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Genomic insights into Sahiwal cattle: Genome-wide SNP analysis using ddRAD sequencing

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Abstract

India, home to a significant portion of the world's cattle population, boasts a diverse range of *Bos indicus* cattle breeds. Among them, Sahiwal cattle play a pivotal role, contributing substantially to India's milk production. To enhance genetic improvement and conservation strategies, this study utilized a cost-effective reduced representation next-generation sequencing technique known as Double-digest RAD (ddRAD) sequencing to identify genome-wide single nucleotide polymorphisms (SNPs) and indels in the Sahiwal cattle genome.

A total of 12 unrelated Sahiwal cattle provided blood samples, and genomic DNA was extracted and sequenced following the RAD sequencing protocol. The bioinformatic analysis pipeline included FastQC for quality assessment, PRINSEQ for trimming adapters and barcodes, STACKS for sequence filtering, Bowtie2 for alignment to the *Bos indicus* reference genome, and Vcftools for variant calling. SNPs were annotated using SnpEff and Ensembl Variant Effect Predictor.

The study generated 94.61 million raw reads, of which 96.28% passed quality control, resulting in 181,975 SNPs identified at a read depth of 10. Genome-wide annotation revealed 1545 SNPs mapped to transcripts, 139,715 in introns, and 111,963 in intergenic regions. The transition/transversion (Ts/Tv) ratio was 2.4682, suggesting potential genomic stability.

Further exploration focused on candidate genes associated with milk yield and fat percentage. A total of 1447 high-quality variants were annotated in 69 genes affecting these traits. Noteworthy genes such as SP110, IFIH1, ITPR2, GHR, LEP, and TRAPPC9 exhibited multiple SNPs, with ITPR2 having the highest count at 157 SNPs, indicating its potential significance in milk production.

Keywords: Sahiwal, ddRAD sequencing, genome-wide SNP analysis

1. Introduction

Domesticated cattle species are grouped into exotic (*Bos taurus*) and indigenous (*Bos indicus*). With a population of 192.49 million cattle, India has 13.1% of the world's cattle population [1] and it is home to a mega diverse *Bos indicus* cattle breeds of the world [2]. These animals produced 46.67 million tonnes (MT) out of the total milk production in India. India is a country rich in Animal Genetic Resources (AnGR), with 53 registered breeds of cattle. The identification and creation of genome-wide markers are essential to advancing genetic improvement and conservation efforts. As the most common type of genomic variation, single nucleotide polymorphisms (SNPs) are distinguished by Mendelian inheritance, low mutation rates, genetic stability, and economical genotyping [3]. SNPs have therefore gained widespread use as markers in genomic research. Genome-wide SNP discovery typically entails sequencing the complete genome, which contains many repetitive and uninformative sequences. Genomic sub-sampling methods, like RAD Seq, offer an efficient alternative to Whole Genome Sequencing (WGS) for SNP genotyping, enabling simultaneous sequencing and genotyping. High Linkage Disequilibrium within genetic markers allows selecting a representative tagged SNP, making WGS technically unnecessary [4]. A reduction of about 35-fold in cost is possible through RAD seq methods as compared to WGS [5]. A reduced representation next-generation sequencing (NGS) technique called Double-digest RAD (ddRAD) uses both common and uncommon cutting restriction enzymes to fragment the target genome. The ddRAD sequencing method offers various advantages over other RAD seq methods. It's easier to multiplex samples and choose readings based on their size. The present study was carried out to identify the genome-wide SNPs and indels in the genome of Indian Sahiwal cattle using ddRAD sequencing.

2. Materials and Methods

2.1 Blood collection, DNA isolation, and Sequencing

Twelve unrelated Sahiwal cattle provided blood samples, from which DNA was extracted using the phenol extraction method [6]. DNA quantity and quality were assessed using Nanodrop/UV spectrophotometry and agarose gel electrophoresis. Following the RAD sequencing protocol [7], genomic DNA underwent double digestion with SphI and EcoRI [5] and MluCI and MseI [3]. Barcoding with Illumina indexes and inline barcodes, along with pooling and size selection, preceded the sequencing of the samples.

2.2 Bioinformatic analysis

FastQC used to assess the quality, read size, and GC content of raw sequence FASTQ files [8]. PRINSEQ [9] trimmed adapters and barcodes over restriction enzymes. STACKS [10] discarded sequences lacking restriction sites for both enzymes or with an average Phred score < 15. Bowtie 2 [11] aligned quality-passed sequences to the *Bos indicus* reference genome. Samtools [12] converted SAM to BAM files, which underwent sorting, indexing, merging, and mpileup for a single BCF file. Vcftools performed variant calling at Read Depths of 10 with a quality score ≥ 30 .

2.3 Annotation of SNPs

Annotation of the SNPs obtained at RD 10 was done using SnpEff (13) and Ensembl Variant Effect Predictor (VEP) [14].

3. Results and discussion

3.1 Selection of raw reads

The libraries were constructed based on restriction digestion with restriction enzymes, followed by size selection. A total of 94.61 million raw reads were obtained by sequencing of 12 samples of Sahiwal cattle. After the QC, a total of 91.10 million reads were kept, 96.28% of the total raw reads. An average of 0.87 and 1.4 million reads per sample were obtained using the GBS method respectively in the cattle [19, 20]. However, in the present study the average reads obtained per sample was higher than the above-mentioned study.

3.2 Alignment and Variant Calling

The average number of aligned reads was 95.14% when aligned to the Indicus cattle reference genomes. SNPs identified at read depth 10 were 181,975.

A total of 40,725 SNPs were reported in the SNPs identification of 47 animals using the GBS method [19]. However, in the present study with the ddRAD approach, more SNPs was obtained with a less number of samples.

3.3 Genome-wide annotation of SNPs

SNPs with a read depth of 10 and quality above 30 were carried forward. The SNPs identified were annotated using the SnpEff. A total of 1545 SNPs map to transcripts, 139715 are present in introns and 111963 are present in intergenic regions (Table 1). The TS/TV ratio for the SNPs was 2.46 (Table 2).

The high-quality SNPs for final annotation were selected with RD 10 and MQ (Mapping Quality) 30 as reported in the previous study (15). The TS/TV ratio for whole genome sequencing ranges from 2.0 to 2.1, and for whole exome sequencing from 2.6 to 3.5 (16). In this study, the genome was reduced using a restriction enzyme which might increase Ts/Tv ratio.

Table 1: Number of effects by region

Region	Count	Percent
Downstream	11,959	4.24%
Exon	2,340	0.83%
Intergenic	1,11,963	39.67%
Intron	1,39,715	49.50%
Splice_Site_Acceptor	13	0.01%
Splice_Site_Donor	12	0.00%
Splice_Site_Region	140	0.05%
Transcript	1,545	0.55%
Upstream	12,388	4.39%
Utr_3_Prime	1,676	0.59%
Utr_5_Prime	504	0.18%

Table 2: Number of Transitions and Transversions

Transitions	6,46,995
Transversions	2,62,136
Ts/Tv ratio	2.4682

3.4 Annotation of SNPs for candidate genes

The genome location of candidate genes in the cattle genome was collected from the NCBI website. The candidate genes responsible for milk yield and milk fat percentage were collected from the literature (Annexure I) and the SNPs present in these candidate genes were annotated for their location, reference allele, impact, symbol, gene, and uploaded allele.

A total of 1447 high-quality variants were annotated (Annexure II) in 69 genes affecting milk yield or milk fat percentage.

Candidate genes such as SP110, IFIH1, ITPR2, GHR, LEP, and TRAPPC9 contained more SNPs among those genes affecting milk production. ITPR2 had 157 SNPs was the highest among genes affecting milk production.

In a study (17), found that 2 SNP of the LEP gene in Brown Swiss cows were associated with reductions of SFA and increases of MUFA and PUFA and also enhanced fat synthesis. In the GWAS study (18), analysis showed that gene ITPR2 has a relationship with milk yield.

4. Conclusion

In conclusion, this study employs ddRAD sequencing to unveil the genomic landscape of Sahiwal cattle, identifying 181,975 SNPs and providing insights into candidate genes associated with milk-related traits. The cost-effective nature of ddRAD sequencing makes it a viable approach for large-scale genomic studies in diverse cattle populations. These findings not only contribute to our understanding of Sahiwal cattle genetics but also lay the groundwork for targeted breeding strategies aimed at enhancing economically vital traits such as milk production.

5. Acknowledgement

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Annexure 1

Table 1: List of major candidate genes for Milk production traits in dairy cattle.

S.No	Gene	Description	PUBMED ID	Trait
1.	POU1F1	POU class 1 homeobox 1	18557974	Milk yield, productive life
2.	DIP2A	DIP2 disco-interacting protein 2 homolog A	21048968	Protein yield
3.	TNFSF10	Tumour necrosis factor	21198698	Fat yield, protein yield, fat percentage, interval from first to successful insemination (cow)
4.	MIS18A	MIS18 kinetochore protein homolog A (<i>S. pombe</i>)	24456127	Somatic cell score
5.	SLC37A1	Solute carrier family 37 member 1	26613780	Milk production
6.	STAT1	Signal transducer and activator of transcription 1	17033032	Milk yield, fat yield, protein yield
7.	IFIH1	Interferon induced with helicase C domain 1	21198698	Milk yield, fat yield, fat percentage
8.	IGFBP2	Insulin-like growth factor- binding protein 2, 36 kDa	21198698	Lactation, establishment of pregnancy
9.	SLC40A1	Solute carrier family 40	25148050	Milk yield
10.	SP110	SP110 nuclear body protein	24456127	Fat percentage
11.	SDC3	Syndecan 3	24456127	Mammary system
12.	SMARCA1	SWI/SNF-related, matrix assoc., actin dep. Reg. of chromatin, subfamily a-like 1	24456127	Mammary system
13.	GBA	Glucosidase beta, acid	24456127	Protein percentage
14.	CTTNBP2NL	CTTNBP2 N-terminal like	24456127	Somatic cell score
15.	MUC1	Mucin 1, cell surface associated	26613780	Milk production
16.	LEP	Leptin	15905454, 18565947, 18650297, 15927775	Milk protein, milk fat, lactation performance, health, daily milk reproduction, postpartum luteal activity
17.	OLR1	Oxidized low density lipoprotein	16606746	Milk fat yield, milk fat percentage
18.	GABARAPL1	GABA type-A receptor- associated protein-like 1	21198698, 27287773	Milk yield, fat percentage, fat production

