REFERENCES

REFERENCES

Alzheimer's research a program of the American health Assistance Foundation (21 September, 2011). **Alzheimer's Symptoms & Stages**. Retrieved January 7, 2012, from http://www.ahaf.org/alzheimers/about/symptomsandstages.html

American Psychiatric Association. (1994). **Diagnostic and Statistical manual of mental disorders** (4th ed.). Washington DC: American Psychiatric Association.

Bagli, M., Papassotiropoulos, A., Schwab, S.G., Jessen, F., Rao, M.L., Maier, W., et al. (1999). No association between an intronic polymorphism in the presenilin-1 gene and Alzheimer disease in a German population. **Journal of the Neurological Sciences**, 167(1), 34-36.

Baki, L., Marambaud, P., Efthimiopoulos, S., Georgakopoulos, A., Wen, P., Cui, W., et al. (2001). Presenilin-1 binds cytoplasmic epithelial cadherin, inhibits cadherin/p120 association, and regulates stability and function of the cadherin/catenin adhesion complex. **Proceedings of the National Academy of Sciences of the United States of America**, 98(5), 2381-2386.

Belbin, O., Beaumont, H., Warden, D., Smith, A. D., Kalsheker, N. and Morgan, K. (2009). PSEN1 polymorphisms alter the rate of cognitive decline in sporadic Alzheimer's disease patients. **Neurobiology of Aging,** 30(12), 1992-1999.

Berezovska, O., Jack, C., McLean, P., Aster, J. C., Hicks, C., Xia, W., et al. Aspartate mutations in presenilin and gamma-secretase inhibitors both impair notch1 proteolysis and nuclear translocation with relative preservation of notch1 signaling. **Journal of Neurochemistry**, 75(2), 583-593.

Bird, T. D. (2005). Genetic factors in Alzheimer's disease. **The New England Journal of Medicine**, 352(9), 862–864.

Blennow, K., de Leon, M. J., Zetterberg, H. (2006). Alzheimer's disease. **The Lancet,** 368(9533), 387-403.

Bowang, C., Stefan, W., Marion, D. and Kari, H. (2009), SNP_tools: A compact tool package for analysis and conversion of genotype data for MS-Excel. **BMC Research Notes**, 2, 214.

Brouwers, N., Sleegers, K. and Van Broeckhoven C. (2008). Molecular genetics of Alzheimer's disease: an update. **Annuals of Medicine**, 40(8), 562-583.

Butterfield, D. A., Castegna, A., Lauderback, C.M., and Drake, J. (2003). Evidence that amyloid beta-peptide-induced lipid peroxidation and its sequelae in AD brain contribute to neuronal death. **Neurobiological of Aging**, 23(5), 655-664.

Campion, D., Dumanchin, C., Hannequin, D., Dubois, B., Belliard. S., Puel, M., et al. (1996). Early-onset autosomal dominant Alzheimer disease: prevalence, genetic heterogeneity, and mutation spectrum. **The American Journal of Human Genetics**, 65(3), 664–670.

Clinical Practice Guideline for Dementia. (2008). **Prasat Neurological Institute** (2nd). Bangkok: Prasat Neurological Institute.

Combarros, O., Alvarez-Arcaya, A., Oterino, A., Berciano, J., Delgado-Rodríguez, M., Peña, N., et al. (1999). Polymorphisms in the presenilin 1 and presenilin 2 genes and risk for sporadic Alzheimer's disease. **Journal of the Neurological Sciences,** 171(2), 88-91.

Combarros, O., Alvarez-Arcaya, A., Sánchez-Guerra, M., Infante, J. and Berciano, J. (2002). Candidate gene association studies in sporadic Alzheimer's disease. **Dementia and Geriatric Cognitive Disorders,** 14(1), 41-54.

Cruts, M. and Van, B. C. (1998). Molecular genetics of Alzheimer's disease. **Annuals of Medicine**, 30(6), 560-565.

Cuajungco, M. P., Faget, K. Y. (2003). Zinc takes the center stage: its paradoxical role in Alzheimer's disease, **Brain Research Reviews**, 41(1), 44–56.

Dewij, N. N. (2005). The structure and function of the presenilins. **Cellular and Molecular Life Sciences,** 62(10), 1109-1119.

Ferri, C. P., Sousa, R., Albanese, E., Ribeiro, W. S. and Honyashiki, M. (2009). Prince, M., and Jackson, J. (Eds). **Alzheimer's Disease International World Alzheimer Report 2009 - Executive Summary.** London: Alzheimer's Disease International.

Galasko, D., Bennett, D. A., Sano, M., Ernesto, C., Thomas, R., Grundman, M., et al. (1997). An inventory to assess activities of daily living for clinical trials in Alzheimer's disease: the Alzheimer's Disease Cooperative Study. **Alzheimer's disease and Association Disorders**, 11(suppl 2), S33-S39.

Genetics home reference, (December, 2008). ***PSEN1***. Retrieved May 8, 2010, from http://ghr.nlm.nih.gov/gene=psen1

Hall, T.A. (1999). BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. **Nucleic Acids Symposium Series**, 41(41), 95-98.

HapMap tutorial (2007). **ASHG07 HapMap Turorial**. Retrieved May 10, 2011, from http://hapmap.ncbi.nlm.nih.gov/tutorials.html.en

Hardy, J. (1997). Amyloid, the presenilins and Alzheimer's disease. **Trends Neurosciences**, 20(4), 154–159.

Hardy, J., Duff, K., Hardy, K. G., Perez-Tur, J., and Hutton, M. (1998). Genetic dissection of AD and related dementias: amyloid and its relationship to tau. **Nature Neuroscience**, 1(5), 355–358.

Hardy, J. (2001). The genetic causes of neurodegenerative diseases. **Journal of Alzheimer's disease**, 3(1), 109–116.

Hardy, J., and Selkoe, D. J. (2002). The amyloid hypothesis of AD: progress and problems on the road to therapeutics. **Science**, 297(5580), 353-356.

Holcomb, L., Gordon, M. N ., McGowan, E., Yu, X., Benkovic, S., Jantzen, P., et al,. (1998). Accelerated Alzheimer-precursor protein and presenilin 1 transgenes. **Nature Medicine**, 4(1), 97–100.

Imbimbo, B. P, Lombard, J. and Pomara, N. (2005), Pathophysiology of Alzheimer's disease. **Neuroimaging Clinics of North America**, 15(4), 727-753.

Janssen, J. C., Beck, J. A., Campbell, T. A., Dickinson, A., Fox, N. C., Harvey., R. J., et al. (2003). Early onset familial AD: Mutation frequency in 31 families. **Neurology**, 60(2), 235–239.

Jeffrey, L. C. (2004). Alzheimer's disease. Alastair J.J. W. (Ed.). **The New England Journal of Medicine**, 351(1), 56-67.

Joel, N. H. (2005). Genetic Approaches to Studying Common Diseases and Complex Traits, **Pediatric Research**, 57, 74R-77R.

John, H. (2001). The genetic causes of neurodegenerative diseases. **Journal of Alzheimer's Disease**, 24(3), 109–116.

Hock, C., Konietzko, U., Streffer, JR., Tracy, J., Signorell, A., Müller-Tillmanns, B., et al. (2003). Antibodies against beta-amyloid slow cognitive decline in AD. **Neuron**, 38 (4), 547-554.

Kwanjai, K. (2007). **Development methods for Detecting 9 Single nucleotide polymorphisms of Xenobiotic metabolizing Genes in Phitsanulok Population Area**. Master thesis, M.S., Naresuan University, Phisanulok.

Kulic L., Walter J., Multhaup G., Teplow D.B., Baumeister R., et al. (2000). Separation of presenilin function in amyloid beta-peptide generation and endoproteolysis of Notch. **Proceedings of the National Academy of Sciences of the United States of America**, 97(11), 5913-5918.

Larner, AJ. and Doran, M. (2006). Clinical phenotypic heterogeneity of Alzheimer's disease associated with mutations of the presenilin-1 gene. **Journal of Neurology**, 253(2), 139-158.

Leonidas, C., Bart, P.F. R., Gunter, K., Odette, P., Pieter, J.V., Frans, V., et al. (2010). Epigenetic regulation in the Pathophysiology of Alzheimer's disease, **Progress in Neurobiology**, 90(4), 498-510

Letenneur, L. (2004). Risk of dementia and alcohol and wine consumption: a review of recent results. **Biological Research**, 37(2), 189–193.

Lleo, A., Blesa, R., Queralt, R., Ezquerra, M., Molinuevo, J.L., Pena-Casanova, J., at al. (2002). Frequency of mutations in the presenilin and amyloid precursor protein genes in early-onset Alzheimer disease in Spain. **Archives of Neurology**, 59(11), 1759–1763.

Longfei, J., Chunkui, Z., Haiyan, L., Weishan, W., Jing. Y., Xiaojun. Z., et al. (2006). Association between presenilin 1 intronic polymorphism and late onset Alzheimer's disease in the North Chinese population. **Brain Research**, 1116(1), 201-205.

Martin Bland, J. and Douglas, G. A. (2000). Statistics Notes:The odds ratio. **BMJ Journal**, 320(7247), 1468.

Mehta, N.D., Refolo, L.M., Eckman, C., Sanders, S., Yager, D., Perez-Tur, J.,et al,. (1998) Increased Abeta42(43) from cell lines expressing presenilin 1 mutations. **Annals of Neurology**, 43(2), 256–258.

Newman, M., Musgrave, F.I. and Lardelli, M.(2007). Alzheimer disease: Amyloidogenesis, the presenilins and animal models. **Biochimica et Biophysica Acta**, 1772(3), 285–297.

Nussbaum, R. L., and Ellis, C.E. (2003). AD and Parkinson's disease. **The New England Journal of Medicine**, 348(14), 1356-1364.

Pellegrini, L., Passer, B.J., Tabaton, M., Ganjei, L. and D'Adamio, J.K. (1999). Alternative non-secretase processing of Alzheimer's beta-amyloid precursor protein during apoptosis by caspase-6 and -8. **The Journal of Biological Chemistry**, 274(30), 21011–21016.

Jim, G. and John, M. (2007). **QUANTO Version 1.2**. USA: University of Southern California.

Ray, W.J., Yao, M., Mumm, J., Schroeter, E.H., Saftig, P., Wolfe, M., et al. (1999). Cell surface presenilin-1 participates in the gamma-secretase-like proteolysis of Notch. **The Journal of Biological Chemistry**, 274(51), 36801-36807.

Robert, L. and Christopher, E. E. (2003). Alzheimer's disease and Parkinson's Disease. **The New England Journal of Medicine**, 348(14), 1356-1364.

