Electronic Supplementary Material (ESI) for Chemical Communications

Generalized probe selection method for DNA chips

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Supporting information

1. Material and Methods:

All chemicals were purchased from Sigma-Aldrich Chemicals, Korea. All the oligonucleotides were purchased from Bioneer, Korea. Glass slides (2.5x7.5 cm) were purchased from Paul Marienfeld GmbH & Co. KG, Germany**.** The standard viral genomic DNAs were obtained from the Korea Food and Drug Administration. All DNA chips used in this study were obtained by following the previously reported method.[1] Hybridizations were done by using the 100fmol of the Cy5 labeled PCR products of the 19 HPV genotypes at 25^0C for 30min in the commercial incubator and then the slides were dried using the commercial centrifuge (1000rpm). The fluorescence signal of the microarray was measured on ScanArrayLite (GSI Lumonics), and the images were analyzed by Quant Array software (Packard Bioscience).

2. Composition of different solutions used for hybridization and washing on 9G DNAChips:

1. Immobilization solution (pH = 7.4): 15% glycerol, 50mM butyl amine, 600mM NH_4Cl
2. Blocking buffer solution (pH = 7.4): 0.5% milk casein in 4xSSC
3. Hybridization buffer (pH = 7.4): 25% Formamide, 0.1% Triton X-100, 6xSSC
4. Washing buffer solution A (pH = 7.4): 0.1% SDS in 4xSSC
5. Washing buffer solution B (pH = 7.4): 4xSSC

3. Probes and Target oligonucleotides:

Table S1. Sequences and the nomenclature of probes and target oligonucleotides

Probes	Description	HPV Type	Sequence
(Probe length, 14mer, 17mer, 20mer)			
Probe1	14mer	HPV16	5'-GGGGGGGGG CTT TAT AC GAC ATG GGG AGG
Probe2	17mer	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
Probe3	20mer	HPV16	5'-GGGGGGGGG CTTTAT GT ACC TAC GAC ATG GGG AGG
Probe4	14mer	HPV18	5'-GGGGGGGGG CTT TAT CA GAC ATG TTG AGG
Probe5	17mer	HPV18	5'-GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
Probe6	20mer	HPV18	5'-GGGGGGGGG CTT TAT GT ATA GCA GAC ATG TTG AGG
(Probe position, -14, -11,-8, -5, -1, +3, +7, and +11)			
Probe7	(-14Probe)	HPV16	5'-GGGGGGGGG CTT TAT GA GGA ATA TGA TTT ACA
Probe8	(-11Probe)	HPV16	5'-GGGGGGGGG CTT TAT GG GGA GGA ATA TGA TTT
Probe9	(-8Probe)	HPV16	5'-GGGGGGGGG CTT TAT CT TGG GGA GGA ATA TGA
Probe10	(-5Probe)	HPV16	5'-GGGGGGGGG CTT TAT CG ACT TGG GGA GGA ATA
Probe11	(-1Probe)	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
Probe12	(+3Probe)	HPV16	5'-GGGGGGGGG CTT TAT AG TAC CTA CGA CAT GGG
Probe13	(+8Probe)	HPV16	5'-GGGGGGGGG CTT TAT TA AGG AGT ACC TAC GAC
Probe14	(+11Probe)	HPV16	5'-GGGGGGGGG CTT TAT CT TTA AGG AGT ACC TAC
Probe15	(-14Probe)	HPV18	5'-GGGGGGGGG CTT TAT GA GGA ATA TGA TTT GCA
Probe16	(-11Probe)	HPV18	5'-GGGGGGGGG CTT TAT GT TGA GGA ATA TGA TTT
Probe17	(-8Probe)	HPV18	5'-GGGGGGGGG CTT TAT CT TGT TGA GGA ATA TGA
Probe18	(-5Probe)	HPV18	5'-GGGGGGGGG CTT TAT AG ACT TGT TGA GGA ATA
Probe19	(-1Probe)	HPV18	5'-GGGGGGGGG CTT TAT TA GCA GAC TTG TTG AGG
Probe20	(+5Probe)	HPV18	5'-GGGGGGGGG CTT TAT AGT ATA GCA GAC ATG
Probe21	(+8Probe)	HPV18	5'-GGGGGGGGG CTT TAT AAG CAG TAT AGC AGA C
Probe22	(+12Probe)	HPV18	5'-GGGGGGGGG CTT TAT ATT TAA GCA GTA TAG C
(Original HPV Probes (without mutations)			
Probe23		HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
Probe24		HPV18	5'-GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
Probe25		HPV06	5'-GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
Probe26		HPV66	5'-GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
Probe27		HPV39	5'-GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
Probe28		HPV42	5'-GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
Probe29		HPV31	5'-GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
Probe30		HPV45	5'-GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
Probe31		HPV11	5'-GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
Probe32		HPV59	5'-GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
Probe33		HPV51	5'-GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
Probe34		HPV34	5'-GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
Probe35		HPV33	5'-GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG

Probe36		HPV52	5'-GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
Probe37		HPV40	5'-GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
Probe38		HPV68	5'-GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
Probe39		HPV56	5'-GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
Probe40		HPV35	5'-GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
Probe41		HPV58	5'-GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG
Probe with one mutations (M1), two mutations (M2),and three mutations (M3)			
Probe42	1T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGT
Probe43	2T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG GGG ATG
Probe44	3T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG GGG TGG
Probe45	4T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG GGT AGG
Probe46	5T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG GTG AGG
Probe47	6T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATG TGG AGG
Probe48	7T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC ATT GGG AGG
Probe49	8A	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC AAG GGG AGG
Probe50	9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG GGG AGG
Probe51	2,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG GGG ATG
Probe52	3,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG GGG TGG
Probe53	4,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG GGT AGG
Probe54	5,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG GTG AGG
Probe55	6,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG TGG AGG
Probe56	7,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTT GGG AGG
Probe57	2,5,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG GTG ATG
Probe58	3,6,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG TGG TGG
Probe59	4,7,9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTT GGT AGG
(HPV Probes with one artificial mutation except for HPV33 and HPV68)			
Probe60	9T	HPV16	5'-GGGGGGGGG CTT TAT CC TAC GAC TTG GGG AGG
Probe61	9T	HPV18	5'-GGGGGGGGG CTT TAT TA GCA GAC TTG TTG AGG
Probe62	7T	HPV06	5'-GGGGGGGGG CTT TAT CA TGC GTC ATA TGG AAG
Probe63	7T	HPV66	5'-GGGGGGGGG CTT TAT CC TTC GCC ATA TGG AGG
Probe64	4T	HPV39	5'-GGGGGGGGG CTT TAT TA CCA GGC ACG TGT AGG
Probe65	9T	HPV42	5'-GGGGGGGGG CTT TAT TT TAA GAC TTG CTG AAG
Probe66	7T	HPV31	5'-GGGGGGGGG CTT TAT TT TAA GAC ATA GTG AGG
Probe67	7T	HPV45	5'-GGGGGGGGG CTT TAT TA GTA GAC ATA TGG AGG
Probe68	7T	HPV11	5'-GGGGGGGGG CTT TAT CA TGC GCC ATA TGG AGG
Probe69	7T	HPV59	5'-GGGGGGGGG CTT TAT TG CCA GAC ATA TGG AGG
Probe70	7T	HPV51	5'-GGGGGGGGG CTT TAT TA TTA GGC ATA GGG AAG
Probe71	9T	HPV34	5'-GGGGGGGGG CTT TAT CC TCA GAC TTG CAG AAG
Probe72	-	HPV33	5'-GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
Probe73	8T	HPV52	5'-GGGGGGGGG CTT TAT CC TTC GTC AAG GCG AGG
Probe74	7T	HPV40	5'-GGGGGGGGG CTT TAT TT TGC GTC ATA GGG AGG
Probe75	-	HPV68	5'-GGGGGGGGG CTT TAT TG TTA GGC ATG TTG AGG

Probe76	4T	HPV56	5'-GGGGGGGGG CTT TAT CC TTA GAC ATG TGT AGG
Probe77	8T	HPV35	5'-GGGGGGGGG CTT TAT TT TAA GGC AAG GTG AAG
Probe78	7T	HPV58	5'-GGGGGGGGG CTT TAT TG TAC GTC ATA TTG AAG
Probe79		HC	5'-GGGGGGGGG TTT CCT AG TGG CTC TAT GGT AAC
Probe80		PC	5'-GGGGGGGGG TGA TTT ACA GTT TAT DTT TC
Probe81		PCR	5'-GGGGGGGGG ATT GGC ATG BKG ARG ART WTG A
Probe82		NC	5'-GGGGGGGGG AAA GCT GCT GCT CGT CGT CGT CGT
Target1		HC-Cy5-T1	3'- GGA TCA CCG AGA TAC CAT TG GAG ACT GCG -Cy5-5'
Forward primer	primer	FP	3`-GCMCAGGGWCATAAYAATGG-5'
Reverse primer	primer	RP-Cy5	3`-GAAAHATAAACTGTAAATCATAYTC-Cy5-5'

HC – probe for the Hybridization control
PC – probe for the Primer control (Positive control)
PCR – probe for the PCR control
HC-Cy5-T1 – Target oligonucleotide for HC probe
GGGGGGGGG – 9G for immobilization of the probes on the AMCA slides
CTT TAT – vertical spacer group

4. Amplification of the HPV DNA by PCR:

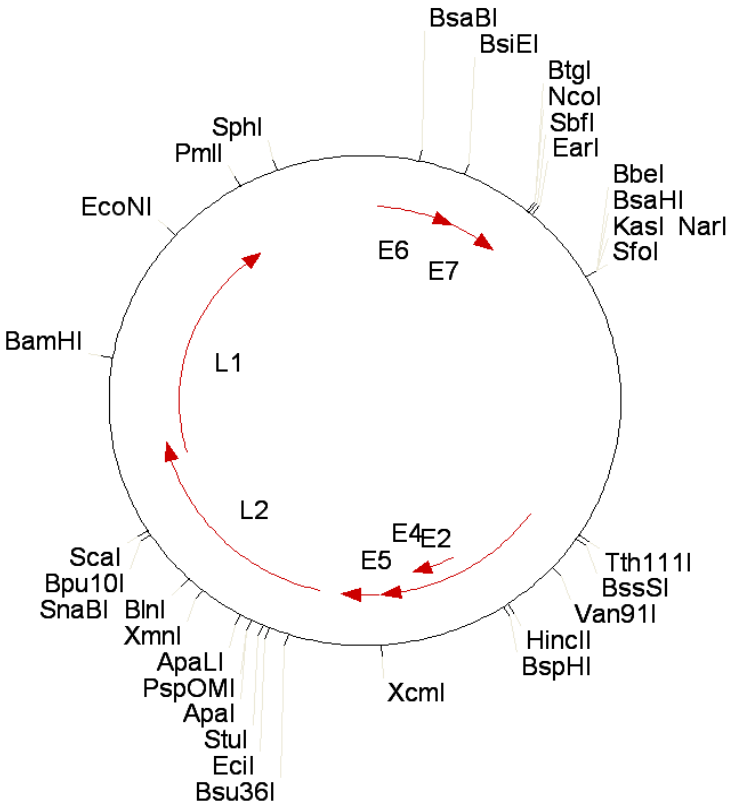


Figure S1: Genomic map with different regions on the HPV 16 genotype, L1 gene position 5559-7154.

The MY09/MY11 primer set-mediated PCR (MY-PCR) and the $GP5^{+}/GP6^{+}$ primer set-mediated PCR (GP^{+}-PCR) are the most frequently used amplification systems for the detection of HPV DNA in clinical samples, amplifying DNA fragments in the conserved L1 region with approximately 450bp and 150bp, respectively. Further, type-specific PCR primer sets allow the identification of individual genotypes. The MY11/ $GP6^{+}$ primer set consists of a fixed nucleotide sequence for the forward and reverse primers, respectively, and detects a wide range of HPV types by using a lowered annealing temperature during PCR.

(Note: The MY11/GP6+ is a primer set is used to amplify a 189 bp fragment of the HPV L1 region by PCR.)

