Canadian Covid Care Alliance
Alliance canadienne pour la prévention et prise-en-charge de la covid
CCCA

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PAXLOVID™ - Making an Informed Decision

In January 2022, Health Canada approved the use of the oral antiviral medication called PAXLOVID™. PAXLOVID™ is made of a combination of two medications: nirmatrelvir and ritonavir. PAXLOVID™ is the first oral medication authorized for outpatient use for those who have a positive result from a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral test for the treatment of mild to moderate infection. PAXLOVID™ must be taken within five days of symptom onset. Currently in Canada, it is only recommended for patients who are at high risk of progressing to serious COVID-19 disease, including hospitalization or death.

How does PAXLOVID™ work?

PAXLOVID™ is made of a combination of two medications that work together to reduce or stop the replication of SARS-CoV-2. In order for a virus to make more copies of itself inside our cells, it needs to use several tools. One of these tools is an enzyme called SARS-CoV-2 3CL-like protease. This protease is an enzyme that cuts the virus' protein into smaller parts and is necessary for the virus to make new copies of itself. Nirmatrelvir blocks viral replication by inhibiting SARS-CoV-2 3CL-like protease. Nirmatrelvir has been studied in combination with ritonavir. Ritonavir increases the *effectiveness* of nirmatrelvir by slowing its breakdown so it is able to work for a longer period of time.

> Evidence-Based Recommendations on the Use of Nirmatrelvir/Ritonavir (PAXLOVID™) for Adults in Ontario - Ontario COVID-19 Science Advisory Table (covid19-sciencetable.ca)

As with any medication, there are a number of key questions that healthcare practitioners can and do use to help determine if it is a good choice for their patients. We felt it important to offer the public the same kind of review, e*specially since this is a new medication.*

When considering treatment of COVID-19, the overarching question is:

What factors would a healthcare provider use to determine if a particular COVID-19 therapy is best for a patient?

In order to know this, we need to answer a number of targeted questions about the medication itself.

Q1. Does it make people feel better by reducing symptoms?
Q2. Has it shown to prevent progression to severe disease so that hospitalization is not required?
Q3. Does it prevent transmission of SARS-CoV-2 making one less contagious?
Q4. Does it prevent and/or treat Long COVID?
Q5. Is it affordable and readily available?
Q6. It is easy to take (route, duration) with no, or limited drug/food interactions?
Q7. Could it cause harm?
Q8. What actual benefits have been shown from taking it?
Q9. How does it compare to other similar medications?

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Q1. Does PAXLOVID™ make people feel better by reducing symptoms?

Answer: At this point, we don't actually know.

The available research has not reported that PAXLOVID™ provided any improvement in symptoms. In one major study (EPIC-HR,2021 NEJM), symptomatic improvement was measured but not reported. Oral Nirmatrelvir for High-Risk, Nonhospitalized Adults with Covid-19 | NEJM

"Interim analyses of the EPIC-SR (Evaluation of Protease Inhibition for COVID-19 in Standard-Risk Patients) Phase 2/3 study, which included unvaccinated adults who were at standard risk (i.e., low risk of hospitalization or death) as well as vaccinated adults who had one or more risk factors for progressing to severe illness, showed that *the novel primary endpoint of self-reported sustained alleviation of all symptoms for four consecutive days as compared to placebo, was not met."*

Pfizer Announces Additional Phase 2/3 Study Results Confirming Robust Efficacy of Novel COVID-19 Oral Antiviral Treatment Candidate in Reducing Risk of Hospitalization or Death | Business Wire

Q2. Does PAXLOVID™ prevent progression to severe disease so that hospitalization is not required?

Answer: In the EPIC-HR study, PAXLOVID™ appeared to dramatically lower the combined outcome of COVID-19 related hospitalizations or death from any cause compared to the placebo group when expressed as a relative risk reduction of 88.9%; **these results are less dramatic when they are expressed as an absolute risk reduction of 5.81%**. For a comparison of relative and absolute risk, see - Relative vs Absolute Risk Reduction – Canadian Covid Care Alliance

When clinicians evaluate the benefit of a therapy for their patients, they want to know, did the participants in the therapy's trial represent the group they want to treat? Currently, PAXLOVID™ is approved for high-risk patients. However, in the EPIC-HR study, *most of the participants were **not** at high risk of developing severe illness.*

High risk patients are the ones where treatment would be most beneficial. For example, we know that people over 70 years of age are at the highest risk for severe illness. However, most participants in the study were younger than 65 years old. Only 13% were over 65 and only 3% were over 75 years of age. The trial looked only at **unvaccinated** patients. Only about 20% of patients had more than one comorbidity and <1% were immunocompromised. Most participants were not using multiple medications, which is usually the case for high-risk patients. In conclusion, the study did not adequately evaluate PAXLOVID™ as treatment for high-risk patients.

