



Pfizer Receives U.S. FDA Emergency Use Authorization for Novel COVID-19 Oral Antiviral Treatment

- PAXLOVID™ (nirmatrelvir [PF-07321332] tablets and ritonavir tablets) is authorized for emergency use in both high-risk adults and high-risk pediatric patients 12 years of age and older weighing at least 40 kg
- EUA based on clinical data from EPIC-HR study, showing PAXLOVID reduced risk of hospitalization or death by 89% (within three days of symptom onset) and 88% (within five days of symptom onset) compared to placebo
- Pfizer is ready to start immediate delivery in the U.S., in accordance with its agreement with the U.S. government to supply 10 million treatment courses between 2021 and 2022
- Pfizer raises production projections from 80 million to 120 million courses of treatment in 2022, as a result of continued investments to support the manufacturing and distribution of PAXLOVID
- The company plans to file a New Drug Application (NDA) with the FDA for full regulatory approval in 2022

NEW YORK, December 22, 2021 -- [Pfizer Inc.](#) (NYSE: PFE) announced today that the U.S. Food and Drug Administration (FDA) has authorized the emergency use of PAXLOVID™ (nirmatrelvir [PF-07321332] tablets and ritonavir tablets) for the treatment of mild-to-moderate COVID-19 in adults and pediatric patients (12 years of age and older weighing at least 40 kg [88 lbs]) with positive results of direct SARS-CoV-2 viral testing, and who are at high risk for progression to severe COVID-19, including hospitalization or death. The treatment includes nirmatrelvir, a novel main protease (M^{pro}) inhibitor originating in Pfizer's laboratories, which was specifically designed to block the activity of the SARS-CoV-2 M^{pro}, an enzyme that the coronavirus needs to replicate.

"Today's authorization of PAXLOVID represents another tremendous example of how science will help us ultimately defeat this pandemic, which, even two years in, continues to disrupt and devastate lives across the world. This breakthrough therapy, which has been shown to significantly reduce hospitalizations and deaths and can be taken at home, will change the way we treat COVID-19, and hopefully help reduce some of the significant pressures facing our healthcare and hospital systems," said Albert Bourla, Chairman and Chief Executive Officer, Pfizer. "Pfizer stands ready to begin delivery in the U.S. immediately to help get PAXLOVID into the hands of appropriate patients as quickly as possible."

The FDA based its decision on clinical data from the Phase 2/3 EPIC-HR (**E**valuation of **P**rotease **I**nhibition for **C**oVID-19 in **H**igh-**R**isk Patients) trial, which enrolled non-hospitalized adults aged 18 and older with confirmed COVID-19 who are at increased risk of progressing to severe illness. The data demonstrated an 89% reduction in the risk of COVID-19-related hospitalization or death from any cause in adults treated with PAXLOVID, compared to placebo, within three days of symptom onset (primary endpoint). No deaths occurred in the treatment group compared to nine deaths in the placebo group by Day 28. Similar results were seen in those treated within five days of symptom onset (secondary endpoint), with an 88% reduction in risk and no deaths observed in the treatment group. Treatment-emergent adverse events were comparable between PAXLOVID (23%) and placebo (24%), most of which were mild in intensity. While PAXLOVID clinical trials did not include patients under the age of 18, the authorized adult dosing regimen is expected to result in comparable blood concentration levels of PAXLOVID in pediatric patients 12 years of age and older weighing at least 40 kg. Additional Phase 2/3 clinical trials are ongoing in adults at standard risk (i.e., low risk of hospitalization or death) of progressing to severe illness, and in those who have been exposed to the virus through household contacts.

With PAXLOVID now authorized for emergency use, Pfizer stands ready to start delivery in the U.S. immediately. In November 2021, Pfizer announced an agreement with the U.S. government to supply 10 million treatment courses of PAXLOVID, with delivery fulfillment expected to be completed in 2022.

Regulatory Activity Outside of the U.S.

In addition to the U.S. FDA EUA, on December 16, 2021, the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) issued advice that PAXLOVID can be used to treat adults with COVID-19 who do not require supplemental oxygen and who are at increased risk of progressing to severe disease. The EMA issued this advice under Article 5(3) of Regulation 726/2004 to support authorities of European Union (EU) Member States who may decide to allow the supply and use of PAXLOVID, for example in emergency use settings, prior to EU conditional marketing authorization.

Pfizer has submitted applications for regulatory approval or authorization to multiple regulatory agencies around the world and anticipates further regulatory decisions to follow. The company also plans to file a New Drug Application (NDA) with the FDA in 2022 for potential full regulatory approval.

