

MESA-MIND-Longitudinal-Proteomics-cSVD

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Table 1: Field Center by Race / Ethnicity Frequencies

Characteristic	Wake Forest N = 713 ¹	Columbia N = 607 ¹	Johns Hopkins N =
Race or ethnicity			
Non-Hispanic White	331 / 713 (46%)	150 / 607 (25%)	256 / 491 (52%)
Chinese American	0 / 713 (0%)	6 / 607 (1.0%)	0 / 491 (0%)
Black/African-American	379 / 713 (53%)	194 / 607 (32%)	235 / 491 (48%)
Hispanic	3 / 713 (0.4%)	257 / 607 (42%)	0 / 491 (0%)
¹ _n / N (%)			

Important Notes - read me first

Version control

- Always check that you have the most recent version of this document, which - unless I am sending you unfinalized work - is available [here](#).
 - An easy check for version control is to make sure this date: 2026-01-09. is the same as on the GitHub file [here](#).
- The code for this is analysis available in the same repository ([targets master file here](#) and [individual functions here](#))

Regarding the use of site & race/ethnicity

- Some MESA field centers did not collect data on individuals from select race / ethnicity groups (see: Table 1). Therefore, only race/ethnicity was included in analyses, with the exception of sample descriptives.

Summary

Step 1: Cleaning and Formatting Proteins

Input file names

- A table of protein abundances: SMP_IntensityNormalized_20251005.csv

- Sample information to link TOPMed IDs to unique MESA SHARe ID and exam combinations: Mapping_SMP_Plate_20251005.csv
- Keys to link Olink IDs to names compounds: MESAlink3k_proteinKeys_03292023.csv
- A file to bridge SHARe ids (sidno) with MESA IDs (idno) MESA-SHARe_IDList_Labelled.csv

Raw file info

- The raw protein abundance file contained information on N=3040 protein assays, including those used for QC.
- When removing assays for QC, the raw protein abundance file contained information on N=2941 proteins.
- The protein abundance file contained information on N=14051 sample IDs (i.e., unique participant/exam combinations), including bridging samples.
- After removing QC samples (including bridging, controls, and one duplicate) the protein abundance file contained information on N=12739 sample IDs (i.e., unique participant/exam combinations).

Formatting

- Bridging (and other QC) samples were removed.
- Protein assays used for QC were removed.
- Proteins that should be excluded due to QC warnings (variable “QC_warning” set to “EXCLUDED”) were removed, even though these do not have NPX values.
- Data were put into wide format, with “SampleID” as the unique ID, “OlinkID” forming the variable names (protein identifiers), and values taken from the “NPX” column.
 - In wide format, the file contained information on N=12739 unique sample IDs.
 - In wide format, the file contained information on N=0 duplicated sample IDs. ¹
- SHARe IDs, and subsequently MESA IDs, were merged into the file with exam information.
- At this point, the range of unique SHARe ID by exam combinations was N=0 - 1. This indicates no sample ID were duplicated in the assays.
- The formatted protein file was used to calculate the coefficient of variation (CV) using the formula: $CV = \sqrt{2^{(\sigma^2 - 1)}}$.

Table 2: Final N by exam

Exam	N_Pps
1	5949
5	3917
6	2873

- A variable called “Retain” was created to indicate whether each protein was (1) unique (i.e., included on only one panel); (2) duplicated, and across all panels had the lowest CV; or (3) duplicated, and across all panels did not have the lowest CV.
- A final table of protein abundances, with additional variables for SHARe ID, MESA ID, Exam, TOPMed ID and Batch, was created after the steps above, with proteins duplicated across more than one panel cleaned such that only the one with the lowest CV is retained. This file was used in the analysis
- The number of participants, stratified by exam, in the final file is available in [Table 2](#):

Step 2: Format Phenotypes

Input files

- Covariates from E1: MESAe1FinalLabel02092016.dta
- Covariates from E5: MESAe5_FinalLabel_20140613.dta
- Covariates from E6: MESAe6_FinalLabel_20220513.dta
- Afib info: SHARe_MesaEventsThruYear2020_AF_DS.txt
- ApoE info: MESA_ApoE_03102014.sas7bdat
- Incident CVD: MESAeVThru2020AllCohort_20241120.dta
- Microbleeds: MESAe6as253as301_BMRICMB_08052025.csv
- Perivascular spaces: MESAe6as253as301_BMRIPVS_20250310.csv
- White matter hyperintensities: MESAe6anyFIRST_BMRIWMHVol_20240422.csv
- Intracranial volumes: SHARe_AncilMesaAF_BMRIROIIVol_DS.txt
- Fractional anisotropy: mesae6anyfirst_bmriTotalFAMUSE_20250828.csv
- White matter hyperintensities: MESAe6anyFIRST_BMRIWMHVol_20240422.csv

Formatting

Outcomes:

- Microbleeds were coded as 0/1, where 0= no microbleeds (value: 0) and 1 = presence of microbleeds (all non-zero values except missing). Then, those images with a low image quality (value = 4; N=0) were recoded to missing.
- Perivascular spaces (variable: epvs_wholebrain_vol) were recoded to missing where the variable 'pvs_exclude' was coded as 1 (N=0).
- White matter hyperintensities (variable: wm_wmh) were divided by 1000 to convert to ml (following Rizwan's code), and those where the variable wmh_exclude had a code of 1 were set to missing.
- Fractional anisotropy (variable: wmfa) was coded to missing where the variable fa_exclude had a value of 1.

Covariates

True time invariant covariates

- Race/ethnicity, gender, and highest education level were all taken from exam 1 data. ApoE information was taken from its own dataset (above).
- ApoE was coded 0/1/2 where 0= no e4 isoform (codes 22, 23, 33), 1 = e4 isoform (24, 34, 44), and 2 = no isoform data. The ApoE variable was formatted as a factor.
- Gender was coded such that female = 0 and male = 1.
- Education was recoded 0/1, such that 0 = less than high school (codes: 0: NO SCHOOLING / 1: GRADES 1-8 / 2: GRADES: 9-11) and 1= high school or more (all other codes, excluding missing).
- Race/ethnicity was recoded retaining the original MESA coded whereby 1=White American; 2= Chinese American, 3=Black, African-American, and 4 = Hispanic. Race/ethnicity was coded as a factor variable.

Pseudo-time invariant covariates

- Although some variables are technically time invariant, where they were included due to their effects on MRI data, since MRI data are only measured at one exam for this analysis (exam 6), these covariates were always taken from exam 6.
- These ‘pseudo time invariant covariates’ were: atrial fibrillation, myocardial infarction, congestive heart failure, LDL, systolic blood pressure, hypertension medication, and site (since site seems to affect MRI more than proteins??).
- Afib, MI, and CHF were coded 0/1, such that 0= no diagnosis and 1= afib diagnosis. Missing data was left as missing (this is different to Rizwan who coded missing data as no diagnosis).
- Site was arbitrarily coded as 0=Wake forest, 1= Columbia, 2=Johns Hopkins, 3=University of Minnesota, 4=Northwestern, 5=UCLA

Time varying covariates

- The following covariates were taken from the exam when the proteins were used, as these were seen to affect proteins more in the short term than they affect MRI (?): kidney function (egfr), BMI , cigarette smoking (never/former/current; coded as ordinal), diabetes status.
- Smoking was harmonized and coded such that 0 = never smoker, 1= past smoker, 2=current smoker.

- Diabetes has harmonized and coded such that 0= no diabetes (including impaired fasting glucose), and 1 = diabetes (treated and untreated).
- The following covariates were taken from exam 6: age (age6c), kidney function (egfr; cepgfr6c), BMI (bmi6c), systolic blood pressure (sbp6c), LDL (ldl6), site(site6c), the use of hypertension medication (htnmed6c; coded 0= no, and 1= yes), cigarette smoking (cig6c), diabetes status (dm036t)

Missingness

The missingness for each variable those who have at least one MRI measure can be found in [Table 3](#)

Step 3: Sample descriptives

- There were N=1429 MESA participants with at least one MRI outcome after the exclusions above.
- Of those with MRI data, N=1307 participants had protein data, equating to N=1307 at exam 1, N=1281 at exam 5, and N=1284 at exam 6
- Sample descriptives are available in [Table 4](#)

Table 3: Missingness for those who have at least one MRI measure

Variable	Frequency (N)	Proportion (%)
icv	307	23.9
mb_present	252	19.6
epvs	197	15.3
fa	52	4.05
ldl	34	2.65
egfr	26	2.02
diabetes	25	1.95
wmh	19	1.48
htnmeds	11	0.857
E4	10	0.779
AFprevalent	4	0.312
edu	2	0.156
smoking	2	0.156
sbp	2	0.156
BMI	1	0.0779
MIprevalent	1	0.0779
CHFprevalent	1	0.0779
idno	0	0
sidno	0	0
Exam	0	0
time	0	0
BL_age	0	0
age	0	0
gender	0	0
site	0	0
race	0	0

Table 4: Sample Descriptives

Characteristic	Exam		
	1 N = 1,307 ^I	5 N = 1,281 ^I	6 N = 1,284 ^I
Age (y)	56.40 (7.96)	65.84 (7.83)	72.20 (7.79)
Gender			
Female	689 / 1,307 (53%)	676 / 1,281 (53%)	676 / 1,284 (53%)
Male	618 / 1,307 (47%)	605 / 1,281 (47%)	608 / 1,284 (47%)
Field Center			
Wake Forest	239 / 1,284 (19%)	235 / 1,259 (19%)	239 / 1,284 (19%)
Columbia	204 / 1,284 (16%)	199 / 1,259 (16%)	204 / 1,284 (16%)
Johns Hopkins	165 / 1,284 (13%)	161 / 1,259 (13%)	165 / 1,284 (13%)
Minnesota	239 / 1,284 (19%)	232 / 1,259 (18%)	239 / 1,284 (19%)
Northwestern	228 / 1,284 (18%)	227 / 1,259 (18%)	228 / 1,284 (18%)
UCLA	209 / 1,284 (16%)	205 / 1,259 (16%)	209 / 1,284 (16%)
Highest education level			
Up to and including high school	133 / 1,305 (10%)	129 / 1,279 (10%)	130 / 1,282 (10%)
More than high school	1,172 / 1,305 (90%)	1,150 / 1,279 (90%)	1,152 / 1,282 (90%)
Race or ethnicity			
Non-Hispanic White	553 / 1,307 (42%)	545 / 1,281 (43%)	542 / 1,284 (42%)
Chinese American	157 / 1,307 (12%)	156 / 1,281 (12%)	157 / 1,284 (12%)
Black/African-American	350 / 1,307 (27%)	340 / 1,281 (27%)	345 / 1,284 (27%)
Hispanic	247 / 1,307 (19%)	240 / 1,281 (19%)	240 / 1,284 (19%)
BMI (kg/m²)	27.95 (5.21)	28.41 (5.36)	28.35 (5.44)
Smoking status			
Never	699 / 1,305 (54%)	609 / 1,277 (48%)	615 / 1,282 (48%)
Former	463 / 1,305 (35%)	574 / 1,277 (45%)	592 / 1,282 (46%)
Current	143 / 1,305 (11%)	94 / 1,277 (7.4%)	75 / 1,282 (5.9%)
LDL levels	107.96 (35.28)	107.96 (34.98)	107.96 (35.28)
systolic blood pressure	126.34 (20.35)	126.37 (20.37)	126.34 (20.35)
Diabetes status			

Normoglycemia/IFG	1,219 / 1,303 (94%)	1,076 / 1,280 (84%)	994 / 1,259 (79%)
Diabetes (treated or untreated)	84 / 1,303 (6.4%)	204 / 1,280 (16%)	265 / 1,259 (21%)
Takes hypertensions medicine			
No	537 / 1,273 (42%)	527 / 1,248 (42%)	537 / 1,273 (42%)
Yes	736 / 1,273 (58%)	721 / 1,248 (58%)	736 / 1,273 (58%)
Atrial fibrillation			
No	1,095 / 1,280 (86%)	1,073 / 1,255 (85%)	1,095 / 1,280 (86%)
Yes	185 / 1,280 (14%)	182 / 1,255 (15%)	185 / 1,280 (14%)
Myocardial Infarction			
No	1,245 / 1,283 (97%)	1,220 / 1,258 (97%)	1,245 / 1,283 (97%)
Yes	38 / 1,283 (3.0%)	38 / 1,258 (3.0%)	38 / 1,283 (3.0%)
Coronary Heart Failure			
No	1,261 / 1,283 (98%)	1,236 / 1,258 (98%)	1,261 / 1,283 (98%)
Yes	22 / 1,283 (1.7%)	22 / 1,258 (1.7%)	22 / 1,283 (1.7%)
ApoeE information			
No E4 isoform	916 / 1,274 (72%)	899 / 1,249 (72%)	916 / 1,274 (72%)
E4 isoform	348 / 1,274 (27%)	340 / 1,249 (27%)	348 / 1,274 (27%)
No ApoE data	10 / 1,274 (0.8%)	10 / 1,249 (0.8%)	10 / 1,274 (0.8%)
Kidney function (egfr)	82.72 (15.47)	82.46 (19.44)	76.86 (19.53)
Intracranial volume	1,360,304.37 (145,625.45)	1,361,045.01 (145,456.35)	1,360,304.37 (145,625.45)
Fractional anisotropy	0.40 (0.03)	0.40 (0.03)	0.40 (0.03)
White matter hyperintensities	6.74 (10.15)	6.62 (9.89)	6.71 (10.16)
Enlarged perivascular spaces	3,701.67 (2,374.34)	3,702.34 (2,383.48)	3,701.67 (2,374.34)
Presence of microbleeds?			
No	661 / 1,032 (64%)	652 / 1,017 (64%)	661 / 1,032 (64%)
Yes	371 / 1,032 (36%)	365 / 1,017 (36%)	371 / 1,032 (36%)

¹Mean (SD); n / N (%)

Step 5: Cross sectional Protein-Wide Association Studies (PWAS)

- This section includes PWAS where proteins were only used at one time point (exam 1 or exam 6), even if this was not the same time point as when the MRI data were used.
- All estimates are standardized.

