

Swiss Public Assessment Report

Jeraygo

International non-proprietary name:	aprocitentan
Pharmaceutical form:	film-coated tablets
Dosage strength(s):	12.5 mg, 25 mg
Route(s) of administration:	oral
Marketing authorisation holder:	Idorsia Pharmaceuticals Ltd
Marketing authorisation no.:	70047
Decision and decision date:	approved on 18.09.2025

Note:

This assessment report is as adopted by Swissmedic with all information of a commercially confidential nature deleted.

SwissPARs are final documents that provide information on submissions at a particular point in time. They are not updated after publication.

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1 Terms, Definitions, Abbreviations

ADA	Anti-drug antibody
ADME	Absorption, distribution, metabolism, elimination
AE	Adverse event
ALT	Alanine aminotransferase
API	Active pharmaceutical ingredient
AST	Aspartate aminotransferase
ATC	Anatomical Therapeutic Chemical Classification System
AUC	Area under the plasma concentration-time curve
AUC _{0-24h}	Area under the plasma concentration-time curve for the 24-hour dosing interval
CI	Confidence interval
C _{max}	Maximum observed plasma/serum concentration of drug
CYP	Cytochrome P450
DDI	Drug-drug interaction
EMA	European Medicines Agency
ERA	Environmental risk assessment
FDA	Food and Drug Administration (USA)
GI	Gastrointestinal
GLP	Good Laboratory Practice
HPLC	High-performance liquid chromatography
IC/EC ₅₀	Half-maximal inhibitory/effective concentration
ICH	International Council for Harmonisation
Ig	Immunoglobulin
INN	International non-proprietary name
ITT	Intention-to-treat
LoQ	List of Questions
MAH	Marketing authorisation holder
Max	Maximum
Min	Minimum
MRHD	Maximum recommended human dose
N/A	Not applicable
NO(A)EL	No observed (adverse) effect level
PBPK	Physiology-based pharmacokinetics
PD	Pharmacodynamics
PIP	Paediatric investigation plan (EMA)
PK	Pharmacokinetics
PopPK	Population pharmacokinetics
PSP	Pediatric study plan (US FDA)
RMP	Risk management plan
SAE	Serious adverse event
SwissPAR	Swiss Public Assessment Report
TEAE	Treatment-emergent adverse event
TPA	Federal Act of 15 December 2000 on Medicinal Products and Medical Devices (SR 812.21)
TPO	Ordinance of 21 September 2018 on Therapeutic Products (SR 812.212.21)

2 Background information on the procedure

2.1 Applicant's request(s) and information regarding procedure

New active substance status

The applicant requested new active substance status for aprocitentan in the above-mentioned medicinal product.

2.2 Indication and dosage

2.2.1 Requested indication

Treatment of resistant hypertension in adult patients in combination with at least 3 antihypertensive medicinal products (see "Properties/Effects").

2.2.2 Approved indication

Jeraygo is indicated for the treatment of resistant hypertension in adult patients in combination with at least 3 antihypertensive medicinal products (see "Properties/Effects").

2.2.3 Requested dosage

Summary of the requested standard dosage:

The recommended dose is 12.5 mg orally once daily. The dose can be increased to 25 mg once daily for patients tolerating the 12.5 mg dose and in need of a tighter blood pressure (BP) control (see "Warnings and Precautions").

2.2.4 Approved dosage

(see appendix)

2.3 Regulatory history (milestones)

Application	4 September 2024
Formal objection	12 September 2024
Response to formal objection	17 September 2024
Formal control completed	19 September 2024
List of Questions (LoQ)	15 January 2025
Response to LoQ	27 February 2025
Preliminary decision	27 May 2025
Response to preliminary decision	22 June 2025
Final decision	18 September 2025
Decision	approval

Based on Art. 13 TPA Swissmedic has only assessed parts of the primary data submitted with this application. As regards the remaining data, Swissmedic relies for its decision on the assessment of the foreign reference authorities, the EMA and FDA.

3 Medical context

Arterial hypertension is an elevation of blood pressure with an increased risk of cerebral, cardiac, and renal clinical events. Incidence and prevalence of arterial hypertension are high in all countries. Nearly 30 percent of adults worldwide suffer from high blood pressure, and it is one of the main treatable cardiovascular risk factors.

Resistant arterial hypertension is defined as uncontrolled blood pressure that remains above target despite adequate pharmacological treatment. Diagnosis of resistant arterial hypertension varies based on proper clinical assessment and specific investigations. Treatment should focus on encouraging a healthy lifestyle and intensifying treatment by addition of other classes of antihypertensive medications. Untreated resistant hypertension can cause various cardiovascular events, such as myocardial infarction and stroke.

4 Quality aspects

4.1 Drug substance

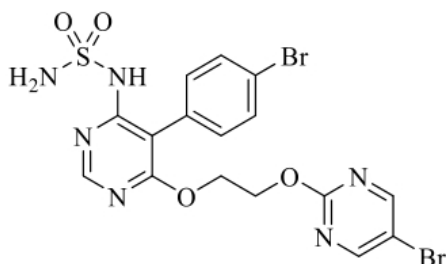
INN: Aprocitentan

Chemical name: N-[5-(4-bromophenyl)-6-[2-[(5-bromo-2-pyrimidinyl)oxy]ethoxy]-4-pyrimidinyl]-sulfamide

Molecular formula: $C_{16}H_{14}Br_2N_6O_4S$

Molecular mass: 546.2

Molecular structure:



Aprocitentan is a white to off-white powder. Multiple polymorphic forms have been identified. The commercial synthetic process has been designed to consistently produce only the desired polymorphic form, which was used throughout development. The drug substance is characterised by low solubility across the pH range of the gastrointestinal tract (pH 1.2–6.8) in aqueous buffer systems. The solubility increases in FaSSIF and FeSSIF due to the presence of bile salts.

Appropriate specifications have been defined, and analytical procedures have been validated.

Appropriate stability data have been generated, resulting in suitable storage conditions and an appropriate re-test period.

4.2 Drug product

Aprocitentan is formulated as round, biconvex (6 mm diameter), film-coated tablets containing 12.5 or 25 mg of the active substance. The 12.5 mg film-coated tablet is a yellow to orange film-coated tablet, debossed with “AN” on one side and plain on the other side; the 25 mg film-coated tablet is a pink film-coated tablet, debossed with “AN” on one side and “25” on the other side. Standard excipients for film-coated tablets have been selected. The final formulation is the same as that used in Phase 3 studies, except for debossment and film-coating colour, which are not expected to impact performance.

