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Editorial

The Application of Flow Cytometry in the Clinical Setting of HIV

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Despite tremendous advances in the diagnosis and management of Human Immunodeficiency Virus (HIV) infection in the present era of basic and clinical infectious diseases research, the constantly high mortality rate of the patients remains a challenge for scientists. With the revolutionary introduction of flow cytometry as a clinical diagnostic technique, a new light was shed on the way of clinical practice not only for the diagnosis and monitoring of the infection, but also to set up more effective therapeutic protocols based on the immunophenotyping of the immune cells. However, the significance of this technique is highly beyond what is currently being used.

Determination of the number of CD4+ T lymphocytes in the peripheral blood has been used as an accurate approach to follow up HIV positive patients and to enable antiretroviral therapy when the CD4+ T cell count falls below certain amounts. Today, with the emergence of novel antiretroviral therapies and the effective harnessing of secondary and opportunistic infections which were previously the main cause of death in immune-compromised patients, attentions have been attracted towards other causes of death among such patients. It has been revealed that patients with HIV are significantly at a higher risk of other life threatening medical conditions such as Myocardial Infarction (MI), hepatic cirrhosis, and many others, which if looked at superficially, it will not seem to be attributable to the immune-compromising nature of HIV.

Although the main complications of HIV are due to the depletion of adaptive immunity, more progressive stages of the infection are associated with immune activation. The intestinal lymphatic system as a desirable target of the virus is extensively depleted soon after initiation of the infection. This might disrupt the complicated mucosal immunity of the intestinal tract which not only protects the gut against pathogenic micro organisms but also controls the population of the resident micro flora. At this time, the non-pathogenic micro floras along with a broad array of pathogenic organisms trigger an inflammatory response in the intestine which serves as the inception of a systemic immune activation. Such a widespread immune response is manifested in different body organs.

Herein, CD4+/CD8+ T cell ratio serves as a more reliable indicator of the immune status of the patient in comparison to the sole CD4+ T cell count herein, CD4+/CD8+ T cell ratio, which is affected by the variation of both T cell subsets. Despite the controlling of the viral load, the ratio might still remain at low levels which is representative of immune activation. In such a setting, a higher CD4+/CD8+ T cell ratio reflects a more normalized immune response of the individual. This ratio is always low in untreated HIV patients. Alterations of the ratio has been attributed to altered risk of multisystem organ diseases making it a valuable measure to be potentially recruited in the prediction of the risk of MI, hepatic cirrhosis, etc. in later life stages of patients with HIV, even after acceptable remission. Since most of these complications are the result of immune activation following the depletion of the gut lymphatic system, careful observation of this ratio immediately after confirmation of the infection, may aid in the prevention of such a fatal deterioration of intestinal mucosal immunity and thus reducing the risk of death as a result of later life complications which are mentioned above. Another advantage might be a better monitoring of the immune status in patients which have not reached the end stages of the infection manifested as Acquired Immuno Deficiency Syndrome (AIDS).

However, there are obstacles against the applicability of CD4+/CD8+ T cell ratio in the follow up and prognosis of HIV positive patients. Proper interpretation of the ratio by the clinicians and their tendency to get help from the para-clinical diagnostic laboratories as a constant compartment of

their diagnosis seems to be necessary. For instance, senile alterations in the immune system might be also associated with a decrease in the ratio which has to be differentiated from the disease condition. Indeed, more precise evaluations are required to determine the limitations of the usage of CD4+/CD8+ T ratio in clinical diagnosis and as a marker to investigate the response to treatment. The applicability of flow cytometric evaluation of CD4+/CD8+ ratio depends on the facilities provided in the paraclinics of the health care centers which is particularly important in the developing countries. Taken together, the significance of CD4+/CD8+ T cell ratio in the diagnosis and follow up of HIV positive patients and the application of flow cytometry as a sensitive technique in the clinical setting seem to be more than what is currently known about. This should encourage researchers to perform an in depth analysis, to introduce the CD4+/CD8+ T cell ratio as a reliable clinical marker for high risk patients.