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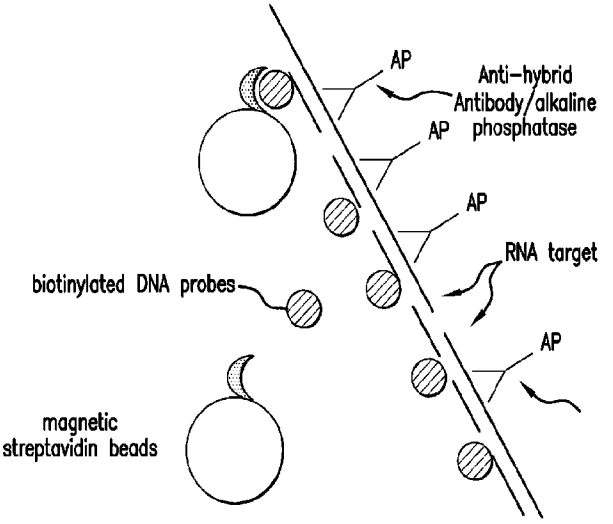
(54) Titre : COMPOSITIONS, PROCEDE ET TROUSSES UTILISANT DES SONDES SYNTHETIQUES POUR DETERMINER LA PRESENCE D'UN ACIDE NUCLEIQUE VOULU

(54) Title: COMPOSITIONS, METHODS, AND KITS USING SYNTHETIC PROBES FOR DETERMINING THE PRESENCE OF A TARGET NUCLEIC ACID



(57) Abrégé/Abstract:
Compositions, methods, and kits are provided for determining the presence of a target nucleic acid in a sample using synthetic probes. The compositions, methods, and kits of the present disclosure use nucleic acid hybridization probes which have the advantages of high sensitivity and specificity over other detection methods. In one embodiment, the methods provided detect various types of HPV. Also provided are probe sets and kits for detecting various types of HPV.

Abstract

Compositions, methods, and kits are provided for determining the presence of a target nucleic acid in a sample using synthetic probes. The compositions, methods, and kits of the present disclosure use nucleic acid hybridization probes which have the advantages of high sensitivity and specificity over other detection methods. In one embodiment, the methods provided detect various types of HPV. Also provided are probe sets and kits for detecting various types of HPV.

COMPOSITIONS, METHODS, AND KITS USING SYNTHETIC PROBES FOR DETERMINING THE PRESENCE OF A TARGET NUCLEIC ACID

RELATED APPLICATIONS

This application claims priority to U.S. provisional applications: 61/045,952 (filed on April 17, 2008; 61/113,841 (filed on November 12, 2008); and 61/147,862 (filed on January 28, 2009).

FIELD OF THE INVENTION

The present invention relates to compositions, methods, and kits using synthetic probes for determining the presence of a target nucleic acid in a biological sample.

BACKGROUND OF THE INVENTION

The detection and characterization of specific nucleic acid sequences and sequence changes have been utilized to detect the presence of viral or bacterial nucleic acid sequences indicative of an infection, the presence of variants or alleles of mammalian genes associated with disease and cancers, and the identification of the source of nucleic acids found in forensic samples, as well as in paternity determinations.

For example, the RNA or DNA for many microorganisms and viruses have been isolated and sequenced. Nucleic acid probes have been examined for a large number of infections. Detectable nucleic acid sequences that hybridize to complementary RNA or DNA sequences in a test sample have been previously utilized. Detection of the probe indicates the presence of a particular nucleic acid sequence in the test sample for which the probe is specific. In addition to aiding scientific research, DNA or RNA probes can be used to detect the presence of viruses and microorganisms such as bacteria, yeast and protozoa as well as genetic mutations linked to specific disorders in patient samples. Nucleic acid hybridization probes have the advantages of high sensitivity and specificity over other detection methods and do not require a viable organism. Hybridization probes can be labeled, for example with a radioactive substance that can be easily detected.

As nucleic acid sequence data for genes from humans and pathogenic organisms accumulates, the demand for fast, cost-effective, and easy-to-use tests increases. It would be desirable to provide novel and effective methods, compositions, and kits for determining a target nucleic acid in a sample.

SUMMARY OF THE INVENTION

In one aspect, the present invention provides a method for determining the presence of a target nucleic acid in a sample. The method comprises:

a) contacting one or more polynucleotide probes with the sample under a hybridization condition sufficient for the one or more polynucleotide probes to hybridize to the target nucleic acid in the sample to form double-stranded nucleic acid hybrids, wherein the one or more polynucleotide probes does not hybridize to a variant of the target nucleic acid; and

b) detecting the double-stranded nucleic acid hybrids, wherein detecting comprises contacting the double-stranded nucleic acid hybrids with a first anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, whereby detection of the double-stranded nucleic acid hybrids determines the target nucleic acid in the sample.

In another aspect of the invention, the hybridization of the nucleic acids and detection of the double-stranded nucleic acid hybrids are performed at the same time.

In a further aspect of the invention, after the double-stranded nucleic acid hybrids are contacted with a first anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, a second anti-hybrid antibody is added to detect the double-stranded nucleic acid hybrids whereby detection of the double-stranded nucleic acid hybrids by these second anti-hybrid antibodies determines the presence of target nucleic acid in the sample.

In another aspect of the invention, synthetic RNA probes corresponding to more than one HPV type are used to detect for the presence of HPV infection.

In certain embodiments, the detecting further comprises providing a second anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, wherein the second anti-hybrid antibody is detectably labeled.

In certain embodiments, the at least one probe and the anti-hybrid antibody are added in the same step.

The target nucleic acid is may be an HPV nucleic acid and in certain embodiments, it is a high risk HPV type and the variant is a low risk type or another high risk type HPV nucleic acid. In certain embodiments, the hrHPV type is 16, 18 and/or 45.

In certain embodiments the one or more polynucleotide probes consist essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 1-2026.

The present invention provides for a method of determing the presence of an HPV target nucleic acid in a sample wherein if the target nucleic acid is HPV 16, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 1-162.

When the target nucleic acid is HPV 18, the the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 163-309.

When the target nucleic acid is HPV 45, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 842-974.

When the target nucleic acid is HPV 31, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 310-454.

When the target nucleic acid is HPV 33, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 455-579.

When the target nucleic acid is HPV 35, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 580-722.

When the target nucleic acid is HPV 39, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 723-841.

When the target nucleic acid is HPV 51, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 975-1120.

When the target nucleic acid is HPV 52, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 1121-1252.

When the target nucleic acid is HPV 56, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 1253-1367.

When the target nucleic acid is HPV 58, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 1368-1497.

When the target nucleic acid is HPV 59, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 1498-1646.

When the target nucleic acid is HPV 66, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 1647-1767.

When the target nucleic acid is HPV 68, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 1768-1875.

When the target nucleic acid is HPV 82, the one or more polynucleotide probes is a set of nucleic acid probes comprising at least one nucleic acid sequence chosen from the group consisting of: SEQ ID NOs: 1876-2026.

In certain embodiments, the one or more polynucleotide probes comprises the whole set of probes for that HPV type provided herein. In certain embodiments, the one or more polynucleotide probes consists essentially of or consists of the whole set of probes for that HPV type provided herein.

The present invention further provides probe sets of SEQ ID NO: 1-162 (HPV 16); 163-309(HPV 18); 842-974(HPV 45); 310-454(HPV 31); 455-579(HPV 33); 580-722(HPV 35); 723-841(HPV 39); 975-1120(HPV 51); 1121-1252(HPV 52); 1253-1367(HPV 56); 1368-1497(HPV 58); 1498-1646(HPV 59); 1647-1767(HPV 66); 1768-1875(HPV 68); and 1876-2026(HPV 82).

The present invention further provides probe sets of SEQ ID NO: 1-161 (HPV 16); 163-299 (HPV 18); and 842-968 (HPV 45). In certain embodiments the one or more polynucleotide probes is a mixture of probe sets comprising the probes set forth in SEQ ID NO: 1-2026.

In certain embodiments the one or more polynucleotide probes is a mixture of probe sets comprising the probes set forth in SEQ ID NO: 1-19, 21-23, 25-53, 55-65, 67-71, 73-92, 94-116, 118-130, 132-241, 244-274, 276, 277, 279, 280, 282-849, 851-893, 895-917, 919-929, 931, 933-936, 938-2026.

In certain embodiments the hybridization is performed at about 45 to about 55 °C.

The present invention also provides kits comprising any one of the probes disclosed herein from SEQ ID NO: 1-2026. In certain embodiments the kits comprise the probes set forth from the group consisting of SEQ ID NO: 1-162 (HPV 16); 163-309(HPV 18); 842-974(HPV 45); 310-454(HPV 31); 455-579(HPV 33); 580-722(HPV 35); 723-841(HPV 39);

975-1120(HPV 51); 1121-1252(HPV 52); 1253-1367(HPV 56); 1368-1497(HPV 58); 1498-1646(HPV 59); 1647-1767(HPV 66); 1768-1875(HPV 68); and 1876-2026(HPV 82). In another embodiment, the kit comprises the probes set forth in SEQ ID NO: 1-161 (HPV 16); 163-299 (HPV 18); and 842-968 (HPV 45). In another embodiment, the kit comprises the probes set forth in SEQ ID NO: 1-2026. In yet another embodiment, the kit comprises the 2,007 probes set forth in SEQ ID NO: 1-19, 21-23, 25-53, 55-65, 67-71, 73-92, 94-116, 118-130, 132-241, 244-274, 276, 277, 279, 280, 282-849, 851-893, 895-917, 919-929, 931, 933-936, 938-2026. Advantages and benefits of the present invention will be apparent to one skilled in the art from reading this specification.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1a shows the sequence conservation across 20 HPV genomes.

Figure 1b shows location of RNA probes along HPV18 genome.

Figure 2 shows performance of RNA probes specific for HPVs 16, 18, 31, or 45.

Figure 3 shows detection of 5,000 copies of HPV18 plasmid with synRNA coverage of 3.7Kb. synRNA = ((1.5kb coverage; 30mers) or (3.7kb coverage; 25mers)) @ 1.34 nM

Figure 4 shows that increasing the concentration of synRNA increased sensitivity of detection.

Figure 5 shows that 50mer synRNA gave higher signal than 25mer synRNA; synRNA = 0.5kb of coverage; 25 or 50mers @ concentrations listed above; at about 40 min hybridization @ about 50°C.

Figure 6 shows the effect of contiguous synRNA coverage on sensitivity of detection; 40 min hybridization @ 50°C; synRNA = 1.5kb of coverage; 30 mers @ 2.24 nM.

Figure 7 shows HPV16 and HPV18 detection with synRNA is comparable; 55°C hybridization; synRNA = 3.7kb (coverage for HPV 18) or 3.175kb (coverage for HPV 16); 25 mers @ 1.34 nM.

Figure 8 shows comparison of synRNA prepared by different chemistries.

Figure 9 shows hybridization of synRNAs at different temperatures; synRNA = 3.7kb of coverage; 25mers @ 1.34 nM.

Figure 10 shows detection in the presence or absence of exogenous RNase A.

Figure 11 shows sensitivity of detection.

Figure 12 shows amplification time course.

Figure 13 shows enhancing sensitivity by increasing target amplification.

Figure 14 shows specificity.

Figure 15 represents another embodiment of a method in accordance with the present invention.

Figure 16 shows that diluting the sample collected in PreservCyt® with a suitable collection medium ("DCM" – Digene Collection Medium) enhances the signal.

Figure 17 shows that synRNA probes have the same signal and dynamic range as the full length probes.

Figure 18 shows that synRNA probes detected all specific targets (15 hrHPV target nucleic acids) with robust S/N and low variability.

Figure 19 shows that even with 10^8 copies of low-risk HPV mixed with 10^8 copies of positive control, the mixture of 2,007 hrHPV probes were specific enough not to provide a positive signal for the low risk HPV types and were still able to provide a strong signal for the positive control.

Figures 20A and B shows that decreasing hybridization temperature increases the detection signal where the biological sample containing the target nucleic acid has been collected in PreverveCyt®.

DETAILED DESCRIPTION

The present inventors have discovered novel methods, compositions, and kits using synthetic probes for determining the presence of a target nucleic acid in a biological sample. The present invention also provides synthetic probes useful for detecting a target nucleic acid in a sample. The present invention includes use of novel detection methods, compositions, and kits for, among other uses, clinical diagnostic purposes, including but not limited to the detection and identification of pathogenic organisms.

In one aspect, the present invention provides a method for determining the presence of a target nucleic acid in a sample, the method comprising:

a) contacting one or more polynucleotide probes with the sample under a hybridization condition sufficient for the one or more polynucleotide probes to hybridize to the target nucleic acid in the sample to form double-stranded nucleic acid hybrids, wherein the one or more polynucleotide probes does not hybridize to a variant of the target nucleic acid; and

b) detecting the double-stranded nucleic acid hybrids, wherein detecting comprises contacting the double-stranded nucleic acid hybrids with a first anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, whereby detection of the double-stranded nucleic acid hybrids determines the target nucleic acid in the sample.

The sample includes, without limitation, a specimen or culture (*e.g.,* microbiological and viral cultures) including biological and environmental samples. Biological samples may be from an animal, including a human, fluid, solid (*e.g.,* stool) or tissue, as well as liquid and solid food and feed products and ingredients such as dairy items, vegetables, meat and meat by-products, and waste. Environmental samples include environmental material such as surface matter, soil, water and industrial samples, as well as samples obtained from food and dairy processing instruments, apparatus, equipment, utensils, disposable and non-disposable items. Particularly preferred are biological samples including, but not limited to cervical samples (*e.g.,* a sample obtained from a cervical swab), blood, saliva, cerebral spinal fluid, pleural fluid, milk, lymph, sputum and semen. The sample may comprise a single- or double-stranded nucleic acid molecule, which includes the target nucleic acid and may be prepared for hybridization analysis by a variety of methods known in the art, *e.g.,* using proteinase K/SDS, chaotropic salts, or the like. These examples are not to be construed as limiting the sample types applicable to the present invention.

For example, a sample such as blood or an exfoliated cervical cell specimen can be collected and subjected to alkaline pH to denature the target nucleic acid and, if necessary, nick the nucleic acid that may be present in the sample. The treated, or hydrolyzed, nucleic acids can then be subjected to hybridization with a probe or group of probes diluted in a neutralizing buffer.

In certain embodiments, the sample is an exfoliated cell sample, such as an exfoliated cervical cell sample. The sample can be collected with a chemically inert collection device such as, but not limited to, a dacron tipped swab, cotton swap, cervical brush, etc. The sample and collection device can be stored in a transport medium that preserves nucleic acids and inhibits nucleases, for example in a transport medium comprising a chaotropic salt solution, a detergent solution such as sodium dodecyl sulfate (SDS), preferably 0.5% SDS, or a chelating agent solution such as ethylenediaminetetraacetic acid (EDTA), preferably 100 mM, to prevent degradation of nucleic acids prior to analysis. In certain embodiments, the sample is a cervical cell sample and in this situation, both the cell sample and the collection device are stored in the chaotropic salt solution provided as the Sample Transport Medium™ in the digene Hybrid Capture® 2 High-Risk HPV DNA Test® kit (Qiagen Gaithersburg, Inc., Gaithersburg, MD). Alternatively, the sample can be collected and stored in a base hydrolysis solution, for example.

The sample may be collected and stored in a liquid based cytology collection medium such as, but not limited to, PreservCyt® and Surepath™. When such collection mediums are

used (methanol based), it is preferable that the sample is diluted prior to performing methods of the present invention relating to detecting at target nucleic acid to obtain a stronger detection signal. A suitable solution is one that dilutes the methanol concentration, but still allows the rest of the reaction to proceed (i.e. allows hybridization of the probe to the target nucleic acid, allows binding of the hybrid capture antibody to the DNA:RNA, etc.). A useful solution is a collection medium comprising NP-40, sodium deoxycholate, Tris-HCl, EDTA, NaCl and sodium azide. In certain embodiments, the medium comprises or consists essentially of 1% NP-40, 0.25% sodium deoxycholate, 50mM Tris-HCl, 25 mM EDTA, 150 mM NaCl and 0.09% sodium azide. This medium is often referred to herein and in the figures as Digene Collection Medium or DCM. Figure 16 shows that diluting a methanol based collection medium, such as PreserveCyt® (or noted as "PC" in the figure) with a suitable solution such as DCM, produces a stronger signal and as such signals and hence detection of a target nucleic acid can be obtained even when the target nucleic acid has been collected in a relatively large volume of solution (i.e. ≥ 1ml). Preferably the methanol based collection medium or PreserveCyt® is diluted in the following ratios of PC to DCM:

Amount of PreserveCyt® (PC) in ml	Amount of Digene Collection Medium (DCM) in µl
1	about 100 to about 1500
1	about 200 to about 1300
1	about 300 to about 1200
1	about 400 to about 1100
1	about 500 to about 1000
1	about 600 to about 1000
1	about 600 to about 900
1	about 600 to about 800

In other embodiments 1 ml of PC is diluted with at least 200 µl of DCM, in other embodiments, 1 ml of PC is diluted with at least 300 µl of DCM, and in other embodiments, 1 ml of PC is diluted with at least 500 µl of DCM. In certain embodiments, 1 ml of PC is diluted with at least 500 DCM but no more than 1000 µl DCM. By diluting the PC containing the biological sample, the methods of the present invention are able to provide results and detect a target nucleic acid from a relative large sample volume (i.e. a biological sample collected in ≥ 1 ml).

If the nucleic acids to be determined are present in blood, a blood sample can be collected with a syringe, for example, and the serum separated by conventional methods.

Preferably, serum is incubated for approximately 20 minutes at approximately 65° C with a protease, such as proteinase K prior to a base treatment.

In some embodiments, the sample is treated with a base, or hydrolyzed, to render the target nucleic acid accessible to hybridization. Nucleic acids can be denatured and, if necessary, nicked by incubating the sample and collection device, if present, in 0.1 to 2.0 M base at about 20 to about 100° C for 5 to 120 minutes. Preferably, treatment is achieved with 0.2 to 0.8 M NaOH, or a similar base such as KOH, at 60-70° C for 30 to 60 minutes. Most preferably, the sample and swab are incubated in 0.415 M NaOH for 65° C for 45 minutes. Approximately one volume of sample can be treated with about one-half volume of base, also referred to herein as the hydrolysis reagent. The pH will typically be about 13. This basic pH will both nick and denature a majority of the nucleic acid in the specimen. In addition, base treatment can disrupt interactions between peptides and nucleic acids to improve accessibility of the target nucleic acid and degrade protein. Base treatment effectively homogenizes the specimen to ensure reproducibility of analysis results for a given sample. Base treatment also can reduce the viscosity of the sample to increase kinetics, homogenize the sample, and reduce background by destroying any existing DNA-RNA or RNA-RNA hybrids in the sample. Base treatment also can help inactivate enzymes such as RNAases that may be present in the sample.

The variant of the target nucleic acid includes genetic variants of the target. A variant includes polymorphisms, mutants, derivatives, modified, altered, or the like forms of the target nucleic acid. By way of example with respect to a human papillomavirus (HPV), variants include the various types. Thus, for example, wherein the target nucleic acid corresponds to HPV type 18 nucleic acid, the variant can be a corresponding nucleic acid sequence of a type of HPV other than type 18.

In one embodiment, the target nucleic acid is an HPV nucleic acid. In another embodiment, the HPV nucleic acid is HPV DNA of an HPV type. In some embodiments, the HPV type is HPV 18, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 16, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 45, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 31, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 33, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 35, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 39, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 51, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 52, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 56, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 58, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31,

33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 59, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 66, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 68, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

In other embodiments, the HPV type is HPV 82, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 83, 84, and 89.

In other embodiments, the HPV type is HPV 16, 18 and 45, wherein the variant is nucleic acid of a low risk HPV type.

In other embodiments, the HPV type is a high risk HPV type (hrHPV), wherein the variant is nucleic acid of a low risk HPV type.

In other embodiments, the HPV type is 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68, and 82 wherein the wherein the variant is nucleic acid of a low risk HPV type (such as 1, 2, 3, 4, 5, 6, 8, 11, 13, 26, 30, 34, 53, 54, 61, 62, 67, 69, 70, 71, 72, 73, 74, 81, 83, 84, and 89).

Thus, the present invention provides methods, compositions, and kit for determining a target nucleic acid in a sample. The sample can be collected with a chemically inert device and optionally treated with a base or other denaturing solution. The sample is incubated with one or more polynucleotide probes that are specific for the target nucleic acid but not for any other member of the population (i.e. will not bind to a variant). For example, the target nucleic acid to be determined can be an oncogenic or non-oncogenic HPV DNA sequence, HBV DNA sequence, Gonorrhea DNA, Chlamydia DNA, or other pathogen DNA or RNA. The target nucleic acid may be from cells for the detection of cancer.

In one embodiment, the target nucleic acid is an HPV nucleic acid, wherein the target and the variant nucleic acids correspond to an HPV high risk or low risk type. HPV types characterized as low risk and high risk are known to one of ordinary skill in the art. Presently HPV types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68, and 82 are considered hrHPVs and HPV types 1, 2, 3, 4, 5, 6, 8, 11, 13, 26, 30, 34, 53, 54, 61, 62, 67, 69, 70, 71, 72, 73, 74, 81, 83, 84, and 89 are considered low risk HPVs.

Thus, for example, the target nucleic acid to be determined can be nucleic acid of a microorganism such as, *e.g.*, a disease-causing pathogen, preferably a virus or bacteria, preferably HPV, however, the invention is not restricted thereto and the description following is merely illustrated by reference to determining an HPV DNA in a sample.

Polynucleotide probes ("synprobes")

In accordance with the present invention, one or more polynucleotide probes are contacted with the sample under conditions sufficient for the one or more polynucleotide probes to hybridize to the target nucleic acid in the sample to form double-stranded nucleic acid hybrids. In certain embodiments, the target nucleic acid is DNA and the probes are RNA. In certain embodiments the RNA probes are short probes as opposed to full length transcribed RNA probes. These short probes are often referred to herein as synthetic RNA probes or "synRNA."

In certain embodiments, sets of polynucleotide probes are used (i.e. more than one probe). For example, if the target nucleic acid to be detected is HPV 16, a set of probes designed to specifically (i.e. only) bind to HPV 16 as opposed to binding to other HPV types is used. In certain embodiments a set of probes is used to ensure coverage of about 3-4 kb of the target nucleic acid, which ensures a strong, readable signal. In certain embodiments, detection of HPV 16 using the methods of the present invention may use a probe set comprising all of the HPV 16 probes disclosed herein (see Table 1). In other embodiments, a set of probes designed to specifically bind to another HPV type is used. For example, for HPV 18, the set of probes comprises the probes disclosed in Table 2, for HPV 45- the set of probes comprises the probes disclosed in Table 3; for HPV 31 – the set of probes comprises the probes disclosed in Table 4; for HPV 33 – the set of probes comprises the probes disclosed in Table 5; for HPV 35 – the set of probes comprises the probes disclosed in Table 6; for HPV 39 – the set of probes comprises the probes disclosed in Table 7; for HPV 51 – the set of probes comprises the probes disclosed in Table 8 ; for HPV 52 – the set of probes comprises the probes disclosed in Table 9; for HPV 56 – the set of probes comprises the

probes disclosed in Table 10; for HPV 58 – the set of probes comprises the probes disclosed in Table 11; for HPV 59 – the set of probes comprises the probes disclosed in Table 12; for HPV 66 – the set of probes comprises the probes disclosed in Table 13; for HPV 68 – the set of probes comprises the probes disclosed in Table 14; for HPV 15 – the set of probes comprises the probes disclosed in Table 15.

In certain embodiments a probe mixture comprising multiple sets of probes is used to simultaneously screen for any one of a mixture of desired target nucleic acids. For example, it may be desirable to screen a biological sample for the presence of any hrHPV type. In such a situation, a probe mixture of some, and in some cases, all of the probes provided in Tables 1-15 are used. For example, a probe mixture can be designed to provide a probe set for every high risk HPV (hrHPV) so one test can be run to identify whether the sample had any hrHPV target nucleic acid. For example, a probe mixture of 2,007 type-specific probes for the detection of 15 hrHPV types was used and was able to detect 5,000 copies/assay of each target genome (see Figures 17 and 18). Figure 17 shows that the synthetic probes have the same signal and dynamic range as traditional full length probes. Figure 19 provides the results of an analytical specificity test, which shows a good signal for the positive control having 10^8 copies, whereas the low risk HPV types had a signal below the cutoff, even when they were present at 10^8 copies. Thus, figures 17-19 show that the methods of the present utilizing the synthetic RNA probes ("synRNA") of the invention provide analytical specificity and are equivalent in limit of detection and dynamic range to full-length transcribed probes and do not suffer any loss of sensitivity with clinical samples. The probes of the present invention enable sensitive detection of a set of target genomes, while also achieving excellent specificity against even very similar related species. For example, the methods of the invention using the synprobes are able to distinguish HPV 67 from HPV 52 and 58 (HPV67 is greater than 72% identical to HPV 52 and 56). See Figure 19.

If a positive signal is obtained in the example above, it may then be desirable to further test the sample to identify the actual hrHPV type target nucleic acid present. In such a situation, the sample would be further tested with one probe specific for the HPV type or a set of probes for the specific HPV type. For example, if one were testing the sample to determine whether the sample contained an HPV 16 target nucleic acid, then at least one probe from Table 1 (HPV 16 probes) would be used, or alternatively the entire set of probes from Table 1 would be used to increase the signal strength. Alternatively, it may be desirable to test for certain hrHPV types such as HPV 16, 18 and 45 and not necessarily test for each individual hrHPV types. In this situation, the mixture of probes would employ at least one

probe from the HPV 16, 18 and 45 probe sets (or alternatively, all of the probes from the 16, 18 and 45 HPV probe sets are used).

The one or more polynucleotide probes are designed so that they do not hybridize to a variant of the target nucleic acid under the hybridization conditions utilized. The number of different polynucleotide probes employed per set can depend on the desired sensitivity. Higher coverage of the nucleic acid target with the corresponding polynucleotide probes can provide a stronger signal (as there will be more DNA-RNA hybrids for the antibodies to bind).

In one embodiment, the method further comprises determining the one or more polynucleotide probes, wherein determining comprises identifying a contiguous nucleotide sequence of the target nucleic acid, wherein the contiguous nucleotide sequence is not present in the variant. By way of example, relatively short regions (*e.g.*, about 25mers) of the HPV genome with sufficient sequence specificity can be determined to provide the one or more polynucleotide probes for HPV type-specific hybridization.

Thus, depending on the target nucleic acid of interest, and the corresponding variant(s), the one or more polynucleotide probes can be prepared to have lengths sufficient to provide target-specific hybridization. In some embodiments, the one or more polynucleotide probes each have a length of at least about 15 nucleotides, illustratively, about 15 to about 1000, about 20 to about 800, about 30 to about 400, about 40 to about 200, about 50 to about 100, about 20 to about 60, about 20 to about 40, about 20 to about 20 and about 25 to about 30 nucleotides. In one embodiment, the one or more polynucleotide probes each have a length of about 25 to about 50 nucleotides. In certain embodiments, the probes have a length of 25 nucleotides. In certain embodiments, all of the probes in a set will have the same length, such as 25 nucleotides, and will have very similar melting temperatures to allow hybridization of all of the probes in the set under the same hybridization conditions.

Bioinformatics tools can be employed to determine the one or more polynucleotide probes. For example, Oligoarray 2.0, a software program that designs specific oligonucleotides can be utilized. Oligoarray 2.0 is described by Rouillard *et al.*, Nucleic Acids Research, 31: 3057-3062 (2003).

Oligoarray 2.0 is a program which combines the functionality of BLAST (Basic Local Alignment Search Tool) and Mfold (Genetics Computer Group, Madison, WI). BLAST, which implements the statistical matching theory by Karlin and Altschul (Proc. Natl. Acad. Sci. USA 87:2264 (1990); Proc. Natl. Acad. Sci. USA 90:5873 (1993), is a widely used program for rapidly detecting nucleotide sequences that match a given query sequence. One

of ordinary skill in the art can provide a database of sequences, which are to be checked against, for example HPV high risk and low risk types 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89. The target sequence of interest, *e.g.* HPV 18, can then be BLASTed against that database to search for any regions of identity. Melting temperature (Tm) and %GC can then be computed for one or more polynucleotide probes of a specified length and compared to the parameters, after which secondary structure also can be examined. Once all parameters of interest are satisfied, cross hybridization can be checked with the Mfold package, using the similarity determined by BLAST. The various programs can be adapted to determine the one or more polynucleotide probes meeting the desired specificity requirements. For example, the parameters of the program can be set to prepare polynucleotides of 25nt length, Tm range of 55-95°C, a GC range of 35-65%, and no secondary structure or cross-hybridization at 55°C or below.

Accordingly in other aspects, the present invention utilizes bioinformatics to provide sequence information sufficient to design and/or prepare polynucleotide probes for determining the target in the sample.

In addition to using the synprobes in a method of the present invention, one aspect of the invention comprises the probes disclosed herein.

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 16 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 1-162 (See Table 1). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 16, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 1-162. In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 16, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 1-161. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 16 comprising SEQ ID NOs: 1-162. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 16 comprising SEQ ID NO: 1-19, 21-23, 25-53, 55-65, 67-71, 73-92, 94-116, 118-130, 132-162.

Table 1: Polyribonucleotide probes for determining HPV 16 nucleic acid.

SEQ ID NO:	Name	Sequence
1	HPV16_25_HR&LR_7866	GGGUUACACAUUUACAAGCAACUUA
2	HPV16_25_HR&LR_7841	ACAUGGGUGUGUGCAAACCGAUUUU
3	HPV16_25_HR&LR_7799	CUGUGUAAAGGUUAGUCAUACAUUG
4	HPV16_25_HR&LR_7774	AAUGUCACCCUAGUUCAUACAUGAA
5	HPV16_25_HR&LR_7749	AGGUUUAAACUUCUAAGGCCAACUA
6	HPV16_25_HR&LR_7712	GGCUUGUUUUAACUAACCUAAUUGC
7	HPV16_25_HR&LR_7676	CAACGCCUUACAUACCGCUGUUAGG
8	HPV16_25_HR&LR_7629	CUGAAUCACUAUGUACAUUGUGUCA
9	HPV16_25_HR&LR_7577	GCACUGCUUGCCAACCAUUCCAUUG
10	HPV16_25_HR&LR_7552	UGCCAAAUCCCUGUUUUCCUGACCU
11	HPV16_25_HR&LR_7527	UUGUACGUUUCCUGCUUGCCAUGCG
12	HPV16_25_HR&LR_7502	CUAUGUCAGCAACUAUGGUUUAAAC
13	HPV16_25_HR&LR_7433	CCCAUUUUGUAGCUUCAACCGAAUU
14	HPV16_25_HR&LR_7408	AUAUACUAUAUUUUGUAGCGCCAGG
15	HPV16_25_HR&LR_7371	UAUAAACUAUAUUUGCUACAUCCUG
16	HPV16_25_HR&LR_7340	CCUACUAAUUGUGUUGUGGUUAUUC
17	HPV16_25_HR&LR_7293	GUGUAACUAUUGUGUCAUGCAACAU
18	HPV16_25_HR&LR_7250	UGUAUGGUAUAAUAAACACGUGUGU
19	HPV16_25_HR&LR_7225	AUAUUAAGUUGUAUGUGUGUUUGUA
20	HPV16_25_HR&LR_7201	GUAUGUGCUUGUAUGUGCUUGUAAA
21	HPV16_25_HR&LR_7175	UAGUGUUGUUUGUUGUGUAUAUGUU
22	HPV16_25_HR&LR_7150	UGUAAGUAUUGUAUGUAUGUUGAAU
23	HPV16_25_HR&LR_7112	AUCUACCUCUACAACUGCUAAACGC
24	HPV16_25_HR&LR_7087	AACGAAAAGCUACACCCACCACCUC
25	HPV16_25_HR&LR_7061	GGCCAAACCAAAAUUUACAUUAGGA
26	HPV16_25_HR&LR_6935	AGCACCUAAAGAAGAUGAUCCCCUU
27	HPV16_25_HR&LR_6894	UUUGUAACCCAGGCAAUUGCUUGUC
28	HPV16_25_HR&LR_6869	AGGCACACUAGAAGAUACUUAUAGG
29	HPV16_25_HR&LR_6790	CAGACGUUAUGACAUACAUACAUUC
30	HPV16_25_HR&LR_6675	GCCAUAUCUACUUCAGAAACUACAU
31	HPV16_25_HR&LR_6541	CUGAUGCCCAAAUAUUCAAUAAACC
32	HPV16_25_HR&LR_6496	CCAGUUCAAAUUAUUUUCCUACACC
33	HPV16_25_HR&LR_6471	GGCUCUGGGUCUACUGCAAAUUUAG
34	HPV16_25_HR&LR_6438	GGUGAAAAUGUACCAGACGAUUUAU
35	HPV16_25_HR&LR_6350	GUCAGAACCAUAUGGCGACAGCUUA
36	HPV16_25_HR&LR_6294	GUUCCACUGGAUAUUUGUACAUCUA
37	HPV16_25_HR&LR_6192	CCACCAUUAGAGUUAAUAAACACAG
38	HPV16_25_HR&LR_6165	AAUGUUGCAGUAAAUCCAGGUGAUU
39	HPV16_25_HR&LR_6052	CAGGUGUGGAUAAUAGAGAAUGUAU
40	HPV16_25_HR&LR_6022	CAGAAAAUGCUAGUGCUUAUGCAGC
41	HPV16_25_HR&LR_5851	UAUUUAGAAUACAUUUACCUGACCC
42	HPV16_25_HR&LR_5825	UAAAGUAUCAGGAUUACAAUACAGG
43	HPV16_25_HR&LR_5800	CUAACAAUAACAAAAUAUUAGUUCC
44	HPV16_25_HR&LR_5745	GCAGGAACAUCCAGACUACUUGCAG
45	HPV16_25_HR&LR_5586	GUUAUUACAUGUUACGAAAACGACG
46	HPV16_25_HR&LR_5546	ACAAUUAUUGCUGAUGCAGGUGACU
47	HPV16_25_HR&LR_5521	UAUAGUUCCAGGGUCUCCACAAUAU
48	HPV16_25_HR&LR_5496	CUGACCAAGCUCCUUCAUUAAUUCC
49	HPV16_25_HR&LR_5469	CAGGUCCUGAUAUACCCAUUAAUAU

50	HPV16_25_HR&LR_5442	GUGGUGCAUACAAUAUUCCUUUAGU
51	HPV16_25_HR&LR_5406	CAGGUUAUAUUCCUGCAAAUACAAC
52	HPV16_25_HR&LR_5381	CCAUCUGUACCCUCUACAUCUUUAU
53	HPV16_25_HR&LR_5356	UACAGAUACUUCUACAACCCCGGUA
54	HPV16_25_HR&LR_5336	AUUUAUGCAGAUGACUUUAUUACAG
55	HPV16_25_HR&LR_5301	CCUCACCUACUUCUAUUAAUAAUGG
56	HPV16_25_HR&LR_5276	ACAUAUACUACCACUUCACAUGCAG
57	HPV16_25_HR&LR_5228	ACUAUUGAUCCUGCAGAAGAAAUAG
58	HPV16_25_HR&LR_5182	UGGAAAAUCUAUAGGUGCUAAGGUA
59	HPV16_25_HR&LR_5153	GGUAAUAAACAAACACUACGUACUC
60	HPV16_25_HR&LR_5122	UAGGCGUACUGGCAUUAGGUACAGU
61	HPV16_25_HR&LR_5051	AAUAGUAUUAAUAUAGCUCCAGAUC
62	HPV16_25_HR&LR_5000	GCAUAUGAAGGUAUAGAUGUGGAUA
63	HPV16_25_HR&LR_4965	CCACUCCCACUAAACUUAUUACAUA
64	HPV16_25_HR&LR_4910	GGAUUAUAUAGUCGCACAACACAAC
65	HPV16_25_HR&LR_4854	CUAACACAGUAACUAGUAGCACACC
66	HPV16_25_HR&LR_4829	GAUACAUUUAUUGUUAGCACAAACC
67	HPV16_25_HR&LR_4771	GCAUUUUACACUUUCAUCAUCCACU
68	HPV16_25_HR&LR_4706	CAUAAUAAUCCCACUUUCACUGACC
69	HPV16_25_HR&LR_4681	UAAUACUGUUACUACUGUUACUACA
70	HPV16_25_HR&LR_4640	ACUACUUCAACUGAUACCACACCUG
71	HPV16_25_HR&LR_4588	UGCACCAACAUCUGUACCUUCCAUU
72	HPV16_25_HR&LR_4562	GAAGAAACUAGUUUUAUUGAUGCUG
73	HPV16_25_HR&LR_4480	UACAGAUACACUUGCUCCUGUAAGA
74	HPV16_25_HR&LR_4435	CGGACGCACUGGGUAUAUUCCAUUG
75	HPV16_25_HR&LR_4369	AUUACAAUAUGGAAGUAUGGGUGUA
76	HPV16_25_HR&LR_4275	CGGCUACCCAACUUUAUAAAACAUG
77	HPV16_25_HR&LR_4232	ACAAUGCGACACAAACGUUCUGCAA
78	HPV16_25_HR&LR_4131	AAUUGUUGUAUACCAUAACUUACUA
79	HPV16_25_HR&LR_4103	AUAUGUACAUAAUGUAAUUGUUACA
80	HPV16_25_HR&LR_4009	CUCUGCGUUUAGGUGUUUUAUUGUA
81	HPV16_25_HR&LR_3984	UAUUACUAUUGUGGAUAACAGCAGC
82	HPV16_25_HR&LR_3942	UGCUUUUGUCUGUGUCUACAUACAC
83	HPV16_25_HR&LR_3866	UGCAUCCACAACAUUACUGGCGUGC
84	HPV16_25_HR&LR_3824	CAGUGUCUACUGGAUUUAUGUCUAU
85	HPV16_25_HR&LR_3765	UGAUAGUGAAUGGCAACGUGACCAA
86	HPV16_25_HR&LR_3712	CAUUGGACAGGACAUAAUGUAAAAC
87	HPV16_25_HR&LR_3686	UGUAUACUGCAGUGUCGUCUACAUG
88	HPV16_25_HR&LR_3638	CUAAUACUUUAAAAUGUUUAAGAUA
89	HPV16_25_HR&LR_3602	GUAACACUACACCCAUAGUACAUUU
90	HPV16_25_HR&LR_3577	CACAAAGGACGGAUUAACUGUAAUA
91	HPV16_25_HR&LR_3552	AAUCCUCACUGCAUUUAACAGCUCA
92	HPV16_25_HR&LR_3520	UUGUUGCACAGAGACUCAGUGGACA
93	HPV16_25_HR&LR_3495	CGGAAACCCCUGCCACACCACUAAG
94	HPV16_25_HR&LR_3460	ACGACUAUCCAGCGACCAAGAUCAG
95	HPV16_25_HR&LR_3417	GACCCAUACCAAAGCCGUCGCCUUG
96	HPV16_25_HR&LR_3378	UGAAAUUAUUAGGCAGCACUUGGCC
97	HPV16_25_HR&LR_3323	GUCAGGUAAUAUUAUGUCCUACAUC
98	HPV16_25_HR&LR_3241	GGAAUACGAACAUAUUUUGUGCAGU
99	HPV16_25_HR&LR_3201	GGGUCAAGUUGACUAUUAUGGUUUA
100	HPV16_25_HR&LR_3176	AAGAAGCAUCAGUAACUGUGGUAGA