White matter hyperintensity (WMH)

Model Specification

- The associations between WMH and proteins were analyzed via linear regression
- For WMH the numeric covariates included icv, age, egfr, BMI, sbp, ldl. ²
- For WMH the factor covariates included gender, race, edu, htnmeds, smoking, E4, AFprevalent, diabetes, MIprevalent, CHFprevalent. ²
- WMH was transformed using an inverse normal transformation (with blom constant).

WMH: Exam 6 proteins

- The E6 proteins -> E6 MRI for WMH included data from N=933 participants.
- A total of N=0 exam 6 proteins were significantly associated with WMH at an FDR corrected $P < .05$.

WMH: Exam 1 proteins

- The E1 proteins -> E6 MRI for WMH included data from N=913 participants.
- A total of N=0 exam 1 proteins were significantly associated with WMH at an FDR corrected $P < .05$.

Enlarged Perivascular Spaces (EPVS)

Model Specification

- The associations between EPVS and proteins were analyzed via linear regression
- For EPVS the numeric covariates included icv, age, egfr, BMI, sbp, ldl. ²
- For EPVS the factor covariates included gender, race, edu, htnmeds, smoking, E4, AFprevalent, diabetes, MIprevalent, CHFprevalent. ²
- EPVS was transformed using an inverse normal transformation (with blom constant).

EPVS: Exam 6 proteins

- The E6 proteins -> E6 MRI for EPVS included data from N=926 participants.
- A total of N=0 exam 1 proteins were significantly associated with EPVS at an FDR corrected $P < .05$

EPVS: Exam 1 proteins

- The E1 proteins -> E6 MRI for EPVS included data from N=906 participants.
- A total of N=0 exam 1 proteins were significantly associated with EPVS at an FDR corrected $P < .05$

Fractional Anisotropy (FA)

Model Specification

- The associations between FA and proteins were analyzed via linear regression
- For FA the numeric covariates included age, egfr, BMI, sbp, ldl. ²
- For FA the factor covariates included gender, race, edu, htnmeds, smoking, E4, AFprevalent, diabetes, MIprevalent, CHFprevalent. ²
- FA was transformed using an inverse normal transformation (with blom constant).

FA: Exam 6 proteins

- The E6 proteins -> E6 MRI for FA included data from N=1170 participants.
- A total of N=1 exam 6 proteins were significantly associated with FA at an FDR corrected $P < .05$ (see Table 5 and Figure 1).

FA: Exam 1 proteins

- The E1 proteins -> E6 MRI for FA included data from N=1146 participants.
- A total of N=523 exam 1 proteins were significantly associated with FA at an FDR corrected $P < .05$ (see Table 6 and Figure 2).

Microbleeds (MB)

Model Specification

- The associations between MB and proteins were analyzed via logistic regression (MB coded as 'present' vs. 'absent' as above)
- For MB the numeric covariates included age, egfr, BMI, sbp, ldl. ²
- For MB the factor covariates included gender, race, edu, htnmeds, smoking, E4, AFprevalent, diabetes, MIprevalent, CHFprevalent. ²

MB: Exam 6 proteins

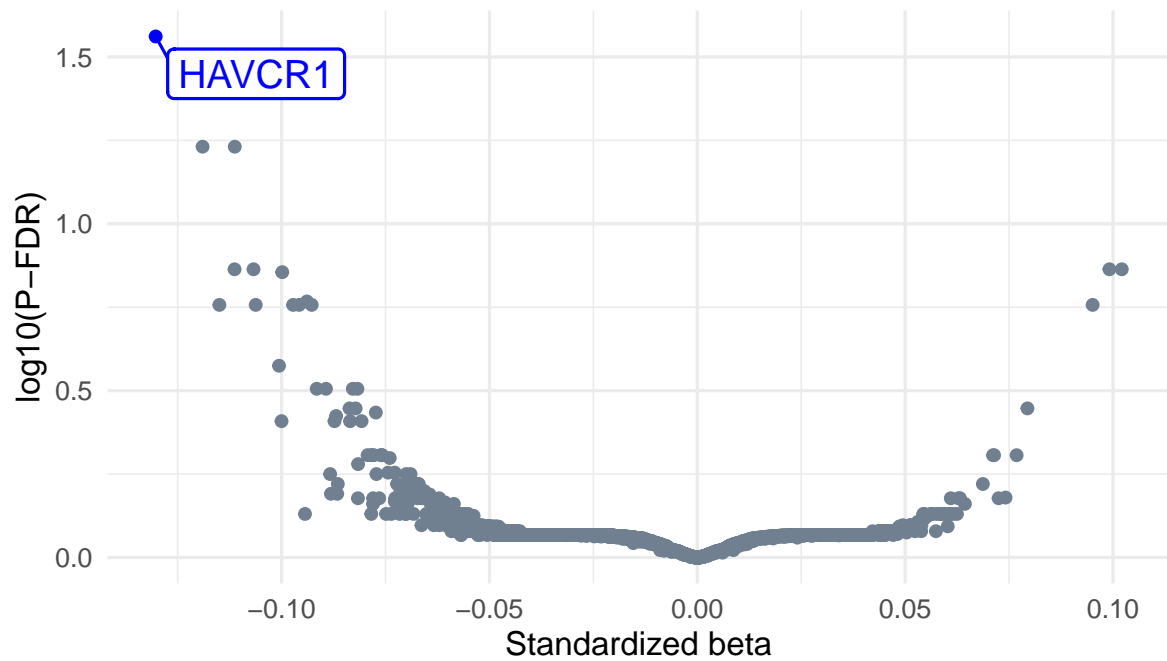
- The E6 proteins -> E6 MRI for MB included data from N= 975 participants.
- A total of N=0 exam 6 proteins were significantly associated with MB at an FDR corrected $P < .05$.

MB: Exam 1 proteins

- The E1 proteins -> E6 MRI for FA included data from N=974 participants.
- A total of N=0 exam 1 proteins were significantly associated with MB at an FDR correct $P < .05$.

Table 5: Associations Between Exam 6 Proteins and Fractional Anisotropy Reaching an FDR-corrected $P < .05$ Equivalent

Protein	N	Beta	SE	P	P-FDR	Olink ID	Protein CV	UniProt ID
HAVCR1	1170	-0.13	0.03	9.39×10^{-6}	2.75×10^{-2}	OID21422	95.89	Q96D42



Models control for age, egfr, BMI, sbp, ldl
gender, race, edu, htnmeds, smoking, E4, AFprevalent, diabetes, MIprevalent, CHFprevalent

Figure 1: Associations Between Exam 6 Proteins and Fractional Anisotropy

Table 6: Associations Between Exam 1 Proteins and Fractional Anisotropy Reaching an FDR-corrected $P < .05$ Equivalent

Protein	N	Beta	SE	P	P-FDR	Olink ID	Protein CV	UniProt ID
TNFAIP8	1146	-0.09	0.03	1.60×10^{-3}	2.06×10^{-2}	OID20433	82.37	O95379
RABGAP1L	1146	-0.09	0.03	9.49×10^{-4}	1.67×10^{-2}	OID20447	38.68	Q5R372
MYO9B	1146	-0.08	0.03	3.35×10^{-3}	2.94×10^{-2}	OID20451	66.67	Q13459
FXVD5	1146	-0.08	0.03	4.07×10^{-3}	3.15×10^{-2}	OID20463	50.38	Q96DB9
SPRY2	1146	-0.08	0.03	2.54×10^{-3}	2.52×10^{-2}	OID20475	53.15	O43597
YTHDF3	1146	-0.10	0.03	3.98×10^{-4}	1.34×10^{-2}	OID20478	62.74	Q7Z739
PRDX3	1146	-0.08	0.03	4.65×10^{-3}	3.36×10^{-2}	OID20483	54.27	P30048
ICA1	1146	-0.09	0.03	1.09×10^{-3}	1.75×10^{-2}	OID20484	58.28	Q05084
IRAK1	1146	-0.08	0.03	3.46×10^{-3}	2.96×10^{-2}	OID20485	50.81	P51617
FGF2	1146	-0.07	0.03	7.32×10^{-3}	4.31×10^{-2}	OID20503	53.39	P09038
BACH1	1146	-0.07	0.03	5.30×10^{-3}	3.61×10^{-2}	OID20505	48.30	O14867
TRAF2	1146	-0.07	0.03	7.66×10^{-3}	4.45×10^{-2}	OID20507	76.43	Q12933
NUB1	1146	-0.10	0.03	3.81×10^{-4}	1.34×10^{-2}	OID20510	64.46	Q9Y5A7
VASH1	1146	-0.08	0.03	2.17×10^{-3}	2.30×10^{-2}	OID20516	53.31	Q7L8A9
BID	828	-0.09	0.03	5.17×10^{-3}	3.55×10^{-2}	OID20517	31.23	P55957
TBC1D5	1146	-0.07	0.03	6.14×10^{-3}	3.88×10^{-2}	OID20521	110.97	Q92609
TRIM5	1146	-0.08	0.03	3.42×10^{-3}	2.95×10^{-2}	OID20526	69.31	Q9C035
SAMD9L	1146	-0.07	0.03	4.70×10^{-3}	3.36×10^{-2}	OID20536	71.16	Q8IVG5
SCRN1	1146	-0.09	0.03	1.55×10^{-3}	2.06×10^{-2}	OID20542	69.63	Q12765
IKBKG	1146	-0.09	0.03	6.30×10^{-4}	1.44×10^{-2}	OID20544	75.19	Q9Y6K9
NFATC1	1146	-0.08	0.03	4.35×10^{-3}	3.21×10^{-2}	OID20545	69.06	O95644
PSMG3	1146	-0.10	0.03	3.81×10^{-4}	1.34×10^{-2}	OID20549	56.53	Q9BT73
GOPC	1146	-0.08	0.03	3.31×10^{-3}	2.93×10^{-2}	OID20551	85.89	Q9HD26
MAP2K6	1146	-0.07	0.03	6.54×10^{-3}	4.01×10^{-2}	OID20552	80.89	P52564
NT5C3A	1146	-0.08	0.03	3.78×10^{-3}	3.09×10^{-2}	OID20553	100.87	Q9H0P0
ARHGEF12	1146	-0.09	0.03	1.26×10^{-3}	1.91×10^{-2}	OID20554	80.27	Q9NZN5
CNTNAP2	1146	0.07	0.03	6.45×10^{-3}	3.96×10^{-2}	OID20556	48.15	Q9UHC6
BCR	1146	-0.08	0.03	2.15×10^{-3}	2.30×10^{-2}	OID20558	64.74	P11274