Rogaeva, E., Tandon, A. and St George-Hyslop, P.H. (2001) Genetic markers in the diagnosis of Alzheimer's disease. **Journal of Alzheimer's Disease**, 3(3), 293-304.

Scheuner, D., Eckman, C., Jensen, M. et al,. (1996). Secreted amyloid beta-protein similar to that in the senile plaques of AD is increased in vivo by the presenilin 1 and 2 and APP mutations linked to familial AD. **Nature Medicine**, 2(8), 864–870.

Selkoe, D.J. (2001). AD: genes, proteins, and therapy. **Physiological Reviews**, 81(2), 741–766.

Shastry, B.S. (2002). SNP alleles in human disease and evolution. **Journal of Human Genetics**, 47(11), 0561-0566.

Suparus, W., Phongsakorn, S., Nutcharut, S., and Rudeethawinl, In. (2008) Prevalence of Dementia among Population Age Over 45 Years in Chiang

Mai, Thailand. **Journal of The Medical Association of Thailand**, 91(11), 1685-1690.

Sodeyama, N., Itoh, Y., Auematsu, N., et al.(1998). Presenilin 1 intronic polymorphism is not associated with Alzheimer's type neuro-pathological changes or sporadic AD. **Journal of Neurology, Neurosurgery & Psychiatry**, 64(5), 548-551.

Sorbi, S., Forleo, P. and Nacmias, B. (1997). Alzheimer's disease: phenotypes and genotypes. **Functional Neurology**, 12(3-4),147-151.

Steven, J. S., Veronica, E. G., Charley, R. and Hywel, B. J., (2007) Pairwise linkage disequilibrium under disease models. **European Journal of Human Genetics**, 15(2), 212–220.

Sukying, J. (2007). **Epidemiology of dementia**, Retrieved July 23 2010, from http://www.azthai.org/articles/a02.html.

Steiner, H., Romig, H., Pesold, B., Philipp, U., Baader, M., Citron, M., et al. (1999). Amyloidogenic function of the Alzheimer's disease-associated presenilin 1 in the absence of endoproteolysis. **Biochemistry**, 38, 14600-14605.

Taddei, K., Yang, D., Fisher, C., Clarnette, R., Hallmayer, J., Barnetson, R., et al. (1998). No association of Presenilin-1 intronic polymorphism and AD in Australia. **Neuroscience Letters**, 246 (3), 178-180.

Theuns, J., Del-Favero, J., Dermaut, B., van Duijn, C. M., Backhovens, H., Van den Broeck, M.V., et al. (2000). Genetic variability in the regulatory region of presenilin 1 associated with risk for AD and variable expression. **Human Molecular Genetics**, 9(3), 325–331.

Wang, J., Beher, D., Nyborg, A. C., Shearman, M. S., Golde, T. E., Goate, A. (2006). C-terminal PAL motif of presenilin and presenilin homologues required for normal active site conformation. **Journal of Neurochemistry**, 96(1), 218-227

Weidemann, A., Paliga, K., Drwang, U., Reinhard, F. B., Schuckert, O., Evin, G., et al. (1999). Proteolytic processing of the AD amyloid precursor protein within its cytoplasmic domain by caspase-like proteases. **The Journal of Biological Chemistry**, 274 (9), 5823–5829.

Wolfe, M. S., Xia, W., Ostaszewski, B. L., Diehl, T. S., Kimberly, W. T., Selkoe, D. J. (1999).Two transmembrane aspartates in presenilin-1 required for presenilin endoproteolysis and gamma-secretase activity. **Nature**, 398, 513-517.

Wragg, M., Hutton, M. and Talbot, C. (1996). Genetic association between intronic polymorphism in presenilin-1 gene and late-onset AD. **Alzheimer's disease Collaborative Group. The Lancet**, 347(9000), 509–512.

Wrigley, J. D., Nunn, E. J., Nyabi O., Clarke, E. E., Hunt, P., Nadin, A., et al. (2004). Conserved residues within the putative active site of gamma-secretase differentially influence enzyme activity and inhibitor binding. **Journal of Neurochemistry**, 90(6), 1312-1320.

Wizard® SB Gel and PCR Clean-Up System. (2005). USA: Promega Corporation.

APPENDIX

APPENDIX A CERTIFICATE OF APPROVAL

EC 017-54

เอกสารรับรองโครงการวิจัย

โดย

คณะกรรมการจริยธรรมการวิจัย โรงพยาบาลประสาทเชียงใหม่

ชื่อโครงการ	การศึกษาความสัมพันธ์ของ Single Nucleotide Polymorphisms ใน Presenilin 1 gene ในผู้ป่วยคนไทยที่เป็นโรคอัลไซเมอร์
หัวหน้าโครงการ/ หน่วยงานที่สังกัด	นายต้องหล้า โสภาซับ นักศึกษาปริญญาโท คณะวิทยาศาสตร์การแพทย์ มหาวิทยาลัยนเรศวร
สถานที่ทำวิจัย	โรงพยาบาลประสาทเชียงใหม่
ระยะเวลาดำเนินการ	๓ ปี
เอกสารที่รับรอง	- โครงการวิจัย - เอกสารชี้แจงผู้เข้าร่วมการวิจัย - แบบฟอร์มยินยอมเข้าร่วมโครงการวิจัย - แบบสอบถามสำหรับเก็บข้อมูลงานวิจัย

รับรองโครงการเมื่อวันที่ ๒๓ สิงหาคม พ.ศ. ๒๕๕๔

การรับรองโครงการมีผลถึงวันที่ ๒๒ สิงหาคม พ.ศ. ๒๕๕๕

(แพทย์หญิงนุสติ กวมทับ)

ประธานคณะกรรมการจริยธรรมการวิจัย

(นางสาวหญิงลำไพ พิมพ์ไทร)

เลขานุการคณะกรรมการจริยธรรมการวิจัย

APPENDIX B CERTIFICATE OF APPROVAL

เอกสารรับรองโครงการวิจัยในมนุษย์
คณะกรรมการจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยนเรศวร

ชื่อโครงการ	การศึกษาความสัมพันธ์ของ Single Nucleotide polymorphisms ใน Presenilin 1 gene ในผู้ป่วยคนไทยที่เป็นโรคอัลไซเมอร์ Single Nucleotide Polymorphisms Association Studies of Presenilin 1 gene in Thai Alzheimer's Disease Patients
ชื่อหัวหน้าโครงการ	นายก้องหล้า ใสกระจ่าง
ชื่ออาจารย์ที่ปรึกษา	รศ.ดร.สุชาติ ยะโสธรศรีกุล
เลขที่โครงการ/รหัส	58 02 02 0061
สังกัดหน่วยงาน/คณะ	วิทยาศาสตร์การแพทย์
การรับรอง	ขอรับรองโครงการวิจัยดังกล่าวข้างต้นนี้ได้ผ่านการพิจารณาและรับรองจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยนเรศวร ครั้งที่ 10/2558 เมื่อวันที่ 21 กันยายน 2558
วันสิ้นสุดการรับรอง	วันที่ 21 กันยายน 2559
ประเภทการรับรอง	รับรองแบบเร่งรัด

ลงนาม

(นายแพทย์สมบูรณ์ ตันสุภสวัสดิกุล)
ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์
กลุ่มสาขาวิชาวิทยาศาสตร์สุขภาพ
มหาวิทยาลัยนเรศวร

APPENDIX C Solution preparation

0.5 M EDTA

EDTA (disodium ethylene diamine tetraacetate H_2O)

Distilled H_2O

Adjust pH to 8.0 with NaOH and adjust the volume to 1 liter with distilled H_2O.

5X TBE buffer

445 mM Tris-base	54.0 g
445 mM Boric acid	27.5 g of boric acid
10 mM EDTA	20 ml of 0.5 M (pH 8.0)

Adjust volume with distilled H_2O to 1 liter.

2% agraose gel

Agarose gel 2 g

Adjust volume with 1XTBE buffer to 100 ml

6X DNA loading dye

10 mM Tris-HCl (pH 7.6)

0.03% bromophenol blue

0.03% xylene cyanol FF

60% glycerol

60 mM EDTA

APPENDIX D Composition of Buffers and Solutions (Promega Corporation, USA)

Membrane Wash Solution (after ethanol addition)

10mM potassium acetate (pH5.0)

80% ethanol

16.7μM EDTA (pH 8.0)

Membrane Binding Solution

4.5M guanidine isothiocyanate

0.5M potassium acetate (pH 5.0)

1X TE buffer

10mM Tris-HCl (pH 7.5)

1mM EDTA (pH 8.0)

1X TBE buffer

89mM Tris base

89mM boric acid

2 mM EDTA (pH 8.0)

1X TEA

40mM Tris base

5mM sodium acetate

1mM EDTA (pH 8.0)