Standard manufacturing operations are applied. Operating ranges and process controls are those resulting from process development activities. The process has been validated.

Appropriate specifications have been defined, and analytical procedures have been validated.

Appropriate stability data have been generated in the packaging materials intended for commercial use, resulting in suitable storage conditions and shelf-life.

4.3 Quality conclusions

Satisfactory and consistent quality of the drug substance and drug product has been demonstrated.

5 Nonclinical aspects

Regarding the marketing authorisation application for Jeraygo (new active substance: aprocitentan), the Nonclinical Assessment Division conducted an abridged evaluation, which was based on the CHMP assessment report (EMA/CHMP/148451/2024, dated 25.04.2024).

Overall, the nonclinical documentation submitted is deemed sufficient to support the approval of Jeraygo for the proposed indication. The pharmacotoxicological profile has been adequately characterised. Safety concerns related to the pharmacological effects of aprocitentan, as well as the expected class-related teratogenic effects of endothelin receptor antagonists, have been addressed in the risk assessment and recommendations for use. The presented data suggest adequate exposure margins to findings in nonclinical species. All nonclinical data that are relevant for safety are mentioned in the Information for healthcare professionals and the RMP.

There is no safety concern regarding impurities and excipients.

Based on the ERA, the risk to the environment is low.

6 Clinical aspects

The evaluation of the clinical and clinical pharmacology data of this application has been carried out in reliance on previous regulatory decisions by the EMA and FDA. The available assessment reports and respective product information from the EMA and FDA were used as a basis for the evaluation.

For further details concerning clinical pharmacology, dosing recommendations, efficacy, and safety, see the Information for healthcare professional in the appendix of this report.

7 Risk management plan summary

The RMP summaries contain information on the medicinal products' safety profiles and explain the measures that are taken to further investigate and monitor the risks, as well as to prevent or minimise them.

The RMP summaries are published separately on the Swissmedic website. It is the responsibility of the marketing authorisation holder to ensure that the content of the published RMP summaries is accurate and correct. As the RMPs are international documents, their summaries might differ from the content in the Information for healthcare professionals / product information approved and published in Switzerland, e.g. by mentioning risks that occur in populations or indications not included in the Swiss authorisations.

8 Appendix

Approved Information for healthcare professionals

Please be aware that the following version of the Information for healthcare professionals for Jeraygo was approved with the submission described in the SwissPAR. This Information for healthcare professionals may have been updated since the SwissPAR was published.

Please note that the valid and relevant reference document for the effective and safe use of medicinal products in Switzerland is the Information for healthcare professionals currently authorised by Swissmedic (see www.swissmedicinfo.ch).

Note:

The following Information for healthcare professionals has been translated by the MAH. It is the responsibility of the authorisation holder to ensure the translation is correct. The only binding and legally valid text is the Information for healthcare professionals approved in one of the official Swiss languages.

▼ This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions. See “Undesirable effects” for advice on the reporting of adverse reactions.

JERAYGO film-coated tablets

Composition

Active substances

Aprocitentan

Excipients

Tablet core: Croscarmellose sodium, Hydroxypropylcellulose, Lactose monohydrate, Magnesium stearate, Microcrystalline cellulose

Film coat: Poly(vinyl alcohol), Hydroxypropylcellulose, Triethyl citrate, Talc, Colloidal hydrated silica, Titanium dioxide, Iron oxide red (E172), Iron oxide yellow (E172), Iron oxide black (E172)

Each 12.5 mg film-coated tablet contains 54 mg lactose monohydrate and max. 0.4 mg sodium.

Each 25 mg film-coated tablet contains 45.7 mg lactose monohydrate and max. 0.4 mg sodium.

Pharmaceutical form and active substance quantity per unit

JERAYGO 12.5 mg film-coated tablets

Each film-coated tablet contains 12.5 mg aprocitentan.

Yellow to orange, round biconvex (6 mm diameter), debossed with “AN” on one side, and plain on the other side.

JERAYGO 25 mg film-coated tablets

Each film-coated tablet contains 25 mg aprocitentan.

Pink, round biconvex (6 mm diameter), debossed with “AN” on one side, and “25” on the other side.

Indications/Uses

JERAYGO is indicated for the treatment of resistant hypertension in adult patients in combination with at least three antihypertensive medicinal products (see “Properties/Effects”).

Dosage/Administration

The recommended dose is 12.5 mg orally once daily. The dose can be increased to 25 mg once daily for patients tolerating the 12.5 mg dose and in need of tighter blood pressure (BP) control (see “Warnings and precautions”).

Elderly

No dose adjustment is required in patients over the age of 65 years (see “Pharmacokinetics”). There is limited clinical experience in patients over the age of 75 years (see “Warnings and precautions”).

Renal impairment

No dose adjustment is required in patients with renal impairment (including severe impairment with estimated glomerular filtration rate [eGFR] 15–29 mL/min) (see “Warnings and precautions” and “Pharmacokinetics”).

Aprocitentan has not been studied in patients with eGFR < 15 mL/min or in patients undergoing dialysis; JERAYGO is not recommended in these patients (see “Warnings and precautions”).

Hepatic impairment

No dose adjustment is required in patients with mild or moderate hepatic impairment (Child-Pugh class A or B, respectively) (see “Pharmacokinetics”).

Aprocitentan has not been studied in patients with severe hepatic impairment (Child-Pugh class C); JERAYGO must not be initiated in these patients (see “Contraindications” and “Warnings and precautions”).

Paediatric population

The safety and efficacy of aprocitentan in children and adolescents aged less than 18 years have not been established. No data are available. JERAYGO is not authorised for use in the paediatric population.

Method of administration

Oral use.

JERAYGO may be taken with or without meals (see “Pharmacokinetics”).

The film-coated tablets are not scored and are designed to be swallowed whole.

Missed dose

If the patient misses a dose, the patient should be told to resume treatment the next day and not take two doses in the same day.

Contraindications

- Hypersensitivity to the active substance or to any of the excipients listed above.
- Pregnancy (see “Pregnancy, lactation”).
- Women of childbearing potential who are not using reliable contraception (see “Warnings and precautions” and “Pregnancy, lactation”).
- Breast-feeding (see “Pregnancy, lactation”).
- Patients with severe hepatic impairment (Child-Pugh class C; with or without cirrhosis) (see “Warnings and precautions”).