CLIP2	1146	-0.08	0.03	2.87×10^{-3}	2.71×10^{-2}	OID20559	129.72	Q9UDT6
IL15	1146	-0.08	0.03	3.67×10^{-3}	3.05×10^{-2}	OID20562	93.83	P40933
HSD11B1	1146	-0.09	0.03	1.99×10^{-3}	2.23×10^{-2}	OID20575	55.40	P28845
IRAK4	1146	-0.09	0.03	1.53×10^{-3}	2.06×10^{-2}	OID20577	85.38	Q9NWZ3
DECR1	1146	-0.10	0.03	3.00×10^{-4}	1.31×10^{-2}	OID20579	90.33	Q16698
AXIN1	1146	-0.08	0.03	4.88×10^{-3}	3.42×10^{-2}	OID20582	77.89	O15169
MGMT	1146	-0.09	0.03	1.38×10^{-3}	2.01×10^{-2}	OID20588	92.75	P16455
HEXIM1	1146	-0.08	0.03	2.52×10^{-3}	2.52×10^{-2}	OID20589	90.57	O94992
BANK1	1146	-0.09	0.03	1.23×10^{-3}	1.90×10^{-2}	OID20594	101.49	Q8NDB2
PLXNA4	1146	-0.10	0.03	2.13×10^{-4}	1.30×10^{-2}	OID20597	140.83	Q9HCM2
HPCAL1	1146	-0.10	0.03	4.09×10^{-4}	1.34×10^{-2}	OID20615	41.35	P37235
CD40LG	1146	-0.09	0.03	5.36×10^{-4}	1.39×10^{-2}	OID20616	36.56	P29965
DFFA	1146	-0.11	0.03	8.55×10^{-5}	1.19×10^{-2}	OID20620	37.57	O00273
TGFB1	1146	-0.12	0.03	2.57×10^{-5}	7.57×10^{-3}	OID20621	29.64	P01137
NUDC	1146	-0.10	0.03	2.91×10^{-4}	1.31×10^{-2}	OID20623	35.53	Q9Y266
EIF4G1	1146	-0.10	0.03	1.09×10^{-4}	1.30×10^{-2}	OID20625	77.25	Q04637
DNAJA2	1146	-0.09	0.03	6.52×10^{-4}	1.46×10^{-2}	OID20627	57.09	O60884
CD244	1146	-0.07	0.03	6.09×10^{-3}	3.88×10^{-2}	OID20628	23.06	Q9BZW8
GMPR	1146	-0.10	0.03	3.60×10^{-4}	1.34×10^{-2}	OID20641	44.82	P36959
PPP1R9B	1146	-0.09	0.03	1.63×10^{-3}	2.07×10^{-2}	OID20643	59.30	Q96SB3
PRDX5	1146	-0.08	0.03	3.02×10^{-3}	2.77×10^{-2}	OID20644	66.05	P30044
HCLS1	1146	-0.09	0.03	8.50×10^{-4}	1.59×10^{-2}	OID20648	43.02	P14317
VEGFA	1146	-0.08	0.03	3.61×10^{-3}	3.03×10^{-2}	OID20650	27.56	P15692
MMP1	1146	-0.07	0.03	7.61×10^{-3}	4.43×10^{-2}	OID20672	34.86	P03956
DBNL	1146	-0.08	0.03	3.43×10^{-3}	2.95×10^{-2}	OID20681	66.12	Q9UJU6
NCK2	1146	-0.08	0.03	1.97×10^{-3}	2.23×10^{-2}	OID20683	54.22	O43639
PLA2G4A	1146	-0.09	0.03	1.44×10^{-3}	2.03×10^{-2}	OID20685	54.80	P47712
IL18	1146	-0.08	0.03	4.69×10^{-3}	3.36×10^{-2}	OID20694	34.57	Q14116
EGF	1146	-0.08	0.03	5.03×10^{-3}	3.50×10^{-2}	OID20698	66.95	P01133
MANF	1146	-0.08	0.03	2.79×10^{-3}	2.66×10^{-2}	OID20707	79.98	P55145
CCN2	1146	-0.07	0.03	7.12×10^{-3}	4.24×10^{-2}	OID20709	34.54	P29279
GLOD4	1146	-0.10	0.03	3.56×10^{-4}	1.34×10^{-2}	OID20710	38.81	Q9HC38

SHMT1	1146	-0.09	0.03	6.58×10^{-4}	1.46×10^{-2}	OID20714	52.12	P34896
PTPN6	1146	-0.07	0.03	6.08×10^{-3}	3.88×10^{-2}	OID20717	60.43	P29350
HSPA1A	1146	-0.10	0.03	1.24×10^{-4}	1.30×10^{-2}	OID20718	37.63	P0DMV8
FIS1	1146	-0.09	0.03	3.70×10^{-4}	1.34×10^{-2}	OID20722	58.43	Q9Y3D6
SCGB3A2	1146	-0.09	0.03	1.47×10^{-3}	2.05×10^{-2}	OID20723	43.11	Q96PL1
CD40	1146	-0.08	0.03	3.28×10^{-3}	2.93×10^{-2}	OID20724	39.07	P25942
PDLIM7	1146	-0.08	0.03	3.18×10^{-3}	2.86×10^{-2}	OID20729	98.10	Q9NR12
PDGFB	1146	-0.08	0.03	6.35×10^{-3}	3.95×10^{-2}	OID20741	64.90	P01127
CRKL	1146	-0.09	0.03	8.38×10^{-4}	1.59×10^{-2}	OID20742	75.20	P46109
DNPH1	1146	-0.11	0.03	7.81×10^{-5}	1.14×10^{-2}	OID20744	44.01	O43598
CCL17	1146	-0.08	0.03	4.84×10^{-3}	3.40×10^{-2}	OID20745	45.38	Q92583
LHPP	1146	-0.08	0.03	4.06×10^{-3}	3.15×10^{-2}	OID20749	39.65	Q9H008
ATP5IF1	1146	-0.09	0.03	5.50×10^{-4}	1.39×10^{-2}	OID20760	116.26	Q9UII2
SKAP2	1146	-0.09	0.03	1.20×10^{-3}	1.88×10^{-2}	OID20761	92.54	O75563
PLAUR	1146	-0.10	0.03	5.77×10^{-4}	1.40×10^{-2}	OID20764	35.07	Q03405
DAG1	1146	-0.09	0.03	1.40×10^{-3}	2.01×10^{-2}	OID20774	35.95	Q14118
MPIG6B	1146	-0.08	0.03	3.01×10^{-3}	2.77×10^{-2}	OID20779	62.39	O95866
REG4	1146	-0.08	0.03	8.43×10^{-3}	4.79×10^{-2}	OID20784	40.16	Q9BYZ8
CXCL3	1146	-0.07	0.03	8.03×10^{-3}	4.62×10^{-2}	OID20788	58.51	P19876
TLR4	1146	-0.08	0.03	5.06×10^{-3}	3.51×10^{-2}	OID30428	48.02	O00206
PALLD	1146	-0.07	0.03	6.17×10^{-3}	3.89×10^{-2}	OID30444	82.41	Q8WX93
PIKFYVE	1146	-0.09	0.03	1.86×10^{-3}	2.20×10^{-2}	OID30465	54.63	Q9Y2I7
BAG4	1146	-0.07	0.03	5.97×10^{-3}	3.85×10^{-2}	OID30474	51.02	O95429
XIAP	1146	-0.09	0.03	8.94×10^{-4}	1.63×10^{-2}	OID30490	53.21	P98170
CPOX	1146	-0.09	0.03	1.10×10^{-3}	1.75×10^{-2}	OID30495	28.56	P36551
BCL2L15	1146	-0.07	0.03	7.12×10^{-3}	4.24×10^{-2}	OID30498	55.73	Q5TBC7
MCEMP1	1146	-0.08	0.03	3.94×10^{-3}	3.13×10^{-2}	OID30501	73.55	Q8IX19
NEDD9	1146	-0.08	0.03	6.36×10^{-3}	3.95×10^{-2}	OID30503	45.18	Q14511
ANKMY2	1146	-0.08	0.03	5.47×10^{-3}	3.68×10^{-2}	OID30518	80.14	Q8IV38
EVI5	1146	-0.10	0.03	2.65×10^{-4}	1.30×10^{-2}	OID30519	68.21	O60447
NDUFA5	1146	-0.09	0.03	2.06×10^{-3}	2.27×10^{-2}	OID30520	39.96	Q16718
VAMP8	1146	-0.07	0.03	5.50×10^{-3}	3.69×10^{-2}	OID30555	92.45	Q9BV40

STX7	1146	-0.08	0.03	2.75×10^{-3}	2.66×10^{-2}	OID30560	90.22	O15400
PPL	1146	-0.09	0.03	6.65×10^{-4}	1.46×10^{-2}	OID30564	41.64	O60437
NUMB	1146	-0.07	0.03	6.43×10^{-3}	3.96×10^{-2}	OID30568	80.85	P49757
PDIA3	1146	-0.08	0.03	1.60×10^{-3}	2.06×10^{-2}	OID30573	66.59	P30101
ERP29	1146	-0.08	0.03	2.91×10^{-3}	2.72×10^{-2}	OID30578	94.89	P30040
JAM3	1146	-0.08	0.03	4.67×10^{-3}	3.36×10^{-2}	OID30586	46.52	Q9BX67
APPL2	1146	-0.08	0.03	4.63×10^{-3}	3.36×10^{-2}	OID30590	94.16	Q8NEU8
DDI2	1146	-0.08	0.03	4.02×10^{-3}	3.15×10^{-2}	OID30602	50.11	Q5TDH0
UROD	1146	-0.09	0.03	8.90×10^{-4}	1.63×10^{-2}	OID30603	56.00	P06132
YWHAQ	1146	-0.08	0.03	2.72×10^{-3}	2.65×10^{-2}	OID30605	48.87	P27348
TPD52L2	1146	-0.07	0.03	7.94×10^{-3}	4.58×10^{-2}	OID30609	64.18	O43399
TBCA	1146	-0.09	0.03	5.78×10^{-4}	1.40×10^{-2}	OID30616	77.12	O75347
PRKG1	1146	-0.07	0.03	8.62×10^{-3}	4.86×10^{-2}	OID30621	81.18	Q13976
GMPR2	1146	-0.08	0.03	1.98×10^{-3}	2.23×10^{-2}	OID30623	58.01	Q9P2T1
ST13	1146	-0.09	0.03	5.81×10^{-4}	1.40×10^{-2}	OID30624	57.38	P50502
TNFAIP8L2	1146	-0.08	0.03	1.82×10^{-3}	2.19×10^{-2}	OID30629	50.49	Q6P589
SLC9A3R1	1146	-0.08	0.03	1.86×10^{-3}	2.20×10^{-2}	OID30630	72.54	O14745
TP53I3	1146	-0.07	0.03	6.76×10^{-3}	4.09×10^{-2}	OID30632	43.98	Q53FA7
PHYKPL	1146	-0.08	0.03	2.14×10^{-3}	2.30×10^{-2}	OID30634	44.22	Q8IUZ5
SYAP1	1146	-0.09	0.03	4.87×10^{-4}	1.39×10^{-2}	OID30636	49.68	Q96A49
MOCS2	1146	-0.08	0.03	3.87×10^{-3}	3.13×10^{-2}	OID30638	40.25	O96007
VTI1A	1146	-0.07	0.03	6.36×10^{-3}	3.95×10^{-2}	OID30640	39.08	Q96AJ9
ACYP1	1146	-0.09	0.03	4.57×10^{-4}	1.39×10^{-2}	OID30642	52.53	P07311
SNX15	1146	-0.11	0.03	2.85×10^{-5}	7.57×10^{-3}	OID30644	32.81	Q9NRS6
SNCA	1146	-0.08	0.03	2.00×10^{-3}	2.24×10^{-2}	OID30645	141.68	P37840
RABEP1	1146	-0.09	0.03	1.04×10^{-3}	1.70×10^{-2}	OID30647	64.15	Q15276
CACYBP	1146	-0.09	0.03	1.25×10^{-3}	1.91×10^{-2}	OID30649	65.14	Q9HB71
UBXN1	1146	-0.10	0.03	2.54×10^{-4}	1.30×10^{-2}	OID30654	45.97	Q04323
ADD1	1146	-0.08	0.03	2.18×10^{-3}	2.30×10^{-2}	OID30655	74.90	P35611
SPART	1146	-0.07	0.03	5.70×10^{-3}	3.76×10^{-2}	OID30656	65.34	Q8N0X7
DCTD	1146	-0.09	0.03	8.60×10^{-4}	1.59×10^{-2}	OID30657	61.24	P32321
MARS1	1146	-0.10	0.03	2.63×10^{-4}	1.30×10^{-2}	OID30658	54.63	P56192

