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Predictive Therapeutic Outcomes to Immunotherapy using Biomarkers

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Editorial Note

Cancer treatment has been revolutionized by immunotherapy. It was also considered as one of the most significant cancer advancements and a major breakthrough in treatment of cancer. Cancer studies have discovered novel biomarkers that correspond with improved outcomes from immunotherapy and may assist identify patients most likely to benefit from this treatment, according to exploratory studies. Unlike most chemotherapy and targeted therapies, immunotherapy offers the potential for a long-lasting response, sometimes even without continued treatment. An independent dataset of cancer patients was analyzed for gene set enrichment to determine the biological basis of the radiographic biomarker.

Previous studies have shown that immunotherapy is not effective to all patients with cancer. PD-L1 expression detects pre-existing immunity, which will be required for PD-1 or PD-L1 targeting immunotherapy agents to be effective. The question lies in the identification of more cancer patients that react to immunotherapy by utilizing biomarkers other than PD-L1 expression as biomarkers. Researchers examined the prognostic value of copy number variation in the PDL1 gene in cancer treatment in order to discover novel therapeutic biomarkers and determines if the gene number has decreased, remained the same, or increased. Patients treated with immunotherapy benefit from both tumor-infiltrating lymphocytes and PD-L1 expression in the tumor microenvironment. Biomarkers continue to be a crucial missing link to identify immunotherapy patients and personalize immunotherapy treatment regimens. Biomarker identification has been hindered by the lack of prospective cohort trials that could validate their use and variability in assay development and interpretation.

Identification of biomarkers can become increasingly important for improving patient selection, elucidating the drug mechanisms of action, and personalizing treatment regimens for patients. Biomarkers are being investigated at the soluble, cellular, and genomic levels, and examples in immunotherapy include serum proteins, tumor-specific receptor expression patterns, tumor microenvironment factors, circulating immune and tumor cells, and host genomic factors. Research shows that single agent immunotherapy trials in the first-line condition have not proven effective and a lot of learning is involved about immunotherapy in cancer studies. However, these findings clearly demonstrate that there is a subgroup of patients that do at least as well as chemotherapy in terms of survival and maybe better in terms of quality of life with single agent immunotherapy.

The studies involving the performance of machine learning algorithms to assess radiographic characteristics of cancer lesions that predict immunotherapy response have been alarmingly increased thus resulting in the prognostic performance of non-invasive radiomic biomarker showed and association with proliferative potential. Despite their exceptional accomplishment, clinical benefit is only available to a limited percentage of individuals as immunotherapy is costly and can cause side effects, patients must be stratified prior to treatment based on the probability of response. The recently developed biomarkers for quantitative imaging provide promising opportunities by hypothesizing a set of morphological characteristics, quantified by radiomics, are related to and may therefore serve as predictive markers. Biomarker studies will become increasingly important when immunotherapy is further improved and novel combination approaches are developed. An extended trial is required to confirm the findings according to the experts.