19.	MGP	Matrix Gla protein	21198698	Milk yield, fat percentage
20.	EPS8	Epidermal growth factor receptor pathway substrate 8	24456127	Milk yield
21.	MGST1	Microsomal glutathione S-transferase 1	24456127	Fat yield, fat percentage
22.	RPAP3	RNA polymerase II associated protein 3	24456127	Milk yield, protein percentage
23.	SOCS2	Suppressor of cytokine signalling 2	24779965	Mammary development pathways, prolactin signalling pathways, lactation
24.	ATF4	Activating transcription factor 4	24779965	Lactation yields, involution pathways
25.	ITPR2	Inositol 1,4, 5-triphosphate receptor, type 2	25148050	Fat percentage
26.	ACSS3	Acyl-CoA synthetase short- chain family member 3	25511820	Milk fat composition, milk fat percentage
27.	MKL1	Megakaryoblastic leukaemia (translocation) 1	27006194	Milk yield
28.	VDR	Vitamin D (1,25- dihydroxyvitamin D3) receptor	26613780	Milk production
29.	CSF2RB	Colony-stimulating factor 2 receptor beta common subunit	26613780	Milk production
30.	NCF4	Neutrophil cytosolic factor 4	26613780	Milk production
31.	CSN1S2	Casein alpha-S2	15040897	Protein yield, protein percentage, fat yield, fat percentage, milk yield)
32.	CSN2	Casein beta	15040897	Protein yield, protein percentage, fat yield, fat percentage, milk yield)
33.	PPARGC1A	peroxisome proliferator-activated receptor gamma, coactivator	15781588	Milk fat
34.	SPP1	Secreted phosphoprotein	16230712	Milk production, milk protein percentage, milk fat percentage
35.	IL8	Interleukin 8	17433017	Milk yield, fat yield, protein yield, somatic cell score
36.	IGFBP7	Insulin-like growth factor- binding protein 7	21198698	Milk yield, 56-day non-return rate, interval from first service to successful insemination (heifer)
37.	FAM13A1	Family with sequence similarly 13, member A	21257065	Milk yield, fat yield, fat percentage
38.	IGFBP-5	Insulin-like growth factor- binding protein-5	21338820	Calving ability, milk yield, protein yield, mammary gland involution
39.	PKD2	Polycystic kidney disease 2	25148050	Protein percentage
40.	CSN1S1	Casein alpha s1	12939094, 15905454, 16840633	Milk yield, fat yield, protein yield, milk fat percentage, milk protein percentage
41.	CSN3	Casein kappa	12939094, 18666558	Milk yield, fat yield, protein yield, milk fat percentage, milk protein percentage
42.	ABCG2	ATP-binding cassette, subfamily G	15998908, 17584938, 17106124	Milk yield, milk fat and protein concentration
43.	CAS1A	Casein alpha s1	24456127	Protein percentage
44.	LARPI	La ribonucleo protein domain family, member 1	24456127	Somatic cell score
45.	IRF1	Interferon regulatory factor 1	24779965	Lactation yields, involution pathways
46.	CAST	Calpastatin	16734705, 23759029	Daughter pregnancy rate, productive life, protein yield, milk yield, fat yield, somatic cell score, net merit, conception rate (heifer and cow)
47.	FBP1	Fructose 1,6 bisphosphatase 1	22669841	Milk performance
48.	FBP2	Fructose 1,6 bisphosphatase 2	22669841	Milk performance
49.	TP53	Tumour protein p53	17584498	Lactation and involution, pregnancy, puberty
50.	TEP1	Telomerase associated protein 1	27506634	Test day protein yield, test day fat yield
51.	PCK2	Phosphoenolpyruvate carboxykinase 2, mitochondrial isoform	22669841	Milk performance
52.	GFI1B	Growth factor independent 1B transcription receptor	21048968	Fat percentage
53.	LGB	Lactoglobulin, beta	22192223, 19032698, 12836958	Milk protein composition, milk beta- lactoglobulin protein concentration
54.	NLRP6	NLR family, pyrin domain- containing 6	24456127	Mammary system
55.	PRKCE	Protein kinase C, epsilon	24456127	Mammary system
56.	NRXN1	Neurexin 1	24456127	Somatic cell score
57.	PAEP	Progestogen-associated endometrial protein	26613780	Milk production
58.	RNF219	Ring finger protein 219	24456127	Fat production
59.	ACSS2	Acyl-CoA synthetase short- chain family member 2	21569316	Fat yield, milk fatty acids
60.	PLK1S1	Kizuna centrosomal protein	27506634	Somatic cell score
61.	PCK1	Phosphoenolpyruvate carboxykinase 1, cytosolic isoform	22669841	Milk performance
62.	VPS28	Vacuolar protein sorting 28 Homolog	21048968	Milk yield, protein percentage, fat yield, fat

				Percentage
63.	MAF1	MAF1 homolog	21048968	Milk yield, fat percentage
64.	OPLAH	5-oxoprolinase	21048968	Fat percentage
65.	MAPK15	Mitogen-activated protein kinase 15	21048968	Fat percentage
66.	ZNF623	Zinc finger protein 623	21048968	Fat percentage, milk yield
67.	EEF1D	Eukaryotic translation elongation factor 1 delta	21048968	Fat percentage
68.	ZC3H3	Zinc finger CCCH-type containing 3	21048968	Fat percentage
69.	GPIHBP1	Glycosyl phosphatidyl inositol anchored high density lipoprotein-binding protein 1	21048968	Milk yield, protein yield, fat percentage
70.	RHPN1	Rhopilin, Rho GTPase- binding protein 1	21048968	Fat percentage
71.	PTK2	Protein tyrosine kinase 2	21048968	Fat percentage
72.	KCNK9	Potassium channel, subfamily K, member 9	21048968	Fat percentage
73.	COL22A1	Collagen, type XXII, alpha 1	21048968	Milk yield, protein yield, fat percentage
74.	KHDRBS3	KH domain-containing, RNA binding, signal transduction associated 3	21048968	Fat percentage
75.	NIBP	IKKb-binding protein	21831322	Fat percentage
76.	MYC	v-myc avian myelocytomatosis viral oncogene homolog	24779965	Involution pathways
77.	CYHR1	Cysteine/histidine-rich 1	25511820, 27287773	Milk fat composition, milk fat percentage, milk production
78.	ARHGAP39	Rho GTPase-activating protein 39	25511820, 27287773	Milk fat composition, milk fat percentage, fat Production
79.	CPSF1	Cleavage and polyadenylation specific factor 1	25511820	Milk fat composition, milk fat percentage
80.	GRINA	Glutamate receptor, ionotropic, N methyl D- aspartate-associated protein 1	25511820	Milk fat composition, milk fat percentage
81.	FAM83H	Family with sequence similarity 83, member H	25511820	Milk fat composition, milk fat percentage
82.	DGAT1	Diacylglycerol O- acyltransferase 1	11827942, 16621755, 17179535, 18650297, 18666558, 18669245	Milk yield and composition, milk protein yield, milk fat yield, milk fat and protein percentage, somatic cell score, maternal non-return rate, productive life, conformation traits
83.	TONSL	Tonsoku-like, DNA repair Protein	27506634, 27287773	Test day fat yield (milk fat%), milk production
84.	PPP1R16A	Protein phosphatase 1 regulatory subunit 16A	27506634, 27287773	Test day fat yield (milk fat%), milk Production
85.	TRAPPC9	Trafficking protein particle complex 9	27506634	Test day fat yield (milk fat %)
86.	LRRC14	Leucine-rich repeat- containing 14	27506634	305-day fat yield, lactose percentage
87.	FOXH1	Forkhead box H1	27287773	Milk production
88.	SMPD5	Sphingomyelin phosphodiesterase 5	27287773	Fat production, and fat percentage
89.	EIF2C2	Argonaute 2, RISC catalytic Component	25510969	Milk yield, fat yield, protein yield
90.	CD44	CD44 molecule (Indian blood group)	27287773	Milk production
91.	LAX1	Lymphocyte transmembrane adaptor 1	27006194	Milk yield
92.	ADCK3	AarF domain-containing kinase 3	24456127	Somatic cell score
93.	FGF2	Fibroblast growth factor 2	18487671	Milk fat, productive life
94.	RILPL2	Rab-interacting lysosomal protein-like 2	27506634	Somatic cell score
95.	NOD2	Nucleotide-binding oligomerization domain-containing 2, CARD15	18005441	Milk yield, somatic cell score
96.	PGLYRP1	Peptidoglycan recognition protein 1	21831322	Fat yield, protein yield, service-sire, daughter calving-ease, net merit, milk yield, productive life, fat percentage, protein Percentage
97.	TGFB1	Transforming growth factor, beta 1	24779965	Mammary development pathways, milk production
98.	GH	Growth hormone	16388132	Milk yield, lactation
99.	FASN	Fatty acid synthase	17242864	Milk fat, milk fatty acids
100.	CCL2	Chemokine	17433017	Milk yield, fat yield, protein yield, somatic cell score
101.	ACLY	ATP citrate lyase	19389950	Fatty acid biosynthesis
102.	BAIAP2	BAI1-associated protein 2	21198698	Fat percentage, protein percentage, 56-day non-return rate (heifer)
103.	SREBF1	Sterol regulatory element- binding transcription factor 1	21569316	Fat yield, milk fatty acids
104.	STAT5B	Signal transducer and activator of transcription 5B	24779965	Mammary development pathways, involution pathways, prolactin signalling pathways
105.	STAT5A	Signal transducer and activator of transcription 5A	15523155, 18218766	Milk yield, milk fat and protein content, fertilization rate, embryonic survival
106.	GHDC	GH3 domain containing	26613780	Milk production
107.	GHR	Growth hormone receptor	12586713	Milk yield and composition

