REFFERENCE

1. Yoder JA, Walsh CP, Bestor TH, "Cytosine methylation and the ecology of intragenomic parasites," Trends Genet 13 (1997): 335-40.
2. Kisseljova NP, Kisseljov FL, "DNA demethylation and carcinogenesis," Biochemistry (Mosc) 70 (2005): 743-52.
3. Loeb DD, Padgett RW, Hardies SC, Shehee WR, Comer MB, et al, "The sequence of a large L1Md element reveals a tandemly repeated 5' end and several features found in retrotransposons," Mol Cell Biol 6 (1986): 168-82.
4. Jurgens B, Schmitz-Drager BJ, Schulz WA, "Hypomethylation of L1 LINE sequences prevailing in human urothelial carcinoma," Cancer Res 56 (1996): 5698-703.
5. Florl AR, Steinhoff C, Muller M, Seifert HH, Hader C, et al, "Coordinate hypermethylation at specific genes in prostate carcinoma precedes LINE-1 hypomethylation," Br J Cancer 91 (2004): 985-94.
6. Kazazian HH, Jr., Goodier JL,"LINE drive. retrotransposition and genome instability," Cell 110 (2002): 277-80.
7. Chalitchagorn K, Shuangshoti S, Hourpai N, Kongruttanachok N, Tangkijvanich P, et al, "Distinctive pattern of LINE-1 methylation level in normal tissues and the association with carcinogenesis," Oncogene 23 (2004): 8841-6.
8. Hanahan D, Weinberg RA, "The hallmarks of cancer," Cell 100 (2000): 57-70.
9. Pitot HC, "Altered hepatic foci: their role in murine hepatocarcinogenesis," Annu Rev Pharmacol Toxicol 30 (1990): 465-500.
10. Trosko JE, "Commentary: is the concept of "tumor promotion" a useful paradigm?," Mol Carcinog 30 (2001): 131-7.
11. Parsons R, Li GM, Longley M, Modrich P, Liu B, et al, "Mismatch repair deficiency in phenotypically normal human cells," Science 268 (1995): 738-40.
12. Schulte-Hermann R, Timmermann-Trosiener I, Barthel G, Bursch W, "DNA synthesis, apoptosis, and phenotypic expression as determinants of growth of altered foci in rat liver during phenobarbital promotion," Cancer Res 50 (1990): 5127-35.

13. Bursch W, Oberhammer F, Jirtle RL, Askari M, Sedivy R, et al, "Transforming growth factor-beta 1 as a signal for induction of cell death by apoptosis," Br J Cancer 67 (1993): 531-6.

14. Ames BN, Gold LS, "Chemical carcinogenesis: too many rodent carcinogens," Proc Natl Acad Sci U S A 87 (1990): 7772-6.

15. Cohen SM, Ellwein LB, "Genetic errors, cell proliferation, and carcinogenesis," Cancer Res 51 (1991): 6493-505.

16. Land H, Parada LF, Weinberg RA, "Cellular oncogenes and multistep carcinogenesis," Science 222 (1983): 771-8.

17. Vogelstein B, Fearon ER, Hamilton SR, Kern SE, Preisinger AC, et al, "Genetic alterations during colorectal-tumor development," N Engl J Med 319 (1988): 525-32.

18. Nowell PC, "The clonal evolution of tumor cell populations," Science 194 (1976): 23-8.

19. Pitot HC, Dragan YP, "Facts and theories concerning the mechanisms of carcinogenesis," Faseb J 5 (1991): 2280-6.

20. Dragan YP, Pitot HC, "The role of the stages of initiation and promotion in phenotypic diversity during hepatocarcinogenesis in the rat," Carcinogenesis 13 (1992): 739-50.

21. Swenberg JA, Richardson FC, Boucheron JA, Deal FH, Belinsky SA, et al, "High- to low-dose extrapolation: critical determinants involved in the dose response of carcinogenic substances," Environ Health Perspect 76 (1987): 57-63.

22. Holliday R, "Mechanisms for the control of gene activity during development," Biol Rev Camb Philos Soc 65 (1990): 431-71.

23. Feinberg AP, "Cancer epigenetics takes center stage.," Proc Natl Acad Sci U S A 98 (2001): 392-4.

24. Holliday R, "Epigenetics: an overview," Dev Genet 15 (1994): 453-7.

25. Counts JL, Goodman JI, "Alterations in DNA methylation may play a variety of roles in carcinogenesis," Cell 83 (1995): 13-5.

26. Goodman JI, Watson RE, "Altered DNA methylation: a secondary mechanism involved in carcinogenesis," Annu Rev Pharmacol Toxicol 42 (2002): 501-25.

27. Shen JC, Rideout WM, 3rd, Jones PA, "High frequency mutagenesis by a DNA methyltransferase," Cell 71 (1992): 1073-80.

28. Razin A, Kafri T, "DNA methylation from embryo to adult," Prog Nucleic Acid Res Mol Biol 48 (1994): 53-81.

29. Robertson KD, Jones PA, "DNA methylation: past, present and future directions," Carcinogenesis 21 (2000): 461-7.

30. Goodman JI, Counts JL, "Hypomethylation of DNA: a possible nongenotoxic mechanism underlying the role of cell proliferation in carcinogenesis," Environ Health Perspect 101 Suppl 5 (1993): 169-72.

31. Herman JG, Merlo A, Mao L, Lapidus RG, Issa JP, et al, "Inactivation of the CDKN2/p16/MTS1 gene is frequently associated with aberrant DNA methylation in all common human cancers," Cancer Res 55 (1995): 4525-30.

32. Boyes J, Bird A, "DNA methylation inhibits transcription indirectly via a methyl-CpG binding protein," Cell 64 (1991): 1123-34.

33. Lewis J, Bird A, "DNA methylation and chromatin structure," FEBS Lett 285 (1991): 155-9.

34. Jones PA, Buckley JD, "The role of DNA methylation in cancer, Adv Cancer Res 54 (1990): 1-23.

35. Costello JF, Futscher BW, Tano K, Graunke DM, Pieper RO, "Graded methylation in the promoter and body of the O6-methylguanine DNA methyltransferase (MGMT) gene correlates with MGMT expression in human glioma cells," J Biol Chem 269 (1994): 17228-37.

36. Razin A, Szyf M, Kafri T, Roll M, Giloh H, et al, "Replacement of 5-methylcytosine by cytosine: a possible mechanism for transient DNA demethylation during differentiation," Proc Natl Acad Sci U S A 83 (1986): 2827-31.

37. Okano M, Bell DW, Haber DA, Li E, "DNA methyltransferases Dnmt3a and Dnmt3b are essential for de novo methylation and mammalian development, Cell 99 (1999): 247-57.

38. Razin A, Shemer R, "DNA methylation in early development," Hum Mol Genet 4 Spec No(1995): 1751-5.

39. Li E, Bestor TH, Jaenisch R, "Targeted mutation of the DNA methyltransferase gene results in embryonic lethality," Cell 69 (1992): 915-26.

40. Goelz SE, Vogelstein B, Hamilton SR, Feinberg AP, "Hypomethylation of DNA from benign and malignant human colon neoplasms," Science 228 (1985): 187-90.

41. MacLeod AR, Szyf M, "Expression of antisense to DNA methyltransferase mRNA induces DNA demethylation and inhibits tumorigenesis," J Biol Chem 270 (1995): 8037-43.

42. Laird PW, Jackson-Grusby L, Fazeli A, Dickinson SL, Jung WE, et al, "Suppression of intestinal neoplasia by DNA hypomethylation," Cell 81 (1995): 197-205.

43. Esteller M, "Aberrant DNA methylation as a cancer-inducing mechanism," Annu Rev Pharmacol Toxicol 45 (2005): 629-56.

44. Gaudet F, Hodgson JG, Eden A, Jackson-Grusby L, Dausman J, et al, "Induction of tumors in mice by genomic hypomethylation," Science 300 (2003): 489-92.

45. Garrick D, Fiering S, Martin DI, Whitelaw E, "Repeat-induced gene silencing in mammals," Nat Genet 18 (1998): 56-9.

46. Morgan HD, Sutherland HG, Martin DI, Whitelaw E, "Epigenetic inheritance at the agouti locus in the mouse," Nat Genet 23 (1999): 314-8.

47. Yates PA, Burman RW, Mummaneni P, Krussel S, Turker MS, "Tandem B1 elements located in a mouse methylation center provide a target for de novo DNA methylation," J Biol Chem 274 (1999): 36357-61.

