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From EST to structure models for functional inference of APP, BACE1, PSEN1, PSEN2 genes

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Abstract:

Successive oxidative stress and biochemical changes results in neuronal death and neuritic plaques growth in Alzheimer's disease (AD). Therefore, it is interest to analyze amyloid-βeta precursor protein (APP), beta-secretase 1 (BACE1), presenilin (PSEN1 and PSEN2) genes from brain tissues to gain insights. Development of potential inhibitors for these targets is of significance. EST sequences of 2898 (APP), 539 (BACE1), 786 (PSEN1) and 314 (PSEN2) genes were analyzed in this study. A contig sequences with APP (contigs 1-4), BACE1 (contigs 5-7), PSEN1 (contigs 8, 9, 10, 11), PSEN2 (contigs 13, 14) except PSEN1 (contigs 10) and PSEN2 (contigs 13) genes were identified. APP (contig 3 without translational error) was further analyzed using molecular modeling and docking to show its binding with curcumin (principal curcuminoid of turmeric) having -7.3 kcal/mol interaction energy for further consideration as a potential inhibitor.

Keywords: Alzheimer's disease, Curcumin, Hypothetical protein

Background:

Alzheimer's disease (AD) is caused due to the structural and functional loss of neurons which shows symptoms like cognitive and memory deterioration, progressive destruction of intellectual activities in day to life and behavioral abnormalities **[1].** About 36 million people were found to be affected by AD worldwide in 2010 and it was anticipated to rise 66 million by 2030 and 115 million by 2050 **[2].** In India, 3.7 million people were affected by AD **[3]** and the number of people having AD. Prevalence increases exponentially with age, affecting a little more than 1% in the population aged 65-69 years up to as much as 30-40% in the oldest old **[4].** Alzheimer's disease is mainly caused due to the accumulation of β-amyloid peptides **[5],** which are formed by the action of sequential cleaving of the APP gene which plays an important role in the central nervous system. Proteolytic cleavage of APP by β- and γ-secretase enzymes resulting in the release of neurotoxic Aβ peptides which can aggregate into oligomer is known. A mutation in the APP gene is likely to inhibit α-secretase cleavage which further enables preferential cleavage by β-secretase. Mutations in the PSEN1 and PSEN2 genes (which are components of the γ-secretase complex) results in increased cleavage by γ-secretase at this site. Both these conditions result in the excess production of Aβ peptide. Eventually, subsequent oxidative stress and biochemical changes result in the neuronal death and development of neuritic plaques in AD **[6].**

Expressed sequence tags are sequenced regions of complementary deoxyribonucleic acid (cDNA) imitates of messenger ribonucleic acid (mRNA) that are expressed in different states and represents element of the transcribed portion of the genome. The EST sequence information plays a vital role in human biology and disease, such as neurological disorders **[7].** This helps to identify the functional genes expressed in diseased condition. Mutations in the alzheimer's susceptibility genes APP, BACE1, PSEN1 and PSEN2 greatly increase the risk of AD. The approved drugs for AD namely, tacrine, donepezil, rivastigmine and galantamine failed due to severe side effects and were abandoned. This work will help to identify the functional annotation of APP, BACE1, PSEN1,

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PSEN2 genes and new discovery for the development of novel therapeutic approaches for the treatment of AD.

Methodology:

Retrieval of ESTs sequence and assembly:

In silico analysis of AD human genes APP, BACE1, PSEN1 and PSEN2 taken from UniGene database and those genes originating from brain tissues were taken. The 5' ESTs were considered, as the ESTs generated from the 3' end are most error prone as of the low base-call quality at the start of sequence reads. The 5' EST sequences were extracted using contig assembly program by CAP3 server **[8].** The default parameters were used and each gene sequences were submitted to DNA sequence assembly program (CAP3) server in FASTA formatted text file and result was displayed in different output files e.g. contigs, single sequences, Assembly details and sequence file. We have selected contig sequence data set as it is useful functionality ascertained.

Database similarity search:

The contig sequences were obtained from clustering and similarity search using tools like nucleotide BLAST (BLASTN) and BLASTX (search protein). The contig sequence is aligned to the genome sequence of the organism using BLAT (BLAST like alignment tool) **[9]** to assist genome mapping and gene discovery. Each genes contig sequence was generated by BLAT analysis with parameters reading (genome: human, assembly: Dec. 2013 (GRCh38/hg38), query type: translated DNA, sort output: Score, output type: hyperlink).

Conceptual translation of ESTs and functional annotation:

ESTScan is a program that can identify the coding regions in DNA sequences and this was translated into amino acid sequences at either N- or C-terminus. Each contig sequence was generated by ESTScan2 tool **[10].** Finally, the amino acid sequences were selected using multiple sequence alignment by CLC Genomics Workbench and further functional annotations were carried out. Our translated protein sequences for each sequence were generated by InterProScan 5.0 **[11]**.

Molecular modelling of hypothetical protein:

Structural annotation of APP hypothetical amino acid sequence was used for build a 3D structure by Modeller v9.13 software **[12].** The hypothetical protein sequence was aligned in BLASTP against the Protein Data Bank (PDB) database to select their appropriate templates. The template was selected for hypothetical protein query sequence aligning 18-199 amino acid residues, showing 97% sequence identity with 3KTM **[13];** aligning 342-551 amino acid residues shows 99% sequence identity with 3NYL **[14]** and aligning 652-751 amino acid residues shows 100% sequence identify with 2LP1 **[15].**

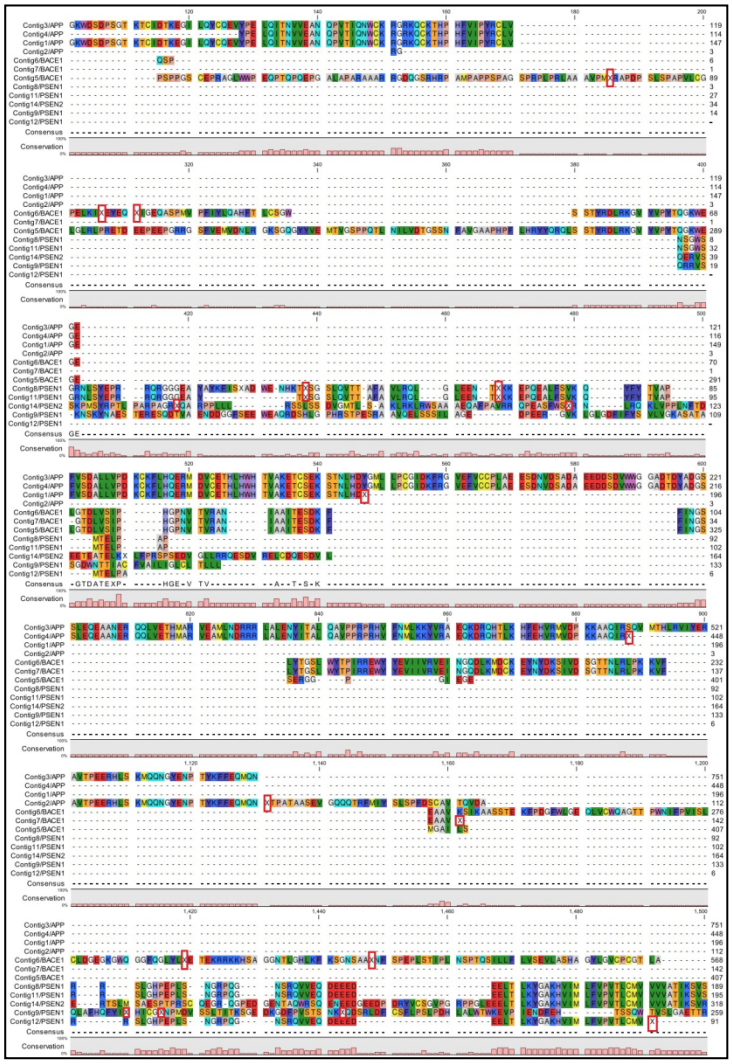

Figure 1: Graphical representation of contig protein sequences obtained from ESTscan2 translation sequences. Red color box represents X error translate level in APP (Contig 1, 2, 4), BACE1 (5, 6, 7), PSEN1 (8,9,11) and PSEN2 (14) except APP contig 3 sequence.

These templates were used to build a 3D structure for homology modelling. Modelled structure was energy minimized using Swiss-PDB viewer program (Gromos96 force field). Theoretically predicted structure was visualized using PyMol visualization

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software. The amino acid constraint validation of the modeled APP protein was done by PROCHECK program (www.ebi.ac.uk/thornton-srv/software/PROCHECK/) **[16].** Further, 3D profile of the modelled protein was computed by Verify3D program.

Selection of ligands:

The 2D structure of synthetic compounds tacrine, donepezil, rivastigmine, galantamine and natural remedy like compounds from plants such as *Rosmarinus officinalis* (α-Pinene, Camphene, β-Pinene, 1,8-Cineole, α-Thujone, β-Thujone, Chrysanthenone, Camphor, (+)-Borneol, Bornyl acetate, α-Copaene, Trans-Caryophyllene, α-Humulene, Germacrene-D and (+) -δ-Cadinene); *Ginkgo biloba* (Quercetin, Kaempferol, Isorhamnetin, Ginkgolide A, B, C, J, M); *Panax ginseng* (Ginsenoside Rb1 and Rg1); *Curcuma Longa* (Curcumin, Demethoxycurcumin and Bisdemethoxycurcumin); *Salvia officinalis* (Borneol, Caryophyllene, Linalool); *Huperzia serrata* (Huperzine A, B and Lycopodine) ; *Melissa officinalis* (1-Octen-3-ol, 6-Methyl-5-hepten-2-one, Myrcene, (Z)-β-Ocimene, (E)-β-Ocimene, n-Nonanal, Cis-Rose oxide, (+)-Trans-Rose oxide, (+)-Trans-Limonene oxide, Citronellal, Menthol, Isomenthol, Nerol, Neral, Piperitone, Geraniol, Geranial, α-Cubebene, Geranyl acetate, β-Cubebene, β-Caryophyllene, Valencene, Caryophyllene oxide, 1-Hexadecene, n-Eicosane, n-Heneicosane); *Withania somnifera* (Propane,1,1-diethoxy-2-methyl-, 2-Nonanone, PhenylethylAlcohol, Amyl nitrite, Dodecanoic acid, 3-ter-Butyl-4-hydroxyanisole, Tetradecanoic acid, n-Hexadecanoic acid, 9-Octadecenal, 1-tridecyne, Oleic acid); *Baccopa monnieri* (2-octanol, Dimethoxane, 2-Methyl-1-Phenyl-1-butanol, Phytol, Phytol acetate, Octadecanamide); *Centella asiatica* (Thujopsene, α-Thujene, Eucalyptol, 3-Nonen-2-one, β-Linalool, L-Camphor, trans-Borneol, α–Terpeneol, Cis-Geraniol, Isobornyl acetate, 7-Tetradecene, β-Elemene, β-Gurjunene, γ-Elemene, Isocaryophyllene, Aromadendrene, β-Farnesene, β-Acoradiene, β-Selinene, α-Selinene, α-Chamigrene, α-Panasinsen, -(-)Spathulenol, Viridiflorol, Valeranone, Isoaromadendrene epoxide, Aristolene epoxide, 1-Naphthalenol); *Celastrus paniculatus* (Palmitic acid, Erucic acid, γ-Muurolene, Cubenol) were downloaded from PubChem databases as .sdf format. Further, the .sdf format converted into .pdb format using Openbabel 2.3.2.

Molecular docking:

Docking studies was carried out using Glide module from Schrodinger suite **[17]** to find the interaction between modeled APP protein with natural and synthetic compounds. All the compounds were prepared by LigPrep Module. The protein grids were prepared with the mutated residues and the size of the bounding box was set to 30Å. Modelled APP protein coordinates file of enclosing box was set as x=3.9023Å; y=32.884Å; z=30Å respectively. All the prepared inhibitory compounds were docked against the grid generated APP modelled protein. The inhibitory compounds used for docking was screened using Virtual screening. Glide score was selected as the scoring function to rank the poses of each inhibitory compound. Validation of the docking is useful technique to identify best docked complex among number of docked complex.