108.	FYB	FYN-binding protein	21048968	Protein percentage
109.	RICTOR	RPTOR independent companion of MTOR, complex 2	21048968	Protein percentage
110.	CCNB1	Cyclin B1	21198698	56-day non-return rate (cow and heifer), milk yield
111.	GDNF	Glial cell-derived neurotrophic factor	22281351	Milk yield, fat yield, protein yield, protein and fat composition
112.	PRLR	Prolactin receptor	24779965	Mammary development pathways, involution pathways, prolactin signalling pathways
113.	LIFR	Leukaemia inhibitory factor receptor alpha	24779965	Mammary development pathways, involution pathways, prolactin signalling pathways
114.	OSMR	Oncostatin M receptor	24779965	Involution pathways
115.	LTF	Lactotransferrinbola	16621755, 18666558	Fat yield, protein yield, fat percentage, protein percentage
116.	PRL	Prolactin	15523155	Milk protein, milk yield, milk composition
117.	JARID2	Jumonji, AT-rich interactive domain 2	25148050	Protein yield
118.	TRIM26	Tripartite motif-containing 26	27006194	Fat yield
119.	CLEC16A	C-type lectin domain family 16 member A	27006194	Fat yield
120.	PAM16/GLIS2	GLIS family zinc finger 2	27006194	Milk yield, protein yield
121.	BTRC	Beta-transducin repeat Containing	24456127	Fat yield
122.	PLCE1	Phospholipase C, epsilon 1	24456127	Protein yield
123.	SUFU	Suppressor of fused homolog	24456127	Mammary system
124.	DKK1	Dickkopf WNT signalling pathway inhibitor 1	24779965	Mammary development pathways, milk production
125.	SCD	Stearoyl-CoA desaturase	25511820	Milk fat composition, milk fat percentage
126.	NEURL1	Neuralized E3 ubiquitin protein ligase 1	27006194	Fat yield
127.	GINS4	GINS complex subunit 4	24456127	Fat percentage
128.	AGPAT6	1-acylglycerol-3-phosphate O-acyltransferase 6	21569316, 24465687	Milk fatty acid content, milk fat percentage
129.	FADS1	Fatty acid desaturase 1	27506634, 24533445	Milk omega-3 FA synthesis
130.	FADS2	Fatty acid desaturase 2	27506634, 24533445	Milk omega-6 synthesis

Annexure II

Table 1: Gene wise annotation of SNPs for the candidate genes responsible for Milk Production traits

Location	Allele	Symbol	Gene	REF_ALLELE	Uploaded_ALLELE
1:35413562-35413562	T	POU1F1	ENSBTAG00000009128	C	C/T
1:146125773-146125773	G	DIP2A	ENSBTAG00000011495	A	A/G
1:146125773-146125773	G	DIP2A	ENSBTAG00000011495	A	A/G
1:146125773-146125773	G	DIP2A	ENSBTAG00000011495	A	A/G
1:146125773-146125773	G	DIP2A	ENSBTAG00000011495	A	A/G
1:3208728-3208728	G	MIS18A	ENSBTAG00000016619	T	T/G
1:3208810-3208810	C	MIS18A	ENSBTAG00000016619	A	A/C
1:3208883-3208883	C	MIS18A	ENSBTAG00000016619	G	G/C
1:142837316-142837316	G	SLC37A1	ENSBTAG00000021286	T	T/G
1:142837316-142837316	G	SLC37A1	ENSBTAG00000021286	T	T/G
1:142837316-142837316	G	SLC37A1	ENSBTAG00000021286	T	T/G
1:142852990-142852990	A	SLC37A1	ENSBTAG00000021286	T	T/A
1:142852990-142852990	A	SLC37A1	ENSBTAG00000021286	T	T/A
1:142852990-142852990	A	SLC37A1	ENSBTAG00000021286	T	T/A
1:142855717-142855717	A	SLC37A1	ENSBTAG00000021286	G	G/A
1:142855717-142855717	A	SLC37A1	ENSBTAG00000021286	G	G/A
1:142855717-142855717	A	SLC37A1	ENSBTAG00000021286	G	G/A
2:79518225-79518225	G	STAT1	ENSBTAG00000007867	A	A/G
2:79518225-79518225	G	STAT1	ENSBTAG00000007867	A	A/G
2:34123053-34123053	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123053-34123053	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123053-34123053	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123053-34123053	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123053-34123053	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123053-34123053	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123088-34123088	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123088-34123088	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123088-34123088	T	IFIH1	ENSBTAG00000008142	C	C/T

2:34123088-34123088	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34123088-34123088	T	IFIH1	ENSBTAG00000008142	C	C/T
2:34130451-34130451	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34130451-34130451	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34130451-34130451	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34130451-34130451	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34130451-34130451	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34130451-34130451	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34152640-34152640	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152640-34152640	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152640-34152640	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152640-34152640	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152640-34152640	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152645-34152645	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34152645-34152645	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34152645-34152645	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34152645-34152645	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34152645-34152645	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34152645-34152645	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34152645-34152645	C	IFIH1	ENSBTAG00000008142	G	G/C
2:34152661-34152661	A	IFIH1	ENSBTAG00000008142	G	G/A
2:34152661-34152661	A	IFIH1	ENSBTAG00000008142	G	G/A
2:34152661-34152661	A	IFIH1	ENSBTAG00000008142	G	G/A
2:34152661-34152661	A	IFIH1	ENSBTAG00000008142	G	G/A
2:34152661-34152661	A	IFIH1	ENSBTAG00000008142	G	G/A
2:34152661-34152661	A	IFIH1	ENSBTAG00000008142	G	G/A
2:34152684-34152684	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152684-34152684	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152684-34152684	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152684-34152684	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152684-34152684	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152684-34152684	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152684-34152684	C	IFIH1	ENSBTAG00000008142	T	T/C
2:34152797-34152797	T	IFIH1	ENSBTAG00000008142	G	G/T
2:34152797-34152797	T	IFIH1	ENSBTAG00000008142	G	G/T
2:34152797-34152797	T	IFIH1	ENSBTAG00000008142	G	G/T
2:34152797-34152797	T	IFIH1	ENSBTAG00000008142	G	G/T
2:34152797-34152797	T	IFIH1	ENSBTAG00000008142	G	G/T
2:104624954-104624954	A	IGFBP2	ENSBTAG00000005596	G	G/A
2:104624954-104624954	A	IGFBP2	ENSBTAG00000005596	G	G/A
2:104625522-104625522	G	IGFBP2	ENSBTAG00000005596	T	T/G
2:104625522-104625522	G	IGFBP2	ENSBTAG00000005596	T	T/G
2:104625584-104625584	C	IGFBP2	ENSBTAG00000005596	T	T/C
2:104625584-104625584	C	IGFBP2	ENSBTAG00000005596	T	T/C
2:104625736-104625736	A	IGFBP2	ENSBTAG00000005596	T	T/A
2:104625736-104625736	A	IGFBP2	ENSBTAG00000005596	T	T/A
2:104625753-104625753	A	IGFBP2	ENSBTAG00000005596	T	T/A
2:104625753-104625753	A	IGFBP2	ENSBTAG00000005596	T	T/A
2:104637094-104637094	A	IGFBP2	ENSBTAG00000005596	G	G/A
2:104637094-104637094	A	IGFBP2	ENSBTAG00000005596	G	G/A
2:118180452-118180452	T	SP110	ENSBTAG00000015752	C	C/T
2:118180452-118180452	T	SP110	ENSBTAG00000015752	C	C/T
2:118180452-118180452	T	-	ENSBTAG00000005584	C	C/T
2:118180452-118180452	T	SP110	ENSBTAG00000015752	C	C/T
2:118205193-118205193	T	SP110	ENSBTAG00000015752	C	C/T
2:118205193-118205193	T	SP110	ENSBTAG00000015752	C	C/T
2:118205193-118205193	T	SP110	ENSBTAG00000015752	C	C/T
2:118205193-118205193	T	SP110	ENSBTAG00000015752	C	C/T
2:118205193-118205193	T	SP110	ENSBTAG00000015752	C	C/T
2:118205193-118205193	T	SP110	ENSBTAG00000015752	C	C/T
2:118207079-118207079	A	SP110	ENSBTAG00000015752	T	T/A
2:118207079-118207079	A	SP110	ENSBTAG00000015752	T	T/A
2:118207079-118207079	A	SP110	ENSBTAG00000015752	T	T/A
2:118207079-118207079	A	SP110	ENSBTAG00000015752	T	T/A
2:118207079-118207079	A	SP110	ENSBTAG00000015752	T	T/A
2:118207079-118207079	A	SP110	ENSBTAG00000015752	T	T/A
2:118207092-118207092	A	SP110	ENSBTAG00000015752	G	G/A
2:118207092-118207092	A	SP110	ENSBTAG00000015752	G	G/A
2:118207092-118207092	A	SP110	ENSBTAG00000015752	G	G/A

