

[0106] In the present example, a sample of human buccal cells is scraped onto the end of a swab that is assembled into the amplification chamber 11. The amplification mixture, which is described below, is then pushed into the amplification chamber 11. As described above, the amplification chamber 11 is sealed by applying pressure to the pins 53, 57 at the ingress 12 and egress 14 ports, respectively. The amplification chamber 11 is first heated to about 97° C. for about 45 seconds and then cycled between about 68° C. and about 90° C. for approximately thirty five cycles. The time duration at each temperature is preferably more than 5 and less than 30 seconds, respectively. In a preferred exemplary embodiment, the buffer comprises 22 U/ml *Thermococcus* species KOD thermostable polymerase complexed with anti-KOD antibodies, 66 mM Tris-SO4 (pH 8.4), 30.8 mM (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, 11 mM KCl, 1.1 mM MgSO<sub>4</sub>, 330 uM dNTPs, as well as proteins and stabilizers (e.g., Invitrogen Life Technologies AccuPrime Pfx SuperMix manual, Cat. No. 12344-040). A suitable alternative exemplary embodiment can comprise 20 mM Tris-HCL (pH 8.8), 2 mM MgSO<sub>4</sub>, 10 mM KCl, 10 mM (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, 0.1% Triton-X-100, and 0.1 mg/ml nuclease-free BSA (e.g., Stratagen Pfu DNA polymerase Instruction Manual Cat# 600135 Revision\$ 064003d). Primers is083, is084 and is085 can also be present in the reaction at approximately 7.5 pmol total.

[0107] After the amplification cycle, the pins 53, 57 are released and a pin over the air bladder is pushed to move the sample into the detection device 59. The operation of the detection device 59 has been previously described in, for example, U.S. Application Publication No. 2003/0170881. A poise potential of, for example, 30 mV versus Ag/AgCl is applied to the biosensors. The amplified sample is then mixed over the top of the capture oligonucleotide beads printed over the biosensors, as described above. Amplified material with the appropriate complementary single stranded region hybridizes to one of the two printed beads with capture oligonucleotides. Additionally, the printed streptavidin-alkaline phosphatase conjugate is dissolved into this solution and it binds to the biotinylated bases on the primer sequence. After about 3 to about 10 minutes, this solution is then removed to a waste chamber in the cartridge and a solution containing an electrogenic alkaline phosphatase substrate, e.g., amino nitrophenyl phosphate (ANPP) or the like, is moved over to the region where the biosensors are located. Optionally, this solution is left in place or removed from this location, leaving a thin film of liquid over the biosensor. The amount of current generated (signal) by the conversion of the ANPP to amino nitrophenol by the alkaline phosphatase is then measured, as an indicator of the number of amplicons bound at the biosensor.

[0108] A signal at only the MBW biosensor is indicative of a mutant SNP sequence. A signal at the Sc biosensor is an indication of a wildtype SNP sequence, and a signal at both biosensors indicates that the patient sample is heterozygous for that SNP sequence. It will be recognized that when no

signal is generated at both biosensors, it is an indication of an error occurring in either the amplification or detection process.

## EXAMPLE 2

### [0109]

PCR Amplification of Phenylthiocarbamide (PTC) allele 1 and detection [TAS2R38, Ala49Pro]		
Oligo designation	Sequence (5'→3')	Characteristics
Is095	/A*CTTCATACACAACCTCCCGCGTT GCATAACT/iSp18/GGTGAATTTTGG GGATGTAGTGAAGAGGTAG*/	PTC1 wt with Sc complementary sequence
Is096	/G*CGGCGCGATGCGCCACCTGCC GC/iSp18/GGTGAATTTTGGGATG TAGTGAAGAGTCAG*/	PTC1 mut with MBW comple- mentary region
Is101	/5Bio/T*GG/iBioT/CGGCTCTTACCT TCAGGCT*/	PTC contra sequence with biotinylated nucleotides
Is071	amino_modifier_C12-T20- GCGGCAAGGTGGCGCATCGCGCCG C	MBW capture
Is028.L2	amino_modifier_C12-(T)20- AGTTATGCAACGCGGAGTTGTG TATGAAGT	Sc Capture with anti-Sc

[0110] Designations: 5Bio—5'-biotinylated base; iBioT—internal dT biotinylated base; \*—phosphorothiolate backbone; T20—20 dTs in the sequence; Amino\_modifier\_C12—5' amino derivative; PTC—phenylthiocarbamide gene, Wt—wild type, Mut—mutant; SNP—single nucleotide polymorphism; MBW—selected sequence; Sc—selected sequence.

[0111] In a preferred exemplary embodiment, the detection device 59 is manufactured with two biosensors with detectable sequences for MBW and Sc. In independent reactions, oligonucleotides is071 and is028.L2 are added to carboxylated beads and chemically linked using EDAC using techniques described above. These beads are printed on wafers at two independent locations that are manufactured with gold metal sensors using techniques as described above. In addition to the beads bound with capture synthetic oligonucleotides, another print on the same chip contains a streptavidin-alkaline phosphatase conjugate. The wafers are diced and assembled into detection devices 59, along with an Ag/AgCl reference chip, as described above.

[0112] A human buccal sample is scraped onto the end of a swab that is assembled into the amplification chamber 11. The amplification mixture (described below) is pushed into the amplification chamber 11. The amplification chamber 11 is sealed by applying pressure to the pins 53, 57 at the ingress 12 and egress 14 ports, respectively, and then heated to about 97° C. for approximately 45 seconds. The amplification chamber 11 is then cycled between about 68° C. and about 90° C. for approximately thirty five cycles. The time duration at each temperature is preferably more than 5 and less than 30 seconds, respectively. In a preferred exemplary