SARS-CoV-2 & cancer

Association of Antineoplastic Therapy With Decreased SARS-CoV-2 Infection Rates in Patients With Cancer

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IMPORTANCE

Novel therapies for SARS-CoV-2 infection are urgently needed. Antineoplastic compounds that target cellular machinery used by SARS-CoV-2 for entry and replication, including angiotensin-converting enzyme 2 (ACE2), may disrupt SARS-CoV-2 activity.

OBJECTIVES

To determine whether patients with cancer treated with potential ACE2-lowering antineoplastic compounds exhibit lower SARS-CoV-2 infection rates.

DESIGN, SETTING, AND PARTICIPANTS

We used the Library of Integrated Network-Based Cellular Signatures database to identify antineoplastic compounds associated with decreased ACE2 gene expression across cell lines. We then evaluated a retrospective cohort of 1701 patients who were undergoing antineoplastic therapy at Memorial Sloan Kettering Cancer Center in New York, New York, during the COVID-19 pandemic to determine if treatment with an ACE2-lowering antineoplastic was associated with a decreased odds ratio (OR) of SARS-CoV-2 infection. Patients included in the analysis underwent active treatment for cancer and received a SARS-CoV-2 test between 10 March and 28May 2020.

MAIN OUTCOME AND MEASURE

The association between potential ACE2-lowering antineoplastic treatment and a positive SARS-CoV-2 test.

RESULTS

In the cohort of 1701 patients, SARS-CoV-2 infection rates were determined for 949 (55.8%) female and 752 (44.2%) male patients (mean [SD] age, 63.1 [13.1] years) with diverse cancers receiving antineoplastic therapy. In silico analysis of gene expression signatures after drug treatment identified 91 compounds associated with downregulation of ACE2 across cell lines. Of the total cohort, 215 (12.6%) patients were treated with 8 of these compounds, including three 3 mTOR/PI3K inhibitors and two antimetabolites. In a multivariable analysis of patients who received an ACE2-lowering antineoplastic adjusting for confounders, 15 of 215 (7.0%) patients had a positive SARS-CoV-2 test compared with 191 of 1486 (12.9%) patients who received other antineoplastic therapies (OR, 0.53; 95% CI, 0.29-0.88). Findings were confirmed in additional sensitivity analyses including cancer type, steroid use, and a propensity-matched subcohort. Gemcitabine treatment was associated with reduced SARS-CoV-2 infection (OR, 0.42; 95% CI, 0.17-0.87).

CONCLUSIONS AND RELEVANCE

In this cohort study, in silico analysis of drug-associated gene expression signatures identified potential ACE2-lowering antineoplastic compounds, including mTOR/PI3K inhibitors and antimetabolites. Patients who received these compounds exhibited statistically significantly lower rates of SARS-CoV-2 infection compared with patients given other antineoplastics. Further evaluation of the biological and clinical anti–SARS-CoV-2 properties of identified antineoplastic compounds is warranted.