2:122703497-122703497	C	SDC3	ENSBTAG00000026676	G	G/C
2:122703499-122703499	G	SDC3	ENSBTAG00000026676	A	A/G
2:122703499-122703499	G	SDC3	ENSBTAG00000026676	A	A/G
2:122703499-122703499	G	SDC3	ENSBTAG00000026676	A	A/G
2:122703499-122703499	G	-	ENSBTAG00000066276	A	A/G
2:122703499-122703499	G	SDC3	ENSBTAG00000026676	A	A/G
2:122703500-122703500	C	SDC3	ENSBTAG00000026676	G	G/C
2:122703500-122703500	C	SDC3	ENSBTAG00000026676	G	G/C
2:122703500-122703500	C	SDC3	ENSBTAG00000026676	G	G/C
2:122703500-122703500	C	-	ENSBTAG00000066276	G	G/C
2:122703500-122703500	C	SDC3	ENSBTAG00000026676	G	G/C
2:122703505-122703505	G	SDC3	ENSBTAG00000026676	A	A/G
2:122703505-122703505	G	SDC3	ENSBTAG00000026676	A	A/G
2:122703505-122703505	G	SDC3	ENSBTAG00000026676	A	A/G
2:122703505-122703505	G	-	ENSBTAG00000066276	A	A/G
2:122703505-122703505	G	SDC3	ENSBTAG00000026676	A	A/G
3:30877544-30877544	G	CTTNBP2NL	ENSBTAG00000021602	A	A/G
3:30877544-30877544	G	CTTNBP2NL	ENSBTAG00000021602	A	A/G
3:30877544-30877544	G	CTTNBP2NL	ENSBTAG00000021602	A	A/G
3:30877544-30877544	G	CTTNBP2NL	ENSBTAG00000021602	A	A/G
5:99799212-99799212	C	OLR1	ENSBTAG00000004547	T	T/C
5:99799212-99799212	C	OLR1	ENSBTAG00000004547	T	T/C
5:99799212-99799212	C	OLR1	ENSBTAG00000004547	T	T/C
5:99799318-99799318	T	OLR1	ENSBTAG00000004547	C	C/T
5:99799318-99799318	T	OLR1	ENSBTAG00000004547	C	C/T
5:99799318-99799318	T	OLR1	ENSBTAG00000004547	C	C/T
5:99819475-99819475	A	OLR1	ENSBTAG00000004547	G	G/A
5:99769404-99769404	C	GABARAPL1	ENSBTAG00000011765	T	T/C
5:99769464-99769464	G	GABARAPL1	ENSBTAG00000011765	T	T/G
5:99769464-99769464	G	TMEM52B	ENSBTAG00000011023	T	T/G
5:99769464-99769464	G	GABARAPL1	ENSBTAG00000011765	T	T/G
5:99769464-99769464	G	GABARAPL1	ENSBTAG00000011765	T	T/G
5:99769474-99769474	C	GABARAPL1	ENSBTAG00000011765	A	A/C
5:95027463-95027463	A	MGP	ENSBTAG00000012370	G	G/A
5:95027465-95027465	G	MGP	ENSBTAG00000012370	C	C/G
5:94171690-94171690	T	EPS8	ENSBTAG00000000369	C	C/T
5:94171690-94171690	T	EPS8	ENSBTAG00000000369	C	C/T
5:94171690-94171690	T	EPS8	ENSBTAG00000000369	C	C/T
5:94181288-94181288	G	EPS8	ENSBTAG00000000369	C	C/G
5:94181288-94181288	G	EPS8	ENSBTAG00000000369	C	C/G
5:94181288-94181288	G	EPS8	ENSBTAG00000000369	C	C/G
5:94263189-94263189	A	EPS8	ENSBTAG00000000369	G	G/A
5:94263189-94263189	A	EPS8	ENSBTAG00000000369	G	G/A
5:94263189-94263189	A	EPS8	ENSBTAG00000000369	G	G/A
5:94263189-94263189	A	EPS8	ENSBTAG00000000369	G	G/A
5:94300550-94300550	T	EPS8	ENSBTAG00000000369	G	G/T
5:94300550-94300550	T	EPS8	ENSBTAG00000000369	G	G/T
5:93492316-93492316	G	MGST1	ENSBTAG00000008541	A	A/G
5:93510150-93510150	C	MGST1	ENSBTAG00000008541	T	T/C
5:93514803-93514803	C	MGST1	ENSBTAG00000008541	A	A/C
5:32603705-32603705	T	RPAP3	ENSBTAG00000018690	A	A/T
5:32603705-32603705	T	RPAP3	ENSBTAG00000018690	A	A/T
5:32603705-32603705	T	RPAP3	ENSBTAG00000018690	A	A/T
5:32603705-32603705	T	RPAP3	ENSBTAG00000018690	A	A/T
5:32603705-32603705	T	RPAP3	ENSBTAG00000018690	A	A/T
5:32603916-32603916	C	RPAP3	ENSBTAG00000018690	T	T/C
5:32603916-32603916	C	RPAP3	ENSBTAG00000018690	T	T/C
5:32603916-32603916	C	RPAP3	ENSBTAG00000018690	T	T/C
5:32603916-32603916	C	RPAP3	ENSBTAG00000018690	T	T/C
5:32603916-32603916	C	RPAP3	ENSBTAG00000018690	T	T/C
5:32603916-32603916	C	RPAP3	ENSBTAG00000018690	T	T/C
5:32603940-32603940	C	RPAP3	ENSBTAG00000018690	G	G/C
5:32603940-32603940	C	RPAP3	ENSBTAG00000018690	G	G/C
5:32603940-32603940	C	RPAP3	ENSBTAG00000018690	G	G/C
5:32603940-32603940	C	RPAP3	ENSBTAG00000018690	G	G/C
5:32603940-32603940	C	RPAP3	ENSBTAG00000018690	G	G/C
5:32604008-32604008	A	RPAP3	ENSBTAG00000018690	C	C/A
5:32604008-32604008	A	RPAP3	ENSBTAG00000018690	C	C/A
5:32604008-32604008	A	RPAP3	ENSBTAG00000018690	C	C/A

5:32604008-32604008	A	RPAP3	ENSBTAG00000018690	C	C/A
5:32604008-32604008	A	RPAP3	ENSBTAG00000018690	C	C/A
5:32605604-32605604	A	RPAP3	ENSBTAG00000018690	G	G/A
5:32605604-32605604	A	RPAP3	ENSBTAG00000018690	G	G/A
5:32605604-32605604	A	RPAP3	ENSBTAG00000018690	G	G/A
5:32605604-32605604	A	RPAP3	ENSBTAG00000018690	G	G/A
5:32605604-32605604	A	RPAP3	ENSBTAG00000018690	G	G/A
5:23363571-23363571	C	SOCS2	ENSBTAG00000012007	T	T/C
5:23363571-23363571	C	SOCS2	ENSBTAG00000012007	T	T/C
5:82979172-82979172	A	ITPR2	ENSBTAG00000002313	C	C/A
5:82979172-82979172	A	ITPR2	ENSBTAG00000002313	C	C/A
5:82979172-82979172	A	ITPR2	ENSBTAG00000002313	C	C/A
5:82979172-82979172	A	ITPR2	ENSBTAG00000002313	C	C/A
5:83012897-83012897	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83012897-83012897	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83012897-83012897	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83012897-83012897	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83012966-83012966	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83012966-83012966	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83012966-83012966	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83012966-83012966	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83012971-83012971	C	ITPR2	ENSBTAG00000002313	G	G/C
5:83012971-83012971	C	ITPR2	ENSBTAG00000002313	G	G/C
5:83012971-83012971	C	ITPR2	ENSBTAG00000002313	G	G/C
5:83012971-83012971	C	ITPR2	ENSBTAG00000002313	G	G/C
5:83017912-83017912	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83017912-83017912	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83017912-83017912	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83017912-83017912	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83039843-83039843	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83039843-83039843	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83039843-83039843	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83039843-83039843	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83040115-83040115	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83040115-83040115	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83040115-83040115	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83040115-83040115	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83101945-83101945	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83101945-83101945	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83101945-83101945	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83101945-83101945	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83101963-83101963	T	ITPR2	ENSBTAG00000002313	G	G/T
5:83101963-83101963	T	ITPR2	ENSBTAG00000002313	G	G/T
5:83101963-83101963	T	ITPR2	ENSBTAG00000002313	G	G/T
5:83101963-83101963	T	ITPR2	ENSBTAG00000002313	G	G/T
5:83102062-83102062	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83102062-83102062	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83102062-83102062	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83102062-83102062	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83122574-83122574	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83122574-83122574	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83122574-83122574	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83122582-83122582	G	ITPR2	ENSBTAG00000002313	C	C/G
5:83122582-83122582	G	ITPR2	ENSBTAG00000002313	C	C/G
5:83122582-83122582	G	ITPR2	ENSBTAG00000002313	C	C/G
5:83143824-83143824	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83143824-83143824	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83143824-83143824	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83153318-83153318	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83153318-83153318	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83153318-83153318	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83153508-83153508	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83153508-83153508	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83153508-83153508	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83165970-83165970	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83165970-83165970	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83165970-83165970	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83166168-83166168	A	ITPR2	ENSBTAG00000002313	G	G/A

5:83166168-83166168	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83166168-83166168	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83182812-83182812	A	ITPR2	ENSBTAG00000002313	C	C/A
5:83182812-83182812	A	ITPR2	ENSBTAG00000002313	C	C/A
5:83182812-83182812	A	ITPR2	ENSBTAG00000002313	C	C/A
5:83208605-83208605	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208605-83208605	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208605-83208605	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208625-83208625	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208625-83208625	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208625-83208625	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208726-83208726	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208726-83208726	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208726-83208726	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208731-83208731	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83208731-83208731	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83208731-83208731	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83208741-83208741	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208741-83208741	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83208741-83208741	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83228304-83228304	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83228304-83228304	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83228304-83228304	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83228410-83228410	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83228410-83228410	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83228410-83228410	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83231468-83231468	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83231468-83231468	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83231468-83231468	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83301810-83301810	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83301810-83301810	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83301810-83301810	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83304102-83304102	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83304102-83304102	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83304102-83304102	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83324730-83324730	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83324730-83324730	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83324730-83324730	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83324732-83324732	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83324732-83324732	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83324732-83324732	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83346355-83346355	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83346355-83346355	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83346355-83346355	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83346393-83346393	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83346393-83346393	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83346393-83346393	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83346523-83346523	C	ITPR2	ENSBTAG00000002313	A	A/C
5:83346523-83346523	C	ITPR2	ENSBTAG00000002313	A	A/C
5:83346523-83346523	C	ITPR2	ENSBTAG00000002313	A	A/C
5:83346530-83346530	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83346530-83346530	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83346530-83346530	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83352779-83352779	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83352779-83352779	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83352779-83352779	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83383814-83383814	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83383814-83383814	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83383814-83383814	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83383849-83383849	T	ITPR2	ENSBTAG00000002313	A	A/T
5:83383849-83383849	T	ITPR2	ENSBTAG00000002313	A	A/T
5:83383849-83383849	T	ITPR2	ENSBTAG00000002313	A	A/T
5:83384348-83384348	T	ITPR2	ENSBTAG00000002313	A	A/T
5:83384348-83384348	T	ITPR2	ENSBTAG00000002313	A	A/T
5:83384348-83384348	T	ITPR2	ENSBTAG00000002313	A	A/T
5:83384349-83384349	T	ITPR2	ENSBTAG00000002313	A	A/T
5:83384349-83384349	T	ITPR2	ENSBTAG00000002313	A	A/T
5:83384349-83384349	T	ITPR2	ENSBTAG00000002313	A	A/T