PTRHD1	1146	-0.10	0.03	3.97×10^{-4}	1.34×10^{-2}	OID30659	55.42	Q6GMV3
DNAJB2	1146	-0.09	0.03	1.62×10^{-3}	2.07×10^{-2}	OID30661	45.79	P25686
GLRX5	1146	-0.08	0.03	2.09×10^{-3}	2.28×10^{-2}	OID30663	84.25	Q86SX6
MDH1	1146	-0.07	0.03	5.12×10^{-3}	3.55×10^{-2}	OID30669	15.14	P40925
TXN	1146	-0.08	0.03	3.47×10^{-3}	2.96×10^{-2}	OID30670	44.63	P10599
APOB	1146	-0.09	0.03	2.01×10^{-3}	2.25×10^{-2}	OID30673	58.03	P04114
NRGN	1146	-0.07	0.03	8.58×10^{-3}	4.85×10^{-2}	OID30674	57.28	Q92686
NEXN	1146	-0.08	0.03	2.45×10^{-3}	2.49×10^{-2}	OID30678	44.46	Q0ZGT2
GPI	1146	-0.11	0.03	5.87×10^{-5}	1.01×10^{-2}	OID30680	46.77	P06744
TREML1	1146	-0.09	0.03	5.59×10^{-4}	1.39×10^{-2}	OID30682	89.40	Q86YW5
CAT	1146	-0.08	0.03	4.72×10^{-3}	3.36×10^{-2}	OID30712	40.81	P04040
SAA4	1146	-0.09	0.03	1.79×10^{-3}	2.18×10^{-2}	OID30726	31.62	P35542
CPB2	1146	-0.09	0.03	7.52×10^{-4}	1.50×10^{-2}	OID30734	34.44	Q96IY4
ATRN	1146	-0.08	0.03	4.05×10^{-3}	3.15×10^{-2}	OID30735	34.41	O75882-2
IGLC2	1146	-0.07	0.03	5.69×10^{-3}	3.76×10^{-2}	OID30740	37.37	P0DOY2
C5	1146	-0.07	0.03	5.16×10^{-3}	3.55×10^{-2}	OID30744	28.65	P01031
APOD	1146	-0.08	0.03	3.25×10^{-3}	2.92×10^{-2}	OID30746	53.54	P05090
CFB	1146	-0.10	0.03	9.20×10^{-4}	1.65×10^{-2}	OID30755	43.88	P00751
CFHR4	1146	-0.09	0.03	1.28×10^{-3}	1.94×10^{-2}	OID30758	24.85	Q92496
PPBP	1146	-0.07	0.03	8.82×10^{-3}	4.94×10^{-2}	OID30761	79.52	P02775
PF4	1146	-0.07	0.03	5.15×10^{-3}	3.55×10^{-2}	OID30764	109.25	P02776
SERPIND1	1146	-0.08	0.03	6.34×10^{-3}	3.95×10^{-2}	OID30767	33.84	P05546
ORM1	1146	-0.08	0.03	3.05×10^{-3}	2.79×10^{-2}	OID30768	32.72	P02763
APOA1	1146	-0.08	0.03	8.12×10^{-3}	4.64×10^{-2}	OID30769	86.35	P02647
SERPING1	1146	-0.09	0.03	6.34×10^{-4}	1.44×10^{-2}	OID30777	36.16	P05155
F13B	1146	-0.10	0.03	4.88×10^{-4}	1.39×10^{-2}	OID30781	32.26	P05160
TF	1146	-0.07	0.03	8.79×10^{-3}	4.93×10^{-2}	OID30783	44.34	P02787
SERPINA3	1146	-0.10	0.03	2.26×10^{-4}	1.30×10^{-2}	OID30786	35.45	P01011
VAV3	1146	-0.09	0.03	4.69×10^{-4}	1.39×10^{-2}	OID30795	94.29	Q9UKW4
TP73	1146	-0.07	0.03	6.11×10^{-3}	3.88×10^{-2}	OID30879	891.42	O15350
SOWAHA	1146	0.08	0.03	4.16×10^{-3}	3.15×10^{-2}	OID30888	104.63	Q2M3V2
MRI1	1146	-0.07	0.03	5.76×10^{-3}	3.78×10^{-2}	OID30891	78.01	Q9BV20

RBP1	1146	-0.08	0.03	5.61×10^{-3}	3.72×10^{-2}	OID30913	53.78	P09455
CASC3	1146	-0.08	0.03	3.75×10^{-3}	3.09×10^{-2}	OID30921	77.60	O15234
GTPBP2	1146	-0.08	0.03	1.58×10^{-3}	2.06×10^{-2}	OID30946	85.20	Q9BX10
CIT	1146	-0.08	0.03	2.80×10^{-3}	2.66×10^{-2}	OID30970	49.77	O14578
NFIC	1146	-0.08	0.03	3.35×10^{-3}	2.94×10^{-2}	OID30988	51.43	P08651
ARHGEF10	1146	-0.08	0.03	3.95×10^{-3}	3.13×10^{-2}	OID30994	78.03	O15013
PCBP2	1146	-0.08	0.03	4.32×10^{-3}	3.21×10^{-2}	OID31003	63.32	Q15366
PHACTR2	1146	-0.08	0.03	3.01×10^{-3}	2.77×10^{-2}	OID31009	90.45	O75167
LRTM2	1146	0.09	0.03	1.52×10^{-3}	2.06×10^{-2}	OID31020	36.45	Q8N967
ELAC1	1146	-0.07	0.03	6.32×10^{-3}	3.95×10^{-2}	OID31029	64.67	Q9H777
DDHD2	1146	-0.08	0.03	1.80×10^{-3}	2.18×10^{-2}	OID31043	55.91	O94830
ASPSR1	1146	-0.10	0.03	3.97×10^{-4}	1.34×10^{-2}	OID31055	68.05	Q9BZE9
AZI2	1146	-0.08	0.03	4.42×10^{-3}	3.24×10^{-2}	OID31056	76.07	Q9H6S1
IGBP1	1146	-0.10	0.03	4.19×10^{-4}	1.35×10^{-2}	OID31059	70.42	P78318
RGCC	1146	-0.08	0.03	3.71×10^{-3}	3.08×10^{-2}	OID31060	59.34	Q9H4X1
GIGYF2	1146	-0.07	0.03	5.81×10^{-3}	3.80×10^{-2}	OID31062	68.61	Q6Y7W6
PDLIM5	1146	-0.09	0.03	7.65×10^{-4}	1.51×10^{-2}	OID31063	64.89	Q96HC4
LDLRAP1	1146	-0.07	0.03	5.86×10^{-3}	3.80×10^{-2}	OID31068	73.63	Q5SW96
CAMSAP1	1146	-0.08	0.03	4.50×10^{-3}	3.30×10^{-2}	OID31070	87.61	Q5T5Y3
TAX1BP1	1146	-0.10	0.03	2.40×10^{-4}	1.30×10^{-2}	OID31075	58.89	Q86VP1
SEPTIN8	1146	-0.11	0.03	2.55×10^{-4}	1.30×10^{-2}	OID31079	35.67	Q92599
DXO	1146	-0.08	0.03	2.96×10^{-3}	2.76×10^{-2}	OID31080	48.06	O77932
GAST	1146	-0.08	0.03	2.53×10^{-3}	2.52×10^{-2}	OID31083	40.86	P01350
PLEKHO1	1146	-0.08	0.03	1.54×10^{-3}	2.06×10^{-2}	OID31088	71.34	Q53GL0
PALM2	1146	-0.09	0.03	4.02×10^{-3}	3.15×10^{-2}	OID31096	30.99	Q8IXS6
GSTT2B	1146	-0.10	0.03	2.92×10^{-4}	1.31×10^{-2}	OID31097	78.29	P0CG30
DNAJC21	1146	-0.09	0.03	5.28×10^{-4}	1.39×10^{-2}	OID31104	52.79	Q5F1R6
BLOC1S3	1146	-0.08	0.03	3.30×10^{-3}	2.93×10^{-2}	OID31106	52.17	Q6QNY0
HHEX	1146	-0.08	0.03	2.84×10^{-3}	2.69×10^{-2}	OID31107	60.41	Q03014
DOK1	1146	-0.08	0.03	1.82×10^{-3}	2.19×10^{-2}	OID31111	84.16	Q99704
IMPACT	1146	-0.11	0.03	7.68×10^{-5}	1.14×10^{-2}	OID31112	44.50	Q9P2X3
NAPRT	1146	-0.07	0.03	6.85×10^{-3}	4.13×10^{-2}	OID31114	46.19	Q6XQN6

AP3S2	1146	-0.07	0.03	6.02×10^{-3}	3.87×10^{-2}	OID31117	59.18	P59780
PRKAR2A	1146	-0.10	0.03	3.68×10^{-4}	1.34×10^{-2}	OID31119	59.61	P13861
TNIP1	1146	-0.09	0.03	7.91×10^{-4}	1.54×10^{-2}	OID31120	74.34	Q15025
TXNDC9	1146	-0.08	0.03	2.17×10^{-3}	2.30×10^{-2}	OID31121	58.30	O14530
WASHC3	1146	-0.07	0.03	7.25×10^{-3}	4.28×10^{-2}	OID31123	59.51	Q9Y3C0
EIF1AX	1146	-0.08	0.03	3.18×10^{-3}	2.86×10^{-2}	OID31125	68.60	P47813
DNAJA4	1146	-0.09	0.03	4.84×10^{-4}	1.39×10^{-2}	OID31130	42.61	Q8WW22
ARHGEF1	1146	-0.07	0.03	6.74×10^{-3}	4.09×10^{-2}	OID31133	54.17	Q92888
ESYT2	1146	-0.07	0.03	7.89×10^{-3}	4.56×10^{-2}	OID31134	82.20	A0FGR8
CASP7	1146	-0.09	0.03	9.71×10^{-4}	1.68×10^{-2}	OID31135	61.46	P55210
AK2	1146	-0.09	0.03	4.66×10^{-4}	1.39×10^{-2}	OID31142	79.15	P54819
CRYGD	1146	-0.09	0.03	6.93×10^{-4}	1.46×10^{-2}	OID31144	54.14	P07320
SH3GLB2	1146	-0.09	0.03	6.33×10^{-4}	1.44×10^{-2}	OID31145	51.33	Q9NR46
GCC1	1146	-0.08	0.03	4.60×10^{-3}	3.34×10^{-2}	OID31147	73.24	Q96CN9
ATXN3	1146	-0.10	0.03	3.15×10^{-4}	1.32×10^{-2}	OID31149	51.17	P54252
BCL2L1	1146	-0.08	0.03	4.04×10^{-3}	3.15×10^{-2}	OID31152	89.40	Q07817
SMTN	1146	-0.08	0.03	2.77×10^{-3}	2.66×10^{-2}	OID31154	116.70	P53814
PLCB2	1146	-0.08	0.03	3.64×10^{-3}	3.05×10^{-2}	OID31155	84.84	Q00722
MINK1	1146	-0.07	0.03	6.15×10^{-3}	3.88×10^{-2}	OID31156	86.75	Q8N4C8
RAB33A	1146	-0.08	0.03	4.19×10^{-3}	3.15×10^{-2}	OID30122	71.36	Q14088
ARL13B	828	-0.09	0.03	4.77×10^{-3}	3.37×10^{-2}	OID30166	40.09	Q3SXY8
YOD1	1146	-0.10	0.03	2.94×10^{-4}	1.31×10^{-2}	OID30181	62.82	Q5VVQ6
PACS2	1146	-0.08	0.03	3.36×10^{-3}	2.94×10^{-2}	OID30186	58.09	Q86VP3
PNMA1	1146	-0.08	0.03	4.18×10^{-3}	3.15×10^{-2}	OID30194	69.47	Q8ND90
OPLAH	1146	-0.07	0.03	8.05×10^{-3}	4.62×10^{-2}	OID30201	45.75	O14841
PYDC1	1146	-0.08	0.03	3.97×10^{-3}	3.13×10^{-2}	OID30202	21.15	Q8WXC3
PAGR1	1146	-0.09	0.03	8.11×10^{-4}	1.56×10^{-2}	OID30206	36.38	Q9BTK6
LMOD1	1146	-0.12	0.03	3.67×10^{-5}	8.25×10^{-3}	OID30212	19.03	P29536
HMGCL	1146	-0.08	0.03	3.17×10^{-3}	2.86×10^{-2}	OID30214	49.46	P35914
SNX5	1146	-0.07	0.03	6.64×10^{-3}	4.04×10^{-2}	OID30215	29.20	Q9Y5X3
BECN1	1146	-0.10	0.03	1.86×10^{-4}	1.30×10^{-2}	OID30220	45.85	Q14457
COMMD1	1146	-0.10	0.03	1.84×10^{-4}	1.30×10^{-2}	OID30222	43.50	Q8N668