101	HPV16_25_HR&LR_3145	UAUACAAACUGGACACAUAUAUAUA
102	HPV16_25_HR&LR_3103	GUGGAAGUGCAGUUUGAUGGAGACA
103	HPV16_25_HR&LR_3043	GUUAGCCUUGAAGUGUAUUUAACUG
104	HPV16_25_HR&LR_3018	UAAUGAAAAGUGGACAUUACAAGAC
105	HPV16_25_HR&LR_2974	GAACUGCAACUAACGUUAGAAACAA
106	HPV16_25_HR&LR_2938	CUGGCUGUAUCAAAGAAUAAAGCAU
107	HPV16_25_HR&LR_2890	GCCAGAGAAAUGGGAUUUAAACAUA
108	HPV16_25_HR&LR_2863	CGCCUAGAAUGUGCUAUUUAUUACA
109	HPV16_25_HR&LR_2828	ACCUACGUGACCAUAUAGACUAUUG
110	HPV16_25_HR&LR_2794	AAAAUACUAACACAUUAUGAAAAUG
111	HPV16_25_HR&LR_2630	UAAUGAGUUUCCAUUUGACGAAAAC
112	HPV16_25_HR&LR_2602	AUAAUAGAUUGGUGGUGUUUACAUU
113	HPV16_25_HR&LR_2555	UACAUCUAACAUUAAUGCUGGUACA
114	HPV16_25_HR&LR_2501	UAUGGAUGUAAAGCAUAGACCAUUG
115	HPV16_25_HR&LR_2444	CUGUUGGAACUACAUAGAUGACAAU
116	HPV16_25_HR&LR_2345	GCAAGGGUCUGUAAUAUGUUUUGUA
117	HPV16_25_HR&LR_2324	UAUGAGUUUAAUGAAAUUUCUGCAA
118	HPV16_25_HR&LR_2282	AUUACUAUAUGGUGCAGCUAACACA
119	HPV16_25_HR&LR_2171	AGGUGAUUGGAAGCAAAUUGUUAUG
120	HPV16_25_HR&LR_2139	AUAAAAUAUAGAUGUGAUAGGGUAG
121	HPV16_25_HR&LR_1957	ACGAUAAUGACAUAGUAGACGAUAG
122	HPV16_25_HR&LR_1914	AAUGAUUGUACAUUUGAAUUAUCAC
123	HPV16_25_HR&LR_1827	UAUAAAACAGGUAUAUCAAAUAUUA
124	HPV16_25_HR&LR_1775	UAUGAUGAUAGAGCCUCCAAAAUUG
125	HPV16_25_HR&LR_1750	AACUAUUAUGUGUGUCUCCAAUGUG
126	HPV16_25_HR&LR_1676	GGGAAUGGUUGUGUUACUAUUAGUA
127	HPV16_25_HR&LR_1584	UUUGGACUUACACCCAGUAUAGCUG
128	HPV16_25_HR&LR_1559	GUGUUGCGAUUGGUGUAUUGCUGCA
129	HPV16_25_HR&LR_1534	GACCAUUUAAAAGUAAUAAAUCAAC
130	HPV16_25_HR&LR_1492	AAUUUAAAGAGUUAUACGGGGUGAG
131	HPV16_25_HR&LR_1417	CUAUAUGCCAAACACCACUUACAAA
132	HPV16_25_HR&LR_1364	UUGCAGUCAGUACAGUAGUGGAAGU
133	HPV16_25_HR&LR_1331	AUGUAGUCAGUAUAGUGGUGGAAGU
134	HPV16_25_HR&LR_1306	AAGGGCGCCAUGAGACUGAAACACC
135	HPV16_25_HR&LR_1238	AUUAUUUGAAAGCGAAGACAGCGGG
136	HPV16_25_HR&LR_1185	CCUAGAUUAAAAGCUAUAUGUAUAG
137	HPV16_25_HR&LR_1150	GUGAUAUUAGUGGAUGUGUAGACAA
138	HPV16_25_HR&LR_1101	UAGAGAUGCAGUACAGGUUCUAAAA
139	HPV16_25_HR&LR_1076	UUACUGCACAGGAAGCAAAACAACA
140	HPV16_25_HR&LR_1029	UAAUGAUUAUUUAACACAGGCAGAA
141	HPV16_25_HR&LR_1004	AUUUGGUAGAUUUUAUAGUAAAUGA
142	HPV16_25_HR&LR_984	UGACAGUGAUACAGGUGAAGAUUUG
143	HPV16_25_HR&LR_848	AGAAACCAUAAUCUACCAUGGCUGA
144	HPV16_25_HR&LR_790	CGUACUUUGGAAGACCUGUUAAUGG
145	HPV16_25_HR&LR_732	UUGUUGCAAGUGUGACUCUACGCUU
146	HPV16_25_HR&LR_702	GGACAGAGCCCAUUACAAUAUUGUA
147	HPV16_25_HR&LR_569	GAGAUACACCUACAUUGCAUGAAUA
148	HPV16_25_HR&LR_524	AGAUCAUCAAGAACACGUAGAGAAA
149	HPV16_25_HR&LR_477	UCCAUAAUAUAAGGGGUCGGUGGAC
150	HPV16_25_HR&LR_412	UAUUAACUGUCAAAAGCCACUGUGU
151	HPV16_25_HR&LR_366	UAGAACAGCAAUACAACAAACCGUU

152	HPV16_25_HR&LR_334	ACAUUAUUGUUAUAGUUUGUAUGGA
153	HPV16_25_HR&LR_306	AGUUUUAUUCUAAAAUUAGUGAGUA
154	HPV16_25_HR&LR_281	UAUGCUGUAUGUGAUAAAUGUUUAA
155	HPV16_25_HR&LR_245	CGGGAUUUAUGCAUAGUAUAUAGAG
156	HPV16_25_HR&LR_209	CAGUUACUGCGACGUGAGGUAUAUG
157	HPV16_25_HR&LR_155	GAGCUGCAAACAACUAUACAUGAUA
158	HPV16_25_HR&LR_130	CAGAAAGUUACCACAGUUAUGCACA
159	HPV16_25_HR&LR_92	AAGAGAACUGCAAUGUUUCAGGACC
160	HPV16_25_HR&LR_57	CCGGUUAGUAUAAAAGCAGACAUUU
161	HPV16_25_HR&LR_18	AUAAAACUAAGGGCGUAACCGAAAU
162	HPV16_7200	UGUAUGUGCUUGUAUGUGCUUGUAA

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 18 consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 163-309 (See Table 2). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 18, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 163-309. In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 18, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 163-299. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 18 comprising SEQ ID NOs: 163-309. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 18 comprising SEQ ID NO: 163-241, 244-274, 276, 277, 279, 280, 282-309.

Table 2: Polyribonucleotide probes for determining HPV 18 nucleic acid.

SEQ ID NO:	Name	Sequence
163	HPV18_25_HR&LR(-45)_7833	UUGGGCAGCACAUACUAUACUUUUC
164	HPV18_25_HR&LR(-45)_7796	UAAGCUGUGCAUACAUAGUUUAUGC
165	HPV18_25_HR&LR(-45)_7764	CUGUCUACCCUUAACAUGAACUAUA
166	HPV18_25_HR&LR(-45)_7738	GUACAACUACUUUCAUGUCCAACAU
167	HPV18_25_HR&LR(-45)_7658	AUCCACUCCCUAAGUAAUAAAACUG
168	HPV18_25_HR&LR(-45)_7632	GCUACAACAAUUGCUUGCAUAACUA
169	HPV18_25_HR&LR(-45)_7561	UUGAACAAUUGGCGCGCCUCUUUGG
170	HPV18_25_HR&LR(-45)_7536	CUUUUGGGCACUGCUCCUACAUAUU
171	HPV18_25_HR&LR(-45)_7501	CAAUACAGUACGCUGGCACUAUUGC
172	HPV18_25_HR&LR(-45)_7476	UGGCUUAUGUCUGUGGUUUUCUGCA
173	HPV18_25_HR&LR(-45)_7423	CCAUUUUAUCCUACAAUCCUCCAUU

174	HPV18_25_HR&LR(-45)_7398	UAUAAAACUGCACACCUUACAGCAU
175	HPV18_25_HR&LR(-45)_7370	GGGCUAUAUAUUGUCCUGUAUUUCA
176	HPV18_25_HR&LR(-45)_7345	GUUUGUGGUAUGGGUGUUGCUUGUU
177	HPV18_25_HR&LR(-45)_7320	CCUAGUGAGUAACAACUGUAUUUGU
178	HPV18_25_HR&LR(-45)_7291	UUGUGGUUCUGUGUGUUAUGUGGUU
179	HPV18_25_HR&LR(-45)_7249	GUUACUAUAUUUGUUGGUAUGUGGC
180	HPV18_25_HR&LR(-45)_7211	CAUUGUAUGGUAUGUAUGGUUGUUG
181	HPV18_25_HR&LR(-45)_7184	CCUGUGUUUGUGUUUGUUGUAUGAU
182	HPV18_25_HR&LR(-45)_7123	GUGCCAGGAAGUAAUAUGUGUGUGU
183	HPV18_25_HR&LR(-45)_7098	AAACCUGCCAAGCGUGUGCGUGUAC
184	HPV18_25_HR&LR(-45)_7073	UGCUCCAUCUGCCACUACGUCUUCU
185	HPV18_25_HR&LR(-45)_6982	CUUUAGACUUAGAUCAAUAUCCCCU
186	HPV18_25_HR&LR(-45)_6911	UGCACCGGCUGAAAAUAAGGAUCCC
187	HPV18_25_HR&LR(-45)_6876	GUACAAUCUGUUGCUAUUACCUGUC
188	HPV18_25_HR&LR(-45)_6698	GCAGUAUAGCAGACAUGUUGAGGAA
189	HPV18_25_HR&LR(-45)_6672	GGGCAAUAUGAUGCUACCAAAUUUA
190	HPV18_25_HR&LR(-45)_6625	CCAGUACCAAUUUAACAAUAUGUGC
191	HPV18_25_HR&LR(-45)_6482	GUAUUCUCCCUCUCCAAGUGGCUCU
192	HPV18_25_HR&LR(-45)_6425	GCCUCAAUCCUUAUAUAUUAAAGGC
193	HPV18_25_HR&LR(-45)_6254	AGAUACUAAAUGUGAGGUACCAUUG
194	HPV18_25_HR&LR(-45)_6188	CACAGUUUUGGAAGAUGGUGAUAUG
195	HPV18_25_HR&LR(-45)_6137	UAAAUCGCGUCCUUUAUCACAGGGC
196	HPV18_25_HR&LR(-45)_6029	UUCUGAGGACGUUAGGGACAAUGUG
197	HPV18_25_HR&LR(-45)_6004	GUUCCCAUGCCGCCACGUCUAAUGU
198	HPV18_25_HR&LR(-45)_5766	GUUCCUGCAGGUGGUGGCAAUAAGC
199	HPV18_25_HR&LR(-45)_5667	GCAAGAGUUGUAAAUACCGAUGAUU
200	HPV18_25_HR&LR(-45)_5642	CGUAUAUCUUCCACCUCCUUCUGUG
201	HPV18_25_HR&LR(-45)_5519	CAGUAUAUUGGUAUACAUGGUACAC
202	HPV18_25_HR&LR(-45)_5487	CCAUUGUAUCACCCACGGCCCCUGC
203	HPV18_25_HR&LR(-45)_5462	UUACCAUCUACUACCUCUGUAUGGC
204	HPV18_25_HR&LR(-45)_5437	UGUAUACACGGGUCCUGAUAUUACA
205	HPV18_25_HR&LR(-45)_5409	UCCCUUUAACCUCCUCUUGGGAUGU
206	HPV18_25_HR&LR(-45)_5384	GCCUCUUCCUAUAGUAAUGUAACGG
207	HPV18_25_HR&LR(-45)_5329	AUCGCGUUCUACUACCUCCUUUGCA
208	HPV18_25_HR&LR(-45)_5304	ACAUGGACCCUGCAGUGCCUGUACC
209	HPV18_25_HR&LR(-45)_5249	CAGCCUUUAGUAUCUGCCACGGAGG
210	HPV18_25_HR&LR(-45)_5224	ACCUUCCCCAGAAUAUAUUGAACUG
211	HPV18_25_HR&LR(-45)_5160	UUACCCGCAGCGGUACACAAAUAGG
212	HPV18_25_HR&LR(-45)_5118	GGACUGUUCGCUUUAGUAGAUUAGG
213	HPV18_25_HR&LR(-45)_5021	GACACUACAUUAACAUUUGAUCCUC
214	HPV18_25_HR&LR(-45)_4971	CACGUCCAUCCUCUUUAAUUACAUA
215	HPV18_25_HR&LR(-45)_4946	UCAGUGGCUAACCCUGAGUUUCUUA
216	HPV18_25_HR&LR(-45)_4833	UACAAACAUUUGCUUCUUCUGGUAC
217	HPV18_25_HR&LR(-45)_4737	CGUCCAUUAUUGAAGUUCCACAAAC
218	HPV18_25_HR&LR(-45)_4701	CCACAACCAAUUUUACCAAUCCUGC
219	HPV18_25_HR&LR(-45)_4676	CCUUCGUCUACCUCUGUGUCUAUUU
220	HPV18_25_HR&LR(-45)_4634	ACAUCUGCGGGUACAACUACACCUG
221	HPV18_25_HR&LR(-45)_4591	UGCACCUAGGCCUACGUUUACUGGC
222	HPV18_25_HR&LR(-45)_4566	AGGACUCCAGUGUGGUUACAUCAGG
223	HPV18_25_HR&LR(-45)_4483	AGUGGUGGAUGUUGGUCCUACACGU
224	HPV18_25_HR&LR(-45)_4455	ACAUUCCAUUGGGUGGGCGUUCCAA

225	HPV18_25_HR&LR(-45)_4375	AUUGCAAUGGUCAAGCCUUGGUAUA
226	HPV18_25_HR&LR(-45)_4276	GGCUUCGGUAACUGACUUAUAUAAA
227	HPV18_25_HR&LR(-45)_4234	UAAUAAAAGUAUGGUAUCCCACCGU
228	HPV18_25_HR&LR(-45)_4113	CCCAUGUUACUAUUGCAUAUACAUG
229	HPV18_25_HR&LR(-45)_4072	CUGCCACAGCAUUCACAGUAUAUGU
230	HPV18_25_HR&LR(-45)_4047	GUGUAUAUUGUGGUAAUAACGUCCC
231	HPV18_25_HR&LR(-45)_3971	AUGCAUGUAUGUGUGCUGCCAUGUC
232	HPV18_25_HR&LR(-45)_3922	GCUGUAGUACCAAUAUGUUAUCACU
233	HPV18_25_HR&LR(-45)_3888	AUAUUGGUGGGAUACAUGACAAUGU
234	HPV18_25_HR&LR(-45)_3863	UGUUGCAAUUCCAGAUAGUGUACAA
235	HPV18_25_HR&LR(-45)_3823	CAUACCAUAGUGAAACACAAAGAAC
236	HPV18_25_HR&LR(-45)_3752	CUAUAGAGAUAUAUCAUCCACCUGG
237	HPV18_25_HR&LR(-45)_3727	ACAGAUUGCGAAAACAUAGCGACCA
238	HPV18_25_HR&LR(-45)_3647	AAGACGGAAACUCUGUAGUGGUAAC
239	HPV18_25_HR&LR(-45)_3622	CAGCUACACCUACAGGCAACAACAA
240	HPV18_25_HR&LR(-45)_3597	GGACCUGUCAACCCACUUCUCGGUG
241	HPV18_25_HR&LR(-45)_3572	UGGACUCGCGGAGAAGCAGCAUUGU
242	HPV18_25_HR&LR(-45)_3547	CGGCUGCUACACGACCUGGACACUG
243	HPV18_25_HR&LR(-45)_3499	AUUCCAGCACCGUGUCCGUGGGCAC
244	HPV18_25_HR&LR(-45)_3454	CCGCUACUCAGCUUGUUAAACAGCU
245	HPV18_25_HR&LR(-45)_3382	GGGAAGUACAUUUUGGGAAUAAUGU
246	HPV18_25_HR&LR(-45)_3315	GAAGGGUACAACACGUUUUAUAUAG
247	HPV18_25_HR&LR(-45)_3269	CAAAACCGCUACCUGUGUAAGUCAC
248	HPV18_25_HR&LR(-45)_3244	AUAUGACUGAUGCAGGAACAUGGGA
249	HPV18_25_HR&LR(-45)_3219	UAUGUAGCAUGGGACAGUGUGUAUU
250	HPV18_25_HR&LR(-45)_3168	GGCCAAACAGUACAAGUAUAUUUUG
251	HPV18_25_HR&LR(-45)_3134	GAAUACAGAACCUACUCACUGCUUU
252	HPV18_25_HR&LR(-45)_3080	AAGUCGAUACAAAACCGAGGAUUGG
253	HPV18_25_HR&LR(-45)_2972	ACAUGGCAUACAGACAUUAAACCAC
254	HPV18_25_HR&LR(-45)_2938	GUUGGGAAAAUGCAAUAUUCUUUGC
255	HPV18_25_HR&LR(-45)_2903	CAUAGACAGCCAAAUACAGUAUUGG
256	HPV18_25_HR&LR(-45)_2645	GCAAAGGAUAAUAGAUGGCCAUAUU
257	HPV18_25_HR&LR(-45)_2612	CCUCCAAUACUACUAACCACAAAUA
258	HPV18_25_HR&LR(-45)_2527	CUUUGAUACCUAUAUGAGAAAUGCG
259	HPV18_25_HR&LR(-45)_2475	CAGAUACUAAGGUGGCCAUGUUAGA
260	HPV18_25_HR&LR(-45)_2270	CUGCGAUACCAACAAAUAGAGUUUA
261	HPV18_25_HR&LR(-45)_2202	CACAGUGGAUACGAUUUAGAUGUUC
262	HPV18_25_HR&LR(-45)_2065	UGAAUAUGCCUUAUUAGCAGACAGC
263	HPV18_25_HR&LR(-45)_2036	GAGCUGACAGAUGAAAGCGAUAUGG
264	HPV18_25_HR&LR(-45)_1944	CUGAGUGGAUACAAAGACUUACUAU
265	HPV18_25_HR&LR(-45)_1918	UAUUAGUGAAGUAAUGGGAGACACA
266	HPV18_25_HR&LR(-45)_1829	CACGUACCUGAAACUUGUAUGUUAA
267	HPV18_25_HR&LR(-45)_1802	GUUGCUAAAGGUUUAAGUACGUUGU
268	HPV18_25_HR&LR(-45)_1777	CAAAUGUGGUAAGAGUAGACUAACA
269	HPV18_25_HR&LR(-45)_1751	GUAUUAAUAUUAGCCCUGUUGCGUU
270	HPV18_25_HR&LR(-45)_1726	UCAAUGUCUAGACUGUAAAUGGGGA
271	HPV18_25_HR&LR(-45)_1572	ACACAUAUGGGCUAUCAUUUACAGA
272	HPV18_25_HR&LR(-45)_1536	ACAAUAAACAAGGAGCUAUGUUAGC
273	HPV18_25_HR&LR(-45)_1493	CCACAAUGUACCAUAGCACAAUUAA
274	HPV18_25_HR&LR(-45)_1455	ACGGUACAAGUGACAAUAGCAAUAU
275	HPV18_25_HR&LR(-45)_1429	CACAGAGGGCAACAACAGCAGUGUA

276	HPV18_25_HR&LR(-45)_1399	CGGCAGUACGGAGGCUAUAGACAAC
277	HPV18_25_HR&LR(-45)_1360	AACUACAAAUGGCGAACAUGGCGGC
278	HPV18_25_HR&LR(-45)_1216	GCGGCUGGAGGUGGAUACAGAGUUA
279	HPV18_25_HR&LR(-45)_1149	CACAAGUGUUGCAUGUUUUAAAACG
280	HPV18_25_HR&LR(-45)_1072	ACAAGGAACAUUUUGUGAACAGGCA
281	HPV18_25_HR&LR(-45)_959	GGCUGGUUUUAUGUACAAGCUAUUG
282	HPV18_25_HR&LR(-45)_885	CGUGGUGUGCAUCCCAGCAGUAAGC
283	HPV18_25_HR&LR(-45)_857	UUUCUGAACACCCUGUCCUUUGUGU
284	HPV18_25_HR&LR(-45)_816	UAGAAAGCUCAGCAGACGACCUUCG
285	HPV18_25_HR&LR(-45)_791	UGUGAAGCCAGAAUUGAGCUAGUAG
286	HPV18_25_HR&LR(-45)_695	GAAGAAAACGAUGAAAUAGAUGGAG
287	HPV18_25_HR&LR(-45)_670	UCACGAGCAAUUAAGCGACUCAGAG
288	HPV18_25_HR&LR(-45)_645	AUGAAAUUCCGGUUGACCUUCUAUG
289	HPV18_25_HR&LR(-45)_620	AUUGUAUUGCAUUUAGAGCCCCAAA
290	HPV18_25_HR&LR(-45)_589	UAUGCAUGGACCUAAGGCAACAUUG
291	HPV18_25_HR&LR(-45)_554	CCAACGACGCAGAGAAACACAAGUA
292	HPV18_25_HR&LR(-45)_529	GCAACCGAGCACGACAGGAACGACU
293	HPV18_25_HR&LR(-45)_489	AACAUAGCUGGGCACUAUAGAGGCC
294	HPV18_25_HR&LR(-45)_344	UUAUUCAGACUCUGUGUAUGGAGAC
295	HPV18_25_HR&LR(-45)_264	GUGGUGUAUAGAGACAGUAUACCCC
296	HPV18_25_HR&LR(-45)_216	GUAUUGGAACUUACAGAGGUAUUUG
297	HPV18_25_HR&LR(-45)_179	GCAAGACAUAGAAAUAACCUGUGUA
298	HPV18_25_HR&LR(-45)_154	UGUGCACGGAACUGAACACUUCACU
299	HPV18_25_HR&LR(-45)_92	ACACCACAAUACUAUGGCGCGCUUU
300	HPV18_7601	CCUGGUAUUAGUCAUUUUCCUGUCC
301	HPV18_6850	CUAGUUUGGUGGAUACAUAUCGUUU
302	HPV18_5697	ACUCCCACAAGCAUAUUUUAUCAUG
303	HPV18_5046	GUAGUGAUGUUCCUGAUUCAGAUUU
304	HPV18_2877	GACCACUAUGAAAAUGACAGUAAAG
305	HPV18_1298	CUGUUUACAAUAUCAGAUAGUGGCU
306	HPV18_1241	AGUCCACGGUUACAAGAAAUAUCUU
307	HPV18_739	AGCCCGACGAGCCGAACCACAACGU
308	HPV18_405	UUAUUAAUAAGGUGCCUGCGGUGCC
309	HPV18_289	AUGCUGCAUGCCAUAAAUGUAUAGA

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 45 consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 842-974 (See Table3). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 45, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 842-974. In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 45, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 842-968. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 45

comprising SEQ ID NOs: 842-974. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 45 comprising SEQ ID NO: 842-849, 851-893, 895-917, 919-929, 931, 933-936, 938-974.

Table 3: Polyribonucleotide probes for determining HPV 45 nucleic acid.

SEQ ID NO:	Name	Sequence
842	HPV45_25_HR&LR(-18)_7834	GGCCCUAUAACACAUACCUUUUCUU
843	HPV45_25_HR&LR(-18)_7754	CCAACAAUCUGUCUACUUGUUACAU
844	HPV45_25_HR&LR(-18)_7726	UAAUUGGCGUGUAGAACCACUUUCU
845	HPV45_25_HR&LR(-18)_7646	GCACAACUGUAUCCACACCCUAUGU
846	HPV45_25_HR&LR(-18)_7552	ACAUAGUUUAACCUACUGGCGCGCC
847	HPV45_25_HR&LR(-18)_7527	CUAAACUGGCACAUUUACAACCCCU
848	HPV45_25_HR&LR(-18)_7495	GUGGCUUAUAUGUGACCUUUUAAAC
849	HPV45_25_HR&LR(-18)_7440	GCAUCCAUUUUACUUAUAAUCCUCC
850	HPV45_25_HR&LR(-18)_7385	CUUUGUACCCUAUAUUCUUUCCUGU
851	HPV45_25_HR&LR(-18)_7322	UAAUAGUGUUGUGUAGGGUUGCACC
852	HPV45_25_HR&LR(-18)_7282	GGUGUUACUGUACAUAAUUGUGGUA
853	HPV45_25_HR&LR(-18)_7250	GUGUAUGUAUGAAUGUGCCUUGUGG
854	HPV45_25_HR&LR(-18)_7225	UACUGUAUUUUGUUUGUUUGCGUGC
855	HPV45_25_HR&LR(-18)_7106	CAUCUAGGCCUGCCAAACGUGUACG
856	HPV45_25_HR&LR(-18)_7081	GCUUCCACGUCUACUGCAUCUACUG
857	HPV45_25_HR&LR(-18)_7052	CUACCAUAGGACCUCGUAAGCGUCC
858	HPV45_25_HR&LR(-18)_7027	GUUCAGGCUGGGUUACGUCGUAGGC
859	HPV45_25_HR&LR(-18)_6911	AUACUACACCUCCAGAAAAGCAGGA
860	HPV45_25_HR&LR(-18)_6885	AUCAGUUGCUGUUACCUGUCAAAAG
861	HPV45_25_HR&LR(-18)_6697	UUUAAGCAGUAUAGUAGACAUGUGG
862	HPV45_25_HR&LR(-18)_6672	GCCAAGUACAUAUGACCCUACUAAG
863	HPV45_25_HR&LR(-18)_6505	GGCUCUAUUAUUACUUCUGAUUCUC
864	HPV45_25_HR&LR(-18)_6479	GUUGUGUGUAUUCCCCUUCUCCCAG
865	HPV45_25_HR&LR(-18)_6454	GCUAAUAUGCGUGAAACCCCUGGCA
866	HPV45_25_HR&LR(-18)_6426	UACGGACCUAUAUAUUAAAGGCACU
867	HPV45_25_HR&LR(-18)_6272	CAUUAGACAUUUGUCAAUCCAUCUG
868	HPV45_25_HR&LR(-18)_6247	UUGCAGGAUACAAAGUGCGAGGUUC
869	HPV45_25_HR&LR(-18)_6142	GCACAAUUGCAACCUGGUGACUGUC
870	HPV45_25_HR&LR(-18)_6018	AGCUGUUAUUACGCAGGAUGUUAGG
871	HPV45_25_HR&LR(-18)_5833	GUAGCUUUACCCGAUCCUAAUAAAU
872	HPV45_25_HR&LR(-18)_5791	GCUGUUCCUAAGGUAUCCGCAUAUC
873	HPV45_25_HR&LR(-18)_5766	ACCUAAUGGUGCAGGUAAUAAACAG
874	HPV45_25_HR&LR(-18)_5741	UAGGCAAUCCAUAUUUUAGGGUUGU
875	HPV45_25_HR&LR(-18)_5654	CUUCUGUGGCCAGAGUUGUCAGCAC
876	HPV45_25_HR&LR(-18)_5534	CACACAAUAUUAUUUAUGGCCAUGG
877	HPV45_25_HR&LR(-18)_5490	UCUCCUACCAAUGCUUCCACCACCA
878	HPV45_25_HR&LR(-18)_5465	CCAUACUCCUAUGUGGCCUAGUACA
879	HPV45_25_HR&LR(-18)_5437	AUACUGGCCCGGACAUUAUAUUGCC
880	HPV45_25_HR&LR(-18)_5402	AGUACCAUUAACAUCUGCAUGGGAU
881	HPV45_25_HR&LR(-18)_5372	UACUGCUGCAUCCUCUUACAGUAAU
882	HPV45_25_HR&LR(-18)_5347	CAAAGUAUUCCUUGACCAUGCCUUC
883	HPV45_25_HR&LR(-18)_5314	CACCUAGCACUAUACACAAAUCAUU

884	HPV45_25_HR&LR(-18)_5289	GACUUCCCACCUCCUGCGUCCACUA
885	HPV45_25_HR&LR(-18)_5254	CUACAAAUGAUAGUGACCUGUUUGA
886	HPV45_25_HR&LR(-18)_5209	CCAUUGCUGCUACAGAGGAAAUUGA
887	HPV45_25_HR&LR(-18)_5111	CACUGUUAGAUUUAGUAGAUUGGGU
888	HPV45_25_HR&LR(-18)_5038	CCAGUAAUGUUCCUGAUUCCGAUUU
889	HPV45_25_HR&LR(-18)_5013	GACACCACACUAUCCUUUGAGCCUA
890	HPV45_25_HR&LR(-18)_4974	UCGUUGGUUACAUUUGAUAAUCCAG
891	HPV45_25_HR&LR(-18)_4926	AAUCAACAGGUCCGUGUGUCCACCU
892	HPV45_25_HR&LR(-18)_4837	CAUCUUCUGGGUCAGGUACGGAACC
893	HPV45_25_HR&LR(-18)_4781	UGGUACACCAACAUCGGGCAGCCAU
894	HPV45_25_HR&LR(-18)_4716	GCAUUUUCUGAUCCCUCUAUUAUUG
895	HPV45_25_HR&LR(-18)_4679	CUCUGUUUCUAUUUCGUCAACUAGU
896	HPV45_25_HR&LR(-18)_4654	UGUUGGACAUCACACCUACCGUGGA
897	HPV45_25_HR&LR(-18)_4573	UUGCCUCUGGUGCUCCGGUUCCCAC
898	HPV45_25_HR&LR(-18)_4463	CAGGUCUAAUACUGUUGUGGAUGUU
899	HPV45_25_HR&LR(-18)_4367	UUUACAGUGGUCUAGCCUUGGGAUA
900	HPV45_25_HR&LR(-18)_4224	GUUUAAUAAACCAUGGUAUCCCACC
901	HPV45_25_HR&LR(-18)_4158	AUACCUGUGAUGUGCAUGUUGUUGU
902	HPV45_25_HR&LR(-18)_4106	GCAUGCUUUACACACCAUACAAUAA
903	HPV45_25_HR&LR(-18)_4053	GCAUUUGCUGUAUACAUUUGUUGCU
904	HPV45_25_HR&LR(-18)_3989	UGUGUGUGCUUUUGCUUGGUUGUUG
905	HPV45_25_HR&LR(-18)_3944	GUGCCUUUAUGUGUGCUGCAAUGUC
906	HPV45_25_HR&LR(-18)_3857	GGGAUACAUGACUAUAUGAAUCUGU
907	HPV45_25_HR&LR(-18)_3832	UUCCUAACAGUGUACAAAUCUCGGU
908	HPV45_25_HR&LR(-18)_3717	UACUCAGAAAUAUCCUCCACCUGGC
909	HPV45_25_HR&LR(-18)_3685	UAAGAUAUAGGCUACGCAAAUAUGC
910	HPV45_25_HR&LR(-18)_3612	AGAAGGAAAGUGUGUAGUGGUAACA
911	HPV45_25_HR&LR(-18)_3585	CUGUGUUCAAGUACAAGUAACAACA
912	HPV45_25_HR&LR(-18)_3535	UCACAGAGCAGCACCACGGACGUGU
913	HPV45_25_HR&LR(-18)_3492	CACAUCCAGACGCCGGCUACUAAGC
914	HPV45_25_HR&LR(-18)_3429	AGACAGCUACAACACGCCUCCACGU
915	HPV45_25_HR&LR(-18)_3325	GAAAUAGUAAUACGUGGGAAGUACA
916	HPV45_25_HR&LR(-18)_3241	GUGUUAGCUAUUGGGGUGUAUAUUA
917	HPV45_25_HR&LR(-18)_3216	GGGAUAUGGGACAAAACAGCAGCAU
918	HPV45_25_HR&LR(-18)_3173	GAACUAUGUAGUAUGGGACAGUAUA
919	HPV45_25_HR&LR(-18)_3134	CGUGCACGUAUACUUUGAUGGCAAC
920	HPV45_25_HR&LR(-18)_3092	GAAUACAGAACCGUCGCAGUGUUUU
921	HPV45_25_HR&LR(-18)_3039	AGCAAGUAUAACAAUGAGGAAUGGA
922	HPV45_25_HR&LR(-18)_2918	UACAGCAAGGGAACAUGGUAUUACC
923	HPV45_25_HR&LR(-18)_2883	UGGCAACUUAUACGUUUGGAAAAUG
924	HPV45_25_HR&LR(-18)_2850	GACAGUAAAGACAUAAACAGCCAAA
925	HPV45_25_HR&LR(-18)_2765	GACGAUGAAGAUGCAGACACCGAAG
926	HPV45_25_HR&LR(-18)_2642	ACGGUAUUUACAUUUCCACAUGCAU
927	HPV45_25_HR&LR(-18)_2586	CAUCCAAUAUUGAUCCAGCAAAAGA
928	HPV45_25_HR&LR(-18)_2560	GCUAAAAUGUCCUCCAAUCCUAUUA
929	HPV45_25_HR&LR(-18)_2431	AGCAGAUACUAAGGUAGCCAUGUUG
930	HPV45_25_HR&LR(-18)_2358	GUUUUAUACAUUUCCUACAAGGUGC
931	HPV45_25_HR&LR(-18)_2266	GGCACUAAAGGAAUUUCUUAAAGGA
932	HPV45_25_HR&LR(-18)_1781	UUGUUGCACGUACCUGAAACAUGUA
933	HPV45_25_HR&LR(-18)_1754	CUAACUGUUGCAAAAGGCUUAAGCA
934	HPV45_25_HR&LR(-18)_1676	GCCCAUAUCCAAUGUUUAGAUUGUA

935	HPV45_25_HR&LR(-18)_1599	GGGUAAUGGCUAUAUUUGGAGUUAA
936	HPV45_25_HR&LR(-18)_1541	CUGUCAUUUACGGAUUUGGUUAGAA
937	HPV45_25_HR&LR(-18)_1516	GGCAGUAUUUAAAGACAUAUAUGGG
938	HPV45_25_HR&LR(-18)_1474	AAAGGAGCUAUUACAAGCAAGUAAC
939	HPV45_25_HR&LR(-18)_1449	AUCCGCAUUGCAGUAUUACAGAACU
940	HPV45_25_HR&LR(-18)_1424	AGUAGUGACAAUGCAGAAAAUGUAG
941	HPV45_25_HR&LR(-18)_1399	UAGUACACAAAGUAGUGGUGGGGAU
942	HPV45_25_HR&LR(-18)_1365	UAAACACUAAUGCGGAAAAUGGCGG
943	HPV45_25_HR&LR(-18)_1338	UGGAAGCUGCAGAGACUCAGGUAAC
944	HPV45_25_HR&LR(-18)_1242	GUCCACGGUUACAAGAAAUUUCAUU
945	HPV45_25_HR&LR(-18)_1217	CAGCUAAGUGUGGAUACGGAUCUAA
946	HPV45_25_HR&LR(-18)_1153	GGUGUUGCAUCUUUUAAAACGAAAG
947	HPV45_25_HR&LR(-18)_1124	CAUGCGCAGGAAGUUCAGAAUGAUG
948	HPV45_25_HR&LR(-18)_1072	ACAAUUAUCCAUUUGUGAACAGGCA
949	HPV45_25_HR&LR(-18)_954	GUAAUGGCUGGUUCUUUGUAGAAAC
950	HPV45_25_HR&LR(-18)_897	CUAACCAAUAAUCUACAAUGGCGGA
951	HPV45_25_HR&LR(-18)_832	GGACCUUAGAACACUACAGCAGCUG
952	HPV45_25_HR&LR(-18)_799	CAGAAUUGAGCUUACAGUAGAGAGC
953	HPV45_25_HR&LR(-18)_649	AGAUCCUGUUGACCUGUUGUGUUAC
954	HPV45_25_HR&LR(-18)_624	UGCAUUUGGAACCUCAGAAUGAAUU
955	HPV45_25_HR&LR(-18)_596	CCCCGGGAAACACUGCAAGAAAUUG
956	HPV45_25_HR&LR(-18)_570	CAAGUAUAGCAAUAAGUAUGCAUGG
957	HPV45_25_HR&LR(-18)_536	ACGGCAAGAAAGACUUCGCAGACGU
958	HPV45_25_HR&LR(-18)_511	AGUGUAAUACAUGUUGUGACCAGGC
959	HPV45_25_HR&LR(-18)_486	AGCAUAGCUGGACAGUACCGAGGGC
960	HPV45_25_HR&LR(-18)_461	CCUUAAGGACAAACGAAGAUUUCAC
961	HPV45_25_HR&LR(-18)_348	AACUCUGUAUAUGGAGAGACACUGG
962	HPV45_25_HR&LR(-18)_265	UGUAUAGAGACUGUAUAGCAUAUGC
963	HPV45_25_HR&LR(-18)_218	GGAACGCACAGAGGUAUAUCAAUUU
964	HPV45_25_HR&LR(-18)_188	UAUUGCCUGUGUAUAUUGCAAAGCA
965	HPV45_25_HR&LR(-18)_163	UGAAUACAUCACUACAAGACGUAUC
966	HPV45_25_HR&LR(-18)_138	AAGCUACCAGAUUUGUGCACAGAAU
967	HPV45_25_HR&LR(-18)_113	UGACGAUCCAAAGCAACGACCCUAC
968	HPV45_25_HR&LR(-18)_87	AAAGUGCAUUACAGGAUGGCGCGCU
969	HPV45_7599	CCUGGUAUUAGUCAUUUUCCUGUCC
970	HPV45_6860	UGGUGGAUACAUAUCGUUUUGUGCA
971	HPV45_2617	AUGGCCAUAUUUAGAAAGUAGGGUG
972	HPV45_1297	GUUGUUUACAAUAUCAGAUAGUGGC
973	HPV45_733	ACUACCAGCCCGACGAGCCGAACCA
974	HPV45_414	UGCCUGCGGUGCCAGAAACCAUUGA

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 31 consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 310-454 (See Table4). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 31, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 310-454. In certain embodiments, the methods of the present invention utilize a set

of polynucleotide probes for specific hybridization to HPV 31 comprising SEQ ID NOs: 310-454.

Table 4: Polyribonucleotide probes for determining HPV 31 nucleic acid.

