

Investigation of Glial Changes in Dementia with Lewy Bodies

Safitri Maulidina (2007770053), Christopher Morris, Lina Patterson
Institute for Ageing and Health, Newcastle University
Email: s.maulidina2@newcastle.ac.uk



Newcastle
University

BACKGROUND

Dementia with Lewy bodies (DLB) is the second most common neurodegenerative disease after Alzheimer's disease (AD).¹ The pathological hallmark of DLB is aggregation of α -synuclein that accumulates as Lewy bodies.² Microglia and astrocytes are proposed to hold essential roles in initiation and progression of DLB by regulating inflammation.³

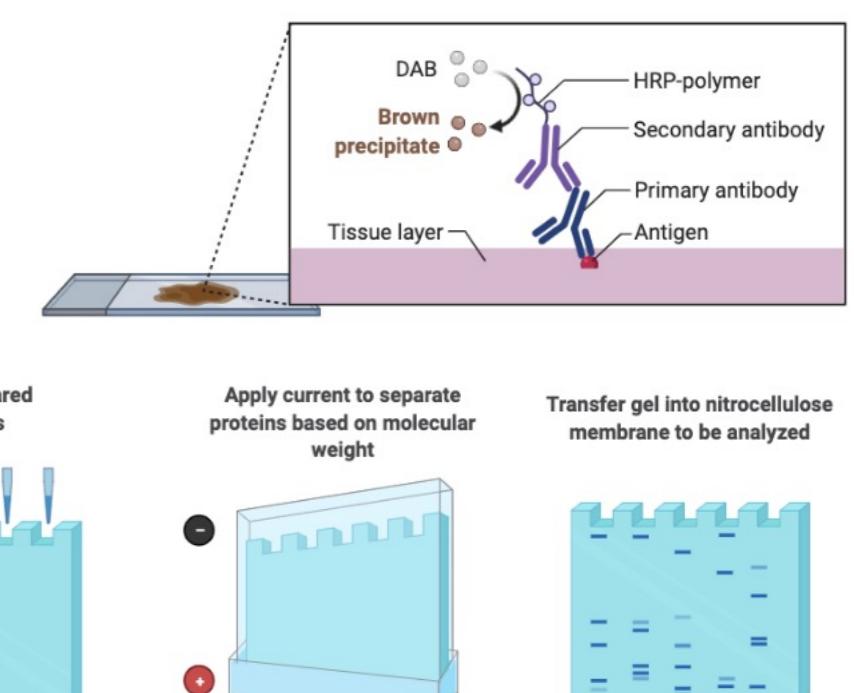
AIM

To investigate inflammatory changes in Dementia with Lewy bodies (DLB) by using specific protein markers for astrocytes (ALDH1L1, GFAP) and microglia (CD14, CD74)