Please see Full Emergency Use Authorization (EUA) Prescribing Information available at www.fda.gov and www.COVID19oralRx.com.

Our Commitment to Equitable Access

Pfizer is committed to working toward equitable access to PAXLOVID for all people, aiming to deliver safe and effective antiviral therapeutics as soon as possible and at an affordable price. If authorized or approved, during the pandemic, Pfizer will offer its oral antiviral therapy through a tiered pricing approach based on the income level of each country to promote equity of access across the globe. High and upper-middle income countries will pay more than lower income countries.

Pfizer continues to invest to support the manufacturing and distribution of PAXLOVID, including exploring potential contract manufacturing options. As a result of these efforts, Pfizer is raising its production projections from 80 million to 120 million courses of treatment by the end of 2022.

The company has entered into agreements with multiple countries and has initiated bilateral outreach to approximately 100 countries around the world. Additionally, Pfizer has signed a voluntary license agreement with the Medicines Patent Pool (MPP) for its oral antiviral treatment to help expand access, pending country regulatory authorization or approval, in 95 low- and middle-income countries that account for approximately 53% of the world's population.

About PAXLOVID™ (nirmatrelvir [PF-07321332] tablets and ritonavir tablets)

PAXLOVID is a SARS-CoV-2 main protease (M^{pro}) inhibitor (also known as SARS-CoV2 3CL protease inhibitor) antiviral therapy. It was developed to be administered orally so that it can be prescribed at the first sign of infection or, pending clinical success of the rest of the EPIC development program and subject to regulatory authorization, at first awareness of an exposure – potentially helping patients avoid severe illness (which can lead to hospitalization and death) or avoid disease development following contact with a household member who contracts COVID-19. Nirmatrelvir [PF-07321332], which originated in Pfizer laboratories, is designed to block the activity of the M^{pro}, an enzyme that the coronavirus needs to replicate. Co-administration with a low dose of ritonavir helps slow the metabolism, or breakdown, of nirmatrelvir in order for it to remain active in the body for longer periods of time at higher concentrations to help combat the virus.

Nirmatrelvir is designed to inhibit viral replication at a stage known as proteolysis, which occurs before viral RNA replication. In preclinical studies, nirmatrelvir did not demonstrate evidence of mutagenic DNA interactions.

Current variants of concern can be resistant to treatments that inhibit the spike protein found on the surface of the SARS-CoV-2 virus, due to its high mutation rate. PAXLOVID, however, works intracellularly by binding to the protease of the SARS-CoV-2 virus to inhibit viral replication. Nirmatrelvir has shown consistent in vitro antiviral activity against current variants of concern (i.e., alpha, beta, delta, gamma, lambda, and mu). In addition, nirmatrelvir potently inhibited the M^{pro} associated with Omicron in an in vitro biochemical assay. This indicates nirmatrelvir's potential to maintain robust antiviral activity against Omicron. Additional in vitro antiviral studies with this variant are underway.

PAXLOVID is authorized to be administered at a dose of 300 mg (two 150 mg tablets) of nirmatrelvir with one 100 mg tablet of ritonavir, given twice-daily for five days. One carton contains five blister

packs of PAXLOVID, as co-packaged nirmatrelvir tablets with ritonavir tablets, providing all required doses for a full five-day treatment course.

About the EPIC Development Program

The EPIC (**E**valuation of **P**rotease **I**nhibition for **C**COVID-19) Phase 2/3 development program for PAXLOVID consists of three clinical trials spanning a broad spectrum of patients, including adults who have been exposed to the virus through household contacts, as well as adults at both standard risk and high risk of progressing to severe illness.

In July 2021, Pfizer initiated the first of these trials, known as EPIC-HR, a randomized, double-blind study of non-hospitalized adults with COVID-19, who are at high risk of progressing to severe illness. At the recommendation of an independent Data Monitoring Committee and in consultation with the U.S. FDA, Pfizer ceased further enrollment into the study in early November 2021 due to the overwhelming efficacy demonstrated in these results. Findings from the EPIC-HR interim analysis have been submitted to a peer-reviewed journal for publication.