SEQ ID NO:	Name	Sequence
310	HPV31_7871	GUUUUCGGUUACAGUUUUACAAGCA
311	HPV31_7799	CCAAGGUUGUGUCAUGCAUUAUAAA
312	HPV31_7760	CCUUGAUUGCAGUGCUGGCUUUUGC
313	HPV31_7709	CCUACACACCUUAAACUGCUUUUAG
314	HPV31_7670	UGUAGUUCAACUAUGUGUCAUGCAC
315	HPV31_7620	CCAGUCCAACUUUGCAAUUAUACUA
316	HPV31_7595	CUAACACACCUUGCCAACAUAUAAU
317	HPV31_7570	AACAUUCUGGCUUGUAGUUUCCUGC
318	HPV31_7502	CAUGCUAGUACAACUAUGCUGAUGC
319	HPV31_7462	CAUUUUAAAUCCCUAACCGUUUUCG
320	HPV31_7437	CUACUCCAUUUUGAUUUUAUGCAGC
321	HPV31_7396	UAGUAAAAGUUGUACACCCGGUCCG
322	HPV31_7350	CAAUAGUCAUGUACUUAUUUCUGCC
323	HPV31_7325	UGUUCCUACUUGUUCCUGCUCCUCC
324	HPV31_7261	GUUGUCCUUAUAUACACCCUAUUAG
325	HPV31_7232	AUAUGUGUAUACCUGUGUGUGUUGU
326	HPV31_7111	GCUGUAUUGUAUAUGUGUGUGUUUG
327	HPV31_7086	UGUGUCUGUAUGUGUAUGUGCUUGU
328	HPV31_7024	AUCUACCACUACACCAGCAAAACGU
329	HPV31_6984	GUCCUAAAUUUAAAGCAGGUAAACG
330	HPV31_6860	CCCAAGGAAGAUCCAUUUAAAGAUU
331	HPV31_6786	CAGGUUCUUUGGAGGAUACCUAUAG
332	HPV31_6593	GCAAUUGCAAACAGUGAUACUACAU
333	HPV31_6567	GUAGUACCAAUAUGUCUGUUUGUGC
334	HPV31_6424	AUACUUUCCUACACCUAGCGGCUCC
335	HPV31_6390	GCUCCGGUUCAACAGCUACUUUAGC
336	HPV31_6358	UGAAUCGGUCCCUACUGACUUAUAU
337	HPV31_6197	GACACUAAAAGUAAUGUUCCUUUGG
338	HPV31_6089	GCUAUUACCCCUGGUGAUUGUCCUC
339	HPV31_6017	CAACUGUGUUUACUUGGUUGCAAAC
340	HPV31_5962	CGGUGGUCCUGGCACUGAUAAUAGG
341	HPV31_5701	UUCCAUACCUAAAUCUGACAAUCCU
342	HPV31_5666	AGUGCUAGGCUGCUUACAGUAGGCC
343	HPV31_5640	GAACCAACAUAUAUUAUCACGCAGG
344	HPV31_5596	UGUCCCAGUGUCUAAAGUUGUAAGC
345	HPV31_5571	GCGAGGCUACUGUCUACUUACCACC
346	HPV31_5440	GCCCCUACAACGCCACAAGUGUCUA
347	HPV31_5415	UACACAGGUUUUCCCAUUUCCUUUG
348	HPV31_5390	CUGAUGUACCUAUAGAGCAUGCACC
349	HPV31_5364	UUUUGACAUUCCCAUAUUUUCUGGG
350	HPV31_5337	AAAUACCACUGUGCCACUAAGUACA
351	HPV31_5294	CUGCUGUACAGUCCACAUCUGCUGU
352	HPV31_5258	UGGAUACACCUGCCACACAUAAUGU
353	HPV31_5173	AUGCAACCUUUAGGGGCGUCUGCAA

354	HPV31_5148	UAAUCCUGCAGGUGAAAGUAUUGAA
355	HPV31_5097	UGGUGCUACUAUUGGUGCAAGGGUG
356	HPV31_5072	AUAAACAAACUUUGCGCACUCGUAG
357	HPV31_5046	CACUGUUAGAUAUAGUAGACUAGGU
358	HPV31_4990	CCCGACUUUCUAGAUAUUAUAGCAU
359	HPV31_4965	UACAUCGCAUAAUAUAGCCCCUGAU
360	HPV31_4922	CCUAUGAAACUGUAAAUGCUGAAGA
361	HPV31_4888	GCUCCAAAACAGCUAAUUACAUAUG
362	HPV31_4841	GUAAGGCUACACAACAAGUAAAAGU
363	HPV31_4782	CAUAACAAGUAGCACACCCAUUCCA
364	HPV31_4688	CAGGUCAUUUACUACUUUCAUCAUC
365	HPV31_4663	CAGCCUCCUACACCUGCAGAAACAU
366	HPV31_4622	GCACACAUGAAAAUCCUACUUUUAC
367	HPV31_4583	CAGACACAACACCUGCAAUUUUAGA
368	HPV31_4558	UCUGGGUUUGACAUUGCUACAACUG
369	HPV31_4533	UCCUAUACCACACCCUCCUACAACA
370	HPV31_4508	GAAUUGUUGAUGUUGGUGCCCCUGC
371	HPV31_4478	CCUCUAUAGUAAGUCUUGUUGAAGA
372	HPV31_4442	CACCAGUUAGCAUUGACCCUGUAGG
373	HPV31_4417	UCUGAGGCAAGUAUACCUAUUAGAC
374	HPV31_4392	UCUUAGUACACGUCCUUCUACAGUA
375	HPV31_4303	AUAUUAAGGUAUGGUAGUAUGGGUG
376	HPV31_4255	CCAUCAGACGUUAUACCUAAAAUAG
377	HPV31_4182	ACGCUCUACAAAACGCACUAAACGU
378	HPV31_3967	UUAUUGCAACCUCUCCAUUACGUUG
379	HPV31_3923	GUCGGUAUAUGCAACACUACUAUUA
380	HPV31_3898	UCAUACGUCCACUUGUGCUGUCUGU
381	HPV31_3873	UGUGUGCUACUAUUUGUGUGUCUUG
382	HPV31_3789	CAACAGGAUAUAUGACUAUUUAGCC
383	HPV31_3673	UUGGACAUGUACAGAUGGAAAACAU
384	HPV31_3645	UGUAUGAACAAGUGUCAUCUACAUG
385	HPV31_3561	CUGCAACUACACCUAUAAUACACUU
386	HPV31_3536	AACCAAACAAGGGCUGUCAGUUGUC
387	HPV31_3506	UGUGGGGUUAUCAGUGCAGCUGCAU
388	HPV31_3428	CCAAGAACAGAGCCAGAGCACAGAA
389	HPV31_3361	GAAUUCCAAAACCUGCGCCUUGGGC
390	HPV31_3308	UCCUUUGCUGGGAUUGUUACAAAGC
391	HPV31_3281	GAAUCUGUAUUUAGCAGUGACGAAA
392	HPV31_3158	GGCAUUUAUUAUGUACAUGAAGGAC
393	HPV31_3133	UGUGGAAGGGCAAGUUAAUUGUAAG
394	HPV31_3108	UAUGUAUAGAUGGCCAAUGUACUGU
395	HPV31_3073	CACCAUGCAUUAUACUAACUGGAAA
396	HPV31_3046	GGUGCAAUUUGAUGGUGAUGUACAC
397	HPV31_2988	UUGAACUGUAUUUAACUGCACCUAC
398	HPV31_2963	GACUGGACAAUGCAGCAAACAAGUC
399	HPV31_2897	GCCUUACAAGCUAUUGAACUACAAA
400	HPV31_2870	CCAGCGUUGUCAGUAUCAAAGGCCA
401	HPV31_2839	GGGAAUACACAGUAUUAACCACCAG
402	HPV31_2783	GACUAUUGGAAACAUAUUCGACUUG
403	HPV31_2698	GACUCUUUCUCAACGUUUAAAUGUG
404	HPV31_2660	UAAAUUUGCACGAGGAAGAGGACAA

405	HPV31_2520	UGACAGAUGGCCAUACCUACAUAGC
406	HPV31_2430	CCCUGUAUCUAUAGAUGUAAAGCAU
407	HPV31_2402	AUUACCUACGAAAUGCACUAGAUGG
408	HPV31_2222	UAAUACAUGGUGCACCUAAUACAGG
409	HPV31_2109	AGGUGACUGGAGGGACAUAGUAAAG
410	HPV31_2084	GUAGAUGUGACAAAGUUAGUGACGA
411	HPV31_1949	CUGACAGUGAUAGUAAUGCAUGUGC
412	HPV31_1855	GACACAACAUUUGAUUUGUCCCAAA
413	HPV31_1712	GUAUGUUAAUUCAGCCACCCAAAUU
414	HPV31_1591	UUACAAAGUUUAGCAUGUUCCUGGG
415	HPV31_1566	GCAACCAUAUUGUUUGUAUUGCCAU
416	HPV31_1540	GUUGCAGAAGGAUUUAAAACCCUAU
417	HPV31_1515	AGCUGCGUUUGGAGUUACAGGUACA
418	HPV31_1490	AAAGCACAUGUACUGAUUGGUGUGU
419	HPV31_1462	GAACUAAUUAGGCCAUUUCAAAGCA
420	HPV31_1408	GGUAAAGCUGCUAUGUUAGGUAAAU
421	HPV31_1369	CCAACACGUAAUAUAUUGCAAGUGU
422	HPV31_1344	ACAUAGUGAACGAGAGAAUGAAACU
423	HPV31_1319	UAAGUUGUAAUGGUAGUGACGGGAC
424	HPV31_1294	CAGGUAGAGGAGCAACAAACAACAU
425	HPV31_1269	UGAAGUGGAAACGCAGCAGAUGGUA
426	HPV31_1233	ACUCUUUGAACUUCCAGACAGCGGG
427	HPV31_1181	CACGGUUAAAAGCUAUAUGCAUAGA
428	HPV31_1084	GCGGAGGAACAUGCAGAGGCUGUGC
429	HPV31_994	GAGGAUAUGGUUGACUUUAUUGACA
430	HPV31_965	ACGAAAAUGAAGACAGUAGUGAUAC
431	HPV31_940	CAGACAGGGGACAACAUUUCAGAGG
432	HPV31_907	GGUUGGUUUUAUGUAGAAGCAGUAA
433	HPV31_848	AGACUGUAACUACAAUGGCUGAUCC
434	HPV31_814	CUCAUUUGGAAUCGUGUGCCCCAAC
435	HPV31_789	GCAUAUUGCAAGAGCUGUUAAUGGG
436	HPV31_764	GUACAGAGCACACAAGUAGAUAUUC
437	HPV31_727	CUUUUGUUGUCAGUGUAAGUCUACA
438	HPV31_700	GGACACAUCCAAUUACAAUAUCGUU
439	HPV31_662	GAGGAUGUCAUAGACAGUCCAGCUG
440	HPV31_629	UGUUAUGAGCAAUUACCCGACAGCU
441	HPV31_594	UGUUAGAUUUGCAACCUGAGGCAAC
442	HPV31_569	GAAACACCUACGUUGCAAGACUAUG
443	HPV31_535	CUCGUACUGAAACCCAAGUGUAAAC
444	HPV31_510	CGUUGCAUAGCAUGUUGGAGAAGAC
445	HPV31_478	GAUUCCACAACAUAGGAGGAAGGUG
446	HPV31_340	GGUAUAGAUAUAGUGUGUAUGGAAC
447	HPV31_287	CGGAGUGUGUACAAAAUGUUUAAGA
448	HPV31_262	UAGUAUAUAGGGACGACACACCACA
449	HPV31_220	CAGAAACAGAGGUAUUAGAUUUUGC
450	HPV31_186	AGAUUGAAUUGUGUCUACUGCAAAG
451	HPV31_161	AUUGGAAAUACCCUACGAUGAACUA
452	HPV31_136	GGAAAUUGCAUGAACUAAGCUCGGC
453	HPV31_89	GUGCAAACCUACAGACGCCAUGUUC
454	HPV31_60	CGGUUGGUAUAUAAAGCACAUAGUA

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 33 consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 455-579 (See Table 5). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 33, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 455-579. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 33 comprising SEQ ID NOs:455-579.

Table 5: Polyribonucleotide probes for determining HPV 33 nucleic acid.

SEQ ID NO:	Name	Sequence
455	HPV33_7867	CCGUUUUAGGUCAUAUUGGUCAUUU
456	HPV33_7831	UGAGUCACUACCUGUUUAUUACCAG
457	HPV33_7805	GUAUGCCAAACUAUGCCUUGUAAAA
458	HPV33_7780	CAGUUUUGGCUUACACAAUUGCUUU
459	HPV33_7680	UCAUAUAUACAUGCAGUGCAAUUGC
460	HPV33_7655	GUUUGUCUGUACUUGCUGCAUUGAC
461	HPV33_7630	UUAAUCCUUUUCUUUCCUGCACUGU
462	HPV33_7605	AUACCCUAUGACAUUGGCAGAACAG
463	HPV33_7576	GUUUGUCUGUACUUGCUGCAUUGGC
464	HPV33_7551	UUAAUCCUUUUCUUUCCUGCACUGU
465	HPV33_7526	AUACCCUAUGACAUUGGCAGAACAG
466	HPV33_7465	GUCCAUAUUGUACAAUUUCCUCCAU
467	HPV33_7425	CCUACAUGUUUAGUAUUGCUUUACC
468	HPV33_7389	CAAUGUACCUACCUUUAUUUCCCUA
469	HPV33_7364	GUAUUGCUUGCCCUACCCUGCAUUG
470	HPV33_7339	GGUGUACCUAUAUGAGUAAGGAGUU
471	HPV33_7228	UGUACUUGUUUGUGUGCAUGUUCUA
472	HPV33_7129	CUGUCUAUGUACUUUGUGUUGUUGU
473	HPV33_7051	CACCCGCACAUCGUCUGCAAAACGC
474	HPV33_7016	GCAAAACCUAAACUUAAACGUGCAG
475	HPV33_6914	GGUAAAUAUACAUUUUGGGAAGUGG
476	HPV33_6804	GUUUAACACCUCCUCCAUCUGCUAG
477	HPV33_6630	CACAAGUAACUAGUGACAGUACAUA
478	HPV33_6490	GGUUACUUCCGAAUCUCAGUUAUUU
479	HPV33_6434	GGAACUACUGCCUCUAUUCAAAGCA
480	HPV33_6405	UUCCCGAUGACCUGUACAUUAAAGG
481	HPV33_6380	AGGGCUGGUACAUUAGGAGAGGCUG
482	HPV33_6135	CUGCCAAUGAUUGUCCACCUUUAGA
483	HPV33_6109	AGGUGUUGCUUGUACUAAUGCAGCA
484	HPV33_6063	UAUGUUUACUUGGAUGUAAGCCUCC
485	HPV33_6004	UGGACAACCGGGUGCUGAUAAUAGG
486	HPV33_5979	ACACUGAAACCGGUAACAAGUAUCC
487	HPV33_5902	UGUAGGCCUUGAAAUAGGUAGAGGG

488	HPV33_5839	UAAAUUUGGAUUUCCUGACACCUCC
489	HPV33_5783	CCCAAAGUAUCAGGCUUGCAAUAUA
490	HPV33_5521	GCUGACUUUGUUUUACAUCCUAGUU
491	HPV33_5496	UUUUGACACCAUUGUUGUAGACGGU
492	HPV33_5462	CUAGCCCAUUUGUUCCUAUUUCGCC
493	HPV33_5412	UACUCCUGUUAUGUCUGGCCCUGAU
494	HPV33_5375	CCAGCAAUGUGUCUAUACCUUUAAA
495	HPV33_5349	AUACAGUACGUUUGCAACAACACGU
496	HPV33_5324	AUGUACACACCCCAAUGCAACACUC
497	HPV33_5299	GAUGUUUAUGCUGACGAUGUGGAUA
498	HPV33_5249	CUUUACAUGAUACUUCUACAUCGUC
499	HPV33_5219	CCGUGCCAAAUGAACAAUAUGAAUU
500	HPV33_5194	AGUCCUAUUGUGCCUUUAGACCACA
501	HPV33_5164	GGAGCUAGAAUACAUUAUUAUCAGG
502	HPV33_5092	CGUAGACAUACUGUGCGUUUUAGUA
503	HPV33_4993	CCUGAAGACACAUUACAAUUUCAAC
504	HPV33_4888	UUAUAUAGUCGCAAUACCCAACAGG
505	HPV33_4836	UGUAACAUCAAGCACGCCCAUUCCA
506	HPV33_4811	UUGUUGUUUCCACAGACAGUAGUAA
507	HPV33_4775	GCACACAAAGUUAUGAAAACAUACC
508	HPV33_4742	CUGGACAUUUUAUAUUUUCUUCCCC
509	HPV33_4715	UACACCCUCCAGCGCCUGCAGAAGC
510	HPV33_4652	GGGAGUCAUCUAUUCAAACUAUUUC
511	HPV33_4603	ACUACAUCUGCAGAUACUACACCUG
512	HPV33_4568	CCCCAUCUAUUCCUACACCAUCAGG
513	HPV33_4510	GACUCGUCUAUAGUGUCAUUAAUAG
514	HPV33_4485	UACUGUAGACACUGUUGGACCUUUA
515	HPV33_4460	CCUUGCAGCCUAUACGUCCUCCGGU
516	HPV33_4435	ACUGACCCACCUACAGCUGCAAUCC
517	HPV33_4317	AGGAAGUACCAUAGCAGAUCAAAUU
518	HPV33_4119	CAUGGUGGUGUUUUAACAUUGUUGU
519	HPV33_4060	GCAUAUGACACAACAAGAGUAAUGU
520	HPV33_3969	UUUGGGUGUUUGUGGGAUCUCCUUU
521	HPV33_3944	UGGUUGCUGGUGUUGGUAUUGCUGC
522	HPV33_3773	CUACUGUGCAAAUAAGUACUGGAUU
523	HPV33_3719	CAUUUGUAACUGAACAGCAACAACA
524	HPV33_3646	UAUAGUUCUAUGUCAUCCACCUGGC
525	HPV33_3555	UAGUUCUAACGUUGCACCUAUAGUG
526	HPV33_3530	GCACAAACAAGCAGCGGACUGUGUG
527	HPV33_3497	UGGACAAUAGAACAGCACGUACUGC
528	HPV33_3463	CCCCUUACAAAGCUGUUCUGUGCAG
529	HPV33_3408	ACCACAAGCAGCGGCCAAACGACGA
530	HPV33_3380	ACAUACAGACAGACAACGAUAACCG
531	HPV33_3338	CGUCUAUAUCUAGCAACCAAAUAUC
532	HPV33_3185	CUAUGGUUACAGGGAAAGUAGAUUA
533	HPV33_3135	GGAUUAUACAAACUGGGGUGAAAUA
534	HPV33_3096	AGUAACUGUGCAAUAUGACAAUGAC
535	HPV33_3008	AUAGUACAAGCCAAUGGACAUUGCA
536	HPV33_2939	CAUCAAAGACCAAAGCAUUUCAAGU
537	HPV33_2895	GGGAUUUUCACAUUUAUGCCACCAG
538	HPV33_2867	GUGCUUUAUUGUAUACAGCCAAACA

539	HPV33_2809	GCUGAUAAAACUGAUUUACCAUCAC
540	HPV33_2654	CCCAGUGUAUGCAAUAAAUGAUGAA
541	HPV33_2576	CUCUAGAUGGCCAUAUUUACAUAGU
542	HPV33_2526	UUAAAAUGUCCACCACUGCUUCUUA
543	HPV33_2454	GAUGAUUACAUGAGAAAUGCGUUAG
544	HPV33_2419	UAGAUGAUGUAACGCCAAUAAGUUG
545	HPV33_2269	GCUGUAUGCUAAUUUGUGGACCAGC
546	HPV33_2174	GAGACCAAUAGUACAGUUGUUAAGA
547	HPV33_2004	GCAGAUUCAAAUAGUAAUGCUGCUG
548	HPV33_1951	AUGAUAACGAGUUAACGGACGAUAG
549	HPV33_1795	GGAGCCAAACAUGUGCAUUGUAUUG
550	HPV33_1763	AACAUGUAUGGUUAUAGAGCCACCA
551	HPV33_1715	CAGGUUAACAGUAGCAAAACUAAUG
552	HPV33_1567	GUAUAACAGGAUAUGGAAUUAGUCC
553	HPV33_1496	GGCCUAUGGAAUAAGUUUUAUGGAA
554	HPV33_1426	CGUUGCAGGAAAUUAGUAAUGUUCU
555	HPV33_1395	GAGACAAAUGUAGAUAGCUGUGAAA
556	HPV33_1345	UAAAUGACUUAGAAUCUAGUGGGGU
557	HPV33_1320	GAAAGUCAAAAUGGCGACACAAACU
558	HPV33_1295	AACUCAGCAGAUGGUACAACAGGUA
559	HPV33_1183	AUCGUGCUGCAAACCCGUGUAGAAC
560	HPV33_1154	UUCACAAAGUGCUGCGGAGGACGUU
561	HPV33_1009	GCACGGAUUUACUAGAGUUUAUAGA
562	HPV33_984	GAGGAUGAAACAGCAGAUGACAGUG
563	HPV33_870	UCAUCUACAAUGGCCGAUCCUGAAG
564	HPV33_830	AGUGAAUAUUGUGUGCCCUACCUGU
565	HPV33_805	CCAUACAGCAACUACUUAUGGGCAC
566	HPV33_780	AACAGUACAGCAAGUGACCUACGAA
567	HPV33_742	GUUGUCACACUUGUAACACCACAGU
568	HPV33_717	ACAGCUGAUUACUACAUUGUAACCU
569	HPV33_617	AUAUCCUGAACCAACUGACCUAUAC
570	HPV33_575	GAGAGGACACAAGCCAACGUUAAAG
571	HPV33_539	GUAGAGAAACUGCACUGUGACGUGU
572	HPV33_490	AUUUCGGGUCGUUGGGCAGGGCGCU
573	HPV33_457	CGACAUGUGGAUUUAAACAAACGAU
574	HPV33_424	UGUCAAAGACCUUUGUGUCCUCAAG
575	HPV33_301	CUGUGUUUGCGGUUCUUAUCUAAAA
576	HPV33_274	GAGGGAAAUCCAUUUGGAAUAUGUA
577	HPV33_214	CCUUUGCAACGAUCUGAGGUAUAUG
578	HPV33_183	CAUUGAACUACAGUGCGUGGAAUGC
579	HPV33_103	ACGACUAUGUUUCAAGACACUGAGG

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 35 consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 580-722 (See Table 6). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 35, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ

ID NOs:580-722. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 35 comprising SEQ ID NOs:580-722.

Table 6: Polyribonucleotide probes for determining HPV 35 nucleic acid.

SEQ ID NO:	Name	Sequence
580	HPV35_7767	CACAUUGUUAUAUGCACACAGGUGU
581	HPV35_7737	CAUGCAUGUAAAACAUUACUCACUG
582	HPV35_7711	CACAUCCUGCCAACUUUAAGUUAAA
583	HPV35_7648	CUAAAGGGCUUUAAUUGCACACCUU
584	HPV35_7606	AACACUUGUAACAGUGCUUUUAGGC
585	HPV35_7549	CUUGAUUCAUCUUGCAGUAUUAGUC
586	HPV35_7493	GUGUUCCUGAUAUAUAUUGUUUGCC
587	HPV35_7424	GGUUGCUGUUGGUAAGCUUUAUAUG
588	HPV35_7393	GUGUCCUUUACAUUACCUUUCAACC
589	HPV35_7327	GAGCUUACAUAAUUACAUGACAGCU
590	HPV35_7302	UUGUAUGACUAUGGUGCACCGAUAU
591	HPV35_7261	GCCAUAAAGUGAUGUGUGUGUUUAU
592	HPV35_7236	GUACUUAGUGUGUAGUAGUUCAGUA
593	HPV35_7206	UUGUGCAAUGUGUUGUACGUGGGUG
594	HPV35_7180	CAUGGCGUGUAAAUGUGUGUAUAAU
595	HPV35_7155	UGUUGUGGUGCCUGUUUGUGUUGUA
596	HPV35_7108	CAUGUAUACUGUGUGUUAUGUGUUG
597	HPV35_7028	GCGUGCAGCUCCAGCAUCUACAUCU
598	HPV35_6874	CACCAAAACCUAAAGAUGAUCCAUU
599	HPV35_6825	ACAUAUCGCUAUGUAACAUCACAGG
600	HPV35_6759	AACCCGUCCAUUUUAGAGGAUUGGA
601	HPV35_6592	GUACAAAUAUGUCUGUGUGUUCUGC
602	HPV35_6474	GUAACCUCCGAUGCACAAAUAUUUA
603	HPV35_6439	GUACUAGUUAUUUUCCUACUCCUAG
604	HPV35_6392	AGUACCUGCAGACCUAUAUAUUAAG
605	HPV35_6296	UUCUGAGCCAUAUGGAGAUAUGUUA
606	HPV35_6245	CCUAGAUAUAUGCAGUUCCAUUUGC
607	HPV35_6141	CCUUUGGAGUUACUAAACACUGUAC
608	HPV35_6115	ACCAGGUAAAAGCAGGAGAAUGUCC
609	HPV35_6045	CAAUUGUGUUUAAUAGGUUGUAGGC
610	HPV35_6006	GAUAACAGGGAAUGCAUUUCUAUGG
611	HPV35_5981	UGGUAACUCUGGUAACUCUGGUACA
612	HPV35_5877	UGUACAGGAGUUGAAGUAGGUCGUG
613	HPV35_5849	UCCCUGCCUCCAGCGUUUGGUUUGG
614	HPV35_5748	AAAAUAGCAGUACCCAAGGUAUCUG
615	HPV35_5682	GCAGGCAGUUCUAGGCUAUUAGCUG
616	HPV35_5589	UCUAACGAAGCCACUGUCUACCUGC
617	HPV35_5465	CCCACAGGUCCUAUAUAUUCUAUUA
618	HPV35_5440	UAUUACUAACUCUGUACUACCGGUA
619	HPV35_5412	GGCCAGACAUUGUAUUUAACUCUAA
620	HPV35_5387	GGCUAUGAUAUUCCUAUAACAGCAG
621	HPV35_5354	GUUCCUAGCAAUACUACUAUACCAU

622	HPV35_5274	CUCCUAUAGAUACUGAGGAAGAUAU
623	HPV35_5223	CACAUACCACUGUUUCAACAUCAUU
624	HPV35_5198	UUACAACAUGUACCAUCCUCUUUAC
625	HPV35_5120	AGUGGAAAAGCUAUAGGGGCACGGG
626	HPV35_5094	GUAAUAAACGUACUAUGCAUACACG
627	HPV35_5050	UGCACUAACAUCUAGGAAAGGCACU
628	HPV35_5024	AUGGACAUUAUAGCUUUACAUAGGC
629	HPV35_4993	GGAUAUUAGCUUAGCUCCGGAUCCU
630	HPV35_4967	GAUACAACCUUACAAUUUGAGCAUG
631	HPV35_4909	GACUUCUCCUGCAAAACUUAUUACA
632	HPV35_4857	GAUUAUAUAGUAAAGGUACCCAGCA
633	HPV35_4800	GCAAUAAUAUAACUAAUAGCACGCC
634	HPV35_4713	CAGGUCAUUUUGUACUUUCAUCAUC
635	HPV35_4688	CACCCACCCACGCCUGCAGAAACUU
636	HPV35_4634	GUGACAUCCAUAAGUACACAUGAUA
637	HPV35_4605	CUACAGAUACCACACCUGCUAUUUU
638	HPV35_4578	CUACAACAGGUUUUACAAUAACCAC
639	HPV35_4553	CCUGUUGUUACACCAAGGGUCCCAC
640	HPV35_4506	CUAUAGUGUCAUUAGUAGAGGAAAC
641	HPV35_4481	GACACAAUUGGCCCUUUAGAUUCUU
642	HPV35_4426	GGCUGCCACAAACAUUCCUAUACGA
643	HPV35_4401	UUCCACUGGGUACAACACCUCCAAC
644	HPV35_4376	GGCACAGGUGGAAGAUCUGGAUAUG
645	HPV35_4233	AACUAUAUCGUACUUGCAAAGCUGC
646	HPV35_4190	CACAAAAGGUCUACAAAACGUGUUA
647	HPV35_4068	GUAACAUGUGUGUAUGGUGGUUUUA
648	HPV35_4026	GGCAGUACAGUAAUUGUAUACAAAC
649	HPV35_3999	GAUGAUUAACGCUCAUGCACAAUAU
650	HPV35_3958	CUACUUGCUUUUGUUGUUUCUUGCU
651	HPV35_3933	ACUGUGGGUUACUGUAGCAACACCA
652	HPV35_3889	CUAUCUGUGUCAUUAUACUCAGCAU
653	HPV35_3864	GUGUCUGCUUGUACGUUCGCUAUUG
654	HPV35_3839	UGUGCUUUUGUGUGCUUUUGUGCUU
655	HPV35_3807	AGCUUCCAGUACUGUGUUGCUGUGC
656	HPV35_3760	CACAGUUACAGUGUCUAAAGGAUAU
657	HPV35_3705	CUUACACAACAGAAUAUCAAAGGGA
658	HPV35_3652	AUGGAGAUGGACAUGUACAAACGAU
659	HPV35_3513	ACUGCACAAACAAAGACCGGUGUGG
660	HPV35_3481	CAGUGUUGACAGAGGGGUCUACUCU
661	HPV35_3456	AGCGAGUGCGACUCAGUGCCGUGGA
662	HPV35_3431	ACCGAGCUCCCCUACAACCCCACCA
663	HPV35_3399	AGAAGACAAAUCACAAACGACUUCG
664	HPV35_3360	CCCAUACCAAAGCCUGCUCCGUGGG
665	HPV35_3293	UUUAGCAGCACAGAACUAUCCACUG
666	HPV35_3196	UUAUGUUACUUUUAGGGAAGAGGCU
667	HPV35_3171	AUGUGCAUCAGGGUGUAGAAACAUA
668	HPV35_3123	GUAUAUGUACUGUUGUAAAGGGACU
669	HPV35_3047	GAAGCACAAUUUGAUGGUGAUAAAC
670	HPV35_2946	CAACUGAGUAUAGCACAGAGGACUG
671	HPV35_2890	AAAAGCCAAAGCAAUGCAAGCAAUU
672	HPV35_2865	AAGUGGUUCCAACGCAGGCCAUUUC

673	HPV35_2840	AUGGGAAUUAAAACUCUUAACCACC
674	HPV35_2788	GUAUUGGAAACUGAUUCGUCUUGAA
675	HPV35_2763	GCACAUGUUUGUCUGAUCACAUACA
676	HPV35_2679	AGAGGUCAAAGAAAAUGAUGGAGAC
677	HPV35_2648	GGACGUGGUGCAGAUUAAAUUUGCA
678	HPV35_2551	GUAGUGGUCUUUACAUUUCACAAUG
679	HPV35_2526	CAGGUGGCCAUACUUACAUAGCAGG
680	HPV35_2386	CCAUGUGGCAUAUAUAGACCAAUAU
681	HPV35_2338	CAGCCAUUAUAUGAUGCCAAAAUAG
682	HPV35_2275	CUAAUGCAUUUCUUACAAGGAGCUA
683	HPV35_2220	UUGCAUACUAAUAUAUGGAGCACCA
684	HPV35_2147	GAUAUCAACAAGUAGAUUUUGUGGC
685	HPV35_2075	CACAGUGGAUUAAAAGGCGAUGUGC
686	HPV35_1955	CAGAAACUAAUAGUAAUGCAUGUGC
687	HPV35_1791	UAUUAGUGAGGUUGAUGGAGAAACA
688	HPV35_1744	CGUAGUACCCCAGCUGCGUUAUAUU
689	HPV35_1698	GCUAUGUAUUUCAGCUGCAAGUAUG
690	HPV35_1619	GGGCUAUGGUAAUUCUAGCAUUAUU
691	HPV35_1559	GUGUGGCGAACUUUAAACAUAUAAC
692	HPV35_1534	GUGGCCGCAUUUGGAAUAGCCCCAA
693	HPV35_1391	CAACGCGAGACAUAAUACAAAUACU
694	HPV35_1366	AGCGAUGAAAGACAUGAUGAGACUC
695	HPV35_1341	CAGUGGGGAUAGUAUAACCUCUAGU
696	HPV35_1316	AUACAGUUGAACAAUGUAGUAUGGG
697	HPV35_1286	UACACGAGAUACAACAGGUAGAGGG
698	HPV35_1237	CGAUUAUUUGAACUACCAGACAGCG
699	HPV35_1136	CUAGUAGUCCACUUAGCAGCGUGAG
700	HPV35_1101	CAAAGAGGCUGUACAGGUCCUAAAA
701	HPV35_1051	GAAACAGAGACAGCACAAGCAUUAU
702	HPV35_970	GACGAAAAUGAAGAUGACUGUGACA
703	HPV35_945	UAGACGUACGGGAUCCAGUGUAGAG
704	HPV35_858	AUAAUCUACAAUGGCUGAUCCUGCA
705	HPV35_828	AAUAGUGUGCCCCGGCUGUUCACAG
706	HPV35_781	CACAUUGACAUACGUAAAUUGGAAG
707	HPV35_739	UGUAAAUGUGAGGCGACACUACGUC
708	HPV35_703	CCAGACACCUCCAAUUAUAAUAUUG
709	HPV35_669	AGAUACUAUUGACGGUCCAGCUGGA
710	HPV35_592	UAUGUUUUAGAUUUGGAACCCGAGG
711	HPV35_554	GUGUAAUCAUGCAUGGAGAAAUAAC
712	HPV35_529	GAAACCAACACGUAGAGAAACCGAG
713	HPV35_443	CCAGUUGAAAAGCAAAGACAUUUAG
714	HPV35_350	UAUAGUGUGUAUGGAGAAACGUUAG
715	HPV35_284	CCAUAUGGAGUAUGCAUGAAAUGUU
716	HPV35_259	GUGUAUAGUAUAUAGAGAAGGCCAG
717	HPV35_232	GGUAUAUGACUUUGCAUGCUAUGAU
718	HPV35_207	GCAAACAAGAAUUACAGCGGAGUGA
719	HPV35_163	GGUAGAAGAAAGCAUCCAUGAAAUU
720	HPV35_131	CGACCUUACAAACUGCAUGAUUUGU
721	HPV35_106	CGGUAUGUUUCAGGACCCAGCUGAA
722	HPV35_46	ACGGUUGCCAUAAAAGCAGAAGUGC

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 39 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 723-841 (See Table 7). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 39, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 723-841. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 39 comprising SEQ ID NOs: 723-841.

Table 7: Polyribonucleotide probes for determining HPV 39 nucleic acid.

SEQ ID NO:	Name	Sequence
723	HPV39_7780	CACACAAUAGUUUAUGCAACCGAAA
724	HPV39_7735	CAGGAAUGUGUCUUACAGUAUAAGU
725	HPV39_7692	CUUGCUUAAUUAAAUAGUUGGCCUG
726	HPV39_7642	CCACCCUAUGUAAUAAAACUGCUUU
727	HPV39_7617	CAAUACUUUGGCAACAUCCAUAUCU
728	HPV39_7581	CCUUAUUACUCAUCAUCCUGUCCAG
729	HPV39_7538	UUCACCCUGCAUAGUUGGCACUGGU
730	HPV39_7429	CAUUUUAUACUUCGCCAUUUUGUGG
731	HPV39_7349	UCAUACAUAAUCUAUAUGCCCUACC
732	HPV39_7273	AUGACAGUUUCAUGUGUGAUUGCAC
733	HPV39_7203	CCUUAUGUGUUGAGUGUAUAUGUGU
734	HPV39_7173	CCUUGUUAUGUGUGUGUAUGUUGUU
735	HPV39_7146	CGUGUGUCUAAAUAAUGCAUGUGUA
736	HPV39_7111	CUUCCUCGUCCUCAGCUACUAAACA
737	HPV39_7072	GCCCUACUAUAGGUCCCCGAAAGCG
738	HPV39_7012	UGGAACUUGAUCAAUUCCCUUUGGG
739	HPV39_6956	AGAUCCAUAUGACGGUCUAAAGUUU
740	HPV39_6902	CCUACAGUCUGCAGCCAUUACAUGU
741	HPV39_6877	CCAGUUUGGUAGACACUUACAGAUA
742	HPV39_6851	UUUUGCUGUAGCUCCUCCACCAUCU
743	HPV39_6824	GAAUUCCUCUAUAUUGGACAAUUGG
744	HPV39_6696	CCUUCUACAUAUGAUCCUUCUAAGU
745	HPV39_6671	AUCUACCUCUAUAGAGUCUUCCAUA
746	HPV39_6511	ACUGCCCCUCUCCCAGCGGUUCCAU
747	HPV39_6486	CGUGCAAACCCCGGUAGUUCUGUAU
748	HPV39_6458	CCAAUUGUAUAUUAAGGGCACAGAU
749	HPV39_6370	ACAGUAUGUUCUUCUGUUUACGUAG
750	HPV39_6204	GAACUAGUAAACACCCCUAUUGAGG
751	HPV39_6160	CAUGCAAGCCCAAUAAUGUAUCUAC
752	HPV39_6039	CCAUUUUCAUCAACCACCAAUAAGG
753	HPV39_5998	GACACCCAUUAUAUAAUAGACAGGA
754	HPV39_5908	CCUUAUAUAAUCCAGAAACACAACG
755	HPV39_5875	CCGAUCCUAAUAAAUUCAGUAUUCC

756	HPV39_5850	UAUAGGGUAUUUCGCGUGACAUUGC
757	HPV39_5792	UAAAGUGGGUAUGAAUGGUGGUCGC
758	HPV39_5758	GCUCUAGAUUAUUAACAGUAGGACA
759	HPV39_5543	ACAACAUAUGCAAUAACCAUUCAGG
760	HPV39_5512	GUUGCCAUUGGUGCCUUCUGGACCA
761	HPV39_5487	UUGCUUUACCAAGUACUACUCCACA
762	HPV39_5462	AUGCCUGUAAAUACUGGUCCUGAUA
763	HPV39_5436	CUAUUCCUUUUAGUACCUCAUGGAA
764	HPV39_5409	CAGCAUCUACUAAAUAUGCCAAUAC
765	HPV39_5384	GGCUCACUACCUUCUGUGGCUUCUU
766	HPV39_5359	GGAUUCGGGCACUACAUAUAACACA
767	HPV39_5305	AUAUGCUGAUGUGGACAAUAACACA
768	HPV39_5264	CACGCUGAGCCCUCUGAUGCUUCAG
769	HPV39_5239	AAGCAUUGAAUUACAGCCCCUAGUU
770	HPV39_5209	CCAUGACAUUAGUAGUAUUGCUCCU
771	HPV39_5178	GCACACAAAUUGGAGCGCAAGUACA
772	HPV39_5121	AAGGAACAGUAAGGUUUAGUAGGCU
773	HPV39_5018	GAGCCUGUUGAUACUACAUUAACAU
774	HPV39_4928	UAUAGUAGAGCACAUCAGCAGGUUC
775	HPV39_4889	CCUACACCUGGAAUCAGUCGUGUGG
776	HPV39_4778	UCGGGUAAUAUAUUUGUCAGUACCC
777	HPV39_4736	ACGGAUCCUUCCUUAAUUGAGGUUC
778	HPV39_4706	ACCUCUACUAGUUAUACUAACCCUG
779	HPV39_4621	CACCUCUGGAUUUGAAAUUACUUCU
780	HPV39_4596	GAACACCAGUACCAACAUUUACAGG
781	HPV39_4571	GAGGACUCAAGUGUUAUAACCUCUG
782	HPV39_4546	UGAGCCAUCUAUUGUGCAAUUGGUG
783	HPV39_4487	ACUGUUGUAGAUGUGUCUCCUGCAC
784	HPV39_4358	GGUACUACACUUGCUGACAAAAUUU
785	HPV39_4333	ACCAGACGUUGUUGAUAAAGUUGAG
786	HPV39_4297	CCUAUAUAGAACCUGUAAACAAUCG
787	HPV39_4239	UACUAAUAAACAUGGUUUCCCACCG
788	HPV39_4195	AUUGUGCAUAACUACUGUACAUAGC
789	HPV39_4158	GGCAAUGGAUAUGAUAUAGUACUGU
790	HPV39_4133	UGCCCAUGUGGUUGUUGCAUAGACU
791	HPV39_4046	CGUAUGUGUGGAUAAUUGUGUUUGU
792	HPV39_3888	CAUUGGGUUACAUGACAUUGUAAAG
793	HPV39_3854	GACACUGUUAAAAUACCUUCUAGUG
794	HPV39_3818	ACAUAUGCCACAGAGUCACAACGCC
795	HPV39_3641	AGACGGUACCUCAGUUGUGGUAACA
796	HPV39_3616	CAGUAACAGUACAGGCCACAACACA
797	HPV39_3591	UGGACCAUCUUAACAACCCACUCCA
798	HPV39_3556	AGUCACAGAGCCCACUGAGCCCGAC
799	HPV39_3458	GAAUUAUCAAACACCACCGCGACCC
800	HPV39_3426	ACGGAUCGGUACCCACUACUGAACU
801	HPV39_3328	UAUUCAAGAUGCGGAAAGGUAUGGG
802	HPV39_3301	GCACCUAAAAGUAUACUAUGAAGUG
803	HPV39_3199	GAACUAUGUAUUAUGGGGUGCUAUA
804	HPV39_3174	AUGAUGGGGACAAAUGUAAUGCUAU
805	HPV39_3067	UGAAUACAAUACAGAGGAGUGGACA
806	HPV39_2986	GGUGCCAACCAUAAACAUUUCAAAA

807	HPV39_2636	ACGAUAGGUGGCCAUAUUUACGUAG
808	HPV39_2542	GGGUAUGCAAUAAGUUUAGAUAGGA
809	HPV39_2479	UUAGAUGAUGCAACCGGUACCUGCU
810	HPV39_2412	UAUUUCAUAUGUAAACUCCACCAGC
811	HPV39_2338	GUUAUAUAUGGACCUGCGAAUACAG
812	HPV39_2235	GAGACCCAUAGUACAAUUCUUAAGA
813	HPV39_2205	GUGUAGUAAAUGUGAUGAAGGCGGG
814	HPV39_2056	GCAAUGUUAGCAGAUUGUAACAGUA
815	HPV39_1974	UAGUGUAUUUGACCUAUCGGACAUG
816	HPV39_1906	AGUGUGGUAACAGGGGAUACGCCAG
817	HPV39_1881	GUAUCGCACAGGUAUAUCCAAUAUU
818	HPV39_1835	UUCUGGAGCCUCCUAAACUGCGCAG
819	HPV39_1789	GGAAAGGGAUUAAGUACAUUGUUAC
820	HPV39_1716	CUUAGACACAAAACAAGGAGUACUA
821	HPV39_1645	GUACAUCCAACUAUUGCAGAAGGAU
822	HPV39_1568	UAUCCUUUACUGACCUGGUACGUAC
823	HPV39_1531	GCUGCAAUGCUAACACAAUUUAAAG
824	HPV39_1478	CCAAAUCUCCAACUGCACAAAUUAA
825	HPV39_1453	GCUAUAGAUAGUGAAAACCAGGAUC
826	HPV39_1390	AAUGGGGAUGCUGAAGGGGAACAUG
827	HPV39_1283	GCAGUACGCAGGCAACACAAACGGU
828	HPV39_1251	GGGAACACUACAGGAAAUUUCAUUA
829	HPV39_1189	AAGUAUACAGACAGCAGUGGCGACA
830	HPV39_1083	UGAUUCCACAGAUAUUUGUGUACAG
831	HPV39_876	CUCACUAGGAUUUGUGUGUCCGUGG
832	HPV39_839	GGGAUACUCUGCGACAACUACAGCA
833	HPV39_803	GUAACAACACACUGCAGCUGGUAGU
834	HPV39_595	CGUGGACCAAAGCCCACCUUGCAGG
835	HPV39_567	GAGAAACCCAAGUAUAACAUCAGAU
836	HPV39_464	CACCUAAAUAGCAAACGAAGAUUUC
837	HPV39_336	AGCUACGAUAUUACUCGGACUCGGU
838	HPV39_284	GAACCACUAGCUGCAUGCCAAUCAU
839	HPV39_259	UUUAUAUGUAGUAUAUAGGGACGGG
840	HPV39_212	AGACGACCACUACAGCAAACCGAGG
841	HPV39_7808	GUUGGGCAUACAUACCUAUACUUUU

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 51 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs 975-1120: (See Table 8). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 51, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 975-1120. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 51 comprising SEQ ID NOs: 975-1120.

