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Differentially expressed transcript regions in Alzheimer's disease

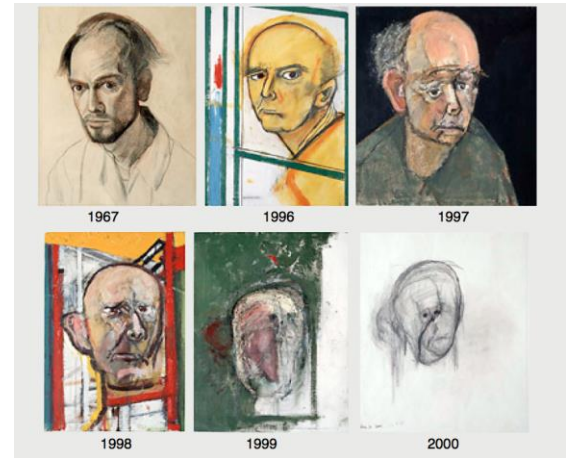
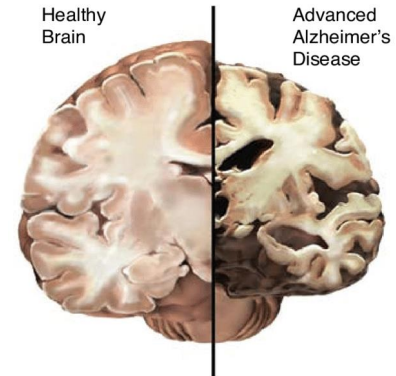
Bled, 14 February 2020

Leipzig University, Bioinformatik

Natasha Jorge

ALZHEIMER'S DISEASE (AD)

- Chronic neurodegenerative disease
- Memory loss, language problems, disorientation, mood swings
- Cause is unknown – plaques and neurofibrillary tangles
- No cure



New Results

Alzheimer related genes show accelerated evolution

Anne Nitsche, Kristin Reiche, Uwe Ueberham, Christian Arnold, Jörg Hackermüller, Friedemann Horn, Peter F. Stadler, Thomas Arendt

doi: <https://doi.org/10.1101/114108>

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with control samples [Supplementary Methods]. Applying this custom array to 19 AD patients and 22 control samples, we identified a differential expression of 154 multi-exonic cRNAs with a total of 4,162 splice sites and 141 multi-exonic lncRNAs with a total of 1,297 splice sites.

New Results

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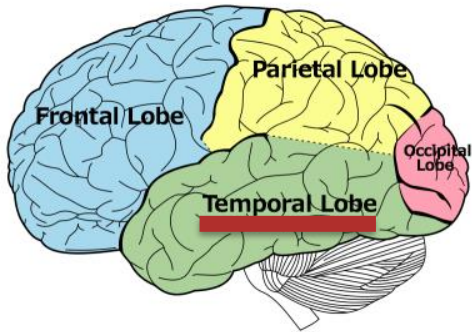
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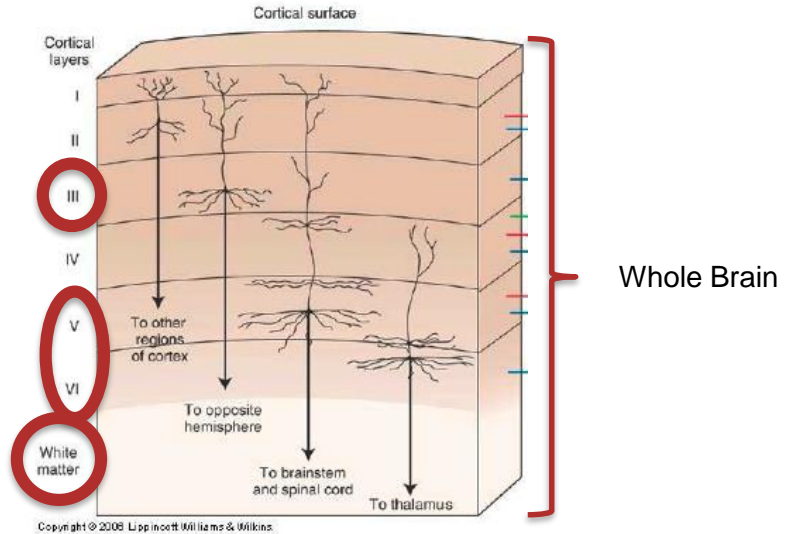
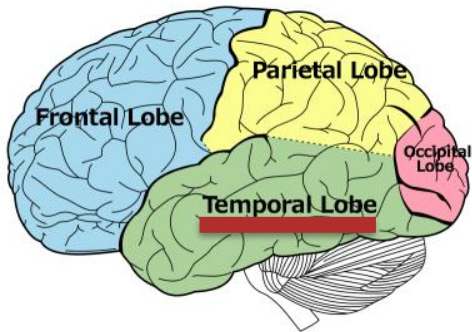
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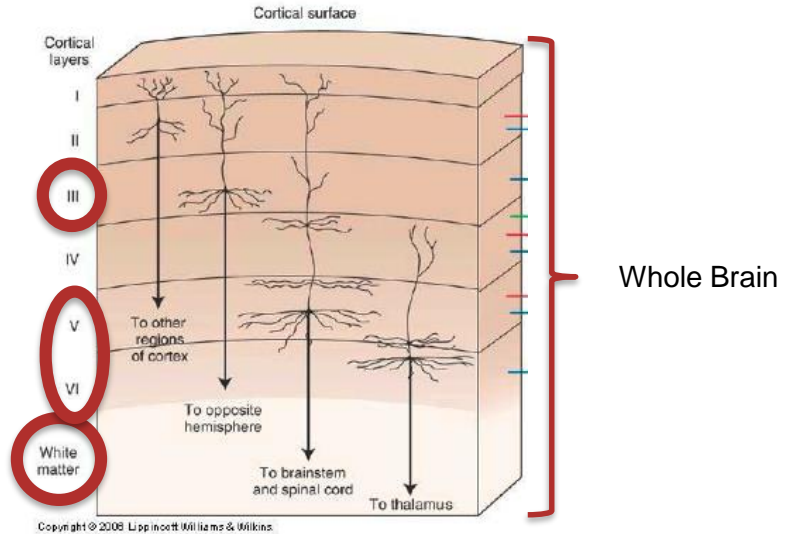
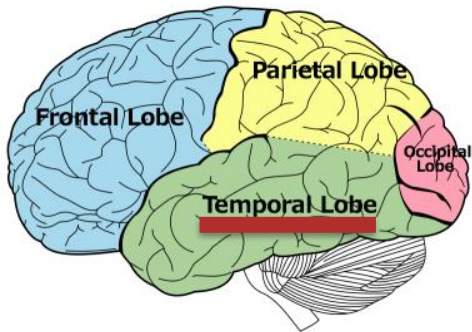
OBJECTIVES

