

## Supplement

Supplementary table 1: AD patients target genes of the module CTCF-EGRF-SP1F derived from biclustering analysis with eight clusters. The columns describe the Gene symbol, GeneID and the molecular function as described in Gene Ontology.

<b>Gene symbol</b>	<b>GeneID</b>	<b>Molecular function</b>
AP3S1	1176	protein binding, protein transporter activity, transporter activity
BAI2	576	G-protein coupled receptor activity, brain-specific angiogenesis inhibitor activity
C1orf95	375057	
C20orf24	55969	molecular function, protein binding
CD164	8763	protein binding
EFNB2	1948	ephrin receptor binding
EIF5	1983	GTP binding, GTPase activity, nucleotide binding, translation factor activity, nucleic acid binding, translation initiation factor activity
EPAS1	2034	DNA binding, RNA polymerase II transcription factor activity, enhancer binding, histone acetyltransferase binding, protein binding, protein heterodimerization activity, contributes to sequence-specific DNA binding, signal transducer activity, specific RNA polymerase II transcription factor activity, transcription coactivator activity, transcription factor binding
GLUD1	2746	ADP, ATP, GTP, NAD binding, glutamate dehydrogenase activity, glutamate dehydrogenase activity, identical protein binding, leucine binding, nucleotide binding, oxidoreductase activity, protein binding
GNAS	2778	GTP binding, GTPase activity, guanyl nucleotide binding, identical protein binding, molecular function, nucleotide binding, protein binding, signal transducer activity
MCTP1	79772	calcium ion binding, NOT calcium-dependent phospholipid binding
NFIB	4781	transcription factor activity
NPTX2	4885	metal ion binding, molecular function, sugar binding
RB1CC1	9821	protein binding
RHEB	6009	GTP binding, GTPase activity, metal ion binding, nucleotide binding, protein binding
VAPA	9218	protein binding, protein heterodimerization activity, signal transducer activity, structural molecule activity

Supplementary table 2: Double transgenic mice target genes of the module CTCF-EGRF-SP1F derived from biclustering analysis with 13 clusters. The columns describe the Gene symbol, GeneID and the molecular function as described in Gene Ontology.

<b>Gene symbol</b>	<b>GeneID</b>	<b>Molecular function</b>
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Abi2	329165	
Bruno15	319586	molecular function
Cacna2d1	12293	calcium channel activity, ion channel activity, metal ion binding, protein binding, voltage-gated calcium channel activity, voltage-gated ion channel activity
Ccdc47	67163	calcium ion binding
Dennd5a	19347	Rab GTPase binding, protein binding
Eid1	58521	protein binding, specific transcriptional repressor activity, transcription corepressor activity
Eif5	217869	GTP binding, binding, nucleotide binding, translation initiation factor activity
Gsk3b*)	56637	ATP binding, beta-catenin binding, glycogen synthase kinase 3 activity, integrin binding, ionotropic glutamate receptor binding, kinase activity, nucleotide binding, p53 binding, protein binding, protein kinase activity, protein serine/threonine kinase activity, tau-protein kinase activity
Hnrnpk	15387	DNA binding, RNA binding, nucleic acid binding, protein binding, single-stranded DNA binding
Jmjd1c	108829	metal ion binding, molecular function, oxidoreductase activity, acting on single donors with incorporation of molecular oxygen, incorporation of two atoms of oxygen
Klc1	16593	binding, microtubule motor activity, motor activity, protein binding
Myh10	77579	ADP, ATP binding, actin binding, actin filament binding, actin-dependent ATPase activity, calmodulin binding, microfilament motor activity, motor activity, nucleotide binding, protein binding
Nfix	18032	DNA binding, protein binding, transcription activator activity, transcription factor activity
Nptxr	73340	pentraxin receptor activity, protein complex binding
Pafah1b1	18472	dynein intermediate chain binding, hydrolase activity, microtubule binding, phosphoprotein binding, protein complex binding, protein homodimerization activity
Pde10a	23984	3',5'-cyclic-GMP phosphodiesterase activity, 3',5'-cyclic-nucleotide phosphodiesterase activity, cAMP binding, catalytic activity, cyclic-nucleotide phosphodiesterase activity, drug binding, hydrolase activity, metal ion binding, nucleotide binding
Pebp1	23980	ATP binding, lipid binding, kinase binding, mitogen-activated protein kinase binding, nucleotide binding, peptidase inhibitor activity, protein kinase binding, receptor binding, serine-type endopeptidase inhibitor activity
Ppp3cb	19056	calcium-dependent protein serine/threonine phosphatase activity, calmodulin binding, hydrolase activity, metal ion binding, phosphoprotein phosphatase activity, protein heterodimerization activity, protein serine/threonine phosphatase activity
Prei4	74182	carbohydrate binding, catalytic activity, glycerophosphodiester phosphodiesterase activity, hydrolase activity, phosphoric diester hydrolase activity
Ptbp2	56195	RNA binding, mRNA binding, nucleic acid binding, nucleotide binding, protein binding
Rab6	19346	ATPase activator activity, GTP binding, nucleotide binding, protein N-terminus binding, protein binding
Reep5	13476	protein binding, receptor activity
Sgtb	218544	Binding, protein heterodimerization activity, protein homodimerization activity
Syp	20977	SH2 domain binding, identical protein binding, protein binding, protein complex binding, syntaxin-1 binding, transporter activity
Tmed7	66676	molecular function
Tsc22d1	21807	transcription factor activity
Tspan2	70747	molecular function
Ttc7b	104718	molecular function
Ubr3	68795	ligase activity, metal ion binding, protein binding, ubiquitin-protein ligase activity, zinc ion