APPENDIX E Measurement of nucleic acid concentration

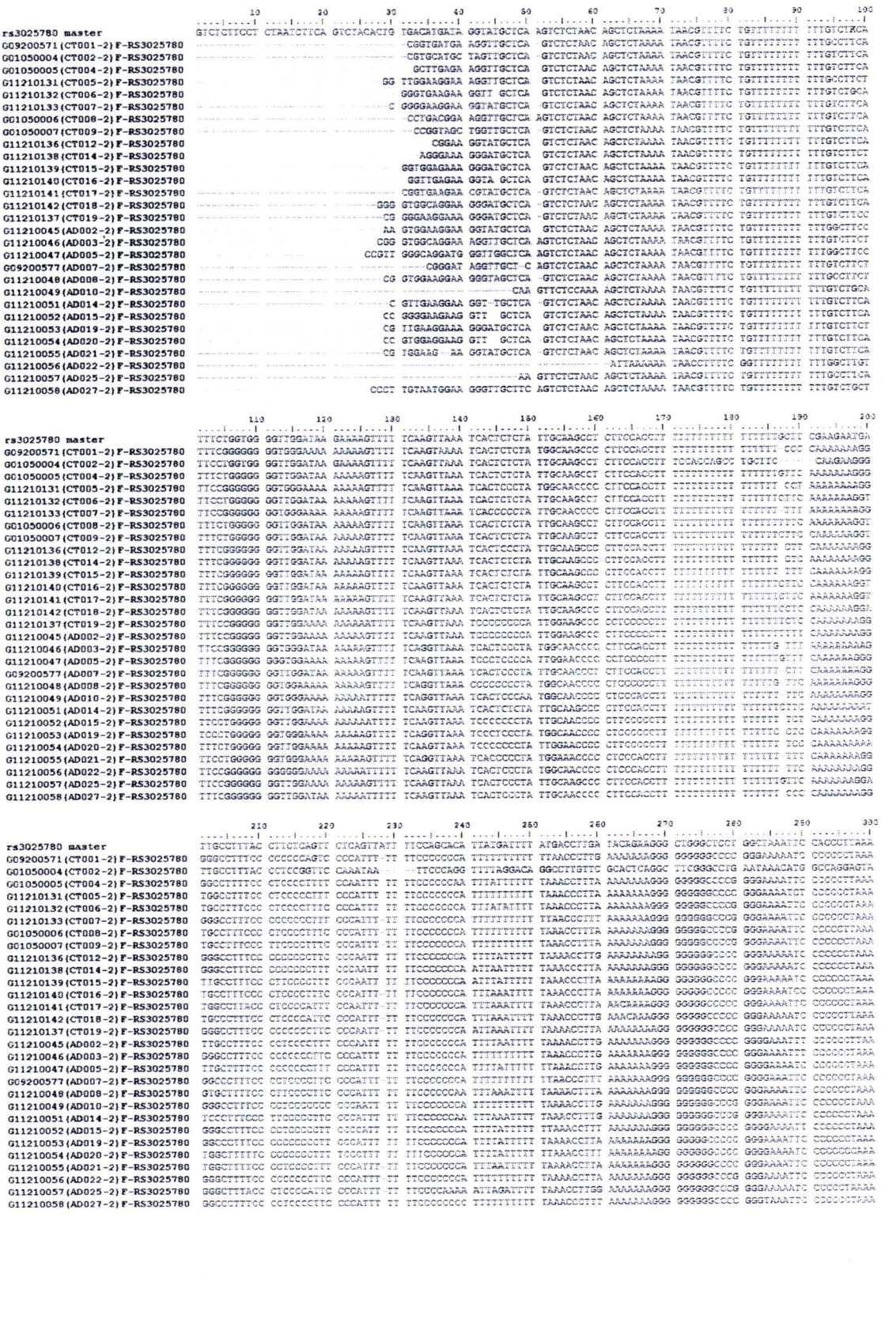
Concentration of extracted DNA was estimated by spectrophotometry method. Light absorbance was measured at the wavelength of 260 nm (A_{260}). An A_{260} value 1.0 corresponds to concentration of 50 µg/ml double-strand DNA (Sambrook et al., 2001). Therefore, concentration of nucleic acids was estimated in µg/ml by using the following equation:

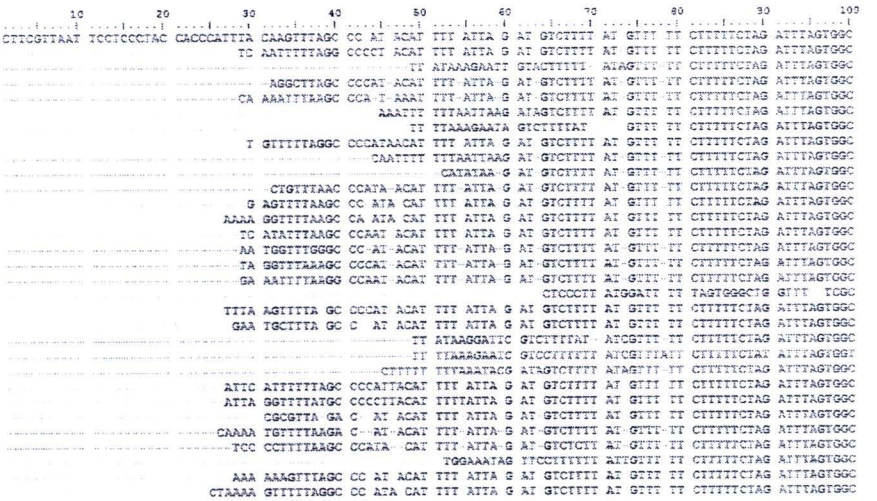
$$DNA = A260 \times 50$$

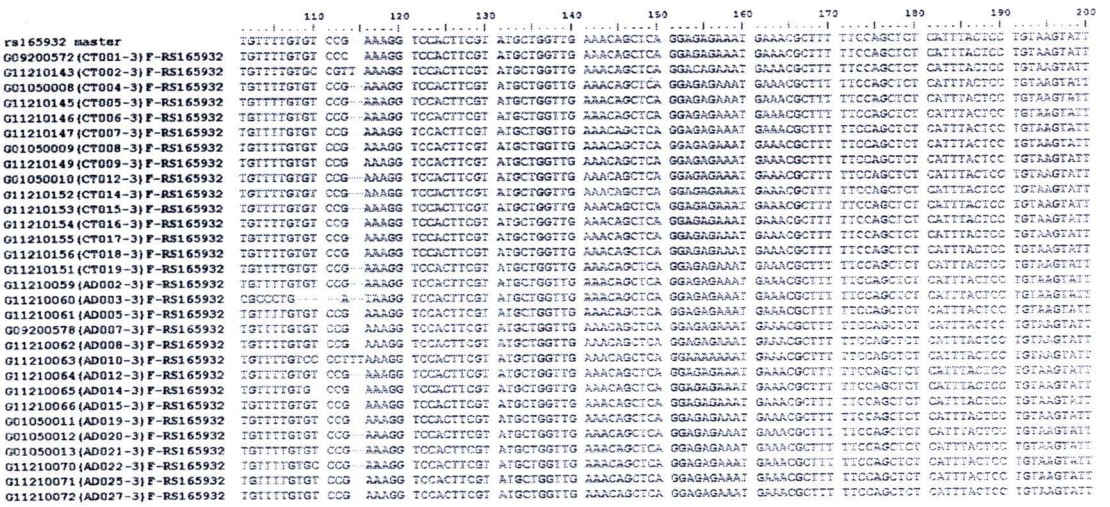
Purity of the nucleic acid samples can be inferred from the ratio of A260/A280. The ratio is much lower than 1.8 indicates contamination of residual proteins or organic solvents.

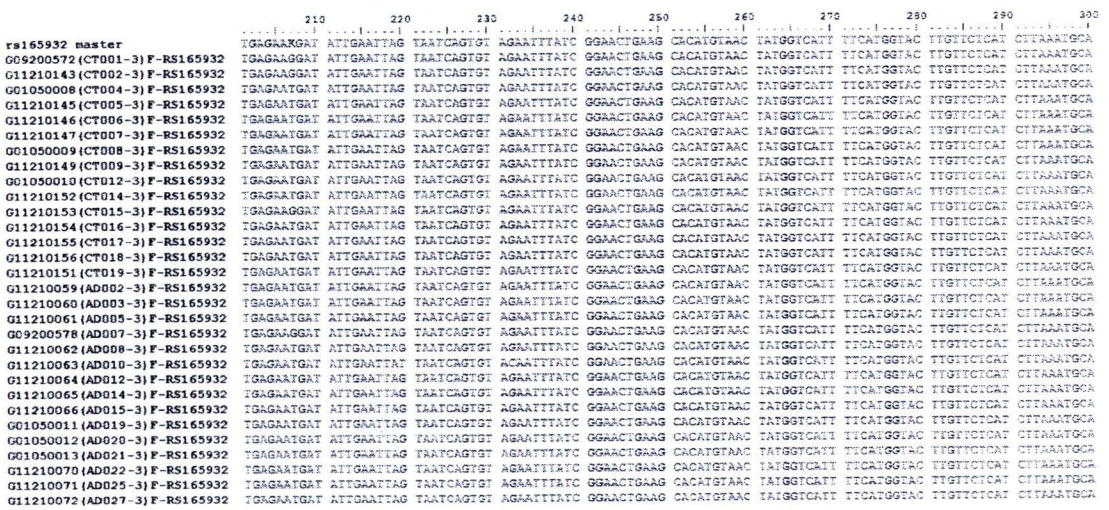
APPENDIX F Alignment of 5 tagSNPs of AD and CT in PSEN1 with rsSNPs

