

# Low-Dose Radiation Therapy for COVID-19

## Time reveals the truth!

## MEDICAL PHYSICS

The International Journal of Medical Physics Research and Practice

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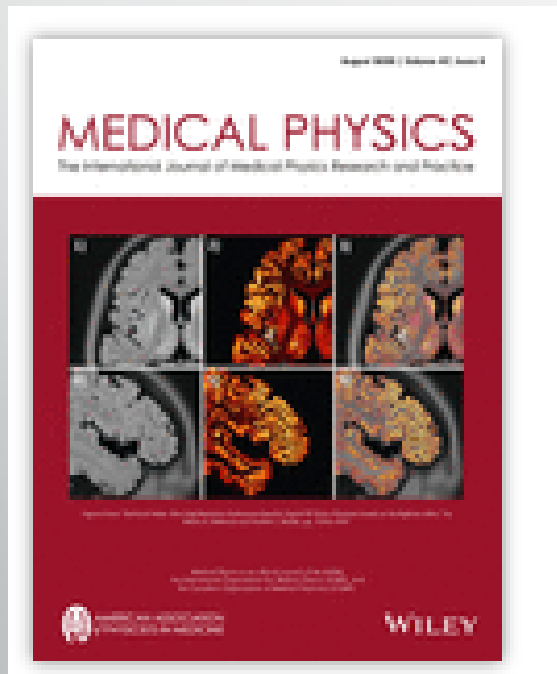
### Low-dose radiation as a treatment for COVID-19 pneumonia: A threat or real opportunity?

Seyed Mohammad Javad Mortazavi Ph.D. ✉, Amirhosein Kefayat M.D. ✉, Jing Cai Ph.D.

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### POINT/COUNTERPOINT

Suggestions for topics suitable for these Point/Counterpoint debates should be addressed to Habib Zaidi, Geneva University Hospital, Geneva, Switzerland: [habib.zaidi@hcuge.ch](mailto:habib.zaidi@hcuge.ch); Jing Cai, The Hong Kong Polytechnic University, Hong Kong: [jing.cai@polyu.edu.hk](mailto:jing.cai@polyu.edu.hk); and/or Gerald White, Colorado Associates in Medical Physics: [gerald.white@mindspring.com](mailto:gerald.white@mindspring.com). Persons participating in Point/Counterpoint discussions are selected for their knowledge and communicative skill. Their positions for or against a proposition may or may not reflect their personal opinions or the positions of their employers.

### Low-dose radiation as a treatment for COVID-19 pneumonia: A threat or real opportunity?

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### OVERVIEW

Low-dose radiation is known to induce anti-inflammatory responses and has been historically used for treating infectious diseases such as pneumonia. As the outbreak of COVID-19 continues globally and effective treatment methods are lacking, low-dose radiation has drawn increasing attention recently. While some are optimistic about the clinical adoption of low-dose radiation for the treatment of COVID-19, others have significant concerns about its effectiveness and safety. This is the premise debated in this month's Point/Counterpoint.

Arguing for the Proposition is SMJ Mortazavi, Ph.D. Dr. Mortazavi serves as Professor of Medical Physics at School of Medicine, Shiraz University of Medical Sciences. His background is in medical physics, with specific training and expertise in the biological effects of ionizing and non-ionizing radiation. He was awarded the Young Scientist Award at the 11th International Congress of Radiation Research, Dublin, Ireland. After completing a postdoc awarded by the Japan Society for Promotion of Science (JSPS) at the Kyoto University of Education, he joined the faculty of RUMS, Rafsanjan, and served as Assistant/associate professor until 2008. Then he moved to SUMS, Shiraz where he served as associate/full professor. He was also, a visiting scientist at Fox Chase Cancer Center, Philadelphia (2017–2018) and University



1 Med. Phys. 0 (0), xxxx

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of Wisconsin-Milwaukee, Milwaukee (2018). He has authored more than 250 papers in peer-reviewed journals. Some of his papers/letters have been published in prestigious journals such as Circulation, PNAS, British Journal of Cancer, and Environmental Research. He has also published papers on the future role of radioadaptation in the long-term stay of humans in space. He is also a member of editorial boards of some well-known journals such as International Journal of Low Radiation (IJLR), Radiology of Infectious Diseases and International Journal of Radiation Research (IJRR).