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		binding
Vamp2	22318	SNARE binding, calmodulin binding, myosin binding, phospholipid binding, protein binding, protein complex binding, syntaxin binding, syntaxin-1 binding
Vapa	30960	protein heterodimerization activity, structural molecule activity
Wdr6	83669	molecular function
Ywhae	22627	enzyme binding, monooxygenase activity, protein binding, protein complex binding, protein domain specific binding
Ywhaq	22630	monooxygenase activity, protein domain specific binding

\*) incorporated in AlzGene database

Supplementary table 3: LOAD patients target genes of the module CTCF-EGRF-SP1F derived from biclustering analysis with 18 clusters. The columns describe the Gene symbol, GeneID and the molecular function as described in Gene Ontology.

Gene symbol	GeneID	Molecular function
ATP1A3	478	ATP binding, ATPase activity, coupled to transmembrane movement of ions, phosphorylative mechanism, hydrolase activity, acting on acid anhydrides, catalyzing transmembrane movement of substances, metal ion binding, monovalent inorganic cation transmembrane transporter activity, nucleotide binding, sodium:potassium-exchanging ATPase activity
ATP6V1A	523	ATP binding, hydrogen ion transporting ATP synthase activity, rotational mechanism, hydrolase activity, acting on acid anhydrides, catalyzing transmembrane movement of substances, nucleotide binding, proton-transporting ATPase activity, rotational mechanism
CALY	50632	clathrin light chain binding, dopamine receptor binding
CCK	885	hormone activity, neuropeptide hormone activity, protein binding
EEF1A2	1917	GTP binding, GTPase activity, nucleotide binding, protein binding, translation elongation factor activity, translation factor activity, nucleic acid binding
GARS	2617	ATP binding, glycine-tRNA ligase activity, nucleotide binding, protein dimerization activity
GOT1*)	2805	L-aspartate:2-oxoglutarate aminotransferase activity, carboxylic acid binding, phosphatidylserine decarboxylase activity, pyridoxal phosphate binding
NAPB	63908	binding
NELL2	4753	calcium ion binding, protein binding, structural molecule activity
PNMA2	10687	protein binding
REEP5	7905	molecular function, protein binding
SYP	6855	SH2 domain binding, calcium ion binding, cholesterol binding, identical protein binding, protein complex binding, syntaxin-1 binding, transporter activity

\*) incorporated in AlzGene database

Supplementary table 4: AD patients target genes of the module CTCF-SP1F-ZBPF derived from biclustering analysis with five clusters. The columns describe the Gene symbol, GeneID and the molecular function as described in Gene Ontology.