5. Selection of length of the Probes:

5a. Hybridization with Cy5 labeled PCR product of HPV16

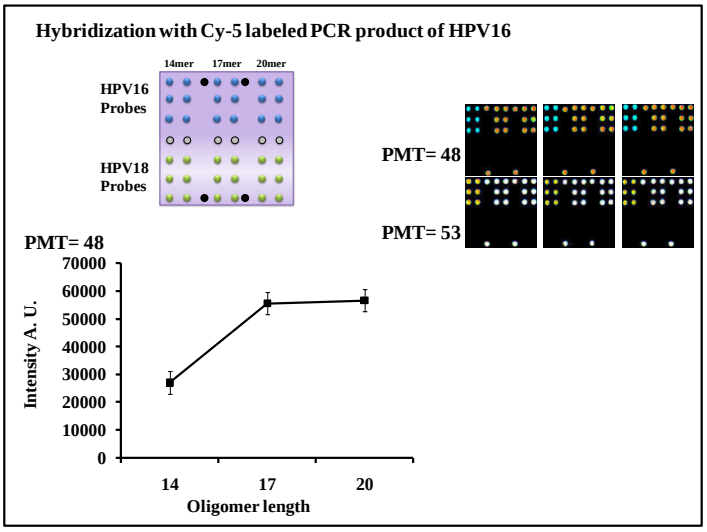


Figure S2: Probe length selection from 14mer, 17mer, and 20mer based on probes complementary to the HPV16

5b. Hybridization with Cy5 labeled PCR product of HPV18

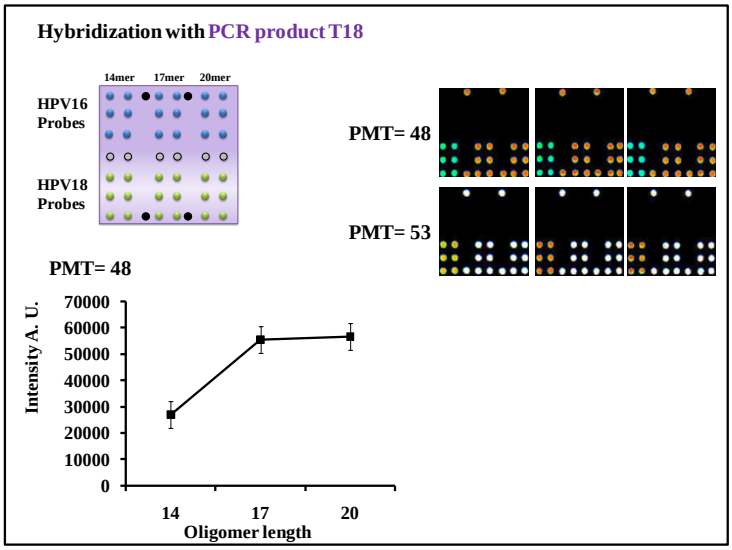


Figure S3: Probe length selection from 14mer, 17mer, and 20mer based on probes complementary to the HPV18

6. Selection of the starting position of the probes:

6a. Hybridization with Cy5 labeled PCR product of HPV16

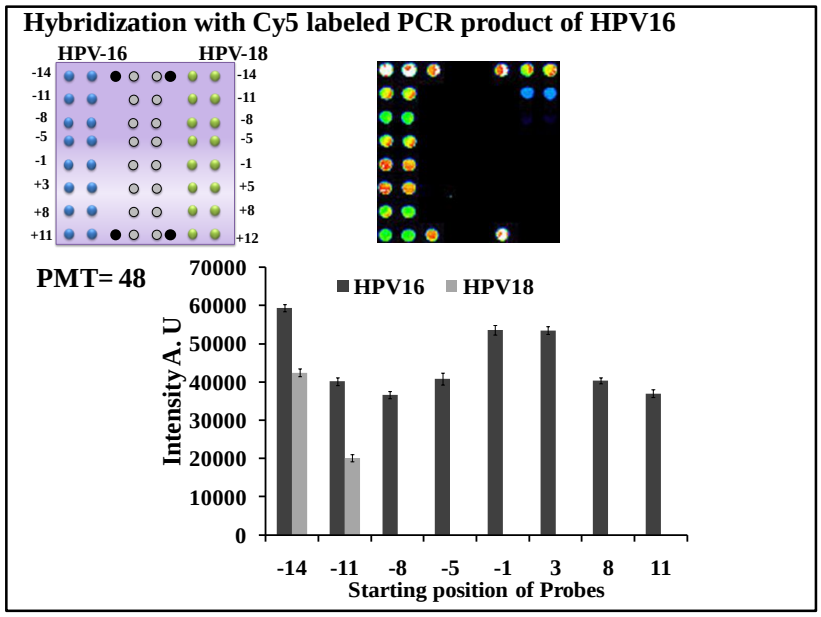


Figure S4: Selection of the starting position of the probes based on probes complementary to the HPV16

6b. Hybridization with Cy5 labeled PCR product of HPV18

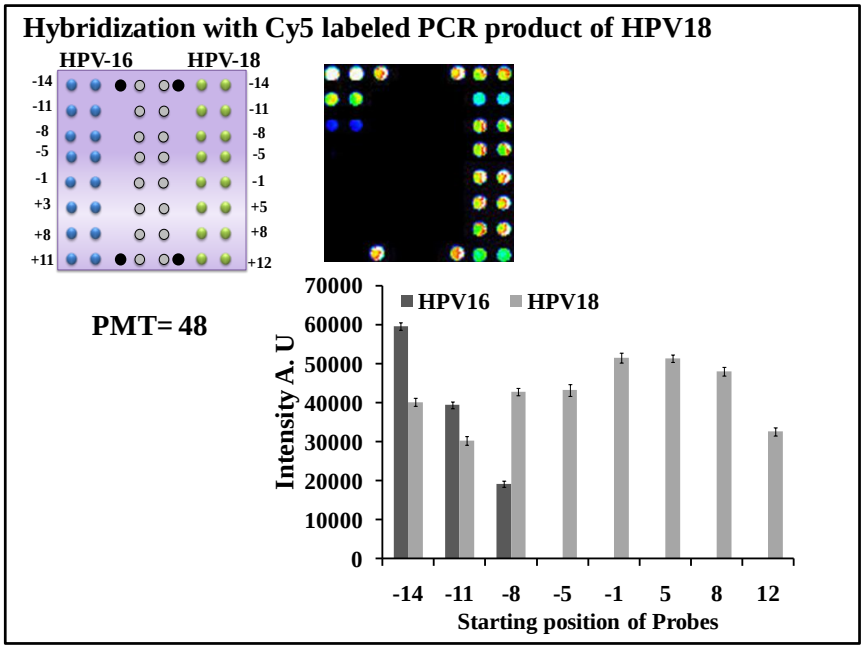


Figure S5: Selection of the starting position of the probes based on probes complementary to the HPV18

7. Probe length and the Probe sequence:

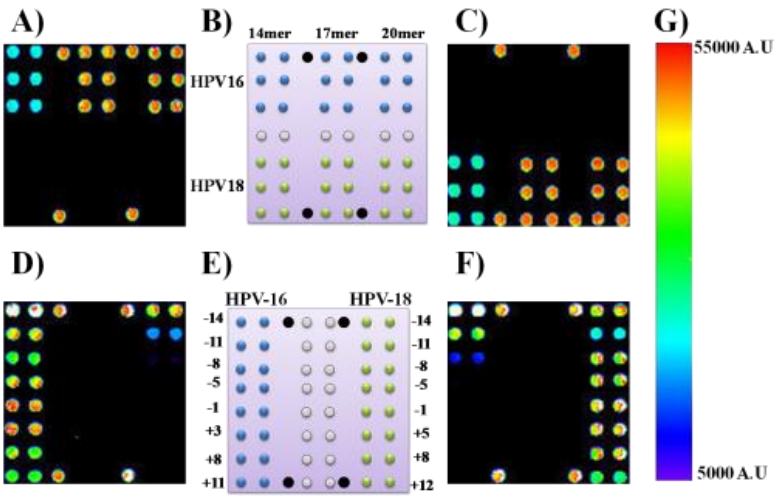
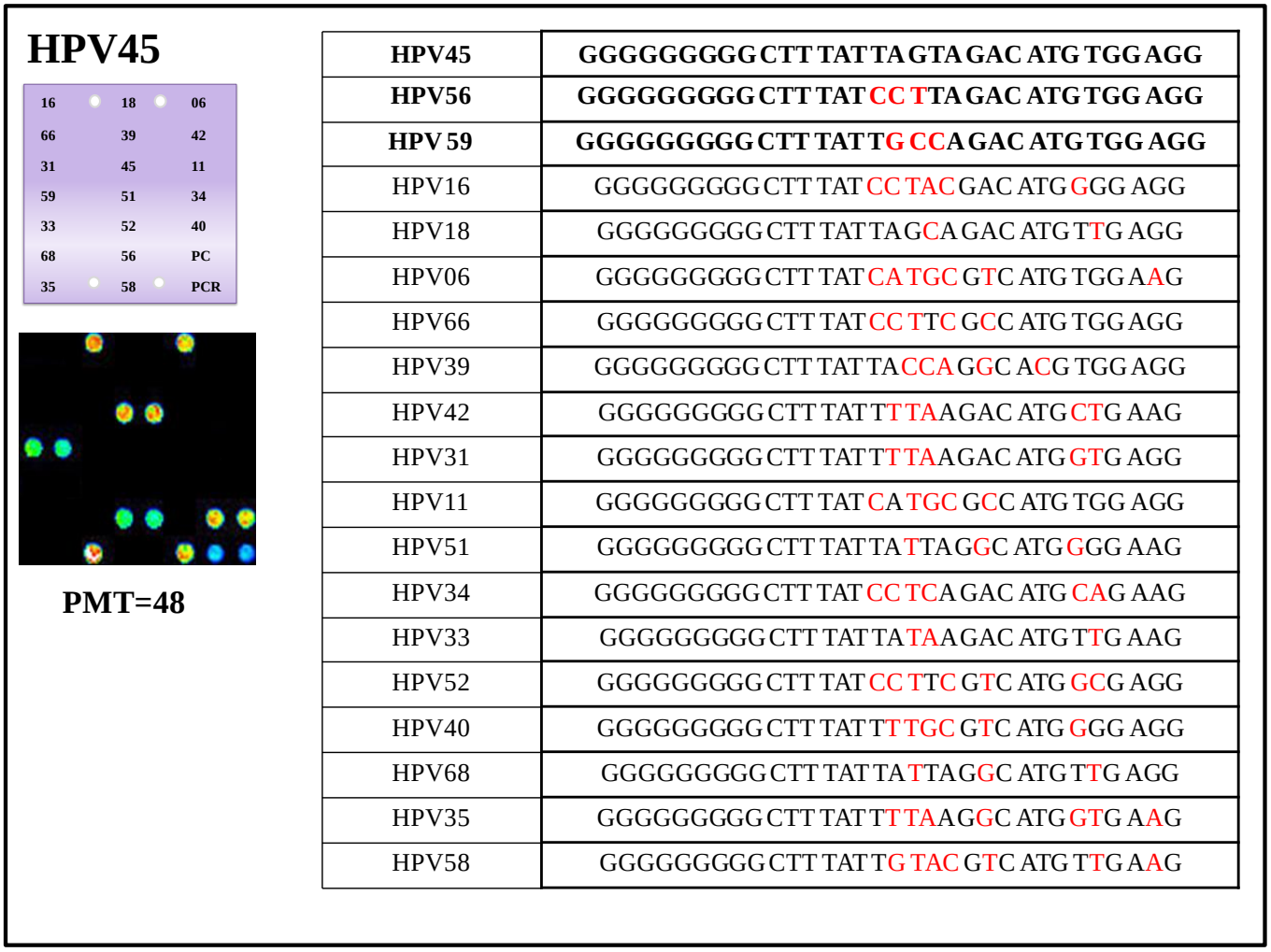


Figure S6: Selection of the Probe length and the Probe sequence. A) Fluorescence image after the hybridization of immobilized probes (Probe1-probe3) with the Cy5 labeled PCR product of HPV16, B) Depicts the scheme for the immobilization of the Probes (Probe1 – Probe6) on the AMCA slide. C) Fluorescence image after the hybridization of the immobilized probes (Probe4 – Probe6) with Cy5 labeled PCR product of HPV18, PMT gain = 48. D) Fluorescence image after the hybridization of the immobilized probes (Probe7 - Probe14) with the Cy5 labeled PCR product of HPV16, PMT gain = 48. E) Depicts the scheme for the immobilization of the probes (Probe7 – Probe22) on the AMCA slide. F) Fluorescence image after the hybridization of the immobilized probes (Probe15 – Probe22) with the Cy5 labeled PCR product of HPV18, G) Fluorescence scale depicting lowest to highest fluorescence. PMT gain = 48.

