Searching for the secret of youth

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As people age, their immune system gradually deteriorates and their ability to respond optimally to infections declines, a process called 'immunosenescence'. A*STAR research shows that not all types of T cells, a type of immune cell that matures in the thymus, follow the same trajectory with age.

There are two main subtypes of T cells. The majority are α/β T cells, which help mediate immunity to infections. While γ/δ T cells represent approximately 1 to 10 per cent of all circulating T cells, they differ from α/β cells in that they recognize fewer foreign elements, or antigens, entering the body, explains immunologist Anis Larbi of A*STAR's Singapore Immunology Network. They are, however, vital for fighting infections and targeting cancer cells.

"We wanted to understand whether all T cells were equal toward the process of cell differentiation and senescence," says Larbi.

Larbi and colleagues in Singapore and Germany compared the blood levels of α/β T cells with those of a subtype of γ/δ T cells, called Vδ2 cells, in thirty-six 18- to 23-year-olds and seventy-two 55- to 85-year-olds. Vδ2 T cells represent 60 to 80 per cent of all γ/δ T cells.

When T cells emerge from the thymus, they are 'naïve' as they have not yet encountered an antigen. Once introduced, however, they turn into 'memory' T cells that can proliferate to deal with the current emergency and then surveil the circulation for similar future ones. The team found significant differences between the two cohorts in the percentages of

naïve and memory α/β and Vδ2 T cells and in the amounts of proteins, called cytokines, secreted by the cells. The data suggests that Vδ2 cells sustain their functionality with age, unlike other types of T cells.

"This study raises the question of whether Vδ2 T cells are resistant to senescence," explains Larbi. "Some cells potentially could be used as models to better understand senescence and identify pathways to resist the phenomenon, and not only on immune cells".

Further studies are needed to understand the pathways that reduce susceptibility to senescence in T cells. Studies should also include other T cell populations to better understand the clinical importance and biological significance of immunosenescence, the researchers say. Studies that aim to control the proportion and function of Vδ2 T cells may be of clinical value. For example, a drug used to treat Crohn's disease was found to selectively eliminate Vδ2 T cells and so may help moderate inflammatory diseases.

More information: Crystal Tze Ying Tan et al. Vδ2+ and α/ß T cells show divergent trajectories during human aging, *Oncotarget* (2014). DOI: 10.18632/oncotarget.10096

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