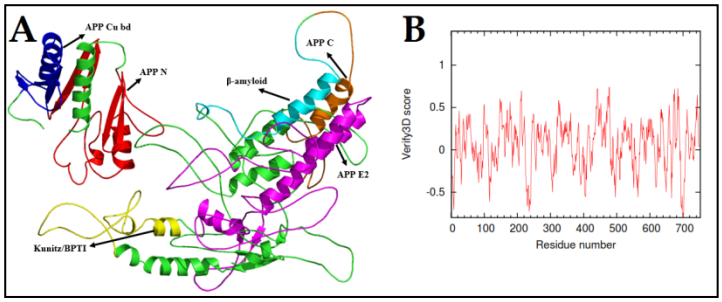

Figure 2: Graphical representation of modelled and validated hypothetical protein of APP. A) Domain regions of red color show APP N (Amyloid A4 N-terminal heparin binding); Blue color is APP Cu bd (Copper-binding of amyloid precursor, CuB); Yellow color is Kunitz BPTI (Kunitz/Bovine pancreatic trypsin inhibitor); Magenta color is APP E2 (E2 domain of amyloid precursor protein); Cyan color is β-amyloid and Orange color is APP C (APP-amyloid). B) Verify 3D plot showed score ranges in between -1.0 to 0.7.

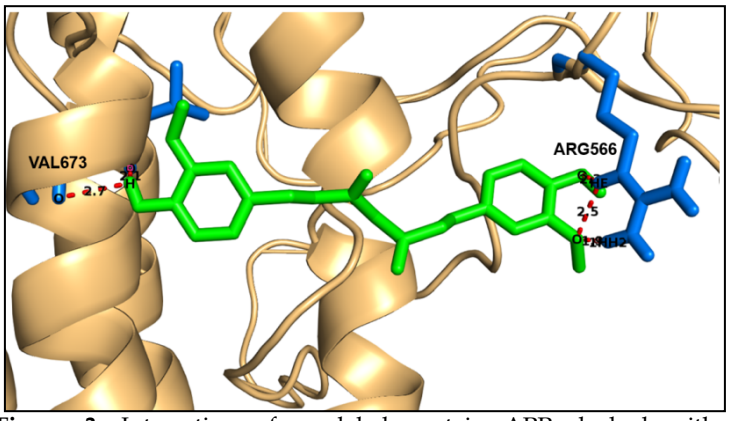

Figure 3: Interaction of modeled protein APP docked with curcumin. Light orange color represents protein; green color is curcumin compound and blue color is interacted residues.

Results and Discussion:

Retrieval of ESTs sequence:

The EST sequences for human AD genes APP, BACE1, PSEN1 and PSEN2 were searched from UniGene database. The gene entries

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with their mRNA and ESTs information are listed in **Table 1.** ESTs of four gene entries originating from brain tissue were used for further analysis.

Table 1: UniGene information on human Alzheimer's disease

S. No	Name of the Genes	Source	mRNA	ESTs
1.	APP	Homo sapiens	38	2898
2.	BACE1	Homo sapiens	27	539
3.	PSEN1	Homo sapiens	16	786
4.	PSEN2	Homo sapiens	10	314

It shows the list of mRNA and ESTs entries.

Table 2: BLAT output showing the alignment of APP, BACE1, PSEN1 and PSEN2 contigs sorted by score

Query	Score	Start	End	Qsize	Identity (%)	Chromosome	Strand
				APP			
Contig1	547	30	582	583	99.9	21	-
Contig1	515	31	550	583	99.9	21	+
Contig2	734	6	752	780	99.5	21	-
Contig2	734	7	757	780	99.2	21	+
Contig3	3838	1	3876	4579	99.8	21	-
Contig3	3838	1	3876	4579	99.8	21	+
Contig4	1331	2	1340	1340	100	21	+
Contig4	1330	1	1340	1340	100	21	-
				BACE1			
Contig5	1605	3	1616	1616	99.9	11	+
Contig5	1604	2	1616	1616	99.8	11	-
Contig6	4916	1	5092	5184	99.4	11	-
Contig6	4916	1	5100	5184	99.3	11	+
Contig7	563	1	572	572	99.7	11	-
Contig7	563	1	572	572	99.7	11	+
				PSEN1			
Contig8	546	1	589	589	99.7	14	-
Contig8	545	2	589	589	99.7	14	+
Contig9	4161	1	4265	4265	99.6	14	+
Contig9	4159	1	4265	4265	99.6	14	-
Contig10	465	1	477	604	98.8	14	-
Contig10	464	1	478	604	98.6	14	+
Contig11	1491	1	1501	1680	100	14	-
Contig11	1491	1	1505	1680	99.9	14	+
Contig12	501	44	638	638	99.5	14	+
Contig12	499	38	638	638	98.7	14	-
				PSEN2			
Contig13	577	1	580	580	99.9	1	-
Contig13	577	1	580	580	99.9	1	+
Contig14	1499	1	1602	1918	98.4	1	-
Contig14	1467	1	1603	1918	97.9	1	+

Note: (+) given segment and (-) reverse complement. It shows the contig sequence of APP, BACE1, PSEN1 and PSEN2 similarity score.

EST clustering and assembly:

Each gene sequence of ESTs from brain tissue was retrieved. The 5′ ESTs were analyzed, as the ESTs created from the 3′ end are most error prone because of the low base-call quality at the start of sequence reads. The subjected ESTs along with their resulting contigs found a total of 988 ESTs from four reported gene entries as listed in **Table 5** (Supplementary Material at the bottom of the article). The tissue-based ESTs from four reported genes were subjected to cluster analysis by CAP3 Server. 14 contigs of four genes were found and further analysis was under taken.

Database similarity searches:

The database similarity search by querying these contigs in BLAT against human genome revealed that alzheimer's contig of APP shows good matches with chromosomes 21. The BACE1, PSEN1 and PSEN2 contigs were showing good matches with chromosomes 11, 14 and 1 respectively and are shown in **Table 2**. The conceptual translation of 14 contigs sequences in ESTScan2 provides 12 protein sequences from APP, BACE1, PSEN1 and PSEN2, as presented in this analysis and protein sequences were not available for the rest of two contig nucleotide sequences contig 10 and contig 13. Multiple sequence alignment was done for these 12 protein sequences obtained by ESTScan2 tool. The entire alignment shows contig 3 sequence of APP protein alone with no error at translate level and rest of the 11 protein sequences were left due to some erroneous readings (X, which does not code for somewhat amino acids or refers to a stop codon) in their sequence as shown in **Figure 1**, obtained by CLC Genomics Workbench 7.6. The APP protein sequence of contig 3 is 751 amino acids with a molecular weight of 84818.77 Daltons and this sequence was named as hypothetical protein for further annotation.

Table 3: The InterProScan annotations for Hypothetical protein

Protein	GENE3D	PANTHER	PFAM	PRINTS	PROFILE	SMART	SUPER FAMILY
Contig3 /APP	G3DSA: 3.90.570.10; 1.10.287.510; 4.10.410.10	PTHR23103	PF12925; PF02177; PF12924 and PF00014	PR00204	PS00319; 00280; 00320	SM000006; 000131	SF10984; 56491; 89811; 57362

Conceptual translation of ESTs

The APP protein sequence was reported from 5′ ESTs of brain tissues and it belongs to the APP amyloid and beta-APP families of proteins with a distinct N-terminal and C-terminal. The major part of the amyloid plaques found in the brains of AD and peptide regions of 36-43 amino acids are fatefully involved in amyloid precursor protein. Aβ molecules can aggregate to form oligomers and the resulting amyloid plaques are toxic to nerve cells [18]. N-terminal region of the APP is a member of the heparin-binding class of GFLDs (Growth Factor-Like Domain) and may itself have growth factor function, neuronal development. It contains four structurally similar domains represented by PFAM families PF12925 **[14],** PF02177 **[19],** PF12924 **[20]** and PF00014 **[21]** as shown in **Table 3**. In structural classification by CATH, the classification lineage of hierarchy 3.90.570.10, 3.30.1490.140, 4.10.230.10 is amyloid beta A4 protein; 1.10.287.510 is amyloid protein and 4.10.410.10 is protease inhibitor IX.

Table 4: Molecular docking analysis of modeled APP protein with synthetic and medicinal compounds

S. No	Compound Name	Glide Score (Kcal/mol)	No. of Hydrogen Bonds	Interacting Residues	Ligand Atom	Distance Length (Å)
			APP			
1.	Curcumin	-8.7	5	ARG566:HE	O	2.3
				ARG566:HE	O	2.5
				ARG566: 1HH2	O	1.9
				VAL673:O	H	2.7
				VAL673:O	H	2.1
2.	Ginsenoside Rb1	-6.1	2	VAL673:O	H	1.9
				LYS680:H	O	1.9
3.	Aristolene epoxide	-5.2	2	PHE745:O	H	2.41
				GLU747:O	H	2.21
4.	Phytol acetate	-3.8	1	SER711:O	H	1.98
5.	Dimethoxane	-3.6	1	GLY677:O	H	2.01
6.	Valeranone	-3.6	1	LYS680:O	H	1.69

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7.	Erucic acid	-3.5	2	LYS680:H	O	2.37
				ASP720:O	H	1.80
8.	Rivastigmine	-2.9	1	LYS600:O	H	1.99
9.	Tacrine	-1.4	1	ASP720:O	H	1.66
10.	Galantamine	-1.0	1	ASP720:O	H	1.51
11.	Donepezil	-	-	-	-	-

Note: Hyphen sign (-), denotes no interaction between protein and ligand. Highlighted compound curcumin shows best glide score and more number of hydrogen bonds, best interaction with mutated residues among other compounds.

Molecular modelling of hypothetical protein:

The 3D structure of hypothetical protein of human APP was predicted using MODELLER v9.13. This program was generated ten different 3D modeled structures and validating these structures was considered based on the scoring percentage of the favored regions. Finally, we selected the best modeled structure for hypothetical protein (model 3) as depicted in **Figure 2A**. Validation of Ramachandran plot showed >96% of the residues in most favored and additional allowed regions and the structure of our modeled protein was found to be stable. Verify3D methods evaluate protein structure using 3D profiles and this program analyzed the compatibility of an atomic model (3D) with their possess amino acid sequence (1D). Each residue is allocated a structural class based on the scores ranges from -1 to +1. In our results verify3D score value of modeled APP protein is -1.0 to 0.7 (**Figure 2B**). Validation results showed stero chemical properties and geometrical arrangements of the atoms of the protein was stable. The root-mean-square deviation value of modeled APP protein 3D structure was higher (0.439Å) than the existing crystal structure PDB IDs: 3KTM (2.70Å) and 3NYL (2.80Å) with an energy value of -30227.773KJ/mol.