8. Results for hybridization of the probes (without mutations)

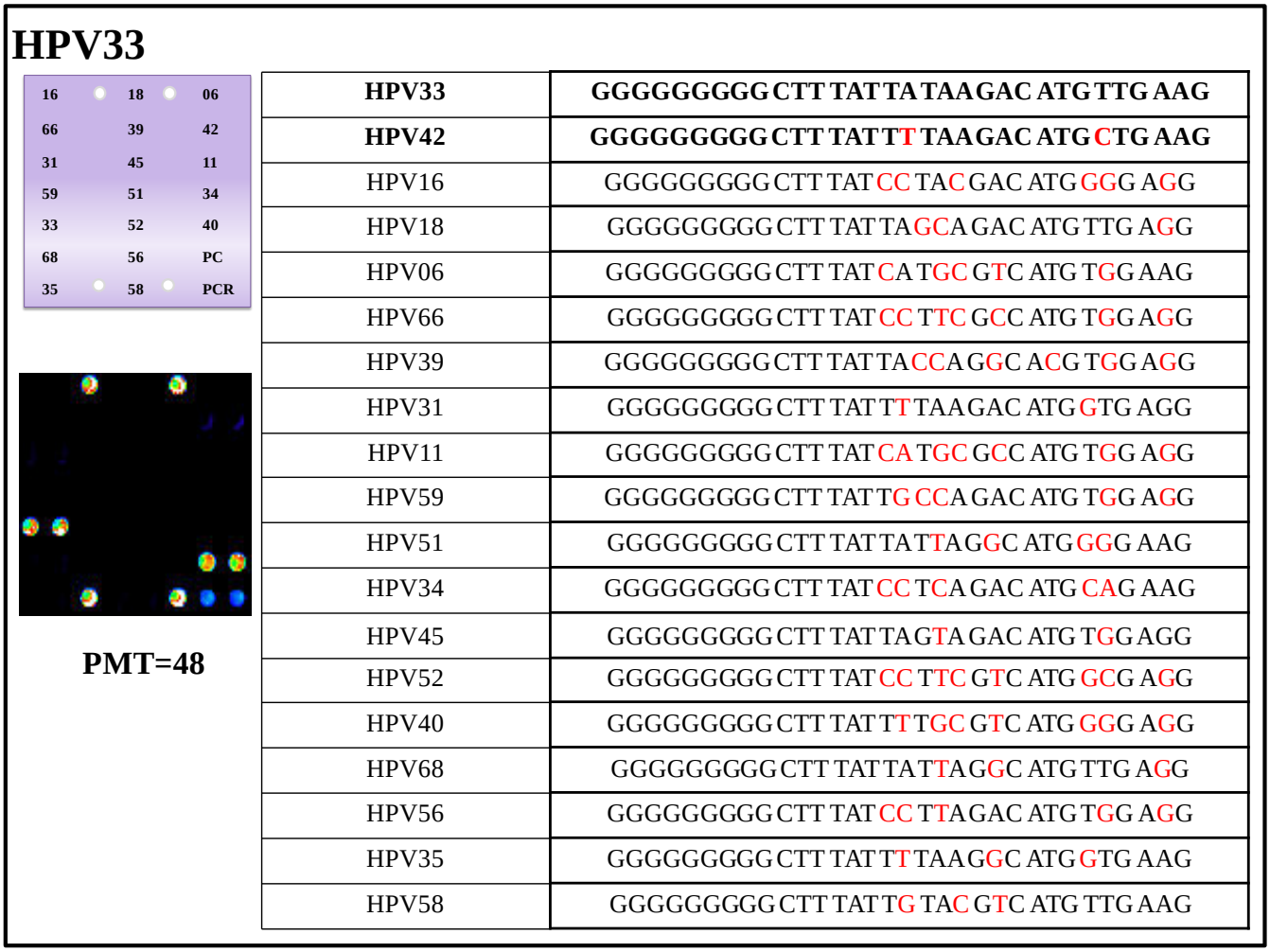
8a. Hybridization with Cy5 labeled PCR product of HPV45



HPV45	**GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG**
HPV56	**GGGGGGGGG CTT TAT CC T TA GAC ATG TGG AGG**
HPV 59	**GGGGGGGGG CTT TAT T G CC A GAC ATG TGG AGG**
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TA AGAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TA AGAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV35	GGGGGGGGG CTT TAT TT TA AGGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S7: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV45

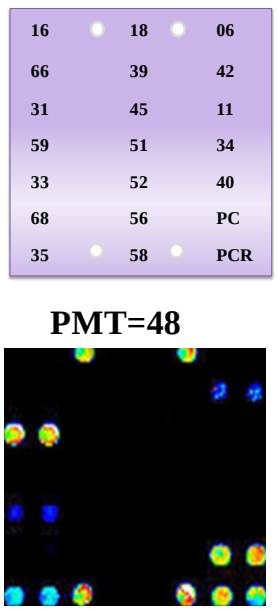
8b. Hybridization with Cy5 labeled PCR product of HPV33



HPV33	**GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG**
HPV42	**GGGGGGGGG CTT TAT T T TAA GAC ATG C TG AAG**
HPV16	GGGGGGGGG CTT TAT CC TA C GAC ATG GG G AG G
HPV18	GGGGGGGGG CTT TAT TA GC A GAC ATG TTG AG G
HPV06	GGGGGGGGG CTT TAT C A T GC G TC ATG T G G AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GC C ATG T G G AG G
HPV39	GGGGGGGGG CTT TAT TA CC A GG C A C G T G G AG G
HPV31	GGGGGGGGG CTT TAT T T TAA GAC ATG G TG AGG
HPV11	GGGGGGGGG CTT TAT C A T GC GC C ATG T G G AG G
HPV59	GGGGGGGGG CTT TAT T G CC A GAC ATG T G G AG G
HPV51	GGGGGGGGG CTT TAT TA T TA G GC ATG GG G AAG
HPV34	GGGGGGGGG CTT TAT CC TC A GAC ATG CA G AAG
HPV45	GGGGGGGGG CTT TAT TA G T A GAC ATG T G G AGG
HPV52	GGGGGGGGG CTT TAT CC TTC G T C ATG GC G AG G
HPV40	GGGGGGGGG CTT TAT T T TGC G TC ATG GG G AG G
HPV68	GGGGGGGGG CTT TAT TA T TA G GC ATG TTG AG G
HPV56	GGGGGGGGG CTT TAT CC TT A GAC ATG T G G AG G
HPV35	GGGGGGGGG CTT TAT T T TAA G GC ATG G TG AAG
HPV58	GGGGGGGGG CTT TAT T G TA C G TC ATG TTG AAG

Figure S8: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV33

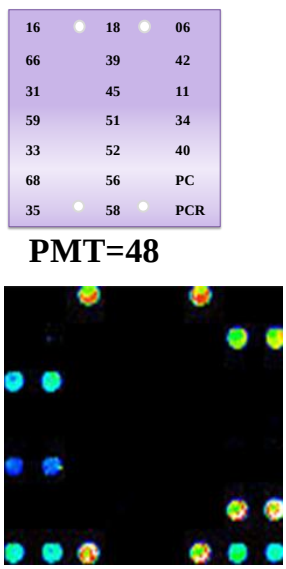
8c. Hybridization with Cy5 labeled PCR product of HPV31



HPV31	**GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG**
HPV42	**GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG**
HPV33	**GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG**
HPV35	**GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG**
HPV45	GGGGGGGGG CTT TAT TAGTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TAGCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TACCA GGC ACG TGG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TATTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TATTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S9: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV31

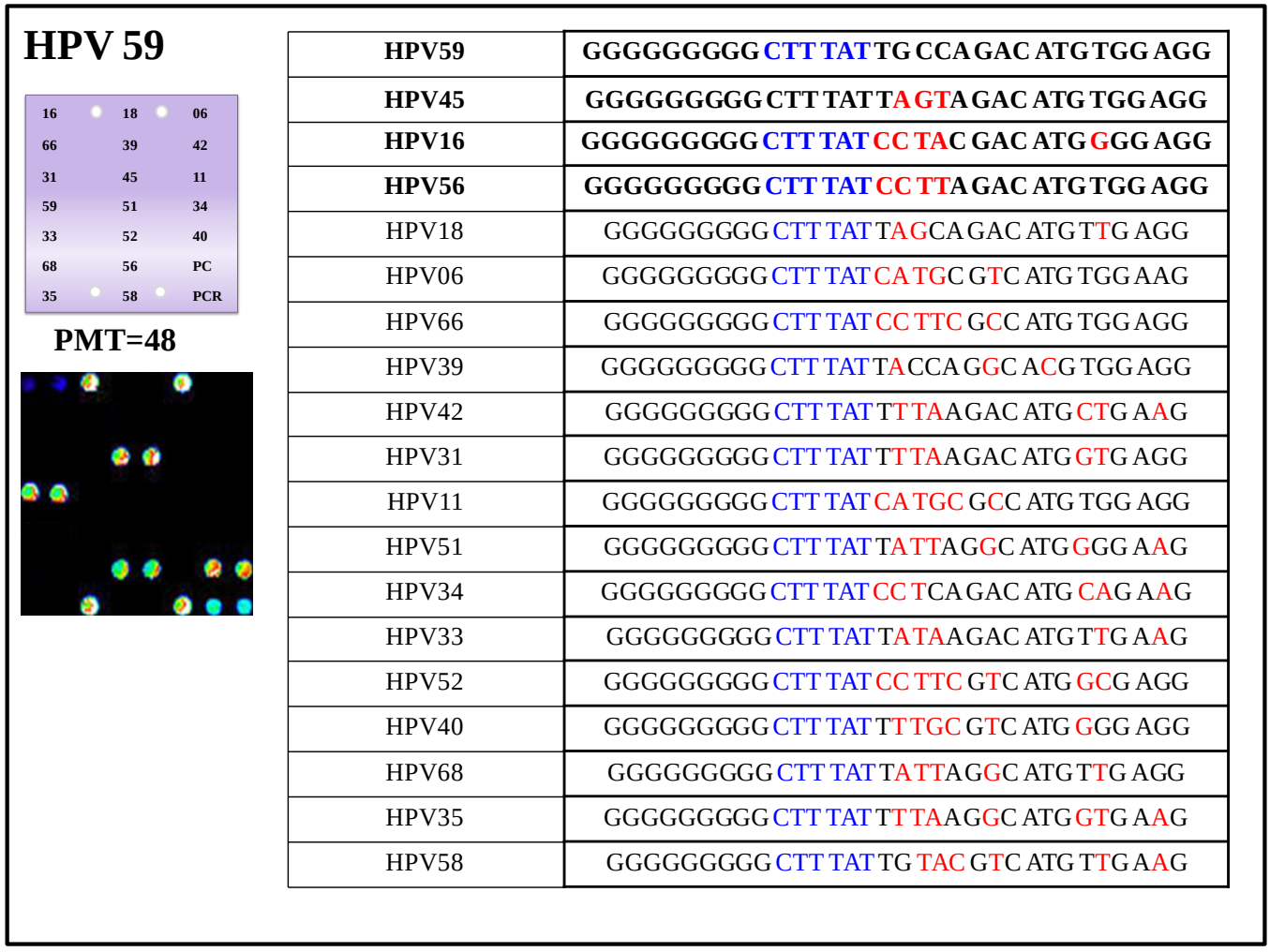
8d. Hybridization with Cy5 labeled PCR product of HPV42



HPV42	**GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG**
HPV35	**GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG**
HPV33	**GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG**
HPV31	**GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG**
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S10: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV42

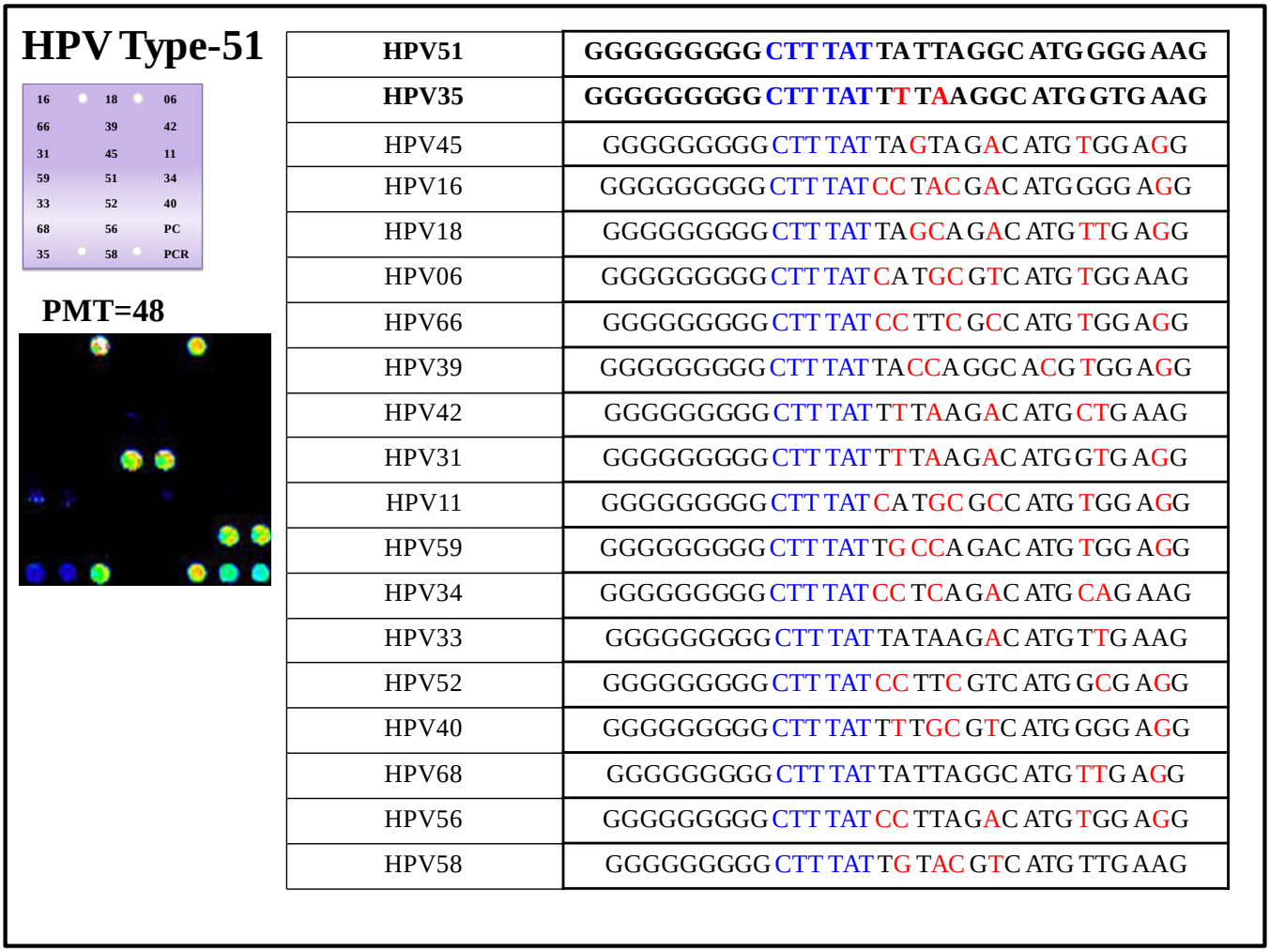
8e. Hybridization with Cy5 labeled PCR product of HPV59