In August 2021, Pfizer began the Phase 2/3 EPIC-SR (**E**valuation of **P**rotease **I**nhibition for **C**COVID-19 in **S**tandard-**R**isk Patients), to evaluate efficacy and safety in adults with a confirmed diagnosis of SARS-CoV-2 infection who are at standard risk (i.e., low risk of hospitalization or death). EPIC-SR includes a cohort of vaccinated adults who have an acute breakthrough symptomatic COVID-19 infection and who have risk factors for severe illness. Interim data from this study have been reported. In September, Pfizer initiated the Phase 2/3 EPIC-PEP (**E**valuation of **P**rotease **I**nhibition for **C**COVID-19 in **P**ost-**E**xposure **P**rophylaxis) to evaluate efficacy and safety in adults exposed to SARS-CoV-2 by a household member. These trials are ongoing.

For more information on the EPIC Phase 2/3 clinical trials for PAXLOVID, visit clinicaltrials.gov.

About the EPIC-HR Final Results

In the final analysis of the primary endpoint from all patients enrolled in EPIC-HR, an 89% reduction in COVID-19-related hospitalization or death from any cause compared to placebo in patients treated within three days of symptom onset was observed, consistent with the interim analysis. In addition, a consistent safety profile was observed.

0.7% of patients who received PAXLOVID were hospitalized through Day 28 following randomization (5/697 hospitalized with no deaths), compared to 6.5% of patients who received placebo and were hospitalized or died (44/682 hospitalized with 9 subsequent deaths). The statistical significance of these results was high ($p < 0.0001$). In a secondary endpoint, PAXLOVID reduced the risk of hospitalization or death for any cause by 88% compared to placebo in patients treated within five days of symptom onset; 0.8% of patients who received PAXLOVID were hospitalized or died through Day 28 following randomization (8/1039 hospitalized with no deaths), compared to 6.3% of patients who received placebo (66/1046 hospitalized with 12 subsequent deaths), with high statistical significance ($p < 0.0001$). Relative risk reduction was 94% in patients 65 years of age or older, one of the populations at highest risk for hospitalization or death; 1.1% of patients who received PAXLOVID were hospitalized through Day 28 (1/94 hospitalized with no deaths), compared to 16.3% of patients who received placebo (16/98 hospitalized with 6 deaths), with high statistical significance ($p < 0.0001$). In the overall study population through Day 28, no deaths were reported in patients who received PAXLOVID as compared to 12 (1.2%) deaths in patients who received placebo.

In the EPIC-HR trial, in a secondary endpoint, SARS-CoV-2 viral load at baseline and Day 5 have been evaluated for 499 patients. After accounting for baseline viral load, geographic region, and serology status, PAXLOVID reduced viral load by approximately 10-fold, or 0.93 \log_{10} copies/mL, relative to placebo, indicating robust activity against SARS-CoV-2 and representing the strongest viral load reduction reported to date for an oral COVID-19 agent.

Treatment-emergent adverse events were comparable between PAXLOVID (23%) and placebo (24%), most of which were mild in intensity. Fewer serious adverse events (1.6% vs. 6.6%) and discontinuation of study drug due to adverse events (2.1% vs. 4.2%) were observed in patients dosed with PAXLOVID, compared to placebo, respectively.

All other secondary endpoints for this study, which are available on clinicaltrials.gov (NCT04960202), were not yet available for this review. Full study data are expected to be released in the coming weeks.

Emergency Use Authorization Statement

PAXLOVID has not been approved, but has been authorized for emergency use by FDA under an EUA, for the treatment of mild-to-moderate COVID-19 in adults and pediatric patients (12 years of age and older weighing at least 40 kg) with positive results of direct SARS CoV-2 viral testing, and who are at high-risk for progression to severe COVID-19, including hospitalization or death.

The emergency use of PAXLOVID is only authorized for the duration of the declaration that circumstances exist justifying the authorization of the emergency use of drugs and biological products during the COVID-19 pandemic under Section 564(b)(1) of the Act, 21 U.S.C. § 360bbb-3(b)(1), unless the declaration is terminated or authorization revoked sooner.

AUTHORIZED USE

The U.S. Food and Drug Administration (FDA) has issued an Emergency Use Authorization (EUA) for the emergency use of the unapproved product PAXLOVID for the treatment of mild-to-moderate coronavirus disease 2019 (COVID-19) in adults and pediatric patients (12 years of age and older weighing at least 40 kg) with positive results of direct severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral testing, and who are at high risk for progression to severe COVID-19, including hospitalization or death.

LIMITATIONS OF AUTHORIZED USE

- PAXLOVID is not authorized for initiation of treatment in patients requiring hospitalization due to severe or critical COVID-19
- PAXLOVID is not authorized for use as pre-exposure or post-exposure prophylaxis for prevention of COVID-19
- PAXLOVID is not authorized for use for longer than 5 consecutive days

PAXLOVID may only be prescribed for an individual patient by physicians, advanced practice registered nurses, and physician assistants that are licensed or authorized under state law to prescribe drugs in the therapeutic class to which PAXLOVID belongs (i.e., anti-infectives).