Molecular docking:

Molecular docking studies were performed for modeled complete sequences of APP protein with current drugs and medicinal compounds. Various synthetic drugs are available against AD such as tacrine, donepezil, rivastigmine and galantamine, but causing side effects like diarrhea, nausea, vomiting etc **[22].** Hence, a new drug development is important to cure AD without these side effects. In our study, we have selected 11 medicinal plants such as *R. officinalis* (α-Pinene, Camphene, β-Pinene, 1,8-Cineole, α-Thujone, β-Thujone, Chrysanthenone, Camphor, (+)-Borneol, Bornyl acetate, α-Copaene, Trans-Caryophyllene, α-Humulene, Germacrene-D and (+)-δ-Cadinene) plant essential oils have a potent effect in patients with symptoms of AD **[23]** and mentioned 15 natural compounds were identified in this plant using GC-MS analysis. *G.biloba* extract from leaves has been found to improve the symptoms of AD **[24]** and this plant compounds like Quercetin, Kaempferol, Isorhamnetin, Ginkgolide A, B, C, J, M. *P.ginseng* plant extract from root has a potential role in the treatment AD[29] and compounds like Ginsenoside Rb1 and Rg1. *C.Longa Linn* plant extract from root have been used to treat of AD and compounds like Curcumin, Demethoxycurcumin and Bisdemethoxycurcumin **[25].** *S.officinalis* extract from leaf has been found a significant benefit in cognition to the patients with mild to moderate AD and compounds like Borneol, Caryophyllene, Linalool. *H. serrata* has been studied extensively for it is role in treating AD and this plant leaves had been extracted to identify compounds like Huperzine A, B and Lycopodine. The essential oil is obtained from leaves of *M.officinalis* compounds 1-Octen-3-ol, 6-Methyl-5-hepten-2-one, Myrcene, (Z)-β-Ocimene, (E)-β-Ocimene, n-Nonanal, Cis-Rose oxide, (+)-Trans-Rose oxide, (+)-Trans-Limonene oxide, Citronellal, Menthol, Isomenthol, Nerol, Neral, Piperitone, Geraniol, Geranial, α-Cubebene, Geranyl acetate, β-Cubebene, β-Caryophyllene, Valencene, Caryophyllene oxide, 1-Hexadecene, n-Eicosane, n-Heneicosane **[26]** and this plant has been modulate mood and cognitive performance in AD. Compounds like Propane,1,1-diethoxy-2-methyl-, 2-Nonanone, PhenylethylAlcohol, Amyl nitrite, Dodecanoic acid, 3-ter-Butyl-4-hydroxyanisole, Tetradecanoic acid, n-Hexadecanoic acid, 9-Octadecenal, 1-tridecyne, Oleic acid extracted from *W.somnifera* root **[27]** are mainly used to treat AD. *B.monnieri* leaf extract has been used to promote memory increasing activity and treat psycho neurological disorders. GC-MS analysis of this plant identified compounds such as 2-octanol, Dimethoxane, 2-Methyl-1-Phenyl-1-butanol, Phytol, Phytol acetate, Octadecanamide **[28].** *C.asiatica* plant essential oil extract from leaves and GC-MS analysis compounds like Thujopsene, α-Thujene, Eucalyptol, 3-Nonen-2-one, β-Linalool, L-Camphor, trans-Borneol, α–Terpeneol, Cis-Geraniol, Isobornyl acetate, 7-Tetradecene, β-Elemene, β-Gurjunene, γ-Elemene, Isocaryophyllene, Aromadendrene, β-Farnesene, β-Acoradiene, β-Selinene, α-Selinene, α-Chamigrene, α-Panasinsen, -(-)Spathulenol, Viridiflorol, Valeranone, Isoaromadendrene epoxide, Aristolene epoxide, 1-Naphthalenol. This plant has ability to prevent cognitive deficits treatment for AD. *C.paniculatus* plant contains essential oil extract from seeds and GC-MS analysis compounds like Palmitic acid, Erucic acid, γ-Muurolene, Cubenol. The seed oil is studied as best nervine tonic and used in treatment of various neurological disorders **[29].** We validated the efficacy of synthetic and medicinal plants based compounds with modeled APP protein using molecular docking approach to identify the best inhibitor for AD.

APP is a transmembrane protein without known function that is constitutively cleaved into peptides during cell metabolism. The amyloidogenic 40 or 42 amino acid Aβ peptide is released after cleavage by β-secretase and γ-secretase. Familial alzheimer's disease (FAD) mutations have been identified in APP, PSEN1 and PSEN2 genes, which are essential for the generation of Aβ peptides **[30].** Reported APP mutation sequences include A673V **[31],** V717I **[32].** **Figure 3** shows the interaction of modeled APP protein with curcumin having least glide score value of -7.3Kcal/mol and more

number of hydrogen bonds (ARG566, VAL673) were formed than other compounds. From the results of docking study, out of 11 medicinal plant compounds only six medicinal plants such as *P. ginseng* (Ginsenoside Rb1), *C. longa Linn* (Curcumin), *C. asiatica* (Aristolene epoxide, Valeranone), *B. monnieri* (Phytol acetate), *B. monnieri* (Dimethoxane), *C. paniculatus* (Erucic acid) and synthetic (Rivastigmine, Tacrine, Galantamine) compounds showed proper interaction but mutated residues docked with ginsenoside rb1 and curcumin compounds (**Table 4).** Tang and Taghibiglou 2017 [33] has reported curcumin compound to be more effective than current treatment of AD. Alcigir *et al*. **[34]** found that positive results in new-born rodent pups, curcumin compound as a natural therapy for permanent treatment based on neuronal impairment. Abdolahi *et al*. [35] has considered curcumin compound as a novel promising therapy in migraine prevention. From the molecular interaction study, we conclude that, natural compound curcumin shows better interaction than synthetic, other natural screened compounds and AD approved drugs. Hence we suggested as an alternative lead compound of curcumin in alzheimer's disease research.

Conclusion:

EST analysis of the four genes associated with AD produced 14 contig sequences. APP contig 3, the only contig with no error of translation was annotated using functional and structural data. APP was further analyzed using molecular modeling and docking with natural compound of curcumin, it shows the best glide score of -7.3kcal/mol into mutated residues unlike the synthetic and other natural compounds. Hence to avoid the side effects of synthetic drugs and natural compound, curcumin is suggested for the treatment of AD.

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Conflict of Interest:

The authors confirm that this article content has no conflict of interest.

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BIOINFORMATION
Discovery at the interface of physical and biological sciences

Supplementary material: Table 5 ESTs data for APP, BACE1, PSEN1 and PSEN2 genes (Page 1)