rs3025780





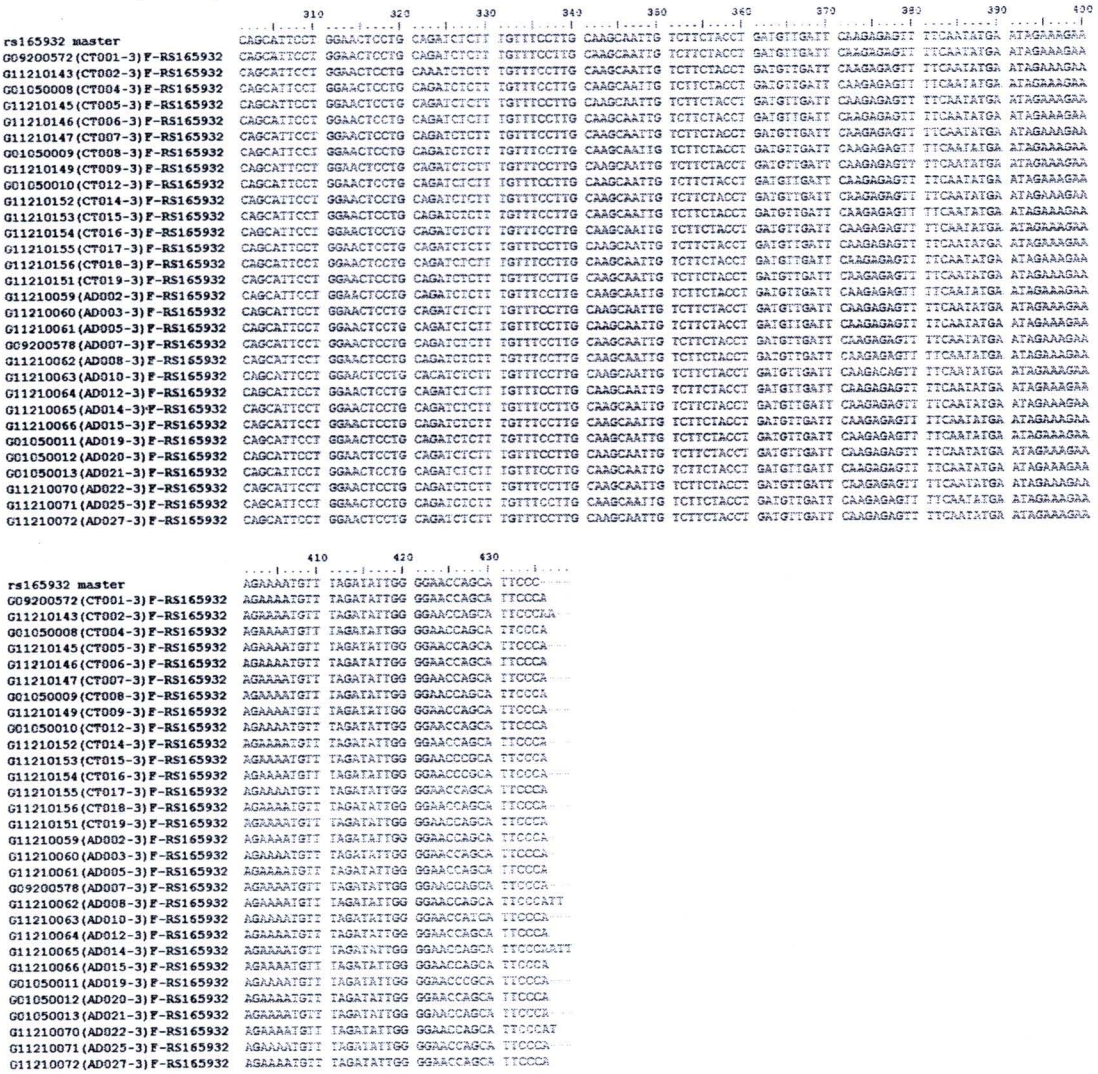




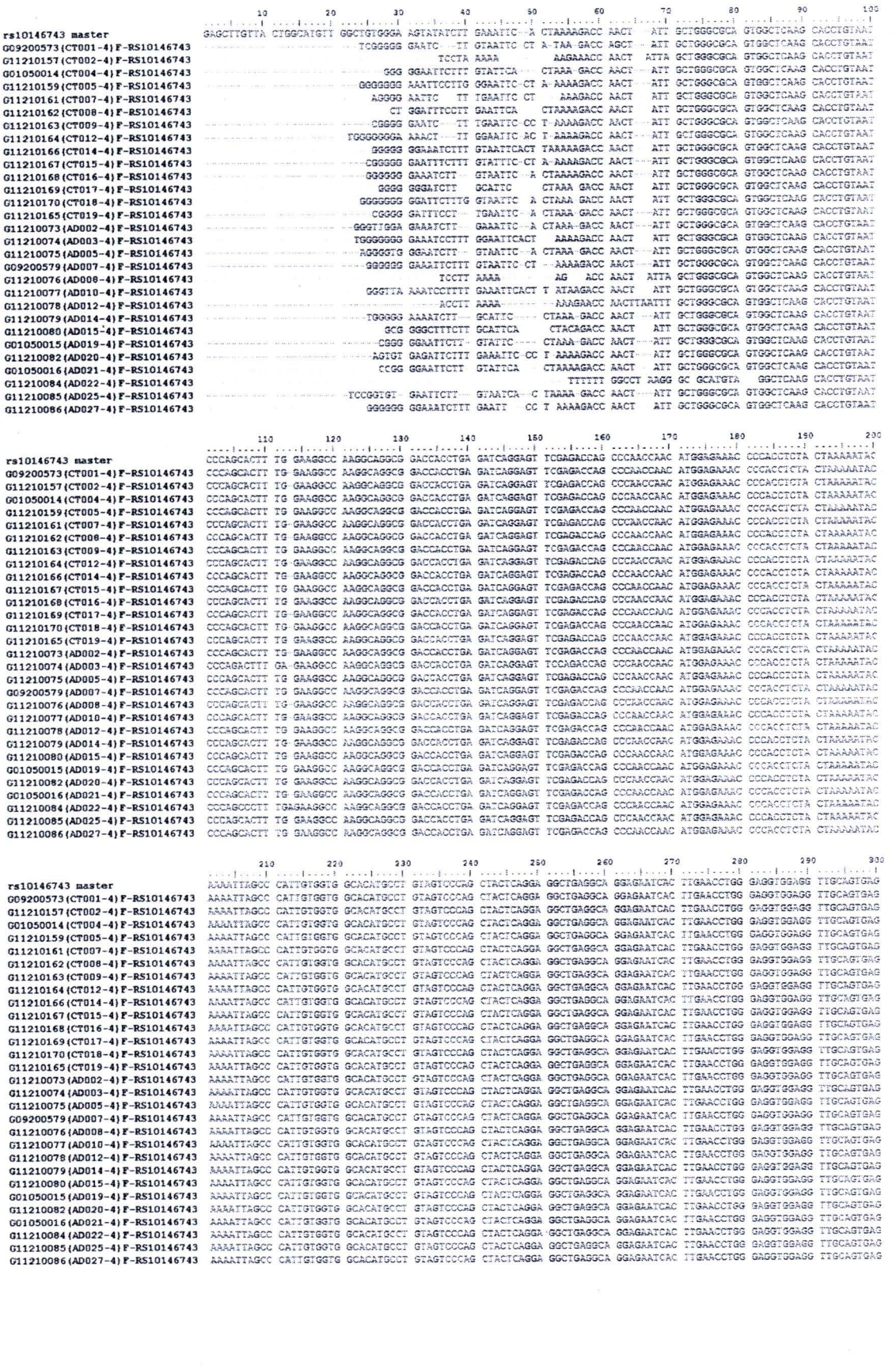
rs165932

```
                                      10         20         30         40         50         60         70         80         90        100
                              ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....|
rs165932 master               CTTCGTTAAT TCCTCCCTAC CACCCATTTA CAAGTTTAGC CC AT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G09200572(CT001-3)F-RS165932                                TC AATTTTTAGG CCCCT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210143(CT002-3)F-RS165932                                                      TT ATAAAGAATT GTACTTTTT  ATAGTTT TT CTTTTTCTAG ATTTAGTGGC
G01050008(CT004-3)F-RS165932                                    AGGCTTAGC CCCAT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210145(CT005-3)F-RS165932                                CA AAATTTAAGC CCA T AAAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210146(CT006-3)F-RS165932                                                  AAATTT TTTAATTAAG ATAGTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210147(CT007-3)F-RS165932                                                      TT TTAAAGAATA GTCTTTTAT     GTTT TT CTTTTTCTAG ATTTAGTGGC
G01050009(CT008-3)F-RS165932                                 T GTTTTTAGGC CCCATAACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210149(CT009-3)F-RS165932                                                 CAATTTT TTTAATTAAG AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G01050010(CT012-3)F-RS165932                                                          CATATAA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210152(CT014-3)F-RS165932                                    CTGTTTAAC CCATA ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210153(CT015-3)F-RS165932                                 G AGTTTTAAGC CC ATA CAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210154(CT016-3)F-RS165932                              AAAA GGTTTTAAGC CA ATA CAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210155(CT017-3)F-RS165932                                TC ATATTTAAGC CCAAT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210156(CT018-3)F-RS165932                                AA TGGTTTGGGC CC AT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210151(CT019-3)F-RS165932                                TA GGTTTAAAGC CCCAT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210059(AD002-3)F-RS165932                                GA AATTTTAAGG CCAAT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210060(AD003-3)F-RS165932                                                                   CTCCCTT ATGGATT TT TAGTGGGCTG GTTT  TCGC
G11210061(AD005-3)F-RS165932                              TTTA AGTTTTA GC CCCAT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G09200578(AD007-3)F-RS165932                               GAA TGCTTTA GC C  AT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210062(AD008-3)F-RS165932                                                      TT ATAAGGATTC GTCTTTTAT  ATCGTTT TT CTTTTTCTAG ATTTAGTGGC
G11210063(AD010-3)F-RS165932                                                      TT TTAAAGAATC GTCCTTTTTT ATCGTTTATT CTTTTTCTAT ATTTAGTGGT
G11210064(AD012-3)F-RS165932                                                  CTTTTT TTTAAATACG ATAGTCTTTT ATAGTTT TT CTTTTTCTAG ATTTAGTGGC
G11210065(AD014-3)F-RS165932                              ATTC ATTTTTTAGC CCCATTACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210066(AD015-3)F-RS165932                              ATTA GGTTTTATGC CCCCTTACAT TTTTATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G01050011(AD019-3)F-RS165932                                   CGCGTTA GA C  AT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G01050012(AD020-3)F-RS165932                             CAAAA TGTTTTAAGA C  AT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G01050013(AD021-3)F-RS165932                               TCC CCTTTTAAGC CCATA  CAT TTT ATTA G AT GTCTCTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210070(AD022-3)F-RS165932                                                          TGGAAATAG TTCCTTTTTT ATTGTTT TT CTTTTTCTAG ATTTAGTGGC
G11210071(AD025-3)F-RS165932                               AAA AAAGTTTAGC CC AT ACAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC
G11210072(AD027-3)F-RS165932                            CTAAAA GTTTTTAGGC CC ATA CAT TTT ATTA G AT GTCTTTT AT GTTT TT CTTTTTCTAG ATTTAGTGGC

                                     110        120        130        140        150        160        170        180        190        200
                              ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....|
rs165932 master               TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G09200572(CT001-3)F-RS165932  TGTTTTGTGT CCC  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210143(CT002-3)F-RS165932  TGTTTTGTGC CGTT AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGACAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G01050008(CT004-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210145(CT005-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210146(CT006-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210147(CT007-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G01050009(CT008-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210149(CT009-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G01050010(CT012-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210152(CT014-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210153(CT015-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210154(CT016-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210155(CT017-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210156(CT018-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210151(CT019-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210059(AD002-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210060(AD003-3)F-RS165932  CGCCCTG      A  TAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210061(AD005-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G09200578(AD007-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210062(AD008-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210063(AD010-3)F-RS165932  TGTTTTGTCC CCTTTAAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAAAAAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210064(AD012-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210065(AD014-3)F-RS165932  TGTTTTGTG  CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210066(AD015-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G01050011(AD019-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G01050012(AD020-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G01050013(AD021-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210070(AD022-3)F-RS165932  TGTTTTGTGC CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210071(AD025-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT
G11210072(AD027-3)F-RS165932  TGTTTTGTGT CCG  AAAGG TCCACTTCGT ATGCTGGTTG AAACAGCTCA GGAGAGAAAT GAAACGCTTT TTCCAGCTCT CATTTACTCC TGTAAGTATT

                                     210        220        230        240        250        260        270        280        290        300
                              ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....|
rs165932 master               TGAGAAKGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G09200572(CT001-3)F-RS165932  TGAGAAGGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210143(CT002-3)F-RS165932  TGAGAAGGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G01050008(CT004-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210145(CT005-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210146(CT006-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210147(CT007-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G01050009(CT008-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210149(CT009-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G01050010(CT012-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210152(CT014-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210153(CT015-3)F-RS165932  TGAGAAGGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210154(CT016-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210155(CT017-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210156(CT018-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210151(CT019-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210059(AD002-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210060(AD003-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210061(AD005-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G09200578(AD007-3)F-RS165932  TGAGAAGGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210062(AD008-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210063(AD010-3)F-RS165932  TGAGAATGAT ATTGAATTAT TAATCAGTGT ACAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210064(AD012-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210065(AD014-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210066(AD015-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G01050011(AD019-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G01050012(AD020-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G01050013(AD021-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210070(AD022-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210071(AD025-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
G11210072(AD027-3)F-RS165932  TGAGAATGAT ATTGAATTAG TAATCAGTGT AGAATTTATC GGAACTGAAG CACATGTAAC TATGGTCATT TTCATGGTAC TTGTTCTCAT CTTAAATGCA
```