5:83432672-83432672	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83432672-83432672	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83432672-83432672	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83432736-83432736	C	ITPR2	ENSBTAG00000002313	G	G/C
5:83432736-83432736	C	ITPR2	ENSBTAG00000002313	G	G/C
5:83432736-83432736	C	ITPR2	ENSBTAG00000002313	G	G/C
5:83432738-83432738	G	ITPR2	ENSBTAG00000002313	C	C/G
5:83432738-83432738	G	ITPR2	ENSBTAG00000002313	C	C/G
5:83432738-83432738	G	ITPR2	ENSBTAG00000002313	C	C/G
5:83449290-83449290	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83449290-83449290	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83449290-83449290	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83449370-83449370	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83449370-83449370	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83449370-83449370	C	ITPR2	ENSBTAG00000002313	T	T/C
5:83519780-83519780	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83519780-83519780	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83519780-83519780	A	ITPR2	ENSBTAG00000002313	G	G/A
5:83548342-83548342	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83548342-83548342	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83548342-83548342	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83548562-83548562	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83548562-83548562	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83548562-83548562	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83551024-83551024	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83551024-83551024	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83551024-83551024	G	ITPR2	ENSBTAG00000002313	A	A/G
5:83551070-83551070	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83551070-83551070	T	ITPR2	ENSBTAG00000002313	C	C/T
5:83551070-83551070	T	ITPR2	ENSBTAG00000002313	C	C/T
5:10678388-10678388	T	ACSS3	ENSBTAG00000018694	G	G/T
5:10678388-10678388	T	ACSS3	ENSBTAG00000018694	G	G/T
5:10678388-10678388	T	ACSS3	ENSBTAG00000018694	G	G/T
5:10700295-10700295	G	ACSS3	ENSBTAG00000018694	A	A/G
5:10700295-10700295	G	ACSS3	ENSBTAG00000018694	A	A/G
5:10700295-10700295	G	ACSS3	ENSBTAG00000018694	A	A/G
5:10700374-10700374	A	ACSS3	ENSBTAG00000018694	G	G/A
5:10700374-10700374	A	ACSS3	ENSBTAG00000018694	G	G/A
5:10700374-10700374	A	ACSS3	ENSBTAG00000018694	G	G/A
5:32386286-32386286	A	VDR	ENSBTAG00000016414	G	G/A
5:32386290-32386290	C	VDR	ENSBTAG00000016414	T	T/C
5:32386308-32386308	A	VDR	ENSBTAG00000016414	G	G/A
5:32386323-32386323	A	VDR	ENSBTAG00000016414	G	G/A
5:32386326-32386326	G	VDR	ENSBTAG00000016414	A	A/G
5:32386340-32386340	T	VDR	ENSBTAG00000016414	C	C/T
5:32386344-32386344	G	VDR	ENSBTAG00000016414	A	A/G
5:32386354-32386354	A	VDR	ENSBTAG00000016414	G	G/A
5:32386356-32386356	T	VDR	ENSBTAG00000016414	C	C/T
5:32386374-32386374	C	VDR	ENSBTAG00000016414	A	A/C
5:32386378-32386378	C	VDR	ENSBTAG00000016414	A	A/C
5:32403455-32403455	G	VDR	ENSBTAG00000016414	A	A/G
5:32408908-32408908	T	VDR	ENSBTAG00000016414	C	C/T
5:32427738-32427738	C	VDR	ENSBTAG00000016414	T	T/C
5:32427738-32427738	C	VDR	ENSBTAG00000016414	T	T/C
5:32427738-32427738	C	VDR	ENSBTAG00000016414	T	T/C
5:32432178-32432178	T	VDR	ENSBTAG00000016414	C	C/T
5:32432178-32432178	T	VDR	ENSBTAG00000016414	C	C/T
5:32432178-32432178	T	VDR	ENSBTAG00000016414	C	C/T
5:75363022-75363022	A	CSF2RB	ENSBTAG00000009064	G	G/A
6:85539180-85539180	T	CSN1S2	ENSBTAG00000005005	C	C/T
6:85539180-85539180	T	CSN1S2	ENSBTAG00000005005	C	C/T
6:85539181-85539181	A	CSN1S2	ENSBTAG00000005005	G	G/A
6:85539181-85539181	A	CSN1S2	ENSBTAG00000005005	G	G/A
6:85539205-85539205	T	CSN1S2	ENSBTAG00000005005	C	C/T
6:85539205-85539205	T	CSN1S2	ENSBTAG00000005005	C	C/T
6:43382379-43382379	T	PPARGC1A	ENSBTAG00000017024	C	C/T
6:43382379-43382379	T	PPARGC1A	ENSBTAG00000017024	C	C/T
6:43382379-43382379	T	PPARGC1A	ENSBTAG00000017024	C	C/T

8:81013026-81013026	G	FBP2	ENSBTAG00000019554	A	A/G
8:81026618-81026618	G	FBP2	ENSBTAG00000019554	A	A/G
8:81028478-81028478	A	FBP2	ENSBTAG00000019554	G	G/A
8:81031384-81031384	C	FBP2	ENSBTAG00000019554	T	T/C
8:81031434-81031434	C	FBP2	ENSBTAG00000019554	T	T/C
8:81079208-81079208	C	FBP1	ENSBTAG00000009733	T	T/C
8:81079230-81079230	G	FBP1	ENSBTAG00000009733	A	A/G
8:81079232-81079232	C	FBP1	ENSBTAG00000009733	T	T/C
8:81081863-81081863	G	FBP1	ENSBTAG00000009733	C	C/G
8:81081998-81081998	C	FBP1	ENSBTAG00000009733	T	T/C
8:81082008-81082008	G	FBP1	ENSBTAG00000009733	A	A/G
8:81082072-81082072	C	FBP1	ENSBTAG00000009733	T	T/C
11:74984145-74984145	C	TP53I3	ENSBTAG00000003405	A	A/C
11:103006112-103006112	C	GFI1B	ENSBTAG00000012772	G	G/C
11:103006112-103006112	C	GFI1B	ENSBTAG00000012772	G	G/C
11:103006112-103006112	C	GFI1B	ENSBTAG00000012772	G	G/C
11:28103900-28103900	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28103900-28103900	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28164276-28164276	T	PRKCE	ENSBTAG00000020614	A	A/T
11:28164276-28164276	T	PRKCE	ENSBTAG00000020614	A	A/T
11:28164368-28164368	G	PRKCE	ENSBTAG00000020614	C	C/G
11:28164368-28164368	G	PRKCE	ENSBTAG00000020614	C	C/G
11:28195122-28195122	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28195122-28195122	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28205023-28205023	C	PRKCE	ENSBTAG00000020614	G	G/C
11:28205023-28205023	C	PRKCE	ENSBTAG00000020614	G	G/C
11:28211519-28211519	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28211519-28211519	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28212598-28212598	C	PRKCE	ENSBTAG00000020614	G	G/C
11:28212598-28212598	C	PRKCE	ENSBTAG00000020614	G	G/C
11:28230788-28230788	C	PRKCE	ENSBTAG00000020614	T	T/C
11:28230788-28230788	C	PRKCE	ENSBTAG00000020614	T	T/C
11:28230878-28230878	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28230878-28230878	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28267379-28267379	C	PRKCE	ENSBTAG00000020614	A	A/C
11:28267379-28267379	C	PRKCE	ENSBTAG00000020614	A	A/C
11:28267379-28267379	C	PRKCE	ENSBTAG00000020614	A	A/C
11:28267379-28267379	C	PRKCE	ENSBTAG00000020614	A	A/C
11:28325983-28325983	T	PRKCE	ENSBTAG00000020614	G	G/T
11:28325983-28325983	T	PRKCE	ENSBTAG00000020614	G	G/T
11:28325983-28325983	T	PRKCE	ENSBTAG00000020614	G	G/T
11:28328876-28328876	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28328876-28328876	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28328876-28328876	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28406871-28406871	G	PRKCE	ENSBTAG00000020614	A	A/G
11:28406871-28406871	G	PRKCE	ENSBTAG00000020614	A	A/G
11:28406871-28406871	G	PRKCE	ENSBTAG00000020614	A	A/G
11:28422706-28422706	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28422706-28422706	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28422706-28422706	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28483303-28483303	G	PRKCE	ENSBTAG00000020614	A	A/G
11:28483303-28483303	G	PRKCE	ENSBTAG00000020614	A	A/G
11:28483303-28483303	G	PRKCE	ENSBTAG00000020614	A	A/G
11:28483525-28483525	C	PRKCE	ENSBTAG00000020614	G	G/C
11:28483525-28483525	C	PRKCE	ENSBTAG00000020614	G	G/C
11:28483525-28483525	C	PRKCE	ENSBTAG00000020614	G	G/C
11:28483548-28483548	C	PRKCE	ENSBTAG00000020614	A	A/C
11:28483548-28483548	C	PRKCE	ENSBTAG00000020614	A	A/C
11:28483548-28483548	C	PRKCE	ENSBTAG00000020614	A	A/C
11:28483548-28483548	C	PRKCE	ENSBTAG00000020614	A	A/C
11:28483645-28483645	G	PRKCE	ENSBTAG00000020614	C	C/G
11:28483645-28483645	G	PRKCE	ENSBTAG00000020614	C	C/G
11:28483645-28483645	G	PRKCE	ENSBTAG00000020614	C	C/G
11:28505295-28505295	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28505295-28505295	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28505295-28505295	T	PRKCE	ENSBTAG00000020614	C	C/T
11:28560509-28560509	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28560509-28560509	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28560509-28560509	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28582462-28582462	C	PRKCE	ENSBTAG00000020614	T	T/C