HPV59	**GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG**
HPV45	**GGGGGGGGG CTT TAT TA GT A GAC ATG TGG AGG**
HPV16	**GGGGGGGGG CTT TAT CC TA C GAC ATG GGG AGG**
HPV56	**GGGGGGGGG CTT TAT CC TT A GAC ATG TGG AGG**
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TG C GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TA AGAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TA AGAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TA AGAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV35	GGGGGGGGG CTT TAT TT TA AGGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S11: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV59

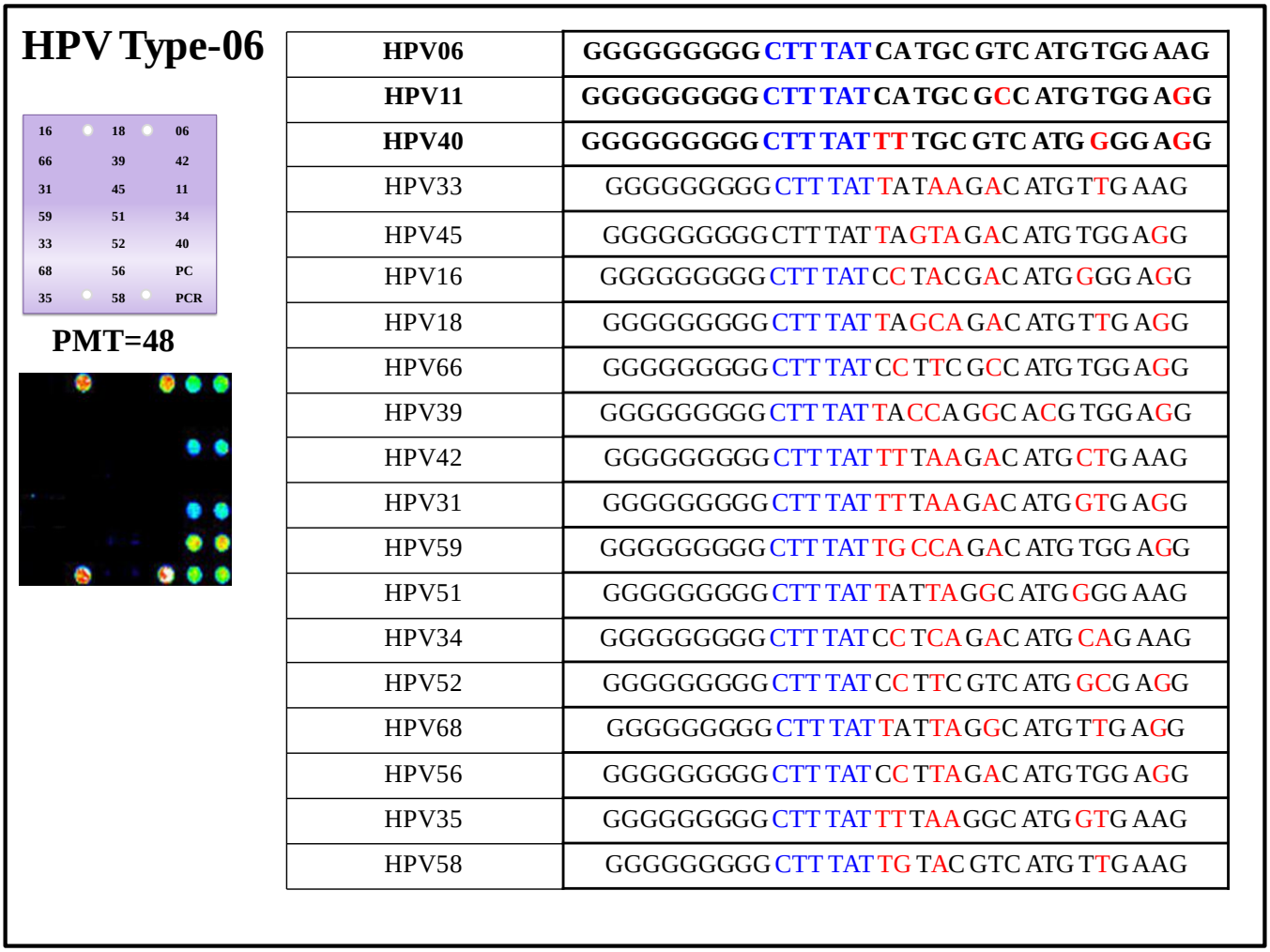
8f. Hybridization with Cy5 labeled PCR product of HPV51



HPV51	**GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG**
HPV35	**GGGGGGGGG CTT TAT TT TA AGGC ATG GTG AAG**
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S12: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV51

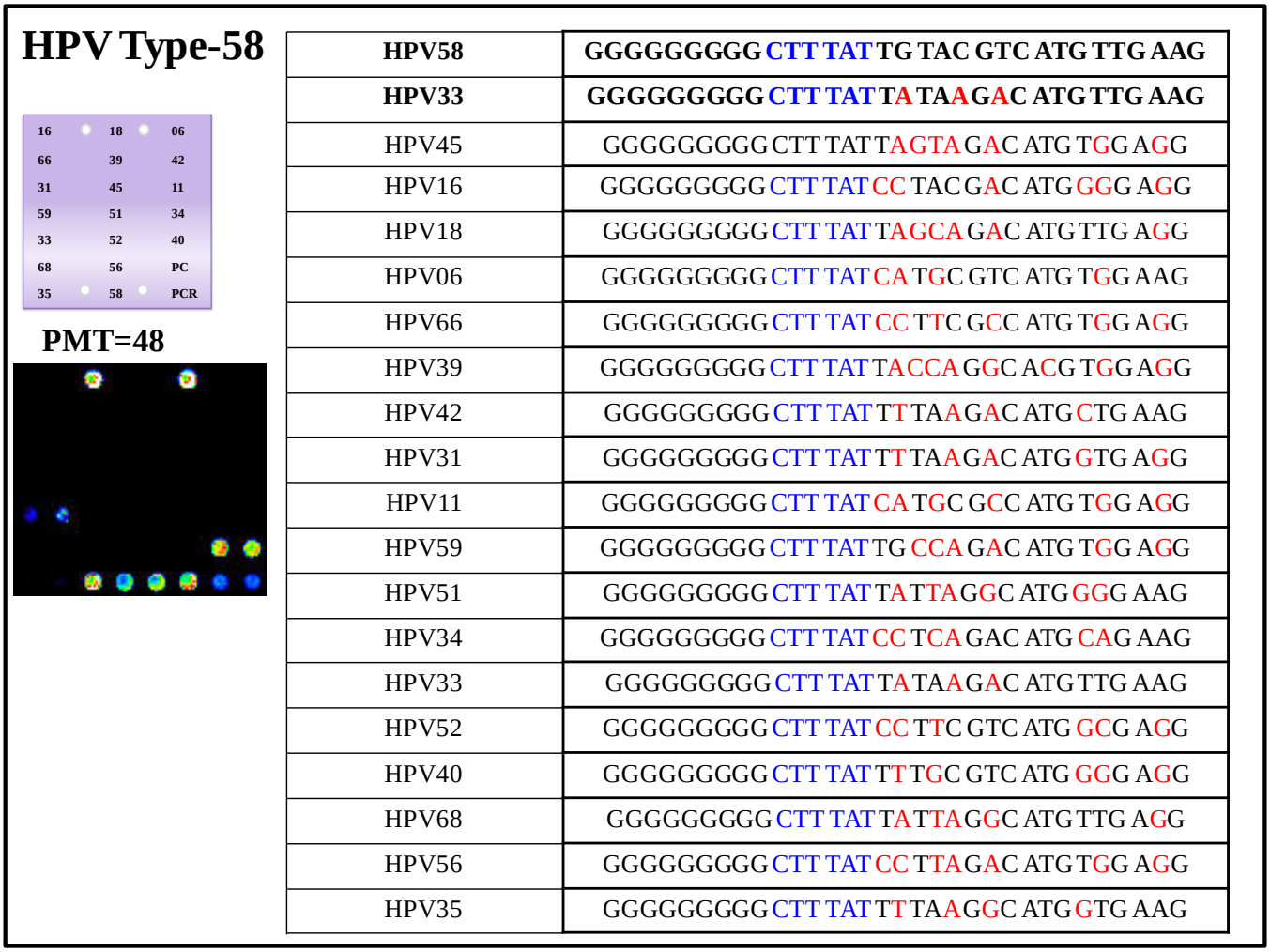
8g. Hybridization with Cy5 labeled PCR product of HPV06



HPV06	**GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG**
HPV11	**GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG**
HPV40	**GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG**
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S13: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV06

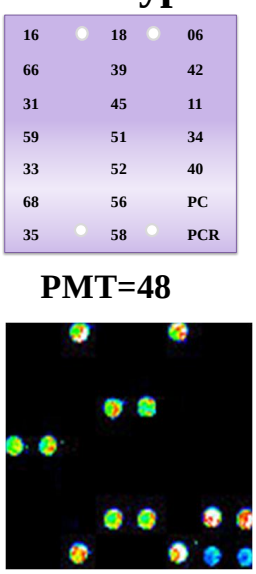
8h. Hybridization with Cy5 labeled PCR product of HPV58



HPV58	**GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG**
HPV33	**GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG**
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG

Figure S14: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV58

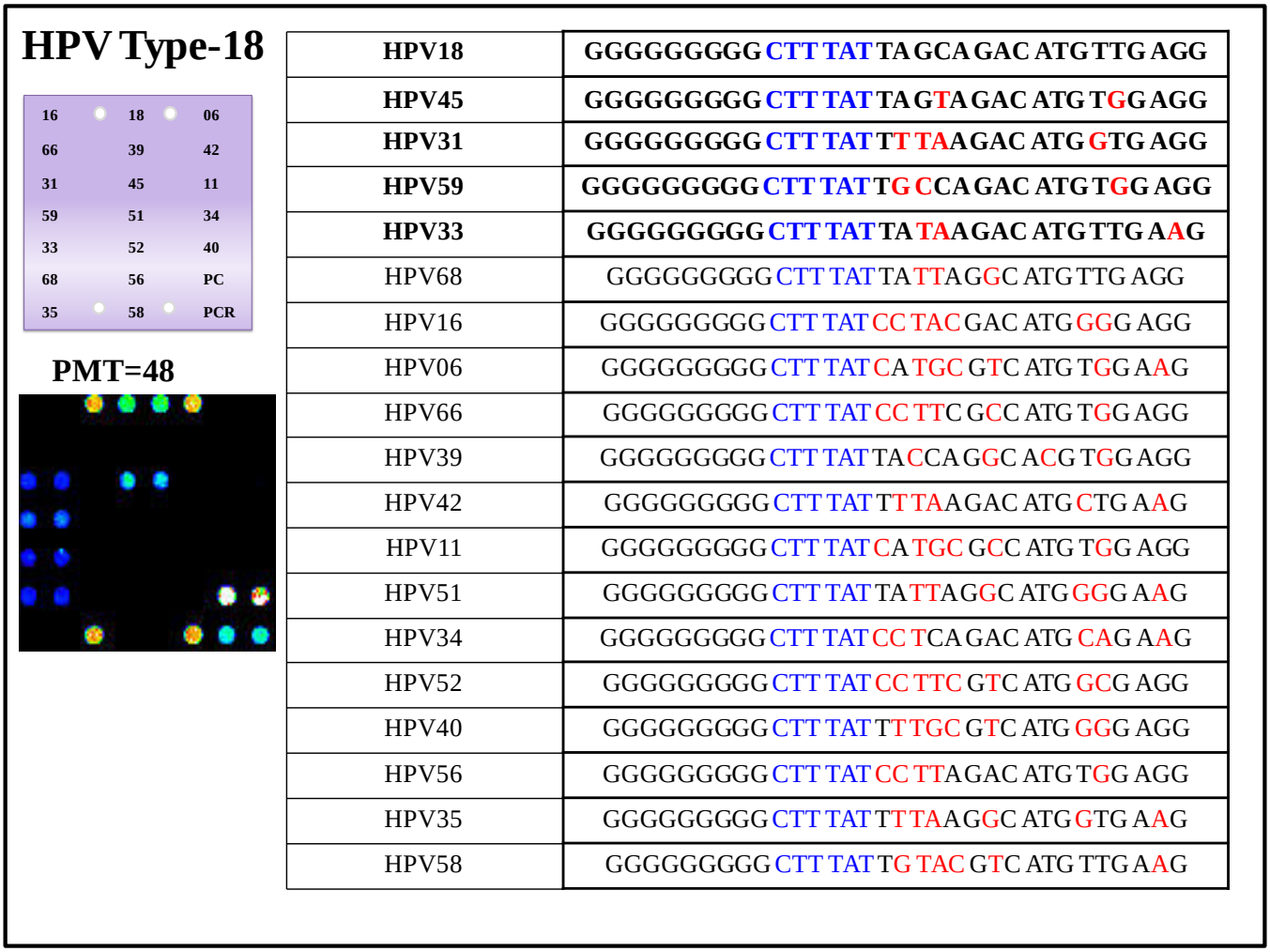
8i. Hybridization with Cy5 labeled PCR product of HPV56



HPV56	**GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG**
HPV45	**GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG**
HPV59	**GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG**
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S15: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV56