Warnings and precautions

Women of childbearing potential, pregnant and breast-feeding women

JERAYGO is contraindicated for use in women who are pregnant, breast-feeding and in women of childbearing potential who are not using reliable contraception (see “Contraindications” and “Pregnancy, lactation”).

Pregnancy tests are recommended before the start of treatment, monthly during treatment, and one month after stopping treatment to allow detection of pregnancy (see “Pregnancy, lactation”).

Hepatotoxicity

Elevations of aminotransferases and hepatotoxicity are known effects of other endothelin receptor antagonists (ERAs). Elevations of transaminases have been reported infrequently in clinical trials of aprocitentan (see “Undesirable effects”).

JERAYGO must not be initiated in patients with severe hepatic impairment (see “Contraindications”) and is not recommended in patients with elevated aminotransferases ($> 3 \times$ upper limit of normal [ULN]). Liver enzyme tests should be obtained prior to initiation of JERAYGO.

During treatment, monitoring of liver enzymes is recommended. If sustained, unexplained, clinically relevant aminotransferase elevations occur, or if elevations are accompanied by an increase in bilirubin $> 2 \times$ ULN, or by clinical symptoms of hepatotoxicity, JERAYGO should be discontinued.

Fluid retention

Peripheral oedema and fluid retention are known effects of ERAs and were observed in clinical studies with aprocitentan (see “Undesirable effects”). After treatment initiation, patients should be monitored for signs of fluid retention such as oedema or weight gain. If clinically significant fluid retention develops, the patient should be evaluated to determine the cause and the need for additional supportive treatment, including additional diuretics or increase of dose of currently prescribed diuretic (as appropriate), before considering dose reduction or discontinuation of JERAYGO.

In patients treated with loop diuretics before starting therapy with JERAYGO, the loop diuretic should not be switched to a less effective diuretic at initiation.

Patients with underlying renal impairment ($\text{eGFR} < 60 \text{ mL/min/1.73 m}^2$) or pre-existing heart failure taking JERAYGO may be at a higher risk of developing fluid retention, as may elderly patients (> 65 years), patients with diabetes, or severely obese patients (body mass index [BMI] $\geq 40 \text{ kg/m}^2$). When switching to 25 mg, the risk of increasing fluid retention, potentially aggravating heart failure or cardiovascular (CV) events, has to be taken into consideration in these patients.

Cardiovascular events

Aprocitentan has not been studied in patients with unstable or severe cardiac disease, such as uncontrolled symptomatic arrhythmia (including atrial fibrillation), heart failure New York Heart Association stage III–IV or stage II with relevant valve disease, with NT-proBNP plasma concentration

≥ 500 pg/mL, or with recent (within 6 months) unstable angina, myocardial infarction, transient ischemic attack or stroke. JERAYGO is not recommended in these patients.

Due to the general risk of CV events in patients with resistant hypertension and since aprocitentan can cause fluid retention, patients at high risk of developing congestive heart failure or other CV events should be monitored for signs and symptoms of fluid retention.

The benefit and risk of continuation or discontinuation of JERAYGO if patients experience CV events while on treatment should be assessed on an individual basis.

Haemoglobin decrease

Decreases in haemoglobin concentration and haematocrit have occurred following administration of ERAs and were observed in clinical studies with aprocitentan (see “Undesirable effects”). These decreases have been attributed to plasma volume expansion (haemodilution). In the clinical studies of aprocitentan, they stabilised after 4 weeks of treatment, remained stable during chronic treatment, and were reversible within 4 weeks after discontinuation.

Initiation of JERAYGO is not recommended in patients with severe anaemia (< 8 g/dL). If clinically indicated, haemoglobin concentrations should be measured prior to initiation of treatment and during treatment. If clinically relevant signs and symptoms related to haemoglobin decrease are observed, consider discontinuation of JERAYGO.

Renal impairment

Patients with eGFR below 60 mL/min/1.73 m² may have a higher risk of experiencing anaemia and oedema/fluid retention during treatment with JERAYGO. Therefore, it is recommended to monitor haemoglobin, and for signs of fluid retention or heart failure.

There is no clinical experience with the use of aprocitentan in patients with resistant hypertension and eGFR < 15 mL/min/1.73 m² or in patients undergoing dialysis; therefore, JERAYGO is not recommended in these patients.

Patients ≥ 75 years of age

Patients ≥ 75 years of age may have a higher risk of experiencing anaemia, oedema/fluid retention, heart failure, and cerebrovascular events. It is recommended to monitor haemoglobin, and for signs of fluid retention or heart failure.

Excipients of particular interest

Lactose monohydrate

JERAYGO contains lactose monohydrate. Patients with rare hereditary problems of galactose intolerance, total lactase deficiency, or glucose-galactose malabsorption should not take this medicinal product.

Sodium

JERAYGO contains less than 1 mmol sodium (23 mg) per tablet, that is to say essentially ‘sodium-free’.

Interactions

Effect of other medicinal products on the pharmacokinetics of aprocitentan

Aprocitentan exposure is not expected to be impacted by other medicinal products that are inhibitors or inducers of CYP enzymes.

Aprocitentan is a substrate of UGT1A1 and UGT2B7. Therefore, concomitant administration of aprocitentan with UGT inducers may decrease aprocitentan exposure.

Aprocitentan is a substrate of P-gp and BCRP *in vitro*. However, inhibitors of these transporters are not anticipated to influence the PK of aprocitentan.

Effect of aprocitentan on the pharmacokinetics of other medicinal products

CYP enzymes

In vitro, aprocitentan is an inducer of CYP3A4, but *in vitro* studies are inconclusive regarding the potential of aprocitentan to induce CYP2B6 and CYP1A2. *In vitro* aprocitentan is an inhibitor of CYP3A4 and all members of the CYP2C family. Aprocitentan does not inhibit CYP1A2, CYP2A6, CYP2B6, CYP2D6, and CYP2E1.

In a clinical study conducted in healthy subjects, co-administration of once daily 50 mg aprocitentan with the sensitive CYP3A4 substrate midazolam did not affect the PK of midazolam (with AUC_{0-∞} and C_{max} ratios of 1.14 and 1.04, respectively), leading to the conclusion of the absence of interaction with CYP enzymes, with the exception of the potential induction of CYP2B6 and CYP1A2 enzymes described above. *In vivo* induction cannot be excluded. Caution is recommended when aprocitentan is co-administered with CYP1A2 substrates with a narrow therapeutic index (e.g., tizanidine).