48. Smit AF, Riggs AD, "Tiggers and DNA transposon fossils in the human genome," Proc Natl Acad Sci U S A 93 (1996): 1443-8.

49. Ostertag EM, Kazazian HH, Jr, "Biology of mammalian L1 retrotransposons," Annu Rev Genet 35 (2001): 501-38.

50. Boissinot S, Entezam A, Young L, Munson PJ, Furano AV, "The insertional history of an active family of L1 retrotransposons in humans," Genome Res 14 (2004): 1221-31.

51. Moran JV, DeBerardinis RJ, Kazazian HH, Jr, "Exon shuffling by L1 retrotransposition," Science 283 (1999): 1530-4.

52. Symer DE, Connelly C, Szak ST, Caputo EM, Cost GJ, et al, "Human l1 retrotransposition is associated with genetic instability in vivo," Cell 110 (2002): 327-38.

53. Holmes SE, Dombroski BA, Krebs CM, Boehm CD, Kazazian HH, Jr, "A new retrotransposable human L1 element from the LRE2 locus on chromosome 1q produces a chimaeric insertion," Nat Genet 7 (1994): 143-8.

54. Gilbert N, Lutz-Prigge S, Moran JV, "Genomic deletions created upon LINE-1 retrotransposition," Cell 110 (2002): 315-25.

55. Viel A, Petronzelli F, Della Puppa L, Lucci-Cordisco E, Fornasarig M, et al, "Different molecular mechanisms underlie genomic deletions in the MLH1 Gene," Hum Mutat 20 (2002): 368-74.

56. Carnell AN, Goodman JI, "The long (LINEs) and the short (SINEs) of it: altered methylation as a precursor to toxicity," Toxicol Sci 75 (2003): 229-35.

57. Loeb LA, "A mutator phenotype in cancer," Cancer Res 61 (2001): 3230-9.

58. Miki Y, Nishisho I, Horii A, Miyoshi Y, Utsunomiya J, et al, "Disruption of the APC gene by a retrotransposal insertion of L1 sequence in a colon cancer," Cancer Res 52 (1992): 643-5.

59. Wei W, Gilbert N, Ooi SL, Lawler JF, Ostertag EM, et al, "Human L1 retrotransposition: cis preference versus trans complementation," Mol Cell Biol 21 (2001): 1429-39.

60. Whitelaw E, Martin DI, "Retrotransposons as epigenetic mediators of phenotypic variation in mammals," Nat Genet 27 (2001): 361-5.

61. Kazazian HH, Jr., Moran JV, "The impact of L1 retrotransposons on the human genome," Nat Genet 19 (1998): 19-24.

62. Chen RZ, Pettersson U, Beard C, Jackson-Grusby L, Jaenisch R, "DNA hypomethylation leads to elevated mutation rate," Nature 395 (1998): 89-93.

63. Takai D, Yagi Y, Habib N, Sugimura T, Ushijima T, "Hypomethylation of LINE1 retrotransposon in human hepatocellular carcinomas, but not in surrounding liver cirrhosis," Jpn J Clin Oncol 30 (2000): 306-9.

64. Dante R, Dante-Paire J, Rigal D, Roizes G, "Methylation patterns of long interspersed repeated DNA and alphoid repetitive DNA from human cell lines and tumors," Anticancer Res 12 (1992): 559-63.

65. Santourlidis S, Florl A, Ackermann R, Wirtz HC, Schulz WA, "High frequency of alterations in DNA methylation in adenocarcinoma of the prostate," Prostate 39 (1999): 166-74.

66. Ushijima T, Morimura K, Hosoya Y, Okonogi H, Tatematsu M, et al, "Establishment of methylation-sensitive-representational difference analysis and isolation of hypo- and hypermethylated genomic fragments in mouse liver tumors," Proc Natl Acad Sci U S A 94 (1997): 2284-9.

67. Stavenhagen JB, Robins DM, "An ancient provirus has imposed androgen regulation on the adjacent mouse sex-limited protein gene," Cell 55 (1988): 247-54.

68. van den Berg CW, Demant P, Aerts PC, Van Dijk H, "Slp is an essential component of an EDTA-resistant activation pathway of mouse complement," Proc Natl Acad Sci U S A 89 (1992): 10711-5.

69. Adler AJ, Danielsen M, Robins DM, "Androgen-specific gene activation via a consensus glucocorticoid response element is determined by interaction with nonreceptor factors," Proc Natl Acad Sci U S A 89 (1992): 11660-3.

70. Britten RJ, "DNA sequence insertion and evolutionary variation in gene regulation," Proc Natl Acad Sci U S A 93 (1996):9374-9377.

71. Medstrand P, Landry JR, Mager DL, "Long terminal repeats are used as alternative promoters for the endothelin B receptor and apolipoprotein C-I genes in humans," J Biol Chem 276 (2001): 1896-903.

72. Landry JR, Medstrand P, Mager DL, "Repetitive elements in the 5' untranslated region of a human zinc-finger gene modulate transcription and translation efficiency," Genomics 76 (2001): 110-6.

73. Brosius J, "Genomes were forged by massive bombardments with retroelements and retrosequences," Genetica 107 (1999): 209-38.

74. Varagona MJ, Purugganan M, Wessler SR, " Alternative splicing induced by insertion of retrotransposons into the maize waxy gene," Plant Cell 4 (1992): 811-20.

75. Feuchter-Murthy AE, Freeman JD, Mager DL, "Splicing of a human endogenous retrovirus to a novel phospholipase A2 related gene," Nucleic Acids Res 21 (1993): 135-43.

76. Goodchild NL, Wilkinson DA, Mager DL, "A human endogenous long terminal repeat provides a polyadenylation signal to a novel, alternatively spliced transcript in normal placenta," Gene 121 (1992): 287-94.

77. Mager DL, Hunter DG, Schertzer M, Freeman JD, "Endogenous retroviruses provide the primary polyadenylation signal for two new human genes (HHLA2 and HHLA3)," Genomics 59 (1999): 255-63.

78. Han JS, Szak ST, Boeke JD, "Transcriptional disruption by the L1 retrotransposon and implications for mammalian transcriptomes," Nature 429 (2004): 268-74.

79. Xiong Z, Laird PW, "COBRA: a sensitive and quantitative DNA methylation assay," Nucleic Acids Res 25 (1997): 2532-4.

80. Penzkofer T, Dandekar T, Zemojtel T, "L1Base: from functional annotation to prediction of active LINE-1 elements," Nucleic Acids Res 33 (2005): D498-500.

APPENDICES

APPENDIX A

BUFFERS AND REAGENT

1. Lysis Buffer 1

Sucrose	109.54	g
1.0 M Tris – HCl (pH 7.5)	10	ml
1.0 M $MgCl_2$	5	ml
Triton X – 100 (pure)	10	ml
Distilled water to	1,000	ml

Sterilize the solution by autoclaving and store in a refrigerator (at 4^0C).

2. Lysis Buffer 2

5.0 M NaCl	15	ml
0.5 M EDTA (pH 8.0)	48	ml
Distilled water to	1,000	ml

Sterilize the solution by autoclaving and store at room temperature.

3. 10% SDS solution

Sodium dodecyl sulfate	10	g
Distilled water to	100	ml

Mix the solution and store at room temperature.

4. 20 mg/ml Proteinase K

Proteinase K	2	mg

Distilled water to	1	ml

Mix the solution and store in a refrigerator (at -20^{0}C).

5. 1.0 M Tris – HCl

Tris base	12.11	g

Dissolve in distilled water and adjusted pH to 7.5 with HCl

Distilled water to	100	ml

Sterilize the solution by autoclaving and store at room temperature.

6. 0.5 M EDTA (pH 8.0)

Disodium ethylenediamine tetraacetate.2H_2O	186.6	g

Dissolve in distilled water and adjusted pH to 8.0 with NaOH

Distilled water to	1,000	ml

Sterilize the solution by autoclaving and store at room temperature.

7. 1.0 M $MgCl_2$ solution

Magnesium chloride.6H_2O	20.33	g
Distilled water to	100	ml

Dispense the solution into aliquots and sterilize by autoclaving.

8. 5 M NaCl solution

Sodium chloride	29.25	g
Distilled water to	100	ml

Dispense the solution into aliquot and sterilize by autoclaving.

9. 10X Tris borate buffer (10X TBE buffer)

Tris – base	100	g
Boric acid	55	g
0.5 M EDTA (pH 8.0)	40	ml

Adjust volume to 1,000 ml with distilled water. The solution was mixed and store at room temperature.