Table 8: Polyribonucleotide probes for determining HPV 51 nucleic acid.

SEQ ID NO:	Name	Sequence
975	HPV51_7766	UUGUGUUCUGCCUAUGCUUGCAACA
976	HPV51_7716	CCAUCUUACUCAUAUGCAGGUGUGC
977	HPV51_7689	GUGCCAAGUUUCUAUCCUACUUAUA
978	HPV51_7593	CCGCCCUAUAAUAAUUUAACUGCUU
979	HPV51_7566	CUUUAACAAUUGUUGGCACACUGUU
980	HPV51_7536	GCUAGUCAUACAACCUAUUAGUCAU
981	HPV51_7510	CCUUGUACUUGGCGCGCCUUACCGG
982	HPV51_7485	UAGUGCAUACAUCCGCCCGCCCACG
983	HPV51_7427	AAGUUUUAAACCACAACUGCCAGUU
984	HPV51_7394	GAUUUCGGUUCGUGUACUUUUAGUA
985	HPV51_7368	CAGCUGCAGCCAUUUUGAGUGCAAC
986	HPV51_7265	AGGGUGGUGUUUCGGUGGCGUCCCU
987	HPV51_7236	UGUGGGUAUUACAUUAUCCCCGUAG
988	HPV51_7211	CAUUUGUAUGACAUGUACGGGUGUA
989	HPV51_7131	GUUGUUCCUGUAUGUAUGAGUUAUG
990	HPV51_7071	GUAUGCCUGUAUGUAUAUGUUUGUG
991	HPV51_6979	UCAUCGGCAUCCUCUUCCUCUUCCU
992	HPV51_6939	CGUACAACGCAAGCCCAGACCAGGC
993	HPV51_6738	AACAUUACCUCCGUCUGCUAGUUUG
994	HPV51_6707	CUACCAUUCUUGAACAGUGGAAUUU
995	HPV51_6671	CUACAGAGGUAAUGGCUUAUUUACA
996	HPV51_6597	CUUUAAGCAAUAUAUUAGGCAUGGG
997	HPV51_6572	UUUCCCCAACAUUUACUCCAAGUAA
998	HPV51_6543	UUUAACUAUUAGCACUGCCACUGCU
999	HPV51_6514	ACCUGUGUUGAUACUACCAGAAGUA
1000	HPV51_6385	UAUAUAUACUCUGCUACUCCCAGUG
1001	HPV51_6360	UAAUGGCCGUGACCCUAUAGAAAGU
1002	HPV51_6307	CUUGUAGGUGUUGGGGAAGACAUUC
1003	HPV51_6160	GCCACCAAAUCAGACGUCCCUUUGG
1004	HPV51_6084	ACUUGUAUCCUCUGUCAUUCAGGAU
1005	HPV51_5962	GUUGACAACAAACAGACUCAGUUAU
1006	HPV51_5922	AAAUGGCAAUGCACAACAAGAUGUU
1007	HPV51_5897	AUGACACAGAAAAUUCACGCAUAGC
1008	HPV51_5773	CCGGAUCCAAAUUUAUAUAAUCCAG
1009	HPV51_5707	AAAGUAUCUGCAUUUCAAUACAGGG
1010	HPV51_5682	AACCUCAACGCGUGCUGCUAUUCCU
1011	HPV51_5641	AGACUAAUAACAUUAGGACAUCCCU
1012	HPV51_5590	ACAGAAGAAUAUAUCACACGCACCG
1013	HPV51_5565	UGCACCUGUGUCUCGAAUUGUGAAU
1014	HPV51_5469	UAUACACAUUUACUACGCAAACGCC
1015	HPV51_5444	AGGUGGGGAUUACUAUUUGUGGCCC
1016	HPV51_5418	GACACCAAGCAUUCUAUUGUUAUAC
1017	HPV51_5393	GCCUUAUGUUCCCCACACUUCCAUU
1018	HPV51_5368	UAUUGCCCACAUCUCCUACAGUAUG
1019	HPV51_5343	CCUAUUCAUACAGGGCCUGAUGUGG
1020	HPV51_5281	CUUCAUCUAUGUCUUCAUCUUAUGC
1021	HPV51_5247	CACUCCUCUUUGUCUAGGCAGUUGC
1022	HPV51_5189	UGAUUUAGAUGAAGCUGAAACAGGU

1023	HPV51_5142	CAGCCUUUACUUUCACCUUCUAAUA
1024	HPV51_5117	UGCACCAGCUGAUGAACUUGAAAUG
1025	HPV51_4967	UCUGGAUAUUAUUACACUGCACCGC
1026	HPV51_4926	ACUUUUGAGGAACCUGAUGCUGUUG
1027	HPV51_4901	UUUUGAGCCUAUUGACACAUCCAUA
1028	HPV51_4825	CCUACACACAGGUUAAAGUUACAAA
1029	HPV51_4800	GCUGCUCCCCGCUUGUAUAGUAAGU
1030	HPV51_4762	CUAUUAGCAGCACACCUACUCCAGG
1031	HPV51_4733	UGCAUCCAAUGUCAGUACUGGUACU
1032	HPV51_4676	UUUACUAGUACACUACUCUGGUACU
1033	HPV51_4633	CAUCCAUUGAGGCUCCACAAUCUGG
1034	HPV51_4578	GGUACUGUACAUGUUUCUAGUACUA
1035	HPV51_4526	UACUUCAUCUUCCACAACAACCCCU
1036	HPV51_4483	GGUCUCCUAUACCUACCUUUACUGG
1037	HPV51_4458	GAGGACUCUAGUAUUAUUCAGUCUG
1038	HPV51_4425	CACCAUACUGAACCUUCUAUAGUAA
1039	HPV51_4400	GCCACCUAUUAUAAUUGACCUAUGG
1040	HPV51_4373	AGGCGUGGUGGAUAUUGCUCCUGCA
1041	HPV51_4337	UACUGGAUAUAUCCCUUUAGGUGGU
1042	HPV51_4253	GGCCGAUAAAAUAUUACAGUGGAGU
1043	HPV51_4223	UGUUGUGAAUAAGGUUGAAGGUACU
1044	HPV51_4131	AAUAUGGUGGCUACACGUGCACGGC
1045	HPV51_4009	UGUUGCAACAUCCCAAUUAACUACA
1046	HPV51_3964	CGUGUUUGCAGCUGCCUUAUUAUUA
1047	HPV51_3939	UGUUGCCGCUACUGCUGUCCCAAUA
1048	HPV51_3861	GACAUAUUGUAACCAUUGCAGUGUU
1049	HPV51_3816	GUACAUAUAUACUGUCACAAGCCAA
1050	HPV51_3778	GGGAAUUAUGACACUGUAACUAGUG
1051	HPV51_3714	GUGCACAUCAACGGGAAACAUUUAU
1052	HPV51_3689	GGCAUUGUUACCAUUGUGUUUGACA
1053	HPV51_3552	CAACUCAGACUGCGUUUAUAGUGCA
1054	HPV51_3495	CAAACAACCAAAUACACUGUGGAAG
1055	HPV51_3463	CUCCACAAUCUCCCCACUGUCCGUG
1056	HPV51_3438	GACAGCGACUUACUGAGCCCGACUC
1057	HPV51_3413	GAAGCCCAGACACAACAGCGAAAAC
1058	HPV51_3379	GACCAAUCCCCUUACCACCUGCGUG
1059	HPV51_3354	UUGAACAACUAUCAAACACCCCAAC
1060	HPV51_3329	GACGCGUUAUCCACUACUACAACUG
1061	HPV51_3284	GGUACUGUAAUAACAUGUCCUGAAU
1062	HPV51_3259	ACAACAGUGGGAGGUCUAUAUGUAU
1063	HPV51_3234	AAGAUGAAGCCAAAAUAUAUGGGGC
1064	HPV51_3176	GACUAUACGGGUAUAUAUUACACUG
1065	HPV51_3151	GUGGGUAAAGACAAAUGGAAAUGUG
1066	HPV51_3102	CAAUGGACUAUACAAGCUGGAAAUU
1067	HPV51_3017	GAACUAUGGUGUGUGGCUCCCAAGC
1068	HPV51_2992	AUGGACAAUGCGGGAGACAUGUUAU
1069	HPV51_2967	ACAAAUCAGACUAUAACAUGGAACC
1070	HPV51_2942	AUGCACAUGGCCUUACAAUCGCUUA
1071	HPV51_2914	AAAACAAAAGGCCUGUCAAGCAAUU
1072	HPV51_2889	AGGUAGUACCAGCAACAACAGUAUC
1073	HPV51_2864	AGAAACUUACGAACAAUCAAUCACC

1074	HPV51_2829	GAUAUGAAGCUGCUAUGUUUUAUGC
1075	HPV51_2623	GGGAAUGCUGUGUAUACAUUGAAUG
1076	HPV51_2545	GAGGAUGCAAACCUAAUGUAUUUAC
1077	HPV51_2363	AGCCACUAGAGGAUGCUAAAAUAGC
1078	HPV51_2307	GUUUAUGCAAGGGUCCAUUAUUUCA
1079	HPV51_2280	GUCAUUAUUUGCAAUGAGCCUAAUG
1080	HPV51_2243	AUUGCAUAGUCAUAUAUGGCCCACC
1081	HPV51_2121	UGAUAGAGCAAAGGAUGGAGGCAAC
1082	HPV51_2089	UUAUCUAUGUCAGCCUGGAUAAGGU
1083	HPV51_2061	GCAUUACAAACGAGCACAAAGAAAA
1084	HPV51_2036	UAAAAGAUUGUGGGACCAUGGCACG
1085	HPV51_1927	GACCAUGAAGUAUUAGAUGAUAGUG
1086	HPV51_1854	ACGACAAACGCAACUACAACAUAGU
1087	HPV51_1819	AGCAAUACAUAUGGAGAGACACCUG
1088	HPV51_1600	CCAUUUUGCAUGUACUACCAUAUAC
1089	HPV51_1559	UUUCCCCAAUGGUAGCAGAAAAUUU
1090	HPV51_1534	GAUUGGGUUUGUGCAUUGUUUGGCG
1091	HPV51_1489	AAUGAGUUGGUACGGGUGUUUAAAA
1092	HPV51_1438	GCAAAAGCAACGUUAAUGGCAAAAU
1093	HPV51_1386	CUGUGCAAAUGUAGAACUAAACAGU
1094	HPV51_1317	UGGCGGUUCACAGAACAGUGUGUGU
1095	HPV51_1228	AGGAGAUUACUGGACAGUUAUCCGG
1096	HPV51_1203	UCAGGCAAACGAGUCACAAGUUAAA
1097	HPV51_1178	AUCAAAACAACACACACAGCCAUAG
1098	HPV51_1130	GAAAGUUUCUAGUCAGCCCGCGAAG
1099	HPV51_1101	AAACAAAGAGGCUGUGCAUCAGUUA
1100	HPV51_1076	UGUUUCAGGCCCAAGAAUUACAGGC
1101	HPV51_1047	UCAGGCGGAACAGGAGACAGCACGG
1102	HPV51_982	GAAAAUGCAGAUGAUACAGGAUCUG
1103	HPV51_957	AGAUAAUGUUUCGGAUGAUGAGGAU
1104	HPV51_862	CUAGCAACGGCGAUGGACUGUGAAG
1105	HPV51_832	AAGCCUGGUUUGCCCGUGUUGUGCG
1106	HPV51_800	CGCGUUGUACAGCAGAUGUUAAUGG
1107	HPV51_770	CUGGCAGUGGAAAGCAGUGGAGACA
1108	HPV51_745	UUGCAGGUGUUCAAGUGUAGUACAA
1109	HPV51_720	CGUGUUACAGAAUUGAAGCUCCGUG
1110	HPV51_686	GACCAGCUACCAGAAAGACGGGCUG
1111	HPV51_661	GGAGGAUGAAGUAGAUAAUAUGCGU
1112	HPV51_552	AUAAAGCCAUGCGUGGUAAUGUACC
1113	HPV51_503	GCGCUAAUUGCUGGCAACGUACACG
1114	HPV51_418	AGACCACUUGGGCCUGAAGAAAAGC
1115	HPV51_348	UGGUACUACAUUAGAGGCAAUUACU
1116	HPV51_323	AUAGACGUUAUAGCAGGUCUGUGUA
1117	HPV51_209	GUAGAGCAGAUGUAUAUAAUGUAGC
1118	HPV51_160	UCUAUGCACAAUAUACAGGUAGUGU
1119	HPV51_103	GAAGACAAGAGGGAAAGACCACGAA
1120	HPV51_75	GGUAAAAGUAUAGAAGAACACCAUG

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 52 consisting essentially of a sequence or a complement

thereof selected from the group consisting of SEQ ID NOs: 1121-1252 (See Table 9). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 52, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 1121-1252. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 52 comprising SEQ ID NOs: 1121-1252.

Table 9: Polyribonucleotide probes for determining HPV 52 nucleic acid.

SEQ ID NO:	Name	Sequence
1121	HPV52_7871	UGUUACUCACCAGGUGUGCACUACA
1122	HPV52_7837	CGCCAAAUAUGUCUUGUAAAACAUG
1123	HPV52_7812	UGUUGGCUUACACAAGUACAUCCUA
1124	HPV52_7732	CAAUACAUUGCCUAACAUUGCAUGU
1125	HPV52_7701	GCUGACUCACAGGUCCUGCAGUGCA
1126	HPV52_7676	GUUGUCCCGCCUAAACUGACUUCUU
1127	HPV52_7651	UCCUGCAGUCCACUGGUCUACACUU
1128	HPV52_7540	CCAUUUUAAAUCCUAACCGAAUUCG
1129	HPV52_7509	CUCUCCAUUUUGUACCAUUUUGUAC
1130	HPV52_7473	GUGUCCUACUUUGUUACACUACUAA
1131	HPV52_7448	UACCCUGUGUCCCCUGCCCUACCCU
1132	HPV52_7421	GCUCCUAAUCUAUUGCAUCUCCUGC
1133	HPV52_7396	CACCCACAUGAGUAACAAUACAGUU
1134	HPV52_7307	CAGUUCCUGUAUGUAUGUUUUGUGU
1135	HPV52_7266	UUUGCAUGUUAUGUAUGUGUGUGCA
1136	HPV52_7241	AUUGUUUUGUGUGUGUACUGUGUUG
1137	HPV52_7200	UGUCAAACACAGGUUAAAAGGUAAC
1138	HPV52_7168	GGUAAUUGUCUGUGUCAUGUAUGUG
1139	HPV52_7143	GUUAAAAGGUAACCAUUGUCUGUUG
1140	HPV52_7112	GGCCCCACGUACCUCCACAAAGAAG
1141	HPV52_7087	CCAAACUAAAACGCCCUGCAUCAUC
1142	HPV52_7062	UUACAGGCAGGGCUACAGGCUAGGC
1143	HPV52_6977	AAAGGACUAUAUGUUUUGGGAGGUG
1144	HPV52_6949	CACCACCUAAAGGAAAGGAAGAUCC
1145	HPV52_6915	GUCACUUCUACUGCUAUAACUUGUC
1146	HPV52_6880	CACCGUCUGCAUCUUUGGAGGACAC
1147	HPV52_6828	CAUAAGAUGGAUGCCACUAUUUUAG
1148	HPV52_6484	AAGGGUCUAACUCUGGCAAUACUGC
1149	HPV52_6459	CCUGUGCCAGGUGAUUUAUAUAUAC
1150	HPV52_6368	CGAGCCAUAUGGUGACAGUUUGUUC
1151	HPV52_6326	UAGCAGUGUAUGUAAGUAUCCAGAU
1152	HPV52_6275	GGAUUUUAAUACCUUGCAAGCUAGU
1153	HPV52_6216	CAGCUCAUUAACAGUGUAAUACAGG
1154	HPV52_6058	CUGGUAAACCUGGUAUAGAUAAUAG
1155	HPV52_6026	GUUUGAUGAUACUGAAACCAGUAAC
1156	HPV52_5540	GCUCCAUCUACAUCUAUUAUUGUUG

1157	HPV52_5515	UCCUUUUGUUCCUAUAGCCCCUACA
1158	HPV52_5490	CAUUACCUUCGUUACCCACACAUAC
1159	HPV52_5460	CUAUGUCCAUUGAGUCAGGUCCUGA
1160	HPV52_5435	GGUAUUGACUUUGUAUAUCAACCCA
1161	HPV52_5385	CUUCCACACUUUCUACCCAUAAUAA
1162	HPV52_5360	UUGCAGCAACCCACGUUUCACUUAC
1163	HPV52_5314	CCCUUACACUAUUAAUGAUGGUUUG
1164	HPV52_5289	AACCUUUAUUACCACAGUCUGUGUC
1165	HPV52_5264	GAAGUUCAGGAAGACAUAGAAUUGC
1166	HPV52_5239	UGAUAUUAGUCCUAUCCAGCCUGCU
1167	HPV52_5076	AACUUUUACCUGCACCGGAUCCUGA
1168	HPV52_5036	GGCGUUGAUACAGAUGAAACUAUAA
1169	HPV52_4990	GUCAUCACCACAGAAAUUAGUAACA
1170	HPV52_4933	CCUUGGUUUAUAUAGCCGUGCCACA
1171	HPV52_4884	GCAGUGUAACAAGUAGUACACCUAU
1172	HPV52_4859	ACAUUUGUUACCUCUACUGACAGCA
1173	HPV52_4821	CUAUUAGUACACACACCUAUGAAGA
1174	HPV52_4796	GGUCAUGUAUUGUUUUCUAGUCCAA
1175	HPV52_4742	CCUACAUUCACUGAACCAUCUAUAA
1176	HPV52_4710	CAUCUGUACAAUCAGUUUCUACACA
1177	HPV52_4655	ACAACAUCUGCAAAUAAUACUCCUG
1178	HPV52_4628	AUUCCAUCAGCAACAGGGUUUGAUG
1179	HPV52_4593	CAACAUUUAUUGAGUCUGGCGCACC
1180	HPV52_4556	CCCUUAGAACCAUCUAUAGUUUCUA
1181	HPV52_4504	UAGUAUUACCACGUCCACCAUUCGU
1182	HPV52_4479	CAUUGUCCACUCGUCCUCCCACUAG
1183	HPV52_4452	GCUCUGGUGGUAGGGCAGGCUAUGU
1184	HPV52_4424	GGAGGUUUGGGUAUAGGUACAGGUG
1185	HPV52_4392	UUUUAAAAUAUGGCAGCCUAGGGGU
1186	HPV52_4250	UAGCUUGUCGCAAUGAGAUACAGAC
1187	HPV52_4157	AUAACUGUACAUGUAGAUUGGCUAC
1188	HPV52_4114	UGUUUUGUAUUCACUGUCAUGCACA
1189	HPV52_4055	AUCUAUUGGGUCACCAUUUAAAGUG
1190	HPV52_4017	UAUGCGCAGGUGUUGGUGCUGGUGC
1191	HPV52_3982	CAGUGCUUAGGCCGCUCUUGCUAUC
1192	HPV52_3887	AACACCCAACACAAGCCAAUAUUGC
1193	HPV52_3832	GGUGUCAUGUCAUUGUGAUAUUUGU
1194	HPV52_3762	CAGUGAUGAAACACAACGUCAACAA
1195	HPV52_3681	GUAUGUUCAAAUUUCAUCUACCUGG
1196	HPV52_3593	CAACUUGUACUGCACCUAUAAUACA
1197	HPV52_3541	CGGGGACUCGUCACUGCAACUGAGU
1198	HPV52_3509	UGCGGGGACAACAAUCCGUGGACAG
1199	HPV52_3484	AACACCAAGUACCCCAACAACCUUU
1200	HPV52_3437	UACAACCACCACAGAAACGACGACG
1201	HPV52_3406	GCAGUGUCCGUGGGUGCCAAAGACA
1202	HPV52_3381	AUGCACCGAAACCUCCAAGACCUCC
1203	HPV52_3208	GGGUUAUAUUAUUGGUGUGAUGGAG
1204	HPV52_3176	GUACAAUUGUAGAAGGACAAGUAGA
1205	HPV52_3125	CUAUGGAUUAUACAAACUGGAAGGA
1206	HPV52_3081	UGGGUAUACAAUAACAGUGCAAUAC
1207	HPV52_3036	UCUAGAAAUGUGGCGUGCAGAACCA

1208	HPV52_3009	AGAUGGAUGGACAUUACAACAAACA
1209	HPV52_2975	CAUUGGAGGCAUUAAACAAAACACA
1210	HPV52_2887	CUGGGAAUAACUCAUAUAGGCCACC
1211	HPV52_2847	GACUCGAAUGGAAUGUGUUUGUUU
1212	HPV52_2815	GACCUAAACGCACAAAUUGAACAUU
1213	HPV52_2788	CUAGAUCUAUACGAAGCUGAUAGUA
1214	HPV52_2578	GGCCAUAUUUACAUAGUAGAUUGGU
1215	HPV52_2548	CAAAUACAAAUGCAGGAACAGAUCC
1216	HPV52_2403	GUGGGUAUGAUAGAUGAUGUAACAC
1217	HPV52_2327	GUUCUUAAGUGGAUGUGUAAUAUCC
1218	HPV52_2143	AUAGAAUAGAUGAUGGUGGAGAUUG
1219	HPV52_1909	GCAUAUUCGAUUUUGGAGAAAUGGU
1220	HPV52_1822	CAGGUUUGUCUAAUAUUAGUGAGGU
1221	HPV52_1789	GAAGUGCUACCUGUGCAUUAUAUUG
1222	HPV52_1753	CAGAAACACAUAUGGUAAUAGAACC
1223	HPV52_1723	CCAAACUAAUGUCACAGCUGUUAAA
1224	HPV52_1670	GCUUAUACUGCUGCUAAUUAGGUUU
1225	HPV52_1585	CAUCAGUUGCAGAAGGAUUAAAAGU
1226	HPV52_1560	UGUAUUAUAGGAAUGGGAGUAACAC
1227	HPV52_1387	GUAUAGAGGACAAUGAGGAAAAUAG
1228	HPV52_1330	GUAACAGUAGUCAAUCAAGUGGGGU
1229	HPV52_1237	CAUGUCACGUAGAAGACAGCGGCUA
1230	HPV52_1207	AUACAGAGUGUGUUUUACCAAAACG
1231	HPV52_1143	GAAAGUGCUGGGCAAGAUGGUGUAG
1232	HPV52_1099	UACAUGCUGUGUCUGCAGUAAAACG
1233	HPV52_1035	AAUGAACAGGCAGAACAUGAGGCAG
1234	HPV52_981	GCAUAUGAUAGUGGAACAGAUCUAA
1235	HPV52_899	GGGAUGUACAGGCUGGUUUGAAGUA
1236	HPV52_853	ACAACCCUGCAAUGGAGGACCCUGA
1237	HPV52_781	GACCUUCGUACUCUACAGCAAAUGC
1238	HPV52_746	GCACACUACGGCUAUGCAUUCAUAG
1239	HPV52_590	UAGAUCUGCAACCUGAAACAACUGA
1240	HPV52_557	GUGGAGACAAAGCAACUAUAAAAGA
1241	HPV52_532	CUGUGACCCAAGUGUAACGUCAUGC
1242	HPV52_483	AUUAUGGGUCGUUGGACAGGGCGCU
1243	HPV52_453	CAUGUUAAUGCAAACAAGCGAUUUC
1244	HPV52_417	UGUCAAACGCCAUUAUGUCCUGAAG
1245	HPV52_352	AUGGGAAAACAUUAGAAGAGAGGGU
1246	HPV52_280	AUGGCGUGUGUAUUAUGUGCCUACG
1247	HPV52_216	CGAAGAGAGGUAUACAAGUUUCUAU
1248	HPV52_170	GCAUGAAAUAAGGCUGCAGUGUGUG
1249	HPV52_145	UGUGUGAGGUGCUGGAAGAAUCGGU
1250	HPV52_120	ACACGACCCCGGACCCUGCACGAAU
1251	HPV52_95	CACGGCCAUGUUUGAGGAUCCAGCA
1252	HPV52_70	UAUAUAGAACACAGUGUAGCUAACG

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 56 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 1253-1367 (See Table 10). In

some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 56, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 1253-1367. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 56 comprising SEQ ID NOs: 1253-1367.

Table 10: Polyribonucleotide probes for determining HPV 56 nucleic acid.

SEQ ID NO:	Name	Sequence
1253	HPV56_7754	GUCAGUAUCUGUUUUGCAAACAUGU
1254	HPV56_7729	AAUACACUAUGUAGGCCAAGUAUCU
1255	HPV56_7697	UGUGUCUGCAACUUUGGUGUUUUGG
1256	HPV56_7605	GUACCGCACCCUGUAUUACUCACAG
1257	HPV56_7532	GGCCCUUUUCAGCAGAACAGUUAAU
1258	HPV56_7506	GCCUAGUGCCAUUAUUUAAACCAAA
1259	HPV56_7431	CAUUUUGUACAUGCAACCGAAUUCG
1260	HPV56_7366	GUGUACUAUGUGUAUUGUGCAUACA
1261	HPV56_7322	GUGUGUCAUUAUUGUGGCUUUUGUU
1262	HPV56_7271	GUCUGUAAUAAACAUGAAUGAGUGC
1263	HPV56_7111	UUUGUGUAACUGUGUUUGUGUGUUG
1264	HPV56_7083	GUAAAAGGCGGUAGUGUGUUGUUGU
1265	HPV56_7058	ACCUCCACCUCUACACCAGCAAAAC
1266	HPV56_7015	GUCAAAGCCUGCUGUAGCUACCUCU
1267	HPV56_6872	UGUCAACGGGAACAGCCACCAACAG
1268	HPV56_6823	CACCAGCCUAGAAGAUAAAUAUAGA
1269	HPV56_6767	AAUAUGAAUGCUAACCUACUGGAGG
1270	HPV56_6727	CAAAAUUACUUUGUCUGCAGAGGUU
1271	HPV56_6612	CUAACAUGACUAUUAGUACUGCUAC
1272	HPV56_6489	UGAUUACGUCUGAGGCACAGUUAUU
1273	HPV56_6421	UUUAAAGGGUAGCAAUGGUAGAGAA
1274	HPV56_6393	UUGGGGAAACAAUACCUGCAGAGUU
1275	HPV56_6253	ACCUUUAGACAUUGUACAAUCCACC
1276	HPV56_6212	GCUAUGGACUUUAAGGUGUUGCAGG
1277	HPV56_6151	GCCUCUUGCAUUAAUUAAUACACCU
1278	HPV56_6119	AAGUCCACACAAGUUACCACAGGGG
1279	HPV56_6094	ACAUUGGACUAAAGGUGCUGUGUGU
1280	HPV56_6031	UAUAUCAGUUGAUGGCAAGCAAACA
1281	HPV56_5860	UAUUUAUAAUCCGGACCAGGAACGG
1282	HPV56_5776	CAUUCCCAAAGUUAGUGCAUAUCAA
1283	HPV56_5750	GUGACUAAGGACAAUACCAAAACAA
1284	HPV56_5524	UCCUCCUUUGCAUUAUGGCCUGUGU
1285	HPV56_5471	CCUUUGUUCCUCAGUCUCCUUAUGA
1286	HPV56_5419	CCAUUUUAUUCAGGUCCUGACAUAG
1287	HPV56_5394	CCCUUUAGGUAAUGUGUGGGAAACA
1288	HPV56_5369	CUAGUAACACCACUAAUGUAACUGC
1289	HPV56_5334	ACACUUACCUAUAAAGCCUUCCACA

1290	HPV56_5306	CUAGCCAGUCAGUUGCUACACCUUC
1291	HPV56_5131	ACUAUACAAACACGUAGAGGCACAC
1292	HPV56_4953	ACCUGCAACAUUAGUAUCUGCUGAU
1293	HPV56_4885	GCAGCUCCUAGAUUAUAUAGAAAAG
1294	HPV56_4818	AUUUGCUGUUCACGGUUCUGGUACA
1295	HPV56_4754	GCAAUAUUUUAAUUAGCACACCCAC
1296	HPV56_4682	GUACCCAUAUAACCAAUCCGUUAUU
1297	HPV56_4657	ACCUCUAGUACUGUACAUGUCAGUA
1298	HPV56_4572	AGGGAUUCCUAAUUUUACUGGGUCU
1299	HPV56_4546	GAGUCCAGUGUUAUAGAAUCUGGUG
1300	HPV56_4474	ACUCCGGCGCGACCACCUAUUGUUG
1301	HPV56_4429	GGCUAUGUUCCAUUGGGGUCUAGGC
1302	HPV56_4206	UAGUACUGUUACUACUAUGGUUGCC
1303	HPV56_4150	CUGUGCUGUGUAUAUAUUUACAUGC
1304	HPV56_4082	GUUUUGGUUUGUUAUAGCCACAUCC
1305	HPV56_4045	CCUCUGUGUUUUCCAGUUGUAUAUU
1306	HPV56_4018	GUCAUGUUGUCCCGCUUUUGCUAUC
1307	HPV56_3993	UGCUUUUGUGUUUGUUUGCUUGUGU
1308	HPV56_3937	UGCUACGCAUAUAUAUUGCAACCAU
1309	HPV56_3912	GUGAAGUGUACCUGCCAUACAUUGC
1310	HPV56_3844	CAAAUGAGUUUUCCAUAAAGUGCUG
1311	HPV56_3819	CAGUAGUGUACAGGUUAGUUUGGGA
1312	HPV56_3717	CAUAUCAUUGGACAAGUACAGACAA
1313	HPV56_3571	CAGUAGAAGUAGAAGUAUCAACAAC
1314	HPV56_3546	ACAUCAGCGACACAGACAAUACCGA
1315	HPV56_3488	GAAUCAGAAUUUGACUCCUCCAGAG
1316	HPV56_3463	ACCAGGAAAACGACCCAGACUACGG
1317	HPV56_3438	ACCAAGACGCCGCAGUAUCCCACAG
1318	HPV56_3390	AAUACAACACCCACAAGACCACCAC
1319	HPV56_3247	CUACACAGACUUUGAACAAGAGGCC
1320	HPV56_3197	GGGGUAGACUAUAGAGGUAUAUAUU
1321	HPV56_3129	GUAUGCAAUAUGUAGCCUGGAAAUA
1322	HPV56_3024	CAUUAAGAGACACAUGCGAGGAACU
1323	HPV56_2978	GCACUGGAAUCAUUAAGUACAACAA
1324	HPV56_2896	CAUUACUGUACUAAACCACCAGAUG
1325	HPV56_2738	AGAAAACAAUGGAGACGCUUUCCCA
1326	HPV56_2683	AAUGUUUCUUUACAAGGACGUGGUC
1327	HPV56_2562	CCUAUGCUAGAUGCUAAAUUACGAU
1328	HPV56_2530	GUCCACCAUUACUAAUUACAACCAA
1329	HPV56_2398	AUGCUAAACUUGGGUUGUUGGAUGA
1330	HPV56_2269	GUUUGGUACUUUGUGGACCGCCAAA
1331	HPV56_2124	CAGUGGAUAAAGCACAUAUGUAGUA
1332	HPV56_1957	AAGUAACAGAUGAUAGCCAAAUUGC
1333	HPV56_1896	CACAGUUUACAGGAUAGUCAAUUUG
1334	HPV56_1837	AUAUUAGUGAUGUGUAUGGAGACAC
1335	HPV56_1756	CACAGGAGCAAAUGUUAAUUCAACC
1336	HPV56_1436	GCAGGACUUGUUUAAAAGUAGCAAU
1337	HPV56_1411	ACAAUGAAACGCCAACACAACAAUU
1338	HPV56_1377	GAGGACUCUGUAAUACAUAUGGAUA
1339	HPV56_1346	CUCACAAAACAGUACCUAUAGUAAC
1340	HPV56_1321	GGUGCGGGAAUACACAAAAUGGAGG

1341	HPV56_1296	GUAGAUGAAGAGGUACAGGGACGUG
1342	HPV56_1265	UACAUUGGAAACUCUGGAAACACCA
1343	HPV56_1231	UUUUAUCAGACCUACAAGACAGCGG
1344	HPV56_1170	CCAUUAAGGGAUAUUAGUAAUCAGC
1345	HPV56_1108	UACAAACAGCACAUGCAGAUAAACA
1346	HPV56_1078	GACGCAGAAACAGUCAACAAUUGUU
1347	HPV56_993	AGAUGAUGAAAGUGACGAGGAGGAU
1348	HPV56_943	UGGUUUGAAGUAGAGGCAAUUGUAG
1349	HPV56_874	CGCAUCAAGUAACUAACUGCAAUGG
1350	HPV56_807	CCAAAGAGGACCUGCGUGUUGUACA
1351	HPV56_778	GUUUGUGGUGCAGUUGGACAUUCAG
1352	HPV56_751	AAUACACGUACCUUGUUGUGAGUGU
1353	HPV56_722	AGACAAGCUAAACAACAUACGUGUU
1354	HPV56_619	ACCUCAAACAGAAAUUGACCUACAG
1355	HPV56_594	UGCAAGACGUUGUAUUAGAACUAAC
1356	HPV56_529	GGAGACAAACAUCUAGAGAACCUAG
1357	HPV56_504	UGGACCGGGUCAUGUUUGGGGUGCU
1358	HPV56_479	ACGAUUUCAUCUAAUAGCACAUGGU
1359	HPV56_423	AGAUGUCAAAGUCCGUUAACUCCGG
1360	HPV56_362	UGGAGCUACACUAGAAAGUAUAACU
1361	HPV56_292	CAGUGUGCAGAGUAUGUUUAUUGUU
1362	HPV56_267	GUGUAUAGGGAUGAUUUUCCUUAUG
1363	HPV56_222	ACACGUGCUGAGGUAUAUAAUUUUG
1364	HPV56_150	CACUUGAGUGAGGUAUUAGAAAUAC
1365	HPV56_115	UCAACAAUCCACAGGAACGUCCACG
1366	HPV56_77	CAGCUUAUUCUGUGUGGACAUAUCC
1367	HPV56_15	UACUUUUAUAUAUUGGGAGUGACCG

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 58 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 1368-1497 (See Table 11). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 58, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 1368-1497. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 58 comprising SEQ ID NOs: 1368-1497.

Table 11: Polyribonucleotide probes for determining HPV 58 nucleic acid.