IDENTIFY ALTERNATIVE USAGE OF 3' ENDS

MATERIAL AND METHODS



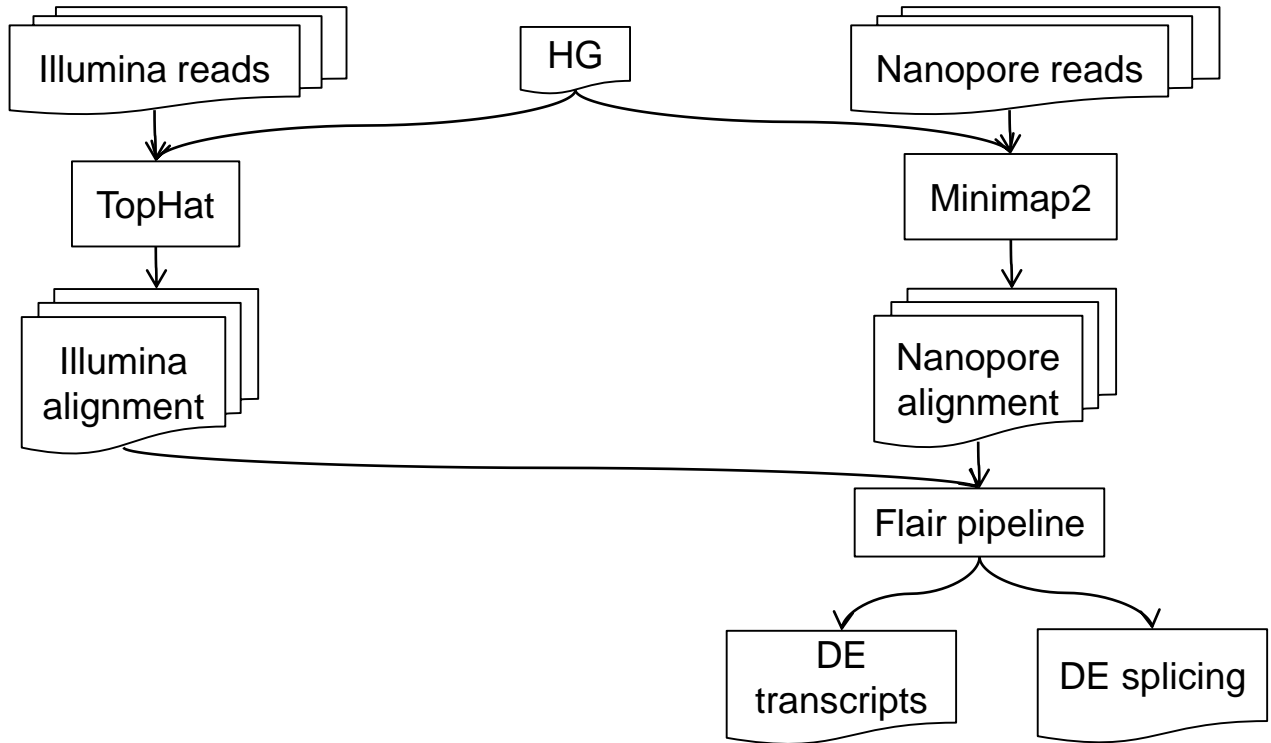


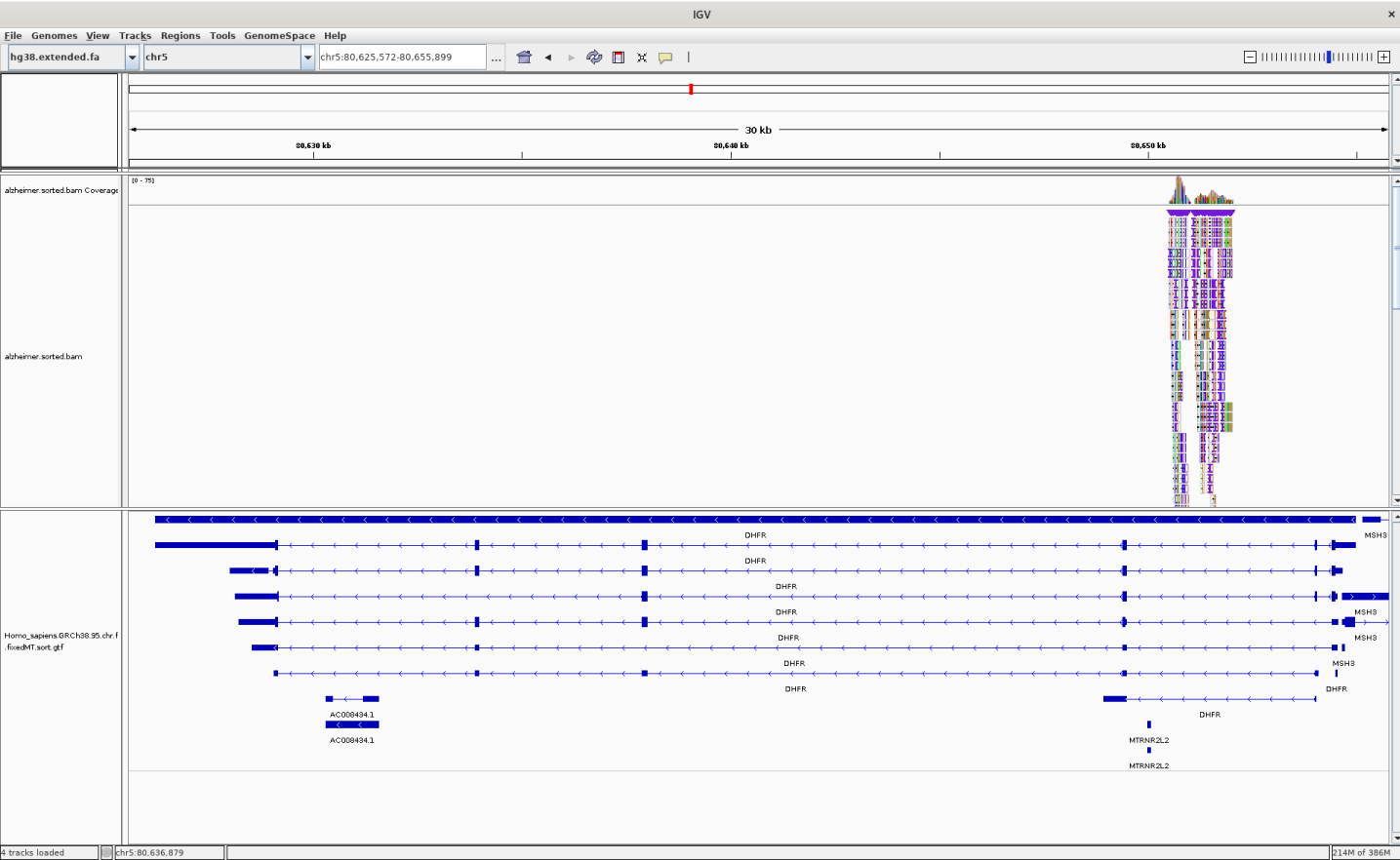