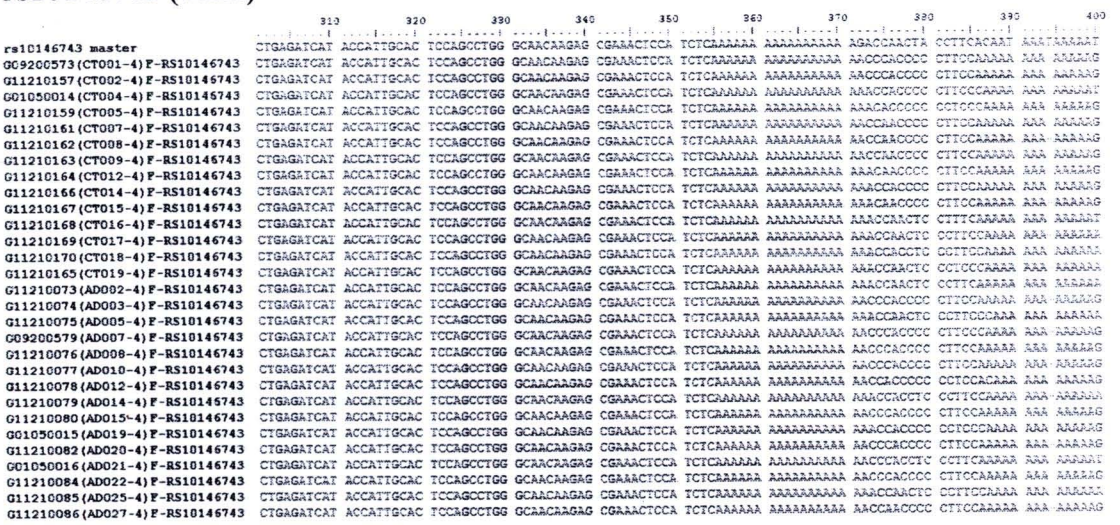
rs165932 (cont.)

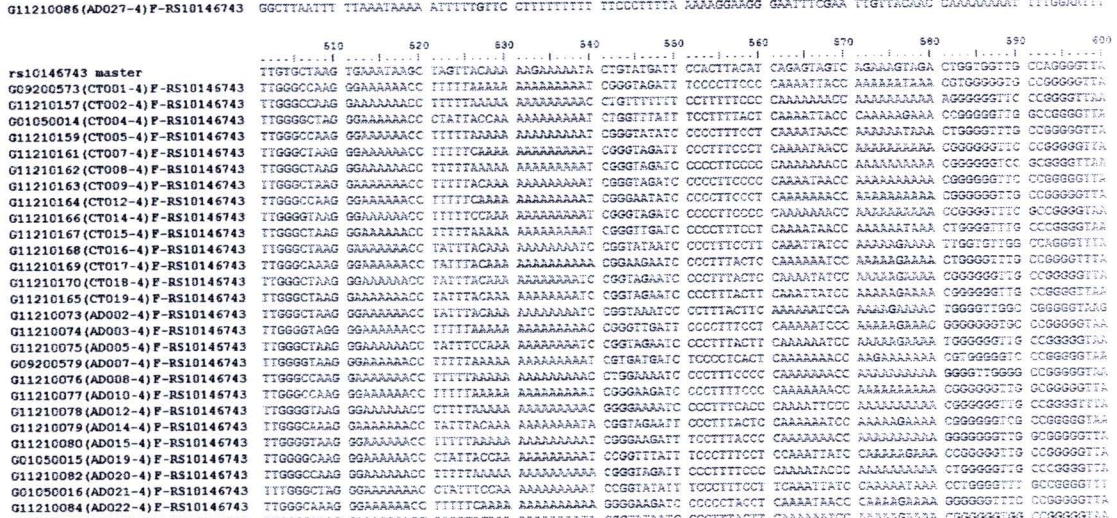


rs10146743

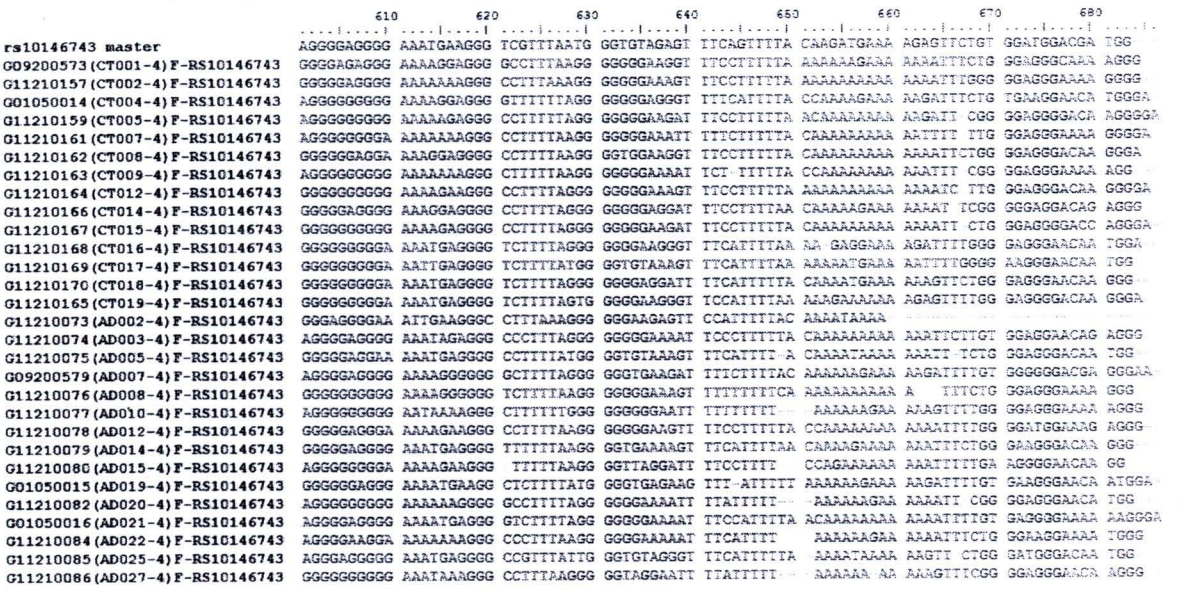

rs10146743 master
G09200573(CT001-4)F-RS10146743
G11210157(CT002-4)F-RS10146743
G11210161(CT007-4)F-RS10146743
G11210162(CT008-4)F-RS10146743
G11210163(CT009-4)F-RS10146743
G11210164(CT012-4)F-RS10146743
G11210166(CT014-4)F-RS10146743
G11210167(CT015-4)F-RS10146743
G11210168(CT016-4)F-RS10146743
G11210169(CT017-4)F-RS10146743
G11210170(CT018-4)F-RS10146743
G11210165(CT019-4)F-RS10146743
G11210073(AD002-4)F-RS10146743
G11210074(AD003-4)F-RS10146743
G11210075(AD005-4)F-RS10146743
G09200579(AD007-4)F-RS10146743
G11210076(AD008-4)F-RS10146743
G11210077(AD010-4)F-RS10146743
G11210078(AD012-4)F-RS10146743
G11210079(AD014-4)F-RS10146743
G11210080(AD015-4)F-RS10146743
G01050015(AD019-4)F-RS10146743
G11210082(AD020-4)F-RS10146743
G01050016(AD021-4)F-RS10146743
G11210084(AD022-4)F-RS10146743
G11210085(AD025-4)F-RS10146743
G11210086(AD027-4)F-RS10146743

rs10146743 (cont.)