No	GB accession No.	Description (clone)	Tissue Type	EST Type	Code	S. No	GB accession No.	Description (clone)	Tissue Type	EST Type	Code	S. No	GB accession No.	Description (clone)	Tissue Type	EST Type	Code
APP																	
1.	R19709.1	IMAGE:34389	brain	5' read	P	94.	DA116901.1	BRACE3036402	brain	5' read	P	190.	DA323817.1	BRHIP3018058	brain	5' read	P
2.	R25270.1	IMAGE:36560	brain	5' read	P	95.	DA240047.1	BRAWH3037525	brain	5' read	P	191.	DA278607.1	BRCOC2006262	brain	5' read	P
3.	R25913.1	IMAGE:36645	brain	5' read	-	96.	DA339166.1	BRHIP3040914	brain	5' read	P	192.	DA173167.1	BRAMY2035910	brain	5' read	P
4.	CB155314.1	B2N807043-5-B05	brain	5' read	P	97.	DA240242.1	BRAWH3037759	brain	5' read	P	193.	DA245394.1	BRAWH3044073	brain	5' read	P
5.	R59909.1	IMAGE:42689	brain	5' read	-	98.	DA240369.1	BRAWH3037908	brain	5' read	P	194.	DA212049.1	BRAWH3001439	brain	5' read	P
6.	AL036427.1	DKFZp564B1262	brain	5' read	P	99.	DA195001.1	BRAMY4000405	brain	5' read	P	195.	DA173389.1	BRAMY2036199	brain	5' read	P
7.	BX424619.2	CS0DFI032YP01	brain	5' read	P	100.	DA195093.1	BRAMY4000465	brain	5' read	P	196.	DA245881.1	BRAWH3044669	brain	5' read	P
8.	BX439883.2	CS0DFI001YI15	brain	5' read	P	101.	DA312904.1	BRHIP3002211	brain	5' read	P	197.	DA095390.1	BRACE3005194	brain	5' read	P
9.	BX439884.2	CS0DFI001YI15	brain	5' read	P	102.	DA195440.1	BRAMY4000883	brain	5' read	P	198.	DA134345.1	BRALZ2006912	brain	5' read	P
10.	BX441775.2	CS0DFI021YN15	brain	5' read	P	103.	DA195476.1	BRAMY4000928	brain	5' read	P	199.	DA095743.1	BRACE3005688	brain	5' read	P
11.	BX442531.2	CS0DFI032YP01	brain	5' read	P	104.	DA267794.1	BRCAN2021559	brain	5' read	-	200.	DA128174.1	BRACE3051693	brain	5' read	P
12.	BX418906.2	CS0DFI011YK13	brain	5' read	P	105.	DA234376.1	BRAWH3030541	brain	5' read	P	201.	DA128251.1	BRACE3051778	brain	5' read	P
13.	BX418441.2	CS0DFI004YL16	brain	5' read	P	106.	DA189096.1	BRAMY3010718	brain	5' read	P	202.	DA128309.1	BRACE3051853	brain	5' read	P
14.	BX410354.2	CS0DN005YC23	brain	5' read	P	107.	DA234436.1	BRAWH3030619	brain	5' read	P	203.	DA128372.1	BRACE3051927	brain	5' read	P
15.	CD245446.1	IMAGE:30376636	brain	5' read	-	108.	DA189184.1	BRAMY3010851	brain	5' read	P	204.	DA128519.1	BRACE3052122	brain	5' read	P
16.	CD252112.1	IMAGE:30374500	brain	5' read	P	109.	DA189304.1	BRAMY3011070	brain	5' read	P	205.	DA291766.1	BRHIP2003440	brain	5' read	P
17.	BX462020.2	CS0DFI038YI11	brain	5' read	P	110.	DA162644.1	BRAMY2023095	brain	5' read	P	206.	DA128927.1	BRACE3052651	brain	5' read	P
18.	BX461311.2	CS0DFI025YA20	brain	5' read	P	111.	DA228405.1	BRAWH3022731	brain	5' read	P	207.	DA180203.1	BRAMY2044844	brain	5' read	P
19.	CD514570.1	IMAGE:30395742	brain	5' read	P	112.	DA189964.1	BRAMY3011212	brain	5' read	P	208.	DA023978.1	ASTRO2006466	brain	5' read	P
20.	CD516288.1	IMAGE:30408890	brain	5' read	P	113.	DA228770.1	BRAWH3023207	brain	5' read	P	209.	DA246563.1	BRAWH3045531	brain	5' read	P
21.	CD516759.1	IMAGE:30398693	brain	5' read	P	114.	DA228785.1	BRAWH3023228	brain	5' read	P	210.	DA246857.1	BRAWH3045894	brain	5' read	P
22.	CD518169.1	IMAGE:30398772	brain	5' read	P	115.	DA201937.1	BRAWH2006781	brain	5' read	P	211.	DA174689.1	BRAMY2037864	brain	5' read	P
23.	CD518760.1	IMAGE:30396047	brain	5' read	-	116.	DA123302.1	BRACE3045131	brain	5' read	P	212.	DA213465.1	BRAWH3003221	brain	5' read	P
24.	CK003075.1	IMAGE:30721155	brain	5' read	P	117.	DA123356.1	BRACE3045205	brain	5' read	P	213.	DA096105.1	BRACE3006174	brain	5' read	P
25.	CK003256.1	IMAGE:30720873	brain	5' read	-	118.	DA117097.1	BRACE3036669	brain	5' read	P	214.	DA168693.1	BRAMY2030435	brain	5' read	P
26.	CK003999.1	IMAGE:30719468	brain	5' read	-	119.	DA123715.1	BRACE3045706	brain	5' read	P	215.	DA168948.1	BRAMY2030724	brain	5' read	P
27.	CK004702.1	IMAGE:30723098	brain	5' read	P	120.	DA117372.1	BRACE3037018	brain	5' read	P	216.	DA207712.1	BRAWH2014849	brain	5' read	P
28.	CK005374.1	IMAGE:30722169	brain	5' read	A	121.	DA117387.1	BRACE3037042	brain	5' read	P	217.	DA207964.1	BRAWH2015212	brain	5' read	P
29.	CK005877.1	IMAGE:30721285	brain	5' read	P	122.	DA117893.1	BRACE3037736	brain	5' read	P	218.	DA030204.1	ASTRO2014322	brain	5' read	P
30.	CK024056.1	IMAGE:30721921	brain	5' read	-	123.	DA313265.1	BRHIP3002712	brain	5' read	P	219.	DA102590.1	BRACE3015251	brain	5' read	P
31.	H22832.1	IMAGE:51381	brain	5' read	-	124.	DA313277.1	BRHIP3002726	brain	5' read	P	220.	DA325199.1	BRHIP3020063	brain	5' read	P
32.	BP195105.1	AD807016	brain	5' read	P	125.	DA274503.1	BRCOC2000899	brain	5' read	P	221.	DA286931.1	BRCOC2017878	brain	5' read	P
33.	BP198916.1	ADR05908	brain	5' read	-	126.	DA213622.1	BRAWH3039131	brain	5' read	P	222.	DA024907.1	ASTRO2007682	brain	5' read	P
34.	BP199940.1	AMR00423	brain	5' read	P	127.	DA313688.1	BRHIP3003301	brain	5' read	P	223.	DA220774.1	BRAWH3012625	brain	5' read	P
35.	BP200456.1	AMR02345	brain	5' read	P	128.	DA196158.1	BRAMY4001764	brain	5' read	P	224.	DA319884.1	BRHIP3012521	brain	5' read	P
36.	BP201043.1	AMR04293	brain	5' read	P	129.	DA307292.1	BRHIP2024092	brain	5' read	P	225.	DA214320.1	BRAWH3004515	brain	5' read	P
37.	BP202570.1	AMR08808	brain	5' read	P	130.	DA196363.1	BRAMY4002014	brain	5' read	P	226.	DA214484.1	BRAWH3004525	brain	5' read	P
38.	BP202830.1	AMR09620	brain	5' read	P	131.	DA235189.1	BRAWH3031578	brain	5' read	P	227.	DA247949.1	BRAWH3047261	brain	5' read	P
39.	BP228627.1	FBR00557	brain	5' read	P	132.	DA196428.1	BRAMY4002090	brain	5' read	P	228.	DA100029.1	BRACE3015891	brain	5' read	P
40.	BP249553.1	HPR01011	brain	5' read	P	133.	DA196582.1	BRAMY4002290	brain	5' read	P	229.	DA097880.1	BRACE3008663	brain	5' read	P
41.	BP250135.1	HPR01849	brain	5' read	P	134.	DA235554.1	BRAWH3032023	brain	5' read	P	230.	DA100612.1	BRACE3016663	brain	5' read	P
42.	BP250657.1	HPR04503	brain	5' read	P	135.	DA163599.1	BRAMY2024006	brain	5' read	P	231.	DA332516.1	BRHIP3030495	brain	5' read	P
43.	BP250904.1	HPR05541	brain	5' read	P	136.	DA235710.1	BRAWH3032217	brain	5' read	P	232.	DA286081.1	BRCOC2018089	brain	5' read	P
44.	BP251044.1	HPR06069	brain	5' read	P	137.	DA085399.1	BRACE2039695	brain	5' read	P	233.	DA260301.1	BRCAN2012243	brain	5' read	P
45.	BP251548.1	HPR08258	brain	5' read	P	138.	DA118051.1	BRACE3037953	brain	5' read	P	234.	DA326164.1	BRHIP3021491	brain	5' read	P
46.	BP251696.1	HPR08878	brain	5' read	P	139.	DA124614.1	BRACE3047021	brain	5' read	P	235.	DA221042.1	BRAWH3012957	brain	5' read	P
47.	BP210817.1	CBL06459	brain	5' read	P	140.	DA281182.1	BRCOC2009860	brain	5' read	P	236.	DA221112.1	BRAWH3013042	brain	5' read	P
48.	BP212596.1	CBR04258	brain	5' read	P	141.	DA118600.1	BRACE3038726	brain	5' read	P	237.	DA248258.1	BRAWH3047637	brain	5' read	P
49.	BP214571.1	CCR01118	brain	5' read	P	142.	DA242038.1	BRAWH3039946	brain	5' read	P	238.	DA221623.1	BRAWH3013717	brain	5' read	P
50.	BP216675.1	CCR07555	brain	5' read	P	143.	DA242267.1	BRAWH3040222	brain	5' read	P	239.	DA215068.1	BRAWH3005331	brain	5' read	P
51.	BP217764.1	CNR01789	brain	5' read	P	144.	DA170116.1	BRAMY2032090	brain	5' read	P	240.	DA248601.1	BRAWH3048989	brain	5' read	P
52.	BP217830.1	CNR02054	brain	5' read	P	145.	DA273747.1	BRCOC2002473	brain	5' read	P	241.	DA176448.1	BRAMY2040056	brain	5' read	P
53.	BP217884.1	CNR02575	brain	5' read	P	146.	DA314561.1	BRHIP3004586	brain	5' read	P	242.	DA248804.1	BRAWH3048541	brain	5' read	P
54.	BP218289.1	CNR03974	brain	5' read	P	147.	DA269424.1	BRCAN2023541	brain	5' read	P	243.	DA215498.1	BRAWH3005772	brain	5' read	P
55.	BP218424.1	CNR04373	brain	5' read	P	148.	DA242745.1	BRAWH3040801	brain	5' read	P	244.	DA143465.1	BRALZ2018944	brain	5' read	P
56.	BP218813.1	CNR05756	brain	5' read	P	149.	DA164638.1	BRAMY2025512	brain	5' read	P	245.	DA104029.1	BRACE3017246	brain	5' read	P
57.	BP218822.1	CNR05940	brain	5' read	P	150.	DA123031.1	BRACE3047973	brain	5' read	P	246.	DA294110.1	BRHIP2006484	brain	5' read	P
58.	BP218918.1	CNR06094	brain	5' read	P	151.	DA158976.1	BRAMY2018659	brain	5' read	P	247.	DA032198.1	ASTRO2016830	brain	5' read	P
59.	BP219126.1	CNR07124	brain	5' read	P	152.	DA119010.1	BRACE3039240	brain	5' read	P	248.	DA333353.1	BRHIP3032135	brain	5' read	P
60.	BP219416.1	CNR07868	brain	5' read	P	153.	DA020076.1	ASTRO2001340	brain	5' read	P	249.	DA300240.1	BRHIP2014535	brain	5' read	P
61.	BP360164.1	THR01187	brain	5' read	P	154.	DA282319.1	BRCOC2011472	brain	5' read	P	250.	DA327139.1	BRHIP3022942	brain	5' read	P
62.	BP360190.1	THR01275	brain	5' read	P	155.	DA125923.1	BRACE3048748	brain	5' read	P	251.	DA288484.1	BRCOC2020035	brain	5' read	P
63.	BP360221.1	THR01345	brain	5' read	P	156.	DA119859.1	BRACE3040402	brain	5' read	P	252.	DA300742.1	BRHIP2015238	brain	5' read	P
64.	BP360289.1	THR01522	brain	5' read	P	157.	DA282972.1	BRCOC2012385	brain	5' read	P	253.	DA300852.1	BRHIP2015395	brain	5' read	P
65.	BP360991.1	THR03533	brain	5' read	P	158.	DA119951.1	BRACE3040535	brain	5' read	P	254.	DA183325.1	BRAMY3000971	brain	5' read	P
66.	BP361025.1	THR03632	brain	5' read	P	159.	DA242999.1	BRAWH3041508	brain	5' read	P	255.	DA183404.1	BRAMY3001110	brain	5' read	P
67.	BP362157.1	THR07465	brain	5' read	P	160.	DA243351.1	BRAWH3041575	brain	5' read	P	256.	DA327826.1	BRHIP3023941	brain	5' read	P
68.	BP362861.1	THR09351	brain	5' read	P	161.	DA243610.1	BRAWH3041899	brain	5' read	P	257.	DA183568.1	BRAMY3001416	brain	5' read	P
69.	BP278643.1	KGR02459	brain	5' read	P	162.	DA237183.1	BRAWH3034012	brain	5' read	P	258.	DA249292.1	BRAWH3048946	brain	5' read	P
70.	BP278868.1	KGR03179	brain	5' read	P	163.	DA237291.1	BRAWH3034146	brain	5' read	P	259.	DA222547.1	BRAWH3014969	brain	5' read	P
71.	BP279002.1	KGR03594	brain	5' read	P	164.	DA132130.1	BRALZ2003950	brain	5' read	P	260.	DA216047.1	BRAWH3006603	brain	5' read	P
72.	BP279445.1	KGR05094	brain	5' read	P	165.	DA054085.1	BRACE1000336	brain	5' read	P	261.	DA177318.1	BRAMY2041155	brain	5' read	P
73.	BP279619.1	KGR05596	brain	5' read	P	166.	DA126542.1	BRACE3049566	brain	5' read	P	262.	DA183951.1	BRAMY3002079	brain	5' read	P
74.	BP280734.1	KGR08780	brain	5' read	P	167.	DA126831.1	BRACE3049937	brain	5' read	P	263.	DA216195.1	BRAWH3006800	brain	5' read	P
75.	BP307522.1	NRB01628	brain	5' read	P	168.	DA349352.1	BRSSN2011546	brain	5' read	P	264.	DA249806.1	BRAWH3049553	brain	5' read	P
76.	BP310380.1	NRR02342	brain	5' read	P	169.	DA250375.1	BRCAN2000154	brain	5' read	P	265.	DA177757.1	BRAMY2041722	brain	5' read	P
77.	BP311080.1	NRR04550	brain	5' read	P	170.	DA316293.1	BRHIP3007084	brain	5' read	P	266.	DA249969.1	BRAWH3049756	brain	5' read	P
78.	BP311985.1	NRR07584	brain	5' read	P	171.	DA244146.1	BRAWH3042546	brain	5' read	P	267.	DA216777.1	BRAWH3007537	brain	5' read	P
79.	BP348267.1	SZB09101	brain	5' read	-	172.	DA316381.1	BRHIP3007206	brain	5' read	-	268.	DA099403.1	BRACE3010815	brain	5' read	P
80.	H29789.1	IMAGE:52969	brain	5' read	-	173.	DA172122.1	BRAMY2034535	brain	5' read	P	269.	DA099439.1	BRACE3010859	brain	5' read	P
81.	DN995202.1	TC125279	brain	5' read	P	174.	DA244315.1	BRAWH3042757	brain	5' read	P	270.	DA099535.1	BRACE3010994	brain	5' read	P
82.	AV728963.1	HTCBYF10	brain	5' read	-	175.	DA190091.1	BRAWH2002509	brain	5' read	P	271.	DA190040.1	BRAMY3012225	brain	5' read	P
83.	AV729003.1	HTCALG08	brain	5' read	P	176.	DA244758.1	BRAWH3043312	brain	5' read	P	272.	DA190081.1	BRAMY3012296	brain	5' read	P
84.	AV729059.1	HTCBBG02	brain	5' read	-	177.	DA211359.1	BRAWH3000550	brain	5' read	P	273.	DA289128.1	BRHIP2000135	brain	5' read	P
85.	AV729405.1	HTCCHF08	brain	5' read	-	178.	DA094366.1	BRACE3003653	brain	5' read	P	274.	DA190235.1	BRAMY3012554	brain	5' read	P
86.	D51546.1	GEN-042F12	brain	5' read	P	179.	DA094673.1	BRACE3004112	brain	5' read	P	275.	DA190252.1	BRAMY3012578	brain	5' read	P
87.	D54514.1	GEN-142D07	brain	5' read	-	180.	DA166971.1	BRAMY2028340	brain	5' read	P	276.	DA262533.1	BRCAN2015036	brain	5' read	P
88.	BP315675.1	IMAGE:4128486	brain	5' read	P	181.	DA127116.1	BRACE3050314	brain	5' read	P	277.	DA190469.1	BRAMY3012883	brain	5' read	P
89.	BP317295.1	IMAGE:4136415	brain	5' read	P	182.	DA055133.1	BRACE2001090	brain	5' read	P	278.	DA184183.1	BRAMY3002494	brain	5' read	P
90.	BP342005.1	IMAGE:4152338	brain	5' read	P	183.	DA127396.1	BRACE3050675	brain	5' read	P	279.	DA184350.1	BRAMY3002775	brain	5' read	P
91.	BP342794.1	IMAGE:4150721	brain	5' read	-	184.	DA055296.1	BRACE2001299	brain	5' read	P	280.	DA190963.1	BRAMY3013632	brain	5' read	P
92.	BP344572.1	IMAGE:4150845	brain	5' read	-	185.	DA127477.1	BRACE3050779	brain	5' read	P	281.	DA151359.1	BRAMY2009352	brain	5' read	P
93.	BP347980.1	IMAGE:4158432	brain	5' read	P	186.	DA278040.1	BRCOC2005504	brain	5' read	P	282.	DA178250.1	BRAMY2042323	brain	5' read	P
						187.	DA284681.1	BRCOC2014797	brain	5' read	P	283.	DA184837.1	BRAMY3003648	brain	5' read	P
						188.	DA323473.1	BRHIP3017585	brain	5' read	P	284.	DA217089.1	BRAWH3007906	brain	5' read	P
						189.	DA049410.1	BNGH42003291	brain	5' read	P	285.	DA178443.1	BRAMY2042579	brain	5' read	P