In their February 2022 document, the Ontario Science Table raised this concern about patient selection, stating that, "young age and lack of details on concomitant medication use limit study generalizability. Also, the impact of nirmatrelvir/ritonavir on the use of invasive mechanical ventilation was not described."

Even the Ontario Science Table questions if the study participants represent the type of patient for which PAXLOVID™ is intended.

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In the findings section of the summary of the above document, the following needs to be considered:

"Patients who received nirmatrelvir/ritonavir had fewer serious adverse events and adverse events overall than those who received placebo – ***though the low proportion of enrolled patients ≥ 60 years of age may bias these conclusions*****.** *There are many known drug-drug interactions, particularly with ritonavir, and the inclusion criteria of the study may not be reflective of those who may derive the most benefit from this medication in Ontario due to the complexities of prescribing this medication."*

Another study looking at PAXLOVID™, the EPIC-SR study, is ongoing. Both unvaccinated adults who are at standard risk (i.e., low risk of hospitalization or death) as well as vaccinated adults who had one or more risk factors for progressing to severe illness are being enrolled. Results from this ongoing study are unavailable, but a press release reported that **there was no appreciable difference between nirmatrelvir/ritonavir and placebo**: with 662 subjects enrolled for interim analysis, 2/333 (0.6%) receiving nirmatrelvir/ritonavir and 8/329 (2.4%) receiving placebo were hospitalized."

The following medical conditions or other factors are considered to place patients at high risk for progression to severe COVID-19 and are recommended for PAXLOVID™ eligibility:

- Older age (i.e., 60 years of age and older)
- Obesity or being overweight (i.e., body mass index [BMI] >25 kg/m^2)
- Current smoker
- Chronic kidney disease
- Diabetes
- Immunosuppressive disease or immunosuppressive treatment
- Cardiovascular disease (including congenital heart disease) or hypertension
- Chronic lung disease (i.e., chronic obstructive pulmonary disease, asthma [moderate-to-severe], interstitial lung disease, cystic fibrosis, and pulmonary hypertension)
- Sickle cell disease
- Neurodevelopmental disorders (i.e., cerebral palsy, Down's syndrome) or other conditions that confer medical complexity (i.e., genetic or metabolic syndromes and severe congenital anomalies)
- Active cancer
- Medical-related technological dependence not related to COVID-19 (i.e., tracheostomy, gastrostomy, or positive pressure ventilation)
- Other medical conditions or factors (i.e., race or ethnicity) may also place individual patients at high risk for progression to severe COVID-19 and are not limited to the medical conditions or factors listed above.

Evidence-Based Recommendations on the Use of Nirmatrelvir/Ritonavir (PAXLOVID™) for Adults in Ontario - Ontario COVID-19 Science Advisory Table (covid19-sciencetable.ca)

PAXLOVID™ (nirmatrelvir tablets; ritonavir tablets) | Pfizer Canada (information included in the Canadian Product Monograph)