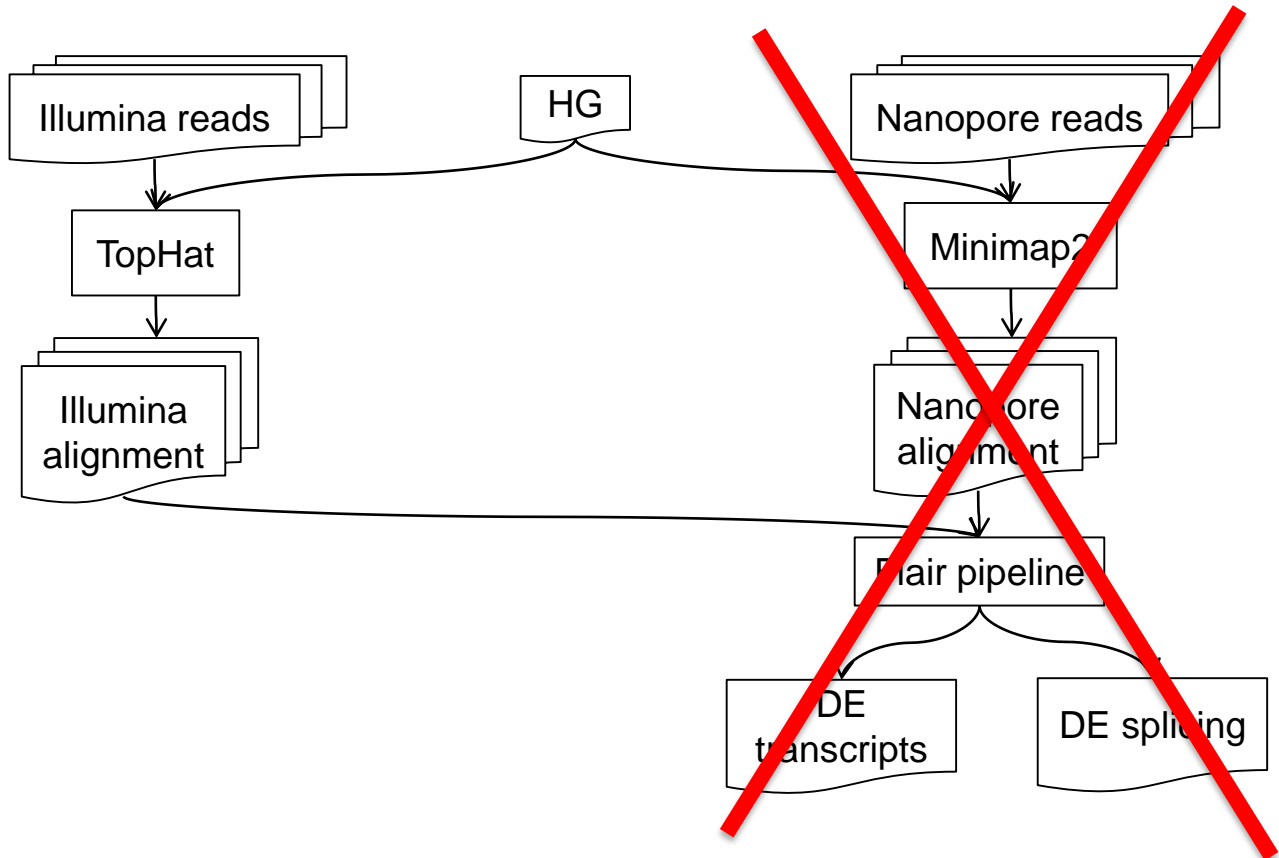
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