

This medicinal product is subject to additional monitoring in Australia. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse events at www.tga.gov.au/reporting-problems.

AUSTRALIAN PRODUCT INFORMATION

KOSELUGO[®] (selumetinib sulfate) capsules

1 NAME OF THE MEDICINE

Selumetinib sulfate.

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each 10 mg hard capsule contains 10 mg of selumetinib (as sulfate).

Each 25 mg hard capsule contains 25 mg of selumetinib (as sulfate).

For the full list of excipients, see Section 6.1 List of excipients.

3 PHARMACEUTICAL FORM

Capsule, hard.

KOSELUGO 10 mg hard capsule

White to off-white, opaque, size 4 hard capsule, banded and marked with “SEL 10” in black ink.

KOSELUGO 25 mg hard capsule

Blue, opaque, size 4 hard capsule, banded and marked with “SEL 25” in black ink.

4 CLINICAL PARTICULARS

4.1 THERAPEUTIC INDICATIONS

KOSELUGO is indicated for the treatment of paediatric patients aged 2 years and above, with neurofibromatosis type 1 (NF1) who have symptomatic, inoperable plexiform neurofibromas (PN).

4.2 DOSE AND METHOD OF ADMINISTRATION

Therapy should be initiated by a physician experienced in the diagnosis and the treatment of patients with NF1 related tumours.

Recommended dosage

The recommended dosage of KOSELUGO is 25 mg/m² orally twice daily (approximately every 12 hours) until disease progression or unacceptable toxicity.

The recommended dose of KOSELUGO is based on body surface area (BSA) and is shown in Table 1.

Table 1 Recommended Dosage Based on Body Surface Area

Body Surface Area*	Recommended Dosage	
	0.55 – 0.69 m ²	20 mg in the morning
0.70 – 0.89 m ²	20 mg twice daily	
0.90 – 1.09 m ²	25 mg twice daily	
1.10 – 1.29 m ²	30 mg twice daily	
1.30 – 1.49 m ²	35 mg twice daily	
1.50 – 1.69 m ²	40 mg twice daily	
1.70 – 1.89 m ²	45 mg twice daily	
≥ 1.90 m ²	50 mg twice daily	

* The recommended dosage for patients with a BSA less than 0.55m² has not been established.

Method of Administration

KOSELUGO should be taken on an empty stomach with no food or drink other than water. Do not consume food 2 hours prior to dosing and 1 hour after dosing (*see sections 4.5 Interactions with other medicine and other forms of interactions*).

KOSELUGO capsules should be swallowed whole with water, and should not be chewed, dissolved, or opened.

Do not administer to patients who are unable or unwilling to swallow a whole capsule. Patients should be assessed for their ability to swallow a capsule before starting treatment. Standard medicine swallowing techniques are expected to be sufficient to swallow selumetinib capsules. For patients who have difficulties swallowing the capsule, referral to an appropriate health care professional such as a speech and language therapist could be considered to identify suitable methods that can be tailored to the particular patient.

Missed dose

If a dose of KOSELUGO is missed, it should only be taken if it is more than 6 hours until the next scheduled dose.

Vomiting

Do not take an additional dose if vomiting occurs after KOSELUGO administration but continue with the next scheduled dose.

Dose adjustments

For adverse reactions

The recommended dose reductions for adverse reactions are provided in Table 2.

Table 2 Recommended Dose Reductions for KOSELUGO for Adverse Reactions

Body Surface Area	First Dose Reduction (mg/dose)		Second Dose Reduction* (mg/dose)	
	Morning	Evening	Morning	Evening
0.55 – 0.69 m ²	10	10	10 once daily	
0.70 – 0.89 m ²	20	10	10	10
0.90 – 1.09 m ²	25	10	10	10
1.10 – 1.29 m ²	25	20	20	10
1.30 – 1.49 m ²	25	25	25	10
1.50 – 1.69 m ²	30	30	25	20
1.70 – 1.89 m ²	35	30	25	20
≥ 1.90 m ²	35	35	25	25

* Permanently discontinue KOSELUGO in patients unable to tolerate KOSELUGO after two dose reductions

Dosage modifications for adverse reactions are in Table 3.

