

Novel drug for COVID-19: Virafin a therapeutic breakthrough

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Information about the article:

Received: Jun 12, 2021

Accepted: Jun 28, 2021

Published online: July 11, 2021

Cite this article:

Robinson J, Banerjee I, Roy B, Leclézio A. Novel drug for COVID-19: Virafin a therapeutic breakthrough. Journal of Biomedical Sciences. 2021;8(1):12-14

Publisher

Nepal Health Research Society, Bahundhara -6, Gokarnesowor Municipality, Kathmandu, Nepal
eISSN 2382-5545, ISSN 2676-1343 (Print)

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ABSTRACT**Background**

Pegylated Interferon Alpha-2b is synthesized via the use of PEG (polyethylene glycol). It is formulated via attaching a 12kDa mono methoxy polyethylene glycol moiety to the recombinant human Interferon Alpha-2b protein. Pegylated Interferon Alpha-2b acts via binding to the (JAK/STAT) Janus kinase signal transducer and activator of the transcription interferon receptor. The Pegylated Interferon Alpha-2b /Virafin binds to the (IFNAR1/2) alpha interferon receptor 1 and 2. Pegylated Interferon Alpha-2b better known as Virafin has been approved by the Drugs Controller General of India. This therapeutic agent is currently under a multicentric phase 3 trial with very promising results being reported. A single subcutaneous dose of Virafin has been shown to decrease the need for oxygen therapy in patients. This reduction in the need for oxygen therapy is a vital factor needed to provide relief to the Indian medical system in light of the recent oxygen shortages faced due to India's worst wave of COVID-19 cases since the onset of the global pandemic. Pegylated Interferon Alpha-2b/ Virafin confers enhanced viral clearance and bolsters the immune response to induce a quicker recovery in patients with mild to moderate symptoms.

Conclusion

It is of paramount importance that further research on Virafin is undertaken as it can hinder the progression of COVID-19, reduce pressure on the inundated health systems, and save countless lives.

Keywords

COVID-19 drug treatment, Drug Design, Interferons, Interferon alpha-2, Pharmacology, SARS-CoV-2, Therapeutics

Background

The SARS-CoV-2 virus that spread across global borders towards the end of December 2019 and January 2020 has resulted in the International Coronavirus pandemic. The ramifications and cases caused by this pandemic is still plaguing the health system and many healthcare facilities have been overrun due to the influx of patients. Vaccines have been synthesized to combat the spread of the virus. The increase of global cases and the time needed for the vaccination campaigns to take effect and confer herd immunity will equate to millions of more deaths if a specific drug for the contracted patients is not developed or discovered. The novel nature of this virus has led to the use of novel drugs and procedures to help cure and or save the lives of patients. One such drug being administered and tried is a pegylated interferon alpha-2b known as Virafin and may answer the grave difficulties being brought forth by the virus [1,2,3].

Pegylated Interferon Alpha-2b/Virafin

Pegylated Interferon Alpha-2b is synthesized via the use of PEG (polyethylene glycol). It is formulated via attaching a 12kDa mono methoxy polyethylene glycol moiety to the recombinant human Interferon Alpha-2b protein. The process of PEGylating a protein-based drug and or therapeutic agent results in the capability to manufacture protein based therapeutic derivatives which boast improved pharmacokinetic and pharmacodynamic properties (thus conferring a greater half-life, better bio-availability and improved drug efficacy). Virafin/ Pegylated Interferon Alpha-2b is such an antiviral drug that has traditionally been used to treat cases of chronic hepatitis C [4].

