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Cardiovascular implications of remdesivir and favipiravir in COVID-19 therapy

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Remdesivir and favipiravir are treatment alternatives for COVID-19; however, the potential side effects on the cardiovascular system are often overlooked. The purpose of this article concerns a discussion for the cardiovascular side effects that may arise from the application of favipiravir and remdesivir in the treatment of COVID-19 patients. Remdesivir and favipiravir have a strong inhibitory potential against SARS-CoV-2 infection by inhibiting the virus's RdRp activity. Preliminary reports from limited clinical studies indicate the success of both drugs in combating COVID-19. Currently, the safety profiles of these two drugs are primarily based on previous clinical trials for anti-influenza and Ebola therapies, which generally show mild side effects such as gastrointestinal disturbances. However, the impact of remdesivir and favipiravir on the cardiovascular system remains unclear. Nevertheless, studies have reported that both drugs can cause cardiac conduction disturbances that overlap with the hyperinflammatory conditions of COVID-19 patients. Additionally, both drugs are known to have vasodilatory effects and can inhibit the hERG potassium channel, potentially triggering cardiac arrhythmias. In conclusion, remdesivir and favipiravir demonstrate inhibitory potential against SARS-CoV-2 infection, with generally mild safety profiles, but their effects on the cardiovascular system, including the possibility of cardiac conduction disturbances, require further investigation.

Καρδιαγγειακές επιπτώσεις της remdesivir και της favipiravir στη θεραπεία της COVID-19

Περίληψη στο τέλος του άρθρου

Key words

Cardiovascular system
COVID-19
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Side effect

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1. INTRODUCTION

COVID-19 has had a significant impact on global health, affecting health systems in various countries and creating new challenges for healthcare services. The prevalence of COVID-19 continues to rise, with infection rates reaching millions worldwide. The high mortality rate due to COVID-19 is also a serious concern, especially among vulnerable populations.[1–3] The management of COVID-19 is highly complex, involving various therapeutic approaches and interventions to reduce the spread of the virus and improve clinical outcomes for patients.[4] Since the surge in COVID-19 cases, numerous studies have been conducted both clinically and *in vitro* to identify therapeutic agents with good efficacy for the management of COVID-19.[5,6] A variety of therapeutic options are available for COVID-19, including antivirals, monoclonal antibodies, and supportive therapies, such as ribavirin, lopinavir, ritonavir, remdesivir, umifenovir, oseltamivir, and favipiravir.[6] Among all these drugs, remdesivir and favipiravir are frequently used therapeutic options, although their potential side effects are often overlooked. Therefore, it is important to conduct careful monitoring of the side effects that may arise from the use of these medications.[7]

Favipiravir and remdesivir are two antiviral drugs that have been widely discussed in the context of COVID-19 treatment.[6] Favipiravir was first discovered by the Japanese pharmaceutical company Toyama Chemical as a treatment for influenza.[8] Before the COVID-19 era, this drug was also used to treat diseases such as Ebola virus and other viral infections.[9,10] Since the onset of the COVID-19 pandemic, the use of favipiravir and remdesivir has significantly increased, with COVID-19 treatment guidelines recommending both drugs as therapeutic options.[11] However, clinicians often overlook the potential side effects of these medications,

particularly their effects on the cardiovascular system.[12] Currently, very few studies report on this impact. Therefore, this study aims to explore and discuss the cardiovascular side effects that may arise from the application of favipiravir and remdesivir in the treatment of COVID-19 patients.