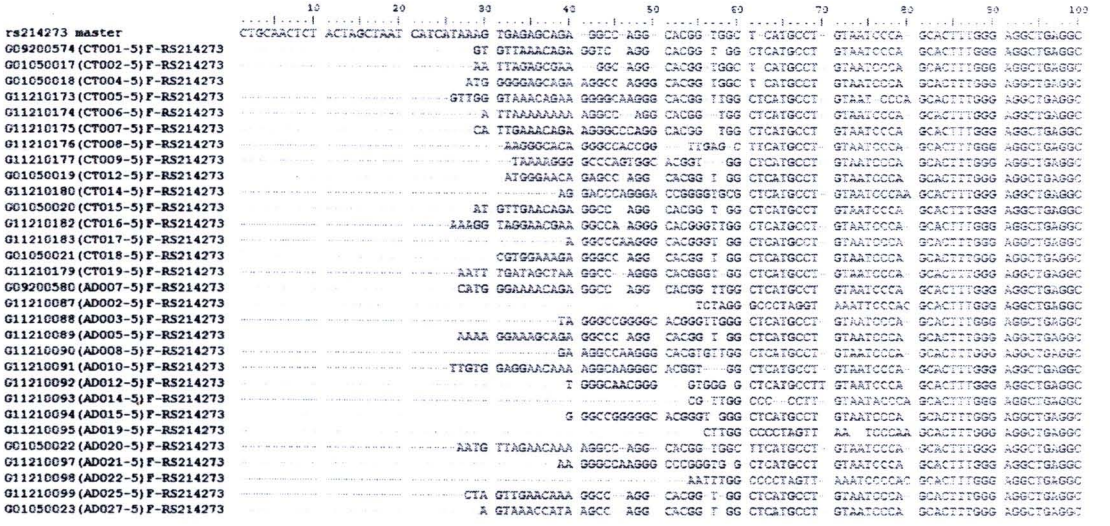




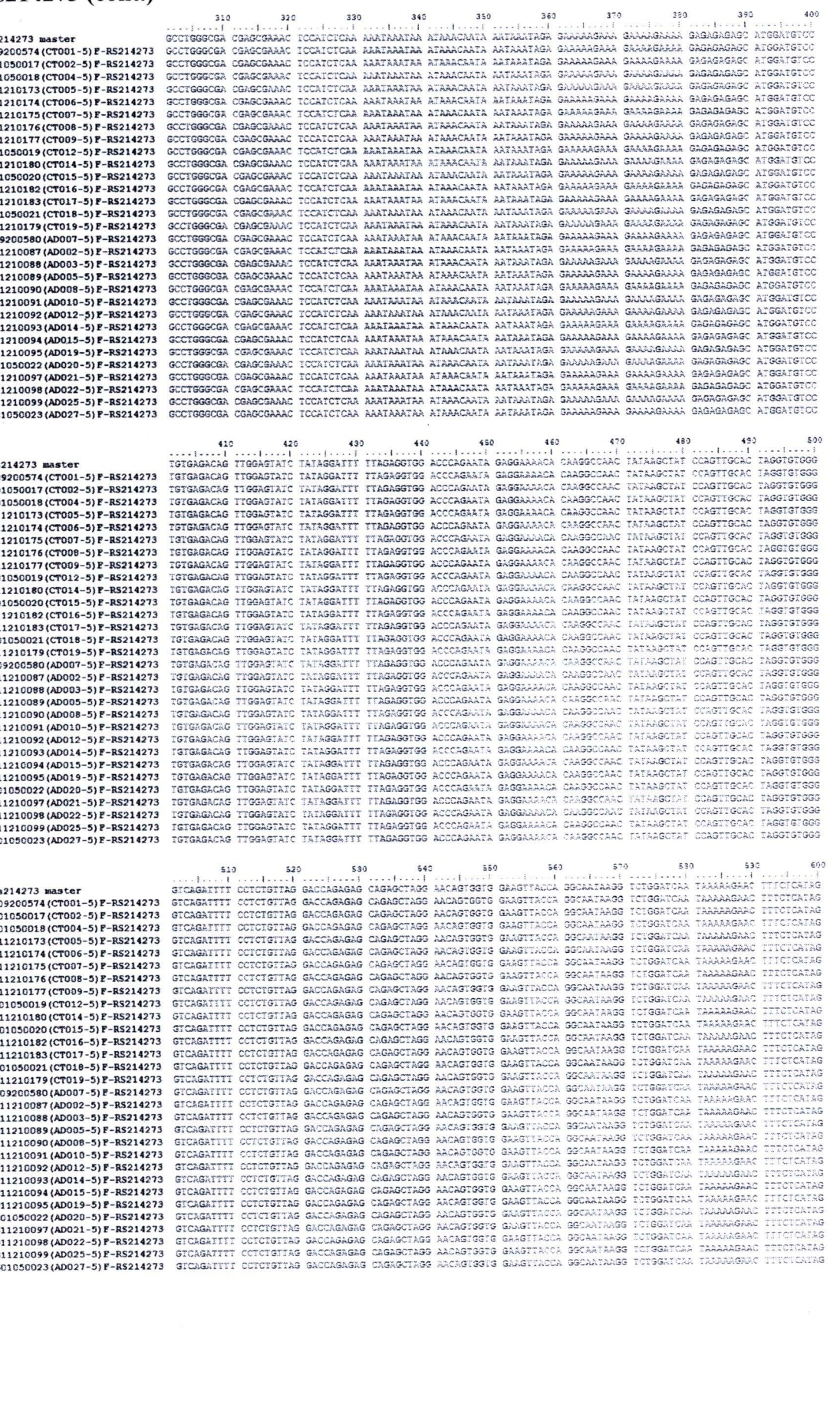
rs10146743 (cont.)



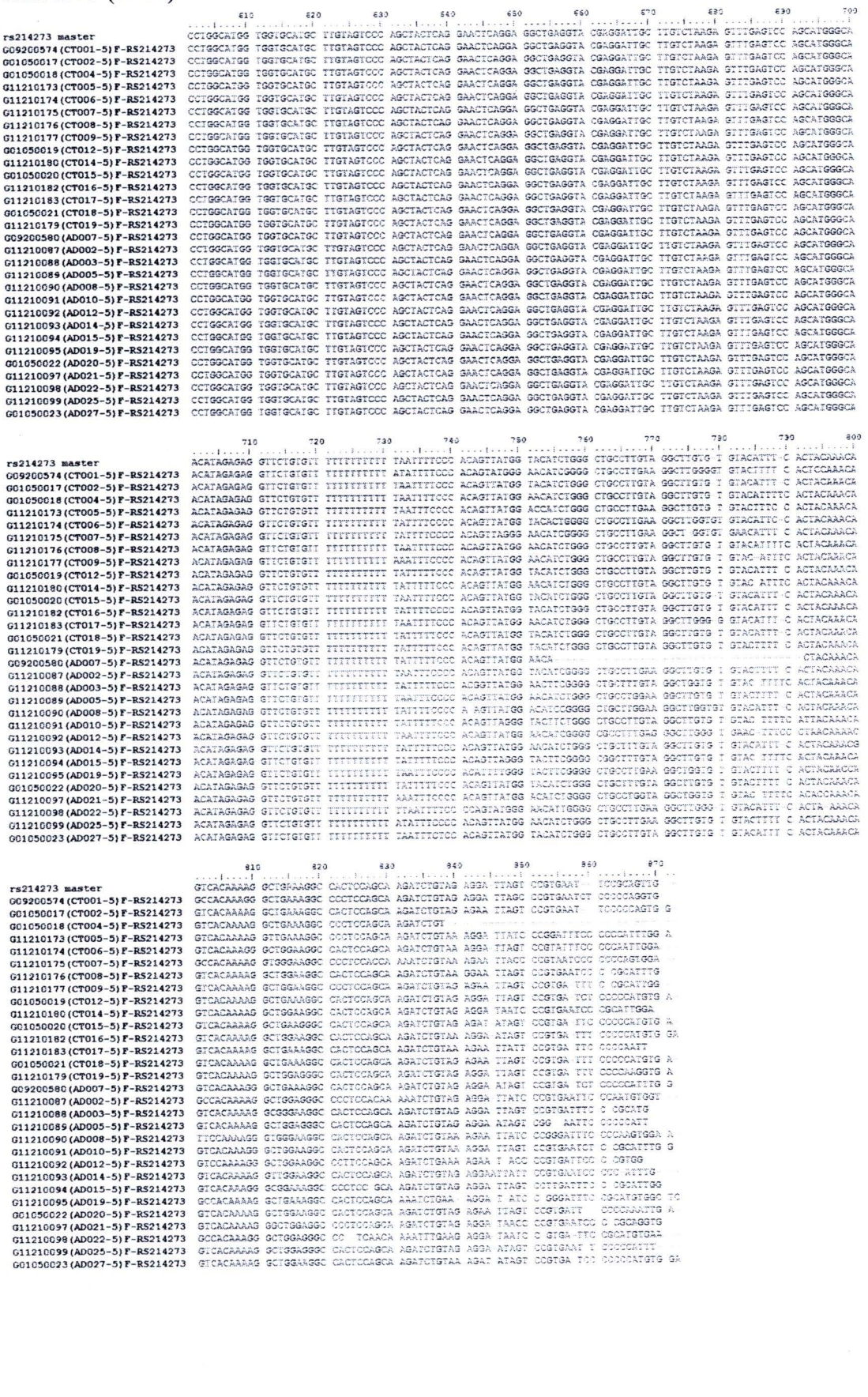
rs214273


rs214273 master
G09200574 (CT001-5) F-RS214273
G01050017 (CT002-5) F-RS214273
G01050018 (CT004-5) F-RS214273
G11210173 (CT005-5) F-RS214273
G11210174 (CT006-5) F-RS214273
G11210175 (CT007-5) F-RS214273
G11210176 (CT008-5) F-RS214273
G11210177 (CT009-5) F-RS214273
G01050019 (CT012-5) F-RS214273
G11210180 (CT014-5) F-RS214273
G01050020 (CT015-5) F-RS214273
G11210182 (CT016-5) F-RS214273
G11210183 (CT017-5) F-RS214273
G01050021 (CT018-5) F-RS214273
G11210179 (CT019-5) F-RS214273
G09200580 (AD007-5) F-RS214273
G11210087 (AD002-5) F-RS214273
G11210088 (AD003-5) F-RS214273
G11210089 (AD005-5) F-RS214273
G11210090 (AD008-5) F-RS214273
G11210091 (AD010-5) F-RS214273
G11210092 (AD012-5) F-RS214273
G11210093 (AD014-5) F-RS214273
G11210094 (AD015-5) F-RS214273
G11210095 (AD019-5) F-RS214273
G01050022 (AD020-5) F-RS214273
G11210097 (AD021-5) F-RS214273
G11210098 (AD022-5) F-RS214273
G11210099 (AD025-5) F-RS214273
G01050023 (AD027-5) F-RS214273

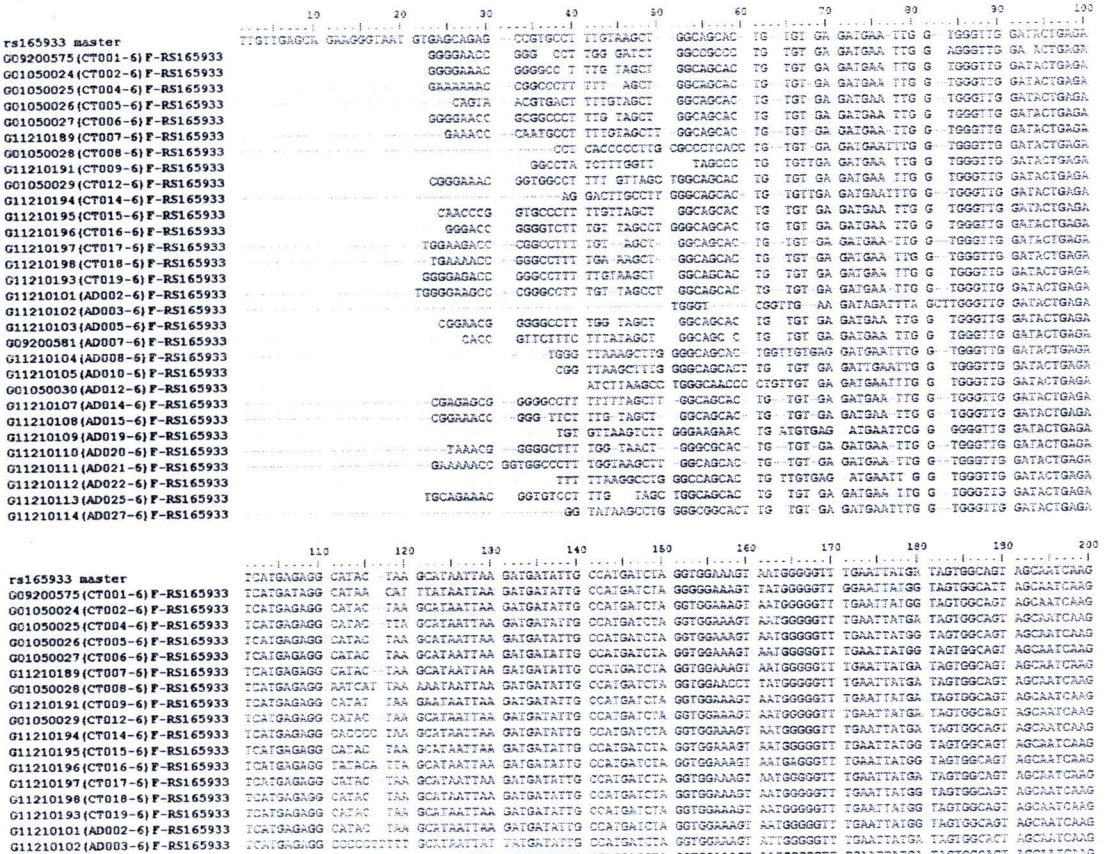
rs214273 (cont.)