EDN1	1146	-0.08	0.03	3.86×10^{-3}	3.13×10^{-2}	OID30224	13.84	P05305
SCRIB	1146	-0.07	0.03	7.55×10^{-3}	4.42×10^{-2}	OID30225	32.06	Q14160
OXCT1	1146	-0.08	0.03	3.77×10^{-3}	3.09×10^{-2}	OID30227	44.24	P55809
EHD3	1146	-0.08	0.03	2.43×10^{-3}	2.48×10^{-2}	OID30229	66.62	Q9NZN3
HSBP1	1146	-0.10	0.03	2.07×10^{-4}	1.30×10^{-2}	OID30232	44.22	O75506
AAMDC	1146	-0.08	0.03	2.95×10^{-3}	2.76×10^{-2}	OID30236	31.30	Q9H7C9
ECHS1	1146	-0.08	0.03	5.42×10^{-3}	3.67×10^{-2}	OID30239	60.84	P30084
ATP6V1G1	1146	-0.08	0.03	3.87×10^{-3}	3.13×10^{-2}	OID30242	48.91	O75348
HS1BP3	1146	-0.09	0.03	1.81×10^{-3}	2.19×10^{-2}	OID30243	45.62	Q53T59
DNAJC6	1146	-0.09	0.03	9.15×10^{-4}	1.65×10^{-2}	OID30247	64.87	O75061
FAM172A	1146	-0.10	0.03	2.18×10^{-4}	1.30×10^{-2}	OID30248	41.97	Q8WUF8
MYL3	1146	-0.08	0.03	7.10×10^{-3}	4.24×10^{-2}	OID30251	22.36	P08590
NIT1	1146	-0.10	0.03	1.58×10^{-4}	1.30×10^{-2}	OID30252	38.52	Q86X76
GATD3	1146	-0.08	0.03	1.88×10^{-3}	2.20×10^{-2}	OID30253	68.95	P0DPI2
HSDL2	1146	-0.09	0.03	1.58×10^{-3}	2.06×10^{-2}	OID30256	29.18	Q6YN16
RBPMS2	1146	-0.09	0.03	8.54×10^{-4}	1.59×10^{-2}	OID30257	125.72	Q6ZRY4
RANBP1	1146	-0.08	0.03	1.63×10^{-3}	2.07×10^{-2}	OID30258	41.60	P43487
INPP5D	1146	-0.08	0.03	2.17×10^{-3}	2.30×10^{-2}	OID30259	41.46	Q92835
BOLA2_BOLA2B	1146	-0.10	0.03	1.68×10^{-4}	1.30×10^{-2}	OID30267	41.37	Q9H3K6
NFE2	1146	-0.10	0.03	1.61×10^{-4}	1.30×10^{-2}	OID30268	70.62	Q16621
SEC31A	1146	-0.07	0.03	6.56×10^{-3}	4.01×10^{-2}	OID30269	47.49	O94979
EIF2S2	1146	-0.10	0.03	2.23×10^{-4}	1.30×10^{-2}	OID30270	62.49	P20042
NAGK	1146	-0.08	0.03	5.46×10^{-3}	3.68×10^{-2}	OID30271	33.37	Q9UJ70
CRYZL1	1146	-0.10	0.03	2.72×10^{-4}	1.30×10^{-2}	OID30272	62.43	O95825
MECR	1146	-0.10	0.03	4.09×10^{-4}	1.34×10^{-2}	OID30274	68.89	Q9BV79
SCPEP1	1146	-0.08	0.03	2.43×10^{-3}	2.48×10^{-2}	OID30278	29.69	Q9HB40
CNP	1146	-0.10	0.03	2.44×10^{-4}	1.30×10^{-2}	OID30285	49.71	P09543
GRHPR	1146	-0.11	0.03	4.78×10^{-5}	9.03×10^{-3}	OID30289	54.77	Q9UBQ7
GGACT	1146	-0.08	0.03	1.91×10^{-3}	2.21×10^{-2}	OID30290	55.16	Q9BVM4
ECHDC3	1146	-0.08	0.03	5.60×10^{-3}	3.72×10^{-2}	OID30293	32.60	Q96DC8
NT5C	1146	-0.09	0.03	8.39×10^{-4}	1.59×10^{-2}	OID30294	59.82	Q8TCD5
ELN	1146	-0.10	0.03	1.65×10^{-3}	2.07×10^{-2}	OID30301	58.63	P15502

EHBP1	1146	-0.08	0.03	4.53×10^{-3}	3.31×10^{-2}	OID30302	43.90	Q8NDI1
GGCT	1146	-0.08	0.03	1.93×10^{-3}	2.21×10^{-2}	OID30304	60.67	O75223
DTYMK	1146	-0.10	0.03	1.19×10^{-4}	1.30×10^{-2}	OID30308	65.21	P23919
BCAT1	1146	-0.09	0.03	5.08×10^{-4}	1.39×10^{-2}	OID30312	36.32	P54687
L3HYPDH	1146	-0.07	0.03	5.15×10^{-3}	3.55×10^{-2}	OID30314	79.86	Q96EM0
COX6B1	1146	-0.08	0.03	4.54×10^{-3}	3.31×10^{-2}	OID30317	76.24	P14854
CRYBB1	1146	-0.11	0.03	7.36×10^{-5}	1.14×10^{-2}	OID30319	47.38	P53674
UBE2L6	1146	-0.10	0.03	2.96×10^{-4}	1.31×10^{-2}	OID30321	49.13	O14933
PTPRB	1146	-0.10	0.03	6.87×10^{-4}	1.46×10^{-2}	OID30324	34.49	P23467
RAB11FIP3	1146	-0.08	0.03	4.74×10^{-3}	3.36×10^{-2}	OID30325	97.50	O75154
CHMP6	1146	-0.12	0.03	1.75×10^{-5}	6.38×10^{-3}	OID30327	52.38	Q96FZ7
SARG	1146	-0.09	0.03	6.07×10^{-4}	1.43×10^{-2}	OID30331	69.40	Q9BW04
EEF1D	1146	-0.10	0.03	2.07×10^{-4}	1.30×10^{-2}	OID30335	91.63	P29692
NIT2	1146	-0.11	0.03	1.09×10^{-4}	1.30×10^{-2}	OID30336	59.32	Q9NQR4
SYTL4	1146	-0.09	0.03	1.08×10^{-3}	1.74×10^{-2}	OID30339	130.03	Q96C24
GMFG	1146	-0.09	0.03	1.40×10^{-3}	2.01×10^{-2}	OID30340	63.77	O60234
RILPL2	1146	-0.08	0.03	2.30×10^{-3}	2.38×10^{-2}	OID30342	67.01	Q969X0
PGD	1146	-0.08	0.03	2.03×10^{-3}	2.25×10^{-2}	OID30344	56.58	P52209
ADGRF5	1146	-0.10	0.03	2.43×10^{-4}	1.30×10^{-2}	OID30349	28.39	Q8IZF2
PPM1F	1146	-0.10	0.03	2.26×10^{-4}	1.30×10^{-2}	OID30350	39.16	P49593
TOMM20	1146	-0.07	0.03	6.41×10^{-3}	3.95×10^{-2}	OID30353	55.34	Q15388
RAB27B	1146	-0.07	0.03	5.84×10^{-3}	3.80×10^{-2}	OID30354	72.47	O00194
ACADSB	1146	-0.08	0.03	2.74×10^{-3}	2.66×10^{-2}	OID30356	89.03	P45954
RAB10	1146	-0.08	0.03	2.04×10^{-3}	2.25×10^{-2}	OID30357	59.01	P61026
CMC1	1146	-0.08	0.03	2.61×10^{-3}	2.57×10^{-2}	OID30360	60.79	Q7Z7K0
LRRC59	1146	-0.07	0.03	8.33×10^{-3}	4.76×10^{-2}	OID30361	38.70	Q96AG4
DDT	1146	-0.11	0.03	3.53×10^{-5}	8.25×10^{-3}	OID30372	34.09	P30046
BDNF	1146	-0.07	0.03	7.18×10^{-3}	4.25×10^{-2}	OID30373	69.06	P23560
PDIA4	1146	-0.09	0.03	1.25×10^{-3}	1.91×10^{-2}	OID30375	61.40	P13667
MYH9	1146	-0.08	0.03	1.52×10^{-3}	2.06×10^{-2}	OID30382	93.21	P35579
TWF2	1146	-0.08	0.03	3.65×10^{-3}	3.05×10^{-2}	OID30386	66.84	Q6IBS0
NPTX2	1146	-0.09	0.03	4.05×10^{-3}	3.15×10^{-2}	OID30390	27.37	P47972

CTHRC1	1146	-0.09	0.03	1.41×10^{-3}	2.01×10^{-2}	OID30393	27.92	Q96CG8
CILP	1146	-0.07	0.03	7.85×10^{-3}	4.55×10^{-2}	OID30399	77.62	O75339
HPSE	1146	-0.08	0.03	5.34×10^{-3}	3.62×10^{-2}	OID30409	75.49	Q9Y251
TALDO1	1146	-0.09	0.03	9.87×10^{-4}	1.68×10^{-2}	OID30414	35.52	P37837
HNRNPK	1146	-0.10	0.03	2.10×10^{-4}	1.30×10^{-2}	OID20051	66.48	P61978
STK11	1146	-0.08	0.03	5.83×10^{-3}	3.80×10^{-2}	OID20077	48.82	Q15831
TSPAN1	1146	-0.09	0.03	1.38×10^{-3}	2.01×10^{-2}	OID20078	21.70	O60635
CEP43	1146	-0.08	0.03	3.54×10^{-3}	3.00×10^{-2}	OID20084	57.91	O95684
IRAG2	1146	-0.07	0.03	8.50×10^{-3}	4.82×10^{-2}	OID20085	93.31	Q12912
COMT	1146	-0.09	0.03	1.51×10^{-3}	2.06×10^{-2}	OID20086	50.14	P21964
ADAMTS16	1146	0.09	0.03	2.48×10^{-3}	2.50×10^{-2}	OID20089	29.43	Q8TE57
GP2	1146	-0.10	0.03	2.49×10^{-4}	1.30×10^{-2}	OID20090	32.25	P55259
MPHOSPH8	1146	-0.08	0.03	1.91×10^{-3}	2.21×10^{-2}	OID20092	45.49	Q99549
GPR37	1146	-0.08	0.03	4.08×10^{-3}	3.15×10^{-2}	OID20095	58.06	O15354
GYS1	1146	-0.07	0.03	5.76×10^{-3}	3.78×10^{-2}	OID20097	65.28	P13807
ENTPD6	1146	-0.08	0.03	5.29×10^{-3}	3.61×10^{-2}	OID20100	22.97	O75354
GLO1	1146	-0.13	0.03	2.84×10^{-6}	4.15×10^{-3}	OID20107	52.29	Q04760
PAG1	1146	-0.08	0.03	4.23×10^{-3}	3.16×10^{-2}	OID20108	37.17	Q9NWQ8
USP8	1146	-0.08	0.03	3.67×10^{-3}	3.05×10^{-2}	OID20110	62.65	P40818
ITGB1BP2	1146	-0.09	0.03	6.15×10^{-4}	1.43×10^{-2}	OID20112	66.86	Q9UKP3
BAG6	1146	-0.09	0.03	8.61×10^{-4}	1.59×10^{-2}	OID20114	37.11	P46379
CLTA	1146	-0.09	0.03	5.22×10^{-4}	1.39×10^{-2}	OID20118	71.61	P09496
AK1	1146	-0.08	0.03	1.72×10^{-3}	2.12×10^{-2}	OID20122	58.10	P00568
ANXA4	1146	-0.08	0.03	1.92×10^{-3}	2.21×10^{-2}	OID20123	50.57	P09525
CNST	1146	-0.10	0.03	4.04×10^{-4}	1.34×10^{-2}	OID20127	75.93	Q6PJW8
VSIR	1146	-0.09	0.03	7.41×10^{-4}	1.50×10^{-2}	OID20131	48.06	Q9H7M9
SNX9	1146	-0.09	0.03	1.34×10^{-3}	2.00×10^{-2}	OID20135	46.59	Q9Y5X1
DOK2	1146	-0.10	0.03	2.67×10^{-4}	1.30×10^{-2}	OID20138	66.39	O60496
STK4	1146	-0.08	0.03	2.13×10^{-3}	2.30×10^{-2}	OID20140	52.02	Q13043
DPP7	1146	-0.12	0.03	1.65×10^{-5}	6.38×10^{-3}	OID20142	42.89	Q9UHL4
PLPBP	1146	-0.09	0.03	1.01×10^{-3}	1.68×10^{-2}	OID20144	53.51	O94903
LACTB2	1146	-0.09	0.03	5.63×10^{-4}	1.39×10^{-2}	OID20150	45.67	Q53H82