PAXLOVID is not approved for any use, including for use for the treatment of COVID-19.

PAXLOVID is authorized only for the duration of the declaration that circumstances exist justifying the authorization of the emergency use of PAXLOVID under 564(b)(1) of the Food Drug and Cosmetic Act unless the authorization is terminated or revoked sooner.

IMPORTANT SAFETY INFORMATION

PAXLOVID is **contraindicated in patients with a history of clinically significant hypersensitivity reactions** (eg, toxic epidermal necrolysis [TEN] or Stevens-Johnson syndrome) to its active ingredients (nirmatrelvir or ritonavir) or any other components of the product.

PAXLOVID is **contraindicated with drugs that are highly dependent on CYP3A** for clearance and for which elevated concentrations are associated with serious and/or life-threatening reactions:

- Alpha₁-adrenoreceptor antagonist: alfuzosin
- Analgesics: pethidine, piroxicam, propoxyphene
- Antianginal: ranolazine
- Antiarrhythmic: amiodarone, dronedarone, flecainide, propafenone, quinidine
- Anti-gout: colchicine
- Antipsychotics: lurasidone, pimozide, clozapine
- Ergot derivatives: dihydroergotamine, ergotamine, methylergonovine
- HMG-CoA reductase inhibitors: lovastatin, simvastatin
- PDE5 inhibitor: sildenafil (Revatio®) when used for pulmonary arterial hypertension
- Sedative/hypnotics: triazolam, oral midazolam

PAXLOVID is **contraindicated with drugs that are potent CYP3A inducers** where significantly reduced nirmatrelvir or ritonavir plasma concentrations may be associated with the potential for loss of virologic response and possible resistance. PAXLOVID cannot be started immediately after discontinuation of any of the following medications due to the delayed offset of the recently discontinued CYP3A inducer:

- Anticancer agents: apalutamide
- Anticonvulsant: carbamazepine, phenobarbital, phenytoin
- Antimycobacterials: rifampin
- Herbal Products: St. John's Wort (*hypericum perforatum*)

There are limited clinical data available for PAXLOVID. **Serious and unexpected adverse events may occur** that have not been previously reported with PAXLOVID use.

Risk of Serious Adverse Reactions Due to Drug Interactions: Initiation of PAXLOVID, a CYP3A inhibitor, in patients receiving medications metabolized by CYP3A or initiation of medications metabolized by CYP3A in patients already receiving PAXLOVID, may increase plasma concentrations of medications metabolized by CYP3A. Initiation of medications that inhibit or induce CYP3A may increase or decrease concentrations of PAXLOVID, respectively. These interactions may lead to:

- Clinically significant adverse reactions, potentially leading to severe, life-threatening, or fatal events from greater exposures of concomitant medications
- Clinically significant adverse reactions from greater exposures of PAXLOVID
- Loss of therapeutic effect of PAXLOVID and possible development of viral resistance

Consult Table 1 of the Fact Sheet for Healthcare Providers for clinically significant drug interactions, including contraindicated drugs. Consider the potential for drug interactions prior to and during PAXLOVID therapy; review concomitant medications during PAXLOVID therapy and monitor for the adverse reactions associated with the concomitant medications.

Hepatotoxicity: Hepatic transaminase elevations, 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**.

Because nirmatrelvir is co-administered with ritonavir, there may be a **risk of HIV-1 developing resistance to HIV protease inhibitors** in individuals with uncontrolled or undiagnosed HIV-1 infection.

Adverse events in the PAXLOVID group ($\geq 1\%$) that occurred at a greater frequency (≥ 5 subject difference) than in the placebo group were dysgeusia (6% and $< 1\%$, respectively), diarrhea (3% and 2%), and hypertension (1% and $< 1\%$), and myalgia (1% and $< 1\%$). The proportions of subjects who discontinued treatment due to an adverse event were 2% in the PAXLOVID group and 4% in the placebo group.

Required Reporting for Serious Adverse Events and Medication Errors: The prescribing healthcare provider and/or the provider's designee are/is responsible for mandatory reporting of all serious adverse events and medication errors potentially related to PAXLOVID within 7 calendar days from the onset of the event.