<b>Gene symbol</b>	<b>GeneID</b>	<b>Molecular function</b>
ADD3	120	actin binding, calmodulin binding, metal ion binding, protein kinase C binding, structural constituent of cytoskeleton
CDC42EP4	23580	GTP-Rho binding, protein binding
CTBP2	1488	NAD or NADH binding, cofactor binding, oxidoreductase activity, acting on the CH-OH group of donors, NAD or NADP as acceptor, protein binding, transcription repressor activity
FXN	2395	2 iron, 2 sulfur cluster binding, ferric iron binding, ferrous iron binding, iron chaperone activity, iron-sulfur cluster binding, protein binding
MAFF	23764	sequence-specific DNA binding, transcription factor activity
NBPF14	25832	
PAX6	5080	DNA binding, protein binding, sequence-specific DNA binding, transcription factor activity
RAB31	11031	GTP binding, GTPase activity, nucleotide binding
RHOQ	23433	GBD domain binding, GTP binding, GTPase activity, nucleotide binding, profilin binding, protein binding
SEPT9	10801	GTP binding, GTPase activity, nucleotide binding, protein binding
SOX10	6663	RNA polymerase II transcription factor activity, enhancer binding, chromatin binding, identical protein binding, promoter binding, protein binding, transcription coactivator activity
SUV420H1	51111	histone methyltransferase activity (H4-K20 specific), methyltransferase activity, protein binding, transferase activity
TMEM184B	25829	
ZBTB16	7704	DNA binding, double-stranded DNA binding, identical protein binding, metal ion binding, protein C-terminus binding, protein binding, protein domain specific binding, protein homodimerization activity, specific transcriptional repressor activity, transcription factor/repressor activity, zinc ion binding

Supplementary table 5: LOAD patients target genes of the module CTCF-SP1F-ZBPF derived from biclustering analysis with 18 clusters. The columns describe the Gene symbol, GeneID and the molecular function as described in Gene Ontology.

<b>Gene symbol</b>	<b>GeneID</b>	<b>Molecular function</b>
ADD3	120	actin binding, calmodulin binding, metal ion binding, protein kinase C binding, structural constituent of cytoskeleton
ATG10	83734	Atg12 ligase activity, ligase activity, protein binding

CXorf41	139212	
EEF1D	1936	protein binding, signal transducer activity, translation elongation factor activity, translation factor activity, nucleic acid binding
GLUL	2752	ATP binding, glutamate decarboxylase activity, glutamate-ammonia ligase activity, identical protein binding, ligase activity, lyase activity, nucleotide binding
MT3	4504	antioxidant activity, copper ion binding, metal ion binding, zinc ion binding
NUCKS1	64710	
PIP4K2B	8396	1-phosphatidylinositol-4-phosphate 5-kinase activity, 1-phosphatidylinositol-5-phosphate 4-kinase activity, ATP binding, kinase activity, nucleotide binding, protein binding, receptor signaling protein activity, transferase activity
RBX1	9978	NEDD8 ligase activity, ligase activity, metal ion binding, protein binding, contributes to ubiquitin-protein ligase activity, zinc ion binding
RPL35	11224	mRNA binding, protein binding, structural constituent of ribosome
SHCBP1	79801	SH2 domain binding, protein binding

Supplementary table 6: AD patients target genes of the module KLFS-SP1F-ZBPF derived from biclustering analysis with five clusters. The columns describe the Gene symbol, GeneID and the molecular function as described in Gene Ontology.