SEQ ID NO:	Name	Sequence
1368	HPV58_7715	GUUUGUUAUGCCAAACUAUGUCUUG
1369	HPV58_7678	CUUUCAAUGCUUAAGUGCAGUUUUG
1370	HPV58_7596	UCAUAUAUACAUGCAGUGCAGUUGC
1371	HPV58_7571	UUUUGCCUAUACUUGCAUAUGUGAC

1372	HPV58_7546	UUAAUCCUUUCCCUUCCUGCACUGC
1373	HPV58_7472	CAUUUUGUGCAUGUAACCGAUUUCG
1374	HPV58_7444	CAGUACUGCCUCCAUUUUACUUUAC
1375	HPV58_7384	CUGCCUAUUAUGCAUACCUAUGUAA
1376	HPV58_7359	UGUCCCUAAAUUGCCCUACCCUGCC
1377	HPV58_7334	UUGGGUGUAUCUAUGAGUAAGGUGC
1378	HPV58_7266	CUUGUCAGUUUCCUGUUUCUGUAUA
1379	HPV58_7232	GUUAUGUGUCAUGUUUGUGUACAUG
1380	HPV58_7097	UACCCGUGCACCAUCCACCAAACGC
1381	HPV58_7070	GCCCAGACUAAAACGUUCGGCCCCU
1382	HPV58_6784	CACUAACUGCAGAGAUAAUGACAUA
1383	HPV58_6722	GGAAUAUGUACGUCAUGUUGAAGAA
1384	HPV58_6676	GCACUGAAGUAACUAAGGAAGGUAC
1385	HPV58_6625	AGUUAUUUGUUACCGUGGUUGAUAC
1386	HPV58_6533	CUCUAUAGUUACCUCAGAAUCACAA
1387	HPV58_6488	UACUGCAGUUAUCCAAAGUAGUGCA
1388	HPV58_6453	GUCCCGGAUGACCUUUAUAUUAAAG
1389	HPV58_6428	UAGGGCUGGAAAACUUGGCGAGGCU
1390	HPV58_6395	ACGUGAGCAGAUGUUUGUUAGACAC
1391	HPV58_6177	AAUGCAGCUGCUACUGAUUGUCCUC
1392	HPV58_6055	CACAGCCAGGGUCUGAUAACAGGGA
1393	HPV58_6030	ACUGAAACCAGUAACAGAUAUCCCG
1394	HPV58_5840	AUCAGGCUUACAGUAUAGGGUCUUU
1395	HPV58_5590	UAGCUAUUUUAUUUUGCGUCGCAGA
1396	HPV58_5562	UGGAUGGUGCUGAUUUUAUGUUGCA
1397	HPV58_5532	CUCCACUAACUCCUUUUAAUACCAU
1398	HPV58_5502	CAUCUAUGUCUAGUCCAUUUAUUCC
1399	HPV58_5477	GGUCCAGACAUUGCAUCUUCUGUAA
1400	HPV58_5452	CACUCCUCUUGUGUCAUUGGAACCU
1401	HPV58_5423	GUGUCCAUACCAUUAAAUACUGGAU
1402	HPV58_5398	CUUUGCCACCACACGUACCAGUAAU
1403	HPV58_5373	AGAGUCCUCUGCACUCACAUACGUC
1404	HPV58_5345	GACGAUGCUGAUACUAUACAUGAUU
1405	HPV58_5304	CUCCCUAUAGUAUUAAUGAUGGACU
1406	HPV58_5258	CAACAGCAGCAACAAUUUGAAUUAC
1407	HPV58_5225	UUAAGUCCCAUACAGCCUGUCCAGG
1408	HPV58_5200	GGCUAAAGUACAUUACUACCAAGAC
1409	HPV58_5161	AAAGGCUACACUUCGUACUCGCAGU
1410	HPV58_5050	ACAUAGUGACAUAUCGCCUGCUCCU
1411	HPV58_5025	ACCCUGAGGACACAUUGCAGUUUCA
1412	HPV58_4977	CUCCUCAUAGACUUGUAACAUAUGA
1413	HPV58_4929	GUCGCAACACCCAACAAGUUAAGGU
1414	HPV58_4867	CAAUGUCACGUCUAGCACACCCAUU
1415	HPV58_4842	CCUUUGUUAUUUCUACUGACAGUGG
1416	HPV58_4809	GCACACAUAGUUAUGAAAACAUACC
1417	HPV58_4776	CUGGACAUUUAAUAUUUUCCUCUCC
1418	HPV58_4741	AUCCGUACUCCGCCCUCCUGCACCU
1419	HPV58_4716	AUUUAAAUCCCUCCUUUACUGAGCC
1420	HPV58_4658	CCUGCAAUACUUAAUGUUUCCUCUA
1421	HPV58_4633	UAUUACCACCUCUGCAGAUACUACA
1422	HPV58_4608	CAAUUCCCACUCCAUCUGGUUUUGA

1423	HPV58_4583	AUAGACGCCGGUGCACCAGCCCCAU
1424	HPV58_4470	GUACCCCACCGUCUGAGGCUAUACC
1425	HPV58_4375	AUUACGAUAUGGUAGCUUAGGGGUG
1426	HPV58_4278	CAUCUGCUACACAACUUUACCAAAC
1427	HPV58_4139	CACAUGGUGGUAUGGUAUUGUAAAU
1428	HPV58_4114	CAAGACUAACUGUAUACUGGUUCUG
1429	HPV58_4015	GUGUCUGUGGGGUCGGCUCUACGAA
1430	HPV58_3990	GCUGGUGUUGGUGUUGCUGCUUUGG
1431	HPV58_3954	GCCAUUGGUGCUAUCUAUUUCUAUA
1432	HPV58_3845	ACUGUAUGUAAACCACAAGCCAAUA
1433	HPV58_3799	GCAAAUAAGUACUGGUGUUAUGUCA
1434	HPV58_3737	ACAUACACAACGGAAACACAACGAC
1435	HPV58_3711	GUGACAAAGUAGGAAUUGUUACUGU
1436	HPV58_3579	CUAAAGUUUCACCUAUCGUGCAUUU
1437	HPV58_3544	UAACUGUACAUACAAAGGGCGGAAC
1438	HPV58_3487	GUAUACAGACUGCGCCGUGGACAGU
1439	HPV58_3462	GAGACAACACCCAGUACUCCACAAA
1440	HPV58_3437	CGACGACUCGAUUUACCAGACUCCA
1441	HPV58_3412	CGAAAGUACACAGGGGACAAAGCGA
1442	HPV58_3350	CCUAGUGAUCAAAUAUCCACUACUG
1443	HPV58_3288	CUAAAACACAAUUAUGGGAGGUACA
1444	HPV58_3209	GACUAUGUGGGGUUGUAUUAUAUAC
1445	HPV58_3184	AUGUACUUUGGUAGCAGGAGAAGUU
1446	HPV58_3116	GACAAUGAUAAAGCAAACACAAUGG
1447	HPV58_3046	CUUAGAAGUGUGGUUAUCAGAGCCA
1448	HPV58_2985	CAUUAGAGACAUUAAAUGCAUCACC
1449	HPV58_2943	CAUCAAAGACUAAAGCGUUUCAAGU
1450	HPV58_2898	UGGGAAUAUCACAUUUGUGCCACCA
1451	HPV58_2873	GCUAUAAUGUAUACAGCCAGACAAA
1452	HPV58_2842	UGAACAUUGGAAACUAAUACGCAUG
1453	HPV58_2794	AAUCCUAGACAUAUACGAAGCUGAU
1454	HPV58_2717	AAUUAGGCUUAAUAGAGGAAGAGGA
1455	HPV58_2598	GCACAGUAGACUAACAGUAUUUGAA
1456	HPV58_2573	GCAAAGAUUCACGAUGGCCAUAUUU
1457	HPV58_2516	GGGCAUUAGUACAAUUAAAAUGUCC
1458	HPV58_2482	GAUGGUAACGACAUUUCAAUAGAUG
1459	HPV58_2404	GAUGCUAAACUAGGUAUGAUAGAUG
1460	HPV58_2278	AUGUUACUGUGUGGCCCAGCAAAUA
1461	HPV58_2109	AAAGCGUGGUAUGACAAUGGGACAA
1462	HPV58_1885	AGAUUAACAGUGUUACAGCAUAGCU
1463	HPV58_1852	GAUGUGCAAGGGACAACACCAGAAU
1464	HPV58_1800	AAGUCAAGCAUGUGCCUUAUAUUGG
1465	HPV58_1770	AUGUAUGAUUAUCGAGCCACCAAAA
1466	HPV58_1643	AUACACACCUACAAUGUUUAACGUG
1467	HPV58_1590	AAGUCCCUCCGUAGCAGAAAGUUUA
1468	HPV58_1565	AUUGGUGUAUAACAGGGUAUGGAAU
1469	HPV58_1498	GAAGCUUAUGGAGUAAGUUUUAUGG
1470	HPV58_1456	CAUAACAGUAAUACUAAAGCAACGC
1471	HPV58_1402	ACGGAUGUAGACAGUUGUAAUACUG
1472	HPV58_1349	UAAAUGACUCGGAGUCUAGUGGGGU
1473	HPV58_1313	CACACCAGGUAGAAAGCCAAAAUGG

1474	HPV58_1196	CAAAUGUGUGUGUAUCGUGGAAAUA
1475	HPV58_1108	GUGGACGAUAUAAAUGCUGUGUGUG
1476	HPV58_1083	AGCGUUGUUUAAUGUACAGGAAGGG
1477	HPV58_1005	CGAUAGUGGUACAGAUUUAAUAGAG
1478	HPV58_958	CGAAGAACAGGAGAUAAUAUUUCAG
1479	HPV58_933	GUUUGAGGUAGAAGCGGUAAUAGAA
1480	HPV58_837	UACCAUUGUGUGCCCUAGCUGUGCA
1481	HPV58_799	GACGUACGAACCCUACAGCAGCUGC
1482	HPV58_774	UUUGUGUAUCAACAGUACAACAACC
1483	HPV58_749	GUUACACUUGUGGCACCACGGUUCG
1484	HPV58_719	CCACAGCUAAUUACUACAUUGUAAC
1485	HPV58_667	UCAGACGAGGAUGAAAUAGGCUUGG
1486	HPV58_620	AUCCUGAACCAACUGACCUAUUCUG
1487	HPV58_585	CAACCCAACGCUAAGAGAAUAUAUU
1488	HPV58_560	CCUGUAACAACGCCAUGAGAGGAAA
1489	HPV58_533	CCCCGACGUAGACAAACACAAGUGU
1490	HPV58_481	GUUUCAUAAUAUUUCGGGUCGUUGG
1491	HPV58_360	AUGGAGACACAUUAGAACAAACACU
1492	HPV58_302	GUGUGCUUACGAUUGCUAUCUAAAA
1493	HPV58_261	GAAUAGUGUAUAGAGAUGGAAAUCC
1494	HPV58_184	AAUCGAAUUGAAAUGCGUUGAAUGC
1495	HPV58_159	AGGCGUUGGAGACAUCUGUGCAUGA
1496	HPV58_134	CCACGGACAUUGCAUGAUUUGUGUC
1497	HPV58_104	AGGACUAUGUUCCAGGACGCAGAGG

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 59 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 1498-1646 (See Table 12). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 59, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 1498-1646. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 59 comprising SEQ ID NOs: 1498-1646.

Table 12: Polyribonucleotide probes for determining HPV 59 nucleic acid.

SEQ ID NO:	Name	Sequence
1498	HPV59_7826	CAAGUACAUGCACACUUUCUACUUA
1499	HPV59_7735	ACUACUGUGCAAUCCAAGAAUGUGU
1500	HPV59_7657	CGCCCUUGUUAAUAAAACAGCUUUU
1501	HPV59_7632	AACAAUACUUGCAUAACUUUGGUGG
1502	HPV59_7592	ACGCCAAAUAGUUAGUCAUCAUCCU
1503	HPV59_7567	CCUAGACUACUAACACAACUUACAA
1504	HPV59_7542	UCCCCAUCUUGUUUCCUCCUACACG

1505	HPV59_7474	UCGGUUACCUUGGUUUAACCUUACC
1506	HPV59_7429	GUCCAUUUUAUCCUUUAAAUCCUCC
1507	HPV59_7392	CCUGAAUGUCCAGUUUUGCAUUUGC
1508	HPV59_7367	AGGUGUGUUUGUUCCUUCAUUUUGU
1509	HPV59_7340	CAUUAUUACACAUUGCCCUACUUAC
1510	HPV59_7309	GUCCCUUUAUUGUUUCUUUGUCCUU
1511	HPV59_7218	GUUUGUCUGCUGUAUGUGUGUAUUU
1512	HPV59_7152	GUAUGUGUGCAUGUUGUAUGUUUUG
1513	HPV59_7117	GUCUUCCAGAAAAUAGUGUUGUUUG
1514	HPV59_7086	CCCCAUCACCAAAACGUGUUAAGCG
1515	HPV59_7027	AGCUAGACCUAAGCCCACUAUAGGC
1516	HPV59_6965	GAAAGGUUUUCUGCAGAUCUUGAUC
1517	HPV59_6940	AAAGUUUUGGCCUGUAGAUCUUAAG
1518	HPV59_6915	UUAAACAGGACCCUUAUGACAAACU
1519	HPV59_6877	UGCUGCUGUAACUUGUCAAAAGGAC
1520	HPV59_6852	UUGACACAUACCGUUUUGUUCAAUC
1521	HPV59_6688	UAAAGAAUAUGCCAGACAUGUGGAG
1522	HPV59_6663	CUAAUGUAUACACACCUACCAGUUU
1523	HPV59_6638	UGUGCUUCUACUACUUCUUCUAUUC
1524	HPV59_6463	AGGCAGUUAUUUAUAUUCCCCUUCC
1525	HPV59_6408	GUGAUCAACUUCCUGAAUCACUAUA
1526	HPV59_6248	GAUAACAAAAGUGAAGUACCAUUGG
1527	HPV59_6223	GGCUAUGGACUUUAAAUUGUUGCAG
1528	HPV59_6136	UACUACUGUGGUUCAGGGCGAUUGU
1529	HPV59_6020	GAUACCAAAGAUACACGUGAUAAUG
1530	HPV59_5991	CUGAAAACUCUCAUGUAGCAUCUGC
1531	HPV59_5912	GUAGGUGUUGAAAUCGGUCGGGGCC
1532	HPV59_5882	CCUAACUCUCAACGCUUGGUCUGGG
1533	HPV59_5857	CCUUCCAGAUAACACAGUAUAUGAU
1534	HPV59_5798	GUGUCUGCAUAUCAAUACAGAGUAU
1535	HPV59_5765	AAAGGUGGUAAUGGUAGACAGGAUG
1536	HPV59_5701	UAUUUUCUACCACGCAGGCAGUUCC
1537	HPV59_5676	CUGAUGAGUAUGUCACCCGUACCAG
1538	HPV59_5642	CUACCUCCACCUUCGGUAGCUAAGG
1539	HPV59_5498	CCUUUACCACCAUACAGUCUAUUAA
1540	HPV59_5473	GUUGAACCCACUUAUUCUACUACAC
1541	HPV59_5441	GACCCGAUAUAGUUUUACCUAAUAC
1542	HPV59_5416	GCCUGGGAUGUUCCUGUAAAUACAG
1543	HPV59_5382	CACCUUUUCAAAUGUAACUGUUCCU
1544	HPV59_5357	UGUCAUUAACACGGUCGGCAUCUAG
1545	HPV59_5315	CCAACACUGCAUUUACAAUUCCUAA
1546	HPV59_5290	ACAGAUGAAGCACCUACUAGUACUG
1547	HPV59_5250	GGCUGCUACUGAUGAUAUAUAUGAU
1548	HPV59_5225	AAUUGCAACCUCUUGUUUCUUCCCA
1549	HPV59_5200	CCUAUACCACAUGCUGAAGAUAUUG
1550	HPV59_5088	AACAUCCAGACGCAGCACUGUAAGG
1551	HPV59_5046	CCCGGACUUUAUGGAUAUAGUUCGU
1552	HPV59_5013	AUUAACUUUUGACCCCUCAUCAGAG
1553	HPV59_4988	CUGCUUAUGAUCCAAUUGAUACUAC
1554	HPV59_4958	GUCCAUCCACAUUUGUUACAUAUGA
1555	HPV59_4923	ACAAGUUCGGGUGUCUAACGCUGAC

1556	HPV59_4896	ACCUAGAUUGUACAGUAGGGCUAAU
1557	HPV59_4871	AUCCAACAGUACGUCGUGUGGCUGG
1558	HPV59_4740	CCAAACAGGUGAAAUUUCUGGUAAU
1559	HPV59_4685	GUAGCUCUAGUUUUAUAAAUCCUGC
1560	HPV59_4660	ACCCCAACCUCUUCUGUUCAAAUUA
1561	HPV59_4607	CAGGAUUUGAAAUAUCUACCUCUAG
1562	HPV59_4555	GAUUCUAGUGUUAUAACAUCUGGAG
1563	HPV59_4522	CCUACAGAUCCAUCUAUAGUUACAU
1564	HPV59_4495	CCACCAGUAGUUAUUGAACCUGUUG
1565	HPV59_4470	UAUAGUAGAUGUAUCGCCUGCUAAA
1566	HPV59_4362	AUUGCAGUGGACCAGCCUAGGAAUA
1567	HPV59_4238	CCCAUCGUGCUGCUCGUCGUAAACG
1568	HPV59_4109	GCAAUACUGUCCAUACAAUAAUUGC
1569	HPV59_4084	UCCACUGUUACUACUAUAUGCCCAU
1570	HPV59_4029	UGGUUAUCACCUCCUCAUAUGAGUG
1571	HPV59_3991	GUGUGCAUAUACAUGGUUACUAGUA
1572	HPV59_3966	UCCCGCUUCUGCAAUCUGUCUAUAU
1573	HPV59_3913	AACCCUUGUAUUUGUGUGUUGUGUU
1574	HPV59_3858	UGCAAAUGUAACACAAGCCAAUACU
1575	HPV59_3832	GGUAUAUGAGUGUGUAAUGGUUGUU
1576	HPV59_3754	UAACAUAUACAAGCGAAACACAACG
1577	HPV59_3718	GAAACAGAGGAUCAGCCAAAACAGG
1578	HPV59_3686	UGAAAAUAUUUCCUCUACCUGGCAU
1579	HPV59_3589	UCCCUUGCAGUAACACUACGCCUAU
1580	HPV59_3562	AUCCAGGCAACAACCCGCGACGGCA
1581	HPV59_3537	UGUGACAACCCAGUCGUCCGUUUGC
1582	HPV59_3512	GUCUACCAGCGUGUCAGUGGACUAC
1583	HPV59_3474	AAGCGACCAAGACAGUGUGGAUACA
1584	HPV59_3392	GCAACUAUCAUACCCCUCCGCAACG
1585	HPV59_3354	ACCAGUGACGAGCAAGUAUCCACUG
1586	HPV59_3319	GCAAGGUUAUUGAUUGUUAUGACUC
1587	HPV59_3291	ACAGACAAGUGGGAAGUGCAUUAUA
1588	HPV59_3237	GAGGAACAGGUGUACUAUGUAAAAU
1589	HPV59_3204	GUGGACUUUUGGGGACUAUAUUAUA
1590	HPV59_3170	UGAUGUAGGACAGUGGUGUAAAACC
1591	HPV59_3134	GCAUUACACAAGCUGGACAUUUAUA
1592	HPV59_3109	CCAUCUGCAGCAAGGAAAACACAAU
1593	HPV59_3050	UGUUUCUUGCAUUGUCCAUUGCUCA
1594	HPV59_3023	AGGUGCUGUUUGCCAUAGUUCUUGG
1595	HPV59_2980	ACCGUACUUCCACUGUAAUGCCCUG
1596	HPV59_2948	CAAGGCAUGUGAAGCUAUUGAACUG
1597	HPV59_2881	CAGCAAGAGAGAACAAUAUACAUAC
1598	HPV59_2757	CUUUCGCAGCGUUUAAGUGUGUUAC
1599	HPV59_2732	GAAGAUGCAGACAGUGAUGGACACC
1600	HPV59_2706	GCAGAUUAGAUUUGAACGAGGAAGA
1601	HPV59_2577	GGUGGCCAUAUUUAAAUAGCAGAUU
1602	HPV59_2508	GGCACCUAGUACAAAUUAAAUGUCC
1603	HPV59_2450	GAUACAUAUAUGCGAAAUGCUUUGG
1604	HPV59_2396	GAUCGUAAAUUAGCUAUGCUAGACG
1605	HPV59_2371	UCACUUUUGGCUAGAACCUUUAACA
1606	HPV59_2264	AAUUGCAUUGUGCUGUGUGGGCCAG

1607	HPV59_2123	CAGUGGAUAAAAUGGAGAUGUGAUA
1608	HPV59_2002	AGAUAGUAAUAGUAACGCCGCUGCA
1609	HPV59_1909	UAGCGUGUUUGACCUGUCAGAAAUG
1610	HPV59_1838	AUUAGUGAAGUUAUAGGGGAAACGC
1611	HPV59_1754	CCAGAUACGUGCAUGUUAAUUGAAC
1612	HPV59_1729	AGGACUUAGCACAUUACUACAUGUA
1613	HPV59_1662	CAUGGGGAGUAGUAAUAUUAGCAUU
1614	HPV59_1614	UAAUACAACCCUAUGUGCUAUAUGC
1615	HPV59_1585	UCCAACUGUAGCAGAAGGAUUUAAA
1616	HPV59_1374	GUAGCGACAGCAGUAACAUGGAUGU
1617	HPV59_1348	UGUUUGUAGCGACAGUCAAAUAGAC
1618	HPV59_1323	CUGGAAAUGGGGAUAGCAAUGGCAG
1619	HPV59_1298	GAGACUCAGGUAACCGUGGAGAAUA
1620	HPV59_1242	GAAGGUUAAUAACAGUGCCAGACAG
1621	HPV59_1212	CAGUAAAUGUUAACCACCCAAAAGU
1622	HPV59_1155	ACAGUAGUGAGAAAGCGGCGGCAGG
1623	HPV59_1130	CGAAAGUUUGGGUGCAGUAUAGAAA
1624	HPV59_1105	UGCACGGGAAAUGCAUGUUUUAAAA
1625	HPV59_1073	GCCUUGUUUAAUGUGCAGGAAGCCC
1626	HPV59_954	CAGGUGACAAAAUUUCAGAUGACGA
1627	HPV59_814	GUUUAUGGACACACUAUCCUUUGUG
1628	HPV59_773	GUAGAAACCUCGCAAGACGGAUUGC
1629	HPV59_684	AUCCUUUGCUACUAGCUAGACGAGC
1630	HPV59_632	UUACCUGACUCCGACUCCGAGAAUG
1631	HPV59_605	GAAGUUGACCUUGUGUGCUACGAGC
1632	HPV59_569	GACAUUGUUUUAGAUUUGGAACCAC
1633	HPV59_541	AAUGCAUGGACCAAAAGCAACACUU
1634	HPV59_499	AGACAGCAACGACAAGCGCGUAGUG
1635	HPV59_459	AGGACAGUGUCGUGGGUGUCGGACC
1636	HPV59_379	CUAAAACCUCUAUGUCCAACAGAUA
1637	HPV59_354	GCUGCUGAUACGCUGUUAUAGAUGC
1638	HPV59_329	CUGAAACCAAGACACCGUUACAUGA
1639	HPV59_304	UCCGUGUAUGGAGAAACAUUAGAGG
1640	HPV59_228	CUGUACACCGUAUGCAGCGUGUCUG
1641	HPV59_169	CUGCAAGAAAGAGAGGUAUUUGAAU
1642	HPV59_130	CAUGAUAUUCGCAUCAAUUGUGUGU
1643	HPV59_105	GAGCACAACAUUGAAUAUUCCUCUG
1644	HPV59_74	CUACACAACGACCAUACAAACUGCC
1645	HPV59_49	AACGGCAUGGCACGCUUUGAGGAUC
1646	HPV59_24	UAAAGGUAGUUGAAAAGAAAAGGGC

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 66 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 1647-1767 (See Table 13). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 66, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ

ID NOs: 1647-1767. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 66 comprising SEQ ID NOs: 1647-1767.

Table 13: Polyribonucleotide probes for determining HPV 66 nucleic acid.

SEQ ID NO:	Name	Sequence
1647	HPV66_7794	GUCGUGCUAAAACAGGUUUCUUUUA
1648	HPV66_7737	GUAUCUGUCUUGCAAAUAUGUAACC
1649	HPV66_7712	GUGUAGCCCUUAUUGUAUAAGCCAA
1650	HPV66_7687	GGUGUUUGCAAUAUAUUUUGUUGGC
1651	HPV66_7611	UUACUCACCUGUAUUUCUGUGCCAA
1652	HPV66_7586	GGUAUGUACACUGCCUUACCCUGUA
1653	HPV66_7521	CAAAACGACUUUUCAGCAAAACAGU
1654	HPV66_7496	CUAGCCUUUUGUCCUUAUUUAAACC
1655	HPV66_7466	CAUUUUAUGCAUGCAACCGAAUUCG
1656	HPV66_7441	CAAACUCCAUUUUAGUGCUGUACGC
1657	HPV66_7416	GUUUGUAUGCACUAUAGUAACACAC
1658	HPV66_7377	GUGGUGUUCCUUACUGUUUAAUGUU
1659	HPV66_7352	CCUUGGGCAGUGUGUGUCAGGUUAG
1660	HPV66_7299	AACAUGCAUGGUUACUUUUACGCGU
1661	HPV66_7246	GCUAUGUGUAUGUAUGACUGUAUGU
1662	HPV66_7183	UGUAUGGUUGUGCUUGUACUGUAUG
1663	HPV66_7122	UUCCUCUUCUUCACCAGCUAAACGU
1664	HPV66_7097	CUAAAAGGCGGGCGGCUCCUACCUC
1665	HPV66_7071	UAGACCCAAGGCUAGUGUAUCUGCC
1666	HPV66_7000	AGCUUUUCUGCAGACCUGGAUCAGU
1667	HPV66_6956	AUCCCCUGGCUAAAUAUAAGUUUUG
1668	HPV66_6858	AUCCCCACCAGUUGCAACUAGCUUA
1669	HPV66_6720	CAAUCAAUACCUUCGCCAUGUGGAG
1670	HPV66_6692	CAUUAACUAAAUAUGAUGCCCGUGA
1671	HPV66_6666	CAUGACUAUUAAUGCAGCUAAAAGC
1672	HPV66_6540	GAUUACCUCUGAGGCCCAAUUAUUU
1673	HPV66_6498	UCCUCCCAGUUCUGUAUAUGUUGCU
1674	HPV66_6466	UUGUAUUGGAAGGGUGGCAAUGGCA
1675	HPV66_6433	GCAGGUAAUGUUGGGGAAGCCAUUC
1676	HPV66_6274	AAGCUAUUACAGGAAUCAAAGGCUG
1677	HPV66_6220	ACCCCGAUAGAGGACGGUGACAUGG
1678	HPV66_6195	UUGUCCACCUCUUGCAUUAGUUAAU
1679	HPV66_6170	AGUCUACACCAGGUAAUACAGGGGA
1680	HPV66_6145	CAUUGGACUAAGGGCGCGGUGUGUA
1681	HPV66_6061	AUAGAAGAUAGCCGGGACAAUAUAU
1682	HPV66_6031	GAGGUCUCUAAUUUAGCAGGUAAUA
1683	HPV66_5999	GUCAUCCAUUAUUUAAUAGGCUGGA
1684	HPV66_5904	UCCAUCUUUCUAUAAUCCUGACCAG
1685	HPV66_5836	GUUAGUGCAUAUCAGUAUAGAGUGU
1686	HPV66_5811	UGGUACCAAAACAAACAUCCCUAAA
1687	HPV66_5783	GCCAUCCUUAUUACUCUGUUUCCAA
1688	HPV66_5718	GGAUACAUAUGUAAAACGUACCAGU

1689	HPV66_5565	AUACAGGGAGCUACAUUUGCACUAU
1690	HPV66_5520	CCCUUCGUACCUCAGUCUCCUUCUG
1691	HPV66_5469	CCAUUUUAUUCAGGUCCUGAUAUAG
1692	HPV66_5427	ACAGCUAAUGUUACUGCCCCUUUGG
1693	HPV66_5400	CCUUCUACAUUAUCCUUUGCUAGUA
1694	HPV66_5374	CACCUUCUGCACAAUUACCUAUUAA
1695	HPV66_5187	CAAACACGUAGGGGUACGCAAAUAG
1696	HPV66_5128	CAUUUACUACACGUAGAACAGGUGU
1697	HPV66_5003	CCCCACAACAUUAAUAUCUGCUGAU
1698	HPV66_4943	CAGGUUAUAUAGUAGGGCUUUUCAG
1699	HPV66_4918	CAGGUUUUAGACGCCUUGCUGCUCC
1700	HPV66_4873	CUAUACACGGUACUGGCAACGAACC
1701	HPV66_4831	CUGGAAUACAUAGCUAUGAGGAAAU
1702	HPV66_4801	CUGGUAAUAUUUUGAUUAGCACUCC
1703	HPV66_4760	UGAUCCUCCAGUAAUUGAGGCUCCA
1704	HPV66_4729	GUAGUACUACUAUAACAAACCCACU
1705	HPV66_4704	CCCACAUCUAGUACUGUACAUGUAA
1706	HPV66_4617	GGGGCUGGUGUUCCCAAUUUUACUG
1707	HPV66_4544	UGUGGUGGAGUCAGUUGGGCCUACA
1708	HPV66_4509	ACUAUAGUUGAUGUCACUCCUGCAC
1709	HPV66_4209	GUGUAUAUAUUGCCAUGCUUUGUGG
1710	HPV66_4038	UGCGCUUUGCUUUUGUGUUUGUCUG
1711	HPV66_3990	GUAAUCGCCAUAUAUUGCAACCAUU
1712	HPV66_3965	AUUGUAACACUGGGAAAGGUAACGU
1713	HPV66_3915	GCUAAGCAUAUAUAUUGCACCCAUU
1714	HPV66_3890	UGAAGUGUAAUUGCCAUACAUUGCU
1715	HPV66_3821	CAAAUGAGUUGUCCAUAAAGUGUUG
1716	HPV66_3796	ACCUAGUGUACAGGUUAUUUUGGGA
1717	HPV66_3702	GGACAAGUACAGAUAAUAAAGACAG
1718	HPV66_3586	UGAUAAAACUACGCCUGUAAUCCAU
1719	HPV66_3536	AACAACGCCAACAGUAGAAGUCCAC
1720	HPV66_3470	GAAUCAGAACCUGACUCCUCCAGAG
1721	HPV66_3445	ACCAGGAAAACGACCCAGAGCAAGU
1722	HPV66_3296	ACCGAGAGUAUUUACUGUCCUGACU
1723	HPV66_3228	AUUACACAGACUUUGAACAGGAGGC
1724	HPV66_3181	GGUGGAUUACAGAGGCAUAUAUUAU
1725	HPV66_3144	AUAAUGGAGAGUGUGGGUGGUGUAA
1726	HPV66_3109	UUGUAUGGAAUAUGUGGUGUGGAAA
1727	HPV66_3017	ACAUGUGAUGAACUGUGGCGCACGG
1728	HPV66_2961	CACUGGAAGCAAUAAGUAACACAAU
1729	HPV66_2878	CAUUAAUGUACUAAACCACCAGAUG
1730	HPV66_2614	CCAUUAGAUAACAAUGGUAAUCCUG
1731	HPV66_2411	CAGAUACGUGUUGGAGAUACAUAGA
1732	HPV66_2374	CUAGACAAUGCCAAAUUAGGUUUGC
1733	HPV66_2254	UUGGUACUGUGUGGACCACCAAAUA
1734	HPV66_2104	UGCCAGUGGAUAAAGCAUAUAUGUA
1735	HPV66_1941	AGUAACAGAUGAUAGCCAAAUUGCC
1736	HPV66_1875	GCAACACAGUUUACAAGACAAUCAA
1737	HPV66_1739	CACAAGAGCAAAUGUUAAUUCAACC
1738	HPV66_1649	GGGGAGUAAUUGUAAUGAUGCUAAU
1739	HPV66_1612	UGUGUGUACUAUCAUAUGCAAUGCU

1740	HPV66_1532	GUUGUAACGAUUGGAUAUGUGCAAU
1741	HPV66_1484	GAGUGCCAUAUACAGAGUUGGUGCG
1742	HPV66_1436	GUAGUAACGUACAAGGAAGAUUACA
1743	HPV66_1403	CACCAACACACCAAUUGCAGGAACU
1744	HPV66_1363	CACUCGGUAUCAAAUAUGGAUAUAG
1745	HPV66_1332	UGGAGGCUCGCAAAACAGUAAUUGU
1746	HPV66_1298	ACGAAAAGGGAAAUGGGUGCGGGAG
1747	HPV66_1273	UUGGAAACAUCACAACAGGUAGAAU
1748	HPV66_1226	GGCUAAUAUUAUCAGAAGACAGCGG
1749	HPV66_1165	GGUAGUCCCUUAAGUGAUAUUAGUA
1750	HPV66_1106	AAGUACAAACAGCACAUGCAGAUGC
1751	HPV66_939	UGGAUGGUUUCAGGUAGAAGCAAUU
1752	HPV66_874	CGCAUCAUCUAAAUAACUGCAAUGG
1753	HPV66_819	UACGUGUGGUACAACAGCUGCUUAU
1754	HPV66_791	UUGGACAUUCAGAGUACCAAAGAGG
1755	HPV66_759	UACCUUGUUGUAAGUGUGAGUUGGU
1756	HPV66_604	UAUAUUAGAACUUGCACCGCAAACG
1757	HPV66_579	GUAAAGUACCAACGUUGCAAGAGGU
1758	HPV66_554	AGAAUCUACAGUAUAACCAUGCAUG
1759	HPV66_529	GGAGACAUACGAGUAGACAAGCUAC
1760	HPV66_504	UGGACCGGGUCAUGUUUGCAGUGUU
1761	HPV66_462	CACUGUGAACAUAAAAGACGAUUUC
1762	HPV66_346	AUAAAUAUUCAGUGUAUGGGGCAAC
1763	HPV66_291	GCAGUAUGUAGGGUAUGUUUAUUGU
1764	HPV66_150	CAUCUGAGCGAGGUAUUACAAAUAC
1765	HPV66_115	UCAGCAAUACACAGGAACGUCCACG
1766	HPV66_88	GCCUGUAGAUAUCCAUGGAUUCCAU
1767	HPV66_63	GUACAUAUAAAAGGCAGCCUGUUGU

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 68 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 1768-1875 (See Table 14). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV68, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 1768-1875. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 68 comprising SEQ ID NOs: 1768-1875.

Table 14: Polyribonucleotide probes for determining HPV 68 nucleic acid.

SEQ ID NO:	Name	Sequence
1768	HPV68_7798	CUGAACACAGCAGUUCUCUAUACUA
1769	HPV68_7696	GGCACACAUACCAAUACUUUUACUU
1770	HPV68_7661	CUACAUCCAUAAAUUUGUGCAACCG

1771	HPV68_7628	UGUCUGGUAGUGUAAGUUAUACAGU
1772	HPV68_7597	GCCAGUAUAACUACUUUUGCAUUCA
1773	HPV68_7527	CCUCCCUUGUAAUAAAACUGCUUUU
1774	HPV68_7502	CAAUAGUUUGGCAACCAACGUAUCU
1775	HPV68_7452	UCGUACUGGCGCACCUUAGUUAGUC
1776	HPV68_7427	CCCACAUAGUUGGCACCAGUAACAG
1777	HPV68_7352	GUCGUUGGUACUAUUUGCUUUUAGA
1778	HPV68_7325	UGGCCGGGUUGUGUGCGACCGCUUU
1779	HPV68_7300	AACUAUACCGUGUGGCCAUUUUGUA
1780	HPV68_7258	CCUAAGGUGUGUUACAUUAUAUGCA
1781	HPV68_7186	CUGUGACUAACAUAUGUCCUUGUUU
1782	HPV68_7159	UAUGUCCGUGUCCUUUGUGGUUGCA
1783	HPV68_7108	GUGUAUGUUUGCAAGUAUGUGUGUA
1784	HPV68_7078	GUGUAUGUGCAUGUAUGUGUAUGUG
1785	HPV68_7053	UGUGUCAUGUUGGUGUUGGUAUGUU
1786	HPV68_7028	UGUUGUUUGUCUGUGUGGUUGUAUA
1787	HPV68_6961	ACCACAUCUACCUCUAAACACAAAC
1788	HPV68_6898	UUACAGGCAGGUGUUCGCAGACGGC
1789	HPV68_6873	AUUCCCAUUAGGACGCAAAUUUCUG
1790	HPV68_6848	AAAAGUUUAGUUCUGAACUGGACCA
1791	HPV68_6809	CCUAUGAUGGUCUUAACUUUUGGAA
1792	HPV68_6749	ACCUACAAUCAGCAGCAAUUACAUG
1793	HPV68_6719	CAUCUGCUAGUCUUGUAGAUACAUA
1794	HPV68_6541	GUACCAGCUGUGUAUGAUUCUAAUA
1795	HPV68_6516	AUUGUCCACUACUACAGACUCUACU
1796	HPV68_6337	GAAACUCCUAGUAGUUAUGUGUAUG
1797	HPV68_6312	GUAUAUUAAGGGCACUGACAUUCGU
1798	HPV68_6145	GUACCUUUGGAUAUAUGUCAAUCUG
1799	HPV68_6118	GGUACAUUACAAGAAACGAAAAGCG
1800	HPV68_6052	GAAUUGGUAAAUACUCCUAUUGAGG
1801	HPV68_6016	CCUACCAAUGUACAACAAGGGGACU
1802	HPV68_5924	AUGUUGCAGUGGACUGUAAACAAAC
1803	HPV68_5874	UGAAAAUUCCCCGUUUUCCUCUAAU
1804	HPV68_5743	CCUGAGUCUACAUUAUAUAAUCCAG
1805	HPV68_5625	CCAUCCAUAUUUUAAGGUUCCUAUG
1806	HPV68_5600	GUACAUCUAGGUUAUUAACUGUAGG
1807	HPV68_5380	CAAUUGAUACAACCUUUGCCAUAAC
1808	HPV68_5355	CAGUUGCCUUUAACACCCUCUACUC
1809	HPV68_5326	CUGAUGUUGUAUUACCAUCUACAAC
1810	HPV68_5301	UGGAACACGCCUGUAAAUACUGGUC
1811	HPV68_5270	UACUAAUACUACCAUUCCUCUUGGU
1812	HPV68_5245	UGGCUUCUGCUGCAUCCACUACAUA
1813	HPV68_5220	CGUUCCCACAUAUCAGUUCCUUCAU
1814	HPV68_5158	CACCUGAUACUGACAAUACUACAGU
1815	HPV68_5126	GGACCCUAUGGAUAACUUAUAUGAU
1816	HPV68_5101	AACCAUUGGUUGCCCCUGAGCAGGC
1817	HPV68_5066	UAGUAACAUUACCCCUGCUGACAGC
1818	HPV68_5006	GACCAUGUUUACACGCCGAGGUACA
1819	HPV68_4973	AACAGUACGUUUUAGCAGAGUAGGC
1820	HPV68_4877	UACUACUCUUACAUAUGAACCUGCU
1821	HPV68_4823	AACGCACCCUUCAUCAUUUGUAACA

1822	HPV68_4692	GUAUUUGCAACACAUGGCACUGGUA
1823	HPV68_4636	UGUUUGUAAGUACCCCUACAUCAGG
1824	HPV68_4595	UAUAAUAGAAGUGCCACAAACAGGU
1825	HPV68_4570	CUAACCCUGCAUUUACAGACCCGAC
1826	HPV68_4498	CUACCACUACACCGGCAGUUUUAGA
1827	HPV68_4452	GUACCAACAUUUACAGGCACCUCUG
1828	HPV68_4427	CAGUGUUAUUACAUCUGGGACACCA
1829	HPV68_4395	GAACCCUCCAUUGUGCAAUUGGUGG
1830	HPV68_4323	GGAAAACCUAAUACUGUUGUGGAUG
1831	HPV68_4206	GGUACUACACUUGCAGACAAAAUAU
1832	HPV68_4046	CAGUAACUGUUAUAGUGUGCAUUUG
1833	HPV68_4012	GUGGUUAUUACACAGUCUUACUCUU
1834	HPV68_3966	CAUUUGAGGUGUUUGCUGUAUACCU
1835	HPV68_3867	GCAUGUAUAUAUGUUGCACUGUCCC
1836	HPV68_3796	CCCACACUGUACACUAUAUGUAUAU
1837	HPV68_3766	GGGGUAUAUGACAUUAUAAGUGUGU
1838	HPV68_3728	GAAACUGUUAAACUACCAUCUAGUG
1839	HPV68_3697	UGUUUCAGAAGCACAACGUGACAAG
1840	HPV68_3514	AAGACGGAGCCUUUGUUGUGGUGAC
1841	HPV68_3489	UCAGUAGAAGUGCAGGCCAAAACAA
1842	HPV68_3438	AGCCCUCUGAGCCCGACAACGUGUC
1843	HPV68_3316	UACUGAAUCUGUUGCCGACCUACAG
1844	HPV68_3291	GUACCACUGACGGAAAAGUAUCCAC
1845	HPV68_3188	UAUUACGAAAGGUUUAUGCAGGAUG
1846	HPV68_3129	AAACCCAAGGGCGUGUGGAUUACUG
1847	HPV68_3079	UGUAGUGUGGGGUACAAUUUACUUU
1848	HPV68_3054	GGGACAAGAGUAACUCAAUGCAUUA
1849	HPV68_2978	AGUAAUGAACUAUGGCAUACAAAGC
1850	HPV68_2927	AGCCUUGCUAAAACUGCAUAUAGUG
1851	HPV68_2776	UAACUAUUGGAAUUGUGUGCGACUG
1852	HPV68_2523	GUAUUUACAUAGUAGACUAACCGUG
1853	HPV68_2496	UAACCCUGUAGAAGACAAUAGGUGG
1854	HPV68_2429	GUUUAGAUAGAAAACACAGACACCU
1855	HPV68_2301	UUCAGCAAGUCACUUUUGGUUAGAG
1856	HPV68_2186	AAGGCACGCCAAAACGAAAUUGUAU
1857	HPV68_1684	UUGCAUGUUCCAGACAGCUGUAUGC
1858	HPV68_1358	CACCUACUACCCAACUUAAAGUAUU
1859	HPV68_1333	GAUAGUGAAAACCAGGAUCCUAAAU
1860	HPV68_1166	CAAGACAACCGGCGUAUACAGUGCC
1861	HPV68_1141	UCACUAAAUGUAAGCAGUACACAGG
1862	HPV68_1116	AGCAAAGUCGCCAUUACAGGAAUUA
1863	HPV68_1091	CAGACAGUAUAGAAAGCAGUCCUUU
1864	HPV68_897	UAAACAAACAGGUGACACAGUCUCA
1865	HPV68_772	UCACUAAAUUUUGUGUGUCCGUGGU
1866	HPV68_745	CGGACACUACAACAGCUGUUUAUGG
1867	HPV68_685	CUGUGUUGUAAGUGUAACAAGGCAC
1868	HPV68_518	UGUUAGAGCUAUGUCCAUACAAUGA
1869	HPV68_487	CAUGGACCAAAGCCCACCGUGCAGG
1870	HPV68_358	CACCUAACAACAAAACGAAGAUUAC
1871	HPV68_253	GUGUAUGCAACUACAUUAGAAACCA
1872	HPV68_228	GGAACUACGAUAUUACUCGGAAUCG

1873	HPV68_150	UGACCUAUGUGUAGUGUAUAGAGAC
1874	HPV68_117	ACAACGGACAGAGGUAUAUGAAUUU
1875	HPV68_3	GGCGCUAUUUCACAACCCUGAGGAA

In one embodiment, the present invention provides an isolated polynucleotide for specific hybridization to HPV 82 consisting essentially of a sequence or a complement thereof selected from the group consisting of SEQ ID NOs: 1876-2026 (See Table 15). In some embodiments, the present invention provides a set of polynucleotides for specific hybridization to HPV 82, wherein the set comprises at least one polynucleotide consisting essentially of a sequence or a complement thereof selected from the group consisting of: SEQ ID NOs: 1876-2026. In certain embodiments, the methods of the present invention utilize a set of polynucleotide probes for specific hybridization to HPV 82 comprising SEQ ID NOs: 1876-2026.

