

# Why are cancer patients with COVID-19 more likely to develop severe events?

Jianping Bi<sup>1</sup>, Yajie Wang<sup>2</sup>, Tingting Nie<sup>1</sup>, Vivek Verma<sup>3</sup>, Guoliang Pi<sup>1</sup>, Changchun Chen<sup>1</sup>, Guowu Jiang<sup>1</sup>, and Guang Han<sup>1</sup>

<sup>1</sup>Hubei Cancer Hospital

<sup>2</sup>People's Hospital of Dongxihu District

<sup>3</sup>Allegheny General Hospital

May 12, 2020

## Abstract

Many articles have reported that cancer patients are more susceptible to COVID-19 pneumonia and cancer patients with COVID-19 seem to be more often tend to develop severe events. In these studies of infected cancer patients, factors associated with a higher risk of developing severe events included age, baseline fragility, and anti-tumor treatment. However, specific reasons regarding why infected patients with cancer have a higher probability of severe events compared to non-cancer infected patients remain unclear. Thus, we sought to study one particular factor to determine a potential associative effect: differences in Computed tomography (CT) findings. In our study, we found that cancer patients represent a special population which multiple lobes of the lungs were more susceptible to infection by the SARS-CoV-2, and thus were more likely to be transferred from mild illness to severe, should be deserved more intensive attention during the SARS-CoV-2 pandemic.

## Why are cancer patients with COVID-19 more likely to develop severe events?

Jianping Bi<sup>1#</sup>, Yajie Wang<sup>2#</sup>, Tingting Nie<sup>3#</sup>, Vivek Verma<sup>4</sup>, Guoliang Pi<sup>1</sup>, Changchun Chen<sup>3</sup>, Guowu Jiang<sup>5\*</sup> and Guang Han<sup>1\*</sup>

<sup>1</sup> Department of Radiation Oncology, Hubei Cancer Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, PR China.

<sup>2</sup> Department of General Surgery, People's Hospital of Dongxihu District, Wuhan, PR China.

<sup>3</sup> Department of Radiology, Hubei Cancer Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, PR China.

<sup>4</sup> Department of Radiation Oncology, Allegheny General Hospital, Pittsburgh, PA, USA

<sup>5</sup> Department of Laboratory, Hubei Cancer Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, PR China.

# These authors contributed equally to this work.

\* Correspondence to: Guang Han, Hubei cancer Hospital, 430079, China. E-mail: 562674771@qq.com. Tel: +86 02787670275; Fax: +8602787670150; Guowu Jiang, Hubei cancer Hospital, 430079, China. E-mail: 245666126@qq.com.

To the Editor,

We read with interest the recent paper by Zhang et al, who described in a retrospective case study of 28 patients, that 53.6% of cancer patients with COVID-19 developed severe events [1]. Additionally, the publication by Hirotaka described that patients with cancer were intubated significantly more frequently than those without cancer [2]. Therefore, cancer patients with COVID-19 seem to be more often tend to develop severe pneumonia. In these studies of infected cancer patients, factors associated with a higher risk of developing severe events included age, baseline fragility, and anti-tumor treatment. However, specific reasons regarding why infected patients with cancer have a higher probability of severe events compared to non-cancer infected patients remain unclear.

Thus, we sought to study one particular factor to determine a potential associative effect: differences in Computed tomography (CT) findings. According to the updated COVID-19 Diagnosis and Treatment Plan (Provisional 7th Edition) of China [3], the serum antibody test for SARS-CoV-2 may be used as a diagnostic criterion. CT images can also be used as an important complement for diagnosis of COVID-19 pneumonia.

Herein, all inpatients and their companions were required to screen for SARS-CoV-2 infection using chest CT scans and viral serum IgM and IgG antibodies by colloidal gold immunoassay in the Hubei Cancer Hospital. All subjects found to harbor antibodies to SARS-CoV-2 were further evaluated by RT-PCR for viral nucleic acid. All CT images were independently reviewed by two experienced thoracic radiologists blinded to clinical data. CT imaging features were described as previously reported by Meng et al [4].

Under the aforementioned screening strategy, conducted from March 9, 2020 to April 22, 2020, we observed that 122 (2.4%) of 5087 screened cancer patients and 51 (1.6%) of 3184 caregivers tested positive for viral serum antibodies but negative for 2019-nCoV RNA. Amongst 126 cancer patients and 51 caregivers, 22 (17.5%) cancer patients and 5 (9.8%) caregivers showed CT imaging changes.

Radiologic features upon admission are shown in Table 1. CT image features of cancer patients, the predominant feature was ground glass opacity (GGO) with peripheral distribution (90.9%), most commonly bilateral (77.3%), and mostly involving [?]3 lung lobes (72.7%). In a previous report<sup>4</sup>, the predominant CT findings in asymptomatic patients without cancer was GGO with peripheral distribution (75.9%), unilateral location (58.6%), and mostly involving [?]2 lung lobes (65.5%). In our study, among caregivers, three (60.0%) had unilateral disease. Only one (20.0%) patient had [?]3 lobes involved. Therefore, based on the lung distribution of CT-evident lesions, cancer patients with COVID-19 pneumonia may be more vulnerable to lung damage with the potential to develop severe events.

The factors that led to severe illness for cancer patients with COVID-19 were comprehensive: age, nutritional status, general conditions, medical resources, etc. However, cancer patients represent a special population which multiple lobes of the lungs were more susceptible to infection by the SARS-CoV-2, and thus were more likely to be transferred from mild illness to severe, should be deserved more intensive attention during the SARS-CoV-2 pandemic.

## Funding

None

## Conflict of interest

All the authors have no conflicts of interest to declare.

## References

1. Zhang L, Zhu F, Xie L, C Wang, J Wang, R Chen, et al. Clinical characteristics of COVID-19-infected cancer patients: A retrospective case study in three hospitals within Wuhan, China. *Ann Oncol.* 2020 Mar 26. pii: S0923-7534(20)36383-3. doi: 10.1016/j.annonc.2020.03.296. [Epub ahead of print].
2. Hirotaka M, Takahisa M, Nitin C, Takayuki Yamada, Svetlana Chernyavsky, Dahlia Rizk, et al. Do Patients with Cancer Have a Poorer Prognosis of COVID-19? An Experience in New York City [letter]. *Ann Oncol.* 2020;S0923-7534(20)39303-0. doi:10.1016/j.annonc.2020.04.006. Online ahead of print.

3. National Health Commission of China. New coronavirus pneumonia prevention and control program (7th edn). Mar 3, 2020. <http://www.gov.cn/zhengce/zhengceku/2020-03/04/5486705/files/ae61004f930d47598711a0d4cbf874a9.pdf> (in Chinese)
4. Meng H, Xiong R, He R, Lin W, Hao B, Zhang L, et al. CT imaging and clinical course of asymptomatic cases with COVID-19 pneumonia at admission in Wuhan, China. *J Infect.* 2020 Apr 12. pii: S0163-4453(20)30211-5. doi: 10.1016/j.jinf.2020.04.004. [Epub ahead of print]

### Hosted file

Table.docx available at <https://authorea.com/users/320900/articles/450313-why-are-cancer-patients-with-covid-19-more-likely-to-develop-severe-events>