UGT enzymes

In vitro, aprocitentan is an inhibitor of UGT1A1 and UGT2B7.

Drug transporters

In vitro, aprocitentan is an inhibitor of several transporters (BCRP, bile salt export pump [BSEP], and sodium taurocholate co-transporting polypeptide [NTCP]), but does not inhibit P-gp, organic cationic transporter (OCT)1, OCT2, human multi-drug and toxin compound extrusion (MATE)1, or MATE2K. Aprocitentan does not inhibit organic anion transporter (OAT)1, OATP1B1, or OATP1B3 at therapeutic concentrations.

In a clinical study conducted in healthy subjects receiving 25 mg aprocitentan and rosuvastatin, a BCRP substrate, once daily dosing of aprocitentan increased C_{max} of rosuvastatin by 1.40-fold; however, the total exposure to rosuvastatin expressed as AUC_{0-∞} was unchanged (AUC_{0-∞} ratio of 0.99). Therefore, BCRP substrates can be administered with aprocitentan.

Aprocitentan does not impact the PK of medicinal products for which PK is dependent on active transport, with the exception of OAT3 substrates described below.

OAT3 substrates

In vitro, aprocitentan is an OAT3 inhibitor. Therefore, aprocitentan may increase plasma concentrations of medicinal products for which excretion is dependent upon OAT3. Whether this would result in a clinically relevant effect on the PK of concomitantly administered substrates of OAT3 cannot be excluded as a dedicated interaction study has not been performed. Therefore, caution should be exercised when OAT3 substrates with a narrow therapeutic index (e.g., methotrexate) are given concomitantly.

Hormonal contraceptives

The potential interaction between aprocitentan and hormonal contraceptives has not been studied. Therefore, women using hormonal contraceptives should add a barrier method.

Pregnancy, lactation

Use in women of childbearing potential/Contraception in females

JERAYGO is contraindicated for use in women of childbearing potential not using contraception. Women of childbearing potential must be advised to use reliable methods of contraception during treatment and for one month after treatment discontinuation, as women should not become pregnant during this time. Since the potential interaction between aprocitentan and hormonal contraceptives has not been studied, women using hormonal contraceptives should add a barrier method. Women of childbearing potential are recommended to perform a pregnancy test before the start of treatment, monthly during treatment, and one month after stopping treatment to allow for the early detection of pregnancy. If pregnancy is detected, JERAYGO must be discontinued (see “Contraindications” and “Warnings and precautions”).

A card addressed to the patient is included in the packaging. It contains information regarding the risk of harm to the unborn child, the need to use contraceptive measures and the recommendation for pregnancy testing.

Pregnancy

JERAYGO is contraindicated during pregnancy, based on studies in animals with other ERAs (see “Preclinical data”). There are very limited data from the use of JERAYGO in pregnant women.

Lactation

JERAYGO is contraindicated during breast-feeding. It is unknown whether aprocitentan/metabolites are excreted in human milk. Animal studies have shown that aprocitentan is excreted into milk. A risk to the breastfed infant cannot be excluded.

Fertility

Decreased sperm count has been observed in patients taking other ERAs. It is not known if aprocitentan may adversely affect spermatogenesis in men. Animal studies with aprocitentan have shown adverse effects in females and males without affecting fertility (see “Preclinical data”).

Effects on ability to drive and use machines

Aprocitentan has negligible influence on the ability to drive and use machines. However, adverse reactions (e.g., headache or hypotension) may occasionally occur that may influence the ability to drive and use machines.

Undesirable effects

Summary of safety profile

The most frequently reported adverse reactions with aprocitentan were oedema/fluid retention (9.1% [12.5 mg] and 18.4% [25 mg]) and haemoglobin decreased (3.7% [12.5 mg] and 1.2% [25 mg]) (see “Warnings and precautions”).

List of adverse reactions

The safety of aprocitentan was evaluated in one placebo-controlled Phase 3 clinical study (see “Properties/Effects”). In this study, 724 patients received aprocitentan, with 633 patients treated for at least 26 weeks, 192 patients for at least 47 weeks, and 99 patients for at least 48 weeks.

The frequency of adverse reactions is defined using the following convention: very common ($\geq 1/10$); common ($\geq 1/100$ to $< 1/10$); uncommon ($\geq 1/1\,000$ to $< 1/100$); rare ($\geq 1/10\,000$ to $< 1/1\,000$); very rare ($< 1/10\,000$); not known (cannot be estimated from the available data).

Table 1: Adverse reactions

System organ class	Adverse reaction	Frequency
Infections and infestations	Upper respiratory tract infection ^a	Common
Blood and lymphatic system disorders	Haemoglobin decreased ^b	Common
Immune system disorders	Hypersensitivity ^c	Common
Nervous system disorders	Headache	Common
Vascular disorders	Hypotension	Uncommon
	Flushing	Uncommon
Respiratory, thoracic and mediastinal disorders	Dyspnoea ^d	Common
Hepatobiliary disorders	Transaminase increased	Uncommon
General disorders and administration site conditions	Oedema/fluid retention ^e	Very common
Investigations	Glomerular filtration rate decreased during initial treatment	Uncommon
	Weight increased during initial treatment	Uncommon

^a Upper respiratory tract infection includes pharyngitis, nasopharyngitis.

^b Haemoglobin decreased includes anaemia.

^c Hypersensitivity includes rash, erythema, allergic oedema, dermatitis allergic.

^d Dyspnoea includes dyspnoea exertional.

^e Oedema/fluid retention includes mainly oedema peripheral, fluid retention, face oedema.

Description of selected adverse reactions

Oedema/fluid retention

Oedema/fluid retention events appear to be dose-related (9.1% [12.5 mg] and 18.4% [25 mg] during the 4-week double-blind [DB] treatment).

Over the entire study, 0.8% of patients discontinued treatment of aprocitentan 25 mg due to oedema/fluid retention.

Actions to be taken if oedema/fluid retention occurs are described in “Warnings and precautions”.

A mean increase in body weight of +0.4 kg and +0.6 kg was observed in patients on aprocitentan 12.5 and 25 mg, respectively, compared to –0.2 kg in patients on placebo during the 4-week DB treatment (part 1). This increase disappeared during the 32-week single-blind (SB) treatment (part 2).