Arguing against the proposition is Amirhosein Kefayat, M.D. He received his M.D. degree from the Isfahan University of Medical Sciences, Iran. His research encompasses many different aspects of cancer diagnosis and treatment. His major research interest is design and assessment of novel nanomaterials and nanostructures for enhancement of cancer treatment efficacy. He has published more than 30 peer-reviewed papers.

P.S. This article was written before the publication of Emory University Hospital on the phase III trial evaluating the safety and efficacy of single-fraction, low-dose, whole-



lung radiation for COVID-19 pneumonia.<sup>1</sup> The authors were unaware of the findings of the Emory study during their writings of this article. The topic of this debate is still actively developing. According to ClinicalTrials.gov website, about ten trials have been registered by 25 June 2020 to investigate the use of low-dose radiation for

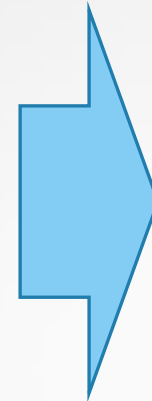
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2 years ago



Rebuttal:  
Amirhosein Kefayat, M.D



Point/Counterpoint

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“It is somehow **apparent** that using **antiviral drugs** and vaccines for COVID-19 treatment would be **more acceptable** for patients in comparison with ionizing radiations even in low-dose form. Therefore, **further achievements** in these fields like approving Remdesivir for COVID-19 treatment<sup>25</sup> may bury the subject of employing LDRT for COVID-19 treatment “.

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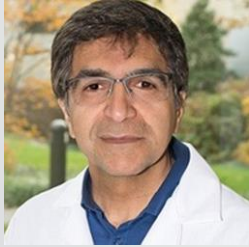
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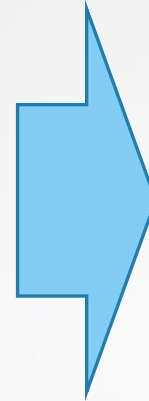
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Rebuttal:  
SMJ Mortazavi, Ph.D



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“the report by Ghadimi-Moghadam et al.<sup>4</sup> received attention not only for introducing LDRT as a treatment method for pneumonia in COVID-19 patients but also for noting the key **disadvantages of** other treatment methods such as using **antiviral drugs**. .....any antiviral drug against SARS-CoV-2 would exert an intense **selective pressure** on the virus. This may result in **highly adaptive and treatment-resistant virus types with enhanced pathogenicity**.”.

Time reveals the truth!

Now, after 2 years, we know that:



- WHO Guideline Development Group advises against use of remdesivir for covid-19.

## LDRT for COVID-19

- Several groups, including our own, have shown that whole-lung radiation at doses of 0.5–1.5 Gy can accelerate the recovery in clinical and radiographic status without acute toxicity [12,13,14,15,16,17,18,19,20,21]."

Rodríguez-Tomás et al. Antioxidants 2022, 11(6), 1184; <https://doi.org/10.3390/antiox11061184>,  
Published: 16 June 2022

[nature](#) > [news feature](#) > article

NEWS FEATURE | 28 January 2022


## Where did Omicron come from? Three key theories

The highly transmissible variant emerged with a host of unusual mutations. Now scientists are trying to work out how it evolved.

And viruses can **evolve faster** when there is **selection pressure**, he says, because mutations are more likely to stick around if they give the virus an increased ability to propagate under certain environmental conditions.

Review

## Selective Pressure-Free Treatments for COVID-19

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**Abstract:** The new severe acute respiratory syndrome coronavirus (SARS-CoV-2) has caused more than 40 million human infections since December 2019, when a cluster of unexplained pneumonia cases was first reported in Wuhan, China. Just a few days after the coronavirus was officially recognized, it was identified as the causative agent of this mysterious pneumonia. This paper discusses the pros and cons of antiviral drugs from the selective pressure and possible drug resistance point of view. We also address the key advantages of potential selective pressure-free treatment methods such as the use of sparsely and densely ionizing low-dose radiation (LDR). It is known that LDR has the capacity to modulate excessive inflammatory responses, regulate lymphocyte counts and control bacterial co-infections in patients with COVID-19 and different modalities. Substantial evidence

# Emerging SARS-CoV-2 Variants