11:28582462-28582462	C	PRKCE	ENSBTAG00000020614	T	T/C
11:28582462-28582462	C	PRKCE	ENSBTAG00000020614	T	T/C
11:28582466-28582466	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28582466-28582466	A	PRKCE	ENSBTAG00000020614	G	G/A
11:28582466-28582466	A	PRKCE	ENSBTAG00000020614	G	G/A
11:32285038-32285038	G	NRXN1	ENSBTAG00000046199	C	C/G
11:32294032-32294032	T	NRXN1	ENSBTAG00000046199	G	G/T
11:32294032-32294032	T	NRXN1	ENSBTAG00000046199	G	G/T
11:32294158-32294158	C	NRXN1	ENSBTAG00000046199	A	A/C
11:32294158-32294158	C	NRXN1	ENSBTAG00000046199	A	A/C
11:32329893-32329893	A	NRXN1	ENSBTAG00000046199	G	G/A
11:32329893-32329893	A	NRXN1	ENSBTAG00000046199	G	G/A
11:32409051-32409051	A	NRXN1	ENSBTAG00000046199	G	G/A
11:32409200-32409200	T	NRXN1	ENSBTAG00000046199	C	C/T
11:32411385-32411385	C	NRXN1	ENSBTAG00000046199	T	T/C
11:32411457-32411457	C	NRXN1	ENSBTAG00000046199	T	T/C
11:32420428-32420428	G	NRXN1	ENSBTAG00000046199	C	C/G
11:32420441-32420441	G	NRXN1	ENSBTAG00000046199	T	T/G
11:32424088-32424088	T	NRXN1	ENSBTAG00000046199	C	C/T
11:32425850-32425850	C	NRXN1	ENSBTAG00000046199	T	T/C
11:32447328-32447328	C	NRXN1	ENSBTAG00000046199	T	T/C
11:32461387-32461387	C	NRXN1	ENSBTAG00000046199	A	A/C
11:32464260-32464260	T	NRXN1	ENSBTAG00000046199	A	A/T
11:32464294-32464294	A	NRXN1	ENSBTAG00000046199	C	C/A
11:32464348-32464348	G	NRXN1	ENSBTAG00000046199	C	C/G
11:32464469-32464469	G	NRXN1	ENSBTAG00000046199	T	T/G
11:32464486-32464486	T	NRXN1	ENSBTAG00000046199	C	C/T
11:32464509-32464509	G	NRXN1	ENSBTAG00000046199	T	T/G
11:32464574-32464574	A	NRXN1	ENSBTAG00000046199	C	C/A
11:32485201-32485201	A	NRXN1	ENSBTAG00000046199	G	G/A
11:32601823-32601823	T	NRXN1	ENSBTAG00000046199	C	C/T
11:32603932-32603932	C	NRXN1	ENSBTAG00000046199	T	T/C
11:32603934-32603934	A	NRXN1	ENSBTAG00000046199	G	G/A
11:32706846-32706846	A	NRXN1	ENSBTAG00000046199	G	G/A
11:32757349-32757349	C	NRXN1	ENSBTAG00000046199	T	T/C
13:64197612-64197612	T	ACSS2	ENSBTAG00000013303	C	C/T
13:64197612-64197612	T	ACSS2	ENSBTAG00000013303	C	C/T
13:64202231-64202231	A	ACSS2	ENSBTAG00000013303	G	G/A
13:64202231-64202231	A	ACSS2	ENSBTAG00000013303	G	G/A
13:64218291-64218291	A	ACSS2	ENSBTAG00000013303	G	G/A
13:64218291-64218291	A	ACSS2	ENSBTAG00000013303	G	G/A
14:1042398-1042398	G	MAPK15	ENSBTAG00000019864	A	A/G
14:1042398-1042398	G	MAPK15	ENSBTAG00000019864	A	A/G
14:1042398-1042398	G	MAPK15	ENSBTAG00000019864	A	A/G
14:1108235-1108235	T	EEF1D	ENSBTAG00000014643	C	C/T
14:1152611-1152611	A	ZC3H3	ENSBTAG00000021472	G	G/A
14:1152621-1152621	A	ZC3H3	ENSBTAG00000021472	G	G/A
14:2861452-2861452	A	PTK2	ENSBTAG00000009578	G	G/A
14:2861452-2861452	A	PTK2	ENSBTAG00000009578	G	G/A
14:2861452-2861452	A	PTK2	ENSBTAG00000009578	G	G/A
14:2861452-2861452	A	PTK2	ENSBTAG00000009578	G	G/A
14:2861452-2861452	A	PTK2	ENSBTAG00000009578	G	G/A
14:2861485-2861485	T	PTK2	ENSBTAG00000009578	C	C/T
14:2861485-2861485	T	PTK2	ENSBTAG00000009578	C	C/T
14:2861485-2861485	T	PTK2	ENSBTAG00000009578	C	C/T
14:2861485-2861485	T	PTK2	ENSBTAG00000009578	C	C/T
14:2861485-2861485	T	PTK2	ENSBTAG00000009578	C	C/T
14:2864203-2864203	G	PTK2	ENSBTAG00000009578	A	A/G
14:2864203-2864203	G	PTK2	ENSBTAG00000009578	A	A/G
14:2864203-2864203	G	PTK2	ENSBTAG00000009578	A	A/G
14:2864203-2864203	G	PTK2	ENSBTAG00000009578	A	A/G
14:2864203-2864203	G	PTK2	ENSBTAG00000009578	A	A/G
14:2867951-2867951	A	PTK2	ENSBTAG00000009578	G	G/A
14:2867951-2867951	A	PTK2	ENSBTAG00000009578	G	G/A
14:2867951-2867951	A	PTK2	ENSBTAG00000009578	G	G/A
14:2867951-2867951	A	PTK2	ENSBTAG00000009578	G	G/A
14:2867951-2867951	A	PTK2	ENSBTAG00000009578	G	G/A
14:2867951-2867951	A	PTK2	ENSBTAG00000009578	G	G/A
14:2882268-2882268	T	PTK2	ENSBTAG00000009578	C	C/T

14:4200125-4200125	C	COL22A1	ENSBTAG00000058978	T	T/C
14:4205681-4205681	G	COL22A1	ENSBTAG00000058978	A	A/G
14:4205682-4205682	C	COL22A1	ENSBTAG00000058978	A	A/C
14:4217213-4217213	A	COL22A1	ENSBTAG00000058978	G	G/A
14:4232348-4232348	G	COL22A1	ENSBTAG00000058978	A	A/G
14:4232479-4232479	T	COL22A1	ENSBTAG00000058978	C	C/T
14:4232545-4232545	C	COL22A1	ENSBTAG00000058978	T	T/C
14:4232586-4232586	T	COL22A1	ENSBTAG00000058978	C	C/T
14:4232587-4232587	T	COL22A1	ENSBTAG00000058978	C	C/T
14:4232588-4232588	G	COL22A1	ENSBTAG00000058978	T	T/G
14:4232753-4232753	G	COL22A1	ENSBTAG00000058978	A	A/G
14:4232890-4232890	G	COL22A1	ENSBTAG00000058978	C	C/G
14:4247788-4247788	A	COL22A1	ENSBTAG00000058978	G	G/A
14:4247860-4247860	G	COL22A1	ENSBTAG00000058978	A	A/G
14:4247891-4247891	C	COL22A1	ENSBTAG00000058978	T	T/C
14:6390812-6390812	T	KHDRBS3	ENSBTAG00000002181	A	A/T
14:6401805-6401805	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6401805-6401805	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6401805-6401805	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6401805-6401805	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6408352-6408352	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6408352-6408352	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6408352-6408352	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6408352-6408352	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6408457-6408457	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6408457-6408457	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6408457-6408457	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6408457-6408457	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6408457-6408457	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6408457-6408457	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6433773-6433773	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6433773-6433773	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6433773-6433773	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6433773-6433773	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6433773-6433773	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6468693-6468693	A	KHDRBS3	ENSBTAG00000002181	C	C/A
14:6468693-6468693	A	KHDRBS3	ENSBTAG00000002181	C	C/A
14:6468693-6468693	A	KHDRBS3	ENSBTAG00000002181	C	C/A
14:6468693-6468693	A	KHDRBS3	ENSBTAG00000002181	C	C/A
14:6468693-6468693	A	KHDRBS3	ENSBTAG00000002181	C	C/A
14:6487131-6487131	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6487131-6487131	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6487131-6487131	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6487131-6487131	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6487247-6487247	G	KHDRBS3	ENSBTAG00000002181	C	C/G
14:6487247-6487247	G	KHDRBS3	ENSBTAG00000002181	C	C/G
14:6487247-6487247	G	KHDRBS3	ENSBTAG00000002181	C	C/G
14:6487247-6487247	G	KHDRBS3	ENSBTAG00000002181	C	C/G
14:6501716-6501716	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6501716-6501716	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6501716-6501716	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6501716-6501716	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6501716-6501716	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6511717-6511717	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6511717-6511717	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6511717-6511717	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6511717-6511717	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6511717-6511717	G	KHDRBS3	ENSBTAG00000002181	A	A/G
14:6514256-6514256	T	KHDRBS3	ENSBTAG00000002181	G	G/T
14:6514256-6514256	T	KHDRBS3	ENSBTAG00000002181	G	G/T
14:6514256-6514256	T	KHDRBS3	ENSBTAG00000002181	G	G/T
14:6514256-6514256	T	KHDRBS3	ENSBTAG00000002181	G	G/T
14:6518683-6518683	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6518683-6518683	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6518683-6518683	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6518683-6518683	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6518683-6518683	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6525578-6525578	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6525578-6525578	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6525578-6525578	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6525578-6525578	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6525596-6525596	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6525596-6525596	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6525596-6525596	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6525596-6525596	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6525596-6525596	T	KHDRBS3	ENSBTAG00000002181	C	C/T

