PLoS ONE • Open Access • Volume 18, Issue 2 February • February 2023 • Article number e0277630

Document type
Article • Gold Open Access • Green Open Access

Source type
Journal

ISSN
19326203

DOI
10.1371/journal.pone.0277630

Publisher
Public Library of Science

CODEN
POLNC

Original language
English

PubMed ID
36827281

View less

Single-cell RNA sequencing analysis of human Alzheimer's disease brain samples reveals neuronal and glial specific cells differential expression

Soreq, Lilach[a] ; Bird, Hannah[a]; Mohamed, Wael[b, c]; Hardy, John[a, d]

Save all to author list

[a] Department of Molecular Neuroscience, Institute of Neurology, University College London, London, United Kingdom

[b] Basic Medical Science Department, Kulliyyah of Medicine, International Islamic University Malaysia, Pahang, Kuantan, Malaysia

[c] Clinical Pharmacology Department, Menoufia Medical School, Menoufia University, Menoufia, Egypt

[d] Reta Lila Weston Institute of Neurological Studies, UCL ION, London, United Kingdom

Full text options Export

Abstract

Indexed keywords

Device tradenames

SciVal Topics

Chemicals and CAS Registry Numbers

Metrics

Funding details

Abstract

Alzheimer's disease is the most common neurological disease worldwide. Unfortunately, there are currently no effective treatment methods nor early detection methods. Furthermore, the disease underlying molecular mechanisms are poorly understood. Global bulk gene expression profiling suggested that the disease is governed by diverse transcriptional regulatory networks. Thus, to identify distinct transcriptional networks impacted into distinct neuronal populations in Alzheimer, we surveyed gene expression differences in over 25,000 single-nuclei collected from the brains of two Alzheimer's in disease patients in Braak stage I and II and age- and gender-matched controls hippocampal brain samples. APOE status was not measured for this study samples (as well as CERAD and THAL scores). Our bioinformatic analysis identified discrete glial, immune, neuronal and vascular cell populations spanning Alzheimer's disease and controls. Astrocytes and microglia displayed the greatest transcriptomic impacts, with the induction of both shared and distinct gene programs.

Indexed keywords

Device tradenames

SciVal Topics

Chemicals and CAS Registry Numbers

Metrics

Funding details

References (15)

View in search results format >

All

Export Print E-mail Save to PDF Create bibliography

1 Hernandez, D.G., Nalls, M.A., Moore, M., Chong, S., Dillman, A., Trabzuni, D., Gibbs, J.R., (...), Cookson, M.R.

Integration of GWAS SNPs and tissue specific expression profiling reveal discrete eQTLs for human traits in blood and brain

(2012) *Neurobiology of Disease*, 47 (1), pp. 20-28. Cited 99 times.
doi: 10.1016/j.nbd.2012.03.020

View at Publisher

2 Mancuso, R., Van Den Daele, J., Fattorelli, N., Wolfs, L., Balusu, S., Burton, O., Liston, A., (...), De Strooper, B.

Stem-cell-derived human microglia transplanted in mouse brain to study human disease (Open Access)

(2019) *Nature Neuroscience*, 22 (12), pp. 2111-2116. Cited 113 times.
http://www.nature.com/neuro/index.html
doi: 10.1038/s41593-019-0525-x

View at Publisher

3 Elmore, M.R.P., Hohsfield, L.A., Kramár, E.A., Soreq, L., Lee, R.J., Pham, S.T., Najafi, A.R., (...), Green, K.N.

Replacement of microglia in the aged brain reverses cognitive, synaptic, and neuronal deficits in mice (Open Access)

(2018) *Aging Cell*, 17 (6), art. no. e12832. Cited 173 times.
http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1474-9726
doi: 10.1111/acel.12832

View at Publisher

4 Soreq, L., Rose, J., Soreq, E., Hardy, J., Trabzuni, D., Cookson, M.R., Smith, C., (...), Ule, J.

Major Shifts in Glial Regional Identity Are a Transcriptional Hallmark of Human Brain Aging (Open Access)

(2017) *Cell Reports*, 18 (2), pp. 557-570. Cited 237 times.
http://www.sciencedirect.com/science/journal/22111247
doi: 10.1016/j.celrep.2016.12.011

View at Publisher

5 Habib, N., McCabe, C., Medina, S., Varshavsky, M., Kitsberg, D., Dvir-Szternfeld, R., Green, G., (...), Schwartz, M.

Disease-associated astrocytes in Alzheimer's disease and aging

(2020) *Nature Neuroscience*, 23 (6), pp. 701-706. Cited 328 times.
http://www.nature.com/neuro/index.html
doi: 10.1038/s41593-020-0624-8

View at Publisher

6 Olah, M., Menon, V., Habib, N., Taga, M.F., Ma, Y., Yung, C.J., Cimpean, M., (...), De Jager, P.L.

Single cell RNA sequencing of human microglia uncovers a subset associated with Alzheimer's disease (Open Access)

