Advances in Radiation Oncology
The COVID-19 & Cancer Consortium (CCC19) and Opportunities for Radiation Oncology
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Abstract:

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The COVID-19 & Cancer Consortium (CCC19) and Opportunities for Radiation Oncology

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To date, there are more than 38,000,000 confirmed cases of COVID-19 worldwide, with over 1,000,000 deaths [1]. In the United States, there are over 7,800,000 confirmed cases, with over 215,000 deaths [1]. This disease is highly infectious, especially since asymptomatic and symptomatic individuals can transmit the virus [2, 3]. During the pandemic, extensive public health measures have been taken to limit exposure of both staff and patients to the SARS-COV-2 virus, including physical distancing and quarantine. Due to these public health measures, there is concern that access to radiation treatment may be limited, or treatment plans may be interrupted or changed due to SARS-COV-2 infection. Despite the lack of data, multiple clinical practice guidelines have been released recommending changes in dose fractionation schedules for patients undergoing radiation therapy during the pandemic [4]. The short- and long-term clinical impact of these changes on patient outcomes is unknown.

The COVID-19 & Cancer Consortium (CCC19) is an international collection of 120 institutions from the United States, European Union, Argentina, Canada, Mexico and the United Kingdom. The purpose of the CCC19 is to collect detailed information on patients with cancer diagnosed with COVID-19 at scale across the globe. In the CCC19 cohort study, the 30-day all-cause mortality was 13% among 928 patients in the United States with active cancer or previous history of cancer and confirmed COVID-19 [5]. Independent factors associated with increased 30-day mortality were increased age, male sex, smoking history, number of comorbidities, ECOG performance status of 2 or higher, active cancer, and receipt of azithromycin plus hydroxychloroquine, and residence in the US-Northeast. Of note, active anticancer therapy was not associated with increased 30-day mortality [5].

In the UK Coronavirus Cancer Monitoring Project (UKCCMP) study consisting of 800 patients with cancer and symptomatic COVID-19, the risk of death was significantly associated with advanced age, male sex, and comorbidities. After adjusting for age, gender and comorbidities, chemotherapy in the past 4 weeks had no significant effect on mortality from COVID-19 [6]. Several other studies have similarly shown no statistically significant relationship between the use of chemotherapy and adverse outcomes [7, 8].
Specific to radiation therapy, in 59 patients with breast cancer with positive viral RNA testing or typical radiology signs for COVID-19 who were actively treated for early or metastatic disease during the last four months at the Institut Curie Parisian, no association was found between prior RT fields or RT sequelae and the extent of COVID-19 lung lesions. The four patients who died had significant non-cancer co-morbidities and in univariate analysis, hypertension and age > 70 years were two factors associated with a higher risk of ICU admission and/or death [8].

In Wuhan, China, the largest radiation therapy dataset reported to-date provided insight into the radiation treatment courses of 209 patients [9] with a 10-fold decrease in clinical caseload due to the lock-down. Beyond these reports, there have been no large studies addressing the impact of COVID-19 related delays to start radiation therapy, changes in radiation treatment dose and fractionations or unexpected interruptions or delays in completing treatment, which could have long-lasting effects on overall cancer outcomes.

The CCC19 have an exceptionally detailed system of data collection on cancer related variables on almost 5000 patients (Figure 1). Currently, the consortium lacks important details of radiation treatment and timing. We hope to increase the collection and availability of radiation specific variables to allow a more granular analysis of radiation decision making and the impact of radiation treatment during the COVID-19 era. We hope to call attention to the members of the American Society for Radiation Oncology (ASTRO) to join the CCC19 and help accrue additional patients with radiation specific details. The CCC19 will help better understand the use of radiation treatment during the COVID-19 pandemic, the impact on cancer and Covid-19 outcomes in general, and help prepare our field for any future pandemic.
References


**Figure Legend**

*Figure 1.* Patient level demographic, Covid-19 course, and cancer related data available in the COVID-19 & Cancer Consortium (CCC19) database, along with proposed radiation specific data variables.
Demographic Information
- Age, gender, race/ethnicity
- ECOG
- Smoking status
- Medical and smoking status
- Medications

COVID-19 Initial Course of Illness
- Presenting symptoms
- Presenting labs
- Diagnostic testing
- Initial severity of illness
- Co-infections
- Complications
- Treatments including trials
- Clinical status

Radiation Details
- Radiation Modality
- Radiation technique
- Number of fractions and total dose planned and delivered
- Radiation Start and Completion Date
- PTV volume, anatomic site
- Organ at risk (OAR) doses (lungs, heart doses, etc.)
- Use of concurrent therapy (type)

Other Cancer & Treatment details
- Cancer type, stage, status
- Endocrine therapy
- Chemotherapy
- Targeted therapy
- Immunotherapy
- Surgery (type and location)
- Hematopoietic stem cell transplant
- Treatment timing, treatment related adverse events

COVID-19 Related Treatment Modifications
- Was locoregional therapy delayed (surgery, radiation or both)?
- Was there a treatment break during radiation therapy?
- Was the radiation plan modified upfront or during radiation (hypofractionation used)?
- Was the patient diagnosed using CBCT/on board imaging?