Transaminases increased

Alanine/aspartate aminotransferase (ALT/AST) elevations $> 3 \times \text{ULN}$ were reported in 0% and 0.4% of patients receiving JERAYGO 12.5 mg and 25 mg, respectively, compared to 0.9% in placebo patients during the initial 4-week DB treatment (part 1). 1.5% of patients reported these events during the 32-week SB treatment (part 2) when all subjects received 25 mg. 1.3% of patients reported these events during the 12-week double-blind withdrawal (DB-WD) treatment (part 3) on 25 mg, compared to 1.0% on placebo. There were no reports of patients with ALT and/or AST $> 3 \times \text{ULN}$ and total bilirubin $> 2 \times \text{ULN}$ in the study.

Hypersensitivity reactions

Cases of hypersensitivity reactions (i.e., rash, erythema, allergic oedema, dermatitis allergic) occurred within the first 2 weeks of treatment and were mild to moderate. There were 2 patients who discontinued treatment, 1 of whom was hospitalised.

Haemoglobin decreased

Mean haemoglobin at baseline was 13.9, 13.9, and 14.1 g/dL for aprocitentan 12.5 mg, 25 mg, and placebo, respectively. During the 4-week DB treatment (part 1), a mean decrease in haemoglobin of 0.80 and 0.85 g/dL was reported in patients receiving aprocitentan 12.5 and 25 mg, respectively, compared to a decrease of 0.4 g/dL in patients receiving placebo. At the end of the 32-week SB treatment (part 2), during which all patients received aprocitentan 25 mg, the mean decrease in haemoglobin remained unchanged at 0.87 g/dL compared to baseline. Reversibility of the effect was observed within 4 weeks after discontinuation.

A decrease from baseline in haemoglobin concentration to below 10 g/dL was reported in 6.4% of patients during the 48-week exposure to aprocitentan 25 mg. Of these patients, the range for haemoglobin at baseline was 10.3 to 15.4 g/dL.

Actions to be taken if haemoglobin decrease occurs are described in “Warnings and precautions”.

Glomerular filtration rate decreased

Mean eGFR at baseline was 76.2, 76.7, and 76.2 mL/min/1.73 m² for aprocitentan 12.5 mg, 25 mg, and placebo, respectively. During the 4-week DB treatment (part 1), a mean decrease in eGFR of 1.2 and 2.4 mL/min/1.73 m² was reported in patients receiving aprocitentan 12.5 and 25 mg, respectively, compared to a decrease of 0.6 mL/min/1.73 m² in patients receiving placebo. At the end of the 32-week SB treatment (part 2), the mean decrease in eGFR was 2.3 mL/min/1.73 m²; it remained stable until the end of the study.

Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is very important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions online via the EIViS portal (Electronic Vigilance System). You can obtain information about this at www.swissmedic.ch.

Overdose

Aprocitentan has been administered as a single dose of up to 600 mg, and as multiple doses of up to 100 mg daily to healthy subjects (24 and 4 times the maximum approved dose, respectively).

Adverse reactions of headache, nasal congestion, nausea and upper respiratory tract infection were observed.

In the event of an overdose, standard supportive measures should be taken, as required. Because of possible QT interval prolongation at very high concentrations (i.e., more than 22 tablets of aprocitentan 12.5 mg), ECG monitoring should be considered. Dialysis is unlikely to be effective because aprocitentan is highly protein-bound (see "Pharmacokinetics").

Properties/Effects

ATC code

Pharmacotherapeutic group: Antihypertensives, other antihypertensives, ATC code: C02KN01

Mechanism of action

Endothelin (ET)-1, via its receptors (ET_A and ET_B), mediates a variety of effects such as vasoconstriction, fibrosis, cell proliferation, and inflammation and is upregulated in hypertension.

Aprocitentan is a dual ERA that inhibits the binding of ET-1 to ET_A and ET_B receptors and hence the effects mediated by these receptors.

Pharmacodynamics

Cardiac electrophysiology

In a thorough QT study in healthy subjects, once-daily administration of 25 mg (maximum therapeutic dose) aprocitentan at steady state did not prolong the QTc interval as the upper limit of the 90% confidence interval of the mean change from baseline in placebo-corrected QTc was less than 10 ms.

At four times the maximum therapeutic dose (100 mg), the upper limit of the 90% confidence interval of the mean change from baseline in placebo-corrected QTc was 10.4 ms.

Clinical efficacy

The efficacy of aprocitentan was evaluated in one randomized, double-blind, placebo-controlled Phase 3 multicentre study.

Patients with uncontrolled BP (systolic blood pressure [SBP] $\geq$ 140 mmHg) despite the use of at least three antihypertensive medicinal products and following exclusion of pseudo-resistant hypertension (e.g., white coat effect, inappropriate BP measurement, secondary causes of hypertension) were considered to have resistant hypertension.

The patients were switched to standardised background antihypertensive therapy consisting of an angiotensin receptor blocker (valsartan 160 mg), a calcium channel blocker (amlodipine 5 or 10 mg), and a diuretic (hydrochlorothiazide 25 mg) throughout the study. Patients with concomitant use of beta-blockers continued this treatment throughout the study, in addition to the standardised background antihypertensive therapy and study treatment.

A total of 730 patients received either aprocitentan 12.5 mg, aprocitentan 25 mg, or placebo once daily during the initial 4-week DB treatment (part 1). Thereafter, patients received aprocitentan 25 mg once daily during the 32-week SB treatment (part 2). At the end of the 32 weeks, patients were re-randomised to receive either aprocitentan 25 mg or placebo, once daily, during the 12-week DB-WD treatment (part 3) (Table 2).

Table 2: Design of the Phase 3 study

	Treatment	Part 1 (4 weeks)	Part 2 (32 weeks)	Part 3 (12 weeks)
Design		DB, placebo-controlled, randomized (1:1:1)	SB	DB-WD, placebo-controlled, randomized (1:1)
Duration		Week 0 – Week 4	Week 4 – Week 36	Week 36 – Week 48
Treatment as add-on to background therapy*	Aprocitentan 25 mg Aprocitentan 12.5 mg Placebo	N = 243 N = 243 N = 244	N = 704	N = 307 N = 307

* ARB, CCB, and a diuretic.

ARB = angiotensin receptor blocker; CCB = calcium channel blocker; DB = double-blind; DB-WD = double-blind withdrawal; N = number of patients; SB = single-blind.

