Alzheimer's Disease Research Center (ADRC)

Newsletter 22

We are pleased to highlight the research of Juan Young, MD, MHS. He is a T32 Geriatrics Postdoctoral Research Fellow in Yale's Clinical Epidemiology and Aging Related Research Program. His primary research interests include neuroinflammation related neurodegenerative diseases such as Alzheimer's disease.

Research

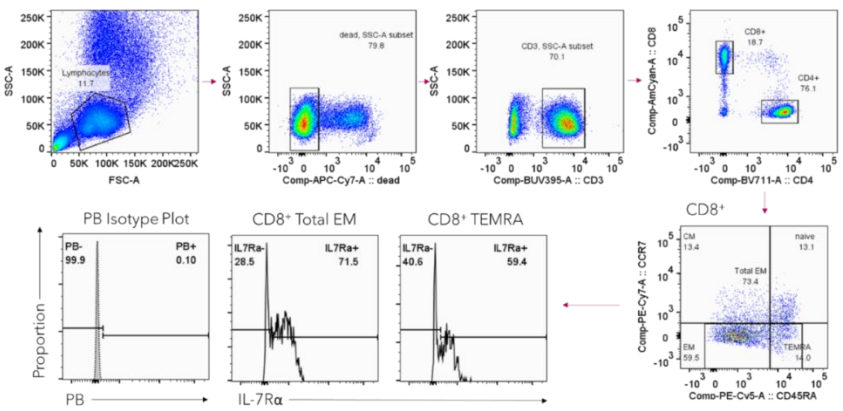
T cells are a type of white blood cell that are part of the immune system and help protect the body from germs and diseases. In human T cells, probably the most prominent change with aging is the expansion of effector memory (EM) $CD8^+$ T cells, a type of white blood cell with a potent capacity to induce inflammation and tissue damage. Portions of these cells exhibit cytotoxic and senescent characteristics that may affect immune activity in the central nervous system.

To investigate these potential immune pathways in Alzheimer's disease, we are studying blood samples from individuals recruited through the Yale Alzheimer's Disease Research Unit who have been diagnosed Alzheimer's disease and individuals without any cognitive concerns deemed to be "cognitively normal". This study is using technology that allows us to break down blood sample to see gene and protein expression at the cellular level.

These research techniques, such as conventional flow and mass cytometry as well as single cell RNA sequencing (scRNA-seq) analysis, will help us characterize $CD4^+$ and $CD8^+$ T cell differences in Alzheimer's participants and would offer additional insights into the cytotoxic and senescent pathways that could contribute to Alzheimer's pathology.

Findings from these analyses will be compared with measures of Alzheimer's disease severity to uncover potential clinical implications of altered peripheral immune functioning in patients with Alzheimer's disease.

Figure Caption: Flow cytometry analysis will be utilized to identify and characterize different populations of T cells with distinct cytotoxic and senescent characteristics that may have the potential to exacerbate Alzheimer's disease pathology.



References

1) Shin, M. S., Park, H.-J., Young, J. & Kang, I. Implication of IL-7 receptor alpha chain expression by CD8$^+$ T cells and its signature in defining biomarkers in aging. *Immunity & Ageing* **19**, 66, doi:10.1186/s12979-022-00324-6 (2022).

2) Young, J.J *et al.* IL-7 receptor alpha low effector memory CD8$^+$ T cell aging gene signature correlates with neurocognitive functioning in Alzheimer's disease. Manuscript in submission.

Thank for your interest in the Yale ADRC. For more information on our studies or to participate in studies please call or visit our website.

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