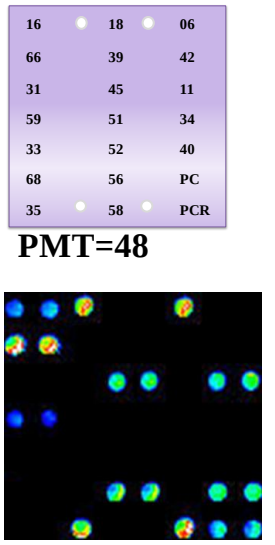
8j. Hybridization with Cy5 labeled PCR product of HPV18



HPV18	**GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG**
HPV45	**GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG**
HPV31	**GGGGGGGGG CTT TAT TT TA AGAC ATG GTG AGG**
HPV59	**GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG**
HPV33	**GGGGGGGGG CTT TAT TA TA AGAC ATG TTG AAG**
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TA AGAC ATG CTG AAG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV35	GGGGGGGGG CTT TAT TT TA AGGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S16: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV18

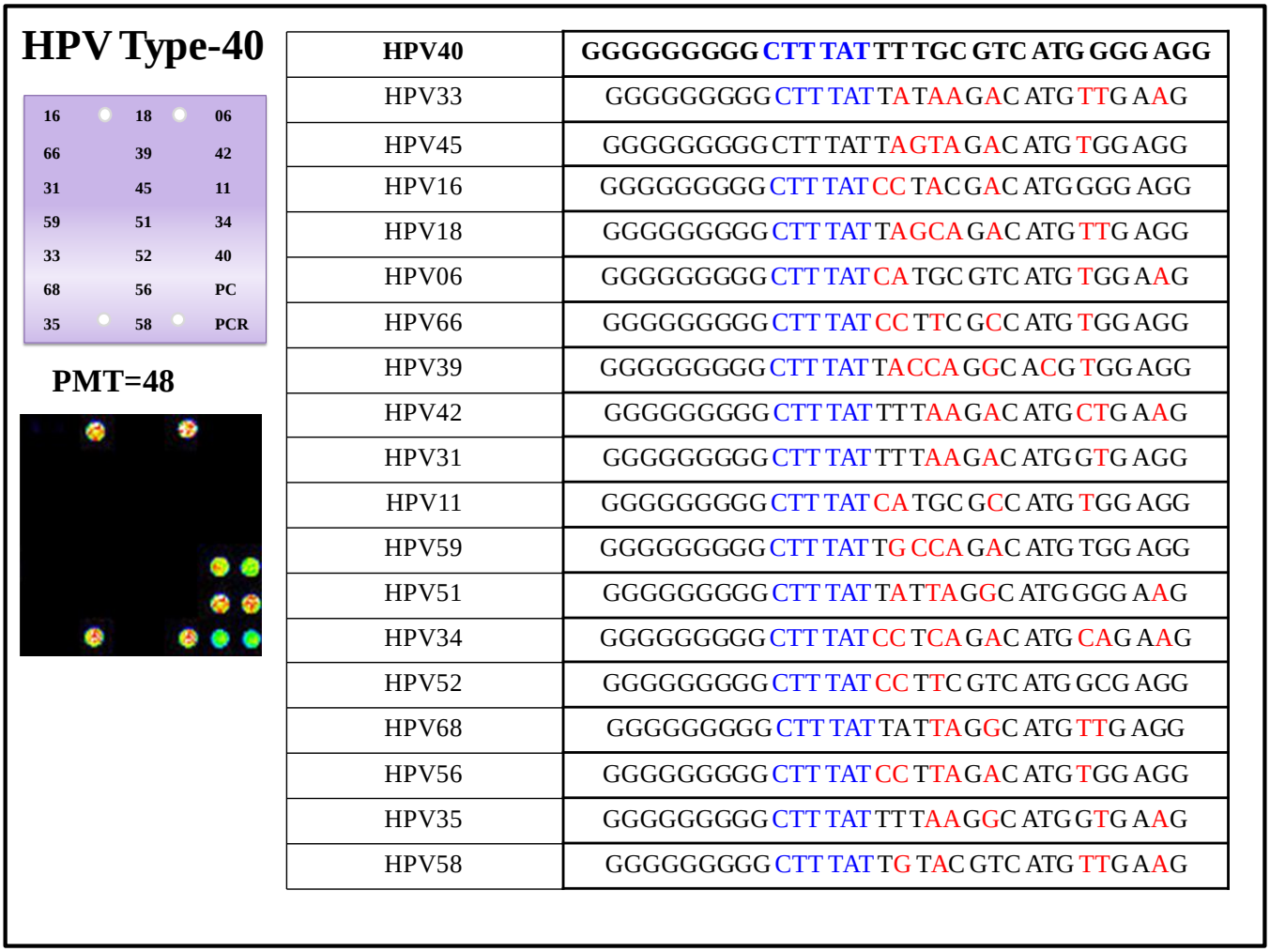
8k. Hybridization with Cy5 labeled PCR product of HPV66



HPV66	**GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG**
HPV45	**GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG**
HPV11	**GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG**
HPV56	**GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG**
HPV59	**GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG**
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S17: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV66

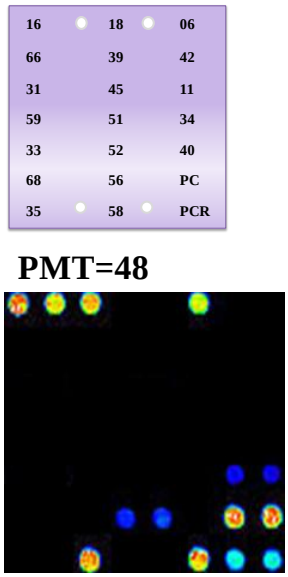
8l. Hybridization with Cy5 labeled PCR product of HPV40



HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S18: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV40

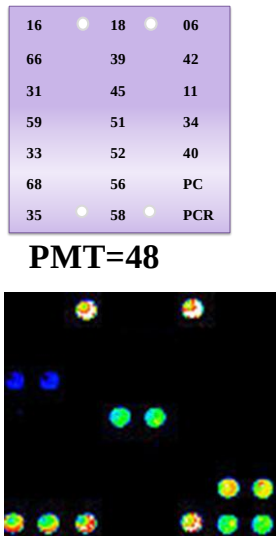
8m. Hybridization with Cy5 labeled PCR product of HPV16



HPV16	**GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG**
HPV56	**GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG**
HPV40	**GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG**
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S19: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV16

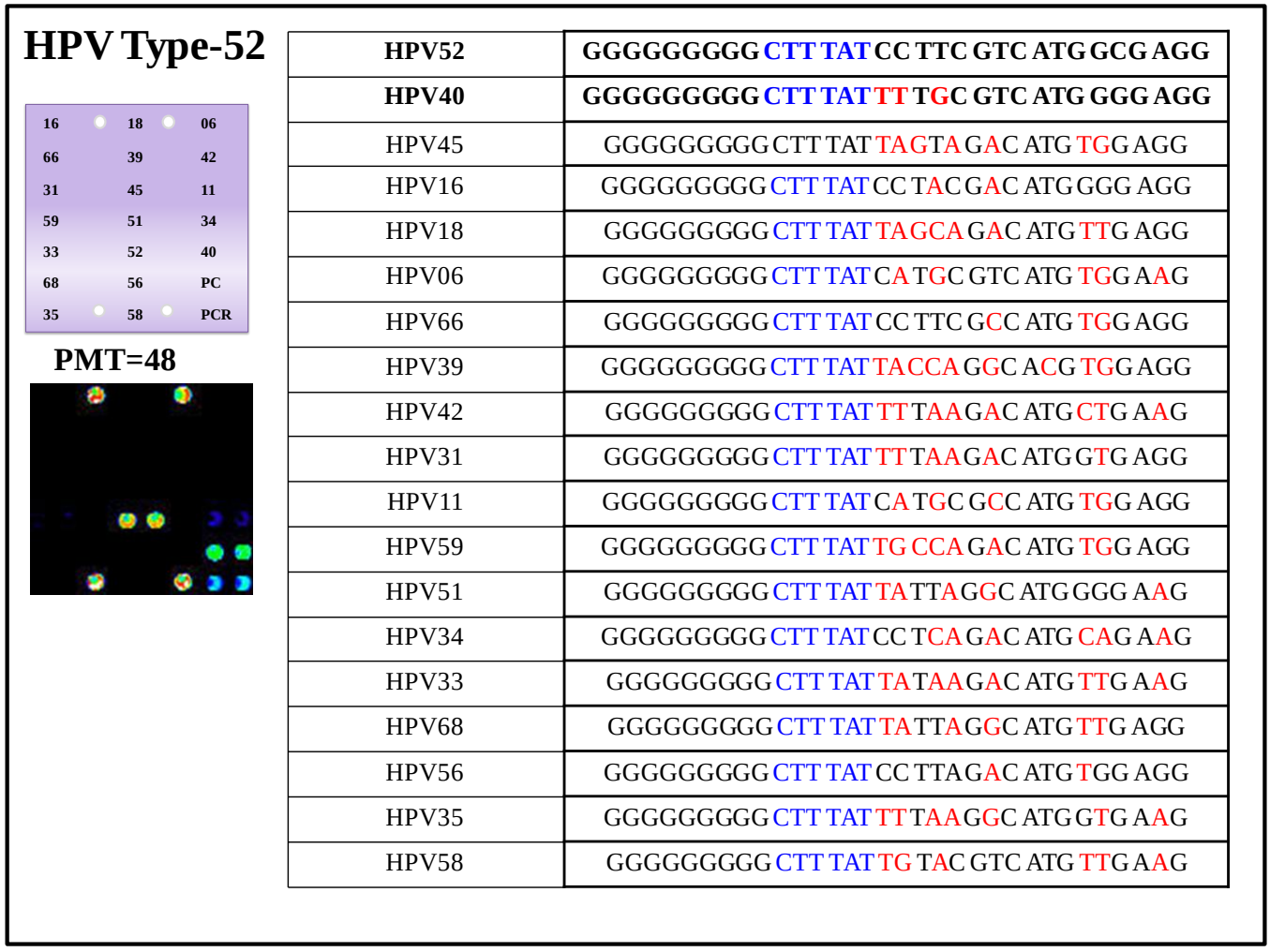
8n. Hybridization with Cy5 labeled PCR product of HPV35



HPV35	**GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG**
HPV51	**GGGGGGGGG CTT TAT TA TT AGGC ATG GG AAG**
HPV31	**GGGGGGGGG CTT TAT TT TAA GA C ATG GTG AG G**
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S20: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV35

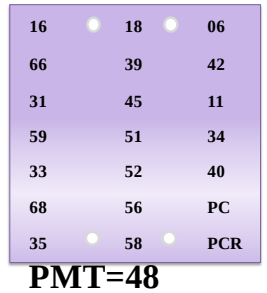
8o. Hybridization with Cy5 labeled PCR product of HPV52



HPV52	**GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG**
HPV40	**GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG**
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S21: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV52

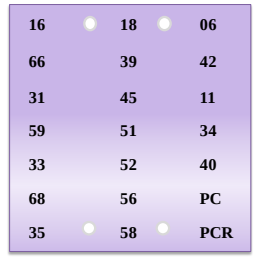
8p. Hybridization with Cy5 labeled PCR product of HPV11



HPV11	**GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG**
HPV06	**GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG**
HPV66	**GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG**
HPV59	**GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG**
HPV56	**GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG**
HPV40	**GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG**
HPV45	**GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG**
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S22: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV11