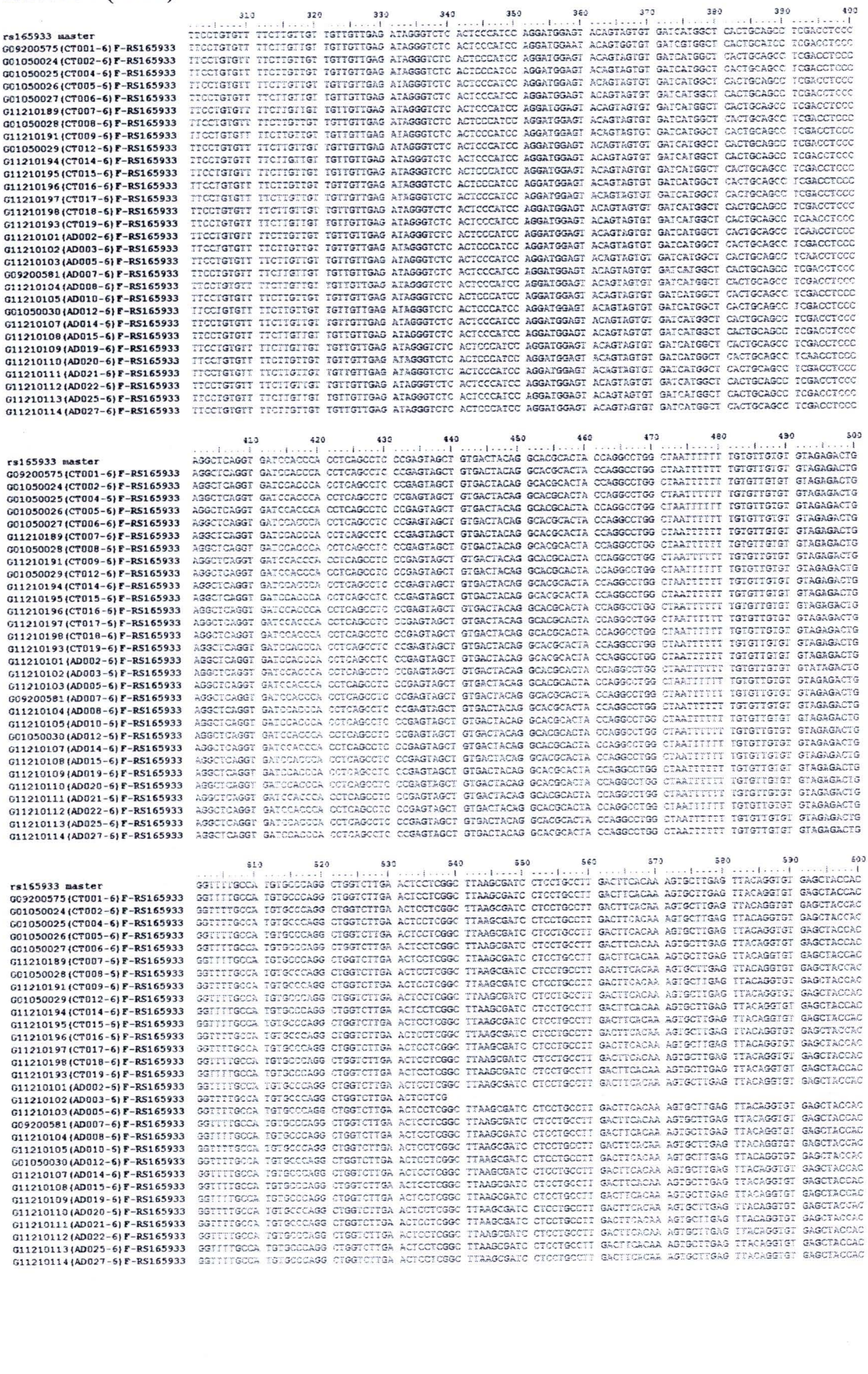
rs214273 (cont.)

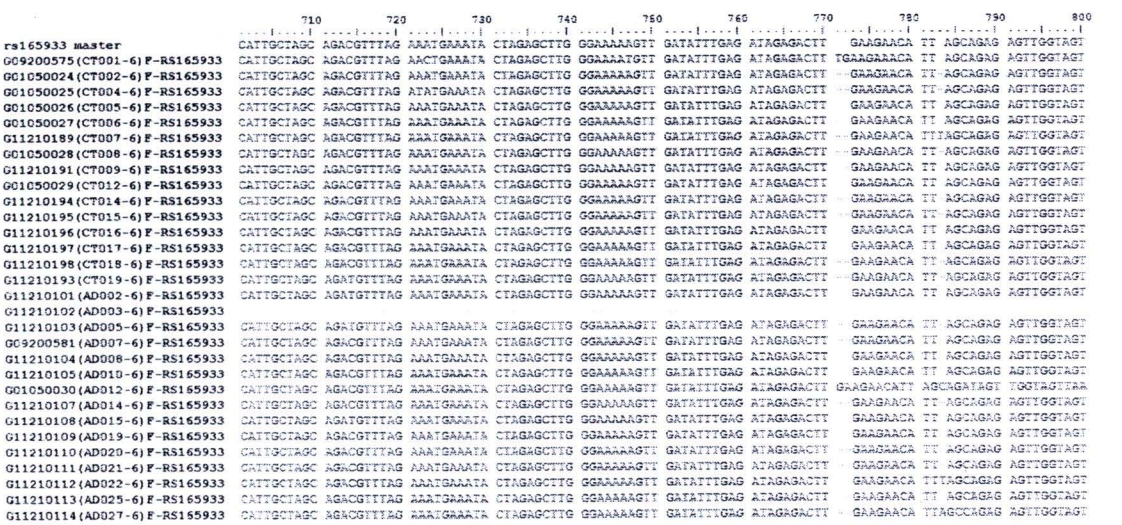


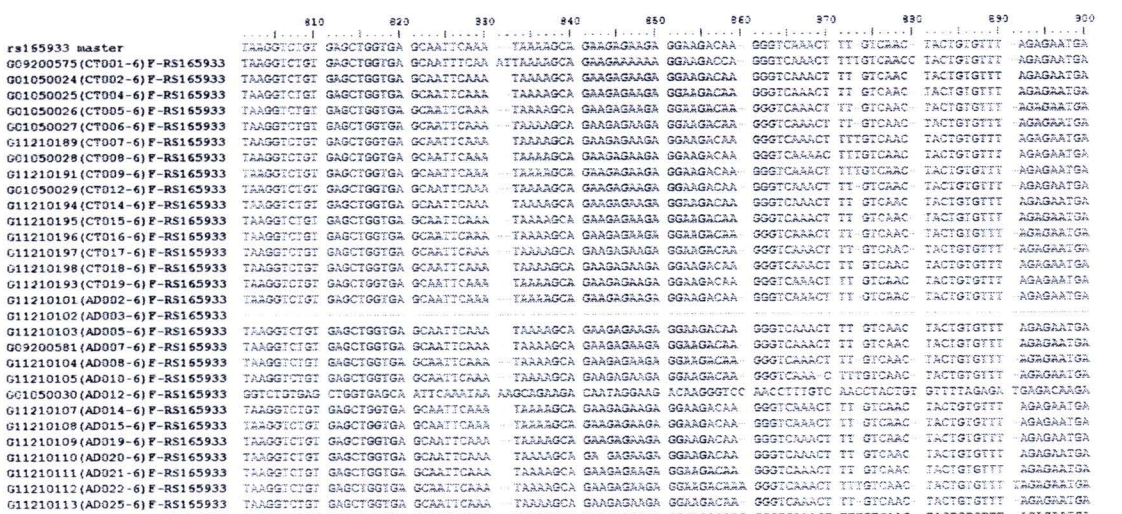
rs165933


rs165933 master
G09200575 (CT001-6) F-RS165933
G01050024 (CT002-6) F-RS165933
G01050025 (CT004-6) F-RS165933
G01050026 (CT005-6) F-RS165933
G01050027 (CT006-6) F-RS165933
G11210189 (CT007-6) F-RS165933
G01050028 (CT008-6) F-RS165933
G11210191 (CT009-6) F-RS165933
G01050029 (CT012-6) F-RS165933
G11210194 (CT014-6) F-RS165933
G11210195 (CT015-6) F-RS165933
G11210196 (CT016-6) F-RS165933
G11210197 (CT017-6) F-RS165933
G11210198 (CT018-6) F-RS165933
G11210193 (CT019-6) F-RS165933
G11210101 (AD002-6) F-RS165933
G11210102 (AD003-6) F-RS165933
G11210103 (AD005-6) F-RS165933
G09200581 (AD007-6) F-RS165933
G11210104 (AD008-6) F-RS165933
G11210105 (AD010-6) F-RS165933
G01050030 (AD012-6) F-RS165933
G11210107 (AD014-6) F-RS165933
G11210108 (AD015-6) F-RS165933
G11210109 (AD019-6) F-RS165933
G11210110 (AD020-6) F-RS165933
G11210111 (AD021-6) F-RS165933
G11210112 (AD022-6) F-RS165933
G11210113 (AD025-6) F-RS165933
G11210114 (AD027-6) F-RS165933

rs165933 (cont.)







