

Health Sciences



U M 6 S S
EDITIONS

Volume 2 | Issue 1

Article 18

Remdesivir Research Progress: An Overview of the Emerging Evidence

Aamir Jalal Al Mosawi

Pediatrics and Pediatric Psychiatry Children Teaching Hospital of Baghdad Medical City, Iraq Headquarter of Copernicus Scientists International Panel Baghdad, Iraq, almosawiAJ@yahoo.com

Follow this and additional works at: <https://journal.um6ss.ma/health-sciences>



Part of the [Medicine and Health Sciences Commons](#)

Recommended Citation

Mosawi, Aamir Jalal Al (2020) "Remdesivir Research Progress: An Overview of the Emerging Evidence," *Health Sciences*: Vol. 2: Iss. 1, Article 18.

Available at: <https://doi.org/10.15342/hs.2020.247>

This Perspective is brought to you for free and open access by Health Sciences. It has been accepted for inclusion in Health Sciences by an authorized editor of Health Sciences.

PERSPECTIVE

Remdesivir Research Progress: An Overview of the Emerging Evidence

Aamir Jalal Al Mosawi ^{a,b}^a Advisor in Pediatrics and Pediatric Psychiatry Children Teaching Hospital of Baghdad Medical City^b Head, Iraq Headquarter of Copernicus Scientists International Panel Baghdad, Iraq**ABSTRACT**

There has been an increasing interest in remdesivir research within the scientific medical community because of the emerging evidence suggesting its beneficial role in patients with Covid 19. Remdesivir which can be given intravenously and not orally has an anti-viral against several RNA viruses. The aim of this paper is to review remdesivir research progress.

KEYWORDS: Remdesivir, Research Progress, Covid 19**Correspondence :** Aamir Jalal Al Mosawi. Advisor doctor, The National Training and Development Center Iraqi Ministry of Health, Baghdad, Iraq. E-mail: almosawiAJ@yahoo.com

Copyright © 2020 Al Mosawi AJ. This is an open access article distributed under the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

There has been an increasing interest in remdesivir research within the scientific medical community because of the emerging evidence suggesting its beneficial role in patients with COVID 19. Remdesivir which can be given intravenously and not orally has an anti-viral against several RNA viruses. Remdesivir has an in vitro antiviral activity against filoviruses, arenaviruses, and coronaviruses including circulating human coronaviruses HCoV-OC43, HCoV-229E, SARS, and MERS zoonotic coronaviruses. Remdesivir (GS-5734) is a monophosphoramidate prodrug of an adenosine analogue that is activated intra-cellularly to the main metabolite in plasma “GS-441524” which act mainly by interfering with the action of viral RNA-dependent RNA polymerase and escapes proofreading by viral exoribonuclease resulting reducing in viral RNA replication [1,2,3,4].

Warren et al (2016) reported that remdesivir has an antiviral activity against multiple variants of Ebola virus and other filoviruses in cell-based assays. Nonhuman primates receiving intravenous remdesivir had persistent nucleoside triphosphate levels in peripheral blood mononuclear cells (half-life:14 hours) and distribution to sites of viral replication in the testes, eyes, and brain. In a rhesus monkey model of Ebola virus disease, once-daily remdesivir intravenous administration of 10 mg/kg for 12 days was associated with a great suppression of Ebola

virus replication and therefore protected 100% of Ebola virus-infected animals against fatal disease. Treatment also improved the clinical and pathophysiological markers, even when treatments were started three days after virus exposure when systemic viral RNA was detected in two out of six treated animals. Warren et al suggested that remdesivir important post-exposure protection against Ebola virus disease in nonhuman primates [5].

Sheahan et al (2017) showed that remdesivir can inhibit SARS-CoV and MERS-CoV replication in multiple in vitro systems, including primary human airway epithelial cell cultures with submicromolar IC₅₀ values. Remdesivir can also inhibit bat CoVs, pre-pandemic bat CoVs, and circulating contemporary human CoV in primary human lung cells. In a mouse model of SARS-CoV pathogenesis, prophylactic and early therapeutic administration of remdesivir considerably decreased lung viral load and was associated with clinical improvement and also improved respiratory function [6].