PLXNB3	1146	-0.09	0.03	5.47×10^{-4}	1.39×10^{-2}	OID20160	35.09	Q9ULL4
EIF4EBP1	1146	-0.10	0.03	2.70×10^{-4}	1.30×10^{-2}	OID20162	48.32	Q13541
APLP1	1146	0.09	0.03	1.56×10^{-3}	2.06×10^{-2}	OID20164	45.43	P51693
MEP1B	1146	0.10	0.03	4.96×10^{-4}	1.39×10^{-2}	OID20168	36.75	Q16820
MCFD2	1146	-0.09	0.03	7.84×10^{-4}	1.54×10^{-2}	OID20171	35.15	Q8NI22
QDPR	1146	-0.10	0.03	1.91×10^{-4}	1.30×10^{-2}	OID20174	38.96	P09417
CD2AP	1146	-0.10	0.03	3.33×10^{-4}	1.34×10^{-2}	OID20177	57.46	Q9Y5K6
DIABLO	1146	-0.08	0.03	2.63×10^{-3}	2.58×10^{-2}	OID20184	87.12	Q9NR28
NPTXR	1146	0.08	0.03	3.98×10^{-3}	3.13×10^{-2}	OID20191	34.41	O95502
GRAP2	1146	-0.08	0.03	2.24×10^{-3}	2.35×10^{-2}	OID20192	81.60	O75791
CD69	1146	-0.10	0.03	2.89×10^{-4}	1.31×10^{-2}	OID20206	59.79	Q07108
CXCL5	1146	-0.07	0.03	7.56×10^{-3}	4.42×10^{-2}	OID20207	67.99	P42830
COL4A1	1146	-0.08	0.03	4.22×10^{-3}	3.16×10^{-2}	OID20208	36.60	P02462
LILRA5	1146	-0.10	0.03	6.96×10^{-4}	1.46×10^{-2}	OID20209	34.07	A6NI73
SNAP23	1146	-0.08	0.03	3.42×10^{-3}	2.95×10^{-2}	OID20218	62.63	O00161
CA13	1146	-0.08	0.03	3.30×10^{-3}	2.93×10^{-2}	OID20225	67.10	Q8N1Q1
HSPB1	1146	-0.07	0.03	6.40×10^{-3}	3.95×10^{-2}	OID20230	53.11	P04792
TYMP	1146	-0.08	0.03	4.81×10^{-3}	3.39×10^{-2}	OID20234	69.95	P19971
GDF15	1146	-0.10	0.03	1.53×10^{-3}	2.06×10^{-2}	OID20251	39.14	Q99988
CORO1A	1146	-0.08	0.03	4.17×10^{-3}	3.15×10^{-2}	OID20286	93.78	P31146
CASP3	1146	-0.09	0.03	1.39×10^{-3}	2.01×10^{-2}	OID20305	68.71	P42574
PPIB	1146	-0.08	0.03	1.84×10^{-3}	2.20×10^{-2}	OID20331	77.67	P23284
NID1	1146	-0.10	0.03	3.79×10^{-4}	1.34×10^{-2}	OID20362	34.78	P14543
PRSS2	1146	-0.08	0.03	4.10×10^{-3}	3.15×10^{-2}	OID20364	34.32	P07478
RARRES2	1146	-0.08	0.03	6.32×10^{-3}	3.95×10^{-2}	OID20373	46.19	Q99969
GP1BA	1146	-0.08	0.03	2.65×10^{-3}	2.59×10^{-2}	OID20381	32.68	P07359
SOD1	1146	-0.08	0.03	2.26×10^{-3}	2.35×10^{-2}	OID20386	39.84	P00441
ANG	1146	-0.10	0.03	6.70×10^{-4}	1.46×10^{-2}	OID20403	33.03	P03950
COMP	1146	-0.08	0.03	7.03×10^{-3}	4.21×10^{-2}	OID20405	35.18	P49747
TGFBI	1146	-0.08	0.03	4.32×10^{-3}	3.21×10^{-2}	OID20417	38.09	Q15582
PAK4	1146	-0.09	0.03	4.67×10^{-4}	1.39×10^{-2}	OID20819	33.21	O96013
FGR	1146	-0.07	0.03	5.85×10^{-3}	3.80×10^{-2}	OID20828	38.32	P09769

ATP6V1F	1146	-0.08	0.03	3.57×10^{-3}	3.01×10^{-2}	OID20843	53.68	Q16864
TST	1146	-0.08	0.03	1.92×10^{-3}	2.21×10^{-2}	OID20868	48.72	Q16762
TARBP2	1146	-0.10	0.03	2.14×10^{-4}	1.30×10^{-2}	OID20870	54.83	Q15633
FHIT	1146	-0.09	0.03	6.88×10^{-4}	1.46×10^{-2}	OID20872	66.39	P49789
TDRKH	1146	-0.08	0.03	1.91×10^{-3}	2.21×10^{-2}	OID20875	61.14	Q9Y2W6
MAX	1146	-0.08	0.03	3.92×10^{-3}	3.13×10^{-2}	OID20877	93.14	P61244
KLB	1146	-0.07	0.03	7.58×10^{-3}	4.42×10^{-2}	OID20888	36.77	Q86Z14
AKT1S1	1146	-0.07	0.03	5.58×10^{-3}	3.71×10^{-2}	OID20895	49.83	Q96B36
MAP4K5	1146	-0.08	0.03	2.27×10^{-3}	2.35×10^{-2}	OID20899	63.58	Q9Y4K4
DARS1	1146	-0.08	0.03	2.79×10^{-3}	2.66×10^{-2}	OID20903	58.15	P14868
IMPA1	1146	-0.08	0.03	4.65×10^{-3}	3.36×10^{-2}	OID20907	35.74	P29218
PTPN1	1146	-0.09	0.03	6.97×10^{-4}	1.46×10^{-2}	OID20908	70.60	P18031
PTPRN2	1146	0.10	0.03	9.36×10^{-4}	1.66×10^{-2}	OID20912	48.03	Q92932
EBAG9	1146	-0.08	0.03	2.88×10^{-3}	2.71×10^{-2}	OID20918	54.41	O00559
CRADD	1146	-0.08	0.03	2.48×10^{-3}	2.50×10^{-2}	OID20923	70.64	P78560
WWP2	1146	-0.07	0.03	6.11×10^{-3}	3.88×10^{-2}	OID20926	46.44	O00308
APRT	1146	-0.10	0.03	4.80×10^{-4}	1.39×10^{-2}	OID20927	54.12	P07741
CHMP1A	1146	-0.08	0.03	3.76×10^{-3}	3.09×10^{-2}	OID20930	42.75	Q9HD42
SERPINB9	1146	-0.07	0.03	5.85×10^{-3}	3.80×10^{-2}	OID20932	35.70	P50453
FKBP5	1146	-0.08	0.03	2.26×10^{-3}	2.35×10^{-2}	OID20937	73.00	Q13451
TBCC	1146	-0.08	0.03	3.90×10^{-3}	3.13×10^{-2}	OID20942	58.18	Q15814
RHOC	1146	-0.09	0.03	4.18×10^{-4}	1.35×10^{-2}	OID20950	83.18	P08134
TXLNA	1146	-0.08	0.03	3.93×10^{-3}	3.13×10^{-2}	OID20952	61.79	P40222
STAMBP	1146	-0.08	0.03	2.09×10^{-3}	2.28×10^{-2}	OID20955	56.51	O95630
DNMBP	1146	-0.08	0.03	2.44×10^{-3}	2.48×10^{-2}	OID20956	59.14	Q6XZF7
CC2D1A	1146	-0.10	0.03	1.68×10^{-4}	1.30×10^{-2}	OID20958	62.36	Q6P1N0
MITD1	1146	-0.07	0.03	5.54×10^{-3}	3.69×10^{-2}	OID20959	67.61	Q8WV92
FKBP4	1146	-0.10	0.03	4.00×10^{-4}	1.34×10^{-2}	OID20960	48.80	Q02790
TNFRSF10A	1146	-0.08	0.03	3.94×10^{-3}	3.13×10^{-2}	OID20967	41.78	O00220
PSME1	1146	-0.09	0.03	7.30×10^{-4}	1.49×10^{-2}	OID20969	37.48	Q06323
IPCEF1	1146	-0.10	0.03	5.15×10^{-4}	1.39×10^{-2}	OID20977	72.10	Q8WWN9
RBKS	1146	-0.07	0.03	7.03×10^{-3}	4.21×10^{-2}	OID20986	64.31	Q9H477

CD63	1146	-0.11	0.03	4.95×10^{-5}	9.03×10^{-3}	OID20988	71.10	P08962
PSME2	1146	-0.09	0.03	1.19×10^{-3}	1.87×10^{-2}	OID20989	45.60	Q9UL46
TBCB	1146	-0.08	0.03	2.14×10^{-3}	2.30×10^{-2}	OID20993	76.16	Q99426
BCAN	1146	0.10	0.03	3.54×10^{-4}	1.34×10^{-2}	OID20998	45.09	Q96GW7
EIF4B	1146	-0.09	0.03	1.61×10^{-3}	2.06×10^{-2}	OID21000	62.77	P23588
PVR	1146	-0.07	0.03	6.12×10^{-3}	3.88×10^{-2}	OID21011	39.24	P15151
RWDD1	1146	-0.09	0.03	5.25×10^{-4}	1.39×10^{-2}	OID21015	50.67	Q9H446
VTA1	1146	-0.09	0.03	1.58×10^{-3}	2.06×10^{-2}	OID21016	54.81	Q9NP79
PDCD5	1146	-0.10	0.03	3.67×10^{-4}	1.34×10^{-2}	OID21021	54.17	O14737
NSFL1C	1146	-0.11	0.03	4.27×10^{-5}	8.92×10^{-3}	OID21022	63.41	Q9UNZ2
SERPINB6	1146	-0.08	0.03	4.15×10^{-3}	3.15×10^{-2}	OID21023	44.33	P35237
PPCDC	1146	-0.12	0.03	5.17×10^{-6}	5.04×10^{-3}	OID21027	40.95	Q96CD2
SMPD1	1146	-0.07	0.03	6.80×10^{-3}	4.11×10^{-2}	OID21028	41.09	P17405
SULT1A1	1146	-0.08	0.03	4.73×10^{-3}	3.36×10^{-2}	OID21031	78.16	P50225
LBR	1146	-0.09	0.03	1.00×10^{-3}	1.68×10^{-2}	OID21034	61.25	Q14739
ANXA3	1146	-0.09	0.03	1.55×10^{-3}	2.06×10^{-2}	OID21036	50.39	P12429
ENO1	1146	-0.08	0.03	1.79×10^{-3}	2.18×10^{-2}	OID21037	72.10	P06733
LGALS8	1146	-0.08	0.03	1.65×10^{-3}	2.07×10^{-2}	OID21041	43.06	O00214
CPPED1	1146	-0.09	0.03	1.12×10^{-3}	1.78×10^{-2}	OID21053	43.01	Q9BRF8
CTSS	1146	-0.07	0.03	7.50×10^{-3}	4.40×10^{-2}	OID21056	26.82	P25774
CLEC1B	1146	-0.09	0.03	7.30×10^{-4}	1.49×10^{-2}	OID21061	73.10	Q9P126
MIF	1146	-0.10	0.03	1.94×10^{-4}	1.30×10^{-2}	OID21073	57.47	P14174
STIP1	1146	-0.09	0.03	5.07×10^{-4}	1.39×10^{-2}	OID21077	41.25	P31948
HARS1	1146	-0.08	0.03	4.16×10^{-3}	3.15×10^{-2}	OID21086	42.75	P12081
PEBP1	1146	-0.12	0.03	8.65×10^{-6}	6.32×10^{-3}	OID21087	49.14	P30086
SERPINB1	1146	-0.08	0.03	4.16×10^{-3}	3.15×10^{-2}	OID21088	63.27	P30740
GP6	1146	-0.09	0.03	1.29×10^{-3}	1.94×10^{-2}	OID21091	52.49	Q9HCN6
MESD	1146	-0.08	0.03	3.46×10^{-3}	2.96×10^{-2}	OID21099	80.68	Q14696
THBS2	1146	-0.09	0.03	9.98×10^{-4}	1.68×10^{-2}	OID21104	32.08	P35442
NUDT5	1146	-0.09	0.03	1.32×10^{-3}	1.98×10^{-2}	OID21115	51.73	Q9UKK9
TMSB10	1146	-0.07	0.03	8.72×10^{-3}	4.90×10^{-2}	OID21118	59.86	P63313
MYOC	1146	-0.08	0.03	2.14×10^{-3}	2.30×10^{-2}	OID21121	42.66	Q99972