METHODS

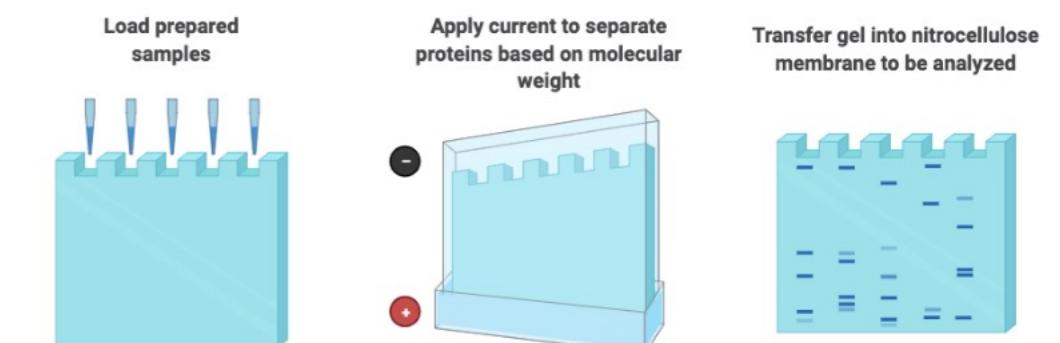
Immunohistochemistry

Antibodies : ALDH1L1, GFAP, CD14, CD74



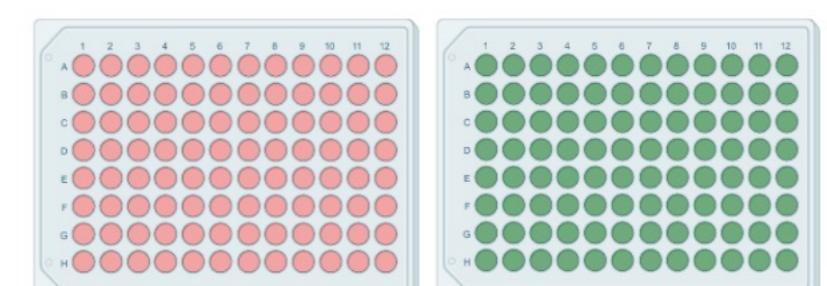
Western Blot

Antibodies : GFAP, CD74, GAPDH



Dot Blot

Antibodies : ALDH1L1, CD14, GFAP, GAPDH



RESULTS

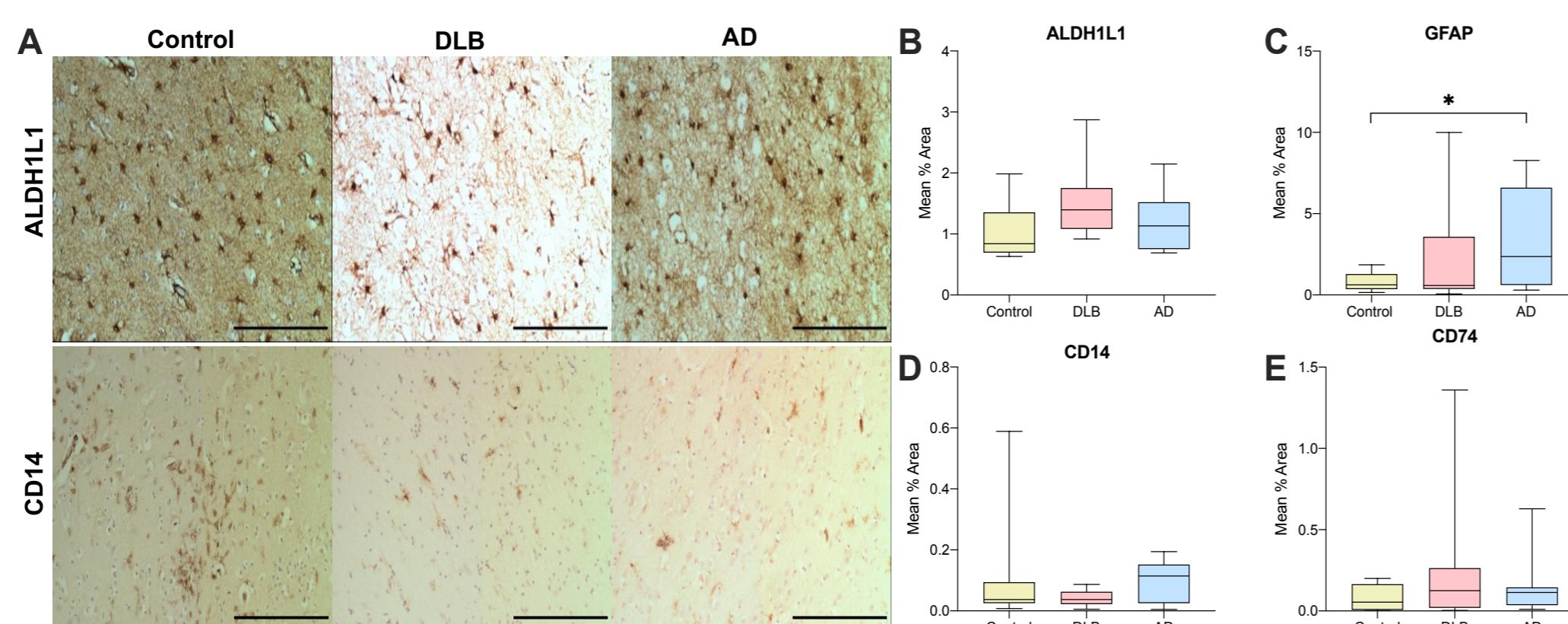


Figure 1. (A) Representative immunohistochemical staining for astrocytes (ALDH1L1) and microglia (CD14) markers in the fusiform gyrus of Control, DLB, and AD group and graphs showing mean percentage area of astrocytes; (B) ALDH1L1, (C) GFAP, and microglia; (D) CD14, (E) CD74. *p < 0.05, AD, Alzheimer's disease; DLB, Dementia with Lewy bodies. ALDH1L1, aldehyde dehydrogenase 1 family member L1; GFAP, glial fibrillary acidic protein. Scale bar in images, 100 μ m.