10. 6X loading dye

Bromphenol blue	0.25	g
Xylene cyanol	0.25	g
Glycerol	50	ml
1M Tris (pH 8.0)	1	ml
Distilled water until	100	ml

Mixed and stored at 4^0C

11. 7.5 M Ammonium acetate (CH_3COONH_4)

Ammonium acetate	57.81	g
Distilled water	80	ml

Adjust volume to 100 ml with distilled water and sterilize by autoclaving.

12. 25:24:1 (v/v) Phenol-chloroform-isoamyl alcohol

Phenol	25	volume

Chloroform	24	volume
Isoamyl alcohol	1	volume

Mix the reagent and store in a sterile bottle kept in a refrigerator.

13. 12% Non-denature acrylamide gel (w/v)

40%acrylamide: Bis (19:1)	2	ml
10X TBE	1	ml
10% ammoniumpersulfate	100	µl
TEMED	10	µl
H_2O	7	ml

Dissolve by heating in microwave oven and occasional mix.

14. TE buffer

Tris base	1.21	g
5M EDTA	200	µl

Adjust pH to 7.5 with conc.HCL and adjust volume to 1.0 litre with H_2O.

15. IPTG stock solution (0.1M)

1.2g IPTG

Add water to 50ml final volume. Filtersterilize and store at 4°C.

16. X-Gal (2ml)

100mg 5-bromo-4-chloro-3- indolyl-β-D-galactoside dissolve in 2ml N,N´-dimethylformamide. Cover with aluminum foil and store at .20°C.

17. LB medium (per liter)

10g Bacto®-tryptone

5g Bacto®-yeast extract

5g NaCl

Adjust pH to 7.0 with NaOH.

18. LB plates with ampicillin

Add 15g agar to 1 liter of LB medium.Autoclave. Allow the medium to cool to 50°C before adding ampicillin to a finalconcentration of 100μg/ml. Pour 30.35ml of medium into 85mm Petri dishes. Let the agar harden. Store at 4°C for up to 1 month or at room temperature for up to 1 week.

19. LB plates with ampicillin/IPTG/X-Gal

Make the LB plates with ampicillin as above; then supplement with 0.5mM IPTG and 80μg/ml X-Gal and pour the plates. Alternatively, 100μl of 100mM IPTG and 20μl of 50mg/ml X-Gal may be spread over the surface of an LBampicillin plate and allowed to absorb for 30 minutes at 37°C prior to use.

20. SOC medium (100ml)

2.0g Bacto®-tryptone

0.5g Bacto®-yeast extract

1ml 1M NaCl

0.25ml 1M KCl

1ml 2M Mg2+ stock, filtersterilized

1ml 2M glucose, filter-sterilized

Add Bacto®-tryptone, Bacto®-yeast extract, NaCl and KCl to 7ml distilled water. Stir to dissolve. Autoclave and cool to room temperature. Add 2M Mg2+ stock and 2M glucose, each to a final

concentration of 20mM. Bring to 100ml with sterile, distilled water. The final pH should be 7.0.

APPENDIX B

Sequence of COBRA LINE-1, and primer

1. Human transposon L1.2 ACCESSION M80343 (5′UTR ; 1-482 bp) for COBRA LINE-1

BEFORE BISULFITE

Gggggaggagccaagatggccgaataggaacagctccggtctacagctcccagcgtgagcgacgcagaag
acggtgatttctgcatttccatctgaggtaccgggttcatctcactagggagtgccagacagtgggcgcaggccagtg
tgtgtgcgcaccgtgcgcgagccgaagcagggcgaggcattgcctcacctgggaagcgcaaggggtcaggga
gttccctttctgagtcaaagaaaggggtgacggtcgcacctggaaaatcgggtcactcccacccgaatattgcgctttt
cagaccggcttaagaaacggcgcaccacgagactatatcccacacctggctcggagggtcctacgcccacgga
atctcgctgattgctagcacagcagtctgagatcaaactgcaaggcggcaacgaggctgggggaggggcgcccg
ccattgcccaggcttgcttaggtaaacaaagcagc

AFTER BISULFITE+METHYLATION ALL CG

GgggggaggagTTaagatggTCGaataggaaTagTtTCGgtTtaTagTtTTTagCGtgagCGaCGT
agaagaCGgtgatttTtgTatttTTatTtgaggtaTCGggttTatTtTaTtagggagtgTTagaTagtgggCG
TaggTTagtgtgtgtgCGTaTCGtgCGCGagTCGaagTagggCGaggTattgTTtTaTTtgggaa
gCGTaaggggtTagggagttTTTtttTtgagtTaaagaaAggggtgaCGgtCGTaTTtggaaaatCGgg
tTaTtTTTaTTCGaatattgCGTttttTagaTCGgTttaagaaaCGgCGTaTTaCGagaTtatatTTTa
TaTTtggTtCGgagggtTTtaCGTTTaCGgaatTtCGTtgattgTtagTaTagTagtTtgagatTaaaT
tgTaaggCGgTaaCGaggTtgggggaggggCGTTCGTTattgTTTaggTttgTttaggtaaaTaaa
gTagT

Tas I => AATT, *Taq I* => TCGA

F COBRALINE-1 = ccgTaaggggtTagggagttTTT

R COBRALINE-1 = RTAAAACCCTCCRAACCAAATATAAA

Total amplicon = 160 bp and TasI = 63+ 97 and TagI = 80+80

APPENDIX C

Description of 17 LINE-1, CU-L1 PCR and RT-PCR

Table C-1 : Description of 17 LINE-1 selected for CU-L1 PCR.

No	Gene	Map	locus	Intron sequence	LINE-1 site	LINE-1 start-end	LINE-1 orientation	LINE-1 Ta
1	COL24A1 collagen, type XXIV, alpha 1	1p22.3	intron 24	195146..195190,245006..245059	229,373-223,325	5-6,050	Antisense	ACAG
2	FAM49A family with sequence similarity 49,	2p24.3-2p24.2	intron 2	41813..41968,77703..77782	66,072-72,120	5-6,043	Sense	ACAG
3	CNTNAP5 contactin associated protein-like	2q14.3	intron 11	537931..538037,584515..584634	573,886-567,835	4-6,031	Antisense	GAGA
4	PKP4 plakophilin 4	2q24.1	intron 1	1..255,76217..76353	65,653-71,700	2-6,041	Sense	GAGA
5	LRP2 low density lipoprotein-related protein	2q31.1	intron 19	106268..106398,114989..115126	113,883-107,834	3-6,038	Antisense	ACAG
6	MGC42174 hypothetical protein MGC42174	2q37.1	intron 8	174789..175036,201776..201949	193,548-187,500	1-6,039	Antisense	ACAG
7	EPHA3 intron 5 EPH receptor A3	3p11.1	intron 5	234232..234567,288314..288438	244,122-238,079	5-6,045	Antisense	GAGA
8	EPHA3 intron 15 EPH receptor A3	3p11.1	intron 15	342654..342847,364941..365096	359,335-353,289	4-6,038	Antisense	ACAG
9	ANTXR2 anthrax toxin receptor 2	4q21.21	intron 16	95399..95479,165633..167529	135,388-129,338	6-6,050	Antisense	ACAG
10	SPOCK3 sparc/osteonectin, cwcv and kazal	4q32.3	intron 7	448383..448502,485943..486164	484,799-478,750	27-6,050	Antisense	ACAG
11	LOC133993 hypothetical LOC133993	5q12.3	intron 3	1..29530	24,756-18,710	8-6,040	Antisense	GAGA
12	PPP2R2B protein phosphatase 2 (formerly 2	5q32	intron 8	443037..443201,480992..481161	471,974-465,923	8-6,050	Antisense	ACGG
13	LOC286094 hypothetical protein LOC28609	8q24.22	intron 1	1..65577	24,962-31,008	4-6,048	Sense	GAGA
14	PRKG1 protein kinase, cGMP-dependent, t	10q21.1	intron 9	1087357..1087431,1177038..1177134	1,158,767-1,164,816	33-6,045	Sense	AAGA
15	ADAMTS20 a disintegrin-like and metallopr	12q12	intron 7	61487..61527,83217..83322	80,951-74,900	3-6,036	Antisense	GAGA
16	CDH8 cadherin 8, type 2	16q21	intron 7	218401..218654,246651..246787	234,682-228,630	5-6,050	Antisense	AAGA
17	LOC284395 hypothetical protein LOC28439	19q12	intron 1	1..325,96939..97018	66,461-60,412	3-5,901	Antisense	AAAG