Agostini et al (2018) reported that remdesivir can effectively inhibit human and zoonotic coronaviruses in vitro and in a severe acute respiratory syndrome coronavirus (SARS-CoV) mouse model. They also showed that remdesivir can inhibit murine hepatitis virus (MHV) with similar 50% effective concentration values

(EC50) as SARS-CoV and Middle East respiratory syndrome coronavirus (MERS-CoV) [7].

In animal experiment, Pedersen et al (2019) studied the safety of remdesivir, and found it safe at a dose of 4.0 mg/kg S.C q24h for 12 weeks [8].

de Wit et al (2020) described the prophylactic and therapeutic use of remdesivir in the treatment of a nonhuman primate “rhesus macaque” model of MERS-CoV infection. Prophylactic remdesivir was started 24 hours before inoculation, completely prevented MERS-CoV-induced clinical disease, potently inhibited MERS-CoV replication in respiratory tissues, and prevented the formation of lung lesions. Therapeutic remdesivir treatment started 12 hours post-inoculation was associated with an obvious clinical benefit, with a reduction in clinical signs, reduced virus replication in the lungs, and reduction of lung lesions, and its severity [9].

Wang et al (2020) reported a randomised, double-blind, placebo-controlled, multicentre trial at ten hospitals in Hubei, China. The study included 237 adults with SARS-CoV-2 positive tests hospitalized within 12 days or less from the onset of symptoms and had oxygen saturation of 94% or less on room air or a ratio of arterial oxygen partial pressure to fractional inspired oxygen of 300 mm Hg or less, and had radiological evidence of pneumonia. 158 patients were to remdesivir intravenous remdesivir (200 mg on day 1 followed by 100 mg on days 2-10 in single daily infusions). 79 patients were treated with placebo infusions for 10 days. Concomitant use of lopinavir-ritonavir, interferons, and corticosteroids was allowed.

Remdesivir use was not associated with a statistically significant difference in time to clinical improvement (hazard ratio 1.23 [95% CI 0.87-1.75]), but patients treated with remdesivir had a numerically faster time to clinical improvement than patients treated with placebo. Adverse effects were observed in 102 (66%) of remdesivir-treated patients and 50 (64%) of placebo-treated patients. Remdesivir was stopped early because of adverse effects in 18 (12%) patients, and four (5%) patients stopped placebo early [10].

REFERENCES

- [1] Al-Mosawi AJ. Bat-Human Coronaviruses: A Global Health Problem and a Therapeutic Challenge. *Journal of Medical Clinical Case Reports* 2020; 2(2) 1-3. Doi: 10.5281/zenodo.3878405
- [2] Al-Mosawi AJ. The Use of the Available Research Evidence to Crack the Padlock of Sars-CoV-2. *Journal of Virology Research & Reports* 2020; 1 (1):1-8 Doi: 10. 5281/zenodo.3970844
- [3] Al-Mosawi AJ. Bat-human coronaviruses: Keys to the therapeutic challenge. 1st ed., Saarbrücken; LAP Lambert Academic Publishing; 2020 (ISBN: 978-620-0-47386-8).
- [4] Al-Mosawi AJ. Bat-human Coronaviruses: Keys to The Therapeutic Challenge .1st ed., Baghdad; Iraq Headquarter of Copernicus Scientists International Panel Publishing; 2020 (ISBN: 978-1-67804-171-7).

Beigel et al (2020) reported a double-blind, randomized, placebo-controlled trial of treating adults hospitalized with Covid-19 with evidence of lower respiratory tract involvement with intravenous remdesivir. 538 patients were treated with remdesivir (200 mg loading dose on day 1, followed by 100 mg daily for up to 9 additional days). 521 patients were treated with placebo for up to 10 days. Remdesivir-treated patients had a median recovery time of 11 days (95% confidence interval [CI], 9 to 12), while patients in the placebo group had a median recovery time of 15 days (95% CI, 13 to 19) [Rate ratio for recovery, 1.32; 95% CI, 1.12 to 1.55; P<0.001]. Kaplan-Meier mortality by 14 days were 7.1% in remdesivir-treated patients, and 11.9% the placebo group (hazard ratio for death, 0.70; 95% CI, 0.47 to 1.04). Serious effects occurred in 114 of the 541 patients in the remdesivir and 141 in the placebo group. Beigel et al considered remdesivir to be superior to placebo in shortening the time to recovery in adults hospitalized with Covid-19 who had lower respiratory tract infection [11].