2. REMDESIVIR FOR THE MANAGEMENT OF COVID-19

Remdesivir (GS-5734) is a nucleoside analog of adenosine triphosphate that was initially documented in 2016 as a possible therapy for Ebola.[13,14] Its antiviral activity is broad, and it is known to have *in vitro* activity against various viruses, including Coronaviridae, Arenaviridae, Pneumoviridae, Flaviviridae, Paramyxoviridae, and Filoviridae.[13] The activity of remdesivir against Coronaviridae was first recognized in 2017,[15] leading to the opinion that remdesivir could be a treatment for COVID-19.[16,17] This is because remdesivir is known to disrupt the RdRp binding in coronaviruses, including SARS-CoV-2, thereby inhibiting the virus's replication process.[7,18,19]

In the case of MERS, the administration of remdesivir for both prophylaxis and therapy showed improvement in lung function and reduced viral load in animal models.[18] In macaques, administering remdesivir 24 hours prior to the inoculation of MERS-CoV was able to prevent the onset of clinical symptoms, suppress viral replication in the respiratory tissues, and avoid the development of lung lesions. Additionally, administering the drug within 12 hours following virus inoculation could reduce symptom onset, suppress viral replication, and lessen the severity of lung lesions.[20] In the case of COVID-19, remdesivir showed good antiviral efficacy *in vitro*. Several clinical studies have demonstrated that remdesivir can accelerate the healing process and reduce mortality compared to placebo, including in severe cases of COVID-19.[6,18,21] A study indicated that earlier administration of remdesivir (onset <10 days) could expedite recovery.[21,22] A cohort study evaluating the use of remdesivir in COVID-19 patients found clinical progress in 36 out of 53 (63%) patients who received intravenous remdesivir for ten days. Mortality was observed in 7 out of 53 (13%) patients, with an increased risk of death among patients aged over 70 and those with increased serum creatinine levels.[20,23] Based on this data, remdesivir was granted Food and Drug Administration (FDA) Emergency Use Authorization (EUA) on May 1, 2020. The FDA subsequently granted full approval for remdesivir as a COVID-19 treatment on October 22, 2020.[24]

To date, remdesivir is the sole antiviral medication authorized by the FDA for the treatment of COVID-19. The recommended FDA dosage is 200 mg of remdesivir IV (loading dose) on the first day, followed by 100 mg per day from day two to day five or ten. The administration of remdesivir is recommended for hospitalized patients who require oxygen therapy (peripheral oxygen saturation of 94%).[25] Multiple clinical trials are currently in progress to assess the safety and effectiveness of remdesivir in patients with mild to severe COVID-19. The National Institute of Allergy and Infectious Diseases (NIAID) in the United States of America (USA) conducted a phase 3 clinical trial involving 394 COVID-19 patients divided into two groups: One receiving remdesivir and the other receiving a placebo. The results showed that remdesivir was able to shorten the recovery time.[26] Similarly, research conducted by Wang et al involving 237 patients (158 in the remdesivir group and 79 in the placebo group) in China at the beginning of the pandemic showed a shorter recovery time with remdesivir administration of 21.0 days (95% confidence interval [CI]: 13.0–28.0) compared to 23.0 days (95% CI: 15.0–28.0) in the placebo group.[27] In addition to coronaviruses (including MERS and SARS), this drug has also been approved for the treatment of Hendra virus, Ebola virus, Nipah virus, respiratory syncytial virus (RSV), Lassa fever virus, and Junin virus.[28]

Remdesivir is a nucleoside analog that blocks the function of viral RdRp, a protein complex involved in the replication of RNA genomes (fig. 1).[7] For remdesivir to become therapeutically active, it must first be metabolized into its triphosphate form within the host cell.[14,15,29] Once inside the cell, remdesivir undergoes hydrolysis to its carboxylate form by carboxylase 1 or cathepsin A. This is followed by cyclization to eliminate the phenoxide group and hydrolysis of the cyclic anhydride to generate the alanine metabolite (GS-704277).[13,29] The alanine metabolite undergoes hydrolysis to form remdesivir monophosphate, which can be further hydrolyzed to produce the pure nucleoside metabolite GS-441524, or it can be phosphorylated by cellular kinases to create the active triphosphate form, known as remdesivir triphosphate (RTP or GS-443902).[13,14,29] The active form, RTP, competes with adenosine triphosphate (ATP) for attachment to viral RNA, resulting in the early cessation of RNA synthesis and replication. In *in vitro* trials, it was shown that at position i+4 (the fourth nucleotide incorporation position after RTP incorporation), the 1′-cyano group of remdesivir binds to Ser-861 of RdRp, thereby stopping RNA replication at position i+3. This mechanism is fundamentally the same across SARS-CoV, SARS-CoV-2, and MERS-CoV. Furthermore, genomic analyses indicate that Ser-861 is present across all alpha, beta, and delta coronaviruses. These two factors contribute to remdesivir being considered to have broad antiviral activity, including for cases of COVID-19.[7]