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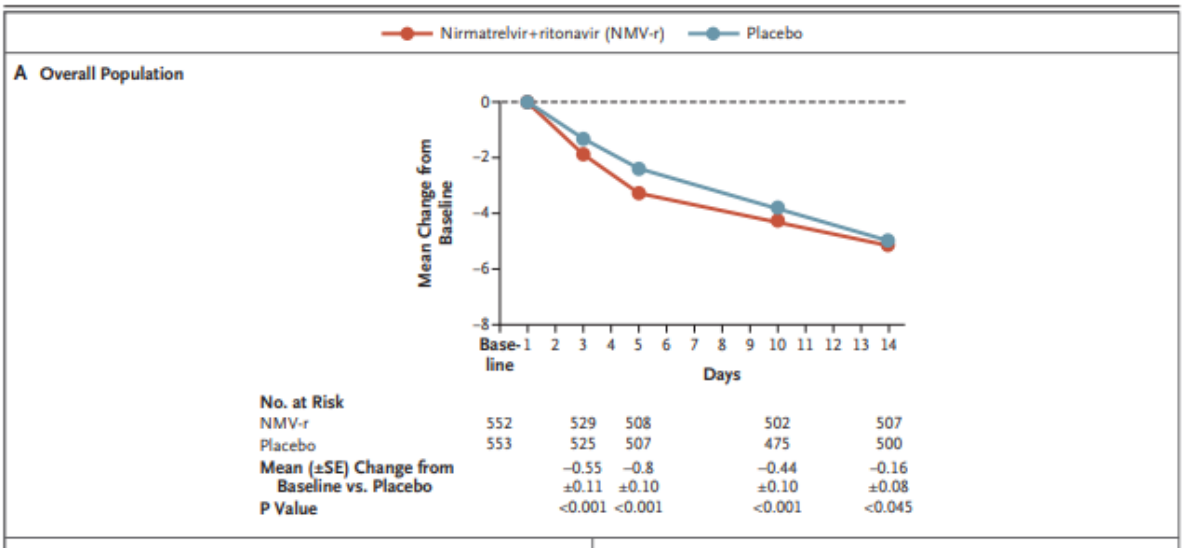
Q3. Does PAXLOVID™ prevent transmission of SARS-CoV-2 making one less contagious?

Answer: At this point, we don't actually know.

Unfortunately, prevention of transmission of SARS-CoV-2 was not included in the EPIC-HR study and there was no measurable difference in the viral load. However, **recent reports suggest that PAXLOVID™ does not appear to prevent transmission.**

Press Release Friday Apr 29, 2022 on PAXLOVID™ failure to prevent infection of household members: Pfizer | CTV News. PAXLOVID™ fails to prevent infection of household members: Pfizer | CTV News

As shown below, **there was no difference in the viral load between the placebo and treatment group at the end of the EPIC-HR study (Figure 3A of the study publication).** This graph shows SARS-CoV-2 viral load (on the vertical or Y-axis) collected at 5 points in the time starting at baseline and continuing to Day 14. Even though the mean change in baseline seems to be less for nirmatrelvir/ritonavir vs placebo on Day 5, there is no appreciable difference by Day 14 between the two groups.



Q4. Does PAXLOVID™ prevent or treat Long Covid?

Answer: We don't know. There is no evidence to show that PAXLOVID™ prevents or treats Long Covid based on the current study results. This was not included in the primary endpoints of the EPIC-HR or the EPIC-SR studies.

Q5. Is PAXLOVID™ affordable and readily available?

Answer: PAXLOVID™ is publicly funded in Canada and is available for patients that meet the eligibility requirements.

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Across Canada, community pharmacies are able to dispense PAXLOVID™ with a prescription provided by a licensed prescribing physician or nurse practitioner for eligible patients. Pharmacists in some provinces including Quebec, Newfoundland and Labrador are able to assess for, prescribe and dispense PAXLOVID™.

Current Science Table's recommendations outline patient criteria for use in Ontario:

AGE (years)	NUMBER OF VACCINE DOSES		
	0 doses	1 or 2 doses	3 doses
<20[1]	**Higher risk** if ≥3 risk factors[1]	Standard risk[1]	Standard risk[1]
20 to 39	**Higher risk** if ≥3 risk factors	**Higher risk** if ≥3 risk factors	Standard risk
40 to 69	**Higher risk** if ≥1 risk factors	**Higher risk** if ≥3 risk factors	Standard risk
≥70	**Higher risk**	**Higher risk** if ≥1 risk factors	**Higher risk** if ≥3 risk factors
Immunocompromised[2] individuals of any age	**Higher risk**: Therapeutics should always be recommended for immunocompromised individuals not expected to mount an adequate immune response to COVID-19 vaccination or SARS-CoV-2 infection due to their underlying immune status, regardless of age or vaccine status.[1,2]		
Pregnancy	**Higher risk**[3]	Standard risk	Standard risk

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Although there is currently no personal cost for the treatment with PAXLOVID™, as it is publicly funded, the approximate cost of one course of treatment is over $500. Source's report that the federal government has purchased a million courses of PAXLOVID™ — about $670 million dollars worth. (Reuters)

PAXLOVID™: Quebec pharmacists can now prescribe this COVID-19 treatment to certain people | CTV News

Dispensing PAXLOVID™ and Monitoring Adverse Drug Events: A Guide for B.C. Community Pharmacists - Province of British Columbia (gov.bc.ca)

PAXLOVID™ Now Available at Pharmacies in Province | VOCM

COVID-19: Clinical Guidance for Primary Care Providers | Centre for Effective Practice - Digital Tools (cep.health)

Q6. Is PAXLOVID™ easy to take (route, duration) with no, or limited drug/food interactions?