The primary efficacy endpoint was the change in sitting SBP (SiSBP) from baseline to Week 4 during DB treatment (part 1), measured at trough by unattended automated office blood pressure (uAOBP). The key secondary endpoint was the change in SiSBP measured at trough by uAOBP from DB-WD baseline (Week 36) to Week 40 (part 3).

Patients had a mean age of 61.7 years (range 24 to 84 years; 34.1% were $\geq$ 65 and $<$ 75 years; 9.9% were $\geq$ 75 years) and 59.5% were male. Patients were White (82.9%), African American (11.2%) or

Asian (5.2%). The mean body weight was 97.6 kg (range 46 to 196 kg) and mean BMI was 33.7 kg/m² (range 18 to 64 kg/m²).

Patients had a medical history of type 2 diabetes mellitus (54.1%), ischaemic heart disease (30.8%), central nervous system vascular disorders (23.0%), chronic kidney disease stages 3 and 4 (22.2%; 19.3% of patients had eGFR 30–59 mL/min/1.73 m² and 2.9% had eGFR 15–29 mL/min/1.73 m²), congestive heart failure (19.6%), and sleep apnoea syndrome (14.1%). 63.0% of patients had four or more antihypertensive medicinal products.

Populations not studied in the Phase 3 study are described in “Dosage/Administration”, “Contraindications”, and “Warnings and precautions”.

Doses of aprocitentan 12.5 and 25 mg showed a statistically significant reduction vs placebo on SiSBP at Week 4. The treatment effect was consistent for sitting diastolic BP (SiDBP) (Table 3).

Table 3: Reduction in sitting trough BP (mmHg) measured by uAOBP at Week 4 of DB treatment

Treatment group	N	Baseline [#] Mean	LS Mean	Difference to placebo	
				LS Mean	p-value
SiSBP (primary endpoint)			LS Mean (97.5% CL)	LS Mean (97.5% CL)	
12.5 mg	243	153.2	−15.3 (−17.4, −13.2)	−3.8 (−6.8, −0.8)	0.0042*
25 mg	243	153.3	−15.2 (−17.3, −13.1)	−3.7 (−6.7, −0.8)	0.0046*
Placebo	244	153.3	−11.5 (−13.6, −9.4)	-	-
SiDBP			LS Mean (95% CL)	LS Mean (95% CL)	
12.5 mg	243	87.9	−10.4 (−11.6, −9.3)	−3.9 (−5.6, −2.3)	<0.0001
25 mg	243	87.7	−11.0 (−12.1, −9.8)	−4.5 (−6.1, −2.9)	<0.0001
Placebo	244	87.1	−6.5 (−7.6, −5.3)	-	-

Observed baseline value.

* Statistically significant at the 2.5% level as prespecified in the testing strategy.

BP = blood pressure; CL = confidence limit; DB = double-blind; LS Mean = least squares mean; SiDBP = sitting diastolic blood pressure; SiSBP = sitting systolic blood pressure; uAOBP = unattended automated office blood pressure.

The persistence of the BP-lowering effect of aprocitentan was shown in DB-WD treatment (part 3). In patients re-randomised to placebo, the mean SiSBP increased, whereas in patients re-randomised to aprocitentan 25 mg the mean effect on SiSBP was stable, resulting in a statistically significant difference. The treatment effect was consistent for SiDBP (Table 4).

Table 4: Sustained reduction in sitting trough BP (mmHg) measured by uAOBP at Week 40 of DB-WD treatment

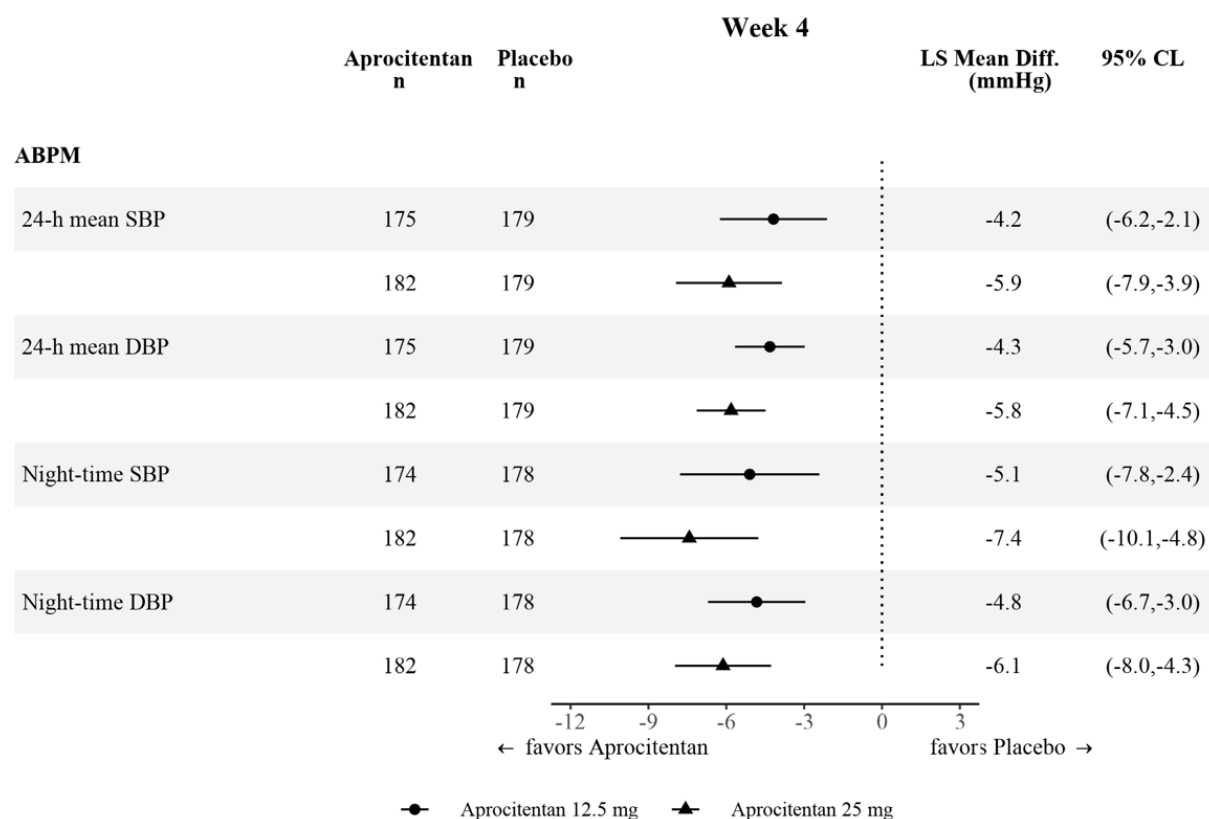
Treatment group	N	DB-WD Baseline# Mean	LS Mean (95% CL)	Difference to placebo	
				LS Mean (95% CL)	p-value
SiSBP (key secondary endpoint)					
25 mg	307	135.3	−1.5 (−3.0, 0.0)	−5.8 (−7.9, −3.7)	<0.0001*
Placebo	307	136.4	4.4 (2.9, 5.8)	-	-
SiDBP					
25 mg	307	76.1	−0.5 (−1.5, 0.5)	−5.2 (−6.6, −3.8)	<0.0001
Placebo	307	76.3	4.7 (3.7, 5.7)	-	-

[#] Observed baseline value. DB-WD baseline: Week 36.