Table 15: Polyribonucleotide probes for determining HPV 82 nucleic acid.

SEQ ID NO:	Name	Sequence
1876	HPV82_7835	UUGUGUUUUGCCUAUGCUUGCAACA
1877	HPV82_7785	AUGUAUUACUCAUCUGCAGGUGUGC
1878	HPV82_7760	GCCAAGUUUCUAUCCUACCUAUAAA
1879	HPV82_7735	GGCAGGUCAUGAACUAAAUGUCUCU
1880	HPV82_7662	CCGCCCUGUAAUAAUUUAUAUGCUU
1881	HPV82_7612	CACACCACAUUACUCAUUUGUACUU
1882	HPV82_7550	UGGUAUGUACAUCCCGCCCGCCCAC
1883	HPV82_7525	GGCAUAACCCUUAAUUCUUUUGGCA
1884	HPV82_7494	CAACUUUUGAACCACACUACCUAUG
1885	HPV82_7408	GCAUGUACCACAGGAUUCCAUUUUG
1886	HPV82_7373	GCAGCACACUUGUAUAUAUAUGUUC
1887	HPV82_7348	AUUGCCCUACCCAUAUUUGUGGCUU
1888	HPV82_7319	GUUAAGGGUGGUGUUUAGGUGGCGU
1889	HPV82_7191	GUAUGGUUUCUGUGUGGUUUACUAA
1890	HPV82_7130	GUGUGCGUGUUGUGUGUAUUUGUGU
1891	HPV82_7086	CGCCCUGCCUAUGUAUGUGUUUGUG
1892	HPV82_7030	CCCCAUCCUCUUCCGCUUCCUCGUC
1893	HPV82_7001	CAAACCCAGACCAGGCCUUAAAAGG
1894	HPV82_6939	UCUUUGGAUUUGGAUCAGUUUGCAU
1895	HPV82_6880	CUAAAGAAGACCCUUUGGCAAAAUA
1896	HPV82_6755	GGAUUCUACAAUUUUAGAACAGUGG
1897	HPV82_6651	UUUAAGCAGUACAUUAGGCAUGGGG
1898	HPV82_6626	UGCACAAACAUUUACUCCAGCAAAC
1899	HPV82_6589	CCAAUUUAACCAUUAGCACUGCUGU
1900	HPV82_6459	GGUUCUAUGAUAACCUCUGAUUCUC
1901	HPV82_6433	GUUAUAUUUAUUCAGCUACUCCCAG
1902	HPV82_6408	GGUGCUGGCCGCGACCCUAUUAGUA
1903	HPV82_6383	AGACAAGGCUUAUAUUAAGGGUACU

1904	HPV82_6358	CUGGUGUGGUUGGUGAUGCCAUUCC
1905	HPV82_6281	AGCAGAUACAUAUGGCAAUUCUAUG
1906	HPV82_6247	CUGUGUGUAAAUACCCUGAUUACUU
1907	HPV82_6210	GCUACUAAAUCAGAUGUUCCAUUGG
1908	HPV82_6137	UGUGUCUACUGUCAUUGAGGAUGGC
1909	HPV82_6039	AUUAUAGGCUGCGCUCCUCCUAUUG
1910	HPV82_6012	GUGGACAACAAACAAACUCAGUUAU
1911	HPV82_5840	UAAUCCAGACACAGAUCGUUUGGUG
1912	HPV82_5815	UUGGUCUUCCUGAUCCUAAUUUGUU
1913	HPV82_5738	UACACGUGCUGAAAUACCUAAGGUA
1914	HPV82_5654	AACCCGCACCGGCAUAUAUUAUUAU
1915	HPV82_5628	CGCAUUGUCAACACAGAAGAAUAUA
1916	HPV82_5603	GUAUUUACCACCUGCACCAGUGUCA
1917	HPV82_5519	UAUACAUAUUUGUUACGCAAACGCC
1918	HPV82_5494	GGUGGGGAUUACUACUUUGUGGCCG
1919	HPV82_5467	GACACACAACAUGCUAUUGUUAUAC
1920	HPV82_5442	GCCCUUUAUUCCACACACAUCUAUU
1921	HPV82_5417	UGUUACCUACUUCACCCACUGUGUG
1922	HPV82_5392	CCUAUUCAUACGGGUCCUGAUGUUG
1923	HPV82_5345	CAUCUUAUGCUAAUGUUACUAUCCC
1924	HPV82_5320	CCUUCAUUGUCUUCCUCUGUUUCUU
1925	HPV82_5294	CAUUUUCUCCUUUGUCUACACAACU
1926	HPV82_5269	CAAACCACACCUAUGCUUCGCUCUC
1927	HPV82_5244	UGAAACAGGUUUUAUGCAGCCUACA
1928	HPV82_5182	CCUUUACUUUCCCCUUCUACUAAUA
1929	HPV82_5143	AUAAGUAGUAUUGCACCUGCUGAGG
1930	HPV82_5009	AUAUUAUUAAACUGCACCGCCCUGC
1931	HPV82_4976	CUACUGAUGUUGCACCAGAUCCUGA
1932	HPV82_4951	GAUACAUCAUUGUCCUUUGAGGAAC
1933	HPV82_4898	UUAGUAAGCCCUCUACAUUUGUUAC
1934	HPV82_4872	GGUUAAGGUUACUAAUCCAGACUUU
1935	HPV82_4847	GUUUAUAUAGCAGGGCAUUUUCACA
1936	HPV82_4790	GUAAGGAACCCAUUAGCAGUACACC
1937	HPV82_4765	GUAUUUGCCUCCAAUGUUACUACUG
1938	HPV82_4706	AUAUAUUUACCAGUACCCCUACGUC
1939	HPV82_4667	CAUUUAUUGAGGCACCACAAUCAGG
1940	HPV82_4627	ACAAGCACUAACAUUGAAAAUCCCU
1941	HPV82_4558	AUUACUUCCUCUUCUACAACAACUC
1942	HPV82_4511	AUUCAGGCUCUACUAUACCUACCUU
1943	HPV82_4425	UCCGGCCAGGCCUCCAAUUAUUAUU
1944	HPV82_4400	GACGGCCUGGUGUUGUAGAUAUUGC
1945	HPV82_4259	UUAUUCCUAAGGUAAAGGGCACUAC
1946	HPV82_4214	AAUUAUAUUCCACAUGCAAAGCUGC
1947	HPV82_4165	ACAAUGGUGGCUGCACGUGCACGGC
1948	HPV82_4036	CCACAUCACCUUUAACUACAUUUAC
1949	HPV82_3976	AAUCCCAAUAUGUGUUUGCAGCAGC
1950	HPV82_3876	UGUAUAUAGUUACUCGCAACCAUUG
1951	HPV82_3801	GUCAUUGGGUAUUAUGACAGUGUAA
1952	HPV82_3776	UUAAAGUACCAUCAAGUGUGACAGU
1953	HPV82_3746	CACACCAACGUCAAAAGUUUAUUGA
1954	HPV82_3704	GUAAUACAAAAGCAGGCAUUGUUAC

1955	HPV82_3668	UGUUUAAAGAAGUGUCAUCUACCUG
1956	HPV82_3580	GCAACUAAAACUGCGUUUAUAGUUC
1957	HPV82_3544	GGAACUGCAGGCCCAAACACCGGAG
1958	HPV82_3519	CACCUGCGACCACCAAAUACACUGU
1959	HPV82_3487	GACUCCUCCACAGUCACCCCGCUGU
1960	HPV82_3449	CACCACAACAACGAAAACGACAGCG
1961	HPV82_3404	CGACCAAUACCUAUUCCGCCUCCGC
1962	HPV82_3362	CACCCUCUACUACAACUGUUGAACA
1963	HPV82_3337	GUAUCUAGUACCUACAGCACCCCGU
1964	HPV82_3295	GAGGUAUAUAUGUGUGGCAAUGUAA
1965	HPV82_3198	CGUGGACUAUACAGGUAUUUAUUAC
1966	HPV82_3131	UGGACUAUACAUGUUGGACAUAUGU
1967	HPV82_3105	GUUUGAUGGGAAUAAGGACAAUACA
1968	HPV82_3036	AUGCUAUGAACUAUGGGGCGAGGCC
1969	HPV82_2977	GCAUUAGAAUCGCUAAACAAAUCUG
1970	HPV82_2937	AUCAAAACAAAAGGCCUGCCAAGCC
1971	HPV82_2912	AUCAAGUAGUACCAGCAUCGGCAGU
1972	HPV82_2887	GAAAGAAACAUGCAAACCCUUAACC
1973	HPV82_2751	GACCCUAUGUCAUCGUUUAAAUGUG
1974	HPV82_2650	GGAAUCCUGUAUAUGCACUAAAUGA
1975	HPV82_2519	GCUGCAAAUUGUAUGCCCACCAUUG
1976	HPV82_2454	GACCAGUACCUAAGAAAUUUCCUAA
1977	HPV82_2196	CGAUACCAGGGUAUUAACUUUAUGU
1978	HPV82_2138	GUAUAGAUGUGACAAAGUGCAAGAC
1979	HPV82_2113	CACUAACAAUGUCAGCAUGGAUUAG
1980	HPV82_2088	CACUACAAACGAGCACAAAGAAAAU
1981	HPV82_1999	AAUUGGCUGAUACAGAUAGCAAUGC
1982	HPV82_1951	UUGACCAUGAUGUAGUAGACGAUAG
1983	HPV82_1914	AGCACGUUUGAACUAUCGCAAAUGG
1984	HPV82_1889	ACAACUACAGCACAGUUUUGAUGAU
1985	HPV82_1841	CAUUAGUAGCACAUAUGGCGAAACA
1986	HPV82_1774	UUAUAGAACCACCUAAGCUACGUAG
1987	HPV82_1723	CCAUUGCCAAAUGUUUAGGUACAUU
1988	HPV82_1685	ACUGUUAGCUAGAUUUACAUGUGCC
1989	HPV82_1660	CAUGUGAUUGGGGUACUAUUGUGCU
1990	HPV82_1633	GUAUGUACUACCAUAUACAAUGCCU
1991	HPV82_1571	UGCCUUAUUUGGGGUAUCGCCAAUG
1992	HPV82_1546	AAACAUGCUGCACGGACUGGGUAUG
1993	HPV82_1518	GAGUUGGUAAGGGUAUUUAAAAGUG
1994	HPV82_1460	CAAUGCAAAAGCAAUGUUUAUGGCA
1995	HPV82_1417	CCAAUGUAGGACUAAACAGUAUAUG
1996	HPV82_1392	GACCUGGAAACAAACGAAAAUGCUA
1997	HPV82_1320	GAUGGGCAAAAUGACGGGUCACAAC
1998	HPV82_1294	AGACUGUGGAAGGACCCUUACAGGU
1999	HPV82_1242	AGGAGAUUACUGGACAGUUAUCCGG
2000	HPV82_1203	CAGCAACAACCAAAACAGGCAAACC
2001	HPV82_1156	GCAGCCCAUUAAAAGACAUUACAAA
2002	HPV82_1093	AAACACAGGCACACAAAGAGGCUGU
2003	HPV82_1068	GCACAGGCGUUGUUGCAGGUCCAAG
2004	HPV82_1035	AAUAGUAUUUGUAGUCAGGCGGAAC
2005	HPV82_987	GAUACAAAUGAUACAGGGUCUGAUA

2006	HPV82_955	CGGGAGAUAAUAUAUCAGACGAUGA
2007	HPV82_867	ACAUCGGCAAUGGACAGUGAAGGUA
2008	HPV82_833	UAAGCCUGGUGUGCCCGUGGUGUGC
2009	HPV82_807	AUUUCAGCAAAUGUUACUGGGCGAC
2010	HPV82_782	AAAGCAGUGGAGACAGCCUUCGCAU
2011	HPV82_748	UGCAGGUGUUCGAGUGUUGUACAGC
2012	HPV82_723	GUGUUACAGAAUUAAAGUGCACUGU
2013	HPV82_608	UAACACCACAACCUGAAAUUGACUU
2014	HPV82_583	CAAUUAAAGGACAUAGUGUUGGAGU
2015	HPV82_539	UAGUGAAACCCAGGUGUAAUAACGC
2016	HPV82_514	AUUGCAGAAAACCACCAAGACAACG
2017	HPV82_440	AGAAAAGCAAAAGGUGGUGGACGAC
2018	HPV82_415	GAUGUCAGAGACCACUUGGGCCUGA
2019	HPV82_361	CAUUAGAGGCCAUUACUAACAAAAG
2020	HPV82_332	AAGGUAUAGUAGGUCUGUGUAUGGU
2021	HPV82_265	GGGACAAUACGCCAUAUGCAGCAUG
2022	HPV82_234	GUAGCAUUUACAGAACUUAGGAUUG
2023	HPV82_209	GUUGUGUAGAGCAGAUGUGUAUAAU
2024	HPV82_164	GUCUAUGCACAAUAUUCAGGUAUUG
2025	HPV82_139	ACGAAUUAUGUGAAGCCUGCAAUAC
2026	HPV82_105	UUUGAAGACAUAAGAGAAAGACCAC

Hybridization

The methods of the present invention comprises contacting the one or more polynucleotide probes with the sample under a hybridization condition sufficient for the one or more polynucleotide probes to hybridize to the target nucleic acid in the sample to form double-stranded nucleic acid hybrids. Preferably, the one or more polynucleotide probes is diluted in a probe diluent that also can act as a neutralizing hybridization buffer. The diluent can be used to dissolve and dilute the probe and also help restore the sample to about a neutral pH, e.g., about pH 6 to about pH 9, to provide a more favorable environment for hybridization. Sufficient volume of probe diluent, preferably one-half volume, can be used to neutralize one and one-half volume of base-treated sample. Preferably, the probe diluent is a 2-[bis(2-Hydroxyethyl) amino] ethane sulfonic acid (BES, Sigma, St. Louis, Mo.)/sodium acetate buffer. Most preferably, the probe diluent is a mixture of 2 M BES, 1 M sodium acetate, 0.05% of the antimicrobial agent NaN_3, 5 mM of the metal chelating agent EDTA, 0.4% of the detergent Tween™-20 and 20% of the hybridization accelerator dextran sulfate. The pH of the probe diluent can be about 5 to about 5.5.

Thus, for example, after treatment with base, an aliquot of sample can be removed from the sample tube and combined with a sufficient amount of probe to allow hybridization to occur under a hybridization condition. The hybridization condition is sufficient to allow the one or more polynucleotide probes to anneal to a corresponding complementary nucleic

acid sequence, if present, in the sample to form double-stranded nucleic acid hybrids. The probes and sample nucleic acids can be incubated for a hybridization time, preferably at least about 5 minutes, to allow the one or more polynucleotide probes to anneal to a corresponding complementary nucleic acid sequence. The hybridization condition can comprise a hybridization temperature of at least about 20° C, preferably about 50 to about 80° C. In certain embodiments, the hybridization is performed at a temperature of less than 55° C. In other embodiments when synRNA probes are used and when the sample containing the target nucleic acid contains a large volume of collection medium (i.e. $\geq$ 1 ml), the hybridization temperature is between 45°C and 55° C and preferably is about 50°C (see figures 20A and 20B). Lowering the hybridization temperature provides the ability to detect 20,000 copies of HPV target nucleic acid in an assay. For any given target to be determined and the one or more polynucleotides employed, one of ordinary skill in the art can readily determine the desired hybridization condition by routine experimentation.

The present invention also allows for hybridization of probes to targets in the presence of anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids (i.e. the anti-hybrid antibody can be added at the same time or before the probes are added to the sample containing the target nucleic acid). This allows for reduction in the time to perform an assay.

Anti-hybrid Antibodies

The double-stranded nucleic acid hybrids formed in accordance with the present invention can be detected using an antibody that is immunospecific to double-stranded nucleic acid hybrids. The antibody is immunospecific to double-stranded hybrids, such as but not limited to RNA/DNA; DNA/DNA; RNA/RNA; and mimics thereof, where "mimics" as defined herein, refers to molecules that behave similarly to RNA/DNA, DNA/DNA, or RNA/RNA hybrids. The anti-double-stranded nucleic acid hybrid antibody (*i.e.*, "anti-hybrid" antibody) that is utilized will depend on the type of double-stranded nucleic acid hybrid formed. In one embodiment, the antibody is immunospecific to RNA/DNA hybrids.

It will be understood by those skilled in the art that either polyclonal or monoclonal anti-hybrid antibodies can be used and/or immobilized on a solid support or phase in the present assay as described below. Monoclonal antibody prepared using standard techniques can be used in place of the polyclonal antibodies. Also included are immunofragments or derivatives of antibodies specific for double-stranded hybrids, where such fragments or derivatives contain binding regions of the antibody.

For example, a polyclonal RNA:DNA hybrid antibody derived from goats immunized with an RNA:DNA hybrid can be used. Hybrid-specific antibody can be purified from the goat serum by affinity purification against RNA:DNA hybrid immobilized on a solid support, for example as described in Kitawaga *et al.*, Mol. Immunology, 19:413 (1982); and U. S. Patent No. 4,732, 847.

Other suitable methods of producing or isolating antibodies, including human or artificial antibodies, can be used, including, for example, methods which select recombinant antibody (*e.g.*, single chain Fv or Fab, or other fragments thereof) from a library, or which rely upon immunization of transgenic animals (*e.g.*, mice) capable of producing a repertoire of human antibodies (see, *e.g.*, Jakobovits *et al.*, Proc. Natl. Acad. Sci. USA, 90:2551 (1993); Jakobovits *et al.*, Nature, 362: 255 (1993); and U.S. Pat. Nos. 5,545, 806 and 5,545, 807).

In one embodiment, the target nucleic acid to be determined is DNA (*e.g.*, HPV 18 genomic DNA) or RNA (*e.g.*, mRNA, ribosomal RNA, nucleolar RNA, transfer RNA, viral RNA, heterogeneous nuclear RNA), wherein the one or more polynucleotide probes are polyribonucleotides or polydeoxyribonucleotides, respectively. According to this embodiment, the double-stranded nucleic acid hybrids (*i.e.* DN/RNA hybrids) formed can be detected using an antibody that is immunospecific to RNA:DNA hybrids.

In a preferred embodiment of the present invention, a polyclonal anti-RNA/DNA hybrid antibody is derived from goats immunized with an RNA/DNA hybrid. Hybrid-specific antibody is purified from the goat serum by affinity purification against RNA/DNA hybrid immobilized on a solid support. Monoclonal antibody prepared using standard techniques can be used in place of the polyclonal antibodies.

While any vertebrate may be used for the preparation of anti-RNA/DNA hybrid monoclonal antibodies, goats or rabbits are preferred. Preferably, a goat or rabbit is immunized with a synthetic poly(A)-poly(dT) hybrid by injecting the hybrid into the animal in accordance with conventional injection procedures. Polyclonal antibodies may be collected and purified from the blood of the animal with antibodies specific for the species of the immunized animal in accordance with well-known antibody isolation techniques. For the production of monoclonal antibodies, the spleen can be removed from the animal after a sufficient amount of time, and splenocytes can be fused with the appropriate myeloma cells to produce hybridomas. Hybridomas can then be screened for the ability to secrete the anti-hybrid antibody. Selected hybridomas may then be used for injection into the peritoneal cavity of a second animal for production of ascites fluid, which may be extracted and used as an enriched source of the desired monoclonal antibodies.

In some embodiments, the step of detecting comprises contacting the double-stranded nucleic acid hybrids with a first anti-hybrid antibody to capture the double-stranded nucleic acid hybrids, wherein the first anti-hybrid antibody is immunospecific to double-stranded nucleic acid hybrids. In one embodiment, the first anti-hybrid antibody is immobilized onto a solid support such as a test tube surface. It will be understood by those skilled in the art that a solid support includes polystyrene, polyethylene, polypropylene, polycarbonate or any solid plastic material in the shape of test tubes, beads, microparticles, dip-sticks or the like. Examples of a solid support also includes, without limitation, glass beads, silica beads, glass test tubes, and any other appropriate shape made of glass. A functionalized solid support such as plastic, silica, or glass that has been modified so that the surface contains carboxyl, amino, hydrazide or aldehyde groups can also be used. Immobilization of the antibody can be direct or indirect. Preferably, test tubes are directly coated with anti-hybrid antibody in accordance with methods known to those skilled in the art or briefly described below. The antibody can also be biotinylated and subsequently immobilized on, for example streptavidin coated tubes or silica, or modified by other methods to covalently bind to the solid phase. Solubilized biotinylated antibody can be immobilized on the streptavidin coated tubes before capture of the hybridized samples as described below or in conjunction with the addition of the hybridized samples to simultaneously immobilize the biotinylated antibody and capture the hybrids.

In another embodiment, the first anti-hybrid antibody is attached to the solid phase in accordance with the method of Fleminger *et al.*, Appl. Biochem. Biotech. 23:123 (1990), by oxidizing the carbohydrate portion of the antibody with periodate to yield reactive aldehyde groups. The aldehyde groups are then reacted with a hydrazide-modified solid phase such as MicroBind-HZ™ microtiter plates available from Dynatech Laboratories (Chantilly, Va.). Passive coating of the antibody according to the well known method of Esser, P., Nunc Bulletin No. 6 (November 1988) (Nunc, Roskilde, Denmark) can also be employed.

In other embodiments, Ventrex Star™ tubes (Ventrex Laboratories Inc., Portland, ME) are coated with streptavidin by the method of Haun et al., Anal. Biochem. 191:337-342 (1990). After binding of streptavidin, a biotinylated goat polyclonal antibody as described above, or otherwise produced by methods known to those skilled in the art, is bound to the immobilized streptavidin. Following antibody binding, tubes can be post-coated with a detergent such as Tween™-20 and sucrose to block unbound sites on the tube and stabilize the bound proteins as described by Esser, Nunc Bulletin No. 8, pp. 1-5 (December 1990) and Nunc Bulletin No. 9, pp. 1-4 (June 1991) (Nunc, Roskilde, Denmark) and Ansari, et al., J.

Immunol. Methods, 84:117 (1985). Preferably, each tube is coated with between 10 ng and 100 μg biotinylated antibody. Most preferably each tube is coated with approximately 250 ng of biotinylated antibody.

As discussed above, the solid phase can be coated with functional antibody fragments or derivatized functional fragments of the anti-hybrid antibody.

In some embodiments, hybridized samples are incubated in tubes coated with the first anti-hybrid antibody for a sufficient amount of time to allow capture of the double-stranded nucleic acid hybrids by the immobilized capture antibodies. The hybrids can be bound to the immobilized antibodies by incubation, for example incubation for about 5 minutes to about 24 hours at about 15 to about 65° C. In some embodiments, the incubation time is about 30 to about 120 minutes at about 20 to about 40° C, with shaking at about 300 to about 1200 rpm. In another embodiment, capture occurs with incubation at about one hour at about room temperature with vigorous shaking on a rotary platform. It will be understood by those skilled in the art that the incubation time, temperature, and/or shaking can be varied to achieve alternative capture kinetics as desired.

In other embodiments, the first anti-hybrid antibody is coupled to a magnetic bead (*e.g.*, COOH-beads) to capture double-stranded nucleic acid hybrids. Magnetic bead-based technology is well known in the art. In some embodiments, magnetic silica beads having derivatized surfaces for reacting with antibody can be employed.

In one embodiment, the step of detecting further comprises providing a second anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, wherein the second anti-hybrid antibody is detectably labeled either directly or indirectly.

For example, in some embodiments, an anti-hybrid antibody as described above can be conjugated to a detectable label to provide the second anti-hybrid antibody for detection of the double-stranded nucleic acid hybrids. Conjugation methods for labeling are well known in the art. Preferably, an antibody, such as the mouse monoclonal antibody deposited with the American Type Culture Collection as ATCC Accession number HB-8730, is conjugated to a detectable label such as alkaline phosphatase. It will be understood by those skilled in the art that any detectable label such as an enzyme, a fluorescent molecule, or a biotin-avidin conjugate can be used.

The antibody conjugate can be produced by well known methods such as direct reduction of the monoclonal antibody with dithiothreitol (DTT) to yield monovalent antibody fragments. The reduced antibody can then be directly conjugated to maleimated alkaline

phosphatase by the methods of Ishikawa et al., J. Immunoassay 4:209-237 (1983) and Means et al., Chem. 1: 2-12 (1990), and the resulting conjugate can be purified by HPLC.

In another embodiment, the double-stranded nucleic acid hybrids can be detected indirectly, for example using an unlabelled anti-hybrid antibody for which a labeled antibody is specific. For example, the second anti-hybrid antibody can be a mouse immunoglobulin that is detected by a labeled goat anti-mouse antibody.

The double-stranded nucleic acid hybrids can be contacted with the second anti-hybrid antibody under a binding condition that is sufficient to provide for specific antibody-antigen binding (*i.e.,* antibody/double-stranded nucleic acid hybrid binding), while minimizing non-specific binding. The binding condition preferably comprises a binding buffer comprising 0.1 M Tris-HCl, pH 7.5, 0.6 M NaCl to reduce cross reaction of antibody with other nucleic acid species, $ZnCl_2$ and $MgCl_2$ for stabilizing alkaline phosphatase, normal goat serum to block non-specific interaction of conjugate with the capture surface, 0.25% of the detergent Tween™-20 to block non-specific binding of conjugate, and sodium azide as a preservative. Reactions can then be washed with a wash buffer (*e.g.,* 0.1 M Tris-HCl, pH 7.5, 0.6 M NaCl, 0.25% Tween™-20, and sodium azide) to remove as much of the unbound or non-specifically bound second anti-hybrid antibody as possible. The second anti-hybrid antibody that is bound to the double-stranded nucleic acid hybrids can subsequently be detected, for example by colorimetry or chemiluminescence methods as described by *e.g.,* Coutlee, et al., J. Clin. Microbiol. 27:1002-1007 (1989). For example, bound alkaline phosphatase conjugate can be detected by chemiluminescence with a reagent such as a Lumi-Phos™ 530 reagent (Lumigen, Detroit, MI) using a detector such as an E/Lumina™ luminometer (Source Scientific Systems, Inc., Garden Grove, CA), an Optocomp I™ Luminometer (MGM Instruments, Hamden, CT), or the like.

In some embodiments, the one or more polynucleotides can be conjugated to a label, such as an enzyme, or to a hapten such as biotin, that is then detected with a labeled anti-hapten antibody.

Thus, target-specific oligoribonucleotides or oligodeoxynucleotides can be designed using commercially available bioinformatics software. For example, for the detection of dsDNA targets, DNA can be denatured, hybridized to the RNA probes, and captured via anti-RNA:DNA hybrid antibodies on a solid support. Detection can be performed by various methods, including anti-RNA:DNA hybrid antibodies conjugated with alkaline phosphatase for chemiluminescent detection. Alternatively, other detection methods can be employed, for

example using anti-RNA:DNA hybrid antibodies conjugated with phycoerythrin, suitable for detection by fluorescence.

In other embodiments, the methods of the present invention, optionally, further comprise a step of amplification of the target nucleic acid. Amplification techniques are known in the art and may be utilized. For example, Whole Genome Amplification (WGA) may be employed. WGA is an isothermal process that uses non-specific primers to generate amplicons using the target nucleic acid sequence as a template. For example, *Phi* 29 DNA polymerase can be used in combination with non-specific primers to amplify target nucleic acid sequences. The polymerase can move along the target nucleic acid sequence displacing the complementary strand. The displaced strand becomes a template for replication allowing high yields of high-molecular weight DNA to be generated. For example, helicase-dependent amplification may be employed.

Kits

In other aspects, the present invention provides a kit comprising the necessary components and reagents for performing the methods of the present invention. The kit can comprise at least one of the following: an inert sample collection device, such as a dacron swab for exfoliated cell sample collection; a sample transport medium for stabilization of the sample during transport to the laboratory for analysis; a base, or a hydrolysis reagent; one or more polynucleotide probes specific for the target nucleic acid to be determined; neutralizing probe diluent; anti-hybrid antibody coated test tubes; and any necessary controls.

Preferably, the sample transport medium is Specimen Transport Medium ; the base is 0.415 M NaOH; the neutralizing probe diluent is a BES/sodium acetate buffer; the test tubes are Ventrex Star™ tubes coated with a polyclonal anti-hybrid antibody; and the conjugated anti-hybrid antibody is a mouse monoclonal antibody conjugated to alkaline phosphatase. Preferably, the kit also contains a substrate for the chemiluminescent detection of alkaline phosphatase, such as a CDP-Star® with Emerald II (Applied Biosystems, Bedford, MA).

The present invention will be illustrated in more detail by way of Examples, but it is to be noted that the invention is not limited to the Examples.

EXAMPLES

Example 1: Polynucleotide probes for determining HPV 18 or HPV 16 DNA

Oligoarray 2.0 was chosen as the tool with which to identify RNA probes specific for HPV 18 or HPV 16 DNA. A database of sequences to be checked against, in this case, HPV

high risk and low risk types: 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89 was provided and the sequence of interest, *i.e.,* HPV16 or HPV 18 was then BLASTed against the database to search for any regions of identity, and the similarities were stored. Tm and %GC were then computed for ribonucleotides of a specified length and compared to the parameters, after which secondary structure was examined. Cross hybridization was checked with the Mfold package, using the similarity determined by BLAST.

The parameters of the Oligoarray 2.0 program were set to look for ribonucleotides of 25nt length, Tm range of 55-95°C, a GC range of 35-65%, and no secondary structure or cross-hybridization at 55°C or below. Using these parameters to determine ribonucleotide probes for HPV18 (with a modified BLAST database that did not include HPV45, as we are not interested in specificity against that type) resulted in 145 ribonucleotides (for HPV 18) and 127 ribonucleotides (for HPV 16) covering a total of about 3.7kb of the target (*i.e.,* HPV 18 or HPV 16 viral DNA). The sequences of the ribonucleotide probes that were selected are shown Tables 1 and 2 above. Sequence conservation across 20 HPV genomes is shown in Fig. 1a. As schematically shown in Fig. 1b for HPV 18, all regions of the HPV 18 genome were represented in the respective probes.

RNA oligos were ordered from IDT technologies, at the 250 nM scale, with standard desalting. Oligos were stored in Ambion's RNA Storage Solution (1 mM Sodium Citrate, pH 6.4). The synthetic ribonucleotide probes are hereinafter referred to as "synRNA."

Example 2: Protocol for detecting HPV 18 DNA using HPV 18 synRNA

The hybridization and detection protocol was performed essentially as described in Table 16.

Table 16: Protocol

Denature	1	Sample nucleic acid was denatured with alkali and heat.
Hybridize/ Capture	2	Synthetic RNA probes were added to sample, hybridized, and neutralized
	3	Synthetic RNA probe/target DNA hybrids were captured with anti-hybrid antibody immobilized on a substrate
Conjugate	4	Alkaline phosphatase-conjugated anti-hybrid antibodies were added

Wash	5	Samples were washed
Detection	6	Alkaline-phosphatase-activated chemiluminescent substrate was added
Read	7	Samples were read using a luminometer

Example 3: Results

To remove as much variability as possible, data was analyzed as (S-N)/N, expressed as (S/N)-1. When signal = noise, data value = 0.0.

A. Specificity Demonstrated with HPV18 synRNA

As shown in Table 17, the synthetic RNA probes (synRNAs) designed for HPV 18 showed no cross-reactivity with either HPV 6 or HPV 16 at up to 10^9 copies/assay (200 ng/ml). synRNA = 3.7kb coverage of HPV 18 DNA; 25 mers @ 1.34 nM final in hybridization.

Table 17: Specificity of HPV18 synRNA

	Input Copies	Avg RLU	S-N	(S/N)-1
HPV 18	0	55	0	0.0
	5000	167	113	2.1
	10^4	238	183	3.4
	10^5	2044	1989	36.5
HPV 16	0	53	0	0.0
	10^7	79	26	0.5
	10^8	59	6	0.1
	10^9	84	32	0.6
HPV 6	0	51	0	0.0
	10^7	51	0	0.0
	10^8	54	3	0.1
	10^9	60	9	0.2

B. Cross-reactivity of HPV18 synRNA with HPV45

HPV 18 synRNA was not designed to be specific against HPV45 because HPV45 was not part of the specificity design. Accordingly, as shown in Table 18, synRNA for HPV18 showed cross-reactivity against HPV 45 plasmid only starting at between 10^6 and 10^7 copies of plasmid. synRNA = 3.7kb coverage of HPV 18 DNA; 25 mers @ 1.34 nM final in hybridization.

Table 18: Limited Cross-reactivity of HPV18 synRNA with HPV45

	Input Copies	Avg RLU	S-N	(S/N)-1
HPV18 3.7kb RNA	0 c	44	0	0.0
	2500 c	105	61	1.4
	5000 c	111	67	1.5
	10^4 c	184	140	3.2
HPV45 3.7kb RNA	0 c	39	0	0.0
	10^5 c	51	12	0.3
	10^6 c	70	31	0.8
	10^7 c	334	296	7.7

C. Determining Specificity with HPV16 synRNA

As shown in Table 19, HPV16 synRNA is unable to detect HPVs 6, 18, or 45 at up to 10^9 copies/assay (200 ng/ml). synRNA = 3.175kb coverage of HPV 16 DNA; 25 mers @ 1.34 nM final in hybridization.

Table 19: Specificity of HPV16 synRNA

	Input Copies	Avg RLU	(S/N)-1	%CV
HPV 16	0 c	24	0.0	5%
	5000 c	85	2.5	3%
	10^4 c	157	5.5	3%
	10^5 c	1270	51.4	2%
HPV 18	0 c	24	0.0	0%
	10^7 c	25	0.0	7%
	10^8 c	24	0.0	2%
	10^9 c	25	0.0	5%
HPV 45	0 c	25	0.0	6%
	10^7 c	26	0.0	5%
	10^8 c	28	0.1	17%
	10^9 c	38	0.5	3%
HPV 6	0 c	29	0.0	33%
	10^7 c	24	-0.2	2%
	10^8 c	26	-0.1	2%
	10^9 c	24	-0.2	5%

D. Deterring different HPV Types

About 0.5kb coverage of specific 25mer probes was provided for HPVs 16, 18, 31, and 45. As shown in Fig. 2, each HPV type was detected at 10^6 copies. synRNA probes should be equally applicable to detection of whichever HPV types are desired.

E. Effect of synRNA coverage on sensitivity of detection

Total coverage of synRNA probe affected signal in the assay. Increasing coverage improved signal in a non-linear fashion, probably due to base-stacking effects and loosening of secondary structure on the single-stranded DNA target as more synRNA probes are

hybridized. As shown in Figure 3, at 3.7 kb of coverage, the sensitivity of detection was at 5,000 copies/assay.

F. Effect of synRNA concentration on sensitivity of detection

As shown in Figure 4, increasing the concentration of synRNA increased sensitivity of detection. 25mer synRNA oligos had Tms about 45 to about 60°C. Increasing probe concentration raised that Tm, resulting in more efficient hybridization. synRNA = 3.7kb coverage; 25mers @ concentrations shown in Figure 4.

G. Effect of synRNA size on sensitivity of detection

As shown in Figure 5, given equivalent coverage, longer synRNA provided increased sensitivity.

H. Effect of synRNA contiguity on sensitivity of detection

As shown in Figure 6, sensitivity increased as synRNA probes targeted adjacent regions. Without being held to a particular theory, it is believed that hybridization efficiency improved as the binding of one probe relaxed secondary structure on the target strand, providing a more accessible template for hybridization of the adjacent synRNA.

I. HPV16 and HPV18 are detected at equivalent levels

As shown in Figure 7, HPV16 synRNA, with about 3.175kb coverage, and HPV18, with about 3.7kb coverage, gave about similar results. Both synRNAs were able to detect their respective targets at a concentration of 5,000 copies.

J. Comparison of different synRNA synthesis chemistries

SynRNAs were prepared by TOM amidite chemistry (Operon Biotechnologies, Inc., Huntsville, AL) or by tBDMS chemistry (Integrated DNA Technologies (IDT)). As shown in Figure 8, 25mers of comparable quality can be provided using different chemical synthesis methods.