Table C-2 : Show all detail of CU-L1 PCR and 17 LINE-1's host gene RT-PCR

Gene	Primer of COBRA unique to LINE-1	CU-L1 PCR product	Primer of RT-PCR	RT-PCR product	Location of RT-PCR
COL24A1 co	5'CUL1-COL24A1=GTTAAAGGGTTAAGAATGTGTGTAG	336 bp	5'RT-COL24A1=GGAGAAGTAGGAGATCAAGGAAA	94 bp	195146-195190,245006-245054
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-COL24A1=CGCCAATGCTTCCAGTCAT		
FAM49A fa	5'CUL1-FAM49A=GTTTTAAAAAAAAATAAAGTTGG	385 bp	5'RT-FAM49A=GCCACCGTCCTGATTTGG	188 bp	41860-41968,77703-77781
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-FAM49A=TTCAAAATCCAGGAAAAAGTGT		
CNTNAP5 c	5'CUL1-CNTNAP5=GATTAAATTTTAATTGAATTAGAG	403 bp	5'RT-CNTNAP5=CAAGTTACACATGGTGCCACCTG	150 bp	538008-538037,584515-584634
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-CNTNAP5=CAGTGATATTGCAGTACACCTGGA		
PKP4 plako	5'CUL1-PKP4 =GGTATGATTTTAAAAAAAGAGAT	392 bp	5'RT-PKP4=CTGATCCCTGGAGCGACG	128 bp	215-255,76214-76303
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-PKP4=TGCCTGGGCCAGTGGAG		
LRP2 low de	5'CUL1-LRP2=GGTATATAATTTTTATGGTGTTG	435 bp	5'RT-LRP2=ATGACACATCCGTTTGGACTTG	109 bp	106365-106398,114989-115063
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-LRP2=CTGTCATTTCTCCACCATCTGC		
MGC42174	5'CUL1-MGC42=ATTGAGGTGTATTAAGAGATGGA	553 bp	5'RT-MGC42174 =TGGACTGGAAGGAGGACTGC	115 bp	17503-175036,21776-201856
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-MGC42174 = AAATCCACGCCATACTCTGTTA		
EPHA3 intron	5'CUL1-EPHA3in5=TGTTATTGGAATATATGGAGATT	386 bp	5'RT-EPHA3=CTCCCTCGACAGTTTGGACTC	196 bp	234408-234567,288314-288349
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-EPHA3=TCCGATCTTTCTTAATCGTCAG		
EPHA3 intron	5'CUL1-EPHA3in15=TAAGGATAAAAATTTTTGAAGTT	464 bp	5'RT-EPHA3=CTCCCTCGACAGTTTGGACTC	196 bp	234408-234567,288314-288349
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-EPHA3=TCCGATCTTTCTTAATCGTCAG		
ANTXR2 an	5'CUL1-ANTXR=TATTGAGTATTAATTAATGTATTTAGTAT	416 bp	5'RT-ANTXR2=TTGATGCTCTCTGGGCTTTG	127 bp	95406-95479,165633-165685
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-ANTXR2=TTCCTGCTTCCCTTTACTGA		
SPOCK3 sp	5'CUL1-SPOCK3=GTGTAATTTTTTTAGATTTTGTAG	492 bp	5'RT-SPOCK3=CCTGGAGTTCAGGGAAGTGG	220 bp	442312-442421,479862-479971
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-SPOCK3=AATGCTTCTGAGCTCTGACTGG		
LOC133993	5'CUL1-LOC133993=TTAGGATATTTTTTATTTTGGGA	446 bp	5'RT-LOC133993=TCAAAGATTAGACACTGGCCTTA	105 bp	5299-5356,27580-27627
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-LOC133993=GATGCTGCATTTGAATTGAGG		
PPP2R2B p	5'CUL1-PPP2R2B=GGGGAAAAAATTGAAAGTT	590 bp	5'RT-PPP2R2B=GGACATTAAGCCAGCCAACA	267 bp	443044-443201,480992-481100
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-PPP2R2B=TCCCTGGTCATGATATACCTCC		
LOC286094	5'CUL1-LOC286094=TATGTAAGTATGGAAATTTGAGG	429 bp	5'RT-LOC286094=CCTCAATGAATCCTGAGGACAG	337 bp	78-387,56992-57058
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-LOC286094=CAAATGCAGAGACCTGGAGTTG		
PRKG1 prot	5'CUL1-PRKG =AAAATTTTTAGTTGTTAAATGG	374 bp	5'RT-PRKG1=TTTGATTGGAGGGCTGGAT	89 bp	1087369-1087431,1177038-1177063
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-PRKG1=CGAAGAAAGCCGCTTCAG		
ADAMTS20	5'CUL1-ADAMTS20=AAGTTGTGTGGTTTTTTGTAAAT	468 bp	5'RT-ADAMTS20=ATTTGTTCATCTAAAGAGAAATGTAA	107 bp	61494-61527,83217-83289
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-ADAMTS20=GAAATGAGTCCTTTTTCTTCATTA		
CDH8 cadh	5'CUL1-CDH8=GGATTTGGGAGTTGGATAGTTAG	405 bp	5'RT-CDH8=GTCTTCTCTTCACCGACTTACCTA	170 bp	218545-218654,246651-246710
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-CDH8=CCATCGTCTGCATTAATGTTGA		
LOC284395	5'CUL1-LOC284395=GAGAAATAGAATAGGTATGATTGATTAA	473 bp	5'RT-LOC284395=CGAGAAGGGCGGAACG	227 bp	174-331,96945-97013
	3'CL1=GTAAAACCCTCCGAACCAAATATAAA		3'RT-LOC284395=CGCCTGAATTCCACTGTTAGA		

APPENDIX C

ANOVA analysis of all group

Table C-3 : COBRA unique to LINE-1 result from multiple group comparison with ANOVA analysis.

Dependent Variable	(I) Cell type	(J) Cell type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
COBRAL1	HNSCC cell line	HNSCC microdissect cell	.39333	1.85110	.833	-3.3195	4.1062
		Normal oral rinse cell	18.22667(*)	2.02778	.000	14.1595	22.2939
		Leukemic cell line	2.95250	2.86771	.308	-2.7994	8.7044
		Normal white blood cell	22.04333(*)	2.02778	.000	17.9761	26.1105
	HNSCC microdissect cell	HNSCC cell line	-.39333	1.85110	.833	-4.1062	3.3195
		Normal oral rinse cell	17.83333(*)	1.85110	.000	14.1205	21.5462
		Leukemic cell line	2.55917	2.74562	.356	-2.9479	8.0662
		Normal white blood cell	21.65000(*)	1.85110	.000	17.9372	25.3628
	Normal oral rinse cell	HNSCC cell line	-18.22667(*)	2.02778	.000	-22.2939	-14.1595
		HNSCC microdissect cell	-17.83333(*)	1.85110	.000	-21.5462	-14.1205
		Leukemic cell line	-15.27417(*)	2.86771	.000	-21.0261	-9.5223
		Normal white blood cell	3.81667	2.02778	.065	-.2505	7.8839
	Leukemic cell line	HNSCC cell line	-2.95250	2.86771	.308	-8.7044	2.7994
		HNSCC microdissect cell	-2.55917	2.74562	.356	-8.0662	2.9479
		Normal oral rinse cell	15.27417(*)	2.86771	.000	9.5223	21.0261
		Normal white blood cell	19.09083(*)	2.86771	.000	13.3389	24.8427
	Normal white blood cell	HNSCC cell line	-22.04333(*)	2.02778	.000	-26.1105	-17.9761
		HNSCC microdissect cell	-21.65000(*)	1.85110	.000	-25.3628	-17.9372
		Normal oral rinse cell	-3.81667	2.02778	.065	-7.8839	.2505
		Leukemic cell line	-19.09083(*)	2.86771	.000	-24.8427	-13.3389
CNTNAP5	HNSCC cell line	HNSCC microdissect cell	32.54444(*)	7.10878	.000	18.2796	46.8093
		Normal oral rinse cell	50.48500(*)	7.78728	.000	34.8587	66.1113
		Leukemic cell line	36.07750(*)	11.01288	.002	13.9785	58.1765
		Normal white blood cell	72.34818(*)	7.96230	.000	56.3707	88.3257
	HNSCC microdissect cell	HNSCC cell line	-32.54444(*)	7.10878	.000	-46.8093	-18.2796
		Normal oral rinse cell	17.94056(*)	7.10878	.015	3.6757	32.2054
		Leukemic cell line	3.53306	10.54403	.739	-17.6251	24.6912
		Normal white blood cell	39.80374(*)	7.30009	.000	25.1550	54.4524
	Normal oral rinse cell	HNSCC cell line	-50.48500(*)	7.78728	.000	-66.1113	-34.8587
		HNSCC microdissect cell	-17.94056(*)	7.10878	.015	-32.2054	-3.6757
		Leukemic cell line	-14.40750	11.01288	.197	-36.5065	7.6915
		Normal white blood cell	21.86318(*)	7.96230	.008	5.8857	37.8407
	Leukemic cell line	HNSCC cell line	-36.07750(*)	11.01288	.002	-58.1765	-13.9785
		HNSCC microdissect cell	-3.53306	10.54403	.739	-24.6912	17.6251
		Normal oral rinse cell	14.40750	11.01288	.197	-7.6915	36.5065
		Normal white blood cell	36.27068(*)	11.13733	.002	13.9220	58.6194
	Normal white blood cell	HNSCC cell line	-72.34818(*)	7.96230	.000	-88.3257	-56.3707
		HNSCC microdissect cell	-39.80374(*)	7.30009	.000	-54.4524	-25.1550
		Normal oral rinse cell	-21.86318(*)	7.96230	.008	-37.8407	-5.8857
		Leukemic cell line	-36.27068(*)	11.13733	.002	-58.6194	-13.9220
ANTXR2	HNSCC cell line	HNSCC microdissect cell	8.55550	8.61186	.325	-8.7419	25.8529
		Normal oral rinse cell	48.66833(*)	9.07770	.000	30.4352	66.9014
		Leukemic cell line	45.31167(*)	12.83781	.001	19.5262	71.0972