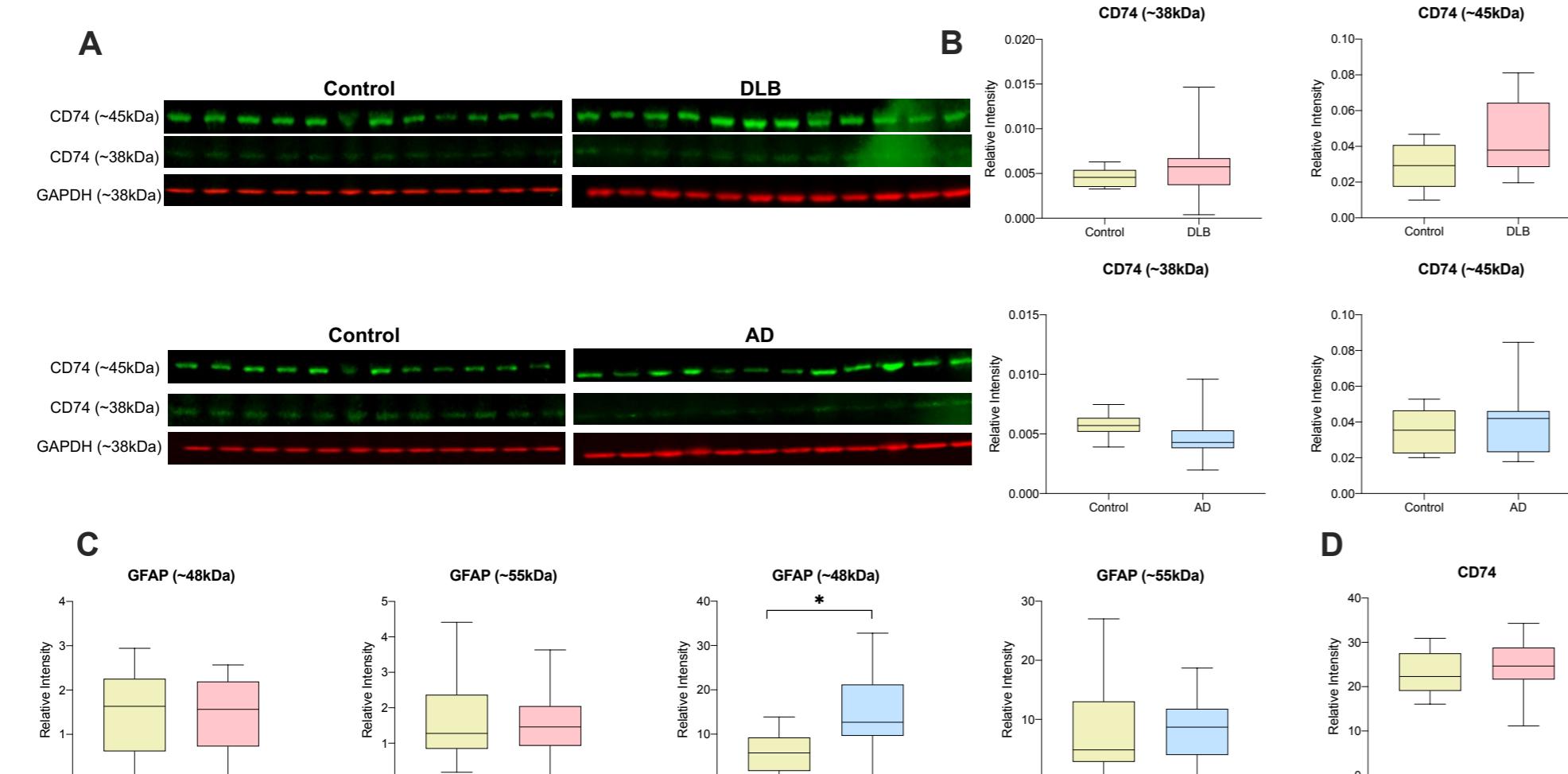


Figure 2. (A) Microglial protein expression (CD74) with loading control antibody (GAPDH) in the fusiform gyrus of Control, DLB, and AD groups. Graphs visualizing intensity of markers normalized to GAPDH; (B) CD74 (~38kDa) and CD74 (~45kDa), (C) GFAP (~48kDa) and GFAP (~55kDa), (D) CD74, only for Control and DLB. Preexisting data were used for graph C and D. *p < 0.05, AD, Alzheimer's disease; DLB, Dementia with Lewy bodies. GAPDH, glyceraldehyde 3-phosphate dehydrogenase, GFAP, glial fibrillary acidic protein.

CONCLUSION

Disease groups (DLB, AD) showed increased surface area, based on immunohistochemical data, with this being significant in astrocytes for Alzheimer's disease. Protein expression data showed significantly increased astrocyte activity based on GFAP data in Alzheimer's disease, but also in DLB based on ALDH1L1 levels. In both DLB and AD, inflammatory changes may be mediated by astrocytes rather than microglia. Further work will be required to investigate the role of astrocytes in DLB pathology and clinical progression.