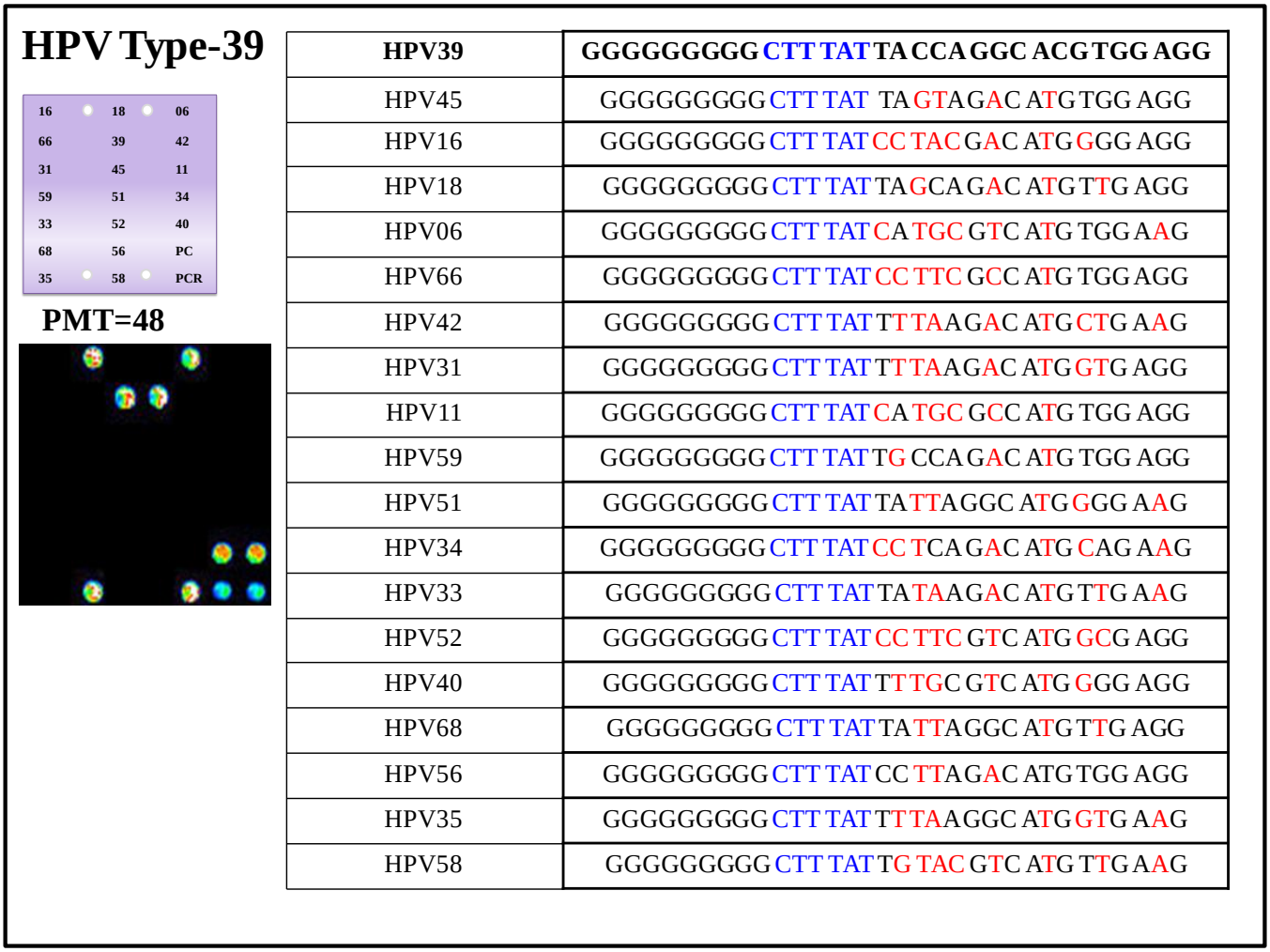
8q. Hybridization with Cy5 labeled PCR product of HPV34



HPV34	**GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG**
HPV42	**GGGGGGGGG CTT TAT TT TAAGAC ATG CTG AAG**
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S23: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV34

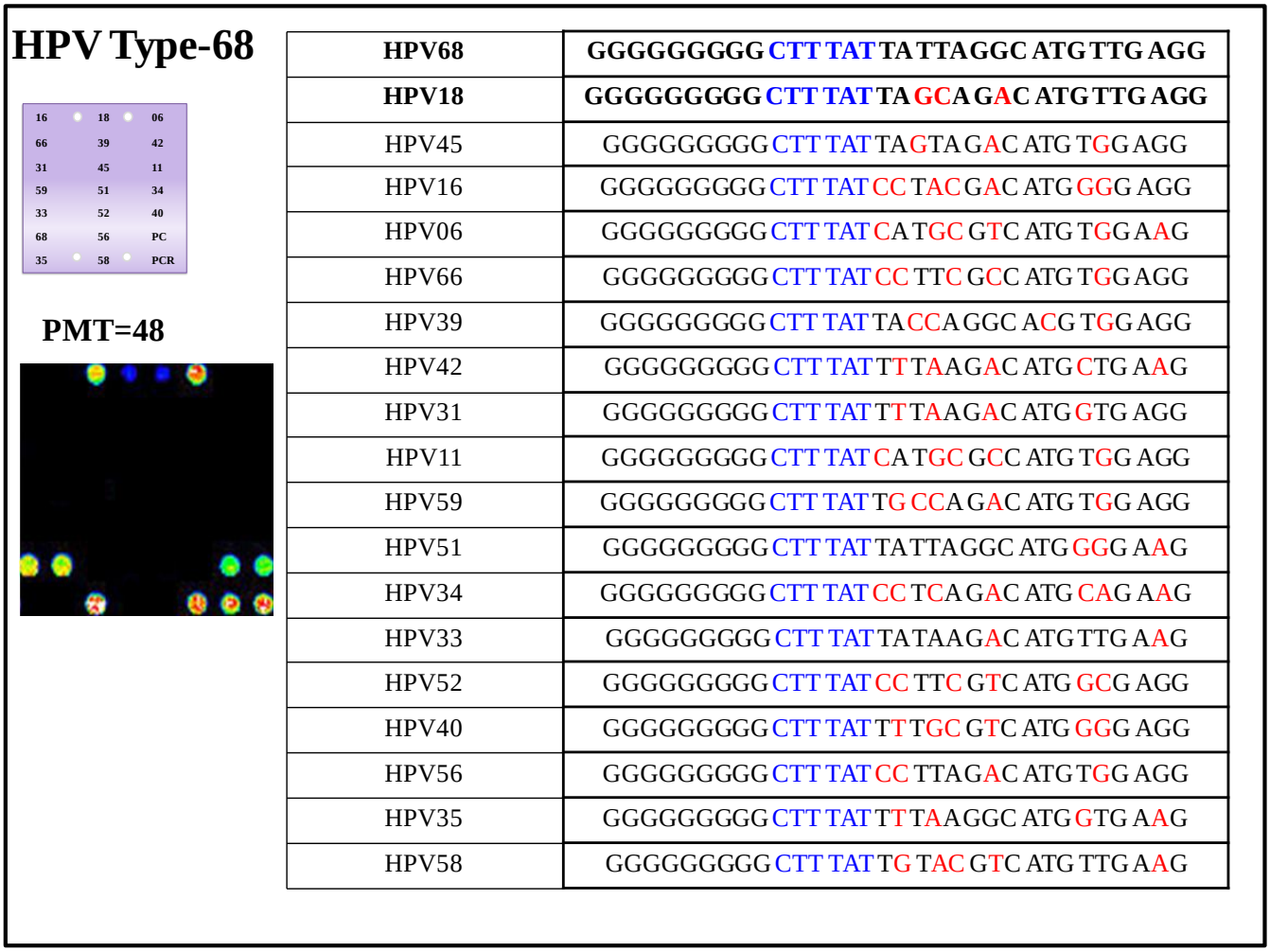
8r. Hybridization with Cy5 labeled PCR product of HPV39



HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV18	GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TA AGA CATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TA AGA CATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TA AGA CATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV68	GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV35	GGGGGGGGG CTT TAT TT TA AGGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S24: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV39

8s. Hybridization with Cy5 labeled PCR product of HPV68



HPV68	**GGGGGGGGG CTT TAT TA TTA GGC ATG TTG AGG**
HPV18	**GGGGGGGGG CTT TAT TA GCA GAC ATG TTG AGG**
HPV45	GGGGGGGGG CTT TAT TA GTA GAC ATG TGG AGG
HPV16	GGGGGGGGG CTT TAT CC TAC GAC ATG GGG AGG
HPV06	GGGGGGGGG CTT TAT CA TGC GTC ATG TGG AAG
HPV66	GGGGGGGGG CTT TAT CC TTC GCC ATG TGG AGG
HPV39	GGGGGGGGG CTT TAT TA CCA GGC ACG TGG AGG
HPV42	GGGGGGGGG CTT TAT TT TAA GAC ATG CTG AAG
HPV31	GGGGGGGGG CTT TAT TT TAA GAC ATG GTG AGG
HPV11	GGGGGGGGG CTT TAT CA TGC GCC ATG TGG AGG
HPV59	GGGGGGGGG CTT TAT TG CCA GAC ATG TGG AGG
HPV51	GGGGGGGGG CTT TAT TA TTA GGC ATG GGG AAG
HPV34	GGGGGGGGG CTT TAT CC TCA GAC ATG CAG AAG
HPV33	GGGGGGGGG CTT TAT TA TAA GAC ATG TTG AAG
HPV52	GGGGGGGGG CTT TAT CC TTC GTC ATG GCG AGG
HPV40	GGGGGGGGG CTT TAT TT TGC GTC ATG GGG AGG
HPV56	GGGGGGGGG CTT TAT CC TTA GAC ATG TGG AGG
HPV35	GGGGGGGGG CTT TAT TT TAA GGC ATG GTG AAG
HPV58	GGGGGGGGG CTT TAT TG TAC GTC ATG TTG AAG

Figure S25: Fluorescence image after hybridization of Pre-HPV 9G DNAChip with Cy5 labeled PCR product of HPV68

9. Artificial mutation(s) in the probes and its effect on the hybridization with target

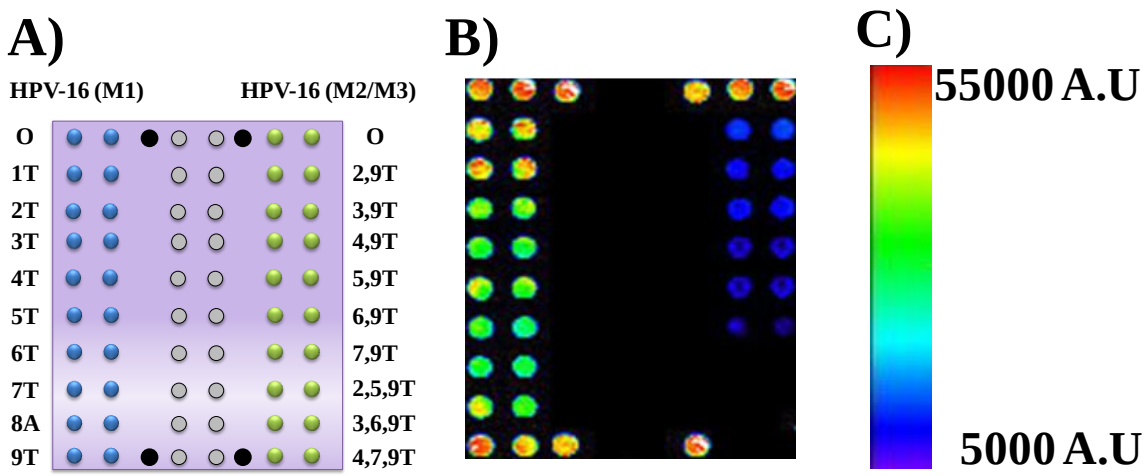


Figure S26: A) Depicts the scheme for the immobilization of the probes (Probe42 – Probe59) on the AMCA slide. B) Fluorescence image after the hybridization of immobilized probes (Probe42 – Probe59) with Cy5 labeled PCR product of HPV16, C) Fluorescence scale depicting lowest to highest fluorescence, PMT gain = 48.

10. Comparison of the results after hybridization of the original probes (without mutation) and final probes (with one artificial mutation)

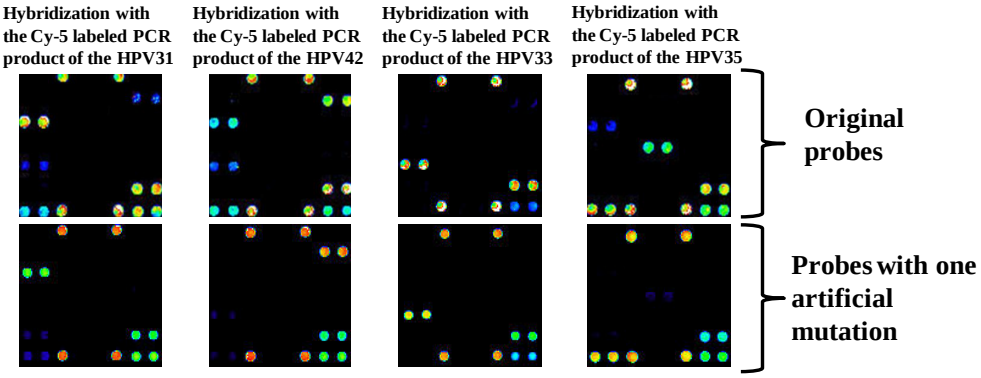
10a. Hybridization with Cy5 labeled PCR products of HPV type 31, 42, 33, 35

A)

16	18	06
66	39	42
31	45	11
59	51	34
33	52	40
68	56	PC
35	58	PCR

Scheme for the spotting of probes, number represents the probes complementary to the HPV genotypes and the ● represents the HC probe

B)



C)

Original Probes (without artificial mutation)		
Probes	**HPV Type**	**Sequence**
Probe29	HPV31	5'-GGGGGGGGGCTTTATTTTAAGACATGGTGAGG
Probe28	HPV42	5'-GGGGGGGGGCTTTATTTTAAGACATGCTGAAG
Probe35	HPV33	5'-GGGGGGGGGCTTTATTATAAGACATGTTGAAG
Probe40	HPV35	5'-GGGGGGGGGCTTTATTTTAAGGCATGGTGAAG

D)

Probes with one artificial mutations			
Probes	**HPV Type**	**Sequence**	**Position of mutation**
Probe66	HPV31	5'-GGGGGGGGGCTTTATTTTAAGACATAGTGAGG	**7**
Probe65	HPV42	5'-GGGGGGGGGCTTTATTTTAAGACTTGCTGAAG	**9**
Probe72	HPV33	5'-GGGGGGGGGCTTTATTATAAGACATGTTGAAG	-
Probe77	HPV35	5'-GGGGGGGGGCTTTATTTTAAGGCAAGGTGAAG	**8**

Figure S27: Fluorescence image after hybridization of HPV 9G DNAChip with Cy5 labeled PCR product of HPV31, HPV42, HPV33, and HPV35