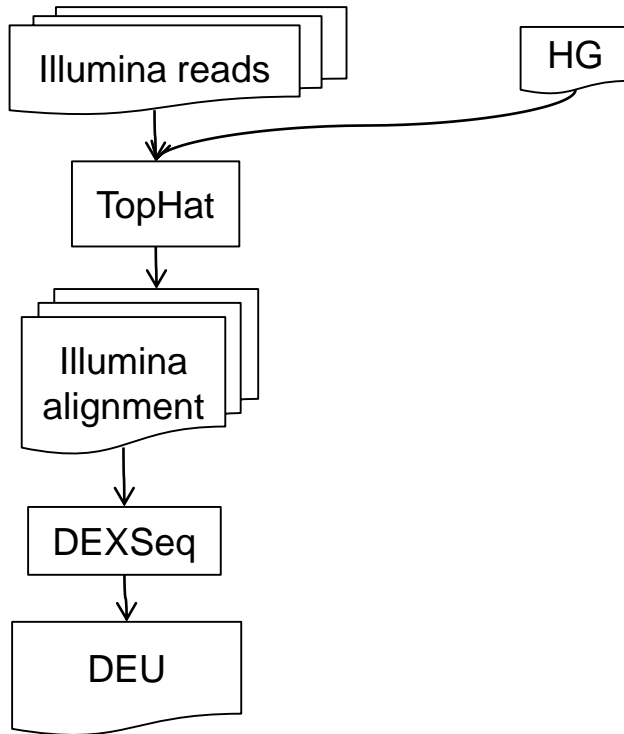
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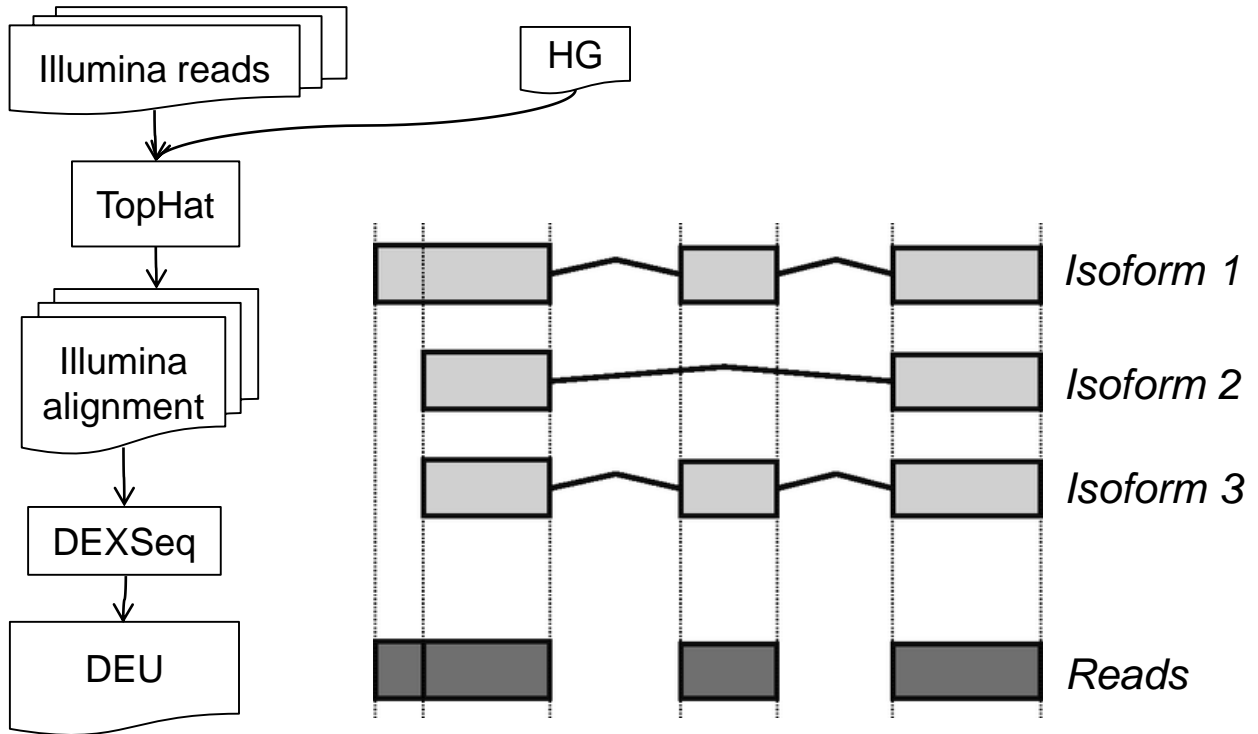
DRS

