Sparse multivariate methods to assess immune response in actively treated oncology patients after COVID-19 vaccination.

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Abstract

The immune response is a reaction that occurs within an organism for the purpose of defense against foreign invaders (viruses, bacteria, tumor cells, etc.). The human immune system consists of a complex network of cells and molecules, including different types of T-lymphocytes (cytokine producers) and B-lymphocytes (antibody producers), which interact to fight the foreign agent. Consequently, the analysis of cellular and humoral immunity (antibody generation) generates large data sets due to the number of variables or molecules identified. However, the treatment of these data sets cannot be performed by classical multivariate dimension reduction methods, given the high number of variables over the number of patients analyzed.

Patients with cancer are at higher risk of manifesting severe disease and high mortality with COVID-19 virus infection than the non-cancer population. SARS-CoV-2 vaccines have been tested in healthy adult populations. However, specific data on their ability to generate antibodies and cellular immune response in cancer patients receiving anti-tumor treatments are still lacking.

In this article, we analyze the usefulness of sparse multivariate methods for the evaluation of immune response in oncology patients receiving anti-tumor treatment and who have received the anti-SARS-CoV2 vaccine during the COVID -19 pandemic. To do so, we will analyze how each set of molecules can be reduced to a smaller set to obtain the underlying patterns among the data. In addition, the humoral and cellular immune response will be related to the level of specific antibodies in the subsample of patients who received the second dose of anti-COVID 19 vaccine. Numerical and graphical results will illustrate the performance and advantages of sparse multivariate methods, and specific sets of molecules will be identified as potential markers of the level of antibodies against COVID 19 in oncology patients.

References

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