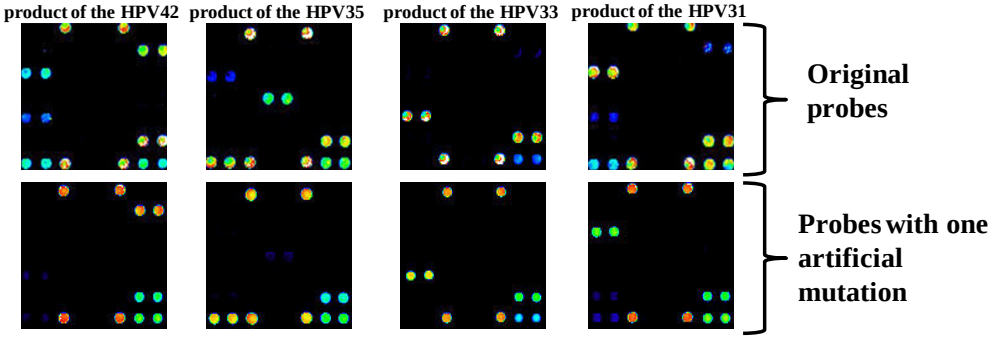
10b. Hybridization with Cy5 labeled PCR products of HPV type 42, 35, 33, 31

A)

16	18	06
66	39	42
31	45	11
59	51	34
33	52	40
68	56	PC
35	58	PCR

Scheme for the spotting of probes, number represents the probes complementary to the HPV genotypes and the ● represents the HC probe

B)



C)

Original Probes (without artificial mutation)		
Probes	**HPV Type**	**Sequence**
Probe28	HPV42	5'-GGGGGGGGGCTTTATTTTAAGACATGCTGAAG
Probe40	HPV35	5'-GGGGGGGGGCTTTATTTTAAGGCATGGTGAAG
Probe35	HPV33	5'-GGGGGGGGGCTTTATTATAAGACATGTTGAAG
Probe29	HPV31	5'-GGGGGGGGGCTTTATTTTAAGACATGGTGAGG

D)

Probes with one artificial mutations			
Probes	**HPV Type**	**Sequence**	**Position of mutation**
Probe65	HPV42	5'-GGGGGGGGGCTTTATTTTAAGACTTGCTGAAG	**9**
Probe77	HPV35	5'-GGGGGGGGGCTTTATTTTAAGGCAAGGTGAAG	**8**
Probe72	HPV33	5'-GGGGGGGGGCTTTATTATAAGACATGTTGAAG	-
Probe66	HPV31	5'-GGGGGGGGGCTTTATTTTAAGACATAGTGAGG	**7**

Figure S28: Fluorescence image after hybridization of HPV 9G DNAChip with Cy5 labeled PCR product of HPV42, HPV35, HPV33, and HPV31

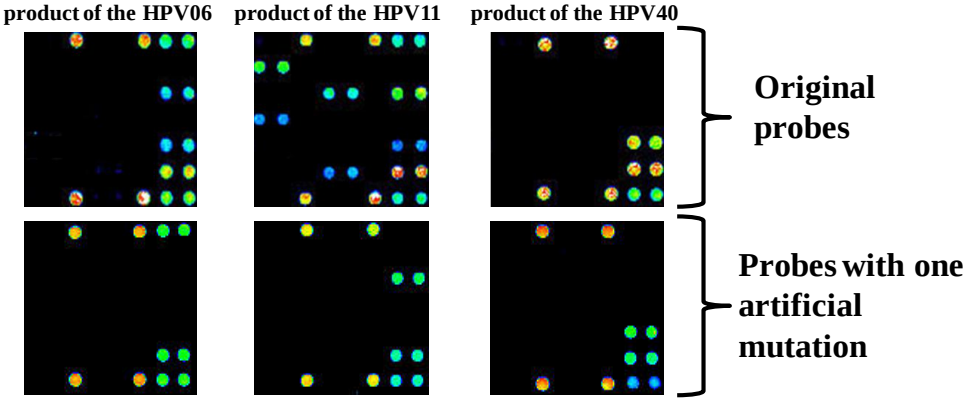
10c. Hybridization with Cy5 labeled PCR products of HPV type 06, 11, 40

A)

16	18	06
66	39	42
31	45	11
59	51	34
33	52	40
68	56	PC
35	58	PCR

Scheme for the spotting of probes, number represents the probes complementary to the HPV genotypes and the ● represents the HC probe

B)



C)

Original Probes (without artificial mutation)		
Probes	**HPV Type**	**Sequence**
Probe25	HPV06	5'-GGGGGGGGGCTTTATCATGCGTCATGTGGAAG
Probe31	HPV11	5'-GGGGGGGGGCTTTATCATGCGCCATGTGGAGG
Probe37	HPV40	5'-GGGGGGGGGCTTTATTTTGCGTCATGGGAGG

D)

Probes with one artificial mutations			
Probes	**HPV Type**	**Sequence**	**Position of mutation**
Probe62	HPV06	5'-GGGGGGGGGCTTTATCATGCGTCATATGGAAG	7
Probe68	HPV11	5'-GGGGGGGGGCTTTATCATGCGCCATATGGAGG	7
Probe74	HPV40	5'-GGGGGGGGGCTTTATTTTGCGTCATAGGGAGG	7

Figure S29: Fluorescence image after hybridization of HPV 9G DNAChip with Cy5 labeled PCR product of HPV06, HPV11, and HPV40

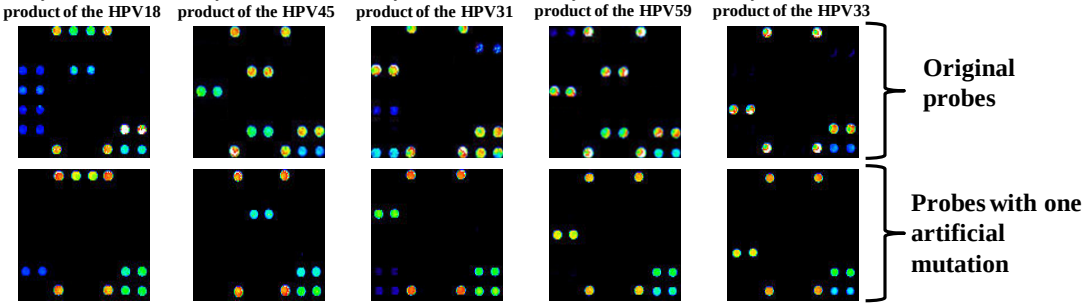
10d. Hybridization with Cy5 labeled PCR products of HPV type 18, 45, 31, 59, 33

A)

16	18	06
66	39	42
31	45	11
59	51	34
33	52	40
68	56	PC
35	58	PCR

Scheme for the spotting of probes, number represents the probes complementary to the HPV genotypes and the ● represents the HC probe

B)



C)

Original Probes (without artificial mutation)		
Probes	**HPV Type**	**Sequence**
Probe24	HPV18	5'-GGGGGGGGGCTTTATTAGCAGACATGTTGAGG
Probe30	HPV45	5'-GGGGGGGGGCTTTATTAGTAGACATGTGGAGG
Probe29	HPV31	5'-GGGGGGGGGCTTTATTTTAAGACATGGTGAGG
Probe32	HPV59	5'-GGGGGGGGGCTTTATTGCCAGACATGTGGAGG
Probe35	HPV33	5'-GGGGGGGGGCTTTATTATAAGACATGTTGAAG

D)

Probes with one artificial mutations			
Probes	**HPV Type**	**Sequence**	**Position of mutation**
Probe61	HPV18	5'-GGGGGGGGGCTTTATTAGCAGACTTGTTGAGG	**9**
Probe67	HPV45	5'-GGGGGGGGGCTTTATTAGTAGACATATGGAGG	**7**
Probe66	HPV31	5'-GGGGGGGGGCTTTATTTTAAGACATAGTGAGG	**7**
Probe69	HPV59	5'-GGGGGGGGGCTTTATTGCCAGACATATGGAGG	**7**
Probe72	HPV33	5'-GGGGGGGGGCTTTATTATAAGACATGTTGAAG	-

Figure S30: Fluorescence image after hybridization of HPV 9G DNAChip with Cy5 labeled PCR product of HPV18, HPV45, HPV31, HPV59, and HPV33

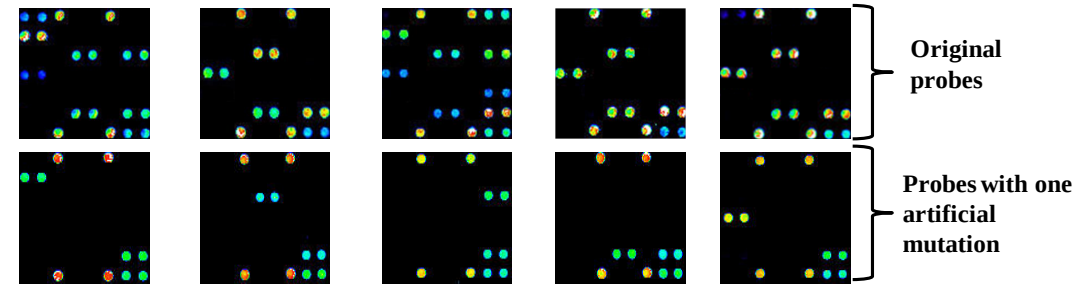
10e. Hybridization with Cy5 labeled PCR products of HPV type 66, 45, 11, 56, 59

A)

16 ●	18 ●	06
66	39	42
31	45	11
59	51	34
33	52	40
68	56	PC
35 ●	58 ●	PCR

Scheme for the spotting of probes, number represents the probes complementary to the HPV genotypes and the ● represents the HC probe

B)



C)

Original Probes		
Probes	**HPV Type**	**Sequence**
Probe26	HPV66	5'-GGGGGGGGGCTTTATCCTTCGCCATGTGGAGG
Probe30	HPV45	5'-GGGGGGGGGCTTTATTAGTAGACATGTGGAGG
Probe31	HPV11	5'-GGGGGGGGGCTTTATCATGCGCCATGTGGAGG
Probe39	HPV56	5'-GGGGGGGGGCTTTATCCTTAGACATGTGGAGG
Probe32	HPV59	5'-GGGGGGGGGCTTTATTGCCAGACATGTGGAGG

D)

Probes with one artificial mutations			
Probes	**HPV Type**	**Sequence**	**Position of mutation**
Probe63	HPV66	5'-GGGGGGGGGCTTTATCCTTCGCCATATGGAGG	7
Probe67	HPV45	5'-GGGGGGGGGCTTTATTAGTAGACATATGGAGG	7
Probe68	HPV11	5'-GGGGGGGGGCTTTATCATGCGCCATATGGAGG	7
Probe76	HPV56	5'-GGGGGGGGGCTTTATCCTTAGACATGTGTAGG	4
Probe69	HPV59	5'-GGGGGGGGGCTTTATTGCCAGACATATGGAGG	7

Figure S31: Fluorescence image after hybridization of HPV 9G DNAChip with Cy5 labeled PCR product of HPV66, HPV45, HPV11, HPV56, and HPV59

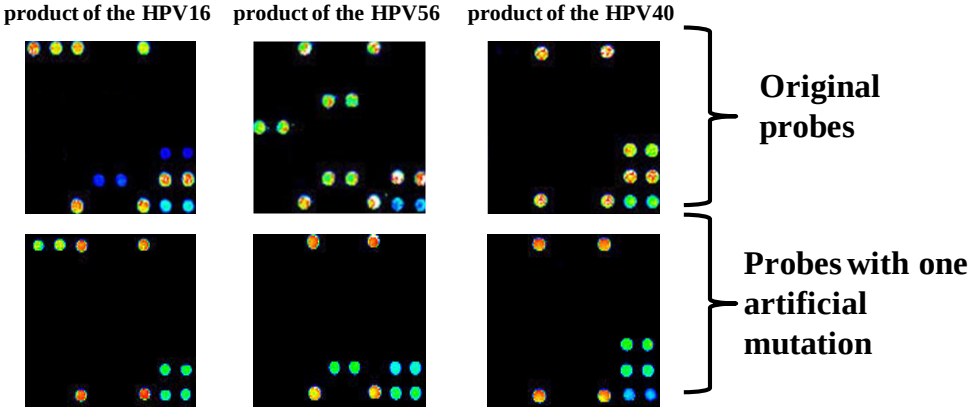
10f. Hybridization with Cy5 labeled PCR products of HPV type 16, 56, 40

A)

16	18	06
66	39	42
31	45	11
59	51	34
33	52	40
68	56	PC
35	58	PCR

Scheme for the spotting of probes, number represents the probes complementary to the HPV genotypes and the ● represents the HC probe

B)



C)

Original Probes (without artificial mutation)		
Probes	**HPV Type**	**Sequence**
Probe23	HPV16	5'-GGGGGGGGGCTTTATCCTACGACATGGGGAGG
Probe39	HPV56	5'-GGGGGGGGGCTTTATCCTTAGACATGTGGAGG
Probe37	HPV40	5'-GGGGGGGGGCTTTATTTTGCGTCATGGGGAGG

D)

Probes with one artificial mutations			
Probes	**HPV Type**	**Sequence**	**Position of mutation**
Probe60	HPV16	5'-GGGGGGGGGCTTTATCCTACGACTTGGGGAGG	9
Probe76	HPV56	5'-GGGGGGGGGCTTTATCCTTAGACATGTGTAGG	4
Probe74	HPV40	5'-GGGGGGGGGCTTTATTTTGCGTCATAGGGAGG	7