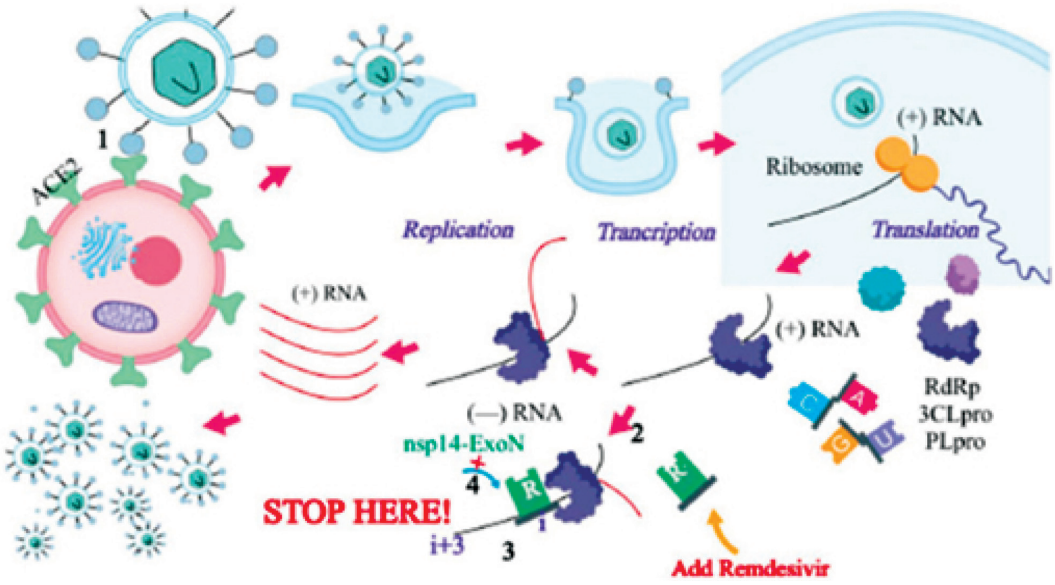

Figure 1. Mechanism of action of remdesivir in inhibiting SARS-CoV-2 replication. Remdesivir is an adenosine nucleotide analog that inhibits the replication of SARS-CoV-2 RNA. Once inside the cell, remdesivir is activated into its triphosphate form, GS-443902, which is then incorporated into the viral RNA strand by the RNA-dependent RNA polymerase (RdRp) enzyme. This incorporation causes premature termination of RNA elongation, preventing the virus from replicating its genetic material and infecting other cells. Remdesivir may also induce mutations in the viral RNA, further reducing the virus's replication efficiency.

Remdesivir is rapidly absorbed, with peak plasma concentrations occurring 30 minutes after intravenous infusion, reaching 0.67–0.68 hours (T_{max}). Repeated administration leads to a C_{max} (coefficient of variation expressed as a percentage) of 2,229 ng/mL and an AUC_{tau} of 1,585 ng·h/mL.[30] Intravenous infusion of remdesivir shows pharmacokinetic effects at doses ranging from 3 to 225 mg. Reversible increases in aspartate aminotransferase (AST) and alanine aminotransferase (ALT) may occur during the administration of remdesivir. The use of remdesivir is not advised for patients whose glomerular filtration rate is below 30 mL/min.[20] Approximately 74% of remdesivir metabolites are eliminated through urine and 18% through feces. Approximately 49% is present as the metabolite GS-441524, while 10% exists as the unaltered parent compound.[31] A minor percentage (0.5%) of the metabolite GS-441524 is detected in feces. The elimination half-life of remdesivir is one hour following administration.[29]