Answer: Current blister packaging is designed to make PAXLOVID™ easy to take.

There are however already significant concerns around the potential for high-risk drug interactions due to interactions between ritonavir and many commonly prescribed medications.

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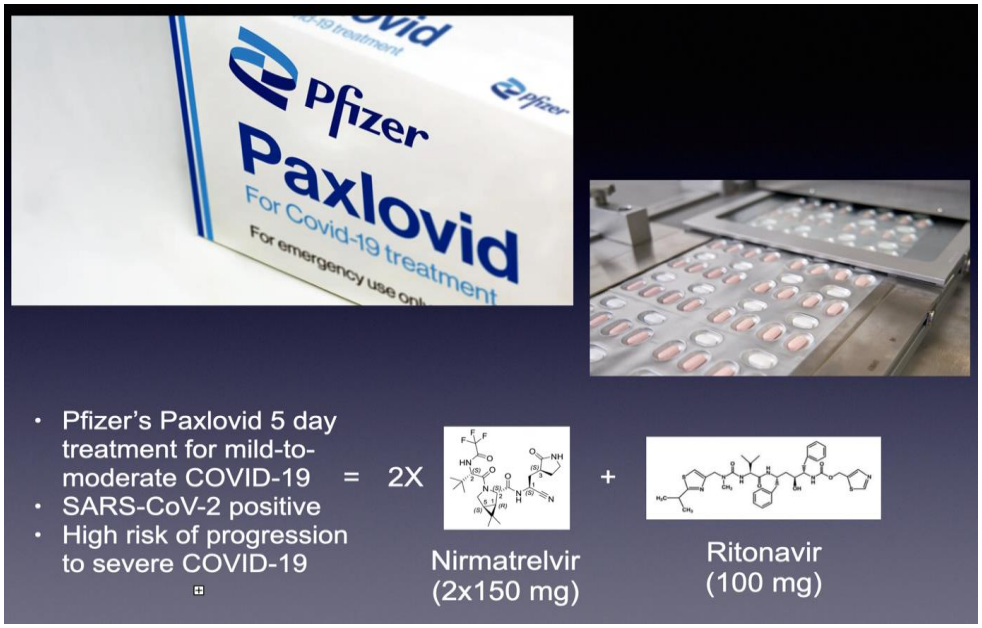

PAXLOVID™ (nirmatrelvir tablets; ritonavir tablets) | Pfizer Canada

Drug-drug interactions leading to potentially serious and/or life-threatening reactions are possible due to the effects of ritonavir on the liver metabolism of certain drugs. Many drugs are processed and broken down in our liver. Ritonavir affects how our liver handles other medications and this may lead to dangerous levels of the medications or their by-products. **Contraindications and interactions must be carefully considered before PAXLOVID™ is prescribed or dispensed.**

access to COVID-19 antiviral treatment PAXLOVID™ Ontario Health - Search (bing.com)

It is essential one's prescriber knows one's current medications so necessary adjustments may be made. Close follow up is needed when reducing doses, holding, switching and/or stopping chronic medications that are known to interact with ritonavir. This is guidance from the Ontario Science Advisory Table for prescribers and pharmacists.

Nirmatrelvir/Ritonavir (PAXLOVID™): What Prescribers and Pharmacists Need to Know - Ontario COVID-19 Science Advisory Table (covid19-sciencetable.ca)

Information to patients include the following in the above document, "Various medications may interact with PAXLOVID™. Taking PAXLOVID™ with these medicines may cause serious or life-threatening side effects or affect how PAXLOVID™ works. Patients should tell their healthcare professional about all the medicines they are taking, including any drugs, vitamins, minerals, natural supplements or alternative medicines." Below is an article published in the National Post in January 2022 outlining some of the potential risks of PAXLOVID™.

Pfizer anti-COVID pill's dangerous interaction with common drugs will narrow its benefit, experts say | National Post

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The buzz around PAXLOVID™ has largely obscured one major downside of this treatment. Ritonavir can interact dangerously with a slew of commonly used medications, pumping up the potency of blood thinners, heart-arrhythmia therapies, epilepsy drugs and others.