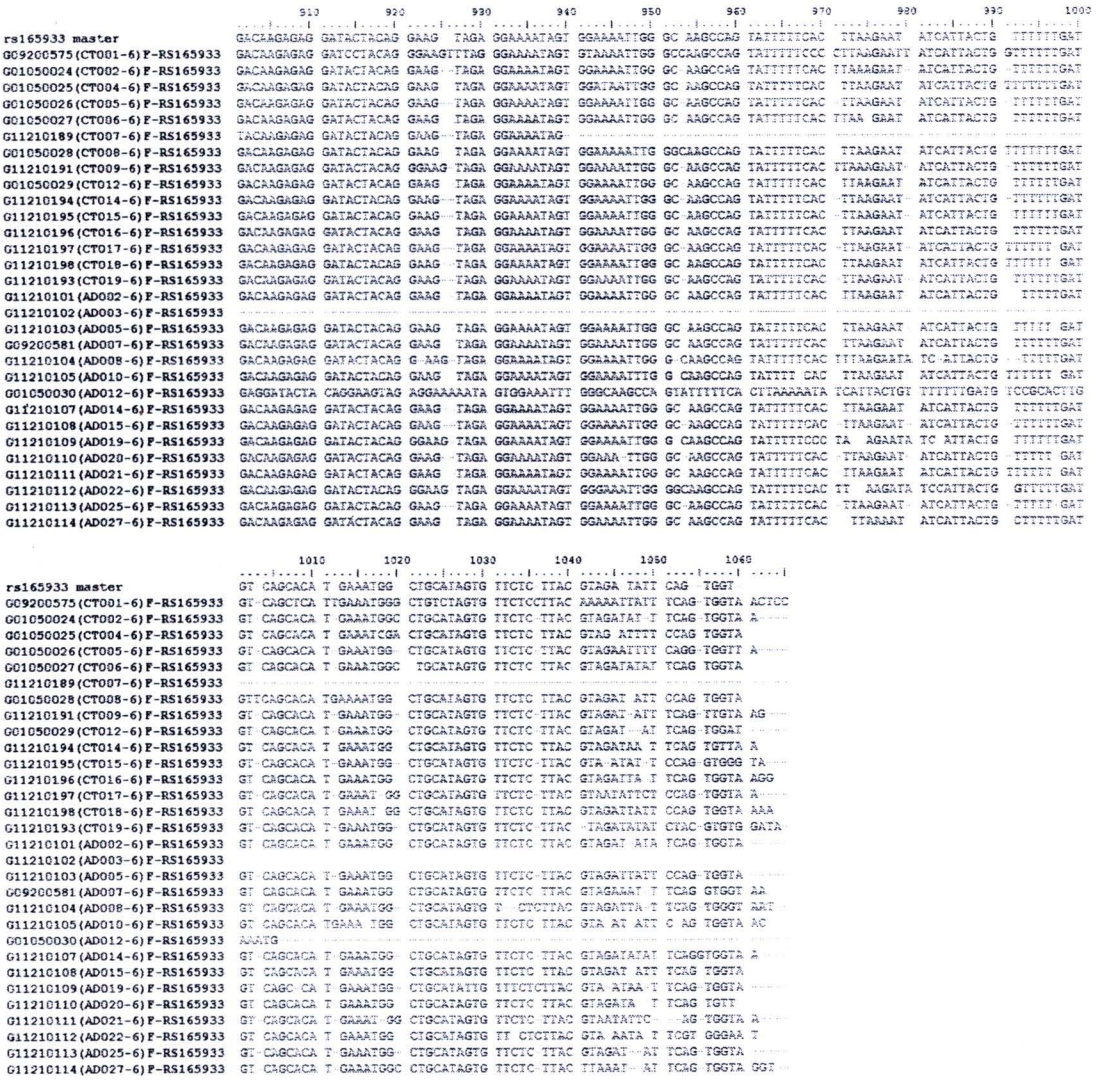
rs165933 (cont.)

```
                                     610        620        630        640        650        660        670        680        690        700
                              ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....|
rs165933 master               GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G09200575(CT001-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTATTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA CTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G01050024(CT002-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G01050025(CT004-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G01050026(CT005-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G01050027(CT006-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210189(CT007-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G01050028(CT008-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210191(CT009-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G01050029(CT012-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210194(CT014-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210195(CT015-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210196(CT016-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210197(CT017-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210198(CT018-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210193(CT019-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210101(AD002-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210102(AD003-6)F-RS165933
G11210103(AD005-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G09200581(AD007-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210104(AD008-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210105(AD010-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G01050030(AD012-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210107(AD014-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210108(AD015-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210109(AD019-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210110(AD020-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210111(AD021-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210112(AD022-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210113(AD025-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
G11210114(AD027-6)F-RS165933  GCCTGGCCAT GTTTTCTTGT GTGAAGGATC TGTTTAGTTT TATATCTTTC TGTGGCTCAT ATCTAATTTA GTTGACAGTA CCTGTGGGTC ACTAGGTAGA
```

```
                                     710        720        730        740        750        760        770        780        790        800
                              ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....|
rs165933 master               CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G09200575(CT001-6)F-RS165933  CATTGCTAGC AGACGTTTAG AACTGAAATA CTAGAGCTTG GGAAAATGTT GATATTTGAG ATAGAGACTT TGAAGAAACA TT AGCAGAG AGTTGGTAGT
G01050024(CT002-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT --GAAGAACA TT-AGCAGAG AGTTGGTAGT
G01050025(CT004-6)F-RS165933  CATTGCTAGC AGACGTTTAG ATATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT --GAAGAACA TT-AGCAGAG AGTTGGTAGT
G01050026(CT005-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G01050027(CT006-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210189(CT007-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT --GAAGAACA TTTAGCAGAG AGTTGGTAGT
G01050028(CT008-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT --GAAGAACA TT-AGCAGAG AGTTGGTAGT
G11210191(CT009-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G01050029(CT012-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210194(CT014-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT  -GAAGAACA TT-AGCAGAG AGTTGGTAGT
G11210195(CT015-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT --GAAGAACA TT-AGCAGAG AGTTGGTAGT
G11210196(CT016-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210197(CT017-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210198(CT018-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT --GAAGAACA TT-AGCAGAG AGTTGGTAGT
G11210193(CT019-6)F-RS165933  CATTGCTAGC AGATGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT --GAAGAACA TT-AGCAGAG AGTTGGTAGT
G11210101(AD002-6)F-RS165933  CATTGCTAGC AGATGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210102(AD003-6)F-RS165933
G11210103(AD005-6)F-RS165933  CATTGCTAGC AGATGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT  -GAAGAACA TT AGCAGAG AGTTGGTAGT
G09200581(AD007-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT  -GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210104(AD008-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210105(AD010-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G01050030(AD012-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT GAAGAACATT AGCAGATAGT TGGTAGTTAA
G11210107(AD014-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT  -GAAGAACA TT-AGCAGAG AGTTGGTAGT
G11210108(AD015-6)F-RS165933  CATTGCTAGC AGATGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210109(AD019-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210110(AD020-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT --GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210111(AD021-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT  -GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210112(AD022-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TTTAGCAGAG AGTTGGTAGT
G11210113(AD025-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT   GAAGAACA TT AGCAGAG AGTTGGTAGT
G11210114(AD027-6)F-RS165933  CATTGCTAGC AGACGTTTAG AAATGAAATA CTAGAGCTTG GGAAAAAGTT GATATTTGAG ATAGAGACTT  -GAAGAACA TTAGCCAGAG AGTTGGTAGT
```

```
                                     810        820        830        840        850        860        870        880        890        900
                              ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....| ....|....|
rs165933 master               TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G09200575(CT001-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTTCAA ATTAAAAGCA GAAGAAAAAA GGAAGACCA- GGGTCAAACT TTTGTCAACC TACTGTGTTT -AGAGAATGA
G01050024(CT002-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G01050025(CT004-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G01050026(CT005-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA --TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G01050027(CT006-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA --TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G11210189(CT007-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TTTGTCAAC  TACTGTGTTT  AGAGAATGA
G01050028(CT008-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAAAC TTTGTCAAC  TACTGTGTTT  AGAGAATGA
G11210191(CT009-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA --TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TTTGTCAAC- TACTGTGTTT -AGAGAATGA
G01050029(CT012-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA --TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G11210194(CT014-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G11210195(CT015-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC- TACTGTGTTT  AGAGAATGA
G11210196(CT016-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA --TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G11210197(CT017-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA --TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G11210198(CT018-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G11210193(CT019-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G11210101(AD002-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA --TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G11210102(AD003-6)F-RS165933
G11210103(AD005-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G09200581(AD007-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G11210104(AD008-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA --TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G11210105(AD010-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAA-C TTTGTCAAC- TACTGTGTTT -AGAGAATGA
G01050030(AD012-6)F-RS165933  GGTCTGTGAG CTGGTGAGCA ATTCAAATAA AAGCAGAAGA CAATAGGAAG ACAAGGGTCC AACCTTTGTC AACCTACTGT GTTTTAGAGA TGAGACAAGA
G11210107(AD014-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G11210108(AD015-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G11210109(AD019-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT GTCAAC  TACTGTGTTT -AGAGAATGA
G11210110(AD020-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GA GAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G11210111(AD021-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAA  GGGTCAAACT TT GTCAAC  TACTGTGTTT  AGAGAATGA
G11210112(AD022-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAAA GGGTCAAACT TTTGTCAAC- TACTGTGTTT TAGAGAATGA
G11210113(AD025-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA  -TAAAAGCA GAAGAGAAGA GGAAGACAA- GGGTCAAACT TT-GTCAAC- TACTGTGTTT -AGAGAATGA
G11210114(AD027-6)F-RS165933  TAAGGTCTGT GAGCTGGTGA GCAATTCAAA   TAAAAGCA GAAGAGAAGA GGAAGACAAG GGGTCAAACT TTTGTCAAC  TACTGTGTTT  AGAGAATGA
```

rs165933 (cont.)



BIOGRAPHY

BIOGRAPHY

Name – Surname	Kongla Sopachai
Date of Birth	November 22, 1982
Address	133 Moo 6 Banyeang, Nakornthai, Phitsanulok Province 65120
Work Place	Medical Science Academic Service Unit, Faculty of Medical Science, Naresuan University
Position	Scientist

Education Background

2008	B.S. (Microbiology) Naresuan University, Phitsanulok, Thailand

Publication

Sopachai, K., Nonglak, Y. and Yasothornsrikul, S. (2010). Identification of single nucleotide polymorphisms in Presenilin1 gene and primer design for Multiplex Polymerase Chain Reaction: A possible Tool in Alzheime's diagnosis in Thai population. In **Proceeding publication in The 3rd SUT Graduate Conference 2010** (pp.121-124). Nakhon Ratchasima: Suranaree University of Technology.