Figure S32: Fluorescence image after hybridization of HPV 9G DNAChip with Cy5 labeled PCR product of HPV16, HPV56, and HPV40

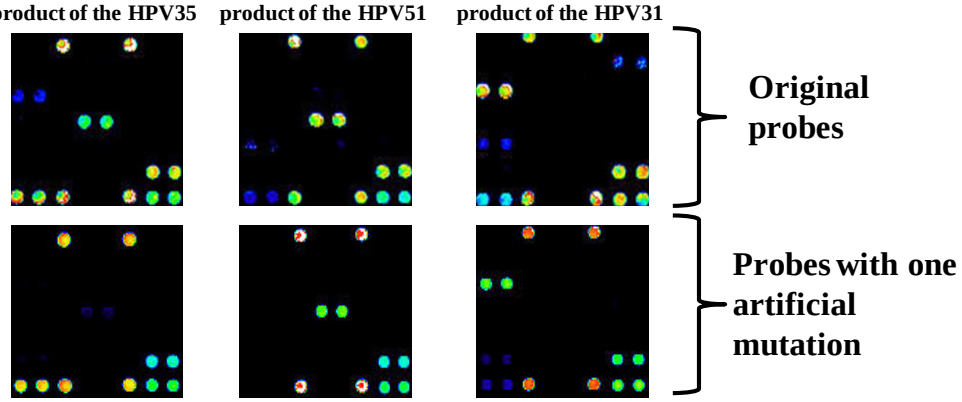
10g. Hybridization with Cy5 labeled PCR products of HPV type 35, 51, 31

A)

16	18	06
66	39	42
31	45	11
59	51	34
33	52	40
68	56	PC
35	58	PCR

Scheme for the spotting of probes, number represents the probes complementary to the HPV genotypes and the ● represents the HC probe

B)



C)

Original Probes (without artificial mutation)		
Probes	**HPV Type**	**Sequence**
Probe40	HPV35	5'-GGGGGGGGGCTTTATTTTAAGGCATGGTGAAG
Probe33	HPV51	5'-GGGGGGGGGCTTTATTATTAGGCATGGGGAAG
Probe29	HPV31	5'-GGGGGGGGGCTTTATTTTAAGACATGGTGAGG

D)

Probes with one artificial mutations			
Probes	**HPV Type**	**Sequence**	**Position of mutation**
Probe77	HPV35	5'-GGGGGGGGGCTTTATTTTAAGGCAAGGTGAAG	8
Probe70	HPV51	5'-GGGGGGGGGCTTTATTATTAGGCATAGGGAAG	7
Probe66	HPV31	5'-GGGGGGGGGCTTTATTTTAAGACATAGTGAGG	7

Figure S33: Fluorescence image after hybridization of HPV 9G DNAChip with Cy5 labeled PCR product of HPV35, HPV51, and HPV31

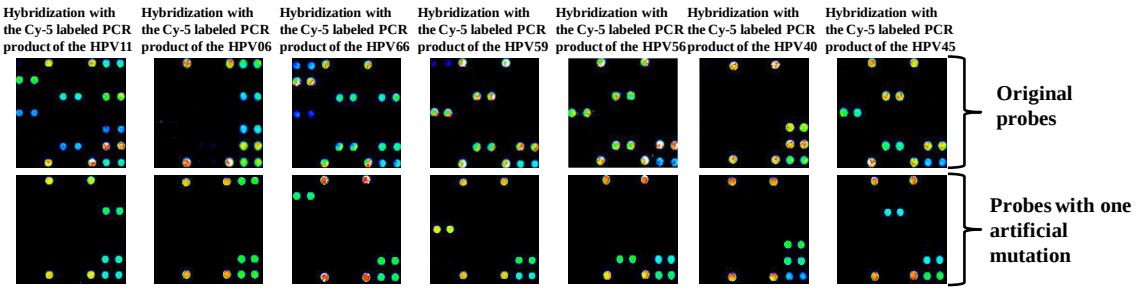
10h. Hybridization with Cy5 labeled PCR products of HPV type 11, 06, 66, 59, 56, 40, 45

A)

16	18	06
66	39	42
31	45	11
59	51	34
33	52	40
68	56	PC
35	58	PCR

Scheme for the spotting of probes, number represents the probes complementary to the HPV genotypes and the ● represents the HC probe

B)



C)

Original Probes		
Probes	**HPV Type**	**Sequence**
Probe31	HPV11	5'-GGGGGGGGGCTTTATCATGCGCCATGTGGAGG
Probe25	HPV06	5'-GGGGGGGGGCTTTATCATGCGTCATGTGGAAG
Probe26	HPV66	5'-GGGGGGGGGCTTTATCCTTCGCCATGTGGAGG
Probe32	HPV59	5'-GGGGGGGGGCTTTATTGCCAGACATGTGGAGG
Probe39	HPV56	5'-GGGGGGGGGCTTTATCCTTAGACATGTGGAGG
Probe37	HPV40	5'-GGGGGGGGGCTTTATTTTGCGTCATGGGGAGG
Probe30	HPV45	5'-GGGGGGGGGCTTTATTAGTAGACATGTGGAGG

D)

Probes with one artificial mutations			
Probes	**HPV Type**	**Sequence**	**Position of mutation**
Probe68	HPV11	5'-GGGGGGGGGCTTTATCATGCGCCATATGGAGG	7
Probe62	HPV06	5'-GGGGGGGGGCTTTATCATGCGTCATATGGAAG	7
Probe63	HPV66	5'-GGGGGGGGGCTTTATCCTTCGCCATATGGAGG	7
Probe69	HPV59	5'-GGGGGGGGGCTTTATTGCCAGACATATGGAGG	7
Probe76	HPV56	5'-GGGGGGGGGCTTTATCCTTAGACATGTGTAGG	4
Probe74	HPV40	5'-GGGGGGGGGCTTTATTTTGCGTCATAGGGAGG	7
Probe67	HPV45	5'-GGGGGGGGGCTTTATTAGTAGACATATGGAGG	7

Figure S34: Fluorescence image after hybridization of HPV 9G DNAChip with Cy5 labeled PCR product of HPV11, HPV06, HPV66, HPV59, HPV56, HPV40, and HPV45

11. Comparison of the probes with and without artificial mutations:

The probes immobilized on the Pre-HPV 9G DNAChip (original probes without mutations) and HPV 9G DNAChip (probes with one artificial mutation) were hybridized with the Cy5 labeled PCR products of the HPV45, HPV56, HPV59. After washing and drying the respective chips were scanned and the results are presented in the **Figure S35**.

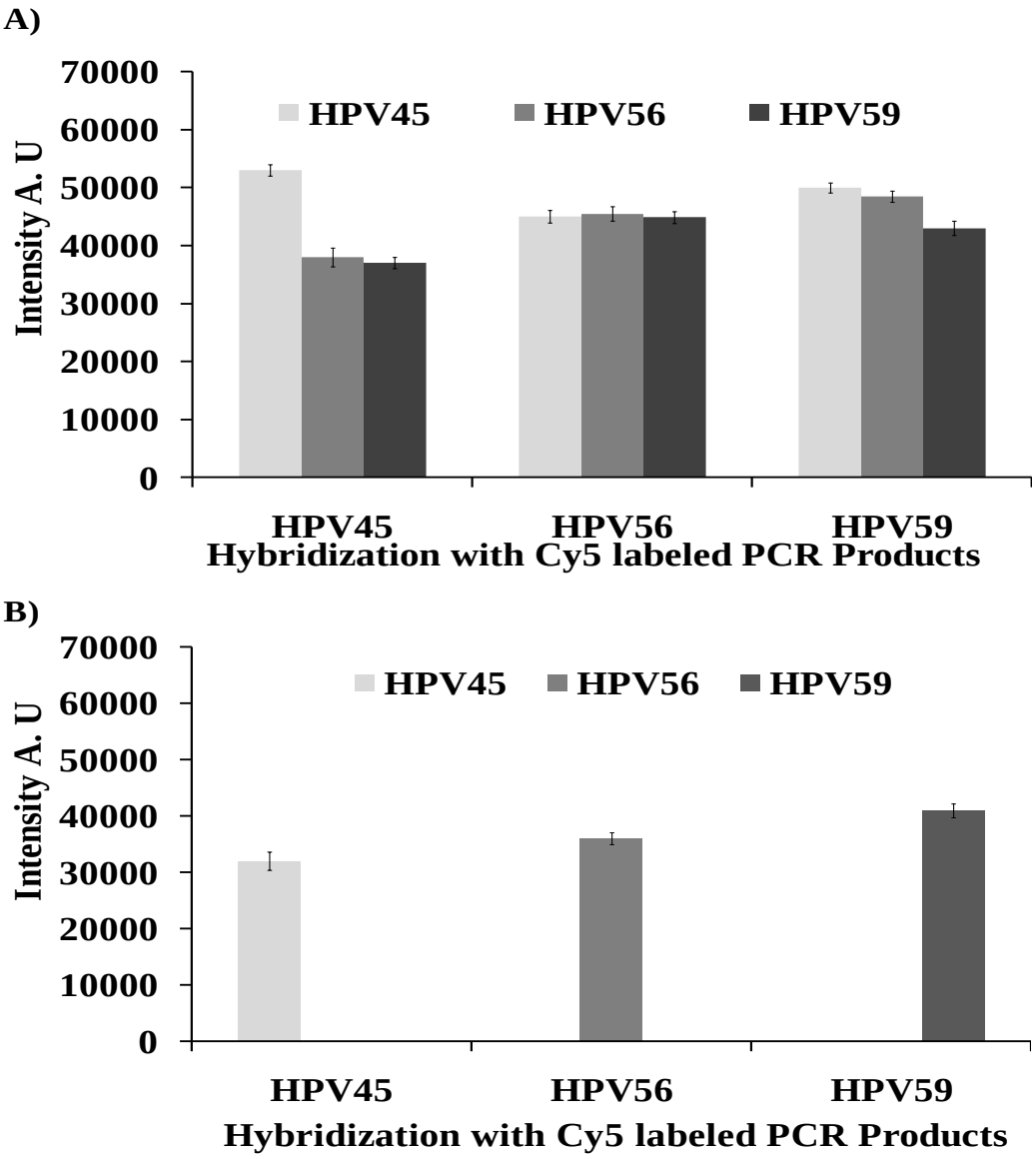


Figure S35: Fluorescence intensities after the hybridization with the Cy5 labeled PCR product of HPV45, HPV56, and HPV59, A) Graph of fluorescence intensities after the hybridization of the probes without mutation with the Cy5 labeled PCR product of HPV45, HPV56, and HPV59, B) Graph of fluorescence intensities after the hybridization of the probes containing one artificial mutation with the Cy5 labeled PCR product of HPV45, HPV56, and HPV59. PMT gain = 48.

12: Application of Proposed method for detection and discrimination HPV genotypes

Table S2: Results of the 1041 clinical samples for the diagnosis of HPV infections by using HPV 9G DNAChip

HPV Type	Total	Normal	ASC-US	ASC-H	LISL	HSIL
16	139	54	31	16	3	35
18	101	64	23	3	6	5
45	45	29	8	2	2	4
31	18	8	4			6
6	13	6	4		3	
11	24	19	3		2	
34	26	16	6		3	1
35	50	19	18	1	4	8
39	29	19	7		2	1
40	66	55	9		1	1
42	18	10	8			
51	51	18	14	2	13	4
56	70	31	16		23	
59	27	19	5		2	1
58	103	45	24	7	14	13
66	24	9	11		4	
68	52	36	11	1	4	
52	58	23	16	9	5	5
33	31	17	1	3	3	7
11/52	1		1			
16/18	1		1			
16/31	1		1			
16/52	1			1		
16/66	1					1
18/34	1		1			
18/39	1		1			
18/45	1	1				
31/35	1	1				
35/52	1		1			
39/56	1		1			
40/52	1	1				
51/6	1		1			
58/45	1		1			
Normal	82	79	3			
Total	1041	579	231	45	94	92

AGUS, aypical glandular cells undetermined significance; ASCUS, atypical squamous cells undetermined significance; HSIL, high-grade squamous intraepithelial lesion; LSIL, low-grade squamous intraepithelial lesion; WNL, within normal limit.

Table S3: Results of the 439 clinical samples for the diagnosis of HPV infections by using HPV 9G DNAChip cross checked by the gene sequencing analysis

	Total	**Sequencing**		**HPV 9G DNAChip**		**Total for each type (Sequencing , BMT)**
		+	-	+	-	
Normal	361	75 (20.8%)	286	75 (20.8%)	286	361
ASC-US	47	39 (83.0%)	8	39 (83.0%)	8	47
ASC-H	9	7 (77.8%)	2	7 (77.8%)	2	9
LSIL	9	8 (88.9%)	1	8 (88.9%)	1	9
HSIL	13	13 (100%)		13 (100%)		13
Total	439	439		439		439

AGUS, aypical glandular cells undetermined significance; ASCUS, atypical squamous cells undetermined significance; HSIL, high-grade squamous intraepithelial lesion; LSIL, low-grade squamous intraepithelial lesion.

(Note: The details of the Clinical sample analysis by using the proposed method and gene sequencing will be reported in our next communication).

13. References:

1. K. Song, S. B. Nimse, J. Kim, J. Kim, V. Ta, V. Nguyen, T. Kim, *Chem. Comm.* 2011, 47, 7101;