And the patients targeted for its use – those most at risk of serious COVID disease because of age and other health issues – are also the people most likely to be taking those "contraindicated" medications.

In some cases, the interactions could be managed, but it's clear the problem will limit the pool of potential recipients, experts say.

"It has a utility, it has a use," said Dr. Gerald Evans, head of the Infectious Diseases Division of the Queen's University medical school. "(But) I certainly would not call it a game-changer."
"A patient on blood thinners could end up with spontaneous bleeding in the gastrointestinal tract or brain", noted Evans.

"Someone taking pills for hypertension might see their blood pressure fall so much they pass out", said Dr. Andrew Hill, a pharmacology researcher at the U.K.'s Liverpool University. "There are all kinds of ways that PAXLOVID™ could cause serious harm," he said.

Ritonavir is also used in HIV treatments, so there is a wealth of knowledge about those potential drug interactions. The U.S. Food and Drug Administration (FDA) product monograph for PAXLOVID™ lists over 100 drugs that it says should not be taken with the COVID pills, or whose use ought to be carefully monitored. The figure below lists a few of these drugs as well as liver enzymes whose functions are impacted by Ritonavir.

Q7. Could PAXLOVID™ cause harm?

Answer: Although this is a critical question, there isn't enough information to rule out the risk of harm.

All medications can cause harm; we simply need more information to determine the probability of harm in the various patient groups, such as over 65 years olds.

This Canadian Health Professional risk communication from Jan 17, 2022, clearly states that,
"Not many people have taken PAXLOVID™. Serious and unexpected side effects may happen.
PAXLOVID™ is still being studied, so it is possible that all the side effects are not known at this time."

> PAXLOVID™ (nirmatrelvir and ritonavir) - Dosing and Dispensing in Renal Impairment, Risk of Serious Adverse Reactions Due to Drug Interactions, and English-Only Labels - Canada.ca

Already, the risk of harm is being noted. For example, with the liver:

The effects/harm to the liver, as found in Dr. Jessica Rose's article on PAXLOVID™:
"As most drugs are metabolized through the liver, this highlights a very important concern. In the Ontario Science Table's document to prescribers and pharmacists, the following is stated, "there is high certainty for harm with ritonavir if drug interactions are not mitigated."

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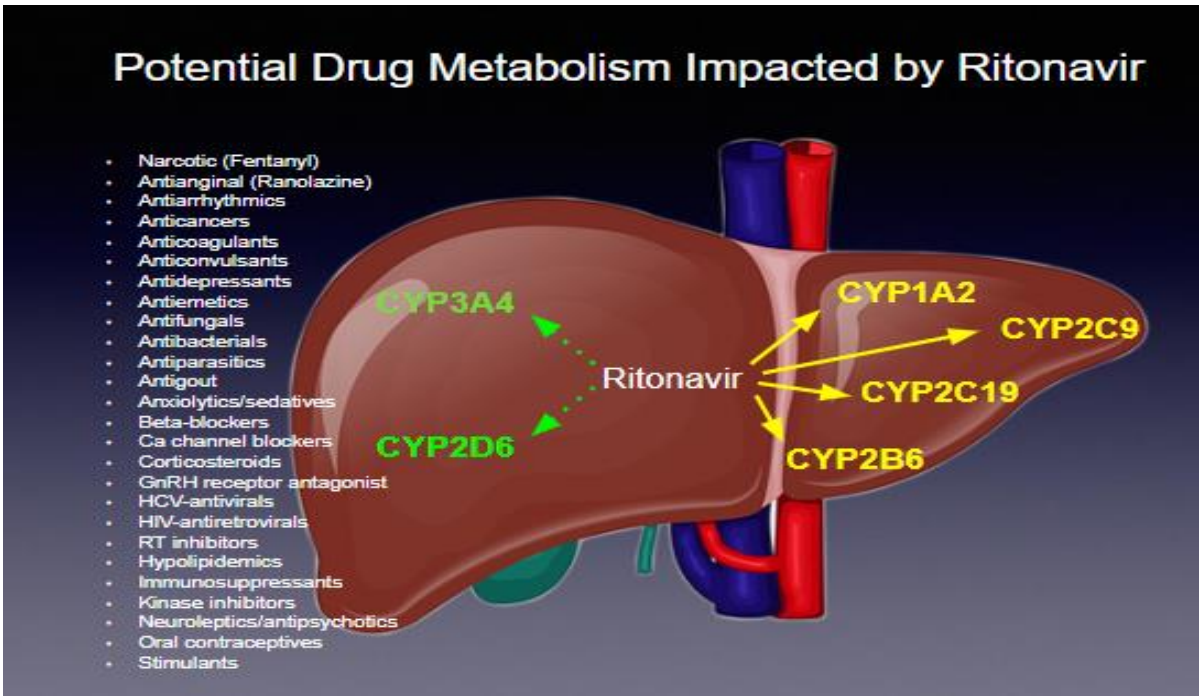
https://jessicar.substack.com/p/what-is-PAXLOVID™?token=eyJ1c2VyX2lkIjo2MTcyMTM2NSwicG9zdF9pZCI6NTI0NzcyNDAsIl8iOiJjMWUvRyIsImlhdCI6MTY1MTQxMzg2NywiZXhwIjoxNjUxNDE3NDY3LCJpc3MiOiJwdWItNTE2ODk2Iiwic3ViIjoicG9zdC1yZWFjdGlvbiJ9.a2xG7dKi7qfxkHGaTnbG7VrYMPg0_xxmiCjzi5OVC2w&s=r