		Normal white blood cell	50.08167(*)	9.07770	.000	31.8486	68.3148
	HNSCC microdissect cell	HNSCC cell line	-8.55550	8.61186	.325	-25.8529	8.7419
		Normal oral rinse cell	40.11283(*)	8.61186	.000	22.8154	57.4103
		Leukemic cell line	36.75617(*)	12.51275	.005	11.6236	61.8888
		Normal white blood cell	41.52617(*)	8.61186	.000	24.2287	58.8236
	Normal oral rinse cell	HNSCC cell line	-48.66833(*)	9.07770	.000	-66.9014	-30.4352
		HNSCC microdissect cell	-40.11283(*)	8.61186	.000	-57.4103	-22.8154
		Leukemic cell line	-3.35667	12.83781	.795	-29.1422	22.4288
		Normal white blood cell	1.41333	9.07770	.877	-16.8198	19.6464
	Leukemic cell line	HNSCC cell line	-45.31167(*)	12.83781	.001	-71.0972	-19.5262
		HNSCC microdissect cell	-36.75617(*)	12.51275	.005	-61.8888	-11.6236
		Normal oral rinse cell	3.35667	12.83781	.795	-22.4288	29.1422
		Normal white blood cell	4.77000	12.83781	.712	-21.0155	30.5555
	Normal white blood cell	HNSCC cell line	-50.08167(*)	9.07770	.000	-68.3148	-31.8486
		HNSCC microdissect cell	-41.52617(*)	8.61186	.000	-58.8236	-24.2287
		Normal oral rinse cell	-1.41333	9.07770	.877	-19.6464	16.8198
		Leukemic cell line	-4.77000	12.83781	.712	-30.5555	21.0155
FAM49A	HNSCC cell line	HNSCC microdissect cell	31.18590(*)	8.14406	.000	14.8112	47.5606
		Normal oral rinse cell	49.87917(*)	8.30535	.000	33.1801	66.5782
		Leukemic cell line	28.10917(*)	11.74554	.021	4.4932	51.7251
		Normal white blood cell	65.10667(*)	8.30535	.000	48.4076	81.8057
	HNSCC microdissect cell	HNSCC cell line	-31.18590(*)	8.14406	.000	-47.5606	-14.8112
		Normal oral rinse cell	18.69327(*)	8.14406	.026	2.3185	35.0680
		Leukemic cell line	-3.07673	11.63205	.793	-26.4645	20.3111
		Normal white blood cell	33.92077(*)	8.14406	.000	17.5460	50.2955
	Normal oral rinse cell	HNSCC cell line	-49.87917(*)	8.30535	.000	-66.5782	-33.1801
		HNSCC microdissect cell	-18.69327(*)	8.14406	.026	-35.0680	-2.3185
		Leukemic cell line	-21.77000	11.74554	.070	-45.3860	1.8460
		Normal white blood cell	15.22750	8.30535	.073	-1.4715	31.9265
	Leukemic cell line	HNSCC cell line	-28.10917(*)	11.74554	.021	-51.7251	-4.4932
		HNSCC microdissect cell	3.07673	11.63205	.793	-20.3111	26.4645
		Normal oral rinse cell	21.77000	11.74554	.070	-1.8460	45.3860
		Normal white blood cell	36.99750(*)	11.74554	.003	13.3815	60.6135
	Normal white blood cell	HNSCC cell line	-65.10667(*)	8.30535	.000	-81.8057	-48.4076
		HNSCC microdissect cell	-33.92077(*)	8.14406	.000	-50.2955	-17.5460
		Normal oral rinse cell	-15.22750	8.30535	.073	-31.9265	1.4715
		Leukemic cell line	-36.99750(*)	11.74554	.003	-60.6135	-13.3815
COL24A1	HNSCC cell line	HNSCC microdissect cell	5.12733	10.76514	.636	-16.5548	26.8094
		Normal oral rinse cell	42.98583(*)	10.26416	.000	22.3128	63.6589
		Leukemic cell line	16.78083	14.51571	.254	-12.4553	46.0170
		Normal white blood cell	46.43750(*)	10.26416	.000	25.7644	67.1106
	HNSCC microdissect cell	HNSCC cell line	-5.12733	10.76514	.636	-26.8094	16.5548
		Normal oral rinse cell	37.85850(*)	10.76514	.001	16.1764	59.5406
		Leukemic cell line	11.65350	14.87418	.437	-18.3046	41.6116
		Normal white blood cell	41.31017(*)	10.76514	.000	19.6281	62.9923
	Normal oral rinse cell	HNSCC cell line	-42.98583(*)	10.26416	.000	-63.6589	-22.3128
		HNSCC microdissect cell	-37.85850(*)	10.76514	.001	-59.5406	-16.1764
		Leukemic cell line	-26.20500	14.51571	.078	-55.4411	3.0311
		Normal white blood cell	3.45167	10.26416	.738	-17.2214	24.1247
	Leukemic cell line	HNSCC cell line	-16.78083	14.51571	.254	-46.0170	12.4553
		HNSCC microdissect cell	-11.65350	14.87418	.437	-41.6116	18.3046
		Normal oral rinse cell	26.20500	14.51571	.078	-3.0311	55.4411
		Normal white blood cell	29.65667(*)	14.51571	.047	.4205	58.8928
	Normal white blood cell	HNSCC cell line	-46.43750(*)	10.26416	.000	-67.1106	-25.7644

