Title: Spectroscopy-based method for study on cells senescence

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Abstract

Aging is an overall process of becoming older and it causes physical and mental decline in health. Aging affects all parts of human body including immune system. Immunosenescence is an age-related change in immune system. This condition lead to the decline in immune system and characterized by decreased immune response resulting in susceptibility to infections, decreased vaccination response, increased expression of pro-inflammatory cytokines which contributes to inflammation-related diseased, increased autoimmune events, and an increased risk of age-related diseases. These age-related changes occur in innate and adaptive immune cells, altering their numbers and functions. One of the important immune cells is CD4+ T cells, due to its crucial function to stimulate other immune cells such as macrophages, B cells, and CD8+ T cells. The disruptions in the T cell pool and persistent inflammation could lead to premature aging of other immune cells. Furthermore, WHO recognize ageing at the biological level can lead to gradual decrease in physical and mental capacity, increasing risk of disease and death. Detection of immunosenescence is important for disease risk management. It could help clinicians to adjust the specific healthcare on the elder patient based on their immune status.

Immunosenescent T cells are identified by flow cytometry using the related markers and throughout literature often called as senescent T cells. Flow cytometry is a powerful technique and has been utilized to assess the circulating immunophenotype in COVID-19, vasculitis, or healthy individual. However, some challenges arise in using flow cytometry, such as the need of expertise in sample preparation and instrument operation, instrument accessibility, and subjective data interpretation. Therefore, other sample source and methods that is easy to perform, rapid and cost-effective for detection of immunosenescence need to be explored. Raman spectroscopy is an instrument that measure the raman scattering phenomenon. It has been risen as a diagnostic tool in recent years. This is due to raman spectroscopy advantages such as the spectra follows the sample composition, minimum sample preparation, and versatility due to various sample type can be measured.

References:

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