Dr. Paul Alexander also addresses the potential risks to consider before taking PAXLOVID™. He states, "There is no long-term safety data for PAXLOVID™; There is limited clinical data available; Serious and unexpected adverse effects may occur that have not been previously reported with PAXLOVID™."

In conclusion, Dr. Alexander asks the following questions:

- How often does COVID-19 relapse occur?
- Does PAXLOVID™ blunt the natural immune response?
- Are relapsed patients contagious?
- Does resistance develop to PAXLOVID™?
- Should high risk individuals who relapse be treated again with Paxlovid?
- What is the long-term safety?

https://palexander.substack.com/p/PAXLOVID™-rebound-covid-phenomena

We do not have enough information to determine potential risks:

- Standard of care indicating who should receive PAXLOVID™ *is not well reflected* by the guidance from the Ontario Science Table

- Data from the clinical trials was not sufficient to detect unexpected and serious adverse effects. The number of patients enrolled in the trials was too small to pick up many rare and potentially serious side effects. Only 1120 patients were included in the treatment arm of the EPIC-HR study.

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- There is no post-marketing safety data available at this time to analyse. Investigators only actively collected safety information for just over a month. This is not long enough to establish long-term safety.

- The study was conducted during the Delta wave and it is unknown if results apply to the Omicron variant.

- Patients may not have recent lab work to know if their kidney and/or liver functions are suitable for safe use of PAXLOVID™.

- Even if it has been collected, pharmacists in some provinces may not have direct access to this important lab work.

- According to the product monograph, PAXLOVID™ is not recommended for use in patients with severe liver impairment. There is a potential for liver disease (hepatotoxicity). Raised liver enzymes, clinical hepatitis, and jaundice have occurred in patients receiving ritonavir. Therefore, caution should be exercised when administering PAXLOVID™ to patients with pre-existing liver diseases, liver enzyme abnormalities, or hepatitis.

- The Ontario Science Table recommends *against taking PAXLOVID™ if a patient is living with HIV*, but not taking an antiretroviral medication, *because it might cause their HIV to become resistant to some antiretroviral medications*. *What is the potential for patients who have **undiagnosed HIV** and are treated with PAXLOVID™ to become resistant to antiretrovirals in the future?*

- According to the product monograph, PAXLOVID™ is not recommended in patients with severe kidney disease. Patients with moderate kidney disease should talk to their healthcare professional, as they will require a reduced dose. There are special dosing considerations in patients with moderate renal impairment (eGFR >30 ml/min to <60 ml/min) and PAXLOVID™ should not be used in patients with an eGFR < 30 ml/min.

- Gastrointestinal side effects (nausea, diarrhea and taste disturbance) from PAXLOVID™ may result in dehydration creating more fluid/electrolyte imbalance in elderly patients with the potential for worsening kidney function.

- No pregnant or lactating women were included in the EPIC-HR study, meaning that there is no safety data for its use in this group of patients.

- The potential for carcinogenicity was not studied in EPIC-HR.

- The potential for genotoxicity was not studied in EPIC-HR.

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Q8. What actual benefits have been shown from taking PAXLOVID™?

Answer: It is unknown if the patients identified in the guidelines as being eligible will actually have any benefit from PAXLOVID™.