		HNSCC microdissect cell	-41.31017(*)	10.76514	.000	-62.9923	-19.6281
		Normal oral rinse cell	-3.45167	10.26416	.738	-24.1247	17.2214
		Leukemic cell line	-29.65667(*)	14.51571	.047	-58.8928	-.4205
ADAMTS20	HNSCC cell line	HNSCC microdissect cell	24.94083(*)	9.62487	.013	5.5030	44.3787
		Normal oral rinse cell	37.69083(*)	7.85867	.000	21.8199	53.5617
		Leukemic cell line	28.02333(*)	11.11384	.016	5.5785	50.4682
		Normal white blood cell	41.33750(*)	7.85867	.000	25.4666	57.2084
	HNSCC microdissect cell	HNSCC cell line	-24.94083(*)	9.62487	.013	-44.3787	-5.5030
		Normal oral rinse cell	12.75000	9.62487	.193	-6.6878	32.1878
		Leukemic cell line	3.08250	12.42565	.805	-22.0116	28.1766
		Normal white blood cell	16.39667	9.62487	.096	-3.0412	35.8345
	Normal oral rinse cell	HNSCC cell line	-37.69083(*)	7.85867	.000	-53.5617	-21.8199
		HNSCC microdissect cell	-12.75000	9.62487	.193	-32.1878	6.6878
		Leukemic cell line	-9.66750	11.11384	.389	-32.1124	12.7774
		Normal white blood cell	3.64667	7.85867	.645	-12.2242	19.5176
	Leukemic cell line	HNSCC cell line	-28.02333(*)	11.11384	.016	-50.4682	-5.5785
		HNSCC microdissect cell	-3.08250	12.42565	.805	-28.1766	22.0116
		Normal oral rinse cell	9.66750	11.11384	.389	-12.7774	32.1124
		Normal white blood cell	13.31417	11.11384	.238	-9.1307	35.7590
	Normal white blood cell	HNSCC cell line	-41.33750(*)	7.85867	.000	-57.2084	-25.4666
		HNSCC microdissect cell	-16.39667	9.62487	.096	-35.8345	3.0412
		Normal oral rinse cell	-3.64667	7.85867	.645	-19.5176	12.2242
		Leukemic cell line	-13.31417	11.11384	.238	-35.7590	9.1307
LOC284395	HNSCC cell line	HNSCC microdissect cell	36.07190(*)	11.07651	.003	13.5366	58.6072
		Normal oral rinse cell	46.59333(*)	13.06514	.001	20.0121	73.1746
		Leukemic cell line	21.93333	15.57918	.169	-9.7628	53.6294
		Normal white blood cell	46.97583(*)	15.57918	.005	15.2797	78.6719
	HNSCC microdissect cell	HNSCC cell line	-36.07190(*)	11.07651	.003	-58.6072	-13.5366
		Normal oral rinse cell	10.52143	12.00110	.387	-13.8950	34.9378
		Leukemic cell line	-14.13857	14.69828	.343	-44.0424	15.7653
		Normal white blood cell	10.90393	14.69828	.463	-18.9999	40.8078
	Normal oral rinse cell	HNSCC cell line	-46.59333(*)	13.06514	.001	-73.1746	-20.0121
		HNSCC microdissect cell	-10.52143	12.00110	.387	-34.9378	13.8950
		Leukemic cell line	-24.66000	16.24956	.139	-57.7200	8.4000
		Normal white blood cell	.38250	16.24956	.981	-32.6775	33.4425
	Leukemic cell line	HNSCC cell line	-21.93333	15.57918	.169	-53.6294	9.7628
		HNSCC microdissect cell	14.13857	14.69828	.343	-15.7653	44.0424
		Normal oral rinse cell	24.66000	16.24956	.139	-8.4000	57.7200
		Normal white blood cell	25.04250	18.33198	.181	-12.2542	62.3392
	Normal white blood cell	HNSCC cell line	-46.97583(*)	15.57918	.005	-78.6719	-15.2797
		HNSCC microdissect cell	-10.90393	14.69828	.463	-40.8078	18.9999
		Normal oral rinse cell	-.38250	16.24956	.981	-33.4425	32.6775
		Leukemic cell line	-25.04250	18.33198	.181	-62.3392	12.2542
LOC286094	HNSCC cell line	HNSCC microdissect cell	33.38417(*)	7.37664	.000	18.5443	48.2241
		Normal oral rinse cell	60.20917(*)	7.37664	.000	45.3693	75.0491
		Leukemic cell line	49.74083(*)	10.43214	.000	28.7541	70.7276
		Normal white blood cell	73.12917(*)	7.37664	.000	58.2893	87.9691
	HNSCC microdissect cell	HNSCC cell line	-33.38417(*)	7.37664	.000	-48.2241	-18.5443
		Normal oral rinse cell	26.82500(*)	7.37664	.001	11.9851	41.6649
		Leukemic cell line	16.35667	10.43214	.124	-4.6301	37.3434
		Normal white blood cell	39.74500(*)	7.37664	.000	24.9051	54.5849
	Normal oral rinse cell	HNSCC cell line	-60.20917(*)	7.37664	.000	-75.0491	-45.3693
		HNSCC microdissect cell	-26.82500(*)	7.37664	.001	-41.6649	-11.9851
		Leukemic cell line	-10.46833	10.43214	.321	-31.4551	10.5184

		Normal white blood cell	12.92000	7.37664	.086	-1.9199	27.7599
	Leukemic cell line	HNSCC cell line	-49.74083(*)	10.43214	.000	-70.7276	-28.7541
		HNSCC microdissect cell	-16.35667	10.43214	.124	-37.3434	4.6301
		Normal oral rinse cell	10.46833	10.43214	.321	-10.5184	31.4551
		Normal white blood cell	23.38833(*)	10.43214	.030	2.4016	44.3751
	Normal white blood cell	HNSCC cell line	-73.12917(*)	7.37664	.000	-87.9691	-58.2893
		HNSCC microdissect cell	-39.74500(*)	7.37664	.000	-54.5849	-24.9051
		Normal oral rinse cell	-12.92000	7.37664	.086	-27.7599	1.9199
		Leukemic cell line	-23.38833(*)	10.43214	.030	-44.3751	-2.4016
LRP2	HNSCC cell line	HNSCC microdissect cell	13.42306(*)	6.09278	.032	1.2025	25.6436
		Normal oral rinse cell	52.67833(*)	6.67431	.000	39.2914	66.0653
		Leukemic cell line	43.05833(*)	9.43889	.000	24.1263	61.9904
		Normal white blood cell	71.45750(*)	6.67431	.000	58.0705	84.8445
	HNSCC microdissect cell	HNSCC cell line	-13.42306(*)	6.09278	.032	-25.6436	-1.2025
		Normal oral rinse cell	39.25528(*)	6.09278	.000	27.0347	51.4758
		Leukemic cell line	29.63528(*)	9.03705	.002	11.5092	47.7613
		Normal white blood cell	58.03444(*)	6.09278	.000	45.8139	70.2550
	Normal oral rinse cell	HNSCC cell line	-52.67833(*)	6.67431	.000	-66.0653	-39.2914
		HNSCC microdissect cell	-39.25528(*)	6.09278	.000	-51.4758	-27.0347
		Leukemic cell line	-9.62000	9.43889	.313	-28.5520	9.3120
		Normal white blood cell	18.77917(*)	6.67431	.007	5.3922	32.1661
	Leukemic cell line	HNSCC cell line	-43.05833(*)	9.43889	.000	-61.9904	-24.1263
		HNSCC microdissect cell	-29.63528(*)	9.03705	.002	-47.7613	-11.5092
		Normal oral rinse cell	9.62000	9.43889	.313	-9.3120	28.5520
		Normal white blood cell	28.39917(*)	9.43889	.004	9.4671	47.3312
	Normal white blood cell	HNSCC cell line	-71.45750(*)	6.67431	.000	-84.8445	-58.0705
		HNSCC microdissect cell	-58.03444(*)	6.09278	.000	-70.2550	-45.8139
		Normal oral rinse cell	-18.77917(*)	6.67431	.007	-32.1661	-5.3922
		Leukemic cell line	-28.39917(*)	9.43889	.004	-47.3312	-9.4671
CDH8	HNSCC cell line	HNSCC microdissect cell	21.55000(*)	6.00261	.001	9.4743	33.6257
		Normal oral rinse cell	64.69917(*)	6.00261	.000	52.6235	76.7749
		Leukemic cell line	16.53667	8.48897	.057	-.5409	33.6143
		Normal white blood cell	61.85333(*)	6.00261	.000	49.7776	73.9290
	HNSCC microdissect cell	HNSCC cell line	-21.55000(*)	6.00261	.001	-33.6257	-9.4743
		Normal oral rinse cell	43.14917(*)	6.00261	.000	31.0735	55.2249
		Leukemic cell line	-5.01333	8.48897	.558	-22.0909	12.0643
		Normal white blood cell	40.30333(*)	6.00261	.000	28.2276	52.3790
	Normal oral rinse cell	HNSCC cell line	-64.69917(*)	6.00261	.000	-76.7749	-52.6235
		HNSCC microdissect cell	-43.14917(*)	6.00261	.000	-55.2249	-31.0735
		Leukemic cell line	-48.16250(*)	8.48897	.000	-65.2401	-31.0849
		Normal white blood cell	-2.84583	6.00261	.638	-14.9215	9.2299
	Leukemic cell line	HNSCC cell line	-16.53667	8.48897	.057	-33.6143	.5409
		HNSCC microdissect cell	5.01333	8.48897	.558	-12.0643	22.0909
		Normal oral rinse cell	48.16250(*)	8.48897	.000	31.0849	65.2401
		Normal white blood cell	45.31667(*)	8.48897	.000	28.2391	62.3943
	Normal white blood cell	HNSCC cell line	-61.85333(*)	6.00261	.000	-73.9290	-49.7776
		HNSCC microdissect cell	-40.30333(*)	6.00261	.000	-52.3790	-28.2276
		Normal oral rinse cell	2.84583	6.00261	.638	-9.2299	14.9215
		Leukemic cell line	-45.31667(*)	8.48897	.000	-62.3943	-28.2391
LOC133993	HNSCC cell line	HNSCC microdissect cell	13.07667(*)	6.13380	.039	.7067	25.4466
		Normal oral rinse cell	39.66500(*)	5.48623	.000	28.6010	50.7290
		Leukemic cell line	23.47667(*)	7.75871	.004	7.8297	39.1236
		Normal white blood cell	48.21917(*)	5.48623	.000	37.1551	59.2832