14:6525630-6525630	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6525630-6525630	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6525630-6525630	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6525630-6525630	C	KHDRBS3	ENSBTAG00000002181	G	G/C
14:6544512-6544512	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6544512-6544512	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6544512-6544512	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6544512-6544512	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6544512-6544512	C	KHDRBS3	ENSBTAG00000002181	T	T/C
14:6544542-6544542	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6544542-6544542	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6544542-6544542	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:6544542-6544542	T	KHDRBS3	ENSBTAG00000002181	C	C/T
14:12656974-12656974	C	MYC	ENSBTAG00000008409	T	T/C
14:554095-554095	A	CPSF1	ENSBTAG00000008355	G	G/A
14:1035028-1035028	T	FAM83H	ENSBTAG00000038682	C	C/T
14:3196404-3196404	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3196404-3196404	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3196404-3196404	A	-	ENSBTAG00000058955	G	G/A
14:3196404-3196404	A	-	ENSBTAG00000069450	G	G/A
14:3196404-3196404	A	-	ENSBTAG00000069450	G	G/A
14:3196404-3196404	A	-	ENSBTAG00000069450	G	G/A
14:3196404-3196404	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3216508-3216508	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3216508-3216508	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3216508-3216508	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3216508-3216508	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3216508-3216508	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3216577-3216577	G	TRAPP9	ENSBTAG00000013955	C	C/G
14:3216577-3216577	G	TRAPP9	ENSBTAG00000013955	C	C/G
14:3216577-3216577	G	TRAPP9	ENSBTAG00000013955	C	C/G
14:3216577-3216577	G	TRAPP9	ENSBTAG00000013955	C	C/G
14:3218980-3218980	T	TRAPP9	ENSBTAG00000013955	C	C/T
14:3218980-3218980	T	TRAPP9	ENSBTAG00000013955	C	C/T
14:3218980-3218980	T	TRAPP9	ENSBTAG00000013955	C	C/T
14:3218980-3218980	T	TRAPP9	ENSBTAG00000013955	C	C/T
14:3221886-3221886	C	TRAPP9	ENSBTAG00000013955	T	T/C
14:3221886-3221886	C	TRAPP9	ENSBTAG00000013955	T	T/C
14:3221886-3221886	C	TRAPP9	ENSBTAG00000013955	T	T/C
14:3221886-3221886	C	TRAPP9	ENSBTAG00000013955	T	T/C
14:3222387-3222387	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3222387-3222387	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3222387-3222387	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3222387-3222387	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3247117-3247117	T	TRAPP9	ENSBTAG00000013955	C	C/T
14:3247117-3247117	T	TRAPP9	ENSBTAG00000013955	C	C/T
14:3247117-3247117	T	TRAPP9	ENSBTAG00000013955	C	C/T
14:3247117-3247117	T	TRAPP9	ENSBTAG00000013955	C	C/T
14:3247118-3247118	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3247118-3247118	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3247118-3247118	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3247118-3247118	A	TRAPP9	ENSBTAG00000013955	G	G/A
14:3398220-3398220	C	TRAPP9	ENSBTAG00000013955	G	G/C
14:3398220-3398220	C	TRAPP9	ENSBTAG00000013955	G	G/C
14:3398220-3398220	C	TRAPP9	ENSBTAG00000013955	G	G/C
14:3398220-3398220	C	TRAPP9	ENSBTAG00000013955	G	G/C
14:3398244-3398244	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398244-3398244	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398244-3398244	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398244-3398244	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398244-3398244	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398245-3398245	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398245-3398245	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398245-3398245	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398245-3398245	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398245-3398245	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398246-3398246	A	TRAPP9	ENSBTAG00000013955	T	T/A
14:3398246-3398246	A	TRAPP9	ENSBTAG00000013955	T	T/A
14:3398246-3398246	A	TRAPP9	ENSBTAG00000013955	T	T/A
14:3398246-3398246	A	TRAPP9	ENSBTAG00000013955	T	T/A
14:3398250-3398250	G	TRAPP9	ENSBTAG00000013955	A	A/G
14:3398250-3398250	G	TRAPP9	ENSBTAG00000013955	A	A/G

15:65718887-65718887	T	CD44	ENSBTAG00000011578	C	C/T
15:65718887-65718887	T	CD44	ENSBTAG00000011578	C	C/T
15:65718887-65718887	T	CD44	ENSBTAG00000011578	C	C/T
15:65718887-65718887	T	CD44	ENSBTAG00000011578	C	C/T
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
15:65721950-65721950	G	CD44	ENSBTAG00000011578	T	T/G
17:34818331-34818331	G	FGF2	ENSBTAG00000005691	T	T/G
17:34818348-34818348	G	FGF2	ENSBTAG00000005691	T	T/G
17:34844101-34844101	T	FGF2	ENSBTAG00000005691	A	A/T
17:34844106-34844106	T	FGF2	ENSBTAG00000005691	G	G/T
17:34862472-34862472	G	FGF2	ENSBTAG00000005691	A	A/G
17:52210645-52210645	G	RILPL2	ENSBTAG00000007804	T	T/G
18:50509979-50509979	G	TGFB1	ENSBTAG00000020457	C	C/G
19:42072178-42072178	G	ACLY	ENSBTAG00000016740	C	C/G
19:42072178-42072178	G	ACLY	ENSBTAG00000016740	C	C/G
19:42072178-42072178	G	ACLY	ENSBTAG00000016740	C	C/G
19:42072178-42072178	G	ACLY	ENSBTAG00000016740	C	C/G
19:42072287-42072287	C	ACLY	ENSBTAG00000016740	G	G/C
19:42072287-42072287	C	ACLY	ENSBTAG00000016740	G	G/C
19:42072287-42072287	C	ACLY	ENSBTAG00000016740	G	G/C
19:42072287-42072287	C	ACLY	ENSBTAG00000016740	G	G/C
19:42072287-42072287	C	ACLY	ENSBTAG00000016740	G	G/C
19:42077438-42077438	A	ACLY	ENSBTAG00000016740	G	G/A
19:42077438-42077438	A	ACLY	ENSBTAG00000016740	G	G/A
19:42077438-42077438	A	ACLY	ENSBTAG00000016740	G	G/A
19:42077438-42077438	A	ACLY	ENSBTAG00000016740	G	G/A
19:51591434-51591434	C	BAIAP2	ENSBTAG00000019044	G	G/C
19:51591434-51591434	C	BAIAP2	ENSBTAG00000019044	G	G/C
19:51591434-51591434	C	BAIAP2	ENSBTAG00000019044	G	G/C
19:51627676-51627676	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51627676-51627676	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51627676-51627676	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51627676-51627676	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51627676-51627676	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51636750-51636750	G	BAIAP2	ENSBTAG00000019044	A	A/G
19:51636750-51636750	G	BAIAP2	ENSBTAG00000019044	A	A/G
19:51636750-51636750	G	BAIAP2	ENSBTAG00000019044	A	A/G
19:51636750-51636750	G	BAIAP2	ENSBTAG00000019044	A	A/G
19:51637304-51637304	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51637304-51637304	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51637304-51637304	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51637304-51637304	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:51637304-51637304	C	BAIAP2	ENSBTAG00000019044	T	T/C
19:42327496-42327496	C	STAT5B	ENSBTAG00000010125	T	T/C
19:42327496-42327496	C	STAT5B	ENSBTAG00000010125	T	T/C
19:42327496-42327496	C	STAT5B	ENSBTAG00000010125	T	T/C
20:31877613-31877613	G	GHR	ENSBTAG00000001335	A	A/G
20:31877613-31877613	G	GHR	ENSBTAG00000001335	A	A/G
20:31877613-31877613	G	GHR	ENSBTAG00000001335	A	A/G
20:31880028-31880028	T	GHR	ENSBTAG00000001335	C	C/T
20:31880028-31880028	T	GHR	ENSBTAG00000001335	C	C/T
20:31880028-31880028	T	GHR	ENSBTAG00000001335	C	C/T
20:31880056-31880056	G	GHR	ENSBTAG00000001335	A	A/G
20:31880056-31880056	G	GHR	ENSBTAG00000001335	A	A/G
20:31880056-31880056	G	GHR	ENSBTAG00000001335	A	A/G
20:31880098-31880098	G	GHR	ENSBTAG00000001335	A	A/G
20:31880098-31880098	G	GHR	ENSBTAG00000001335	A	A/G
20:31880098-31880098	G	GHR	ENSBTAG00000001335	A	A/G
20:31908552-31908552	T	GHR	ENSBTAG00000001335	C	C/T
20:31908552-31908552	T	GHR	ENSBTAG00000001335	C	C/T
20:31908552-31908552	T	GHR	ENSBTAG00000001335	C	C/T
20:35366448-35366448	G	RICTOR	ENSBTAG00000006697	T	T/G
20:35366448-35366448	G	RICTOR	ENSBTAG00000006697	T	T/G