BIOINFORMATION
Discovery at the interface of physical and biological sciences

286.	DA217310.1	BRAWH3008184	brain	5' read	P	382.	DA311853.1	BRHIP3000628	brain	5' read	P	478.	DA411093.1	BRTHA3018111	brain	5' read	P
287.	DA217340.1	BRAWH3008217	brain	5' read	P	383.	DA338902.1	BRHIP3040513	brain	5' read	P	479.	DA399331.1	BRTHA3001782	brain	5' read	P
288.	DA217400.1	BRAWH3008283	brain	5' read	P	384.	DA233481.1	BRAWH3029419	brain	5' read	P	480.	DA411499.1	BRTHA3018705	brain	5' read	P
289.	DA217566.1	BRAWH3008488	brain	5' read	P	385.	DA194792.1	BRAMY4000105	brain	5' read	P	481.	DA411610.1	BRTHA3018869	brain	5' read	P
290.	DA217581.1	BRAWH3008508	brain	5' read	P	386.	DA200112.1	BRAWH2004009	brain	5' read	P	482.	DA366412.1	BRSTN2014315	brain	5' read	P
291.	DA112129.1	BRACE3029873	brain	5' read	P	387.	DA188223.1	BRAMY3009280	brain	5' read	P	483.	DA411827.1	BRTHA3019164	brain	5' read	P
292.	DA296282.1	BRHIP2009229	brain	5' read	P	388.	DA188237.1	BRAMY3009302	brain	5' read	P	484.	DA405732.1	BRTHA3010709	brain	5' read	P
293.	DA296424.1	BRHIP2009398	brain	5' read	P	389.	DA194879.1	BRAMY4000207	brain	5' read	P	485.	DA405767.1	BRTHA3010752	brain	5' read	P
294.	DA106665.1	BRACE3021073	brain	5' read	P	390.	DA227098.1	BRAWH3021091	brain	5' read	P	486.	DA405869.1	BRTHA3010906	brain	5' read	P
295.	DA191489.1	BRAMY3014426	brain	5' read	P	391.	DA227129.1	BRAWH3021133	brain	5' read	P	487.	DA490709.1	FCBBF3001999	brain	5' read	P
296.	DA230240.1	BRAWH3025083	brain	5' read	P	392.	DA188413.1	BRAMY3009595	brain	5' read	-	488.	DA484598.1	FCBBF2001331	brain	5' read	P
297.	DA191610.1	BRAMY3014612	brain	5' read	P	393.	DA161850.1	BRAMY2022146	brain	5' read	P	489.	DA523733.1	FEBRA2014645	brain	5' read	P
298.	DA185182.1	BRAMY3004247	brain	5' read	P	394.	DA188855.1	BRAMY3010348	brain	5' read	P	490.	DA412377.1	BRTHA3019914	brain	5' read	P
299.	DA191776.1	BRAMY3014851	brain	5' read	P	395.	DA188935.1	BRAMY3010459	brain	5' read	P	491.	DA406095.1	BRTHA3011215	brain	5' read	P
300.	DA185394.1	BRAMY3004607	brain	5' read	P	396.	DA122278.1	BRACE3043754	brain	5' read	P	492.	DA412707.1	BRTHA3020370	brain	5' read	P
301.	DA230751.1	BRAWH3025748	brain	5' read	P	397.	DA116000.1	BRACE3035210	brain	5' read	P	493.	DA412753.1	BRTHA3020438	brain	5' read	P
302.	DA185532.1	BRAMY3004840	brain	5' read	P	398.	DA116039.1	BRACE3035261	brain	5' read	P	494.	DA406495.1	BRTHA3011792	brain	5' read	P
303.	DA185579.1	BRAMY3004915	brain	5' read	P	399.	DA116083.1	BRACE3035315	brain	5' read	P	495.	DA406558.1	BRTHA3011880	brain	5' read	P
304.	DA230917.1	BRAWH3025960	brain	5' read	P	400.	DA122704.1	BRACE3044319	brain	5' read	P	496.	DA491446.1	FCBBF3002921	brain	5' read	P
305.	DA080038.1	BRACE2033024	brain	5' read	P	401.	DA116516.1	BRACE3035895	brain	5' read	P	497.	DA518225.1	FEBRA2007285	brain	5' read	P
306.	DA152404.1	BRAMY2010652	brain	5' read	P	402.	DA116604.1	BRACE3036013	brain	5' read	P	498.	DA413174.1	BRTHA3021010	brain	5' read	P
307.	DA218105.1	BRAWH3009194	brain	5' read	P	403.	DA116721.1	BRACE3036181	brain	5' read	P	499.	DA413306.1	BRTHA3021206	brain	5' read	P
308.	DA218127.1	BRAWH3009224	brain	5' read	P	404.	DA312039.1	BRHIP3000910	brain	5' read	P	500.	DA413591.1	BRTHA3021620	brain	5' read	P
309.	DA185956.1	BRAMY3005540	brain	5' read	P	405.	DA496201.1	FCBBF3008978	brain	5' read	P	501.	DA368292.1	BRSTN2016740	brain	5' read	P
310.	DA218269.1	BRAWH3009392	brain	5' read	P	406.	DA502361.1	FCBBF3016894	brain	5' read	P	502.	DA413960.1	BRTHA3022124	brain	5' read	P
311.	DA152739.1	BRAMY2011052	brain	5' read	P	407.	DA502466.1	FCBBF3017033	brain	5' read	P	503.	DA407442.1	BRTHA3013067	brain	5' read	P
312.	DA224935.1	BRAWH3018147	brain	5' read	P	408.	DA391816.1	BRTHA2029554	brain	5' read	P	504.	AV721131.1	HTBBXE12	brain	5' read	P
313.	DA179636.1	BRAMY2044109	brain	5' read	P	409.	DA352179.1	BRSSN2015364	brain	5' read	P	505.	AV723326.1	HTBAIA06	brain	5' read	-
314.	DA179925.1	BRAMY2044476	brain	5' read	P	410.	DA418134.1	BRTHA3027842	brain	5' read	P	506.	AV723576.1	HTBBUF10	brain	5' read	P
315.	DA113185.1	BRACE3031347	brain	5' read	P	411.	DA418230.1	BRTHA3027972	brain	5' read	P	507.	AV724241.1	HTBAQF05	brain	5' read	-
316.	DA218797.1	BRAWH3010075	brain	5' read	P	412.	DA418717.1	BRTHA3028616	brain	5' read	P	508.	AV726015.2	HTCAHD05	brain	5' read	P
317.	DA113210.1	BRACE3031379	brain	5' read	P	413.	DA418776.1	BRTHA3028694	brain	5' read	P	509.	DA407880.1	BRTHA3013682	brain	5' read	P
318.	DA146850.1	BRAMY2003718	brain	5' read	P	414.	DA497156.1	FCBBF3010174	brain	5' read	P	510.	DA531169.1	FEBRA2024346	brain	5' read	P
319.	DA113526.1	BRACE3031816	brain	5' read	P	415.	DA497336.1	FCBBF3010396	brain	5' read	P	511.	DA486375.1	FCBBF2003849	brain	5' read	P
320.	DA342601.1	BRSSN2002385	brain	5' read	P	416.	DA392707.1	BRTHA2030863	brain	5' read	P	512.	DA519853.1	FEBRA2009519	brain	5' read	P
321.	DA107574.1	BRACE3022373	brain	5' read	P	417.	DA503875.1	FCBBF3018897	brain	5' read	P	513.	DA414360.1	BRTHA3022693	brain	5' read	P
322.	DA231145.1	BRAWH3026261	brain	5' read	P	418.	DA386363.1	BRTHA2021671	brain	5' read	P	514.	DA414392.1	BRTHA3022739	brain	5' read	P
323.	DA231163.1	BRAWH3026280	brain	5' read	P	419.	DA386630.1	BRTHA2022059	brain	5' read	P	515.	DA414761.1	BRTHA3023267	brain	5' read	P
324.	DA231188.1	BRAWH3026306	brain	5' read	P	420.	DA386939.1	BRTHA2022490	brain	5' read	P	516.	DA610092.1	IMR322007845	brain	5' read	P
325.	DA186149.1	BRAMY3005826	brain	5' read	P	421.	DA510238.1	FCBBF3026964	brain	5' read	P	517.	DA414885.1	BRTHA3023445	brain	5' read	P
326.	DA303718.1	BRHIP2019355	brain	5' read	P	422.	DA510380.1	FCBBF3027134	brain	5' read	P	518.	DA408304.1	BRTHA3014242	brain	5' read	P
327.	DA186300.1	BRAMY3006057	brain	5' read	P	423.	DA393049.1	BRTHA2031361	brain	5' read	P	519.	DA408371.1	BRTHA3014348	brain	5' read	P
328.	DA186361.1	BRAMY3006154	brain	5' read	P	424.	DA393273.1	BRTHA2031663	brain	5' read	P	520.	DA414935.1	BRTHA3023513	brain	5' read	P
329.	DA186363.1	BRAMY3006159	brain	5' read	P	425.	DA504977.1	FCBBF3020363	brain	5' read	P	521.	DA408624.1	BRTHA3014709	brain	5' read	P
330.	DA186436.1	BRAMY3006278	brain	5' read	P	426.	DA387459.1	BRTHA2023190	brain	5' read	P	522.	DA408665.1	BRTHA3014761	brain	5' read	P
331.	DA231876.1	BRAWH3027230	brain	5' read	P	427.	DA360770.1	BRSTN2006940	brain	5' read	P	523.	DA408994.1	BRTHA3015199	brain	5' read	P
332.	DA186521.1	BRAMY3006419	brain	5' read	P	428.	DA387969.1	BRTHA2023922	brain	5' read	P	524.	DA493259.1	FCBBF3005198	brain	5' read	P
333.	DA153166.1	BRAMY2011587	brain	5' read	P	429.	DA616188.1	IMR322015575	brain	5' read	P	525.	DA532627.1	FEBRA2026314	brain	5' read	P