	HNSCC microdissect cell	HNSCC cell line	-13.07667(*)	6.13380	.039	-25.4466	-.7067
		Normal oral rinse cell	26.58833(*)	6.13380	.000	14.2184	38.9583
		Leukemic cell line	10.40000	8.22935	.213	-6.1961	26.9961
		Normal white blood cell	35.14250(*)	6.13380	.000	22.7725	47.5125
	Normal oral rinse cell	HNSCC cell line	-39.66500(*)	5.48623	.000	-50.7290	-28.6010
		HNSCC microdissect cell	-26.58833(*)	6.13380	.000	-38.9583	-14.2184
		Leukemic cell line	-16.18833(*)	7.75871	.043	-31.8353	-.5414
		Normal white blood cell	8.55417	5.48623	.126	-2.5099	19.6182
	Leukemic cell line	HNSCC cell line	-23.47667(*)	7.75871	.004	-39.1236	-7.8297
		HNSCC microdissect cell	-10.40000	8.22935	.213	-26.9961	6.1961
		Normal oral rinse cell	16.18833(*)	7.75871	.043	.5414	31.8353
		Normal white blood cell	24.74250(*)	7.75871	.003	9.0956	40.3894
	Normal white blood cell	HNSCC cell line	-48.21917(*)	5.48623	.000	-59.2832	-37.1551
		HNSCC microdissect cell	-35.14250(*)	6.13380	.000	-47.5125	-22.7725
		Normal oral rinse cell	-8.55417	5.48623	.126	-19.6182	2.5099
		Leukemic cell line	-24.74250(*)	7.75871	.003	-40.3894	-9.0956
PKP4	HNSCC cell line	HNSCC microdissect cell	-16.16618(*)	4.28064	.000	-24.7559	-7.5764
		Normal oral rinse cell	.92417	4.63500	.843	-8.3766	10.2250
		Leukemic cell line	.17500	6.55488	.979	-12.9783	13.3283
		Normal white blood cell	.92583	4.63500	.842	-8.3750	10.2266
	HNSCC microdissect cell	HNSCC cell line	16.16618(*)	4.28064	.000	7.5764	24.7559
		Normal oral rinse cell	17.09034(*)	4.28064	.000	8.5006	25.6801
		Leukemic cell line	16.34118(*)	6.30929	.012	3.6807	29.0017
		Normal white blood cell	17.09201(*)	4.28064	.000	8.5023	25.6818
	Normal oral rinse cell	HNSCC cell line	-.92417	4.63500	.843	-10.2250	8.3766
		HNSCC microdissect cell	-17.09034(*)	4.28064	.000	-25.6801	-8.5006
		Leukemic cell line	-.74917	6.55488	.909	-13.9025	12.4042
		Normal white blood cell	.00167	4.63500	1.000	-9.2991	9.3025
	Leukemic cell line	HNSCC cell line	-.17500	6.55488	.979	-13.3283	12.9783
		HNSCC microdissect cell	-16.34118(*)	6.30929	.012	-29.0017	-3.6807
		Normal oral rinse cell	.74917	6.55488	.909	-12.4042	13.9025
		Normal white blood cell	.75083	6.55488	.909	-12.4025	13.9042
	Normal white blood cell	HNSCC cell line	-.92583	4.63500	.842	-10.2266	8.3750
		HNSCC microdissect cell	-17.09201(*)	4.28064	.000	-25.6818	-8.5023
		Normal oral rinse cell	-.00167	4.63500	1.000	-9.3025	9.2991
		Leukemic cell line	-.75083	6.55488	.909	-13.9042	12.4025
MGC42174	HNSCC cell line	HNSCC microdissect cell	2.89583	11.14950	.796	-19.6210	25.4127
		Normal oral rinse cell	14.71750	9.10353	.114	-3.6674	33.1024
		Leukemic cell line	13.25583	12.87433	.309	-12.7444	39.2561
		Normal white blood cell	16.22000	9.10353	.082	-2.1649	34.6049
	HNSCC microdissect cell	HNSCC cell line	-2.89583	11.14950	.796	-25.4127	19.6210
		Normal oral rinse cell	11.82167	11.14950	.295	-10.6952	34.3385
		Leukemic cell line	10.36000	14.39394	.476	-18.7092	39.4292
		Normal white blood cell	13.32417	11.14950	.239	-9.1927	35.8410
	Normal oral rinse cell	HNSCC cell line	-14.71750	9.10353	.114	-33.1024	3.6674
		HNSCC microdissect cell	-11.82167	11.14950	.295	-34.3385	10.6952
		Leukemic cell line	-1.46167	12.87433	.910	-27.4619	24.5386
		Normal white blood cell	1.50250	9.10353	.870	-16.8824	19.8874
	Leukemic cell line	HNSCC cell line	-13.25583	12.87433	.309	-39.2561	12.7444
		HNSCC microdissect cell	-10.36000	14.39394	.476	-39.4292	18.7092
		Normal oral rinse cell	1.46167	12.87433	.910	-24.5386	27.4619
		Normal white blood cell	2.96417	12.87433	.819	-23.0361	28.9644
	Normal white blood cell	HNSCC cell line	-16.22000	9.10353	.082	-34.6049	2.1649
		HNSCC microdissect cell	-13.32417	11.14950	.239	-35.8410	9.1927

