimens.

f. Carryover study:

Carryover study was previously reviewed and described in K111409 and K132251.

g. Assay cut-off:

Assay cut-off was previously reviewed and described in K111409 and K132251.

2. Comparison studies:

a. Method comparison with predicate device:

Not applicable.

b. Matrix comparison:

Not applicable.

3. Clinical studies:

Clinical evaluation of the Aptima Combo 2 Assay to support throat and rectal swab specimen types was conducted in collaboration with the Antibacterial Resistance Leadership Group (ARLG) and funded by a grant from the National Institutes of Health (NIH) (Master GC, https://arlg.org/studies-in-progress; NCT02870101 https://clinicaltrials.gov/ct2/show/NCT02870101).

The prospective clinical study included collection of throat and rectal swab specimens from men and women (≥18 years of age) seeking testing for sexually transmitted

infection (STI). The individuals, with or without symptoms of STIs were enrolled at nine participating geographically and ethically diverse US clinical sites, that included clinics focused on sexually transmitted diseases, family planning, student health, women's health, and clinics specializing in lesbian, gay, bisexual, and transgender (LGBT) health.

Up to eight specimens (four throat and four rectal swabs) were collected by clinician from each individual. The collected specimens were tested with the Aptima Combo 2 Assay and with upto three comparator nucleic acid amplification tests (NAATs) FDA-cleared for urogenital specimens and validated for use in throat and rectal swab specimens. The clinical performance of the Aptima Combo 2 Assay with throat and rectal swab specimens was evaluated against anatomic site infected status (ASIS). The results from up to three comparator NAATs established the ASIS at each anatomic site for each analyte (CT and GC), for each individual. An individual was considered infected if at least two comparator NAATs were positive. The individual was considered not infected if at least two comparator NAATs were negative. The third comparator NAAT was used as a tie-breaker when the results of the first two comparator NAATs were discordant. ASIS was determined using test results from the same specimen type.

In total, 2767 individuals were enrolled. Nine individuals with no specimens collected (n=8) or tested (n=1) and 167 individuals with all samples tested but excluded due to temperature-related compromised specimen integrity were not evaluable for the analysis of Aptima Combo 2 Assay performance. For the 2591 evaluable individuals, including 538 women and 2053 men, the following specimens with valid Aptima Combo 2 assay results and a conclusive ASIS were included in the analyses: 2585 throat swab samples evaluable for CT, 2579 throat swab samples evaluable for GC, 2562 rectal swab samples evaluable for CT, and 2569 rectal swab samples evaluable for GC. Six throat samples were excluded from the evaluation of CT performance: four not tested with the Aptima Combo 2 Assay, and two with invalid/indeterminate ASIS. 12 throat samples were excluded from the evaluation of GC performance: four with no result reported for the Aptima Combo 2 Assay, three with final equivocal Aptima Combo 2 Assay results, and five with invalid/indeterminate ASIS. A total of 29 rectal samples were excluded from the evaluation of CT performance: two samples were not collected, one had invalid results for the Aptima Combo 2 Assay, nine not tested with the Aptima Combo 2 Assay, 12 with final equivocal Aptima Combo 2 Assay results (two of which had indeterminate ASIS), and five with invalid/indeterminate ASIS). A total of 22 rectal swab samples were excluded from the evaluation of GC performance: two samples were not collected, one with invalid results for the Aptima Combo 2 Assay, nine not tested with the Aptima Combo 2 Assay, five with final equivocal Aptima Combo 2 Assay results, and five with invalid/indeterminate ASIS).

Among the 5500 samples tested, two (0.04%) had initial invalid results, and 30 (0.55%) had initial equivocal results for either CT or GC. Of the two samples with initial invalid results, one sample was negative for CT and GC and the other sample was invalid on restest. Of the 30 samples with initial equivocal results, five were not retested, 14 had equivocal results, five had negative results, five had positive results, and one was invalid on retest.

Clinical performance of Aptima Combo 2 Assay for CT detection in throat and rectal swabs:

Tables 5, 6, and 7 show the sensitivity and specificity of the Aptima Combo 2 Assay for CT detection compared to the ASIS in throat swab specimens.

Table 5: Performance Characteristics of the Aptima Combo 2 Assay for CT detection in Throat Swabs

		ASIS for CT Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	45	8
	Equivocal	0	0
	Negative	6	2526
Sensitivity: 88.2% (45/51); 95% CI: (76.6% - 94.5%)			
Specificity: 99.7% (2526/2534); 95% CI: (99.4% - 99.8%)			

Table 6: Performance Characteristics of the Aptima Combo 2 Assay for CT detection in Throat Swabs for Symptomatic Subjects

Symptomatic		ASIS for CT Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	9	1
	Equivocal	0	0
	Negative	0	296
Sensitivity: 100.0% (9/9); 95% CI: (70.1% - 100.0%)			
Specificity: 99.7% (296/297); 95% CI: (98.1% - 99.9%)			

Table 7: Performance Characteristics of the Aptima Combo 2 Assay for CT detection in Throat Swabs for Asymptomatic Subjects

Asymptomatic		ASIS for CT Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	36	7
	Equivocal	0	0
	Negative	6	2230
Sensitivity: 85.7% (36/42); 95% CI: (72.2% - 93.3%)			
Specificity: 99.7% (2230/2237); 95% CI: (99.4% - 99.8%)			

Tables 8, 9, and 10 show the sensitivity and specificity of the Aptima Combo 2 Assay for CT detection compared to the ASIS in rectal swab specimens.