TXNRD1	1146	-0.12	0.03	1.68×10^{-5}	6.38×10^{-3}	OID21135	36.84	Q16881
FYB1	1146	-0.08	0.03	2.04×10^{-3}	2.25×10^{-2}	OID21140	69.54	O15117
DBI	1146	-0.08	0.03	3.98×10^{-3}	3.13×10^{-2}	OID21143	42.15	P07108
TIMP4	1146	-0.13	0.03	1.54×10^{-5}	6.38×10^{-3}	OID21147	37.68	Q99727
CA2	1146	-0.09	0.03	1.04×10^{-3}	1.70×10^{-2}	OID21149	59.19	P00918
CTRB1	1146	-0.07	0.03	7.17×10^{-3}	4.25×10^{-2}	OID21150	34.70	P17538
PARK7	1146	-0.09	0.03	9.04×10^{-4}	1.64×10^{-2}	OID21160	50.01	Q99497
RNF41	1146	-0.07	0.03	6.65×10^{-3}	4.04×10^{-2}	OID21179	68.63	Q9H4P4
MAVS	1146	-0.09	0.03	1.37×10^{-3}	2.01×10^{-2}	OID21204	115.88	Q7Z434
SH2B3	1146	-0.09	0.03	1.87×10^{-3}	2.20×10^{-2}	OID21222	85.30	Q9UQQ2
NDUFS6	1146	-0.11	0.03	2.69×10^{-5}	7.57×10^{-3}	OID21224	76.49	O75380
MED18	1146	-0.09	0.03	1.42×10^{-3}	2.01×10^{-2}	OID21236	39.00	Q9BUE0
CEP85	1146	-0.07	0.03	6.65×10^{-3}	4.04×10^{-2}	OID21241	56.58	Q6P2H3
ATG4A	1146	-0.10	0.03	2.19×10^{-4}	1.30×10^{-2}	OID21246	61.93	Q8WYN0
GFER	1146	-0.10	0.03	5.90×10^{-4}	1.41×10^{-2}	OID21259	51.63	P55789
ACAA1	1146	-0.09	0.03	5.34×10^{-4}	1.39×10^{-2}	OID21269	98.51	P09110
STAT5B	1146	-0.09	0.03	1.72×10^{-3}	2.12×10^{-2}	OID21277	119.11	P51692
ABL1	1146	-0.10	0.03	1.53×10^{-4}	1.30×10^{-2}	OID21280	72.34	P00519
VPS53	1146	-0.09	0.03	1.06×10^{-3}	1.71×10^{-2}	OID21281	51.42	Q5VIR6
TBC1D23	1146	-0.08	0.03	1.95×10^{-3}	2.22×10^{-2}	OID21286	76.91	Q9NUY8
AIFM1	1146	-0.09	0.03	1.39×10^{-3}	2.01×10^{-2}	OID21287	84.63	O95831
LAT2	1146	-0.08	0.03	1.94×10^{-3}	2.22×10^{-2}	OID21292	91.17	Q9GZY6
CDKN2D	1146	-0.07	0.03	6.39×10^{-3}	3.95×10^{-2}	OID21295	85.17	P55273
PSMD9	1146	-0.08	0.03	2.78×10^{-3}	2.66×10^{-2}	OID21304	60.83	O00233
AARSD1	1146	-0.10	0.03	4.25×10^{-4}	1.35×10^{-2}	OID21311	79.47	Q9BTE6
INPPL1	1146	-0.08	0.03	3.01×10^{-3}	2.77×10^{-2}	OID21314	75.75	O15357
CNPY4	1146	-0.10	0.03	2.57×10^{-4}	1.30×10^{-2}	OID21317	80.53	Q8N129
KIFBP	1146	-0.09	0.03	7.50×10^{-4}	1.50×10^{-2}	OID21320	72.66	Q96EK5
ERBIN	1146	-0.08	0.03	4.30×10^{-3}	3.21×10^{-2}	OID21323	81.05	Q96RT1
STX4	1146	-0.09	0.03	9.68×10^{-4}	1.68×10^{-2}	OID21326	57.66	Q12846
ARSB	1146	-0.09	0.03	4.41×10^{-4}	1.38×10^{-2}	OID21331	79.32	P15848
SCAMP3	1146	-0.09	0.03	1.36×10^{-3}	2.01×10^{-2}	OID21332	110.02	O14828

DCTN2	1146	-0.10	0.03	4.44×10^{-4}	1.38×10^{-2}	OID21334	165.42	Q13561
DRG2	1146	-0.08	0.03	2.77×10^{-3}	2.66×10^{-2}	OID21335	36.87	P55039
UBAC1	1146	-0.08	0.03	2.18×10^{-3}	2.30×10^{-2}	OID21336	48.96	Q9BSL1
PPME1	1146	-0.09	0.03	9.32×10^{-4}	1.66×10^{-2}	OID21347	87.82	Q9Y570
YES1	1146	-0.09	0.03	1.02×10^{-3}	1.69×10^{-2}	OID21348	102.45	P07947
OMG	1146	0.14	0.03	4.01×10^{-7}	1.17×10^{-3}	OID21352	71.71	P23515
VPS37A	1146	-0.10	0.03	2.42×10^{-4}	1.30×10^{-2}	OID21355	57.46	Q8NEZ2
IQGAP2	1146	-0.09	0.03	5.23×10^{-4}	1.39×10^{-2}	OID21361	92.71	Q13576
DNAJB1	1146	-0.08	0.03	2.54×10^{-3}	2.52×10^{-2}	OID21363	92.03	P25685
DEFB4A_DEFB4B	1146	-0.09	0.03	2.60×10^{-3}	2.57×10^{-2}	OID21373	141.55	O15263
SIRT2	1146	-0.09	0.03	9.89×10^{-4}	1.68×10^{-2}	OID21375	82.40	Q8IXJ6
MOG	1146	0.12	0.03	1.91×10^{-4}	1.30×10^{-2}	OID21384	35.26	Q16653
CALCOCO1	1146	-0.08	0.03	3.04×10^{-3}	2.78×10^{-2}	OID21387	133.48	Q9P1Z2
DCTN1	1146	-0.09	0.03	1.69×10^{-3}	2.10×10^{-2}	OID21399	60.96	Q14203
CASP8	1146	-0.07	0.03	6.98×10^{-3}	4.20×10^{-2}	OID21414	98.10	Q14790
VWA1	1146	-0.08	0.03	3.52×10^{-3}	2.99×10^{-2}	OID21421	85.79	Q6PCB0
HAVCR1	1146	-0.10	0.03	9.57×10^{-4}	1.68×10^{-2}	OID21422	95.89	Q96D42
DAB2	1146	-0.08	0.03	4.35×10^{-3}	3.21×10^{-2}	OID21428	68.64	P98082
RILP	1146	-0.10	0.03	3.13×10^{-4}	1.32×10^{-2}	OID21436	77.75	Q96NA2
METAP2	1146	-0.09	0.03	1.03×10^{-3}	1.69×10^{-2}	OID21437	102.04	P50579
FXN	1146	-0.09	0.03	6.11×10^{-4}	1.43×10^{-2}	OID21442	49.18	Q16595
CDC37	1146	-0.08	0.03	3.93×10^{-3}	3.13×10^{-2}	OID21470	60.91	Q16543
HTRA2	1146	-0.10	0.03	1.20×10^{-4}	1.30×10^{-2}	OID21471	39.44	O43464
PPP1R12A	1146	-0.10	0.03	3.89×10^{-4}	1.34×10^{-2}	OID21475	60.92	O14974
ATOX1	1146	-0.09	0.03	5.56×10^{-4}	1.39×10^{-2}	OID21476	49.02	O00244
TJAP1	1146	-0.09	0.03	7.66×10^{-4}	1.51×10^{-2}	OID21477	57.72	Q5JTD0
C4BPB	1146	-0.08	0.03	5.51×10^{-3}	3.69×10^{-2}	OID21481	40.64	P20851
CTSF	1146	-0.08	0.03	4.41×10^{-3}	3.24×10^{-2}	OID21500	39.38	Q9UBX1
CIAPIN1	1146	-0.10	0.03	1.48×10^{-4}	1.30×10^{-2}	OID21501	54.56	Q6FI81
SIAE	1146	-0.10	0.03	3.42×10^{-4}	1.34×10^{-2}	OID21503	42.52	Q9HAT2
SNAP29	1146	-0.10	0.03	3.06×10^{-4}	1.31×10^{-2}	OID21506	70.90	O95721
P4HB	1146	-0.07	0.03	6.28×10^{-3}	3.95×10^{-2}	OID21509	40.53	P07237

MSRA	1146	-0.09	0.03	1.46×10^{-3}	2.05×10^{-2}	OID21513	51.47	Q9UJ68
CREG1	1146	-0.08	0.03	5.90×10^{-3}	3.81×10^{-2}	OID21515	39.90	O75629
S100A4	1146	-0.10	0.03	2.28×10^{-4}	1.30×10^{-2}	OID21519	43.33	P26447
SRC	1146	-0.08	0.03	3.08×10^{-3}	2.81×10^{-2}	OID21521	95.72	P12931
KLK10	1146	-0.07	0.03	8.52×10^{-3}	4.82×10^{-2}	OID21523	40.68	O43240
KLK6	1146	0.10	0.03	5.08×10^{-4}	1.39×10^{-2}	OID21526	34.01	Q92876
IFIT1	828	-0.10	0.03	1.67×10^{-3}	2.08×10^{-2}	OID31310	67.02	P09914
EFCAB2	1146	-0.07	0.03	5.28×10^{-3}	3.61×10^{-2}	OID31313	43.73	Q5VUJ9
TRDMT1	1146	-0.08	0.03	5.46×10^{-3}	3.68×10^{-2}	OID31335	61.71	O14717
LRRFIP1	1146	-0.08	0.03	3.84×10^{-3}	3.13×10^{-2}	OID31344	61.24	Q32MZ4
PPP1CC	1146	-0.07	0.03	7.93×10^{-3}	4.58×10^{-2}	OID31360	69.58	P36873
RAB2B	1146	-0.09	0.03	1.56×10^{-3}	2.06×10^{-2}	OID31362	68.18	Q8WUD1
THTPA	1146	-0.09	0.03	7.29×10^{-4}	1.49×10^{-2}	OID31375	76.95	Q9BU02
NMI	1146	-0.09	0.03	9.80×10^{-4}	1.68×10^{-2}	OID31378	83.67	Q13287
DTNB	1146	-0.08	0.03	3.56×10^{-3}	3.01×10^{-2}	OID31395	59.66	O60941
IMMT	1146	-0.07	0.03	8.69×10^{-3}	4.90×10^{-2}	OID31397	55.98	Q16891
CMIP	1146	-0.09	0.03	1.60×10^{-3}	2.06×10^{-2}	OID31406	84.20	Q8IY22
TADA3	1146	-0.08	0.03	2.36×10^{-3}	2.43×10^{-2}	OID31422	107.13	O75528
SDCCAG8	1146	-0.09	0.03	1.76×10^{-3}	2.16×10^{-2}	OID31423	153.14	Q86SQ7
USP25	1146	-0.09	0.03	7.00×10^{-4}	1.46×10^{-2}	OID31428	75.12	Q9UHP3
EIF2AK2	1146	-0.07	0.03	7.33×10^{-3}	4.31×10^{-2}	OID31442	113.42	P19525
INSL5	1146	-0.07	0.03	8.40×10^{-3}	4.78×10^{-2}	OID31448	77.00	Q9Y5Q6
ZNRD2	1146	-0.07	0.03	5.89×10^{-3}	3.81×10^{-2}	OID31450	71.56	O60232
ZFYVE19	1146	-0.09	0.03	8.06×10^{-4}	1.56×10^{-2}	OID31452	117.57	Q96K21
FAM13A	1146	-0.09	0.03	6.05×10^{-4}	1.43×10^{-2}	OID31463	93.98	O94988
OGA	1146	-0.08	0.03	4.94×10^{-3}	3.44×10^{-2}	OID31465	62.58	O60502
ATG16L1	1146	-0.07	0.03	6.07×10^{-3}	3.88×10^{-2}	OID31466	88.26	Q676U5
MAP2K1	1146	-0.09	0.03	1.23×10^{-3}	1.90×10^{-2}	OID31468	69.20	Q02750
DNAJC9	1146	-0.08	0.03	3.43×10^{-3}	2.95×10^{-2}	OID31472	127.93	Q8WXX5
SWAP70	1146	-0.07	0.03	4.72×10^{-3}	3.36×10^{-2}	OID31477	116.72	Q9UH65
AP3B1	1146	-0.07	0.03	5.34×10^{-3}	3.62×10^{-2}	OID31478	96.49	O00203
KAZN	1146	-0.08	0.03	3.36×10^{-3}	2.94×10^{-2}	OID31481	121.20	Q674X7

TRIM25	1146	-0.08	0.03	3.40×10^{-3}	2.95×10^{-2}	OID31482	198.57	Q14258
ADGRE1	1146	-0.07	0.03	8.05×10^{-3}	4.62×10^{-2}	OID31483	84.00	Q14246
NUDT16	1146	-0.09	0.03	6.69×10^{-4}	1.46×10^{-2}	OID31484	106.70	Q96DE0
CDC42BPB	1146	-0.09	0.03	1.54×10^{-3}	2.06×10^{-2}	OID31485	153.96	Q9Y5S2
UFD1	1146	-0.08	0.03	4.13×10^{-3}	3.15×10^{-2}	OID31486	154.50	Q92890
OTUD6B	1146	-0.09	0.03	1.13×10^{-3}	1.79×10^{-2}	OID31487	66.88	Q8N6M0
MTSS1	1146	-0.09	0.03	1.51×10^{-3}	2.06×10^{-2}	OID31492	161.33	O43312
YARS1	1146	-0.08	0.03	4.89×10^{-3}	3.42×10^{-2}	OID31494	152.89	P54577
IST1	1146	-0.08	0.03	3.40×10^{-3}	2.95×10^{-2}	OID31497	98.06	P53990
FKBPL	1146	-0.08	0.03	3.16×10^{-3}	2.86×10^{-2}	OID31499	70.71	Q9UIM3
PPP2R5A	1146	-0.08	0.03	4.82×10^{-3}	3.39×10^{-2}	OID31502	166.01	Q15172
CIRBP	1146	-0.07	0.03	7.16×10^{-3}	4.25×10^{-2}	OID31503	106.41	Q14011
PCYT2	1146	-0.07	0.03	8.94×10^{-3}	5.00×10^{-2}	OID31519	74.76	Q99447
JPT2	1146	-0.08	0.03	4.12×10^{-3}	3.15×10^{-2}	OID31520	85.13	Q9H910
ARF6	1146	-0.08	0.03	2.49×10^{-3}	2.50×10^{-2}	OID31523	165.20	P62330