<b>Gene symbol</b>	<b>GeneID</b>	<b>Molecular function</b>
ADD3	120	actin binding, calmodulin binding, metal ion binding, protein kinase C binding, structural constituent of cytoskeleton
CDC42EP4	23580	GTP-Rho binding, protein binding
CLU <sup>*</sup>	1191	misfolded protein binding, protein binding
CTBP2	1488	NAD or NADH binding, cofactor binding, oxidoreductase activity, oxidoreductase activity, acting on the CH-OH group of donors, NAD or NADP as acceptor, protein binding, transcription repressor activity
FXN	2395	2 iron, 2 sulfur cluster binding, ferric iron binding, ferrous iron binding, iron chaperone activity, iron-sulfur cluster binding, protein binding
NFE2L1	4779	protein dimerization activity, sequence-specific DNA binding, transcription cofactor activity, transcription factor activity
NUCKS1	64710	
PAX6	5080	DNA binding, protein binding, sequence-specific DNA binding, transcription factor activity
RAB31	11031	GTP binding, GTPase activity, nucleotide binding
RHOQ	23433	GBD domain binding, GTP binding, GTPase activity, nucleotide binding, profilin binding, protein binding
SEPT9	10801	GTP binding, GTPase activity, nucleotide binding, protein binding

STOM	2040	protein binding
SUV420H1	51111	histone methyltransferase activity (H4-K20 specific), methyltransferase activity, protein binding, transferase activity
TRAM1	23471	protein binding, receptor activity
WNK1	65125	ATP binding, molecular function, nucleotide binding, protein binding, protein kinase inhibitor activity, protein serine/threonine kinase activity, transferase activity
ZBTB16	7704	DNA binding, double-stranded DNA binding, identical protein binding, metal ion binding, protein C-terminus binding, protein binding, protein domain specific binding, protein homodimerization activity, specific transcriptional repressor activity, transcription factor/repressor activity, zinc ion binding

\*) incorporated in AlzGene database

Supplementary table 7: LOAD patients target genes of the module KLFS-SP1F-ZBPF derived from biclustering analysis with 18 clusters. The columns describe the Gene symbol, GeneID and the molecular function as described in Gene Ontology.

Gene symbol	GeneID	Molecular function
ADD3	120	actin binding, calmodulin binding, metal ion binding, protein kinase C binding, structural constituent of cytoskeleton
ATG10	83734	Atg12 ligase activity, ligase activity, protein binding
CKB	1152	ATP binding, creatine kinase activity, nucleotide binding, protein binding
CLU*)	1191	misfolded protein binding, protein binding
CXorf41	139212	
EEF1D	1936	protein binding, signal transducer activity, translation elongation factor activity, translation factor activity, nucleic acid binding
GLUL	2752	ATP binding, glutamate decarboxylase activity, glutamate-ammonia ligase activity, identical protein binding, ligase activity, lyase activity, nucleotide binding
NUCKS1	64710	
PIP4K2B	8396	1-phosphatidylinositol-4-phosphate 5-kinase activity, 1-phosphatidylinositol-5-phosphate 4-kinase activity, ATP binding, kinase activity, nucleotide binding, protein binding, receptor signaling protein activity, transferase activity
RPL35	11224	mRNA binding, protein binding, structural constituent of ribosome
SHCBP1	79801	SH2 domain binding, protein binding

\*) incorporated in AlzGene database

Supplementary table 8: Double transgenic mice target genes of the module CTCF-SP1F-ZBPF derived from biclustering analysis with 13 clusters. The columns describe the Gene symbol, GeneID and the molecular function as described in Gene Ontology.