Remdesivir generally rarely causes side effects. Potential side effects may involve increased liver enzyme levels, diarrhea, rash, renal dysfunction, and hypotension.[6,20,21] In one clinical study, about 10% of patients experienced acute liver dysfunction, leading to the discontinuation of remdesivir. The FDA advises against using remdesivir in patients with an eGFR of less than 30 mL/min or in patients with liver dysfunction, unless the potential therapeutic benefits outweigh the risks of side effects.[6] As a prodrug, remdesivir is mainly processed by hydrolytic activity catalyzed by the enzymes CYP2C8, CYP2D6, and CYP3A4 (variants of the cytochrome P450 enzyme) into its metabolite form. However, due to the rapid processes of distribution, metabolism, and excretion, co-administration with CYP isoform inhibitors generally does not increase the levels of remdesivir and its metabolites.[28]

3. FAVIPIRAVIR FOR THE MANAGEMENT OF COVID-19

Favipiravir, with the chemical name 6-fluoro-3-hydroxypyrazine-2-carboxamide, was initially developed by Toyama Chemical in Japan (under the brand name Avigan). In 2014, it was approved for marketing in Japan as a second-line treatment for influenza.[20] The antiviral target is to inhibit the action of the RNA-dependent RNA polymerase (RdRp) enzyme, which plays a role in the transcription and replication of the RNA virus genome.[6,32–34] Favipiravir has been used in cases of influenza that do not respond to conventional treatment.[35] Considering the effectiveness of favipiravir against several types of influenza, studies have been conducted in other countries on the use of this drug for other viruses, including Ebola and, more recently, COVID-19.[32,36] The FDA has not approved the use of favipiravir regimens in the management of COVID-19 to date. However, in protocols from several countries, favipiravir is still recommended for use as a primary therapy

for COVID-19, with a dosage for adults being 2×1,800 mg per day, followed by 2×800 mg from day 2 to day 7 or 10. The guidelines also suggest remdesivir as an alternative therapy if favipiravir cannot be used, for example, during pregnancy or if oral administration of the drug is not feasible. Favipiravir is recommended primarily for mild to moderate cases, favipiravir or remdesivir for severe cases, and remdesivir for critical cases.[25] There is still very limited evidence regarding the efficacy and safety of favipiravir for treating COVID-19. To date, there have been five studies on the efficacy of favipiravir, but only one study (in mild to moderate COVID-19 cases) and several case reports show that favipiravir can significantly accelerate clinical improvement, enhance viral clearance, and improve chest radiological findings.[6,28]

Favipiravir is a prodrug that is converted in the liver into its main metabolite T705M1, mainly through the action of aldehyde oxidase and, to a lesser degree, by xanthine oxidase, while the active metabolite (favipiravir-RTP) is generated within cells.[20,36] Within the cell, favipiravir is ribosylated and phosphorylated to convert into its active form, favipiravir ribofuranosyl-5′-triphosphate (favipiravir-RTP). Favipiravir-RTP, subsequently, attaches to and inhibits the activity of the viral RdRp, thereby hindering the transcription and replication of the viral genome. Favipiravir was originally created as a treatment for influenza; however, because the main target of favipiravir is the catalytic domain of RdRp, which is similar across various viruses, favipiravir is also expected to have the same effect on the COVID-19 virus as it does on other RNA viruses.[20] There are several hypotheses regarding how favipiravir-RTP interacts with RdRp. Most studies suggest that when favipiravir-RTP is incorporated into the RNA chain, it causes genomic mutations that render the virion ineffective or produce virions that are easily destroyed, thereby inhibiting viral replication and reproduction (fig. 2). Another hypothesis states that FTP acts as a nucleoside analog to mimic GTP/ATP and subsequently incorporates itself into nascent viral RNA, thereby halting RNA synthesis.[37]