Mechanism of action of Pegylated Interferon Alpha-2b

Pegylated Interferon Alpha-2b acts via binding to the (JAK/STAT) Janus kinase signal transducer and activator of the transcription interferon receptor. More specifically, the Pegylated Interferon Alpha-2b /Virafin binds to the (IFNAR1/2) alpha interferon receptor 1 and 2. This receptor docking intern initializes the activation and biological response leading to the dimerization of the receptor. Pegylated Interferon Alpha-2b thus induces the immune system's inherent antiviral protective mechanisms and responses via modulating cytokine transcription genes, specifically interleukin 4 (IL4) and thus thereby stimulates T helper cells which ultimately results in humoral cell proliferation with the production of B cells which intern upregulates the immune response and antibody production. Pegylated Interferon Alpha-2b thereby bolsters and induces a more robust innate antiviral response and thus aids the body combat the viral infection [5].

A second mechanism by which Pegylated Interferon Alpha-2b acts is via the induction of apoptosis in malignant cell lineages. It has been proven that caspases

are implicated in the apoptosis process via the initiation and activation of the apoptotic biological cascade. Further research has determined that Interferon-alpha produces a loss in mitochondria's membrane potential, which results in the release of cytochrome C and thereby induces cell death [5].

Virafin in COVID-19

Pegylated Interferon Alpha-2b, better known as Virafin, approved by the (DGCI) Drugs Controller General of India. It received its EUA (emergency use authorization) on Friday the 23rd of April 2021, where it was cleared to treat adults infected with the SARS-CoV-2 virus and who present with mild to moderate symptoms. A single subcutaneous (Sc) dose of Virafin developed by Zydus Cadila is administered at the cost of Rs 11, 995 Indian rupees. This therapeutic agent is currently under a multicentric phase 3 trial with very promising results being reported. A single subcutaneous dose of Virafin has been shown to decrease the need for oxygen therapy in patients. This reduction in the need for oxygen therapy is a vital factor needed to provide relief to the Indian medical system in light of the recent oxygen shortages faced due to India's worst wave of COVID-19 cases since the onset of the global pandemic. Pegylated Interferon Alpha-2b/ Virafin confers enhanced viral clearance and bolsters the immune response to induce a quicker and more rapid recovery in patients with mild to moderate symptoms. In many of the cases being studied, a large cohort of the patients (91.15%) who received Virafin tested negative for the COVID-19 infection on their 7th day RT-PCR test. It is also speculated that the administration of Virafin in the elderly can confer greater protection to the aged who naturally have a lower interferon alpha titre and can thus possibly used as a prophylactic measure to halt the progression of the disease in those whom are naturally more susceptible [2,4,5,6].

Conclusion

Thus far, the present reports and data for the use of Pegylated Interferon Alpha-2b/ Virafin in the treatment of mild to moderately ill COVID-19 patients are promising and constitute greater international attention and study. The great potential for using this therapeutic agent in the war against COVID-19 cannot be ignored as the capability of this drug to halt the progression of the disease in milder patients will intern free up resources for those with severe symptoms and forms of the disease. Therefore, it is of paramount importance that further research on Virafin is undertaken as it can hinder the progression of COVID-19, reduce pressure on the inundated health systems, and save countless lives.

Abbreviation

Coronavirus disease 2019 (COVID-19), Janus kinases (JAK), Interleukin 4 (IL4), Signal transducer and activator

of transcription proteins (STATs), Severe acute respiratory syndrome coronavirus 2 (SARS-COV-2)

Acknowledgments

We extend our intense gratitude to the Chairman Mr. RPN Singh and Prof. Namrata Chhabra, Principal In charge, Sir Seewoosagur Ramgoolam Medical College, Belle Rive, Mauritius, for providing us with huge support to conduct the research study effectively.

Authors' contribution

- Study planning: JR, IB, BR, AL
- Manuscript writing: JR, IB, BR, AL
- Manuscript revision: JR, IB, BR, AL
- Final approval: JR, IB, BR, AL
- Agreement to be accountable for all aspects of the work: JR, IB, BR, AL

Funding

There was no funding for this work.

Availability of data and materials

All data and materials available as part of the article, and no additional source data are required.

Competing interests

There is no conflict of interest for any author of this manuscript.

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