The EPIC-HR study did not include enough of the very patients who will most likely be prescribed PAXLOVID™ = vaccinated, elderly with multiple comorbidities.

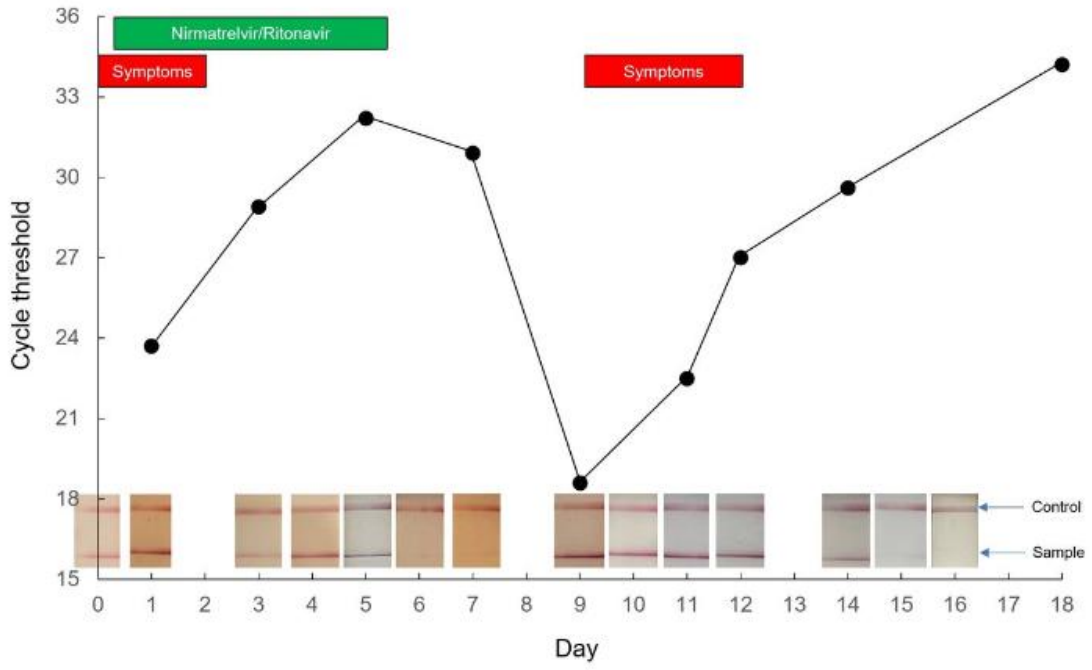
This means there is currently no evidence of benefit for vaccinated patients, since only unvaccinated patients were included in the study.

Finally, recent evidence below suggests a potential of relapse of COVID-19 following treatment with PAXLOVID™. The discussion of the case report concludes with, "the potential for symptomatic rebound of viral load, with or without antiviral treatment, has important implications for clinical management and infection prevention."

Preprint information – relapse of symptomatic SARS-CoV-2 following early suppression

> Rapid Relapse of Symptomatic SARS-CoV-2 Infection Following Early Suppression with Nirmatrelvir/Ritonavir | Research Square

"This case study is limited by the availability of just one, comprehensively studied case. It shows the potential for a rapid relapse of COVID-19 symptoms following completion of early treatment with NM/R. Because this is a single case, it is not possible to know whether rebound occurs more frequently during treatment with NM/R than in untreated patients." In this graph below, lower cycle threshold is an indication of a higher viral load.



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Below is a news report featuring a preprint study from May 2022, which also describes COVID rebound after PAXLOVID™ treatment and a warning from the CDC. This warning cited recent reports by researchers documenting some PAXLOVID™ rebounds, including among patients who have been vaccinated and boosted.

> People who rebound with COVID-19 after PAXLOVID™ may be highly contagious, new studies suggest (msn.com)

The rebounds with such high levels of live virus has prompted Siedner to question if there is something about PAXLOVID™ that might be contributing to the phenomenon.

"It makes us wonder, are we not using the drug properly or long enough, or is this something inherent about PAXLOVID™ that doesn't allow the immune system to kick in?", he said.

Siedner's team, which includes researchers from Brigham and Women's Hospital, as well as the Broad Institute and Ragon Institute of MGH, MIT and Harvard, is launching a new study that hopes to answer some of these questions.

They will test the immune system of people who have rebounded to see if the immune response from those who received PAXLOVID™ is different from those who did not.