A study shows that favipiravir functions as a purine nucleotide analog that mimics the incorporation of nucleotides A and G into the nascent viral RNA product. It was revealed that FTP binds at position +1 and pairs with the template residue C. This incorporation of favipiravir may induce mutations in the subsequent viral genome, thereby inhibiting viral replication. This is different from remdesivir, which directly disrupts the elongation or production of the RNA chain.[37,38]

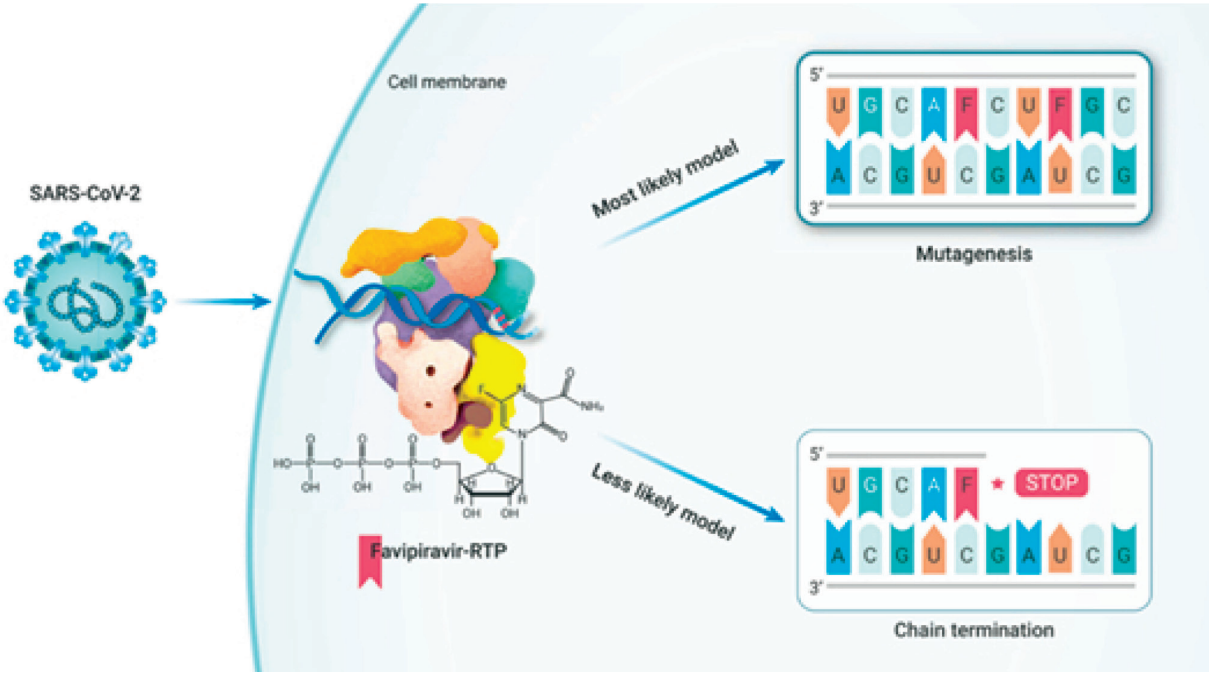

Figure 2. Mechanism of action of favipiravir in inhibiting SARS-CoV-2. Favipiravir is a purine nucleotide analog that inhibits viral replication by targeting the RNA-dependent RNA polymerase (RdRp) enzyme of SARS-CoV-2. Once converted to its active form within the cell, favipiravir is incorporated into the viral RNA, causing errors in the viral RNA synthesis process. This results in an accumulation of mutations in the viral genome, ultimately reducing the virus's ability to replicate and infect additional cells. The introduction of these mutations leads to a defective viral RNA structure, which weakens the overall infectivity and spread of SARS-CoV-2.