Gene symbol	GeneID	Molecular function
1500012F01Rik	68949	
Acs11	14081	ATP binding, acetate-CoA ligase (ADP-forming) activity, catalytic activity, ligase activity, long-chain fatty acid-CoA ligase activity, nucleotide binding
Actr10	56444	protein binding
Add1	11518	T cell receptor binding, actin binding, calmodulin binding, metal ion binding, structural molecule activity
Adss	11566	GTP binding, adenylosuccinate synthase activity, ligase activity, magnesium ion binding, metal ion binding, nucleotide binding
Atp11b	76295	ATP binding, hydrolase activity, molecular function, nucleotide binding
Atp8b2	54667	ATP binding, ATPase activity, coupled to transmembrane movement of ions, phosphorylative mechanism, hydrolase activity, hydrolase activity, acting on acid anhydrides, catalyzing transmembrane movement of substances, magnesium ion binding, metal ion binding, nucleotide binding, phospholipid-translocating ATPase activity, protein binding
BC018507	218333	molecular function
Brsk2	75770	ATP binding, kinase activity, magnesium ion binding, metal ion binding, nucleotide binding, protein kinase activity, protein serine/threonine kinase activity, transferase activity
Bzw1	66882	binding, molecular function
Ccl27a	20301	Cytokine activity, protein binding
Cdc42	12540	GTP-dependent protein binding, GTPase activity, mitogen-activated protein kinase kinase binding, nucleotide binding, protein binding
Cdc42se2	72729	molecular function
Col25a1 <sup>*</sup> )	77018	molecular function
Ctnna2	12386	Cadherin binding, structural molecule activity
D10Ert610e	52666	Rho guanyl-nucleotide exchange factor activity, guanyl-nucleotide exchange factor activity, protein binding
D1Ert622e	52392	molecular function
Dlat	235339	acyltransferase activity, dihydrolipoyllysine-residue acetyltransferase activity, lipoic acid binding, protein binding, transferase activity
Dnpep	13437	aminopeptidase activity, hydrolase activity, metal ion binding, metallopeptidase activity, peptidase activity, zinc ion binding
Dpysl4	26757	hydrolase activity, acting on carbon-nitrogen (but not peptide) bonds, protein binding
Eif1ay	66235	RNA binding, molecular function, translation initiation factor activity
Epb4.111	13821	actin binding, binding, cytoskeletal protein binding, protein binding, structural molecule activity
Fam135a	68187	molecular function
Fam169a	320557	molecular function

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Fam49b	223601	molecular function
Fbxo3	57443	
Fkrp	243853	Transferase activity
Fnbp1	14269	Lipid binding, protein binding
Foxj3	230700	DNA binding, sequence-specific DNA binding, transcription factor activity
Fry	320365	molecular function
Gabra4	14397	GABA-A receptor activity, chloride channel activity, extracellular ligand-gated ion channel activity, ion channel activity, receptor activity
Gabrb3	14402	GABA-A receptor activity, chloride channel activity, extracellular ligand-gated ion channel activity, ion channel activity, receptor activity
Gria2	14800	PDZ domain binding, extracellular-glutamate-gated ion channel activity, ion channel activity, ionotropic glutamate receptor activity, protein binding, protein kinase binding, receptor activity
Hdgfrp3	29877	chromatin binding, growth factor activity
Hnrnpu	51810	ATP, DNA, RNA binding, nucleic acid binding, nucleotide binding, protein binding
Hspa12a	73442	ATP binding, molecular function, nucleotide binding
Il33*)	77125	Cytokine activity
Khdrbs1	20218	RNA binding, SH3 domain binding, SH3/SH2 adaptor activity, protein binding, transcription repressor activity
Kndc1	76484	Ras guanyl-nucleotide exchange factor activity, guanyl-nucleotide exchange factor activity, kinase activity, protein binding, protein serine/threonine kinase activity
Larp5	217980	RNA binding, molecular function, nucleic acid binding
Map2k4	26398	ATP binding, JUN kinase kinase activity, MAP kinase kinase activity, kinase activity, mitogen-activated protein kinase kinase kinase binding, nucleotide binding, protein kinase activity, protein serine/threonine kinase activity, protein tyrosine kinase activity, transferase activity
Mapk1	26413	ATP binding, MAP kinase 2 activity, RNA polymerase II carboxy-terminal domain kinase activity, kinase activity, mitogen-activated protein kinase kinase kinase binding, nucleotide binding, phosphotyrosine binding, protein binding, protein kinase activity, protein serine/threonine kinase activity, transcription factor binding, transcription regulator activity, transferase activity
Mapk9	26420	ATP binding, JUN kinase activity, MAP kinase activity, caspase activator activity, kinase activity, mitogen-activated protein kinase kinase kinase binding, nucleotide binding, protein binding, protein kinase activity, protein serine/threonine kinase activity, transferase activity
March7	57438	ligase activity, metal ion binding, molecular function, zinc ion binding
Mll5	69188	histone-lysine N-methyltransferase activity, metal ion binding, methyltransferase activity, protein binding, transferase activity, zinc ion binding
Mtap4	17758	
Nap111	53605	protein binding
Nr2f1	13865	DNA binding, ligand-dependent nuclear receptor activity, metal ion binding, receptor activity, sequence-specific DNA binding, steroid hormone receptor activity, transcription activator activity, transcription factor activity, zinc ion binding
Ola1	67059	ATP binding, GTP binding, hydrolase activity, molecular function, nucleotide binding
Pcmt1	18537	S-adenosylmethionine-dependent methyltransferase activity, methyltransferase