K. Detection at different temperatures

With no RNA-dependant background occurring from synRNA, the hybridization temperature can be reduced, if desired, to provide a more tolerable condition for antibody/antigen interactions (Figure 9).

L. Exogenous RNase is unnecessary for detection

synRNAs are largely devoid of secondary structure. This eliminates non-specific RNA-based background arising from anti-RNA:DNA hybrid antibodies recognizing long RNA secondary structures. With RNA not bound to DNA no longer contributing to background signal, the use of RNase A in the assay becomes unnecessary (Figure 10).

M. Discussion

The method provided specificity and decreased background, and does not require RNase and is compatible with various media including SurePath, PC, STM and DCM.

The method provided a LOD with a 0.5kb target coverage is of 5pg/mL for HPV18 with an S/N=3, whereas 2.5 kb target coverage could allow target detection to 1pg/mL.

Example 4: Target capture and amplification

The inclusion of a target amplification component provided enhanced sensitivity. The method detected as low as 10 copies of HPV plasmids or 10 SiHa cells comprising HPV nucleic acid target. The method also provided robust specificity, the ability to distinguish HPV 16 or HPV18 plasmid from all other high- and low-risk HPV types.

Target amplification can involve *e.g.*, generating short amplicons with sequence-specific primers (e.g. Polymerase Chain Reaction) or large amplicons with multiple random primers (e.g. Whole Genome Amplification). Amplified targets can be captured and detected on a variety of different detection platforms.

Hybrid-specific antibodies were coupled to magnetic beads and employed in combination with short type-specific RNA probes for target capture. The sample processing procedure involved capture of targets pre-target amplification and the detection procedure involves capture of targets post-target amplification. To enhance assay sensitivity the isothermal WGA technology was utilized to produce non-specific amplification of any captured targets.

The nucleic acid target of interest was immobilized on a solid support with the use of type-specific RNA probes to form nucleic acid hybrids and anti-RNA:DNA hybrid-specific antibodies to capture, concentrate and purify. The sample preparation process produced single-stranded DNA targets free of amplification inhibitors and non-specific targets and allowed for multiple targets to be captured simultaneously. This was demonstrated by coupling hybrid capture antibodies to magnetic beads and using HPV sequence-specific RNA probes for detection.

Magnetic beads coupled with anti-hybrid antibodies were used to specifically capture amplicons generated by WGA. Short RNA probes were used for specific detection. In addition, anti-RNA:DNA hybrid antibodies coupled with alkaline phosphatase was used for detection.

Table 20 shows a flowchart representing a method steps in accordance with one embodiment. Detection reagent 1 is preferably the detection reagent 1 provided in the digene Hybrid Capture Kit and detection reagent 2 is preferably the detection reagent 2 provided in the digene Hybrid Capture Kit. Detection Reagent 1 comprises alkaline phosphatase-conjugated antibodies to RNA:DNA hybrids and Detection Reagent 2 comprises CDP-Star® with Emerald II (chemiluminescent substrate).

Table 20. Protocol.

Assay Flow Chart
Target Denaturation
RNA probe hybridization and capture with anti-hybrid antibody
Wash
Isothermal Amplification
Amplicon Denaturation
RNA probe hybridization and capture with anti-hybrid antibody
Detection Reagent 1
Wash
Detection Reagent 2

One hundred (100) copies of HPV18 plasmid are obtained after 30 minutes of WGA (Fig. 11)

Five hundred (500) copies of HPV18 plasmid are detected after 15 minutes of WGA; and detection of 1000 copies of HPV18 plasmid are obtained after only 10 minutes of WGA (Fig. 12).

Ten (10) copies of plasmid or 10 SiHa cells comprising HPV nucleic acid are detected with longer amplification times of 45 minutes or greater (Fig. 13).

Figure 14 shows specificity for HPV18.

The results demonstrated that after 45 minutes of amplification, as little as 10 copies of plasmid or 10 SiHa cells can be detected; and about 1000 copies of plasmid can be detected after only 10 minutes of amplification.

Example 5: Synthetic type-specific biotinylated DNA probes DNA probes.

In another embodiment, synthetic type-specific biotinylated DNA probes are used to form double-stranded hybrids with target mRNA (Fig. 15). Hybrids are captured on magnetic streptavidin beads. Signal amplification and detection is performed with anti-hybrid antibody/alkaline phosphatase and the resulting chemiluminescent signal is detected.

Example 6: Sample Assay Flow.

Predenatured samples are transferred to a multiwell plate. Probes in neutralizing solution are added to the denatured sample and incubated with shaking at room temperature for about 1 minute to neutralize the sample. The neutralized samples are transferred to a plate containing immobilized anti-RNA:DNA hybrid antibodies so that target DNA is allowed to hybridize to the synthetic RNA probes and also to be captured by the immobilized antibodies. The incubation is at about 55°C for about 120 min. Anti-RNA:DNA hybrid antibodies conjugated with alkaline phosphatase are added at room temp and incubated for about 30 min. After the conjugated antibody step, the plate is washed for about 12 min. A dioxetane substrate is added and incubated for 15 minutes. The plate is then read with a luminometer.

Hybridization and hybrid capture by anti-RNA:DNA hybrid antibodies are performed in the same step at about 55°C and may include shaking.

CLAIMS

1. A method for determining the presence of a target nucleic acid in a sample, the method comprising:

a) contacting a probe set comprising more than one polynucleotide probe with the sample under a hybridization condition sufficient for the probe set to hybridize to the target nucleic acid in the sample to form double-stranded nucleic acid hybrids, wherein the probe set does not hybridize to a genetic variant of the target nucleic acid; and

b) detecting the double-stranded nucleic acid hybrids, wherein detecting comprises contacting the double-stranded nucleic acid hybrids with a first anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, whereby detection of the double-stranded nucleic acid hybrids determines the presence of the target nucleic acid in the sample;

wherein the polynucleotide probes of the probe set are short probes having a length from 25 to 60 nucleotides and at least one of the polynucleotide probes of the probe set is selected from SEQ ID NOs:1-2026 or a complement thereof,

wherein the detecting further comprises providing a second anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, and

wherein the second anti-hybrid antibody is detectably labeled.

2. The method of claim 1 wherein the at least one probe and the first anti-hybrid antibody are added in the same step.

3. The method of claim 1, wherein the target nucleic acid is an HPV nucleic acid.

4. The method of claim 3, wherein the HPV nucleic acid is HPV DNA of a high risk HPV type selected from the group consisting of: HPV 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68, and 82.

5. The method of claim 4, wherein the HPV type is HPV 16, wherein the variant is a nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

6. The method of claim 4, wherein the HPV type is HPV 18, wherein the variant is nucleic acid of a type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

7. The method of claim 4, wherein the HPV type is HPV 45, wherein the variant is nucleic acid of a type selected from the group consisting of. HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 51, 52, 53, 54, 56, 58, 59, 61, 62, 66 , 67, 68, 69, 70, 71, 72, 73, 74, 81, 82, 83, 84, and 89.

8. The method of claim 4 wherein the variant is a nucleic acid of low risk HPV type selected from the group consisting of: HPV 1, 2, 3, 4, 5, 6, 8, 11, 13, 26, 30, 34, 53, 54, 61, 62, 67, 69, 70, 71, 72, 73, 74, 81, 83, 84, and 89.

9. A method for determining the presence of HPV 18 DNA in a sample, the method comprising:

a) contacting a probe set comprising more than one polynucleotide probe with the sample under a hybridization condition sufficient for the probe set to hybridize to the target nucleic acid in the sample to form double-stranded nucleic acid hybrids, wherein the probe set does not hybridize to a genetic variant of the target nucleic acid; and

b) detecting double-stranded nucleic acid hybrids, wherein detecting comprises contacting the double-stranded nucleic acid hybrids with a first anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, whereby detection of the double-stranded nucleic acid hybrids indicates the presence of HPV 18 DNA in the sample;

wherein the polynucleotide probes of the probe set are short probes having a length from 25 to 60 nucleotides in length and at least one of the polynucleotide probes of the probe set comprises one polynucleotide selected from SEQ ID NOs:163-309 or a complement thereof,

wherein the detecting further comprises providing a second anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, and

wherein the second anti-hybrid antibody is detectably labeled.

10. A method for determining the presence of HPV 16 DNA in a sample, the method comprising:

a) contacting a probe set comprising more than one polynucleotide probe with the sample under a hybridization condition sufficient for the probe set to hybridize to the target nucleic acid in the sample to form double-stranded nucleic acid hybrids, wherein the probe set does not hybridize to a genetic variant of the target nucleic acid; and

b) detecting double-stranded nucleic acid hybrids, wherein detecting comprises contacting the double-stranded nucleic acid hybrids with a first anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, whereby detection of the double-stranded nucleic acid hybrids indicates the presence of HPV 16 DNA in the sample;

wherein the polynucleotide probes of the probe set are short probes having a length from 25 to 60 nucleotides and at least one of the polynucleotide probes of the probe set comprises one polynucleotide selected from SEQ ID NOs:1-162 or a complement thereof,

wherein the detecting further comprises providing a second anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, and

wherein the second anti-hybrid antibody is detectably labeled.

11. A method for determining the presence of HPV 45 DNA in a sample, the method comprising:

a) contacting a probe set comprising more than one polynucleotide probe with the sample under a hybridization condition sufficient for the probe set to hybridize to the target nucleic acid in the sample to form double-stranded nucleic acid hybrids, wherein the probe set does not hybridize to a genetic variant of the target nucleic acid; and

b) detecting double-stranded nucleic acid hybrids, wherein detecting comprises contacting the double-stranded nucleic acid hybrids with a first anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, whereby detection of the double-stranded nucleic acid hybrids indicates the presence of HPV 45 DNA in the sample;

wherein the polynucleotide probes of the probe set are short probes having a length from 25 to 60 nucleotides in length and at least one of the polynucleotide probes of the probe set comprises one polynucleotide selected from SEQ ID NOs:842-974 or a complement thereof,

wherein the detecting further comprises providing a second anti-hybrid antibody that is immunospecific to double-stranded nucleic acid hybrids, and

wherein the second anti-hybrid antibody is detectably labeled.

12. The method of any one of claims 9-11, wherein at least one probe and the first anti-hybrid antibody are added in the same step.

13. The method of any one of claims 1-12, wherein the hybridization is performed at about 45 to about 55°C.

14. A probe set comprising more than one polynucleotide probe selected from the group consisting of SEQ ID NO; 1-162 (HPV 16); 163-309(HPV 18); 842-974(HPV 45); 310-454(HPV 31); 455-579(HPV 33); 580-722(HPV 35); 723-841(HPV 39); 975-1120(HPV 51); 1121-1252(HPV 52); 1253-1367(HPV 56); 1368-1497(HPV 58); 1498-1646(HPV 59); 1647-1767(HPV 66); 1768-1875(HPV 68); and 1876-2026(HPV 82),

wherein the polynucleotide probes of the probe set are short probes having a length from 25 to 60 nucleotides, and wherein the probe set is for use in the method of any one of claims 1-13.

15. A kit comprising the probe set of claim 14 and at least one of the following: an inert sample collection device; a sample transport medium for stabilization of the sample during transport to the laboratory for analysis; a base, or a hydrolysis reagent; neutralizing probe diluent; anti-hybrid antibody coated test tubes; and any necessary controls.

16. The kit of claim 15, wherein the inert sample collection device comprises a dacron swab for exfoliated cell sample collection.

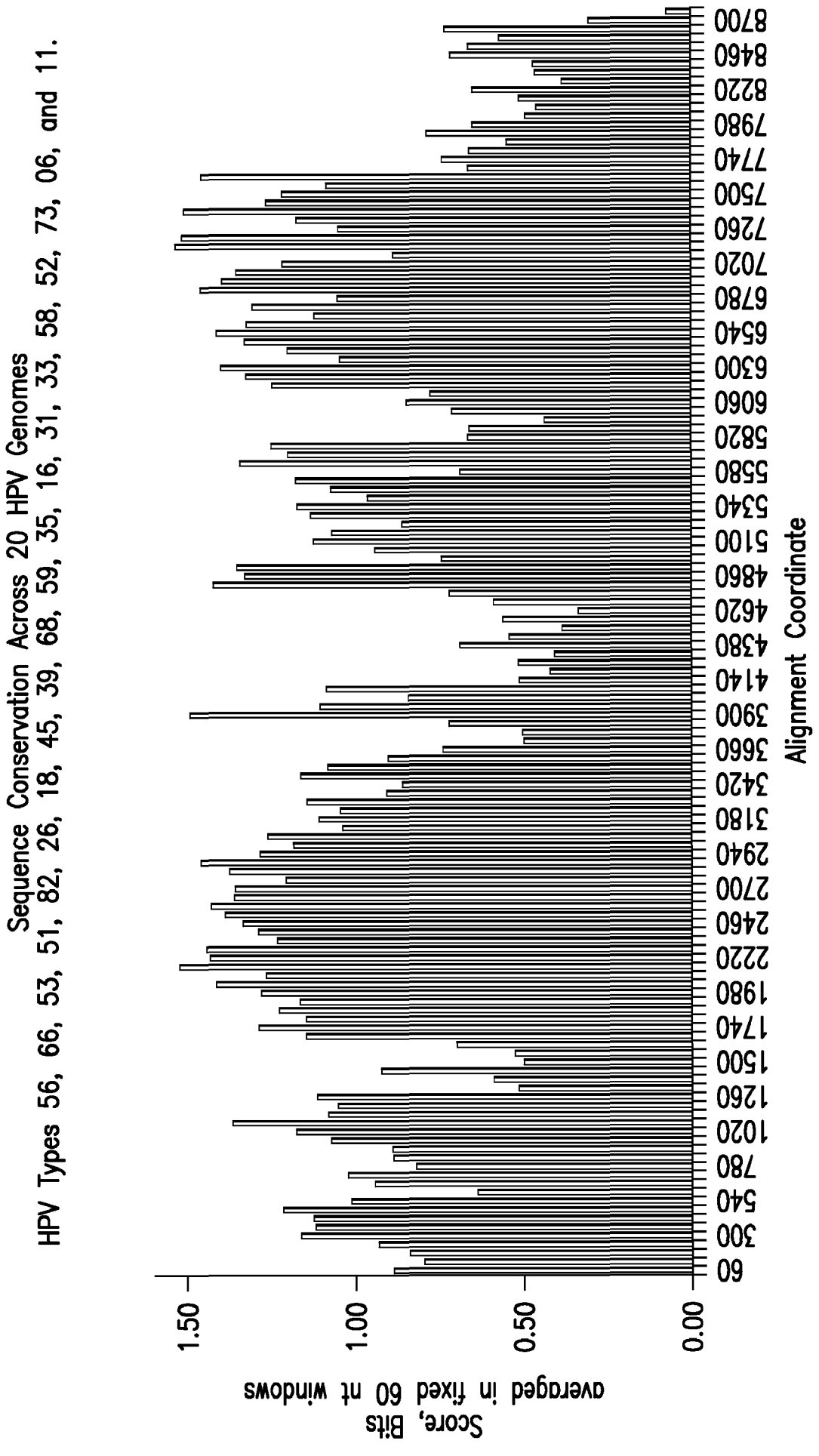

Sequence Conservation Across 20 HPV Genomes
HPV Types 56, 66, 53, 51, 82, 26, 18, 45, 39, 68, 59, 35, 16, 31, 33, 58, 52, 73, 06, and 11.
Score, Bits
averaged in fixed 60 nt windows
1.50
1.00
0.50
0.00
Alignment Coordinate
60
300
540
780
1020
1260
1500
1740
1980
2220
2460
2700
2940
3180
3420
3660
3900
4140
4380
4620
4860
5100
5340
5580
5820
6060
6300
6540
6780
7020
7260
7500
7740
7980
8220
8460
8700

FIG. 1A

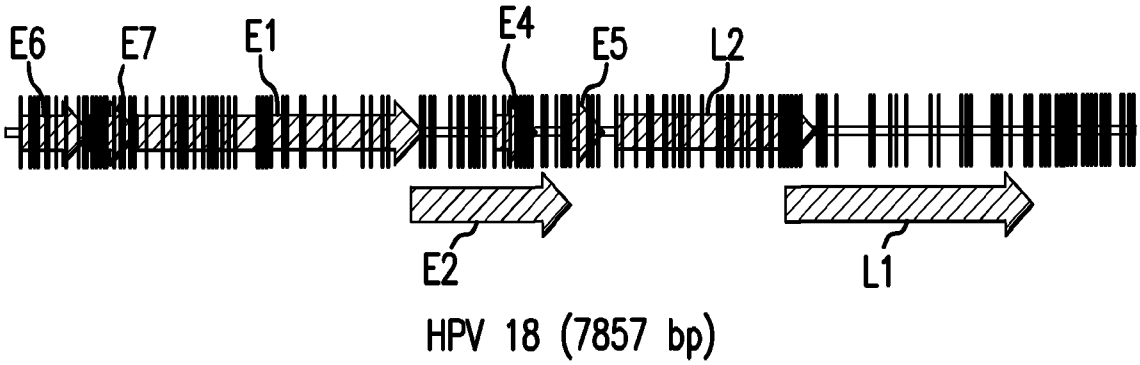


FIG.1B

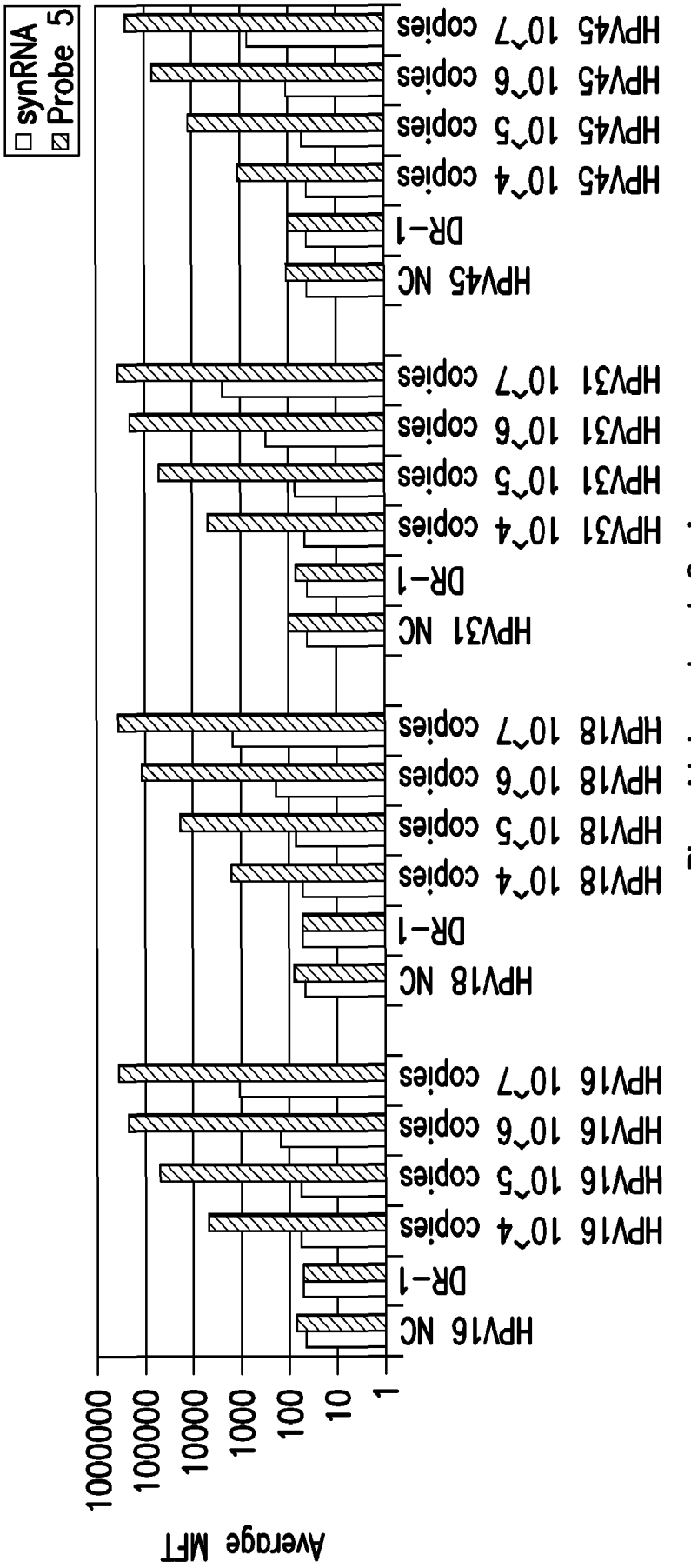

synRNA
Probe 5
Average MFI
1000000
100000
10000
1000
100
10
1
HPV16 NC
DR-1
HPV16 10^4 copies
HPV16 10^5 copies
HPV16 10^6 copies
HPV16 10^7 copies
HPV18 NC
DR-1
HPV18 10^4 copies
HPV18 10^5 copies
HPV18 10^6 copies
HPV18 10^7 copies
HPV31 NC
DR-1
HPV31 10^4 copies
HPV31 10^5 copies
HPV31 10^6 copies
HPV31 10^7 copies
HPV45 NC
DR-1
HPV45 10^4 copies
HPV45 10^5 copies
HPV45 10^6 copies
HPV45 10^7 copies
Plasmid type Input Copies

FIG.2

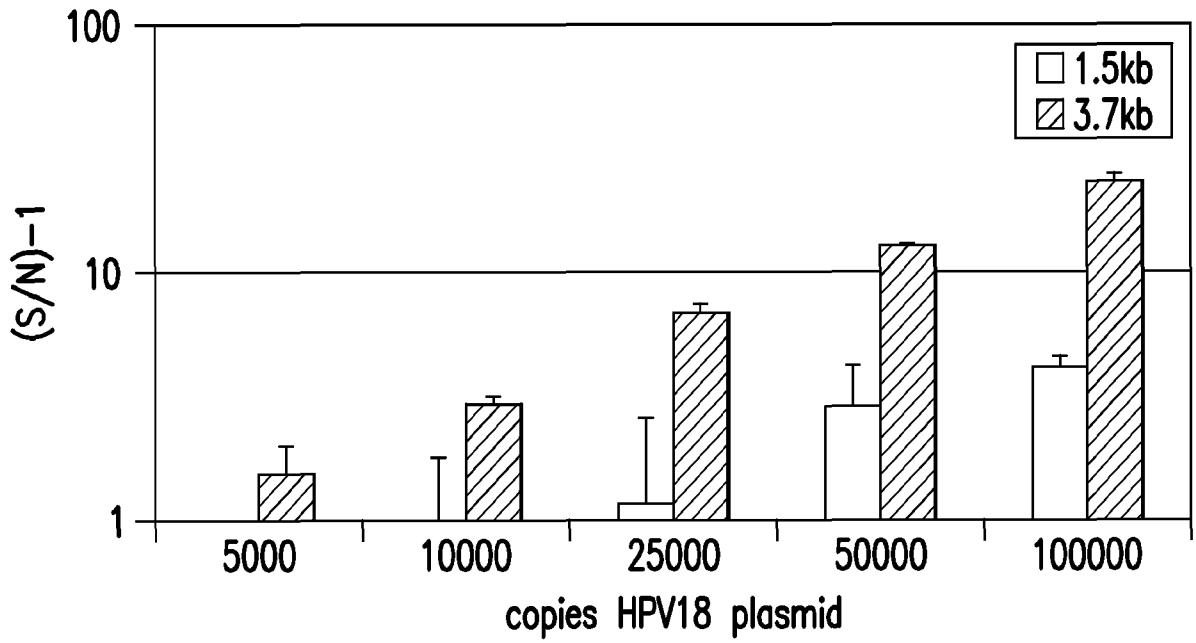

100
10
1
(S/N)-1
1.5kb
3.7kb
5000
10000
25000
50000
100000
copies HPV18 plasmid

FIG.3

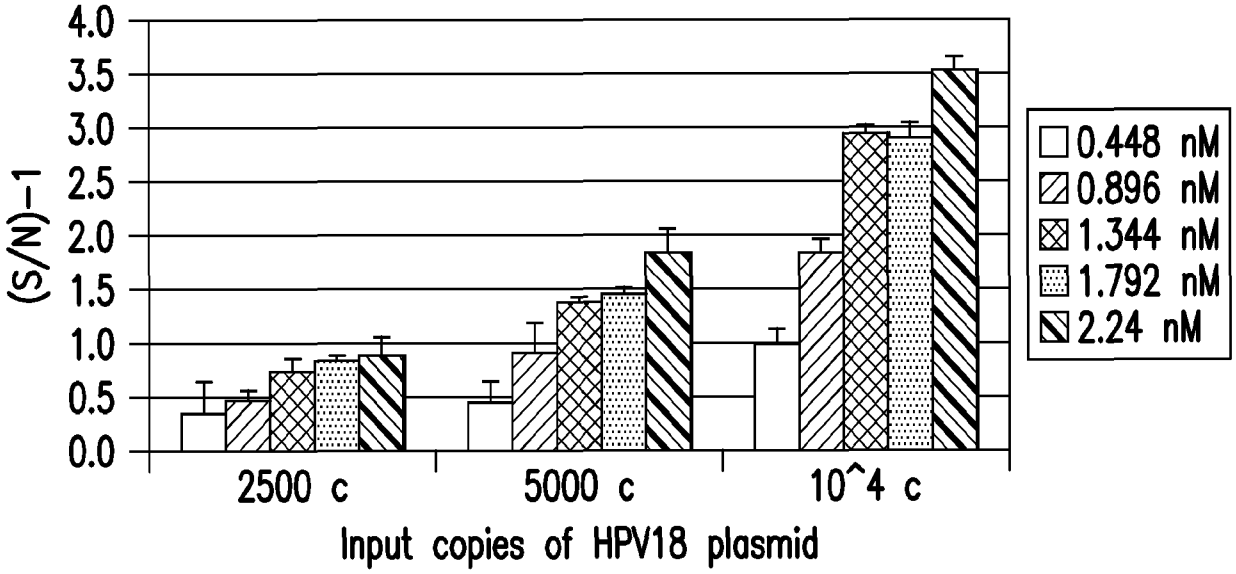

4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
(S/N)-1
2500 c
5000 c
10^4 c
Input copies of HPV18 plasmid
0.448 nM
0.896 nM
1.344 nM
1.792 nM
2.24 nM

FIG.4

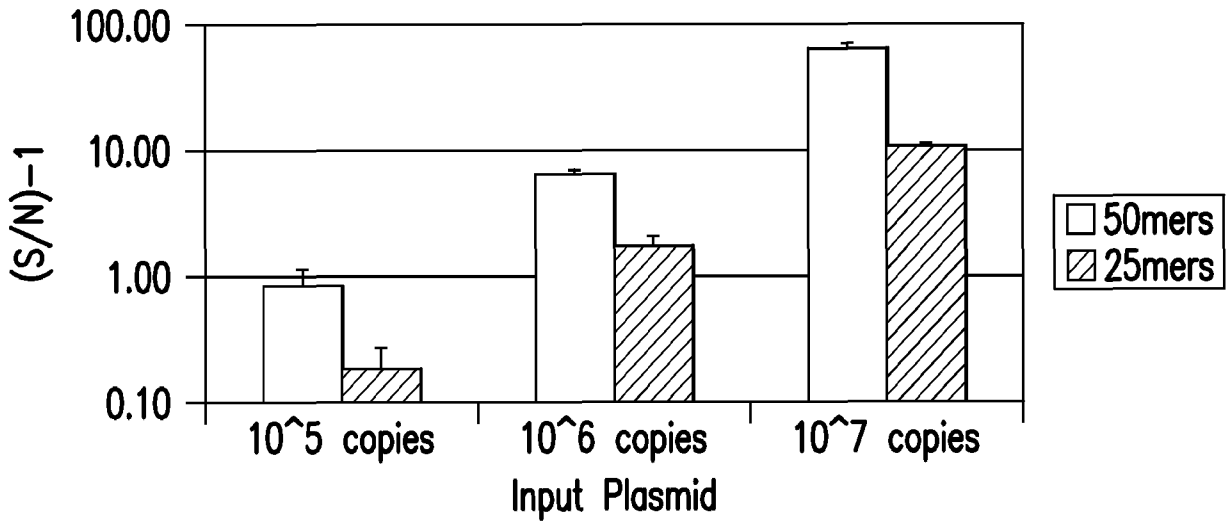

100.00
10.00
1.00
0.10
(S/N)-1
10^5 copies
10^6 copies
10^7 copies
Input Plasmid
50mers
25mers

FIG.5

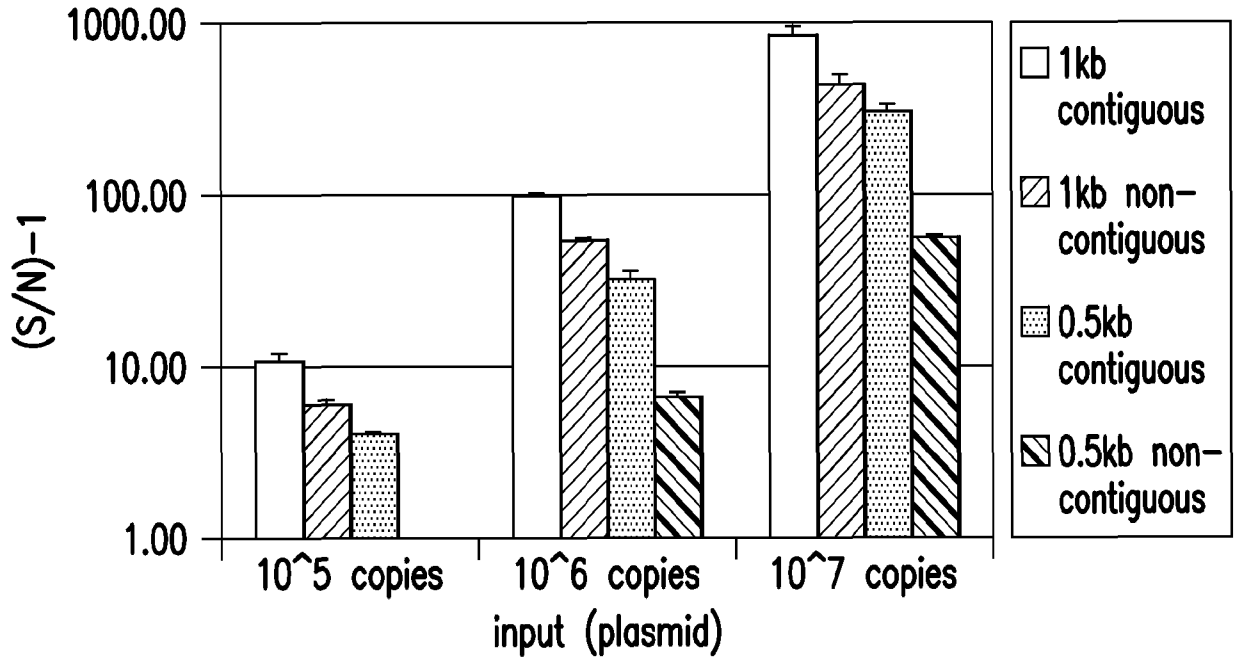

1000.00
100.00
10.00
1.00
(S/N)-1
10^5 copies
10^6 copies
10^7 copies
input (plasmid)
1kb contiguous
1kb non-contiguous
0.5kb contiguous
0.5kb non-contiguous

FIG.6

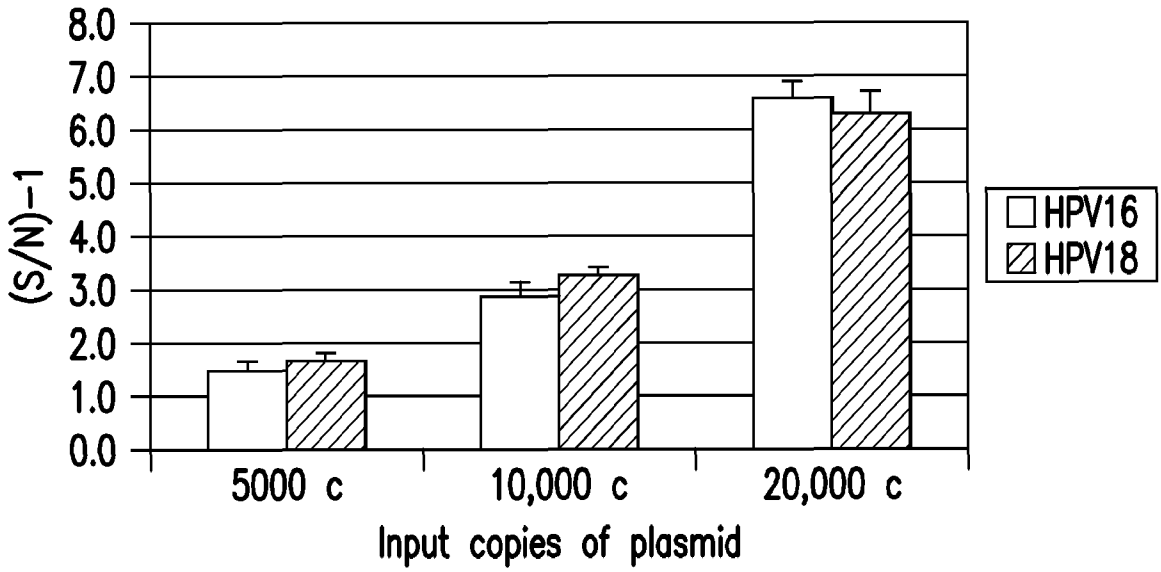

8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
(S/N)-1
5000 c
10,000 c
20,000 c
Input copies of plasmid
HPV16
HPV18

FIG.7

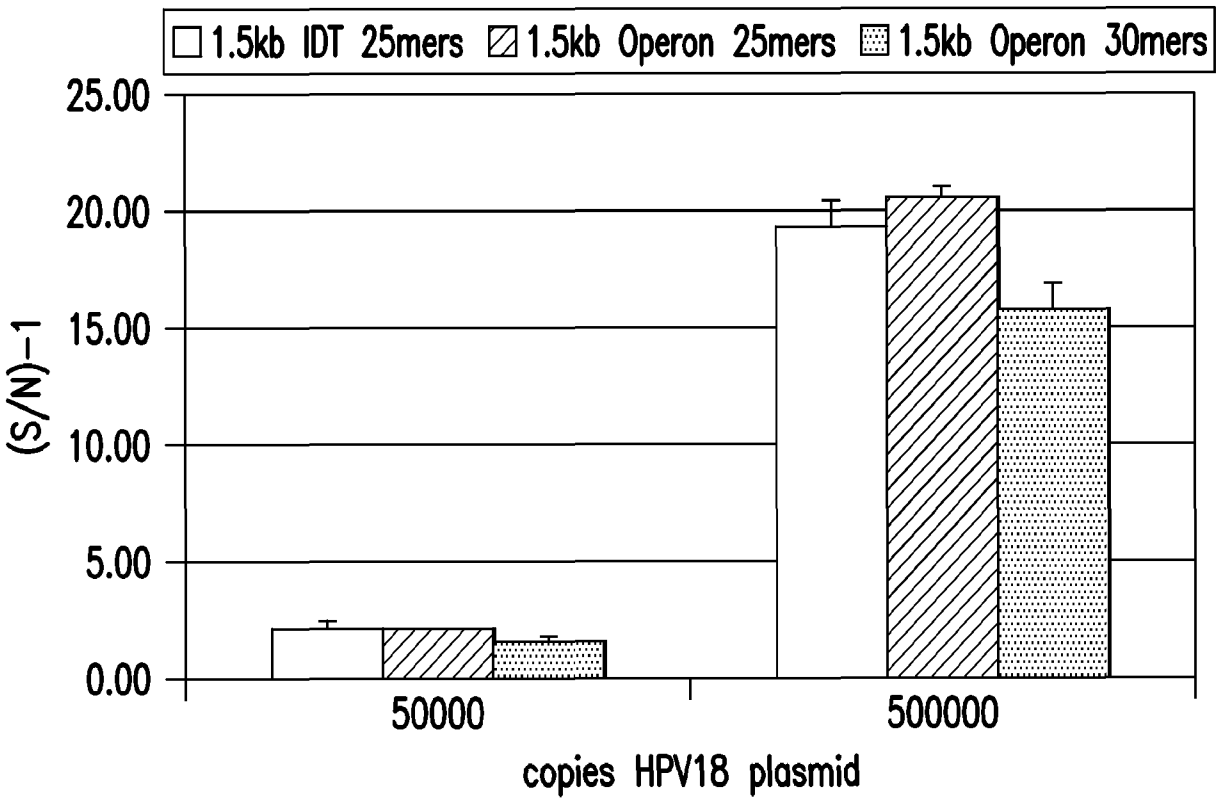

1.5kb IDT 25mers
1.5kb Operon 25mers
1.5kb Operon 30mers
25.00
20.00
15.00
10.00
5.00
0.00
(S/N)-1
50000
500000
copies HPV18 plasmid

FIG.8

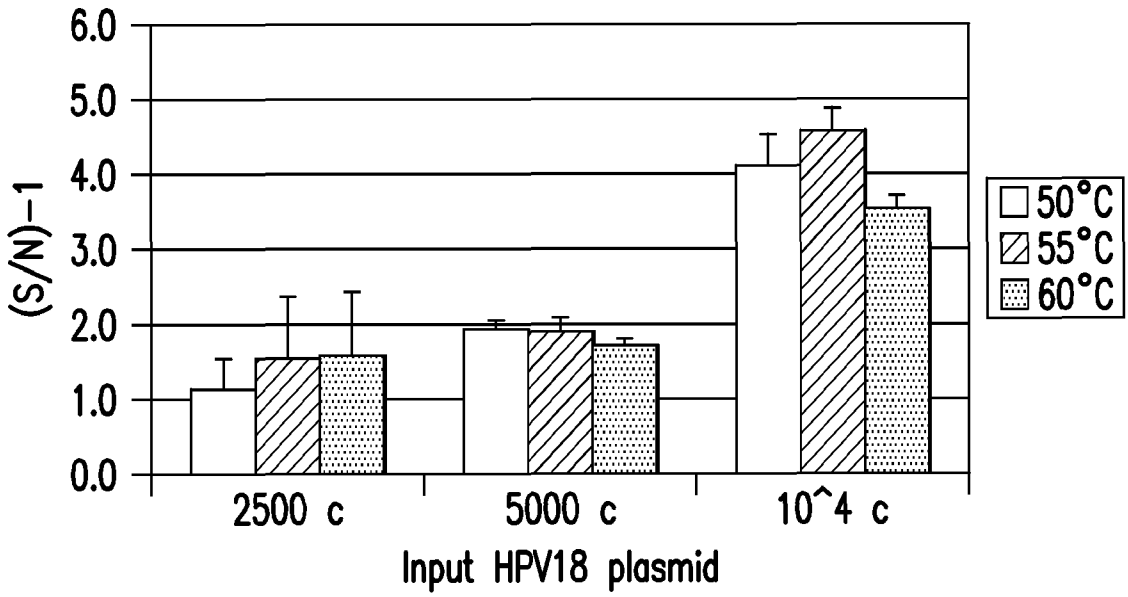

6.0
5.0
4.0
3.0
2.0
1.0
0.0
(S/N)-1
2500 c
5000 c
10^4 c
Input HPV18 plasmid
50°C
55°C
60°C