Favipiravir is available in oral form. Its bioavailability is approximately 97.6%, with a mean C_{max} for the recommended dose being 51.5 µg/mL.[39] Co-administration with food may delay the achievement of peak plasma levels by about 1.5 hours. About 54% of favipiravir attaches to plasma proteins and is extensively distributed across the body, including the lungs. Its half-life is about six hours, which may extend at high doses (>800 mg). Most of the metabolites of favipiravir are excreted via the kidneys.[20] Several clinical studies involving a total of 320 COVID-19 patients in China have demonstrated that the use of favipiravir rarely leads to severe side effects.[20] Generally, favipiravir is well tolerated, although a small number of patients experienced increased uric acid levels, gastrointestinal disturbances, and elevated liver function tests (AST and ALT).[6,20] Based on animal studies, favipiravir is teratogenic and embryotoxic, making its use contraindicated in pregnant women.[20] Favipiravir is mainly metabolized by aldehyde oxidase, and its activity is not linked to CYP isoenzymes, leading to limited drug interactions.[28]

4. EFFICACY OF REMDESIVIR AND FAVIPIRAVIR IN THE MANAGEMENT OF COVID-19

The use of remdesivir and favipiravir in the management of COVID-19 in Indonesia has yielded varied results. A retrospective cohort study at Abdul Radjak Hospital in Salemba, Jakarta (2020) involved 130 subjects, with 65 receiving remdesivir and the other 65 receiving favipiravir. Clinical evaluations, post-treatment RT-PCR tests, and radiological examinations were conducted at a median of ten days post-admission, with results showing a significantly higher rate of negative RT-PCR conversion in the remdesivir group (respiratory rate [RR]: 1.917, 95% CI: 1.044–3.518, p=0.047). However, there were no substantial differences in symptom improvement or radiological findings between the two groups.[40] These results differ from a study by Hadiatussalamah et al at the UGM Academic Hospital in Yogyakarta (2021–2022), which indicated that favipiravir provided better clinical outcomes than remdesivir in the treatment of moderate COVID-19. The proportion of patients improving with favipiravir was 50.0%, compared

	Drugs used in COVID-19	Cardiac injury, Myocardial suppression	Prolonged QT, TdP	Conduction disorder, Heart block	CYP3A4
Investigational drugs	Chloroquine	+++	+++	++	Major substrate
	Hydroxychloroquine	+++	+++	++	Possible substrate
	Remdesivir	?	?	?	?
	Favipiravir	-	+	-	-
	Lopinavir/ritonavir	-	++	-	Major inhibitor
	Umifenovir	-	-	-	Major inhibitor
	Darunavir/ritonavir	-	-	-	Major inhibitor
	Tocilizumab, Sarilumab	-	-	-	Possible inducer
Antibiotics	Azithromycin	-	+++	-	Moderate inhibitor
	Moxifloxacin	-	+++	-	Moderate inhibitor
	Piperacillin-tazobactam	-	Conditional*	-	-
	Ampicillin-sulbactam	-	-	-	-
	Tobramycin	-	-	-	-

*Conditional risk for TdP when one of these risks presents: bradycardia, hypokalemia, hypomagnesemia, use with concomitant QT/TdP drug, use with drugs that can cause hypokalemia or hypomagnesemia

Figure 3. Potential cardiovascular side effects of drugs used in COVID-19 treatment. Various antiviral and supportive drugs used in the treatment of COVID-19, including remdesivir, favipiravir, and other therapeutic agents, may have cardiovascular side effects. Remdesivir has been associated with bradycardia, hypotension, and QT interval prolongation, potentially due to mitochondrial toxicity. Favipiravir generally shows fewer cardiovascular side effects, though data on its long-term impact remains limited. Other COVID-19 treatments, including corticosteroids and anticoagulants, may also contribute to cardiovascular effects such as arrhythmias, myocardial injury, and thrombotic complications. The figure highlights these potential adverse effects and underscores the importance of monitoring cardiovascular health, especially in patients with preexisting heart conditions.