Table 8: Performance Characteristics of the Aptima Combo 2 Assay for CT detection in Rectal Swabs

		ASIS for CT Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	197	25
	Equivocal	5	5
	Negative	18	2322
Sensitivity: 91.6%* (197/215); 95% CI: (87.2% - 94.6%)			
Specificity: 98.9%* (2322/2347); 95% CI: (98.4% - 99.3%)			

*Equivocal results excluded; the percent of equivocal results is 0.4% (10/2572). If all equivocal results are considered discordant results (e.g., false positive or false negative), Sensitivty: 89.5% (197/220), 95% CI: (84.8% - 92.9%) and Specificity: 98.7% (2322/2352), 95% CI: (98.2% - 99.1%).

Table 9: Performance Characteristics of the Aptima Combo 2 Assay for CT detection in Rectal Swabs for Symptomatic Subjects

Symptomatic		ASIS for CT Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	23	2
	Equivocal	0	1
	Negative	1	164
Sensitivity: 95.8%* (23/24); 95% CI: (79.8% - 99.3%)			
Specificity: 98.8%* (164/166); 95% CI: (95.7% - 99.7%)			

*Equivocal results excluded; the percent of equivocal results is 0.5% (1/191). If all equivocal results are considered discordant results (eg., false positive or false negative), Sensitivity = 95.8% (23/24), 95% CI: (79.8% to 99.3%) and Specificity = 98.2% (164/167), 95% CI (94.9% to 99.4%).

Table 10: Performance Characteristics of the Aptima Combo 2 Assay for CT detection in Rectal Swabs for Asymptomatic Subjects

Asymptomatic		ASIS for CT Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	174	23
	Equivocal	5	4
	Negative	17	2158
Sensitivity: 91.1% (174/191); 95% CI: (86.2% - 94.4%)			
Specificity: 98.9% (2158/2181); 95% CI: (98.4% - 99.3%)			

*Equivocal results excluded; the percent of equivocal results is 0.4% (9/2381). If all equivocal results are considered discordant results (e.g., false positive or false negative), Sensitivity: 88.8% (174/196), 95% CI: (83.6% - 92.5%) and Specificity: 98.8% (2158/2185), 95% CI (98.2% - 99.1%).

Clinical performance of Aptima Combo 2 Assay for GC detection in throat and rectal swabs:

Tables 11, 12, and 13 show the sensitivty and specificity of the Aptima Combo 2 Assay for GC detection compared to the ASIS in throat swab specimens.

Table 11: Performance Characteristics of the Aptima Combo 2 Assay for GC detection in Throat Swabs

		ASIS for GC Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	195	25
	Equivocal	0	3
	Negative	8	2351
Sensitivity: 96.1%* (195/203); 95% CI: (92.4% - 98.0%)			
Specificity: 98.9%* (2351/2376); 95% CI: (98.5% - 99.3%)			

*Equivocal results excluded; the percent of equivocal results is 0.1% (3/2582). If all equivocal results are considered discordant results (e.g., false positive or false negative), Sensitivity: 96.1% (195/203), 95% CI: (92.4% - 98.0%) and Specificity: 98.8% (2351/2379), 95% CI: (98.3% - 99.2%).

Table 12: Performance Characteristics of the Aptima Combo 2 Assay for GC detection in Throat Swabs for Symptomatic Subjects

Symptomatic		ASIS for GC Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	39	2
	Equivocal	0	2
	Negative	0	262
Sensitivity: 100.0%* (39/39); 95% CI: (91.0% - 100.0%)			
Specificity: 99.2%* (262/264); 95% CI: (97.3% - 99.8%)			

*Equivocal results excluded; the percent of equivocal results is 0.7% (2/305). If all equivocal results are considered discordant results (e.g., false positive or false negative), Sensitivity: 100.0% (39/39), 95% CI: (91.0% - 100.0% and Specificity: 98.5% (262/266) 95% CI: (96.2% - 99.4%).