REFERENCE

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- Outeiro TF, Koss DJ, Erskine D, Walker L, Kurzawa-Akanbi M, Burn D, et al. Dementia with Lewy bodies: an update and outlook. *Mol Neurodegener.* 2019 Dec;14(1):5.
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- GraphPad PRISM for constructing graphs and BioRender for illustrations

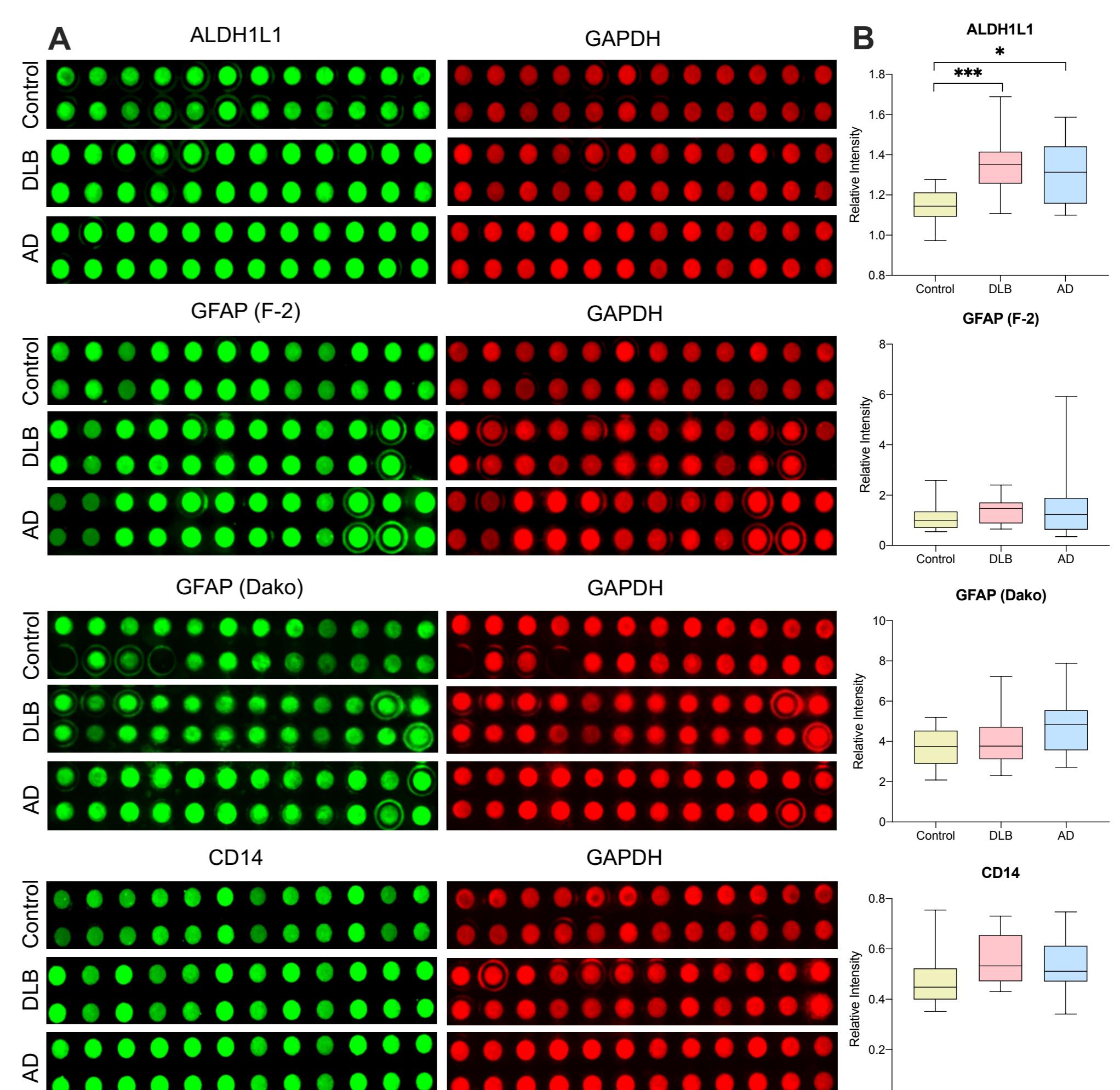


Figure 3. (A) Representative dot blots of astrocytes (ALDH1L1, GFAP) and microglial (CD14) markers in the fusiform gyrus of Control, DLB, and AD group. (B) Quantification of markers intensity normalized to GAPDH, visualized in graphs. ***p < 0.001, *p < 0.05, AD, Alzheimer's disease; DLB, Dementia with Lewy bodies. ALDH1L1, aldehyde dehydrogenase 1 family member L1, GAPDH, glyceraldehyde 3-phosphate dehydrogenase, GFAP, glial fibrillary acidic protein.