334.	DA225364.1	BRAWH3018722	brain	5' read	P	430.	DA394203.1	BRTHA2032987	brain	5' read	P	526.	DA376265.1	BRTHA2007868	brain	5' read	P
335.	DA153299.1	BRAMY2011760	brain	5' read	P	431.	DA505393.1	FCBBF3020889	brain	5' read	P	527.	DA415063.1	BRTHA3023688	brain	5' read	P
336.	DA186711.1	BRAMY3006754	brain	5' read	P	432.	DA505565.1	FCBBF3021115	brain	5' read	P	528.	DA415192.1	BRTHA3023870	brain	5' read	P
337.	DA186742.1	BRAMY3006819	brain	5' read	P	433.	DA388183.1	BRTHA2024243	brain	5' read	P	529.	DA409049.1	BRTHA3015276	brain	5' read	P
338.	DA225506.1	BRAWH3018904	brain	5' read	-	434.	DA400233.1	BRTHA3003098	brain	5' read	P	530.	DA409202.1	BRTHA3015482	brain	5' read	P
339.	DA225588.1	BRAWH3019013	brain	5' read	P	435.	DA388314.1	BRTHA2024425	brain	5' read	P	531.	DA409215.1	BRTHA3015501	brain	5' read	P
340.	DA186800.1	BRAMY3006922	brain	5' read	P	436.	DA400384.1	BRTHA3003302	brain	5' read	P	532.	DA415858.1	BRTHA3024808	brain	5' read	P
341.	DA120073.1	BRACE3040692	brain	5' read	P	437.	DA400389.1	BRTHA3003310	brain	5' read	P	533.	DA409610.1	BRTHA3016026	brain	5' read	P
342.	DA219176.1	BRAWH3010556	brain	5' read	P	438.	DA400515.1	BRTHA3003482	brain	5' read	P	534.	DA409649.1	BRTHA3016079	brain	5' read	P
343.	DA081440.1	BRACE2034775	brain	5' read	P	439.	DA388610.1	BRTHA2024857	brain	5' read	P	535.	DA409839.1	BRTHA3016329	brain	5' read	P
344.	DA120252.1	BRACE3040927	brain	5' read	P	440.	DA400700.1	BRTHA3003727	brain	5' read	P	536.	DA409929.1	BRTHA3016465	brain	5' read	P
345.	DA225923.1	BRAWH3019478	brain	5' read	P	441.	DA400840.1	BRTHA3003932	brain	5' read	P	537.	DA494428.1	FCBBF3006717	brain	5' read	P
346.	DA120375.1	BRACE3041099	brain	5' read	P	442.	DA388978.1	BRTHA2025411	brain	5' read	P	538.	DA494880.1	FCBBF3007304	brain	5' read	P
347.	DA120490.1	BRACE3041260	brain	5' read	P	443.	DA355637.1	BRSTN2000560	brain	5' read	P	539.	DA500668.1	FCBBF3014690	brain	5' read	P
348.	DA219609.1	BRAWH3011127	brain	5' read	P	444.	DA355772.1	BRSTN2000719	brain	5' read	P	540.	DA350787.1	BRSSN2013555	brain	5' read	P
349.	DA075353.1	BRACE2027138	brain	5' read	P	445.	DA401080.1	BRTHA3004273	brain	5' read	P	541.	DA416632.1	BRTHA3025878	brain	5' read	P
350.	DA114383.1	BRACE3032990	brain	5' read	P	446.	DA362465.1	BRSTN2009115	brain	5' read	P	542.	DA416898.1	BRTHA3026228	brain	5' read	P
351.	DA114505.1	BRACE3033140	brain	5' read	P	447.	DA389510.1	BRTHA2026187	brain	5' read	P	543.	DA416987.1	BRTHA3026350	brain	5' read	P
352.	DA114705.1	BRACE3033420	brain	5' read	P	448.	DA401506.1	BRTHA3004877	brain	5' read	P	544.	DA495193.1	FCBBF3007706	brain	5' read	P
353.	DA114814.1	BRACE3033564	brain	5' read	P	449.	DA356235.1	BRSTN2001309	brain	5' read	P	545.	DA390060.1	BRTHA2026992	brain	5' read	P
354.	DA069631.1	BRACE2020043	brain	5' read	P	450.	DA389832.1	BRTHA2026653	brain	5' read	P	546.	DA489132.1	FCBBF3000011	brain	5' read	P
355.	DA108489.1	BRACE3024661	brain	5' read	P	451.	DA396236.1	BRTHA2035945	brain	5' read	P	547.	DA390523.1	BRTHA2027685	brain	5' read	P
356.	DA343765.1	BRSSN2003971	brain	5' read	P	452.	DA507810.1	FCBBF3023939	brain	5' read	P	548.	DA489799.1	FCBBF3000878	brain	5' read	P
357.	DA108546.1	BRACE3024735	brain	5' read	P	453.	DA402383.1	BRTHA3006108	brain	5' read	P	549.	DA528987.1	FEBRA2021560	brain	5' read	P
358.	DA337375.1	BRHIP3038286	brain	5' read	P	454.	DA402691.1	BRTHA3006557	brain	5' read	P	550.	DA417242.1	BRTHA3026565	brain	5' read	P
359.	DA108765.1	BRACE3025066	brain	5' read	P	455.	DA402754.1	BRTHA3006650	brain	5' read	P	551.	DA417492.1	BRTHA3027018	brain	5' read	P
360.	DA337684.1	BRHIP3038737	brain	5' read	P	456.	DA402758.1	BRTHA3006656	brain	5' read	P	552.	DA417594.1	BRTHA3027150	brain	5' read	P
361.	DA193306.1	BRAMY3017161	brain	5' read	P	457.	DA397106.1	BRTHA2037154	brain	5' read	P	553.	DA803543.1	OCBBF3008367	brain	5' read	P
362.	DA193313.1	BRAMY3017169	brain	5' read	P	458.	DA403020.1	BRTHA3006989	brain	5' read	P	554.	DA771014.1	OCBBF2003913	brain	5' read	P
363.	DA265532.1	BRCAN2018790	brain	5' read	P	459.	DA403301.1	BRTHA3007355	brain	5' read	P	555.	DA771031.1	OCBBF2003935	brain	5' read	P
364.	DA193385.1	BRAMY3017277	brain	5' read	P	460.	DA403573.1	BRTHA3007757	brain	5' read	P	556.	DA798071.1	OCBBF3001339	brain	5' read	P
365.	DA193607.1	BRAMY3017599	brain	5' read	P	461.	DA403690.1	BRTHA3007923	brain	5' read	P	557.	DA810151.1	OCBBF3026634	brain	5' read	P
366.	DA193735.1	BRAMY3017786	brain	5' read	P	462.	DA403750.1	BRTHA3008005	brain	5' read	P	558.	DA798203.1	OCBBF3001526	brain	5' read	P
367.	DA187200.1	BRAMY3007523	brain	5' read	P	463.	DA403935.1	BRTHA3008256	brain	5' read	P	559.	DA771448.1	OCBBF2004464	brain	5' read	P
368.	DA232789.1	BRAWH3028478	brain	5' read	P	464.	DA509006.1	FCBBF3025433	brain	5' read	P	560.	DA804031.1	OCBBF3008994	brain	5' read	P
369.	DA187548.1	BRAMY3008084	brain	5' read	P	465.	DA410229.1	BRTHA3016922	brain	5' read	P	561.	DA804066.1	OCBBF3009042	brain	5' read	P
370.	DA232900.1	BRAWH3028640	brain	5' read	P	466.	DA398605.1	BRTHA3000754	brain	5' read	P	562.	DA804174.1	OCBBF3009163	brain	5' read	P
371.	DA187670.1	BRAMY3008301	brain	5' read	P	467.	DA509645.1	FCBBF3026245	brain	5' read	P	563.	DA804179.1	OCBBF3009169	brain	5' read	P
372.	DA226430.1	BRAWH3020158	brain	5' read	P	468.	DA509708.1	FCBBF3026322	brain	5' read	P	564.	DA811109.1	OCBBF3027940	brain	5' read	P
373.	DA187888.1	BRAMY3008654	brain	5' read	P	469.	DA404119.1	BRTHA3008500	brain	5' read	P	565.	DA811110.1	OCBBF3027941	brain	5' read	P
374.	DA121862.1	BRACE3043159	brain	5' read	P	470.	DA404446.1	BRTHA3008952	brain	5' read	P	566.	DA811285.1	OCBBF3028165	brain	5' read	P
375.	DA148749.1	BRAMY2006088	brain	5' read	P	471.	DA359104.1	BRSTN2004846	brain	5' read	P	567.	DA722529.1	OCBBF2005768	brain	5' read	P
376.	DA115918.1	BRACE3035094	brain	5' read	P	472.	DA404713.1	BRTHA3009330	brain	5' read	P	568.	DA722696.1	OCBBF2005977	brain	5' read	P
377.	DA109541.1	BRACE3026180	brain	5' read	P	473.	DA404743.1	BRTHA3009369	brain	5' read	P	569.	DA811703.1	OCBBF3028725	brain	5' read	P
378.	DA344880.1	BRSSN2005413	brain	5' read	P	474.	DA404760.1	BRTHA3009391	brain	5' read	P	570.	DA805331.1	OCBBF3020332	brain	5' read	P
379.	DA194150.1	BRAMY3018376	brain	5' read	P	475.	DA404794.1	BRTHA3009433	brain	5' read	P	571.	DA805805.1	OCBBF3020993	brain	5' read	P
380.	DA194200.1	BRAMY3018446	brain	5' read	P	476.	DA483766.1	FCBBF2000190	brain	5' read	P	572.	DA773287.1	OCBBF2006728	brain	5' read	P
381.	DA233027.1	BRAWH3028807	brain	5' read	P	477.	DA399027.1	BRTHA3001346	brain	5' read	P	573.	DA773935.1	OCBBF2007510	brain	5' read	P

