Editorial Commentary

Indirect evidence of pre-pandemic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) circulation in the United States

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It has been recently hypothesized that coronavirus disease 2019 (COVID-19) may have appeared in the US before the first officially diagnosed case in January 2020 (1). This conclusion was supported by evidence that anti-severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-reactive antibodies were detected in samples obtained from blood donors from nine different US states between December 13, 2019 and January 17, 2020.

To provide further insight on this intriguing finding, we searched Google Trends, using the keyword "pneumonia", with the country option set to "United States", in the period between January 2019 and present time (i.e., end of November 2020). This search term was selected because interstitial pneumonia is the hallmark of SARS-CoV-2 infection (2). The number of new weekly COVID-19 diagnoses in the US was concomitantly retrieved from the official website of the US Centers for Disease Control and Prevention (CDC) (3). This study was conducted in accordance with the Declaration of Helsinki, under the terms of relevant local legislation. The analysis was based on searches of unrestricted, publicly available databases, and thereby no informed consent or ethical committee approvals were required

Figure 1 illustrates the results of our analysis. The volume of Google searches for pneumonia in the US exhibited a substantial increase at the beginning of September 2019, reaching a peak between the last week of November 2019 and the second week of January 2020, while the seasonal peak of influenza was reached later, between the 1st and 7th week of 2020 according to the CDC (4). The search trends then mirrored the subsequent number of new weekly COVID-19 cases diagnosed in the US. The Google Trends score for pneumonia between last week of November 2019 and the second week of January 2020 was found to be over 20% higher than that recorded during the last week of November 2018 and the second week of January 2019 (56±10 *vs.* 46±3; P=0.015).

Taken together, our findings suggest that an unusually high number of Google searches for pneumonia was recorded in the US before the COVID-19 outbreak, displaying a paradigmatic peak in the week between 16–22 December 2020. Although this abnormal increase cannot be directly attributed to searches carried out by individuals with SARS-CoV-2 infection, this phenomenon is supportive of the findings by Basavaraju *et al.* (1), in that SARS-CoV-2 may have started to circulate in the US before January 2020. It is also interesting to note that a similar finding was recently reported by Lippi *et al.* (5), who found an unexpected increase in Google searches for COVID-19 symptoms in Italy's pre-pandemic period.

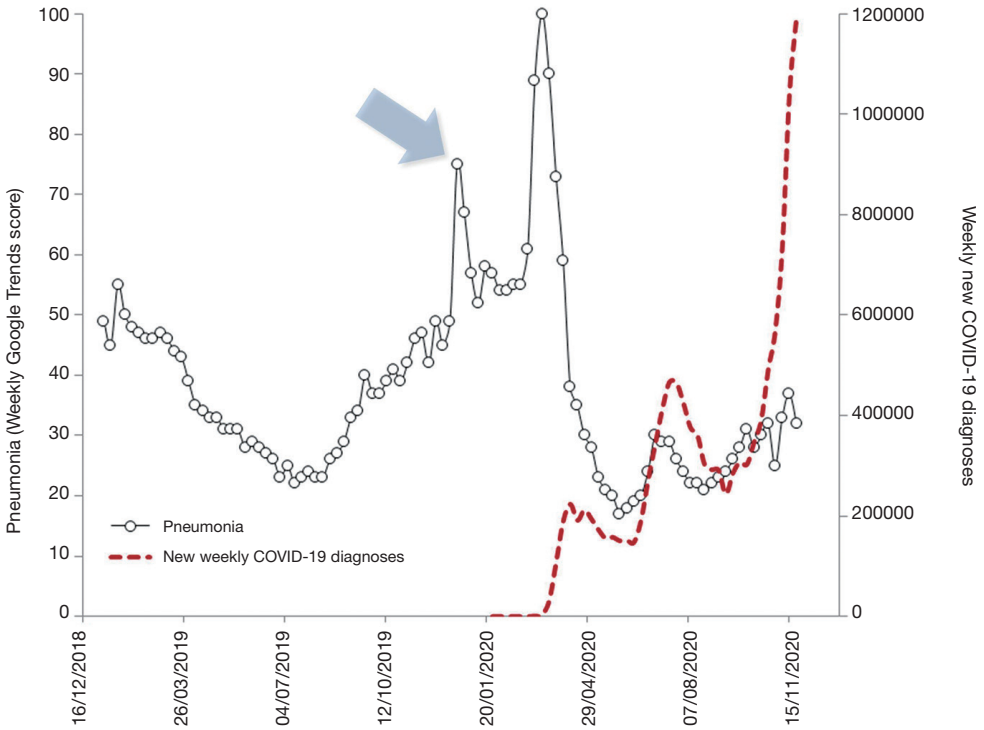

Figure 1 New weekly COVID-19 diagnosis in the United States and weekly volume of Google searches (Google Trends score) for taste and smell loss in the same Country, between November 2015 and November 2020. The anomalous peaks of Google Searches for pneumonia observed between November 2019 and January 2020 is evidenced by the arrow.

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Footnote

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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