The currently, available evidence suggests that remdesivir can be useful in the treatment of Covid-19, but its use as a mono-therapy is far from being the ultimate therapy for Covid-19.

The recent evidence-based recommendation which was published in 9 languages [4,12-19] emphasized that until now, there is no single drug can result in a virological cure. However, lopinavir/ritonavir, remdesivir, azithromycin, and teicoplanin are possibly at the top of the list weapons of that have the potential to enable humans to win the fight against covid-19, but in condition that are used in suitable combinations. Chloroquine side effects include flue like febrile illness, shortness of breath and cardiomyopathy and therefore should be considered after lopinavir/ritonavir, remdesivir, and teicoplanin. Lopinavir/ritonavir was considered at the top of the list because it is more available than remdesivir in many countries of the world, an it has more known profile of toxicity and side effects.

COMPETING INTERESTS

The authors declare no competing interests with this case.

- [8] Pedersen NC, Perron M, Bannasch M, et al. Efficacy and safety of the nucleoside analog GS-441524 for treatment of cats with naturally occurring feline infectious peritonitis. *J Feline Med Surg* 2019; 21(4):271-281. PMID: 30755068. Doi: 10.1177/1098612X19825701
- [9] de Wit E, Feldmann F, Cronin J, et al. Prophylactic and therapeutic remdesivir (GS-5734) treatment in the rhesus macaque model of MERS-CoV infection. *Proc Natl Acad Sci USA* 2020; 117(12):6771-6776. PMID: 32054787. Doi:10.1073/pnas.1922083117
- [10] Wang Y, Zhang D, Du G, et al. Remdesivir in adults with severe COVID-19: a randomised, double-blind, placebo-controlled, multicentre trial [published correction appears in *Lancet*. 2020 May 30; 395(10238):1694]. *Lancet* 2020; 395(10236):1569-1578. PMID: 32423584. Doi: 10.1016/S0140-6736(20)31022-9
- [11] Beigel JH, Tomashek KM, Dodd LE, et al. Remdesivir for the Treatment of Covid-19 - Preliminary Report [published online ahead of print, 2020 May 22]. *N Engl J Med* 2020; NEJMoa2007764. PMID: 32445440. Doi: 10.1056/NEJMoa2007764
- [12] Al-Mosawi AJ. Использование данных исследований для взлома замка SARS-CoV-2 (Russian edition) *Scienca Scripts*: 2020 (ISBN-13:978-620-2-60758-2).
- [13] Al-Mosawi AJ. Utilização de provas de investigação para rachar o cadeado da SRA-CoV-2 (Portuguese edition) *Edições Nosso Conhecimento*: 2020 (ISBN-13: 978-620-2-60757-5)
- [14] Al-Mosawi AJ. Użycie dowodów naukowych do złamania klódki SARS-CoV-2 (Polish edition) *Wnictwo Nasza Wiedza*: 2020 (ISBN-13: 978-620-2-60756-8)
- [15] Al-Mosawi AJ. Gebruik van onderzoeksmateriaal voor het kraken van het hangslot van SARS-CoV-2 (Dutch edition). *Uitgeverij Onze kennis*: 2020 (ISBN-13:978-620-2-60755-1).
- [16] Al-Mosawi AJ. Utilizzare le prove della ricerca per rompere il lucchetto della SARS-CoV-2 (Italian edition) *Edizioni Sapient*: 2020 (ISBN-13: 978-620-2-60753-7).
- [17] Al-Mosawi AJ. Utilisation des résultats de la recherche pour briser le cadenas du SRAS-CoV-2 (French edition) *Editions Notre Savoir*: 2020 (ISBN-13: 978-620-2-60752-0).
- [18] Al-Mosawi AJ. El uso de pruebas de investigación para romper el candado del SARS-CoV-2 (Spanish edition). *Ediciones Nuestro Conocimiento*: 2020 (ISBN-13:978-620-2-60751-3)
- [19] Al-Mosawi AJ. Verwendung von Forschungsergebnissen zum Knacken des Vorhängeschlosses von SARS-CoV-2 (German edition) *Verlag Unser Wissen*: 2020 (ISBN-13:978-620-2-60750-6).