		Normal oral rinse cell	-1.50250	9.10353	.870	-19.8874	16.8824
		Leukemic cell line	-2.96417	12.87433	.819	-28.9644	23.0361
PRKG1	HNSCC cell line	HNSCC microdissect cell	13.95500(*)	2.13305	.000	9.6639	18.2461
		Normal oral rinse cell	20.74917(*)	2.13305	.000	16.4580	25.0403
		Leukemic cell line	10.32750(*)	3.01658	.001	4.2589	16.3961
		Normal white blood cell	37.81500(*)	2.13305	.000	33.5239	42.1061
	HNSCC microdissect cell	HNSCC cell line	-13.95500(*)	2.13305	.000	-18.2461	-9.6639
		Normal oral rinse cell	6.79417(*)	2.13305	.003	2.5030	11.0853
		Leukemic cell line	-3.62750	3.01658	.235	-9.6961	2.4411
		Normal white blood cell	23.86000(*)	2.13305	.000	19.5689	28.1511
	Normal oral rinse cell	HNSCC cell line	-20.74917(*)	2.13305	.000	-25.0403	-16.4580
		HNSCC microdissect cell	-6.79417(*)	2.13305	.003	-11.0853	-2.5030
		Leukemic cell line	-10.42167(*)	3.01658	.001	-16.4902	-4.3531
		Normal white blood cell	17.06583(*)	2.13305	.000	12.7747	21.3570
	Leukemic cell line	HNSCC cell line	-10.32750(*)	3.01658	.001	-16.3961	-4.2589
		HNSCC microdissect cell	3.62750	3.01658	.235	-2.4411	9.6961
		Normal oral rinse cell	10.42167(*)	3.01658	.001	4.3531	16.4902
		Normal white blood cell	27.48750(*)	3.01658	.000	21.4189	33.5561
	Normal white blood cell	HNSCC cell line	-37.81500(*)	2.13305	.000	-42.1061	-33.5239
		HNSCC microdissect cell	-23.86000(*)	2.13305	.000	-28.1511	-19.5689
		Normal oral rinse cell	-17.06583(*)	2.13305	.000	-21.3570	-12.7747
		Leukemic cell line	-27.48750(*)	3.01658	.000	-33.5561	-21.4189
SPOCK3	HNSCC cell line	HNSCC microdissect cell	9.99250	5.96027	.100	-1.9732	21.9582
		Normal oral rinse cell	8.87667	6.37180	.170	-3.9152	21.6686
		Leukemic cell line	-.13000	9.01108	.989	-18.2205	17.9605
		Normal white blood cell	-5.10667	6.37180	.427	-17.8986	7.6852
	HNSCC microdissect cell	HNSCC cell line	-9.99250	5.96027	.100	-21.9582	1.9732
		Normal oral rinse cell	-1.11583	5.96027	.852	-13.0816	10.8499
		Leukemic cell line	-10.12250	8.72494	.251	-27.6385	7.3935
		Normal white blood cell	-15.09917(*)	5.96027	.014	-27.0649	-3.1334
	Normal oral rinse cell	HNSCC cell line	-8.87667	6.37180	.170	-21.6686	3.9152
		HNSCC microdissect cell	1.11583	5.96027	.852	-10.8499	13.0816
		Leukemic cell line	-9.00667	9.01108	.322	-27.0972	9.0838
		Normal white blood cell	-13.98333(*)	6.37180	.033	-26.7752	-1.1914
	Leukemic cell line	HNSCC cell line	.13000	9.01108	.989	-17.9605	18.2205
		HNSCC microdissect cell	10.12250	8.72494	.251	-7.3935	27.6385
		Normal oral rinse cell	9.00667	9.01108	.322	-9.0838	27.0972
		Normal white blood cell	-4.97667	9.01108	.583	-23.0672	13.1138
	Normal white blood cell	HNSCC cell line	5.10667	6.37180	.427	-7.6852	17.8986
		HNSCC microdissect cell	15.09917(*)	5.96027	.014	3.1334	27.0649
		Normal oral rinse cell	13.98333(*)	6.37180	.033	1.1914	26.7752
		Leukemic cell line	4.97667	9.01108	.583	-13.1138	23.0672
EPHA3_15	HNSCC cell line	HNSCC microdissect cell	-9.40333	8.49999	.274	-26.5031	7.6964
		Normal oral rinse cell	28.22083(*)	8.49999	.002	11.1211	45.3206
		Leukemic cell line	-13.96667	12.02080	.251	-38.1494	10.2161
		Normal white blood cell	27.25250(*)	8.49999	.002	10.1527	44.3523
	HNSCC microdissect cell	HNSCC cell line	9.40333	8.49999	.274	-7.6964	26.5031
		Normal oral rinse cell	37.62417(*)	8.49999	.000	20.5244	54.7239
		Leukemic cell line	-4.56333	12.02080	.706	-28.7461	19.6194
		Normal white blood cell	36.65583(*)	8.49999	.000	19.5561	53.7556
	Normal oral rinse cell	HNSCC cell line	-28.22083(*)	8.49999	.002	-45.3206	-11.1211
		HNSCC microdissect cell	-37.62417(*)	8.49999	.000	-54.7239	-20.5244
		Leukemic cell line	-42.18750(*)	12.02080	.001	-66.3702	-18.0048

		Normal white blood cell	-.96833	8.49999	.910	-18.0681	16.1314
	Leukemic cell line	HNSCC cell line	13.96667	12.02080	.251	-10.2161	38.1494
		HNSCC microdissect cell	4.56333	12.02080	.706	-19.6194	28.7461
		Normal oral rinse cell	42.18750(*)	12.02080	.001	18.0048	66.3702
		Normal white blood cell	41.21917(*)	12.02080	.001	17.0364	65.4019
	Normal white blood cell	HNSCC cell line	-27.25250(*)	8.49999	.002	-44.3523	-10.1527
		HNSCC microdissect cell	-36.65583(*)	8.49999	.000	-53.7556	-19.5561
		Normal oral rinse cell	.96833	8.49999	.910	-16.1314	18.0681
		Leukemic cell line	-41.21917(*)	12.02080	.001	-65.4019	-17.0364
EPHA3_5	HNSCC cell line	HNSCC microdissect cell	-6.55927	9.37540	.488	-25.4542	12.3356
		Normal oral rinse cell	28.60689(*)	8.95682	.003	10.5556	46.6582
		Leukemic cell line	3.42023	12.52841	.786	-21.8291	28.6696
		Normal white blood cell	30.04356(*)	8.95682	.002	11.9923	48.0948
	HNSCC microdissect cell	HNSCC cell line	6.55927	9.37540	.488	-12.3356	25.4542
		Normal oral rinse cell	35.16617(*)	9.18750	.000	16.6500	53.6824
		Leukemic cell line	9.97950	12.69436	.436	-15.6043	35.5633
		Normal white blood cell	36.60283(*)	9.18750	.000	18.0866	55.1190
	Normal oral rinse cell	HNSCC cell line	-28.60689(*)	8.95682	.003	-46.6582	-10.5556
		HNSCC microdissect cell	-35.16617(*)	9.18750	.000	-53.6824	-16.6500
		Leukemic cell line	-25.18667(*)	12.38842	.048	-50.1539	-.2194
		Normal white blood cell	1.43667	8.75994	.870	-16.2178	19.0912
	Leukemic cell line	HNSCC cell line	-3.42023	12.52841	.786	-28.6696	21.8291
		HNSCC microdissect cell	-9.97950	12.69436	.436	-35.5633	15.6043
		Normal oral rinse cell	25.18667(*)	12.38842	.048	.2194	50.1539
		Normal white blood cell	26.62333(*)	12.38842	.037	1.6561	51.5906
	Normal white blood cell	HNSCC cell line	-30.04356(*)	8.95682	.002	-48.0948	-11.9923
		HNSCC microdissect cell	-36.60283(*)	9.18750	.000	-55.1190	-18.0866
		Normal oral rinse cell	-1.43667	8.75994	.870	-19.0912	16.2178
		Leukemic cell line	-26.62333(*)	12.38842	.037	-51.5906	-1.6561
PPP2R2B	HNSCC cell line	Normal oral rinse cell	16.94583(*)	4.19018	.000	8.4478	25.4439
		Leukemic cell line	4.52417	5.92581	.450	-7.4939	16.5423
		Normal white blood cell	18.75083(*)	4.19018	.000	10.2528	27.2489
	Normal oral rinse cell	HNSCC cell line	-16.94583(*)	4.19018	.000	-25.4439	-8.4478
		Leukemic cell line	-12.42167(*)	5.92581	.043	-24.4398	-.4036
		Normal white blood cell	1.80500	4.19018	.669	-6.6931	10.3031
	Leukemic cell line	HNSCC cell line	-4.52417	5.92581	.450	-16.5423	7.4939
		Normal oral rinse cell	12.42167(*)	5.92581	.043	.4036	24.4398
		Normal white blood cell	14.22667(*)	5.92581	.022	2.2086	26.2448
	Normal white blood cell	HNSCC cell line	-18.75083(*)	4.19018	.000	-27.2489	-10.2528
		Normal oral rinse cell	-1.80500	4.19018	.669	-10.3031	6.6931
		Leukemic cell line	-14.22667(*)	5.92581	.022	-26.2448	-2.2086

BIOGRAPHY

Miss Chureerat Phokaew was born in Nakornsawan in1980. She graduated from Faculty of Science, Chulalongkorn university in Genetics program and then attended to participate in Medical Science program in Faculty of Medicine, Chulalongkorn university for her master degree.

PROJECT EXPERIENCE

1. **Phokaew C.**, Association between Bradykinin B_2 Receptor Gene Polymorphism and ACE Inhibitor-Related Cough, Senior Project Requirement for the Degree of Bachelor of Science.

INTERNATIONAL PUBLICATIONS

1. Kitkumthorn N, Yanatatsanajit P, Kiatpongsan S, **Phokaew C**, Triratanachat S, Trivijitsilp P, Termrungruanglert W, Tresukosol D, Niruthisard S, Mutirangura A. Cyclin A1 promoter hypermethylation in human papillomavirus-associated cervical cancer. BMC Cancer. 2006 Mar 8;6:55.

POSTER PRESENTATION

1. **Phokaew C.**, Mutirangura A., Human papillomavirus DNA methylation during multistep cervical carcinoma development. The 5th Princess Chulabhorn International Science Congress "Evolving Genetics and Its Global Impact", Shangri-la Hotel, Bangkok, Thailand, August 16-20, 2004
2. **Phokaew C.**, Subbalekha K., Shuangshoti S., Mutirangura A., LINE-1 loci loss of methylation pattern in head and neck squamous cell carcinogenesis. The RGJ Seminar Series Biomedical Sciences, Faculity of medicine, Chulalongkorn University, Bankok, Thailand, May 10, 2006.