BIOINFORMATION
Discovery at the interface of physical and biological sciences

574.	DA806266.1	OCBBF3021620	brain	5' read	P	670.	DC328407.1	BRCOC2004489	brain	5' read	P	70.	DB489685.1	H033028M02	brain	5' read	P
575.	DA806662.1	OCBBF3022098	brain	5' read	P	671.	DC333524.1	BRHIP3013108	brain	5' read	-	71.	EB387863.1	nbj36f03	brain	5' read	-
576.	DA774382.1	OCBBF2008052	brain	5' read	P	672.	DC335672.1	BRHIP3036215	brain	5' read	-	72.	BG914285.1	IMAGE:4942475	brain	5' read	-
577.	DA768196.1	OCBBF2000063	brain	5' read	P	673.	DC308841.1	BRACE3028144	brain	5' read	P	73.	DC326243.1	BRCAN2008281	brain	5' read	P
578.	DA807081.1	OCBBF3022616	brain	5' read	P	674.	DC336035.1	BRHIP3040110	brain	5' read	P	74.	DC343475.1	BRTHA3016381	brain	5' read	P
579.	DA774967.1	OCBBF2008783	brain	5' read	P	675.	DC350289.1	FCBBF3002001	brain	5' read	P	75.	DC302326.1	BRACE2001723	brain	5' read	P
580.	DA807472.1	OCBBF3023130	brain	5' read	P	676.	DC342124.1	BRTHA3000573	brain	5' read	P	76.	DC304226.1	BRACE2024182	brain	5' read	P
581.	DA807559.1	OCBBF3023230	brain	5' read	P	677.	DC309303.1	BRACE3033159	brain	5' read	P	77.	DC316928.1	BRAMY3000548	brain	5' read	P
582.	DA768845.1	OCBBF2001201	brain	5' read	P	678.	DC307229.1	BRACE3010802	brain	5' read	P	78.	DC333869.1	BRHIP3017007	brain	5' read	P
583.	DA807781.1	OCBBF3023511	brain	5' read	P	679.	DC325898.1	BRCAN2004495	brain	5' read	P	79.	DC323188.1	BRAWH3028443	brain	5' read	P
584.	DA807947.1	OCBBF3023719	brain	5' read	P	680.	DC332542.1	BRHIP3002425	brain	5' read	-	80.	DC344178.1	BRTHA3025271	brain	5' read	P
585.	DA775353.1	OCBBF2009239	brain	5' read	P	681.	DC332564.1	BRHIP3002759	brain	5' read	P	81.	DC334219.1	BRHIP3020811	brain	5' read	P
586.	DA769213.1	OCBBF2001600	brain	5' read	P	682.	BI597041.1	IMAGE:5300177	brain	5' read	P	82.	DC338629.1	BRSTN2007994	brain	5' read	P
587.	DA808115.1	OCBBF3023933	brain	5' read	P	683.	BI601746.1	IMAGE:5301766	brain	5' read	-	83.	DC344327.1	BRTHA3026975	brain	5' read	P
588.	DA808736.1	OCBBF3024756	brain	5' read	P	684.	BI544366.1	IMAGE:5284359	brain	5' read	P	84.	DC327347.1	BRCAN2020977	brain	5' read	P
589.	DA782734.1	OCBBF2018639	brain	5' read	P	685.	BI545754.1	IMAGE:5259169	brain	5' read	-	85.	DC334381.1	BRHIP3022424	brain	5' read	P
590.	DA776306.1	OCBBF2010428	brain	5' read	P	686.	BI545908.1	IMAGE:5259793	brain	5' read	P	86.	DC327509.1	BRCAN2022977	brain	5' read	P
591.	DA809447.1	OCBBF3025683	brain	5' read	P	687.	BI545913.1	IMAGE:5259651	brain	5' read	P	87.	DC334618.1	BRHIP3024836	brain	5' read	P
592.	BE438687.1	IMAGE:3275134	brain	3' read	-	688.	BI545987.1	IMAGE:5259674	brain	5' read	P	88.	DC329737.1	BRCOC2019860	brain	5' read	P
593.	DA809642.1	OCBBF3025952	brain	5' read	P	689.	BI547550.1	IMAGE:5262424	brain	5' read	P	89.	DC319663.1	BRAWH2011267	brain	5' read	P
594.	DA809787.1	OCBBF3026128	brain	5' read	P	690.	BI547746.1	IMAGE:5263249	brain	5' read	P	90.	DC337169.1	BRSSN2009225	brain	5' read	P
595.	DA790232.1	OCBBF2028829	brain	5' read	P	691.	BI552242.1	IMAGE:5274838	brain	5' read	P	91.	DC305176.1	BRACE2035087	brain	5' read	P
596.	DA790286.1	OCBBF2028895	brain	5' read	P	692.	BI752434.1	IMAGE:5198424	brain	5' read	P	92.	DC313865.1	BRAMY2012263	brain	5' read	P
597.	DA790778.1	OCBBF2029589	brain	5' read	P	693.	BM547586.1	IMAGE:5727636	brain	5' read	-	93.	DC326205.1	BRCAN2007855	brain	5' read	P
598.	DA790991.1	OCBBF2029889	brain	5' read	P	694.	BU147167.1	IMAGE:6339712	brain	5' read	P	94.	BI757805.1	IMAGE:5200310	brain	5' read	-
599.	DA778289.1	OCBBF2012913	brain	5' read	P	695.	BI13571.1	IMAGE:26828	brain	5' read	P	95.	BI828125.1	IMAGE:5167221	brain	5' read	P
600.	DA784981.1	OCBBF2021514	brain	5' read	P	**BACE1**						96.	BU148788.1	IMAGE:6377144	brain	5' read	P
601.	BF529165.1	IMAGE:4179730	brain	5' read	-	1.	BI14536.1	IMAGE:29111	brain	5' read	-	97.	T75407.1	IMAGE:23171	brain	5' read	-
602.	DA779500.1	OCBBF2014446	brain	5' read	P	2.	BI24715.1	IMAGE:35228	brain	5' read	-	98.	T77182.1	IMAGE:23706	brain	5' read	-
603.	DA779762.1	OCBBF2014773	brain	5' read	P	3.	BI51552.1	IMAGE:39317	brain	5' read	-	99.	T65256.1	IMAGE:22004	brain	5' read	-
604.	DA779889.1	OCBBF2014934	brain	5' read	P	4.	BI54499.1	IMAGE:38962	brain	5' read	-	100.	BI12815.1	IMAGE:26144	brain	5' read	-
605.	DA903332.1	SKNMC2003445	brain	5' read	P	5.	T08924.1	HIBBM31	brain	5' read	-						
606.	DA792653.1	OCBBF2032255	brain	5' read	P	6.	T09493.1	HIBBU95	brain	5' read	-	**PSEN1**					
607.	DA903726.1	SKNMC2003945	brain	5' read	P	7.	BI59459.1	IMAGE:38041	brain	5' read	-	1.	CB153619.1	B1T694954-33-G06	brain	5' read	-
608.	DA786685.1	OCBBF2023867	brain	5' read	P	8.	CF265207.1	IMAGE:30513210	brain	5' read	-	2.	BI53638.1	IMAGE:39842	brain	5' read	-
609.	DA794452.1	OCBBF2034828	brain	5' read	P	9.	CK005695.1	IMAGE:30721565	brain	5' read	-	3.	CD172531.1	IMAGE:30376003	brain	5' read	P
610.	DA794942.1	OCBBF2035528	brain	5' read	P	10.	H15682.1	IMAGE:49409	brain	5' read	-	4.	AL119511.1	DKFZp761O061	brain	5' read	-
611.	DA800473.1	OCBBF3004444	brain	5' read	P	11.	H19939.1	IMAGE:173043	brain	5' read	-	5.	CK004701.1	IMAGE:30723099	brain	5' read	-
612.	DA788942.1	OCBBF2027004	brain	5' read	P	12.	CR736025.1	IMAGp998O06178	brain	5' read	-	6.	CK024223.1	IMAGE:30721305	brain	5' read	-
613.	DA800999.1	OCBBF3005100	brain	5' read	P	13.	H24093.1	IMAGE:51709	brain	5' read	-	7.	H10264.1	IMAGE:46604	brain	5' read	-
614.	DA795496.1	OCBBF2036370	brain	5' read	P	14.	DB001594.1	TC124824	brain	5' read	-	8.	H19012.1	IMAGE:51014	brain	5' read	P
615.	DA795596.1	OCBBF2036515	brain	5' read	P	15.	DB001988.1	TC120577	brain	5' read	P	9.	BP380611.1	Zrv61736	brain	5' read	P
616.	DA795631.1	OCBBF2036564	brain	5' read	P	16.	BF338951.1	IMAGE:4184140	brain	5' read	P	10.	DN993454.1	TC109637	brain	5' read	P
617.	DA795635.1	OCBBF2036569	brain	5' read	P	17.	BF345198.1	IMAGE:4153661	brain	5' read	-	11.	BE958534.1	IMAGE:3930375	brain	5' read	-
618.	DA795946.1	OCBBF2036996	brain	5' read	P	18.	DA234023.1	BRAWH3030091	brain	5' read	P	12.	DA345874.1	BRSSN2006752	brain	5' read	P
619.	DA801307.1	OCBBF3005483	brain	5' read	P	19.	DA281277.1	BRCOC2009985	brain	5' read	-	13.	DA273875.1	BRCOC2000080	brain	5' read	P
620.	DA801469.1	OCBBF3005684	brain	5' read	P	20.	DA197518.1	BRAWH2000058	brain	5' read	P	14.	DA195728.1	BRAMY4001228	brain	5' read	-
621.	DA907265.1	SKNMC2008824	brain	5' read	P	21.	DA276716.1	BRCOC2003797	brain	5' read	-	15.	DA162322.1	BRAMY2022711	brain	5' read	P
622.	DA796596.1	OCBBF2037892	brain	5' read	P	22.	DA171523.1	BRAMY2033793	brain	5' read	-	16.	DA201605.1	BRAWH2006280	brain	5' read	P
623.	DA796666.1	OCBBF2037990	brain	5' read	P	23.	DA210591.1	BRAWH2018742	brain	5' read	-	17.	DA084166.1	BRACE2038202	brain	5' read	P
624.	DA802266.1	OCBBF3006667	brain	5' read	P	24.	DA165933.1	BRAMY2027048	brain	5' read	-	18.	DA346004.1	BRSSN2006919	brain	5' read	P
625.	DA796989.1	OCBBF3000009	brain	5' read	P	25.	DA060695.1	BRACE2009055	brain	5' read	-	19.	DA280524.1	BRCOC2008954	brain	5' read	P
626.	DA802743.1	OCBBF3007318	brain	5' read	P	26.	DA283044.1	BRCOC2012480	brain	5' read	P	20.	DA280738.1	BRCOC2009255	brain	5' read	P
627.	DA802022.1	H023092D17	brain	5' read	P	27.	DA250761.1	BRCAN2000644	brain	5' read	-	21.	DA274197.1	BRCOC2000499	brain	5' read	P
628.	DB500431.1	H033076M12	brain	5' read	P	28.	BF684068.1	IMAGE:4302482	uterus	5' read	-	22.	DA346568.1	BRSSN2007678	brain	5' read	P
629.	DA802601.1	H023094F03	brain	5' read	P	29.	DA063184.1	BRACE2012116	brain	5' read	P	23.	DA313225.1	BRHIP3002656	brain	5' read	-
630.	DA802603.1	H023094F05	brain	5' read	P	30.	DA142579.1	BRALZ2017792	brain	5' read	-	24.	DA346667.1	BRSSN2007810	brain	5' read	P
631.	DB501534.1	H033080L18	brain	5' read	P	31.	DA326129.1	BRHIP3021438	brain	5' read	P	25.	DA196185.1	BRAMY4001798	brain	5' read	-
632.	DB483385.1	H023097D24	brain	5' read	P	32.	DA332992.1	BRHIP3031566	brain	5' read	P	26.	DA307385.1	BRHIP2024211	brain	5' read	P
633.	DB463894.1	H023007K15	brain	5' read	P	33.	DA176586.1	BRAMY2040207	brain	5' read	-	27.	DA202113.1	BRAWH2007055	brain	5' read	P
634.	DB464913.1	H023013O17	brain	5' read	P	34.	DA065219.1	BRACE2014575	brain	5' read	-	28.	DA197071.1	BRASW1000057	brain	5' read	P
635.	DB467711.1	H023029I18	brain	5' read	P	35.	DA110757.1	BRACE3027914	brain	5' read	-	29.	DA079217.1	BRACE2032005	brain	5' read	P
636.	DB486967.1	H033015M02	brain	5' read	-	36.	DA288252.1	BRCOC2019731	brain	5' read	P	30.	DA242655.1	BRAWH3040692	brain	5' read	-
637.	DB470256.1	H023043M14	brain	5' read	P	37.	DA138548.1	BRALZ2012546	brain	5' read	-	31.	DA170551.1	BRAMY2032608	brain	5' read	P
638.	DB470856.1	H023048G16	brain	5' read	-	38.	DA262403.1	BRCAN2014877	brain	5' read	P	32.	DA308500.1	BRHIP2025715	brain	5' read	P
639.	DB490884.1	H033037C13	brain	5' read	-	39.	DA145632.1	BRAMY2002193	brain	5' read	-	33.	DA236795.1	BRAWH3033544	brain	5' read	P
640.	EB385519.1	nbj03g05	brain	5' read	P	40.	DA257904.1	BRCAN2009316	brain	5' read	-	34.	DA047192.1	BNGH42000039	brain	5' read	P
641.	EB386959.1	nbj23d12	brain	5' read	P	41.	DA029399.1	ASTRO2013361	brain	5' read	P	35.	DA348493.1	BRSSN2010342	brain	5' read	P
642.	EB388483.1	nbj46a02	brain	5' read	-	42.	DA264710.1	BRCAN2017739	brain	5' read	-	36.	DA276493.1	BRCOC2003449	brain	5' read	P
643.	EB388822.1	nbj50g08	brain	5' read	P	43.	DA219255.1	BRAWH3010653	brain	5' read	-	37.	DA204395.1	BRAWH2010482	brain	5' read	-
644.	DB473886.1	H023061F19	brain	5' read	P	44.	DA121552.1	BRACE3042719	brain	5' read	-	38.	DA204750.1	BRAWH2010970	brain	5' read	-
645.	DB473887.1	H023061F20	brain	5' read	P	45.	DA311351.1	BRHIP2029691	brain	5' read	-	39.	DA283017.1	BRCOC2012445	brain	5' read	P
646.	DB474420.1	H023063G14	brain	5' read	P	46.	DA344997.1	BRSSN2005568	brain	5' read	-	40.	DA283898.1	BRCOC2013681	brain	5' read	P
647.	DB476002.1	H023069C17	brain	5' read	P	47.	DA194800.1	BRAMY4000114	brain	5' read	P	41.	DA199236.1	BRAWH2002728	brain	5' read	P
648.	DB477017.1	H023073M21	brain	5' read	P	48.	DA535790.1	FEHRT2001237	heart	5' read	-	42.	DA205102.1	BRAWH2011414	brain	5' read	P
649.	DB496423.1	H033061P17	brain	5' read	P	49.	DA352129.1	BRSSN2015301	brain	5' read	-	43.	DA133125.1	BRALZ2005574	brain	5' read	P
650.	DB497026.1	H033064D08	brain	5' read	P	50.	DA352884.1	BRSSN2016309	brain	5' read	-	44.	DA284855.1	BRCOC2015049	brain	5' read	P
651.	DB478562.1	H023079J01	brain	5' read	P	51.	DA498234.1	FCBBF3011514	brain	5' read	-	45.	DA278826.1	BRCOC2006568	brain	5' read	P
652.	DB497655.1	H033066L17	brain	5' read	P	52.	DA360023.1	BRSTN2006007	brain	5' read	P	46.	DA167369.1	BRAMY2028821	brain	5' read	P
653.	DB479066.1	H023081F24	brain	5' read	P	53.	DA400127.1	BRTHA3002932	brain	5' read	-	47.	DA206316.1	BRAWH2013021	brain	5' read	P
654.	DB497957.1	H033067N22	brain	5' read	P	54.	DA401987.1	BRTHA3005571	brain	5' read	-	48.	DA206666.1	BRAWH2013490	brain	5' read	P
655.	AL532648.3	CS0DN001YN12	brain	5' read	P	55.	DA403962.1	BRTHA3008291	brain	5' read	-	49.	DA089302.1	BRACE2044684	brain	5' read	P
656.	AL532723.3	CS0DN001YE01	brain	5' read	P	56.	DA410517.1	BRTHA3017321	brain	5' read	-	50.	DA206985.1	BRAWH2013917	brain	5' read	P
657.	AL533088.3	CS0DN005YC23	brain	5' read	P	57.	DA367354.1	BRSTN2015550	brain	5' read	-	51.	DA285139.1	BRCOC2015422	brain	5' read	P
658.	AL534654.3	CS0DF006YE11	brain	5' read	P	58.	DA412843.1	BRTHA3020553	brain	5' read	P	52.	DA318083.1	BRHIP3009633	brain	5' read	-
659.	AL537562.3	CS0DF026YI24	brain	5' read	P	59.	DA367531.1	BRSTN2015782	brain	5' read	-	53.	DA252618.1	BRCAN2002895	brain	5' read	P
660.	BG818556.1	IMAGE:4914668	brain	5' read	P	60.	DA406749.1	BRTHA3012120	brain	5' read	P	54.	DA174867.1	BRAMY2038081	brain	5' read	P
661.	BG911178.1	IMAGE:4938599	brain	5' read	P	61.	DA491033.1	FCBBF3002402	brain	5' read	P	55.	DA286183.1	BRCOC2016861	brain	5' read	P
662.	BG912661.1	IMAGE:4939108	brain	5' read	P	62.	DA485211.1	FCBBF2002169	brain	5' read	-	56.	DA057820.1	BRACE2005433	brain	5' read	-
663.	BG913173.1	IMAGE:4943762	brain	5' read	P	63.	DA414818.1	BRTHA3023357	brain	5' read	-	57.	DA253154.1	BRCAN2003545	brain	5' read	P
664.	BG913837.1	IMAGE:4944560	brain	5' read	P	64.	DA532599.1	FEBRA2026278	brain	5' read	-	58.	DA319734.1	BRHIP3012110	brain	5' read	-
665.	BG701016.1	IMAGE:4814595	brain	5' read	-	65.	DA527898.1	FEBRA2020177	brain	5' read	P	59.	DA058315.1	BRACE2006036	brain	5' read	P
666.	BG704185.1	IMAGE:4819974	brain	5' read	P	66.	DA501485.1	FCBBF3015745	brain	5' read	-	60.	DA031505.1	ASTRO2015971	brain	5' read	-
667.	BG709029.1	IMAGE:4797883	brain	5' read	P	67.	DA914548.1	SKNSH2009110	brain	5' read	P	61.	DA031927.1	ASTRO2016491	brain	5' read	-
668.	DC318327.1	BRAMY3017932	brain	5' read	P	68.	DA783800.1	OCBBF2019979	brain	5' read	-	62.	DA143311.1	BRALZ2018750	brain	5' read	P
669.	DC351752.1	FCBBF3022441	brain	5' read	P	69.	DA793366.1	OCBBF2033336	brain	5' read	-	63.	DA065266.1	BRACE2014631	brain	5' read	P