Submit adverse event and medication error reports to FDA MedWatch using one of the following methods:

- **Online:** <https://www.fda.gov/medwatch/report.htm>
- **Complete and submit a postage-paid FDA Form 3500 and returning by mail/fax**
- **Call 1-800-FDA-1088 to request a reporting form**

In addition, please provide a copy of all FDA MedWatch forms to: www.pfizersafetyreporting.com, or by fax (1-866-635-8337) or phone (1-800-438-1985).

PAXLOVID is an inhibitor of CYP3A and may increase plasma concentrations of drugs that are primarily metabolized by CYP3A. Co-administration of PAXLOVID with drugs highly dependent on CYP3A for clearance and for which elevated plasma concentrations are associated with serious and/or

life-threatening events is contraindicated. Co-administration with other CYP3A substrates may require a dose adjustment or additional monitoring.

Nirmatrelvir and ritonavir are CYP3A substrates; therefore, drugs that induce CYP3A may decrease nirmatrelvir and ritonavir plasma concentrations and reduce PAXLOVID therapeutic effect.

Pregnancy: There are no available human data on the use of nirmatrelvir during pregnancy to evaluate for a drug-associated risk of major birth defects, miscarriage, or adverse maternal or fetal outcomes. Published observational studies on ritonavir use in pregnant women have not identified an increase in the risk of major birth defects. Published studies with ritonavir are insufficient to identify a drug-associated risk of miscarriage. There are maternal and fetal risks associated with untreated COVID-19 in pregnancy.

Lactation: There are no available data on the presence of nirmatrelvir in human or animal milk, the effects on the breastfed infant, or the effects on milk production. A transient decrease in body weight was observed in the nursing offspring of rats administered nirmatrelvir. Limited published data reports that ritonavir is present in human milk. There is no information on the effects of ritonavir on the breastfed infant or the effects of the drug on milk production. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for PAXLOVID and any potential adverse effects on the breastfed infant from PAXLOVID or from the underlying maternal condition. Breastfeeding individuals with COVID-19 should follow practices according to clinical guidelines to avoid exposing the infant to COVID-19.

Contraception: Use of ritonavir may reduce the efficacy of combined hormonal contraceptives. Advise patients using combined hormonal contraceptives to use an effective alternative contraceptive method or an additional barrier method of contraception.

Pediatrics: PAXLOVID is not authorized for use in pediatric patients younger than 12 years of age or weighing less than 40 kg. The safety and effectiveness of PAXLOVID have not been established in pediatric patients. The authorized adult dosing regimen is expected to result in comparable serum exposures of nirmatrelvir and ritonavir in patients 12 years of age and older and weighing at least 40 kg as observed in adults, and adults with similar body weight were included in the trial EPIC-HR.

Systemic exposure of nirmatrelvir increases in renally impaired patients with increase in the severity of renal impairment. No dosage adjustment is needed in patients with mild renal impairment. **In patients with moderate renal impairment (eGFR \geq 30 to $<$ 60 mL/min), reduce the dose of PAXLOVID to 150 mg nirmatrelvir and 100 mg ritonavir twice daily for 5 days.** Prescriptions should specify the numeric dose of each active ingredient within PAXLOVID. Providers should counsel patients about renal dosing instructions. **PAXLOVID is not recommended in patients with severe renal impairment (eGFR $<$ 30 mL/min based on CKD-EPI formula) until more data are available;** the appropriate dosage for patients with severe renal impairment has not been determined.

No dosage adjustment of PAXLOVID is needed for patients with either mild (Child-Pugh Class A) or moderate (Child-Pugh Class B) hepatic impairment. No pharmacokinetic or safety data are available regarding the use of nirmatrelvir or ritonavir in subjects with severe hepatic impairment (Child-Pugh Class C); therefore, **PAXLOVID is not recommended for use in patients with severe hepatic impairment.**

About Pfizer: Breakthroughs That Change Patients' Lives

At Pfizer, we apply science and our global resources to bring therapies to people that extend and significantly improve their lives. We strive to set the standard for quality, safety and value in the discovery, development and manufacture of health care products, including innovative medicines and vaccines. Every day, Pfizer colleagues work across developed and emerging markets to advance wellness, prevention, treatments and cures that challenge the most feared diseases of our time. Consistent with our responsibility as one of the world's premier innovative biopharmaceutical companies, we collaborate with health care providers, governments and local communities to support and expand access to reliable, affordable health care around the world. For more than 170 years, we have worked to make a difference for all who rely on us. We routinely post information that may be important to investors on our website at www.Pfizer.com. In addition, to learn more, please visit us on

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