(2020) *Nature Communications*, 11 (1), art. no. 6129. Cited 206 times.
http://www.nature.com/ncomms/index.html
doi: 10.1038/s41467-020-19737-2

View at Publisher

7 Hardy, J., Salih, D.

TREM2-mediated activation of microglia breaks link between amyloid and tau (Open Access)

(2021) *The Lancet Neurology*, 20 (6), pp. 416-417. Cited 6 times.
http://www.journals.elsevier.com/the-lancet-neurology/
doi: 10.1016/S1474-4422(21)00133-2

View at Publisher

8 Kulkarni, A., Anderson, A.G., Merullo, D.P., Konopka, G.

Beyond bulk: a review of single cell transcriptomics methodologies and applications (Open Access)

(2019) *Current Opinion in Biotechnology*, 58, pp. 129-136. Cited 150 times.
http://www.elsevier.com/locate/copbio
doi: 10.1016/j.copbio.2019.03.001

View at Publisher

9 Ximerakis, M., Lipnick, S.L., Innes, B.T., Simmons, S.K., Adiconis, X., Dionne, D., Mayweather, B.A., (...), Rubin, L.L.

Single-cell transcriptomic profiling of the aging mouse brain (Open Access)

(2019) *Nature Neuroscience*, 22 (10), pp. 1696-1708. Cited 228 times.
http://www.nature.com/neuro/index.html
doi: 10.1038/s41593-019-0491-3

View at Publisher

10 Lau, S.-F., Cao, H., Fu, A.K.Y., Ip, N.Y.

Single-nucleus transcriptome analysis reveals dysregulation of angiogenic endothelial cells and neuroprotective glia in Alzheimer's disease (Open Access)

(2020) *Proceedings of the National Academy of Sciences of the United States of America*, 117 (41), pp. 25800-25809. Cited 118 times.
https://www.pnas.org/content/pnas/117/41/25800.full.pdf
doi: 10.1073/pnas.2008762117

View at Publisher

11 Mayzel-Oreg, O., Assaf, Y., Gigi, A., Ben-Bashat, D., Verchovsky, R., Mordohovitch, M., Graif, M., (...), Cohen, Y.

High b-value diffusion imaging of dementia: Application to vascular dementia and alzheimer disease (Open Access)

(2007) *Journal of the Neurological Sciences*, 257 (1-2), pp. 105-113. Cited 28 times.
doi: 10.1016/j.jns.2007.01.048

View at Publisher

12 Kolisnyk, B., Al-Onaizi, M., Soreq, L., Barbash, S., Bekenstein, U., Haberman, N., Hanin, G., (...), Prado, M.A.M.

Cholinergic Surveillance over Hippocampal RNA Metabolism and Alzheimer's-Like Pathology (Open Access)

(2017) *Cerebral Cortex*, 27 (7), pp. 3553-3567. Cited 33 times.
http://cercor.oxfordjournals.org/
doi: 10.1093/cercor/bhw177

View at Publisher

13 Hemonnot, AL, Hua, J, Ulmann, L, Hirbec, H.
Microglia in Alzheimer Disease: Well-Known Targets and New Opportunities
(2019) *Front Aging Neurosci*, 11, p. 233. Cited 153 times.
Epub 2019/09/24. PMID: 31543810; PubMed Central PMCID: PMC6730262
https://doi.org/10.3389/fnagi.2019.00233

14 Mathys, H., Davila-Velderrain, J., Peng, Z., Gao, F., Mohammadi, S., Young, J.Z., Menon, M., (...), Tsai, L.-H.

Author Correction: Single-cell transcriptomic analysis of Alzheimer's disease (Nature, (2019), 570, 7761, (332-337), 10.1038/s41586-019-1195-2) (Open Access)

(2019) *Nature*, 571 (7763), p. E1. Cited 12 times.
http://www.nature.com/nature/index.html
doi: 10.1038/s41586-019-1329-6

View at Publisher

15 Sng, L.M.F., Thomson, P.C., Trabzuni, D.

Author Correction: Genome-wide human brain eQTLs: In-depth analysis and insights using the UKBEC dataset (Scientific Reports, (2019), 9, 1, (19201), 10.1038/s41598-019-55590-0) (Open Access)

(2020) *Scientific Reports*, 10 (1), art. no. 16603.
www.nature.com/srep/index.html
doi: 10.1038/s41598-020-73067-3

View at Publisher

Soreq, L.; Department of Molecular Neuroscience, Institute of Neurology, University College London, London, United Kingdom; email:l.soreq@ucl.ac.uk

About Scopus

What is Scopus

Content coverage

Scopus blog

Scopus API

Privacy matters

Language

日本語版を表示する

查看简体中文版本

查看繁體中文版本

Просмотр версии на русском языке

Customer Service

Help

Tutorials

Contact us