BIOINFORMATION
Discovery at the interface of physical and biological sciences

64.	DA209990.1	BRAWH2017959	brain	5' read	P	2.	CK003561.1	IMAGE:30720023	brain	5' read	-
65.	DA288101.1	BRCOC2019515	brain	5' read	-	3.	DA156182.1	BRAMY2015304	brain	5' read	P
66.	DA294700.1	BRHIP2007239	brain	5' read	P	4.	DA163047.1	BRAMY2023579	brain	5' read	-
67.	DA288622.1	BRCOC2020217	brain	5' read	P	5.	DA130088.1	BRALZ2001203	brain	5' read	P
68.	BF696192.1	IMAGE:4281578	brain	5' read	-	6.	DA347874.1	BRSSN2009483	brain	5' read	P
69.	BF697026.1	IMAGE:4286283	brain	5' read	-	7.	DA308638.1	BRHIP2025898	brain	5' read	-
70.	BF697285.1	IMAGE:4286717	brain	5' read	-	8.	DA171064.1	BRAMY2033218	brain	5' read	-
71.	DA144712.1	BRAMY2000995	brain	5' read	P	9.	DA198818.1	BRAWH2002094	brain	5' read	-
72.	DA144939.1	BRAMY2001292	brain	5' read	-	10.	DA159674.1	BRAMY2019501	brain	5' read	-
73.	DA295618.1	BRHIP2008393	brain	5' read	P	11.	DA048320.1	BNGH42001556	brain	5' read	-
74.	DA289738.1	BRHIP2000859	brain	5' read	P	12.	DA048347.1	BNGH42001601	brain	5' read	-
75.	DA341220.1	BRSSN2000475	brain	5' read	P	13.	DA283759.1	BRCOC2013488	brain	5' read	P
76.	DA296258.1	BRHIP2009200	brain	5' read	P	14.	DA048514.1	BNGH42001872	brain	5' read	-
77.	DA263077.1	BRCAN2015700	brain	5' read	P	15.	DA061392.1	BRACE2009922	brain	5' read	P
78.	BF700768.1	IMAGE:4285528	brain	5' read	-	16.	DA291619.1	BRHIP2003271	brain	5' read	-
79.	DA329007.1	BRHIP3025659	brain	5' read	-	17.	DA174555.1	BRAMY2037698	brain	5' read	P
80.	DA191355.1	BRAMY3014230	brain	5' read	-	18.	DA097828.1	BRACE3008590	brain	5' read	-
81.	DA302981.1	BRHIP2018320	brain	5' read	P	19.	DA028819.1	ASTRO2012653	brain	5' read	-
82.	DA252663.1	BRCAN2009033	brain	5' read	P	20.	DA074627.1	BRACE2026176	brain	5' read	-
83.	DA252845.1	BRCAN2009251	brain	5' read	P	21.	DA342948.1	BRSSN2002870	brain	5' read	-
84.	DA179575.1	BRAMY2044034	brain	5' read	P	22.	DA148694.1	BRAMY2006016	brain	5' read	P
85.	DA146632.1	BRAMY2003439	brain	5' read	P	23.	DA353516.1	BRSSN2017180	brain	5' read	-
86.	DA297654.1	BRHIP2011089	brain	5' read	P	24.	DA393597.1	BRTHA2032125	brain	5' read	-
87.	DA336533.1	BRHIP3037073	brain	5' read	P	25.	DA373759.1	BRTHA2004472	brain	5' read	-
88.	DA298160.1	BRHIP2011793	brain	5' read	P	26.	DA501142.1	FCBBF3015286	brain	5' read	-
89.	DA114998.1	BRACE3033835	brain	5' read	-	27.	DA351047.1	BRSSN2013899	brain	5' read	P
90.	DA298351.1	BRHIP2012046	brain	5' read	P	28.	DA770292.1	OCBBF2002935	brain	5' read	-
91.	DA310302.1	BRHIP2028207	brain	5' read	-	29.	DA790113.1	OCBBF2028656	brain	5' read	-
92.	DA271573.1	BRCAN2026162	brain	5' read	P	30.	DA910347.1	SKNSH2003288	brain	5' read	P
93.	DA304396.1	BRHIP2020308	brain	5' read	P	31.	DA795588.1	OCBBF2036505	brain	5' read	-
94.	DA148023.1	BRAMY2005177	brain	5' read	P	32.	DA789669.1	OCBBF2028040	brain	5' read	-
95.	DA299651.1	BRHIP2013707	brain	5' read	P	33.	DC304018.1	BRACE2021964	brain	5' read	P
96.	DA311925.1	BRHIP3000738	brain	5' read	P	34.	DC302320.1	BRACE2001617	brain	5' read	P
97.	DA200944.1	BRAWH2005289	brain	5' read	P	35.	BM548100.1	IMAGE:5732941	brain	5' read	P
98.	DA391262.1	BRTHA2028741	brain	5' read	P	36.	BM558036.1	IMAGE:5477870	brain	5' read	P
99.	DA391292.1	BRTHA2028800	brain	5' read	P						
100.	DA497138.1	FCBBF3010151	brain	5' read	P						
101.	DA608652.1	IMR322006108	brain	5' read	P						
102.	DA392156.1	BRTHA2030022	brain	5' read	P						
103.	DA392661.1	BRTHA2030787	brain	5' read	P						
104.	DA353824.1	BRSSN2017579	brain	5' read	P						
105.	DA510581.1	FCBBF3027410	brain	5' read	-						
106.	DA504115.1	FCBBF3019203	brain	5' read	P						
107.	DA504785.1	FCBBF3020099	brain	5' read	P						
108.	DA393846.1	BRTHA2032476	brain	5' read	P						
109.	DA387469.1	BRTHA2023207	brain	5' read	P						
110.	DA387539.1	BRTHA2023308	brain	5' read	P						
111.	DA354251.1	BRSSN2018169	brain	5' read	P						
112.	DA506604.1	FCBBF3022442	brain	5' read	P						
113.	DA395731.1	BRTHA2035218	brain	5' read	P						
114.	DA362387.1	BRSTN2009016	brain	5' read	P						
115.	DA356342.1	BRSTN2001446	brain	5' read	P						
116.	DA402037.1	BRTHA3005641	brain	5' read	-						
117.	DA520672.1	FEBRA2010587	brain	5' read	P						
118.	DA508815.1	FCBBF3025186	brain	5' read	P						
119.	DA359810.1	BRSTN2005743	brain	5' read	P						
120.	DA483308.1	FCBBF1000375	brain	5' read	P						
121.	DA366554.1	BRSTN2014506	brain	5' read	P						
122.	DA518494.1	FEBRA2007680	brain	5' read	-						
123.	DA368214.1	BRSTN2016635	brain	5' read	P						
124.	DA525968.1	FEBRA2017611	brain	5' read	-						
125.	DA487608.1	FCBBF2005641	brain	5' read	P						
126.	DA500037.1	FCBBF3013875	brain	5' read	-						
127.	DA533762.1	FEBRA2027807	brain	5' read	P						
128.	DA500416.1	FCBBF3014362	brain	5' read	P						
129.	DA351221.1	BRSSN2014118	brain	5' read	P						
130.	DA810841.1	OCBBF3027591	brain	5' read	-						
131.	DA781068.1	OCBBF2016479	brain	5' read	P						
132.	DA782433.1	OCBBF2018252	brain	5' read	P						
133.	DA783137.1	OCBBF2019166	brain	5' read	P						
134.	DA777912.1	OCBBF2012441	brain	5' read	-						
135.	DA791496.1	OCBBF2030608	brain	5' read	-						
136.	DA785260.1	OCBBF2021862	brain	5' read	P						
137.	DA779279.1	OCBBF2014161	brain	5' read	P						
138.	DA792203.1	OCBBF2031559	brain	5' read	P						
139.	DA786622.1	OCBBF2023776	brain	5' read	P						
140.	DA787493.1	OCBBF2025047	brain	5' read	P						
141.	DA788209.1	OCBBF2026041	brain	5' read	P						
142.	DA788891.1	OCBBF2026934	brain	5' read	P						
143.	DA906385.1	SKNMC2007468	brain	5' read	P						
144.	DA795457.1	OCBBF2036316	brain	5' read	P						
145.	DA906953.1	SKNMC2008312	brain	5' read	P						
146.	DA789610.1	OCBBF2027954	brain	5' read	P						
147.	DA796664.1	OCBBF2037986	brain	5' read	P						
148.	DA796870.1	OCBBF2038255	brain	5' read	P						
149.	DB481886.1	H023091L16	brain	5' read	-						
150.	DB484795.1	H033004C24	brain	5' read	-						
151.	DB467937.1	H023030K08	brain	5' read	P						
152.	BG709493.1	IMAGE:4797305	brain	5' read	-						
153.	DC352856.1	FEBRA2008325	brain	5' read	-						
154.	BI753252.1	IMAGE:5196615	brain	5' read	P						
155.	BI755293.1	IMAGE:5193181	brain	5' read	P						
156.	BI831006.1	IMAGE:5172563	brain	5' read	P						
157.	BI913201.1	IMAGE:5243215	brain	5' read	-						
PSEN2											
1.	AW162923.1	IMAGE:2783548	brain	5' read	-						

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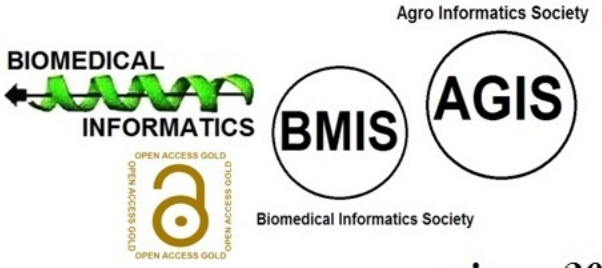

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