* Statistically significant at the 5% level as prespecified in the testing strategy.

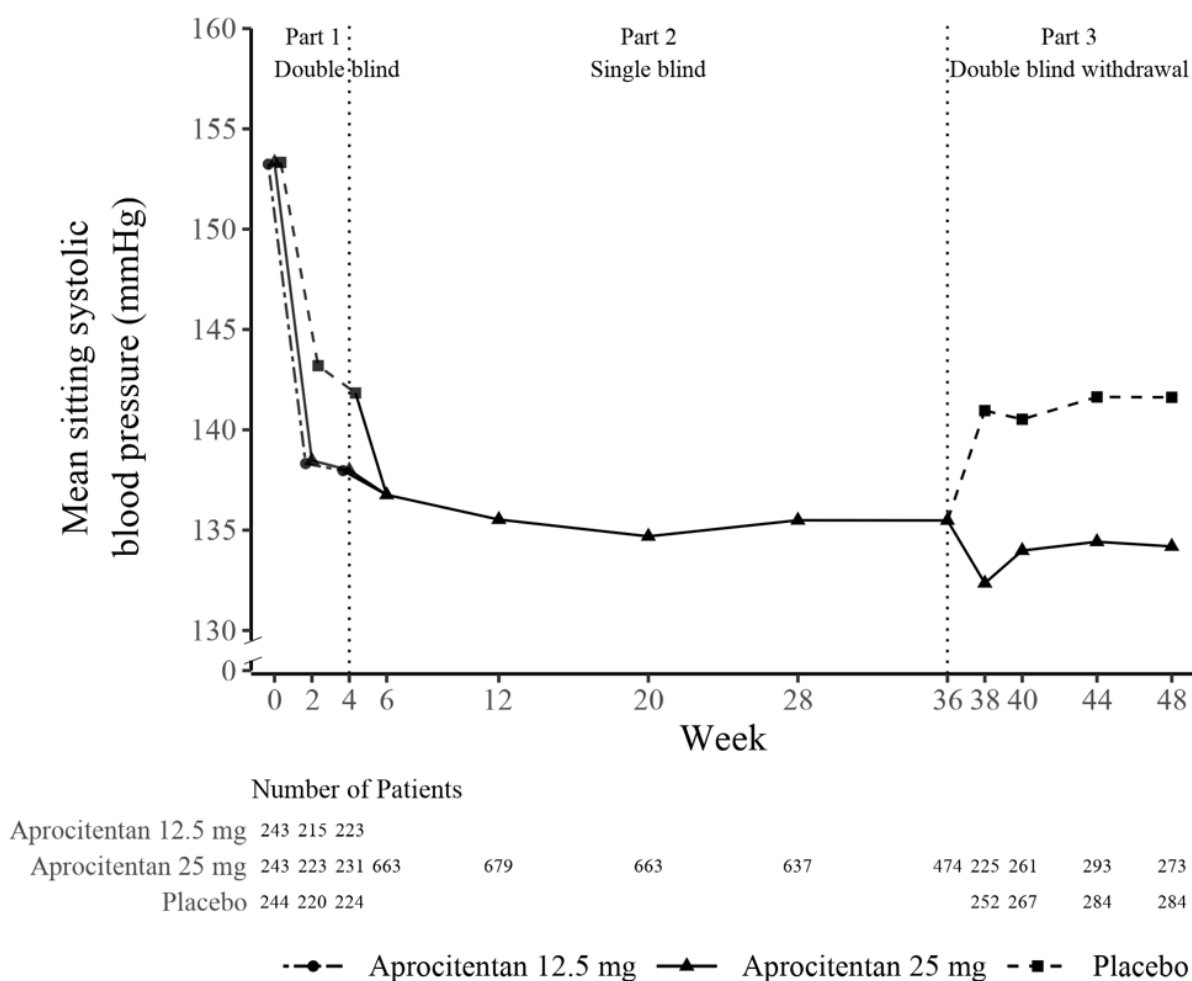
BP = blood pressure; CL = confidence limit; DB-WD = double-blind-withdrawal; LS Mean = least squares mean; SiDBP = sitting diastolic blood pressure; SiSBP = sitting systolic blood pressure; uAOBP = unattended automated office blood pressure.

The effect was also consistent across SBP and DBP measured by ambulatory BP monitoring (ABPM) and assessed as daytime, night-time, and 24 h periods at Week 4 (Figure 1) and Week 40.

Figure 1: Placebo-corrected changes from baseline in systolic and diastolic BP measured by ABPM at Week 4

ABPM = ambulatory blood pressure monitoring; BP = blood pressure; CL = confidence limits; DBP = diastolic blood pressure; LS Mean Diff. = least squares mean difference versus placebo; SBP = systolic blood pressure.

A substantial proportion (i.e., at least 90%) of the BP-lowering effect was observed within the first two weeks of treatment with aprocitantan.

Figure 2: Mean sitting systolic BP measured by uAOBP over 48 weeks

The effect of aprocitentan was consistent across subgroups of age (including patients ≥ 75 years), sex, race (including patients with Black or African American origin), BMI, baseline urine albumin-to-creatinine ratio (UACR), baseline eGFR and medical history of diabetes, and was consistent with the effect in the overall population.