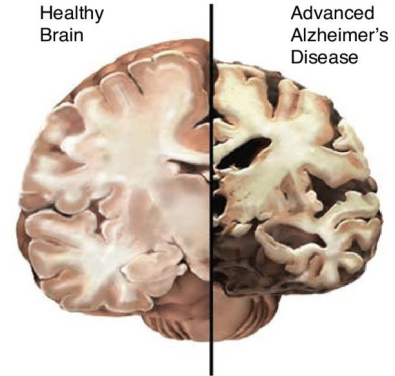
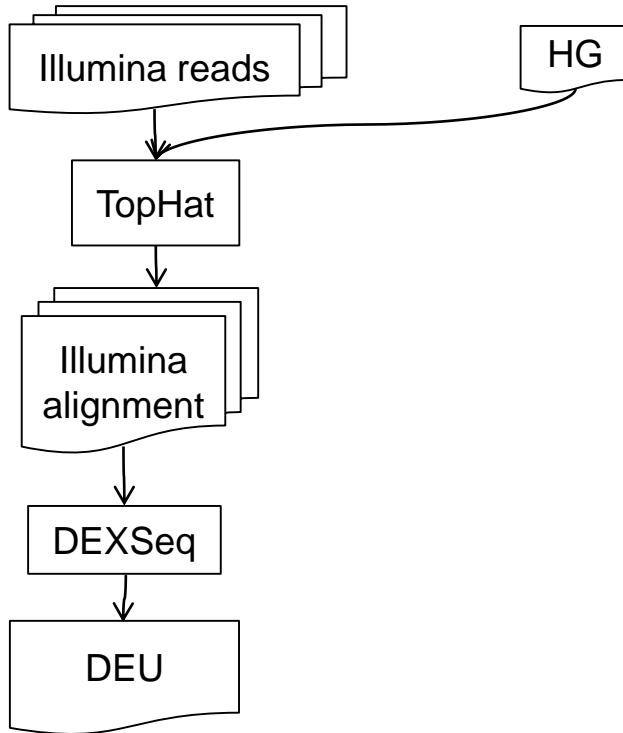


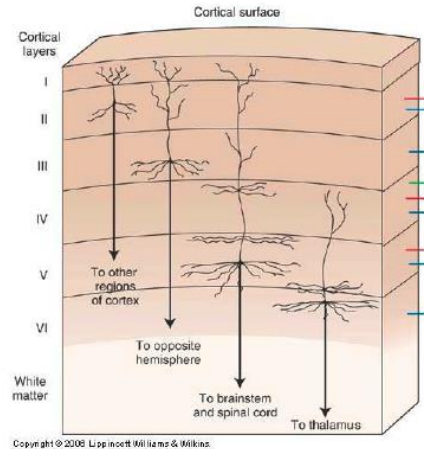
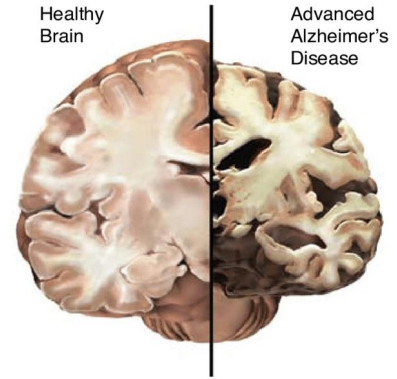
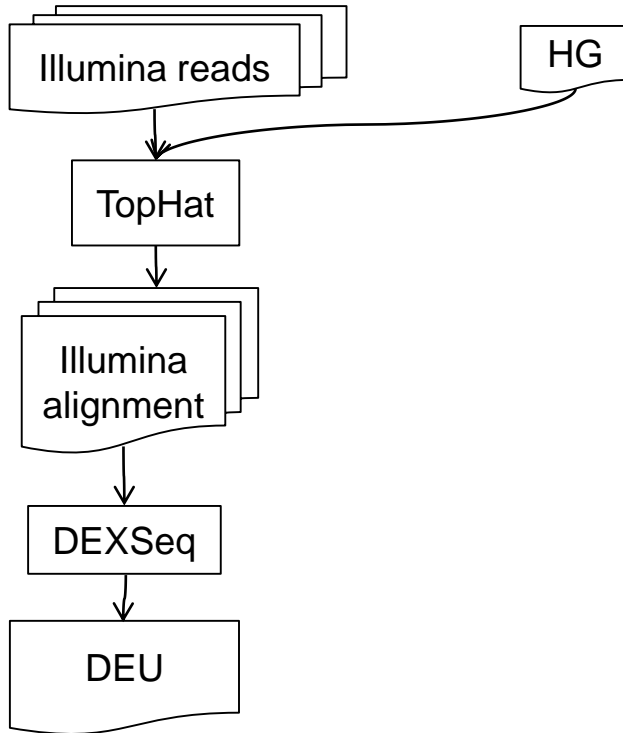