20:36636077-36636077	G	GDNF	ENSBTAG00000005176	A	A/G
20:39057970-39057970	G	PRLR	ENSBTAG00000025035	A	A/G
20:39057970-39057970	G	PRLR	ENSBTAG00000025035	A	A/G
20:39058003-39058003	C	PRLR	ENSBTAG00000025035	G	G/C
20:39058003-39058003	C	PRLR	ENSBTAG00000025035	G	G/C
20:39062733-39062733	G	PRLR	ENSBTAG00000025035	A	A/G
20:39062733-39062733	G	PRLR	ENSBTAG00000025035	A	A/G
20:39063242-39063242	A	PRLR	ENSBTAG00000025035	G	G/A
20:39063242-39063242	A	PRLR	ENSBTAG00000025035	G	G/A
20:39072581-39072581	T	PRLR	ENSBTAG00000025035	C	C/T
20:39072581-39072581	T	PRLR	ENSBTAG00000025035	C	C/T
20:39072591-39072591	C	PRLR	ENSBTAG00000025035	T	T/C
20:39072591-39072591	C	PRLR	ENSBTAG00000025035	T	T/C
20:39072622-39072622	A	PRLR	ENSBTAG00000025035	C	C/A
20:39072622-39072622	A	PRLR	ENSBTAG00000025035	C	C/A
20:39072732-39072732	C	PRLR	ENSBTAG00000025035	T	T/C
20:39072732-39072732	C	PRLR	ENSBTAG00000025035	T	T/C
20:39088448-39088448	A	PRLR	ENSBTAG00000025035	G	G/A
20:39088448-39088448	A	PRLR	ENSBTAG00000025035	G	G/A
20:39088448-39088448	A	PRLR	ENSBTAG00000025035	G	G/A
20:35912965-35912965	A	LIFR	ENSBTAG00000010423	G	G/A
20:35913704-35913704	A	LIFR	ENSBTAG00000010423	G	G/A
20:35913744-35913744	A	LIFR	ENSBTAG00000010423	G	G/A
20:35913810-35913810	A	LIFR	ENSBTAG00000010423	G	G/A
20:35928147-35928147	G	LIFR	ENSBTAG00000010423	A	A/G
20:35928395-35928395	G	LIFR	ENSBTAG00000010423	A	A/G
20:35928463-35928463	A	LIFR	ENSBTAG00000010423	C	C/A
20:35946363-35946363	T	LIFR	ENSBTAG00000010423	C	C/T
20:35498443-35498443	C	OSMR	ENSBTAG00000033107	A	A/C
22:52959690-52959690	C	LTF	ENSBTAG00000001292	T	T/C
22:52959690-52959690	C	LTF	ENSBTAG00000001292	T	T/C
22:52959690-52959690	C	LTF	ENSBTAG00000001292	T	T/C
22:52959783-52959783	T	LTF	ENSBTAG00000001292	C	C/T
22:52959783-52959783	T	LTF	ENSBTAG00000001292	C	C/T
22:52959783-52959783	T	LTF	ENSBTAG00000001292	C	C/T
22:52959783-52959783	T	LTF	ENSBTAG00000001292	C	C/T
22:52966593-52966593	A	LTF	ENSBTAG00000001292	G	G/A
22:52966593-52966593	A	LTF	ENSBTAG00000001292	G	G/A
22:52966593-52966593	A	LTF	ENSBTAG00000001292	G	G/A
22:52981511-52981511	G	LTF	ENSBTAG00000001292	A	A/G
22:52981511-52981511	G	LTF	ENSBTAG00000001292	A	A/G
22:52981511-52981511	G	LTF	ENSBTAG00000001292	A	A/G
23:41505371-41505371	C	JARID2	ENSBTAG00000012938	G	G/C
23:41505371-41505371	C	JARID2	ENSBTAG00000012938	G	G/C
23:41505371-41505371	C	JARID2	ENSBTAG00000012938	G	G/C
23:41522015-41522015	C	JARID2	ENSBTAG00000012938	A	A/C
23:41522015-41522015	C	JARID2	ENSBTAG00000012938	A	A/C
23:41522015-41522015	C	JARID2	ENSBTAG00000012938	A	A/C
23:41522147-41522147	T	JARID2	ENSBTAG00000012938	G	G/T
23:41522147-41522147	T	JARID2	ENSBTAG00000012938	G	G/T
23:41522147-41522147	T	JARID2	ENSBTAG00000012938	G	G/T
23:41527314-41527314	C	JARID2	ENSBTAG00000012938	T	T/C
23:41527314-41527314	C	JARID2	ENSBTAG00000012938	T	T/C
23:41527314-41527314	C	JARID2	ENSBTAG00000012938	T	T/C
23:41527432-41527432	T	JARID2	ENSBTAG00000012938	C	C/T
23:41527432-41527432	T	JARID2	ENSBTAG00000012938	C	C/T
23:41527432-41527432	T	JARID2	ENSBTAG00000012938	C	C/T
23:41556184-41556184	A	JARID2	ENSBTAG00000012938	G	G/A
23:41556184-41556184	A	JARID2	ENSBTAG00000012938	G	G/A
23:41556184-41556184	A	JARID2	ENSBTAG00000012938	G	G/A
23:41556184-41556184	A	JARID2	ENSBTAG00000012938	G	G/A
23:41571243-41571243	G	JARID2	ENSBTAG00000012938	A	A/G
25:9625600-9625600	T	CLEC16A	ENSBTAG00000005208	C	C/T
25:9625600-9625600	T	CLEC16A	ENSBTAG00000005208	C	C/T
25:9625600-9625600	T	CLEC16A	ENSBTAG00000005208	C	C/T
25:9625600-9625600	T	CLEC16A	ENSBTAG00000005208	C	C/T
25:9625600-9625600	T	CLEC16A	ENSBTAG00000005208	C	C/T
25:9625759-9625759	T	CLEC16A	ENSBTAG00000005208	G	G/T
25:9625759-9625759	T	CLEC16A	ENSBTAG00000005208	G	G/T

26:22285652-22285652	G	BTRC	ENSBTAG00000007476	A	A/G
26:22285652-22285652	G	BTRC	ENSBTAG00000007476	A	A/G
26:22285652-22285652	G	BTRC	ENSBTAG00000007476	A	A/G
26:22285652-22285652	G	BTRC	ENSBTAG00000007476	A	A/G
26:22285652-22285652	G	BTRC	ENSBTAG00000007476	A	A/G
26:22285652-22285652	G	BTRC	ENSBTAG00000007476	A	A/G
26:22285652-22285652	G	BTRC	ENSBTAG00000007476	A	A/G
26:22285652-22285652	G	BTRC	ENSBTAG00000007476	A	A/G
26:22296121-22296121	A	BTRC	ENSBTAG00000007476	G	G/A
26:22296121-22296121	A	BTRC	ENSBTAG00000007476	G	G/A
26:22296121-22296121	A	BTRC	ENSBTAG00000007476	G	G/A
26:22296121-22296121	A	BTRC	ENSBTAG00000007476	G	G/A
26:22296121-22296121	A	BTRC	ENSBTAG00000007476	G	G/A
26:22296121-22296121	A	BTRC	ENSBTAG00000007476	G	G/A
26:22296121-22296121	A	BTRC	ENSBTAG00000007476	G	G/A
26:15551465-15551465	A	PLCE1	ENSBTAG00000018966	G	G/A
26:15551465-15551465	A	PLCE1	ENSBTAG00000018966	G	G/A
26:15786401-15786401	A	PLCE1	ENSBTAG00000018966	C	C/A
26:15786401-15786401	A	PLCE1	ENSBTAG00000018966	C	C/A
26:15786416-15786416	C	PLCE1	ENSBTAG00000018966	T	T/C
26:15786416-15786416	C	PLCE1	ENSBTAG00000018966	T	T/C
26:15786418-15786418	G	PLCE1	ENSBTAG00000018966	A	A/G
26:15786418-15786418	G	PLCE1	ENSBTAG00000018966	A	A/G
26:15807458-15807458	G	PLCE1	ENSBTAG00000018966	A	A/G
26:15807458-15807458	G	PLCE1	ENSBTAG00000018966	A	A/G
26:15820390-15820390	T	PLCE1	ENSBTAG00000018966	C	C/T
26:15820390-15820390	T	PLCE1	ENSBTAG00000018966	C	C/T
26:23160034-23160034	G	SUFU	ENSBTAG00000021068	A	A/G
26:23160034-23160034	G	SUFU	ENSBTAG00000021068	A	A/G
26:23177035-23177035	A	SUFU	ENSBTAG00000021068	G	G/A
26:23177035-23177035	A	SUFU	ENSBTAG00000021068	G	G/A
26:23216094-23216094	G	SUFU	ENSBTAG00000021068	A	A/G
26:23216094-23216094	G	SUFU	ENSBTAG00000021068	A	A/G
26:23216220-23216220	G	SUFU	ENSBTAG00000021068	A	A/G
26:23216220-23216220	G	SUFU	ENSBTAG00000021068	A	A/G
26:23221607-23221607	A	SUFU	ENSBTAG00000021068	G	G/A
26:23221607-23221607	A	SUFU	ENSBTAG00000021068	G	G/A
26:23257972-23257972	A	SUFU	ENSBTAG00000021068	T	T/A
26:21259465-21259465	C	SCD	ENSBTAG00000055207	T	T/C
26:21270255-21270255	C	SCD	ENSBTAG00000055207	T	T/C
26:21270270-21270270	G	SCD	ENSBTAG00000055207	A	A/G
26:21270382-21270382	G	SCD	ENSBTAG00000055207	A	A/G
26:24085980-24085980	C	NEURL1	ENSBTAG00000003741	T	T/C
26:24086080-24086080	T	NEURL1	ENSBTAG00000003741	C	C/T
26:24093343-24093343	A	NEURL1	ENSBTAG00000003741	G	G/A
26:24093346-24093346	G	NEURL1	ENSBTAG00000003741	T	T/G
26:24158332-24158332	C	NEURL1	ENSBTAG00000003741	A	A/C
26:24158332-24158332	C	NEURL1	ENSBTAG00000003741	A	A/C
26:24158332-24158332	C	NEURL1	ENSBTAG00000003741	A	A/C
26:24158332-24158332	C	NEURL1	ENSBTAG00000003741	A	A/C
29:40251752-40251752	C	FADS1	ENSBTAG00000022294	A	A/C
29:40251752-40251752	C	FADS1	ENSBTAG00000022294	A	A/C
29:40251752-40251752	C	FADS1	ENSBTAG00000022294	A	A/C
29:40251752-40251752	C	FADS1	ENSBTAG00000022294	A	A/C
29:40251867-40251867	G	FADS1	ENSBTAG00000022294	A	A/G
29:40251867-40251867	G	FADS1	ENSBTAG00000022294	A	A/G
29:40251867-40251867	G	FADS1	ENSBTAG00000022294	A	A/G
29:40251867-40251867	G	FADS1	ENSBTAG00000022294	A	A/G