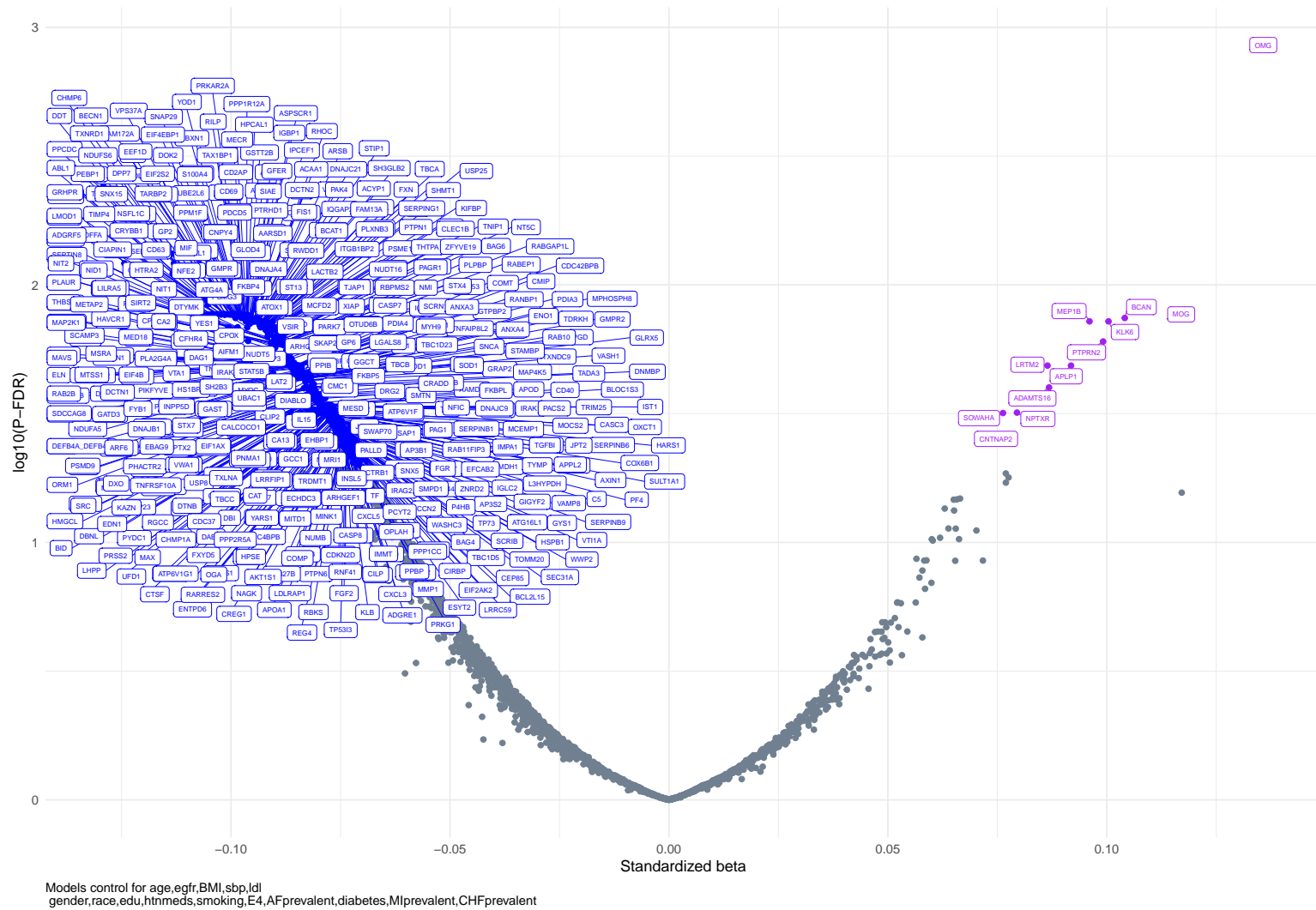


Figure 2: Associations Between Exam 1 Proteins and Fractional Anisotropy

Step 6: Cross sectional Protein-Wide Association Studies (PWAS) with a reduced number of covariates

This section repeats the cross-sectional PWAS, nusing thr set of covariates recommended by Tim.

- This section includes PWAS where proteins were only used at one time point (exam 1 or exam 6), even if this was not the same time point as when the MRI data were used.
- All estimates are standardized.

White matter hyperintensity (WMH)

Model Specification

- The associations between WMH and proteins were analyzed via linear regression
- For WMH the numeric covariates included icv, age, egfr, BMI. ²
- For WMH the factor covariates included gender, race, edu, smoking, E4. ²
- WMH was transformed using an inverse normal transformation (with blom constant).

WMH: Exam 6 proteins

- The E6 proteins -> E6 MRI for WMH included data from N=951 participants.
- A total of N=0 exam 6 proteins were significantly associated with WMH at an FDR corrected $P < .05$.

WMH: Exam 1 proteins

- The E1 proteins -> E6 MRI for WMH included data from N=939 participants.
- A total of N=0 exam 1 proteins were significantly associated with WMH at an FDR corrected $P < .05$.

Enlarged Perivascular Spaces (EPVS)

Model Specification

- The associations between EPVS and proteins were analyzed via linear regression
- For EPVS the numeric covariates included icv, age, egfr, BMI. ²
- For EPVS the factor covariates included gender, race, edu, smoking, E4. ²
- EPVS was transformed using an inverse normal transformation (with blom constant).

EPVS: Exam 6 proteins

- The E6 proteins -> E6 MRI for EPVS included data from N=944 participants.
- A total of N=0 exam 1 proteins were significantly associated with EPVS at an FDR corrected $P < .05$

EPVS: Exam 1 proteins

- The E1 proteins -> E6 MRI for EPVS included data from N=906 participants.
- A total of N=0 exam 1 proteins were significantly associated with EPVS at an FDR corrected $P < .05$

Fractional Anisotropy (FA)

Model Specification

- The associations between FA and proteins were analyzed via linear regression
- For FA the numeric covariates included age, egfr. ²
- For FA the factor covariates included gender, race, edu, smoking, E4. ²
- FA was transformed using an inverse normal transformation (with blom constant).

FA: Exam 6 proteins

- The E6 proteins -> E6 MRI for FA included data from N=1190 participants.
- A total of N=32 exam 6 proteins were significantly associated with FA at an FDR corrected $P < .05$.

FA: Exam 1 proteins

- The E1 proteins -> E6 MRI for FA included data from N=1187 participants.
- A total of N=635 exam 1 proteins were significantly associated with FA at an FDR corrected $P < .05$.

Microbleeds (MB)

Model Specification

- The associations between MB and proteins were analyzed via logistic regression (MB coded as 'present' vs. 'absent' as above)
- For MB the numeric covariates included age, egfr, BMI. ²
- For MB the factor covariates included gender, race, edu, smoking, E4. ²

MB: Exam 6 proteins

- The E6 proteins -> E6 MRI for MB included data from N= 994 participants.
- A total of N=1 exam 6 proteins were significantly associated with MB at an FDR corrected $P < .05$.

MB: Exam 1 proteins

- The E1 proteins -> E6 MRI for FA included data from N=986 participants.
- A total of N=0 exam 1 proteins were significantly associated with MB at an FDR correct $P < .05$.

Notes

Footnotes

¹ This is a reproducible file for many runs, containing many data checks. Values of 0 or NULL are expected, and just indicate no problem with the data.

² These are intentionally written as variable names to avoid reproducibility errors.

Session Info

For reproducibility

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- Session info -----
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os       Linux Mint 21
system   x86_64, linux-gnu
ui       X11
language (EN)
collate  en_US.UTF-8
ctype    en_US.UTF-8
tz       America/Chicago
date     2026-01-09
pandoc   3.2 @ /usr/lib/rstudio-server/bin/quarto/bin/tools/x86_64/ (via rmarkdown)
quarto   1.8.26 @ /usr/local/bin/quarto

- Packages -----
package      * version date (UTC) lib source
backports    1.5.0   2024-05-23 [1] CRAN (R 4.5.0)
base64url    1.4     2018-05-14 [1] CRAN (R 4.5.1)
callr        3.7.6   2024-03-25 [1] CRAN (R 4.5.1)
cards        0.7.1   2025-12-02 [1] CRAN (R 4.5.2)
cli          3.6.5   2025-04-23 [1] CRAN (R 4.5.2)
codetools    0.2-20  2024-03-31 [4] CRAN (R 4.5.0)
commonmark   1.9.5   2025-03-17 [1] CRAN (R 4.5.0)
data.table   1.17.8  2025-07-10 [1] CRAN (R 4.5.1)
digest       0.6.37  2024-08-19 [1] CRAN (R 4.5.1)
dplyr        1.1.4   2023-11-17 [1] CRAN (R 4.5.0)
evaluate     1.0.5   2025-08-27 [1] CRAN (R 4.5.1)
farver       2.1.2   2024-05-13 [1] CRAN (R 4.5.0)
fastmap      1.2.0   2024-05-15 [1] CRAN (R 4.5.0)
fs           1.6.6   2025-04-12 [1] CRAN (R 4.5.0)
generics     0.1.4   2025-05-09 [1] CRAN (R 4.5.1)
ggplot2      4.0.1   2025-11-14 [1] CRAN (R 4.5.2)
ggrepel      0.9.6   2024-09-07 [1] CRAN (R 4.5.0)
glue         1.8.0   2024-09-30 [1] CRAN (R 4.5.0)
gt           1.1.0   2025-09-23 [1] CRAN (R 4.5.2)
gtable       0.3.6   2024-10-25 [1] CRAN (R 4.5.0)
gtsummary    2.5.0   2025-12-05 [1] CRAN (R 4.5.2)
htmltools    0.5.8.1 2024-04-04 [1] CRAN (R 4.5.0)
```

igraph	2.1.4	2025-01-23	[1]	CRAN	(R 4.5.0)
jsonlite	2.0.0	2025-03-27	[1]	CRAN	(R 4.5.0)
knitr	1.50	2025-03-16	[1]	CRAN	(R 4.5.2)
labeling	0.4.3	2023-08-29	[1]	CRAN	(R 4.5.0)
later	1.4.2	2025-04-08	[1]	CRAN	(R 4.5.0)
lifecycle	1.0.4	2023-11-07	[1]	CRAN	(R 4.5.0)
litedown	0.7	2025-04-08	[2]	CRAN	(R 4.5.1)
magrittr	2.0.4	2025-09-12	[1]	CRAN	(R 4.5.1)
markdown	2.0	2025-03-23	[2]	CRAN	(R 4.5.1)
naniar	1.1.0	2024-03-05	[1]	CRAN	(R 4.5.2)
pillar	1.11.1	2025-09-17	[1]	CRAN	(R 4.5.1)
pkgconfig	2.0.3	2019-09-22	[1]	CRAN	(R 4.5.0)
prettyunits	1.2.0	2023-09-24	[1]	CRAN	(R 4.5.0)
processx	3.8.6	2025-02-21	[2]	CRAN	(R 4.5.1)
ps	1.9.1	2025-04-12	[1]	CRAN	(R 4.5.0)
purrr	1.1.0	2025-07-10	[1]	CRAN	(R 4.5.1)
quarto	1.5.1	2025-09-04	[1]	CRAN	(R 4.5.2)
R6	2.6.1	2025-02-15	[1]	CRAN	(R 4.5.0)
RColorBrewer	1.1-3	2022-04-03	[1]	CRAN	(R 4.5.0)
Rcpp	1.0.14	2025-01-12	[1]	CRAN	(R 4.5.0)
rlang	1.1.6	2025-04-11	[1]	CRAN	(R 4.5.0)
rmarkdown	2.29	2024-11-04	[1]	CRAN	(R 4.5.0)
rstudioapi	0.17.1	2024-10-22	[1]	CRAN	(R 4.5.0)
S7	0.2.0	2024-11-07	[2]	CRAN	(R 4.5.1)
scales	1.4.0	2025-04-24	[1]	CRAN	(R 4.5.2)
secretbase	1.0.5	2025-03-04	[1]	CRAN	(R 4.5.1)
sessioninfo	1.2.3	2025-02-05	[1]	CRAN	(R 4.5.1)
targets	1.11.4	2025-09-13	[1]	CRAN	(R 4.5.1)
tibble	3.3.0	2025-06-08	[1]	CRAN	(R 4.5.1)
tidyr	1.3.1	2024-01-24	[1]	CRAN	(R 4.5.0)
tidyselect	1.2.1	2024-03-11	[1]	CRAN	(R 4.5.0)
vctrs	0.6.5	2023-12-01	[1]	CRAN	(R 4.5.0)
visdat	0.6.0	2023-02-02	[1]	CRAN	(R 4.5.2)
withr	3.0.2	2024-10-28	[1]	CRAN	(R 4.5.0)
xfun	0.53	2025-08-19	[1]	CRAN	(R 4.5.1)
xml2	1.4.0	2025-08-20	[1]	CRAN	(R 4.5.1)
yaml	2.3.10	2024-07-26	[1]	CRAN	(R 4.5.0)

[1] /home/awood/R/x86_64-pc-linux-gnu-library/4.5

[2] /usr/local/lib/R/site-library

[3] /usr/lib/R/site-library

[4] /usr/lib/R/library