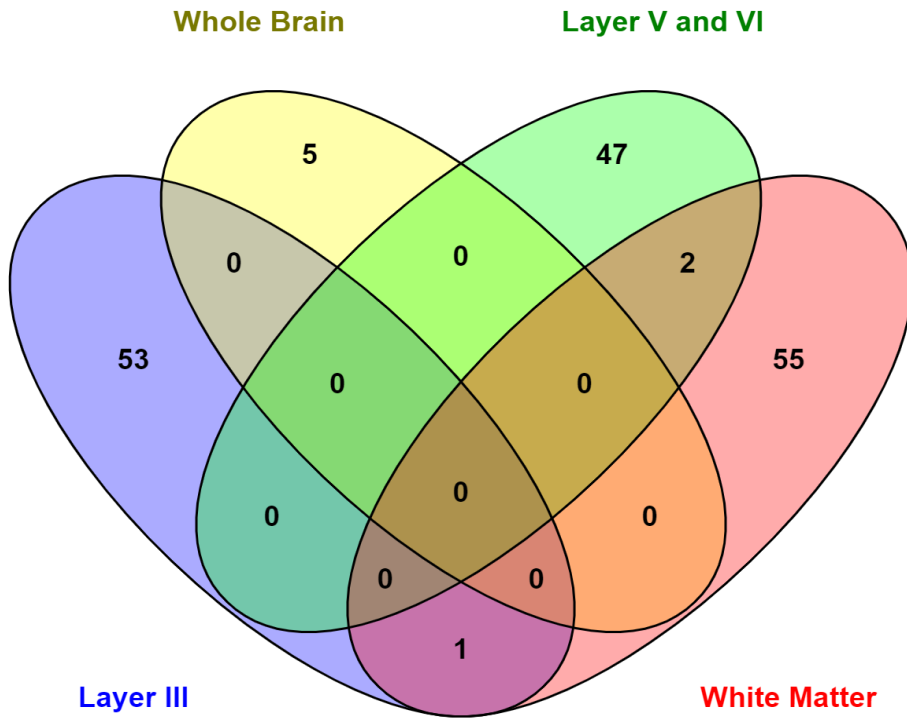
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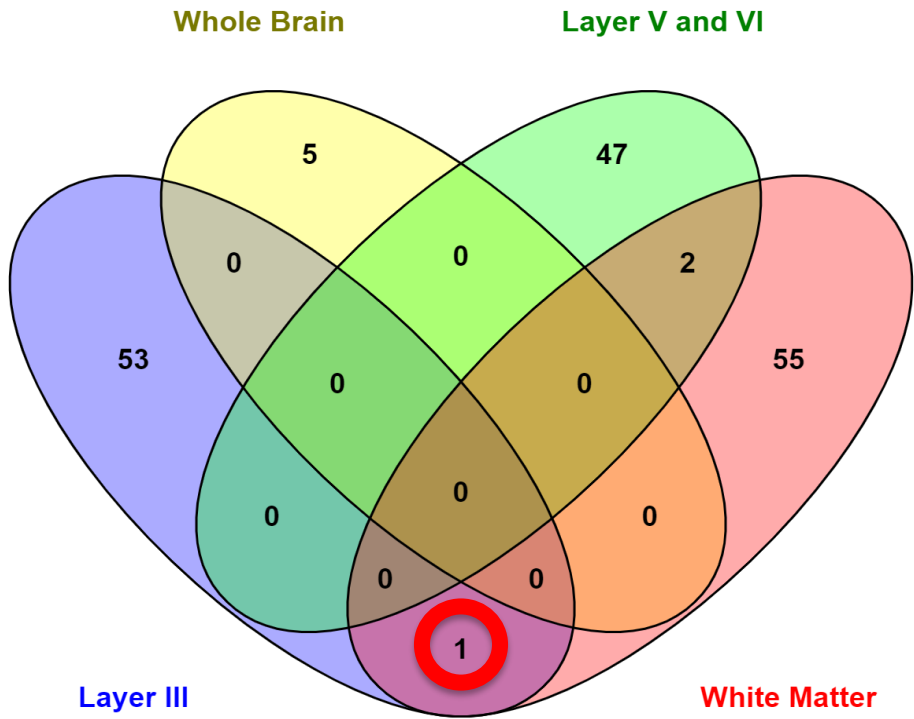
RESULTS PER CONDITION

Region	Number of DE regions
Layer III	52
Area V and VI	34
White Matter	61
Whole Brain	3