FIG.9

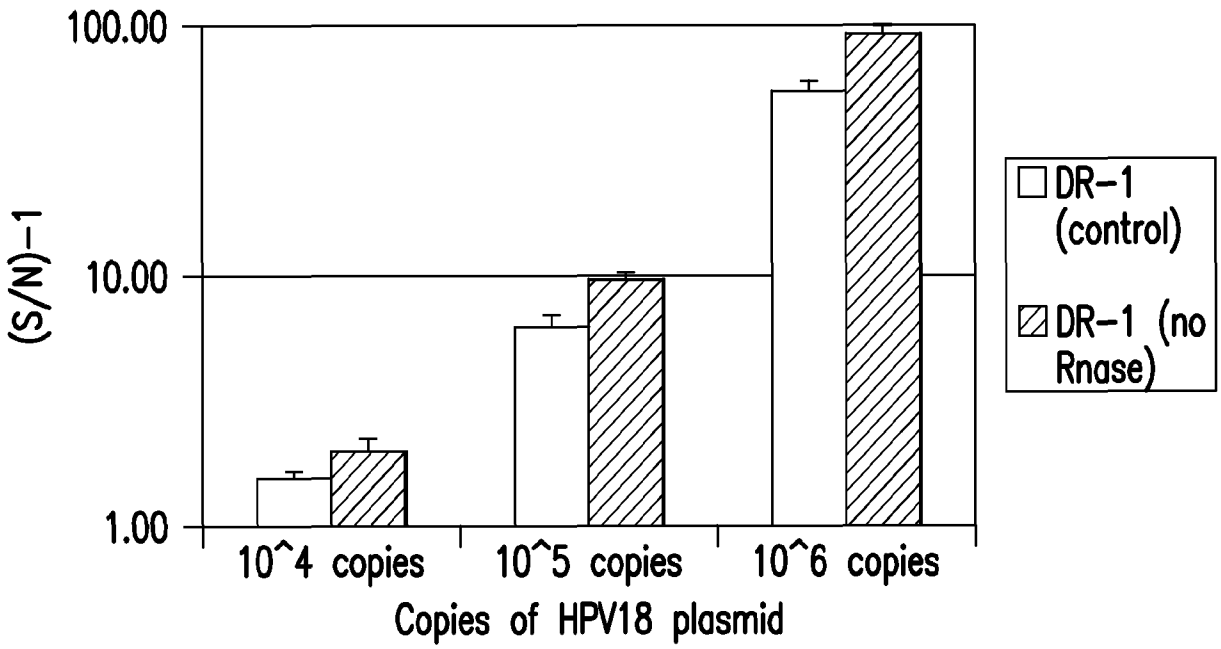

100.00
10.00
1.00
(S/N)-1
10^4 copies
10^5 copies
10^6 copies
Copies of HPV18 plasmid
DR-1 (control)
DR-1 (no Rnase)

FIG.10

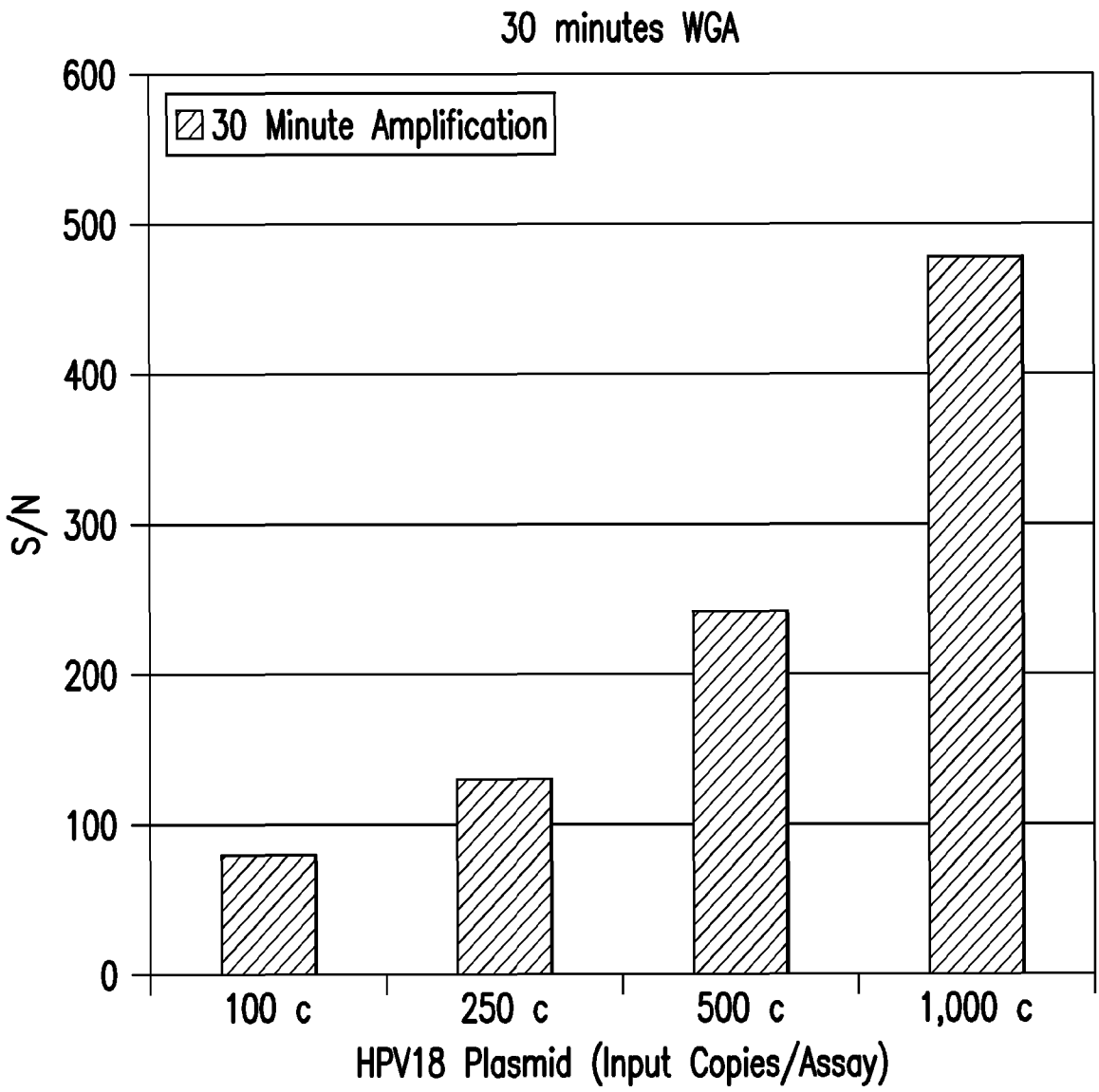

30 minutes WGA
30 Minute Amplification
600
500
400
300
200
100
0
S/N
100 c
250 c
500 c
1,000 c
HPV18 Plasmid (Input Copies/Assay)

FIG.11

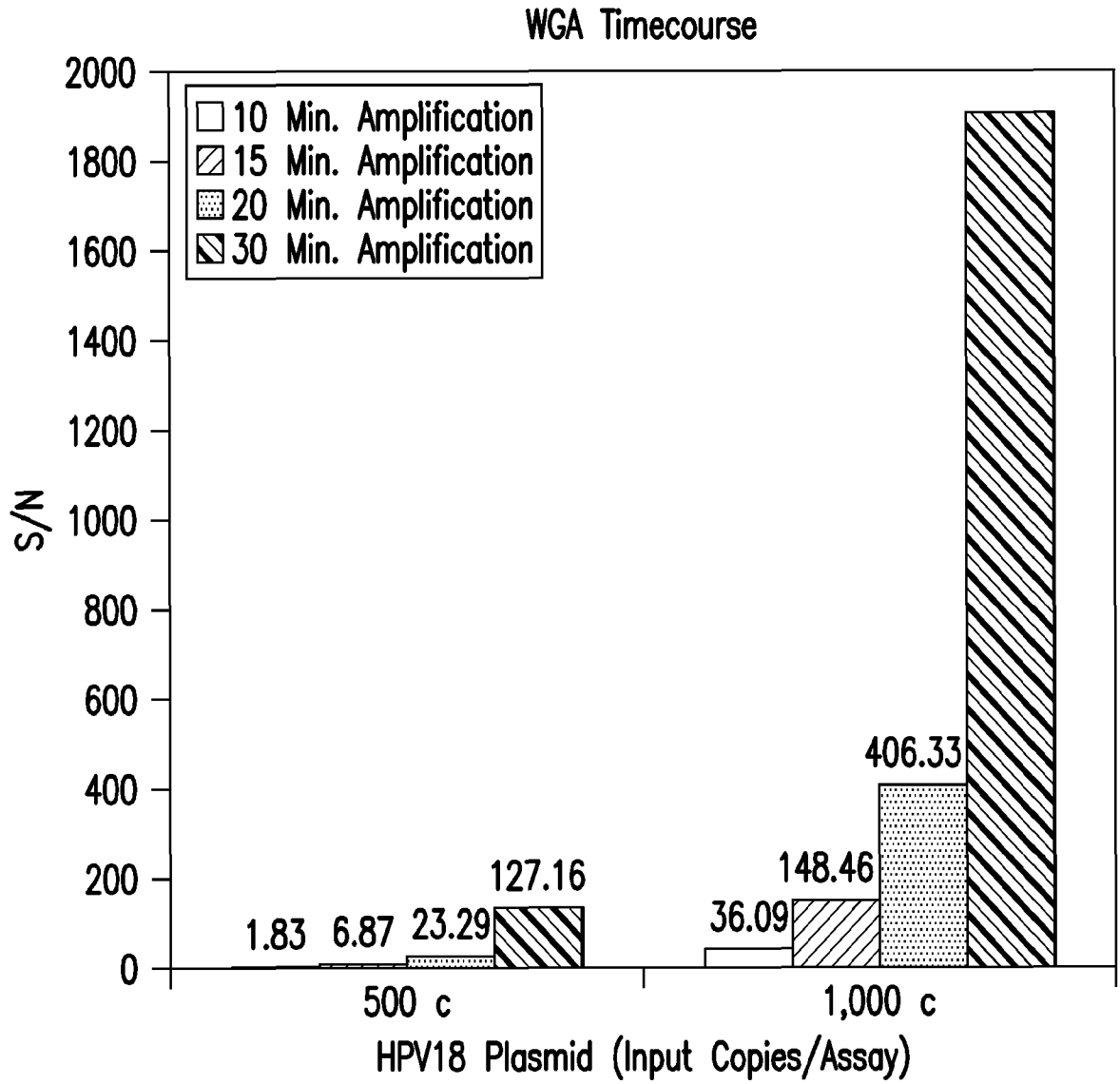

WGA Timecourse
2000
1800
1600
1400
1200
1000
800
600
400
200
0
S/N
10 Min. Amplification
15 Min. Amplification
20 Min. Amplification
30 Min. Amplification
1.83
6.87
23.29
127.16
36.09
148.46
406.33
500 c
1,000 c
HPV18 Plasmid (Input Copies/Assay)

FIG.12

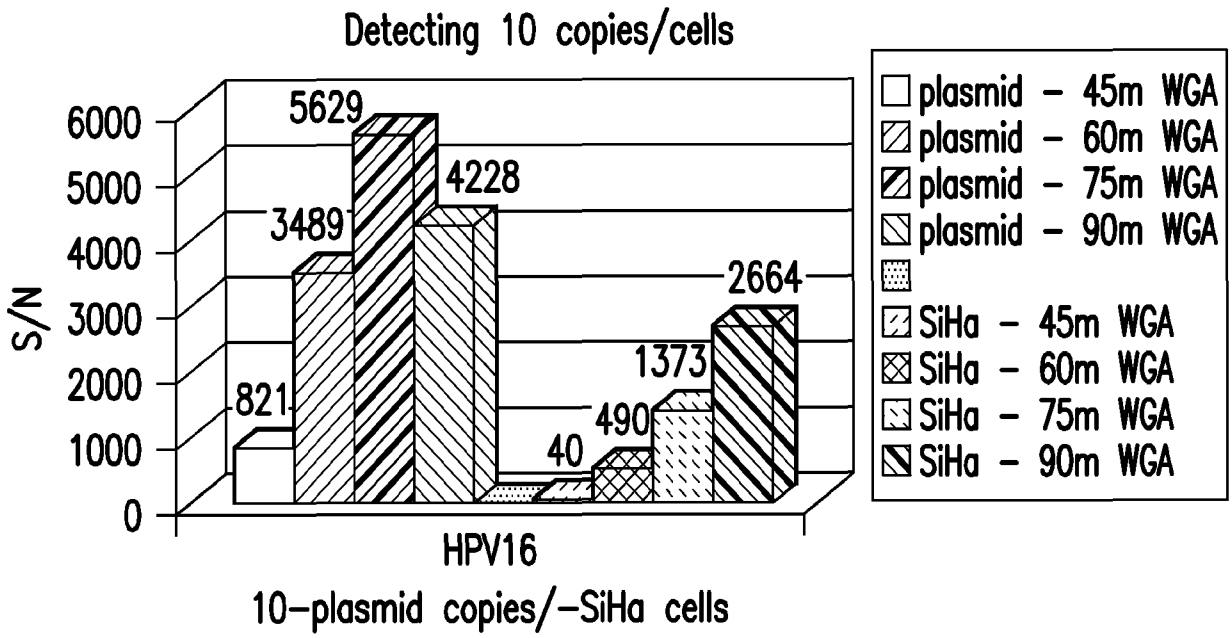

Detecting 10 copies/cells
6000
5000
4000
3000
2000
1000
0
S/N
5629
4228
3489
2664
1373
821
490
40
HPV16
10-plasmid copies/-SiHa cells
plasmid - 45m WGA
plasmid - 60m WGA
plasmid - 75m WGA
plasmid - 90m WGA
SiHa - 45m WGA
SiHa - 60m WGA
SiHa - 75m WGA
SiHa - 90m WGA

FIG.13

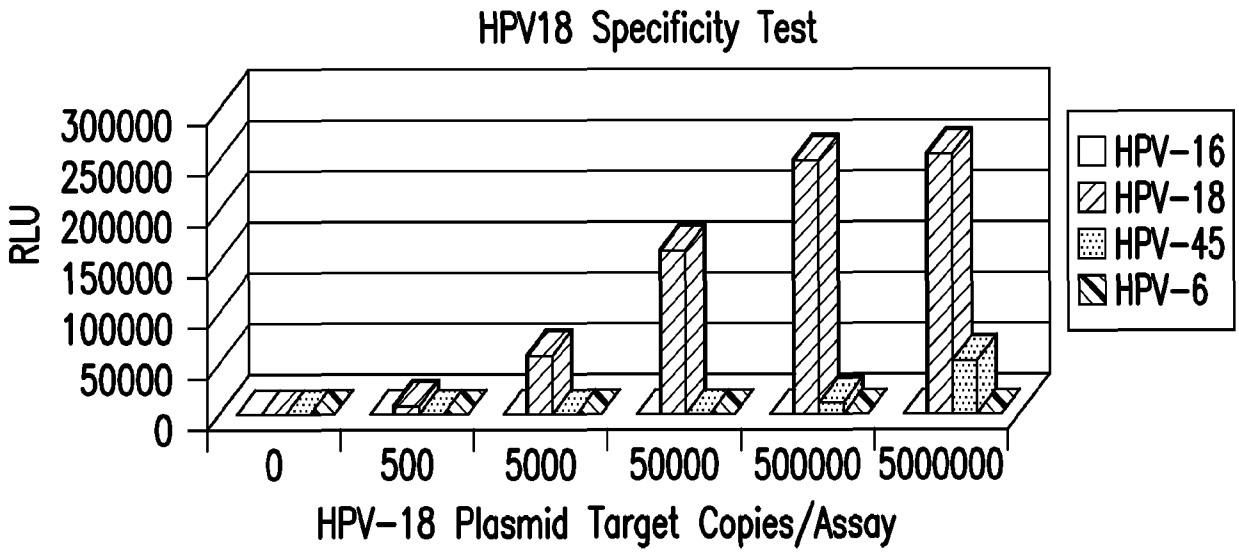

HPV18 Specificity Test
RLU
300000
250000
200000
150000
100000
50000
0
0
500
5000
50000
500000
5000000
HPV-18 Plasmid Target Copies/Assay
HPV-16
HPV-18
HPV-45
HPV-6

FIG.14

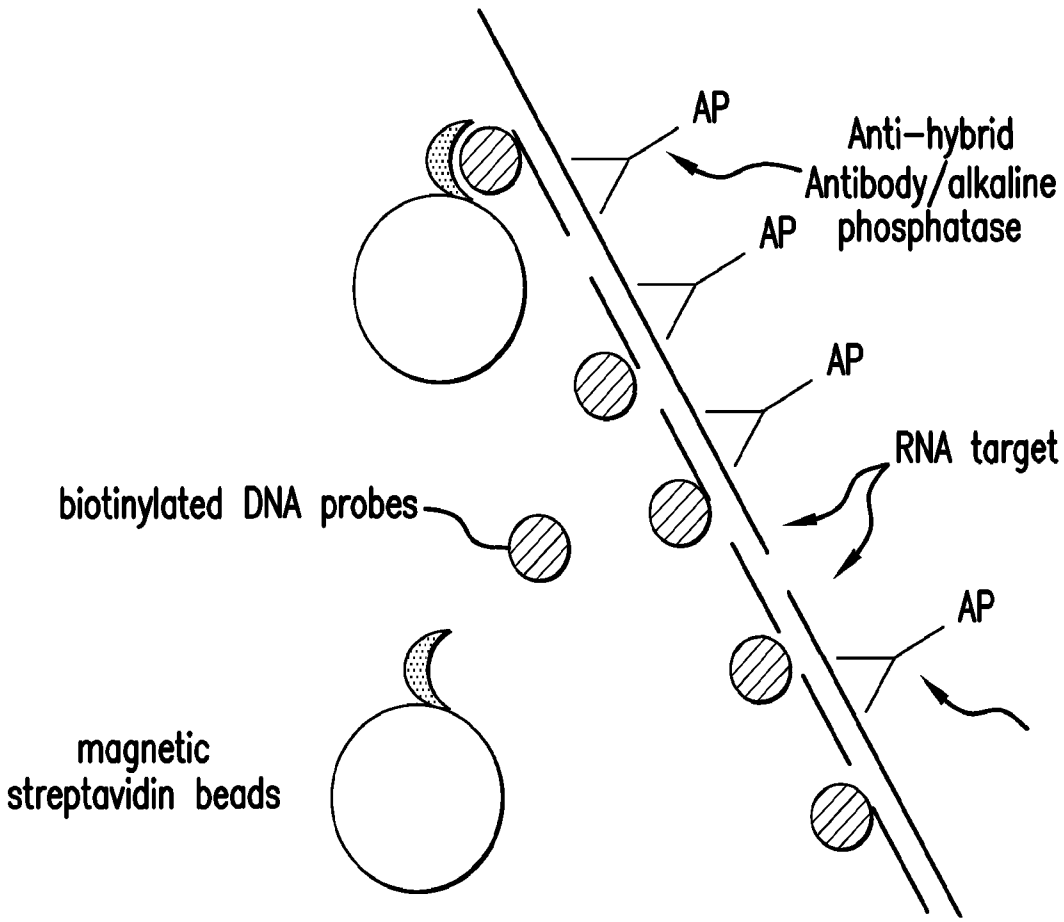

AP
Anti-hybrid
Antibody/alkaline
phosphatase
AP
AP
RNA target
biotinylated DNA probes
AP
magnetic
streptavidin beads

FIG.15

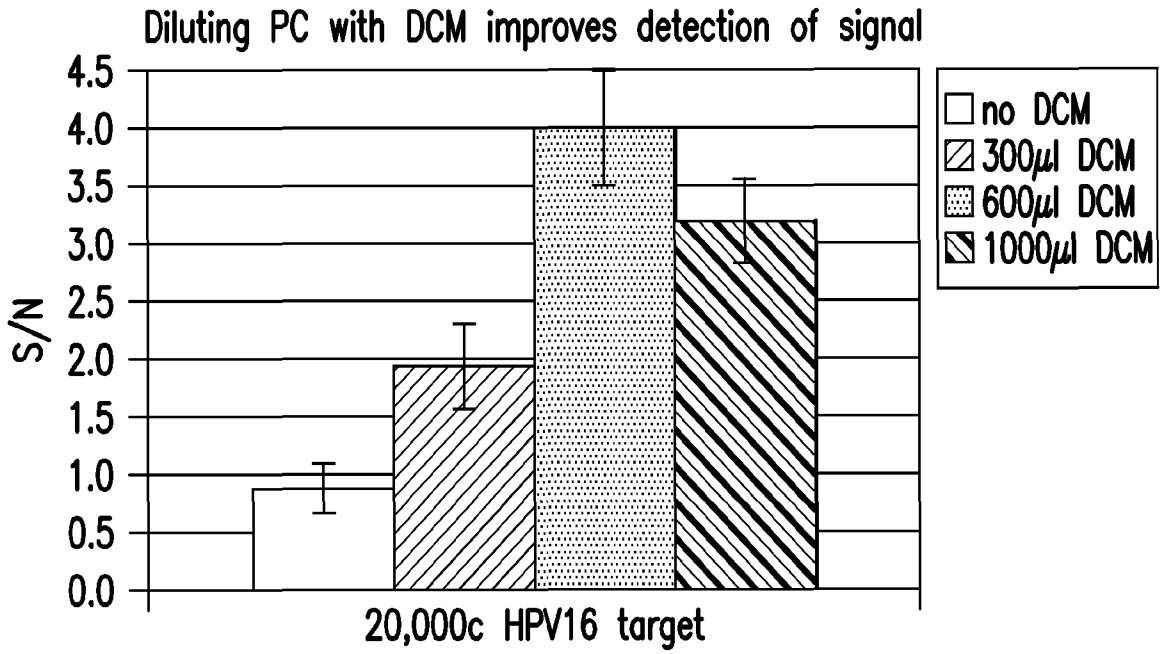

Diluting PC with DCM improves detection of signal
S/N
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
20,000c HPV16 target
no DCM
300µl DCM
600µl DCM
1000µl DCM

FIG.16

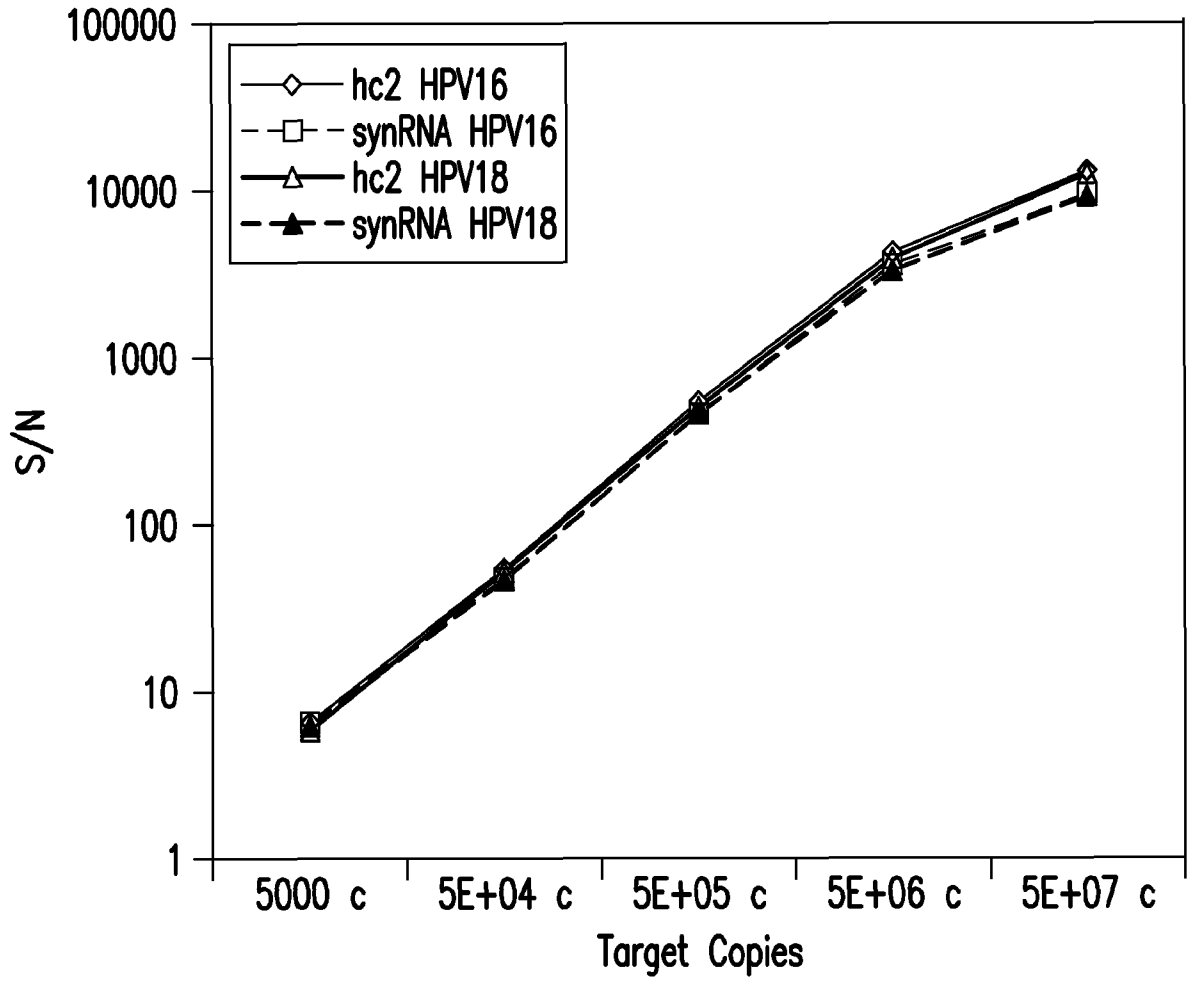

100000
10000
1000
100
10
1
S/N
hc2 HPV16
synRNA HPV16
hc2 HPV18
synRNA HPV18
5000 c
5E+04 c
5E+05 c
5E+06 c
5E+07 c
Target Copies

FIG.17

Target	Aveg RLU	S/N	%CV	Coverage
0	129		10%	
16	639	**5.0**	8%	3.9 kb
18	712	**5.5**	11%	3.6 kb
31	958	**7.5**	7%	3.6 kb
33	632	**4.9**	10%	3.1 kb
35	608	**4.7**	5%	3.6 kb
39	618	**4.8**	9%	3.0 kb
45	631	**4.9**	9%	3.2 kb
51	796	**6.2**	8%	3.7 kb
52	781	**6.1**	8%	3.3 kb
56	531	**4.1**	11%	2.9 kb
58	534	**4.2**	8%	3.3 kb
59	668	**5.2**	6%	3.7 kb
66	520	**4.0**	4%	3.0 kb
68	535	**4.2**	7%	2.7 kb
82	821	**6.4**	9%	3.8 kb

FIG.18

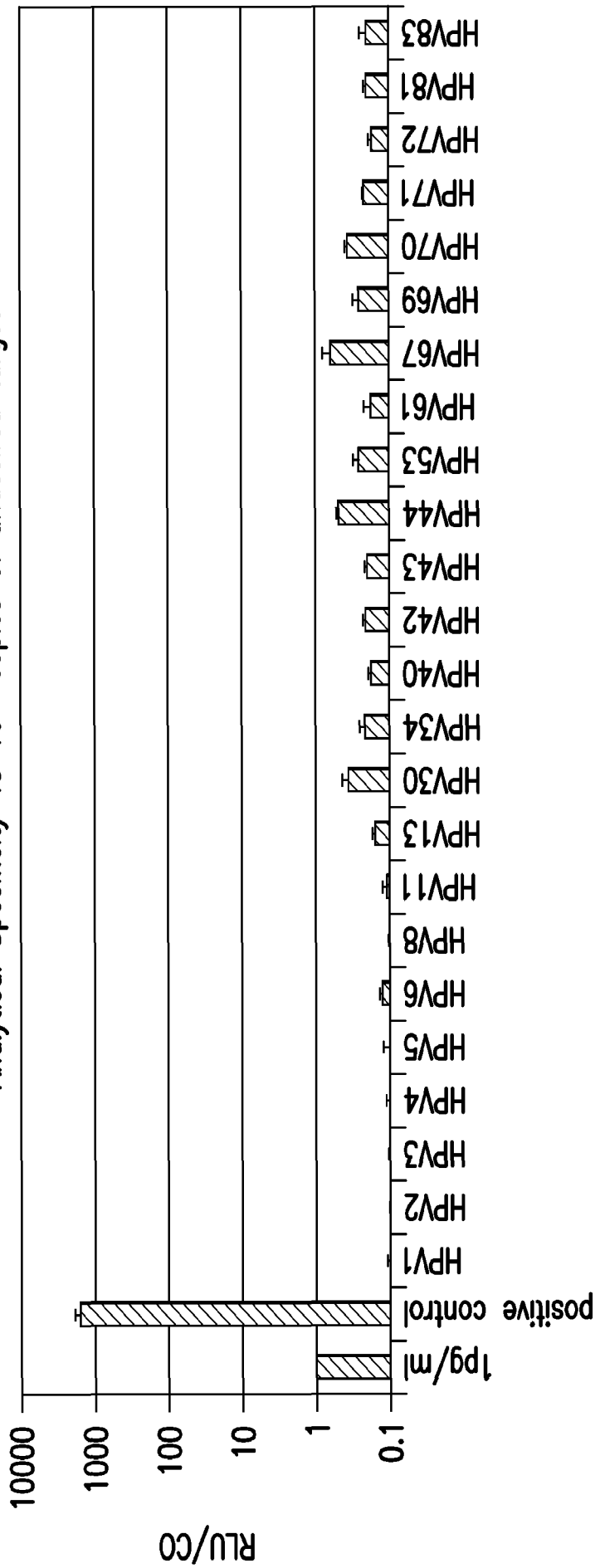

Analytical Specificity vs 10^8 copies of undesired target
RLU/CO
10000
1000
100
10
1
0.1
1pg/ml
positive control
HPV1
HPV2
HPV3
HPV4
HPV5
HPV6
HPV8
HPV11
HPV13
HPV30
HPV34
HPV40
HPV42
HPV43
HPV44
HPV53
HPV61
HPV67
HPV69
HPV70
HPV71
HPV72
HPV81
HPV83
HPV type

FIG.19

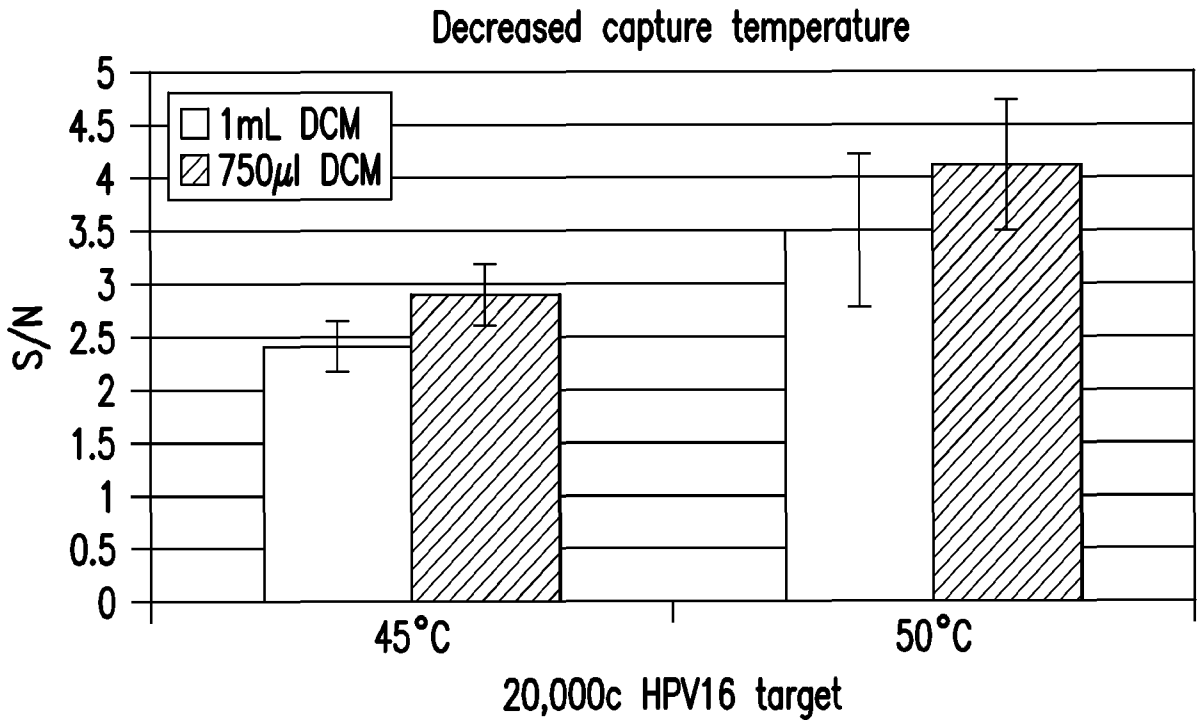

Decreased capture temperature
1mL DCM
750µl DCM
S/N
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
45°C
50°C
20,000c HPV16 target

FIG.20A

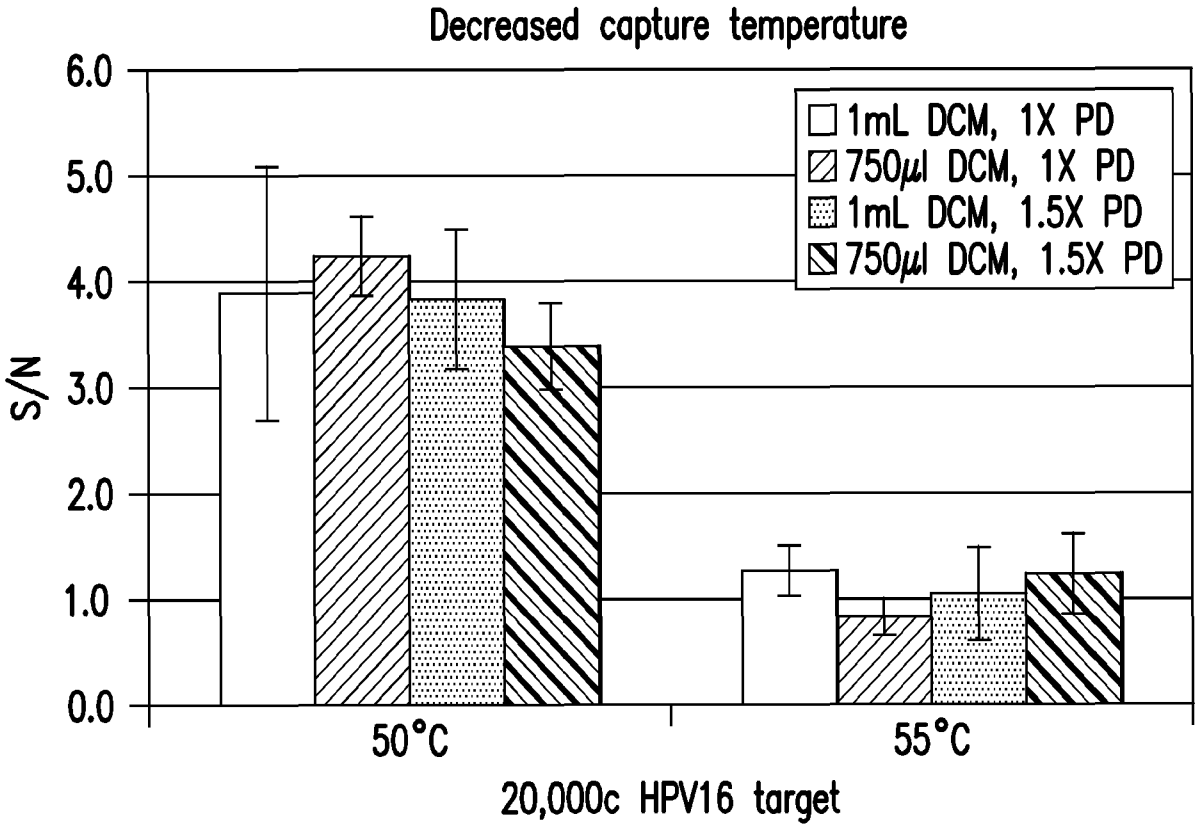

Decreased capture temperature
6.0
5.0
4.0
3.0
2.0
1.0
0.0
S/N
1mL DCM, 1X PD
750µl DCM, 1X PD
1mL DCM, 1.5X PD
750µl DCM, 1.5X PD
50°C
55°C
20,000c HPV16 target

FIG.20B

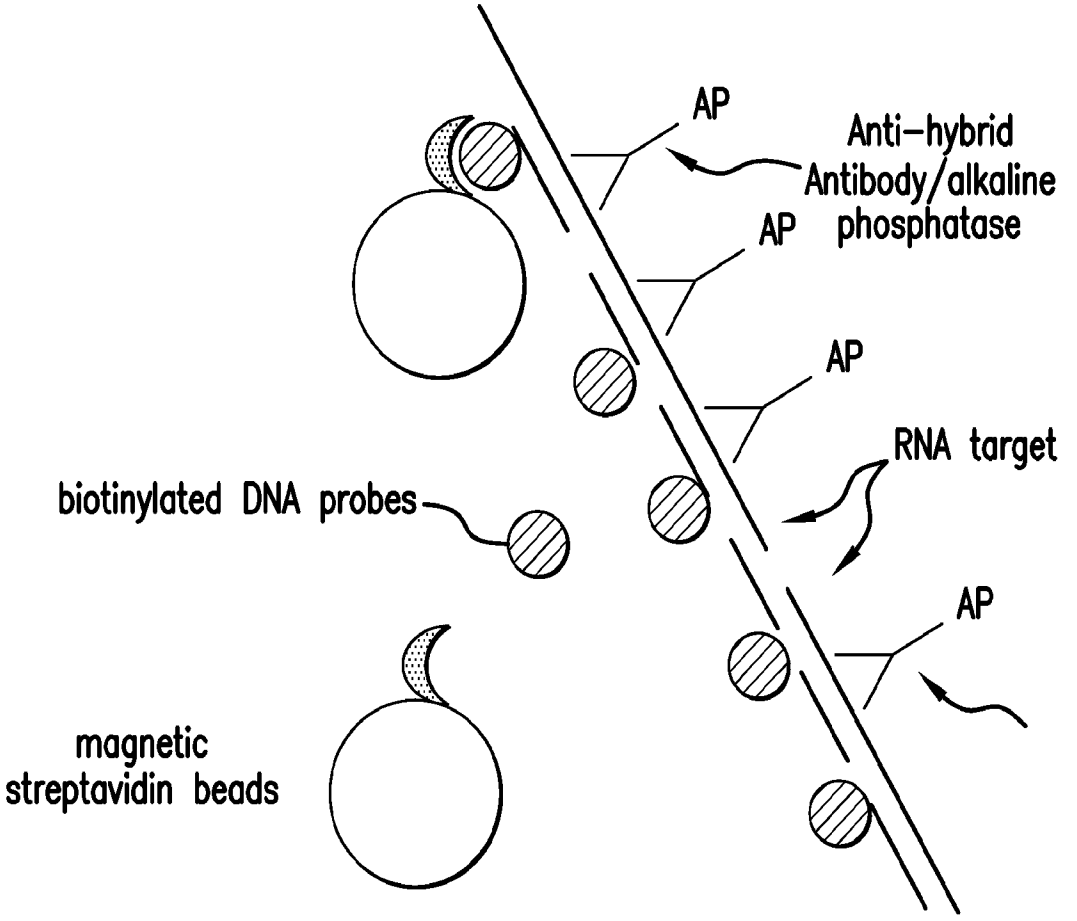

AP
Anti-hybrid
Antibody/alkaline
phosphatase
AP
AP
RNA target
biotinylated DNA probes
AP
magnetic
streptavidin beads

FIG.15