to 35.3% for remdesivir, with a statistically significant difference (p=0.048). No significant differences were found regarding the side effects that occurred.[41]

In addition to the two studies mentioned, there are also several other studies that show no significant difference in effectiveness between the two drugs. An observational analytical study conducted with a retrospective cohort design at Gotong Royong Hospital in Surabaya (2021) demonstrated improvement in clinical manifestations (ventilation support requirements and chest X-ray results) in the second week of therapy, both in patients receiving remdesivir and favipiravir; however, there was no significant difference in effectiveness between the two drugs.[42] Similarly, a study conducted at Husada Utama Hospital in Surabaya (2021) showed no significant differences regarding effectiveness (based on length of hospitalization and mortality) or side effects between the use of favipiravir and remdesivir in patients with moderate symptomatic COVID-19.[43]

5. THE IMPACT OF REMDESIVIR AND FAVIPIRAVIR ON THE CARDIOVASCULAR SYSTEM

Several drugs, including remdesivir and favipiravir, that have been clinically tested for the management of COVID-19 pose risks to the cardiovascular system, particularly in altering heart conduction.[28,44] Adenosine is a potent vasodilator that can cause severe hypotension followed by the release of catecholamines as compensation. This can shorten the action potential and refractory period of the atrium, potentially leading to atrial fibrillation (AF). Such effects can also occur in ventricular cells and result in ventricular fibrillation (VF). Remdesivir is structurally similar to adenosine, but with a half-life of only one hour, it does not accumulate in plasma. The cardiotoxicity induced by remdesivir is due to its binding to human mitochondrial RNA polymerase.[45]

Favipiravir was widely used during the COVID-19 pandemic; however, information regarding cardiac complications, particularly prolonged QT due to favipiravir, remains limited. *In vitro* studies have shown that favipiravir blocks the hERG current at a concentration of 157 µg/mL, which is three times higher than the maximum concentration reached at therapeutic doses in humans. In healthy individuals, the effects of a single dose of favipiravir at 1,200 mg and 2,400 mg on the QT interval were not significantly different from those receiving a placebo,[20] suggesting that the risk of QT interval prolongation due to favipiravir is considered very low.[20,28] At high doses, favipiravir has been reported to trigger QT interval prolongation in a young patient suffering from Ebola.[19,21] In the management of COVID-19, there have been only a few reports of QT interval prolongation that may be caused by favipiravir.[46]

Almost all drugs associated with QT interval prolongation and torsades de pointes (TdP) have an effect on inhibiting the hERG (human ether-a-go-go related gene) potassium channels in the heart that mediate the rapid delayed rectifier K^+ current, IKr. IKr is the primary determinant of ventricular repolarization. In the study by Moubarak et al, it was shown that atazanavir, ritonavir, lopinavir, remdesivir, and favipiravir can, in principle, interact with the canonical binding components of the hERG potassium channel. However, subsequent research has shown that remdesivir does not produce acute inhibition of IhERG (inwardly rectifying hERG; the current generated by the hERG channel) at concentrations of 10 or 50 µM. Conversely, prolonged use of remdesivir may increase hERG expression and the amplitude of IhERG. The effect of favipiravir causing QT interval prolongation through IhERG inhibition is also still unclear. The Japanese Pharmaceutical and Medical Devices Agency (PMDA) stated that there is no inhibitory effect of favipiravir on IhERG at concentrations of 40 or 200 µM, with only an 8% inhibition observed at a concentration of 1,000 µM. QT interval prolongation in COVID-19 is primarily caused by hERG blockade due to hyperinflammatory conditions, where interleukin-6 inhibits IKr/hERG via the Janus Kinase pathway, potentially leading to arrhythmias.[47]