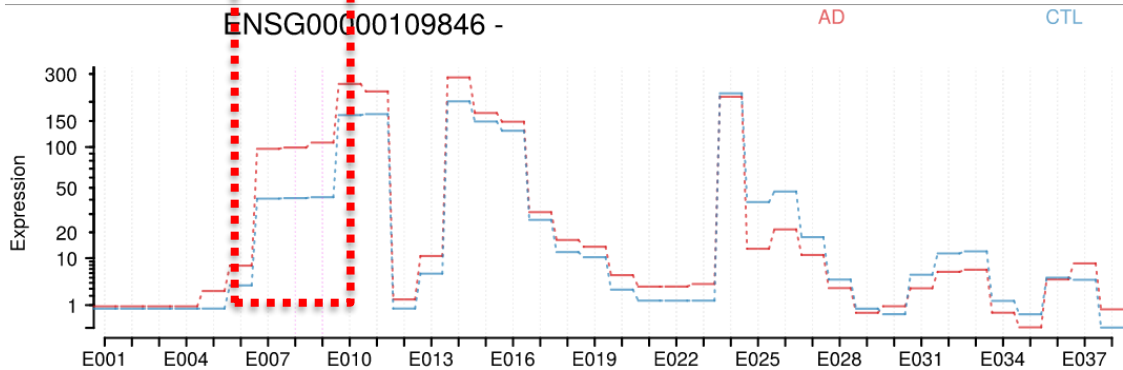
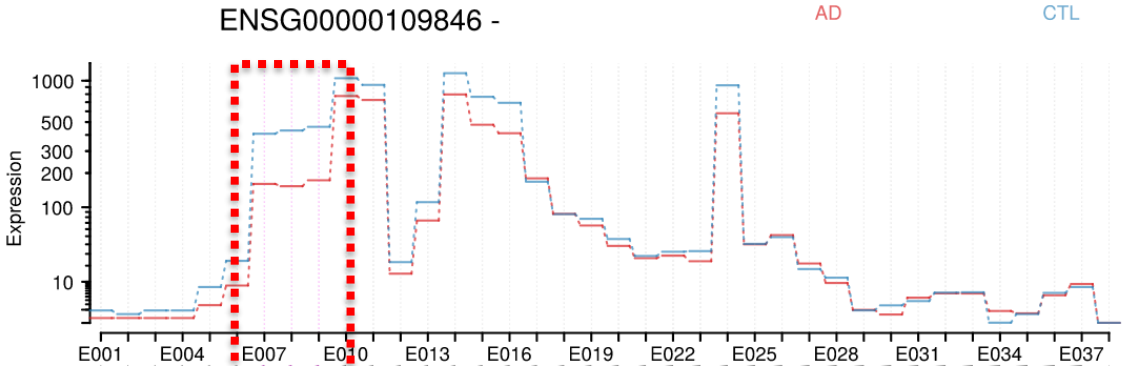
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CRYAB

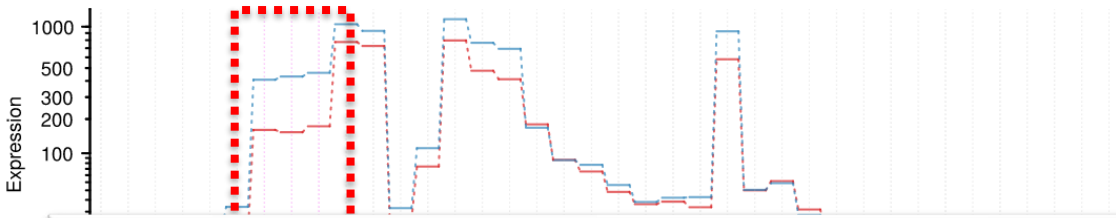


CRYAB

ENSG00000109846 -

AD

CTL

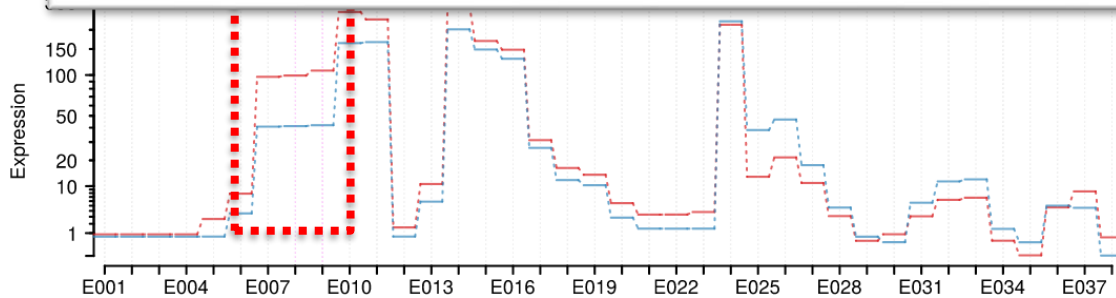


[FEBS Lett.](#) 2006 Oct 30;580(25):5941-6. Epub 2006 Oct 5.

alphaB-crystallin competes with Alzheimer's disease beta-amyloid peptide for peptide-peptide interactions and induces oxidation of Abeta-Met35.