Table 13: Performance Characteristics of the Aptima Combo 2 Assay for GC detection in Throat Swabs for Asymptomatic Subjects

Asymptomatic		ASIS for GC Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	156	23
	Equivocal	0	1
	Negative	8	2089
Sensitivity: 95.1%* (156/164); 95% CI: (90.7% - 97.5%)			
Specificity: 98.9%* (2089/2112); 95% CI: (98.4% - 99.3%)			

*Equivocal results excluded; the percent of equivocal results is 0.04% (1/2277). If all equivocal results are considered discordant results (e.g., false positive or false negative), Sensitivity: 95.1% (156/164), 95% CI: (90.7% - 97.5%) and Specificity: 98.9% (2089/2113), 95% CI: (98.3% - 99.2%).

Tables 14, 15, and 16 show the sensitivity and specificity of the Aptima Combo 2 Assay for GC detection compared to the ASIS in rectal swab specimens.

Table 14: Performance Characteristics of the Aptima Combo 2 Assay (Panther System) for GC detection in Rectal Swabs

		ASIS for GC Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	192	13
	Equivocal	2	3
	Negative	5	2359
Sensitivity: 97.5%* (192/197); 95% CI: (94.2% - 98.9%)			
Specificity: 99.5%* (2359/2372); 95% CI: (99.1% - 99.7%)			

*Equivocal results excluded; the percent of equivocal results is 0.2% (5/2574). If all equivocal results are considered discordant results (e.g., false positive or false negative), Sensitivity: 96.5% (192/199), 95% CI: (92.9% - 98.3%) and Specificity: 99.3% (2359/2375), 95% CI: (98.9% - 99.6%).

Table 15: Performance Characteristics of the Aptima Combo 2 Assay (Panther System) for GC detection in Rectal Swabs for Symptomatic Subjects

Symptomatic		ASIS for GC Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	38	0
	Equivocal	1	0
	Negative	0	154
Sensitivity: 100.0%* (38/38); 95% CI: (90.8% - 100.0%)			
Specificity: 100.0%* (154/154); 95% CI: (97.6% - 100.0%)			

*Equivocal results excluded; the percent of equivocal results is 0.5% (1/193). If all equivocal results are considered discordant results (e.g., false positive or false negative), Sensitivity: 97.4% (38/39), 95% CI: (86.8% -99.5%) and Specificity: 100.0% (154/154), 95% CI (97.6% - 100.0%)

Table 16: Performance Characteristics of the Aptima Combo 2 Assay (Panther System) for GC detection in Rectal Swabs for Asymptomatic Subjects

Asymptomatic		ASIS for GC Detection Result	
		Positive	Negative
Aptima Combo 2	Positive	154	13
	Equivocal	1	3
	Negative	5	2205
Sensitivity: 96.9%* (154/159); 95% CI: (92.9% - 98.6%)			
Specificity: 99.4%* (2205/2218); 95% CI: (99.0% - 99.7%)			

*Equivocal results excluded; the percent of equivocal results is 0.2% (4/2381). If all equivocal results are considered discordant results (e.g., false positive or false negative), Sensitivity: 96.3% (154/160), 95% CI: (92.1% - 98.3%) and Specificity: 99.3% (2205/2221), 95% CI: (98.8% - 99.6%).

4. Clinical cut-off**:**

   Not applicable

5. Expected values/Reference range:

   The overall positivity rate of CT observed with Aptima Combo 2 Assay during this multi-site Clinical Study 4 was 2.1% in throat swab specimens and 8.6% in rectal swab specimens. The overall positivity rate of GC observed with Aptima Combo 2 Assay during this multi-site Clinical Study 4 was 8.6% in throat swab specimens and 8.1% in rectal swab specimens.

N. Instrument Name:

Panther System

O. System Descriptions:

1. Modes of Operation:

   Does the applicant's device contain the ability to transmit data to a computer, webserver, or mobile device?

   Yes ____X____ or No _____

   Does the applicant's device transmit data to a computer, webserver, or mobile device using wireless transmission?

   Yes _____ or No ___X____

2. Software:

   FDA has reviewed applicant's Hazard Analysis and software development processes for this line of product types:

   Yes ___X____ or No _____

3. Specimen Identification:

   By handheld barcode reader and positional checks.

4. Specimen Sampling and Handling:

   Fully automated.

5. Calibration:

   Hologic, Inc Field Service Engineers perform a luminometer calibration on the Panther System every 12 months as part of the Preventive Maintenance. Additionally, there are process controls and calibration checks on all of the dispensers, thermal devices, and the vacuum system.

6. Quality Control:

   In addition to the assay controls that are specific to each assay, the Panther System contains process controls that employ both hardware and software components. The process controls include, but are not limited to:

   - Verification that the sequence of assay processing steps is correct for each reaction.
   - Verification that the reaction incubation times and temperatures are correct.
   - Verification that reagents and fluids are appropriately dispensed.

P. Other Supportive Instrument Performance Characteristics Data Not Covered In The "Performance Characteristics" Section above:

Not applicable

Q. Proposed Labeling:

The labeling supports the finding of substantial equivalence for this device.

R. Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.