Dr. Kathryn Stephenson, an assistant professor at Harvard Medical School and an infectious disease physician at Beth Israel Deaconess Medical Center, is also conducting a PAXLOVID™ study, monitoring patients who just got started on the antiviral with COVID testing for two to three weeks to detect rebound information on symptoms.

Dr. Stephenson said that her study and other small studies of a few dozen people are helpful, but that much larger more rigorous studies are urgently needed to understand and address rebounds.

"I think it is Pfizer's responsibility to produce and share this data rapidly — it's their drug that received emergency use authorization," Stephenson said.

"It's not fair that individual clinicians and researchers are now trying to catch up and collect this data ourselves."

The number of scientific reports of disease rebound after PAXLOVID™ is increasing and such rebound was recently experienced even by "America's doctor" – quadruple-vaccinated Dr. Anthony Fauci who developed symptomatic COVID-19 and took two courses of PAXLOVID™ due to the reoccurrence of symptoms; even mentioning increased severity after the initial treatment course.

> Rapid Relapse of Symptomatic Omicron SARS-CoV-2 Infection Following Early Suppression with Nirmatrelvir/Ritonavir | Research Square
>
> COVID-19 rebound after Paxlovid and Molnupiravir during January-June 2022 | medRxiv
>
> Dr. Fauci talks COVID after Pfizer's Paxlovid treatment (nypost.com)

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Q9. How does PAXLOVID™ compare to other similar available medications?

Answer: There is evidence to support the use of inexpensive repurposed medications, like ivermectin, as safer oral antiviral therapies for early treatment of SARS-CoV-2 symptoms.

> PAXLOVID™ – How does it work and how does it compare to ivermectin? – Canadian Covid Care Alliance

For an interesting and worthwhile video explaining the differences between PAXLOVID™ and ivermectin, here is a link from November 2021 to Dr. John Campbell's commentary.

> https://www.youtube.com/watch?v=ufy2AweXRkc

Here is another video by Dr. John Campbell evaluating the evidence for PAXLOVID™ from May 2022:

> PAXLOVID™, evidence base? - YouTube

Conclusions

There are too many unanswered questions to confidently determine if PAXLOVID™ is a good choice for COVID-19 treatment for eligible patients.

Q1. Does it make you feel better? (reduce symptoms)	?
Q2. Has it shown to prevent progression to severe disease?	?
Q3. Does it prevent transmission of SARS-CoV-2?	?
Q4. Does it prevent and/or treat Long COVID?	?
Q5. Is it affordable and readily available?	X
Q6. It is easy to take (route, duration) with no, or limited drug/food interactions?	X
Q7. Could it cause harm?	?
Q8. What actual benefits have been shown from taking it?	?
Q9. How does it compare to other similar medications?	?

Our Bottom Line: The use of PAXLOVID™ is not supported by the current evidence.

Make sure to boost your immune resilience through the key pillars of optimal health:

- Nutrition (maintain a healthy diet)
- Sleep
- Exercise (mind-body work)
- Immune-supporting supplements where appropriate (including Vitamin D3, Vitamin C, Selenium, Quercetin, Omega 3 Fatty Acids, Probiotics, Melatonin and Nigella Sativa)
- Exposure to nature and sunlight

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About the Canadian Covid Care Alliance

The Canadian Covid Care Alliance (CCCA) is a group of independent research scientists, doctors, registered nurses and nurse practitioners, and other health care practitioners, as well as lawyers, ethicists and other professionals. The Alliance is dedicated to providing balanced, scientific evidence-based information related to the prevention, tracking and treatment of COVID-19 so that hospitalizations can be reduced, lives saved, and our country safely restored as quickly as possible.

Our representative credentials and expertise within our Alliance include, but are not limited to, the following:

MD, Family Practitioner	PhD, Immunogenetics	PhD, Epidemiology	Chiropractic
MD, Coroner	PhD, Immunology	EdD, Psychology	Integrative Medicine
RN, Primary Care	PhD, Molecular Virology	DPhil, Bioanalytics	Naturopathy
PhD, Biomedical Research	PhD, Viral Immunology	PhD, Methodology	Occupational Therapy
Doctor of Dental Surgery	PhD, Pharmacology	PhD, Ethics	Physiotherapy
Doctor of Veterinary Medicine	PhD, Biochemistry	LL.B., B.B.A, Personal Injury	Pharmacy

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