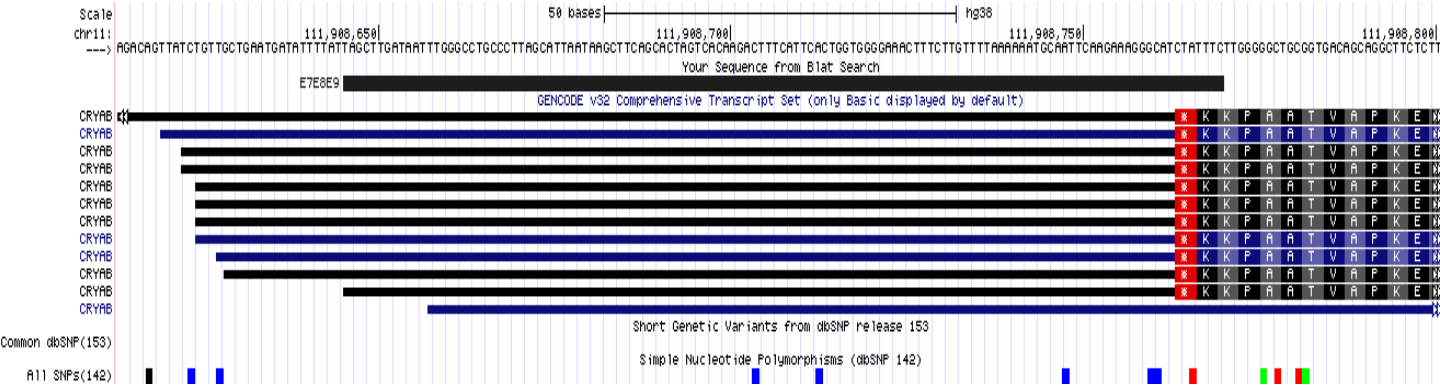
[Narayanan S¹](#), [Kamps B](#), [Boelens WC](#), [Reif B](#).

[+ Author information](#)

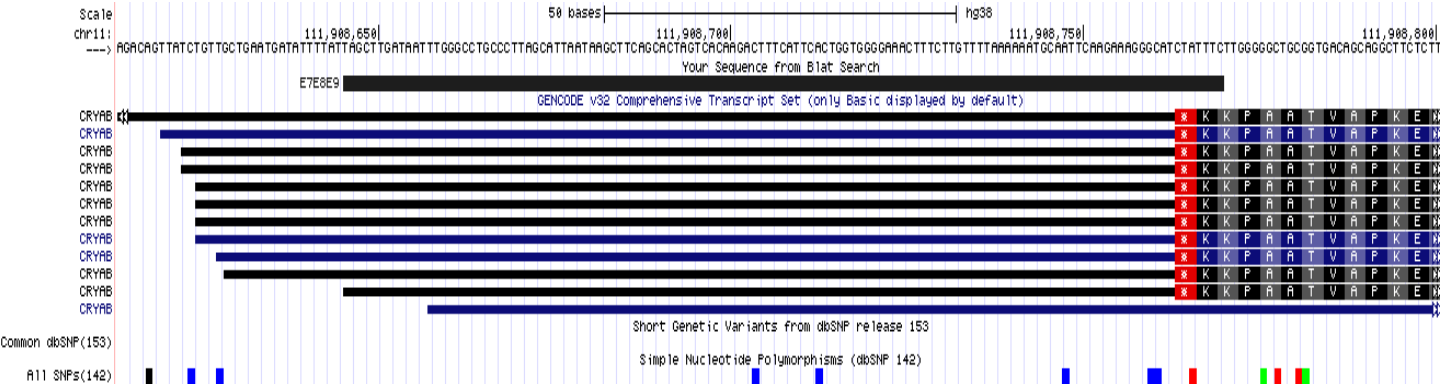


Layer III

CRYAB



CRYAB



63 miRNAs - TargetScan

Region	Number of DE regions	Genomic context
Layer III	52	23 introns 2 5' UTR 20 3' UTR
Area V and VI	34	14 introns 5 5' UTR 8 3' UTR
White Matter	61	22 introns 2 5' UTR 15 3' UTR
Whole Brain	3	All coding exons

PRELIMINARY CONCLUSIONS

- Different brain layers show different splicing patterns;
- The small number of DEU in Whole Brain samples might be due to the natural difference amongst layers;
- The DEU in the 5' and 3' regions might affect the stability and gene expression control mechanisms;

FUTURE STEPS

- Fresh Brains!!!! – DRS
- Differential expressed isoforms -> Ryuto
- Identification of AD related genes
- Putative miRNA target sites
- Putative polyA sites



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VIELEN DANK!

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RESULTS PER LAYER - AD

Comparison		Number of DE regions	Genomic Context
Whole Brain	x Layer III	23	8 introns 1 5' UTR 11 3' UTR
	x Layer V and VI	31	14 introns 4 5' UTR 12 3' UTR
	x White Matter	11	8 introns 0 5' UTR 6 3' UTR
Layer III	x Layer V and VI	19	9 introns 5 5' UTR 4 3' UTR
	x White Matter	18	11 intron 1 5' UTR 8 3' UTR
Layer V and VI	x White Matter	4	4 introns 0 5' UTR 1 3' UTR

RESULTS PER LAYER - CTL

Comparison		Number of DE regions	Genomic Context
Whole Brain	x Layer III	2	0 introns 0 5' UTR 1 3' UTR
	x Layer V and VI	60	25 introns 5 5' UTR 17 3' UTR
	x White Matter	5	4 introns 0 5' UTR 0 3' UTR
Layer III	x Layer V and VI	25	11 introns 3 5' UTR 4 3' UTR
	x White Matter	71	26 intron 5 5' UTR 19 3' UTR
Layer V and VI	x White Matter	9	5 introns 1 5' UTR 1 3' UTR