6. CONCLUSIONS

Remdesivir and favipiravir demonstrate strong potential inhibitory activity against SARS-CoV-2 infection through the inhibition of the virus's RdRp. Preliminary reports from limited clinical studies indicate some success of remdesivir and favipiravir against COVID-19. The safety profiles of these drugs have mostly been documented based on results from previous clinical trials for anti-influenza therapy, Ebola, and other viral infections, which generally show relatively mild side effects in the form of gastrointestinal disturbances. The effects of remdesivir and favipiravir on the cardiovascular system are still not well understood. Generally, they manifest as cardiac conduction disturbances, with causes that may overlap between therapeutic side effects and the hyperinflammatory condition seen in COVID-19. These disturbances are largely caused by the "cytokine storm" experienced by COVID-19 patients, while the use of remdesivir and favipiravir has minimal impact. Both therapeutic agents are known to have adenosine analog effects as vasodilators and inhibit the hERG potassium channels, which can trigger arrhythmias.

ΠΕΡΙΛΗΨΗ

Καρδιαγγειακές επιπτώσεις της remdesivir και της favipiravir στη θεραπεία της COVID-19

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Η ρεμδεσιβίρη (remdesivir) και η φαβιπιραβίρη (favipiravir) είναι εναλλακτικές λύσεις θεραπείας για την COVID-19. Ωστόσο, οι πιθανές ανεπιθύμητες ενέργειες στο καρδιαγγειακό σύστημα συχνά παραβλέπονται. Σκοπός του παρόντος άρθρου είναι η συζήτηση σχετικά με τις ανεπιθύμητες ενέργειες από το καρδιαγγειακό που μπορεί να προκύψουν από την εφαρμογή της φαβιπιραβίρης και της ρεμδεσιβίρης στη θεραπεία ασθενών με COVID-19. Η ρεμδεσιβίρη και η φαβιπιραβίρη έχουν ισχυρό ανασταλτικό δυναμικό έναντι της λοίμωξης SARS-CoV-2 αναστέλλοντας τη δραστηριότητα της RdRp του ιού. Προκαταρκτικές αναφορές από περιορισμένες κλινικές μελέτες δείχνουν την επιτυχία και των δύο φαρμάκων στην καταπολέμηση της COVID-19. Επί του παρόντος, τα προφίλ ασφάλειας των εν λόγω δύο φαρμάκων βασίζονται κυρίως σε προηγούμενες κλινικές δοκιμές για θεραπείες κατά της γρίπης και του ιού Ebola, οι οποίες γενικά αναφέρουν ήπιες ανεπιθύμητες ενέργειες, όπως γαστρεντερικές διαταραχές. Ωστόσο, η επίδραση της ρεμδεσιβίρης και της φαβιπιραβίρης στο καρδιαγγειακό σύστημα παραμένει ασαφής. Από μελέτες έχει αναφερθεί ότι και τα δύο φάρμακα μπορεί να προκαλέσουν διαταραχές της καρδιακής αγωγιμότητας που επικαλύπτονται από τις υπερφλεγμονώδεις καταστάσεις ασθενών με COVID-19. Επί πλέον, και τα δύο φάρμακα είναι γνωστό ότι έχουν αγγειοδιασταλτικά αποτελέσματα και ενδέχεται να αναστείλουν το κανάλι καλίου hERG, προκαλώντας δυνητικά καρδιακές αρρυθμίες. Συμπερασματικά, η ρεμδεσιβίρη και η φαβιπιραβίρη εμφανίζουν ανασταλτικό δυναμικό έναντι της λοίμωξης SARS-CoV-2, με γενικά ήπια προφίλ ασφάλειας, παρ' όλο που οι επιδράσεις τους στο καρδιαγγειακό σύστημα, περιλαμβανομένης της πιθανότητας διαταραχών της καρδιακής αγωγιμότητας, απαιτούν περαιτέρω διερεύνηση.

Λέξεις ευρετηρίου: Ανεπιθύμητες ενέργειες, Καρδιαγγειακό σύστημα, COVID-19, Ρεμδεσιβίρη, Φαβιπιραβίρη

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