Effects on UACR/eGFR

At 4 weeks, a reduction in UACR of 30% (95% confidence limits 20–39%) and 34% (95% confidence limits 25–42%) was observed with aprocitentan 12.5 and 25 mg, respectively, compared to subjects randomised to placebo. This effect disappeared upon treatment discontinuation. As for eGFR, a mean decrease of -1.2 mL/min / 1.73 m² for aprocitentan 12.5 mg and -2.4 mL/min / 1.73 m² for aprocitentan 25 mg occurred during the first 4 weeks of treatment (vs -0.6 mL/min / 1.73 m² for placebo), followed by a stabilisation of eGFR, including in patients with low (< 60 mL/min) baseline values, until the end of the study. The effect of aprocitentan on end organ protection has not been studied.

Effects on mortality and cardiovascular morbidity

The effects of aprocitentan on mortality and cardiovascular morbidity have not been studied.

Paediatric population

The European Medicines Agency has waived the obligation to submit the results of studies with aprocitentan in all subsets of the paediatric population in the treatment of hypertension.

Pharmacokinetics

Absorption

Maximum plasma concentration ($C_{\max}$) of aprocitentan was achieved between 4 and 5 h after administration of 25 mg. Concentrations in plasma increased in a dose-proportional manner following once daily administration of 5 mg, 25 mg, and 100 mg. The absolute bioavailability after oral administration is not known.

With once daily administration, steady-state conditions were reached by Day 8 and accumulation compared to Day 1 was approximately 3-fold.

Effect of food

When a capsule formulation (used in early clinical studies) was taken with a high-fat, high-calorie meal by healthy subjects, aprocitentan median time to $C_{\max}$ ($t_{\max}$) was reached approximately one hour earlier, with a $C_{\max}$ approximately 1.7-fold that in the fasted condition. Total exposure expressed as $AUC_{0-\infty}$ was approximately 1.2-fold that observed in the fasted condition. Food effect has not been specifically studied for the film-coated tablet. In the pivotal Phase 3 study, aprocitentan film-coated tablets were administered irrespective of food intake. The absorption of aprocitentan is not expected to be affected by meals.

Distribution

Aprocitentan had an apparent volume of distribution of approximately 20 L and was highly bound to plasma proteins (> 99%). The blood-to-plasma ratio was 0.63.

Metabolism

Aprocitentan was almost exclusively detected unchanged in plasma.

The main metabolic pathways of aprocitentan were N-glucosidation of the sulfamide moiety catalysed by the glucuronyl transferases UGT1A1 and UGT2B7, and hydrolysis of the sulfamide moiety to the corresponding aminopyrimidine. Hydrolysis was mostly non-enzymatic.

Elimination

After administration of a radiolabelled dose of aprocitentan, approximately 52% of radioactive drug-related material was eliminated via urine and 25% via faeces. A total of 0.2% and 6.8% of the administered dose was recovered in urine and faeces as unchanged aprocitentan, respectively. The apparent oral body clearance is 0.30 L/h. The terminal plasma half-life of aprocitentan is approximately 46 h.

Kinetics in specific patient groups

There were no clinically relevant effects of age (18–84 years), sex, body weight (44–196 kg), or race on the PK of aprocitentan.

Renal impairment

Total exposure to aprocitentan (AUC) in patients with severe renal impairment (eGFR 15–29 mL/min) compared to healthy subjects was increased by an average of 40%. This increase is not considered clinically relevant (see “Dosage/Administration”). Aprocitentan binding to plasma proteins was not influenced by renal function.

Hepatic impairment

Total exposure to aprocitentan (AUC) in patients with moderate hepatic impairment (Child-Pugh class B) compared to healthy subjects was increased by an average of 23%. This increase is not considered clinically relevant (see “Dosage/Administration”). Aprocitentan binding to plasma proteins was not influenced by hepatic function.

Preclinical data

Non-clinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, genotoxicity, carcinogenic potential, and phototoxicity.

Repeated dose toxicity

Histological findings in repeated-dose toxicity studies [degenerative liver changes (rat, dog), thyroid (rat) and nasal cavity findings, and testicular changes (rat, dog)] were observed at exposures in excess of the maximum human exposure, indicating low relevance in clinical use.

Toxicity to reproduction and development

Testicular tubular degeneration was observed after repeated dosing in rats and dogs with safety margins of 8 (20.6)- and 4.9 (16.6)-fold the total (free) exposure at the maximum recommended human dose, respectively. However, no effects were noted on fertility or spermatogenesis in male rats.

In female rats, minimally increased pre-implantation loss (lower number of corpora lutea, implantation sites, and live embryos) was observed at 11 (29)-fold the total (free) exposure at the maximum recommended human dose. No effects on mating behaviour and reproductive performance were noted.

Aprocitentan did not induce teratogenicity in studies with pregnant rats and rabbits with safety margins of 2 (6)- and 14 (3)-fold the total (free) exposure at the maximum recommended human dose, respectively. However, ERAs as a class have shown teratogenicity in rats and rabbits, where the observed malformations indicate serious effects on developmental processes early in pregnancy (neural crest cell migration). Since teratogenic potential of aprocitentan was investigated only at

exposures slightly above the exposure at the maximum recommended human dose, it is not known which exposures may elicit adverse effects on embryo-foetal development.

In pre- and post-natal development studies, female rats treated from late pregnancy through lactation showed reduced pup survival and impairment of the reproductive capability of the offspring.

Other information

Incompatibilities

Not applicable.

Shelf life

The drug may only be used up to the date marked "EXP" on the pack.

Special precautions for storage

Do not store above 25°C.

Shelf-life after opening: 3 months.

Keep out of the reach of children.

Store in the original packaging (bottle or blisters) to protect from moisture.

Keep the container tightly closed to protect from moisture.

Authorisation number

70047 (Swissmedic)

Packs

JERAYGO 12.5 mg film-coated tablets

White, opaque, HDPE bottle with child-resistant closure and induction seal liner, containing silica gel desiccant and 30 film-coated tablets. [B]

Perforated unit dose blisters in aluminium cold-form film with desiccant and aluminium push-through lidding foil containing 10 × 1 film-coated tablets. [B]

JERAYGO 25 mg film-coated tablets

White, opaque, HDPE bottle with child-resistant closure and induction seal liner, containing silica gel desiccant and 30 film-coated tablets. [B]

Perforated unit dose blisters in aluminium cold-form film with desiccant and aluminium push-through lidding foil containing 10 × 1 film-coated tablets. [B]

Not all pack sizes may be marketed.

Marketing authorisation holder

Idorsia Pharmaceuticals Ltd

Hegenheimermattweg 91

4123 Allschwil

Switzerland

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