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		activity, protein binding, protein-L-isoaspartate (D-aspartate) O-methyltransferase activity, transferase activity
Pcsk2	18549	endopeptidase activity, hydrolase activity, peptidase activity, protein complex binding, serine-type endopeptidase activity
Pfn1	18643	Rho GTPase binding, actin binding, phosphatidylinositol-4,5-bisphosphate binding, protein binding, receptor binding
Polr1d	20018	Protein binding
Ppm1a	19042	catalytic activity, hydrolase activity, magnesium ion binding, manganese ion binding, metal ion binding, phosphoprotein phosphatase activity, protein C-terminus binding, protein serine/threonine phosphatase activity
Prpf39	328110	Binding, molecular function
Psmc7	26444	endopeptidase activity, hydrolase activity, peptidase activity, threonine-type endopeptidase activity
Ptptra	19262	hydrolase activity, phosphatase activity, phosphoprotein phosphatase activity, protein complex binding, protein tyrosine phosphatase activity, receptor activity
Ptprz1	19283	hydrolase activity, phosphoprotein phosphatase activity, protein binding, receptor activity
Rasgef1b	320292	guanyl-nucleotide exchange factor activity, molecular function
Rnf115	67845	ligase activity, metal ion binding, protein binding, zinc ion binding
Rundc3b	242819	molecular function
Sesn3	75747	molecular function
Slc23a2	54338	L-ascorbate:sodium symporter activity, L-ascorbic acid transporter activity, symporter activity, transporter activity
Srrm1	51796	DNA binding, RNA binding, NOT RNA binding
Ssx2ip	99167	actinin binding, protein binding
Tanc2 <sup>*)</sup>	77097	binding, molecular function
Tlk1	228012	ATP binding, kinase activity, molecular function, nucleotide binding, protein kinase activity, protein serine/threonine kinase activity, transferase activity
Tm7sf3	67623	molecular function
Trim3	55992	Metal ion binding, protein binding, zinc ion binding
Ttll1	319953	ligase activity, molecular function, tubulin-tyrosine ligase activity
Txndc14	66958	molecular function
Ube2e2	218793	ATP binding, ligase activity, molecular function, nucleotide binding, small conjugating protein ligase activity, ubiquitin-protein ligase activity
Zbtb4	75580	metal ion binding, molecular function
Zc3h14	75553	molecular function

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<sup>\*)</sup> incorporated in AlzGene database



Supplementary figure 1: Expression profile of one cluster of coregulated genes from the GSE15222 dataset (LOAD patients dataset). On the x-axis the sample IDs (specified by accession numbers of GEO/NCBI) incorporated in the cluster are given and y-axis indicates values of expression. One gene corresponds to a single line in the profile and the target genes of the module as mentioned in the text are coloured. The target genes of the profile were used to establish the module CTCF-EGRF-SP1F.