Table 3 Recommended Dosage Modifications for KOSELUGO for Adverse Reactions

Severity of Adverse Reaction	Recommended Dosage Modifications for KOSELUGO
<i>LVEF Reduction (see section 4.4 Special warnings and precautions for use)</i>	
Asymptomatic decrease in left ventricular ejection fraction (LVEF) of 10% or greater from baseline and less than lower level of normal	Withhold until resolution. Resume at reduced dose.
Symptomatic decreased LVEF Grade 3 or 4 decreased LVEF	Permanently discontinue.
<i>Ocular Toxicity (see section 4.4 Special warnings and precautions for use)</i>	
Retinal Pigment Epithelial Detachment (RPED) or Central Serous Retinopathy (CSR)	Withhold until resolution. Resume at reduced dose.
Retinal vein occlusion (RVO)	Permanently discontinue.
<i>Gastrointestinal Toxicity (see section 4.4 Special warnings and precautions for use)</i>	
Grade 3 Diarrhoea	Withhold until improved to Grade 0 or 1. Resume at same dose. Permanently discontinue if no improvement within 3 days.
Grade 4 Diarrhoea	Permanently discontinue.
Grade 3 or 4 Colitis	Permanently discontinue.
<i>Skin Toxicity (see section 4.4 Special warnings and precautions for use)</i>	
Grade 3 or 4	Withhold until improvement. Resume at reduced dose.
<i>Increased Creatine Phosphokinase (CPK) (see section 4.4 Special warnings and precautions for use)</i>	
Grade 4 Increased CPK Any Increased CPK and myalgia	Withhold until improved to Grade 0 or 1. Resume at reduced dose. Permanently discontinue if no improvement within 3 weeks.
Rhabdomyolysis	Permanently discontinue.

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Severity of Adverse Reaction	Recommended Dosage Modifications for KOSELUGO
<i>Other Adverse Reactions CTCAE Grade* (see section 4.8 Adverse effects (Undesirable effects))</i>	
Grade 1 Tolerable Grade 2	Continue treatment and monitor as clinically indicated
Intolerable Grade 2 Grade 3	Withhold KOSELUGO until improve to Grade 0 or 1. Resume at reduced dose.
Grade 4	Withhold KOSELUGO until improved to Grade 0 or 1. Resume at reduced dose. Consider discontinuation.

* Per National Cancer Institute Common Terminology Criteria for Adverse Events

For drug interactions

Co-administration with CYP3A4 or CYP2C19 inhibitors

Concomitant use of strong or moderate CYP3A4 or CYP2C19 inhibitors is not recommended and alternative agents should be considered. If a strong or moderate CYP3A4 or CYP2C19 inhibitor must be co-administered, the recommended KOSELUGO dose reduction is as follows: If a patient is currently taking 25 mg/m² twice daily, dose reduce to 20 mg/m² twice daily. If a patient is currently taking 20 mg/m² twice daily, dose reduce to 15 mg/m² twice daily (see Table 4 and section 4.5).

Table 4 Recommended dosage to achieve 20 mg/m² or 15 mg/m² twice daily dose level

Body Surface Area	20 mg/m ² twice daily (mg/dose)		15 mg/m ² twice daily (mg/dose)	
	Morning	Evening	Morning	Evening
0.55 – 0.69 m ²	10	10	10 mg once daily	
0.70 – 0.89 m ²	20	10	10	10
0.90 – 1.09 m ²	20	20	20	10
1.10 – 1.29 m ²	25	25	25	10
1.30 – 1.49 m ²	30	25	25	20
1.50 – 1.69 m ²	35	30	25	25
1.70 – 1.89 m ²	35	35	30	25
≥ 1.90 m ²	40	40	30	30

Special patient populations

Renal impairment

Based on clinical studies no dose adjustment is recommended in patients with mild, moderate, severe renal impairment or those with End Stage Renal Disease (ESRD) (see section 5.2 *Pharmacokinetic properties*).

Hepatic Impairment

Based on clinical studies, no dose adjustment is recommended in patients with mild hepatic impairment. The starting dose should be reduced in patients with moderate hepatic impairment to 20 mg/m² BSA, twice daily (see Table 4). KOSELUGO is not recommended for use in patients with severe hepatic impairment (see section 5.2 *Pharmacokinetic properties*).

Ethnicity

Increased systemic exposure has been seen in adult Asian subjects, although there is considerable overlap with Western subjects when corrected for body weight. No specific adjustment to the starting dose is recommended for paediatric Asian patients, however, these patients should be closely monitored for adverse events (*see section 5.2 Pharmacokinetic properties*).

Paediatric population

Safety and effectiveness have been established in paediatric patients 3 years of age and older with NF1 who have inoperable PN and information supporting this use is discussed throughout the Product Information. This indication was expanded to paediatric patients who are 2 years of age and older, because the safety, efficacy and pharmacokinetics of KOSELUGO in patients who are 2 years of age is expected to be similar to patients at 3 years of age and older.

4.3 CONTRAINDICATIONS

- Hypersensitivity to the active substance or to any of the excipients (*see section 6.1 List of excipients*)
- Severe hepatic impairment

4.4 SPECIAL WARNINGS AND PRECAUTIONS FOR USE

LVEF Reduction

Asymptomatic decreases in ejection fraction have been reported in 22% of paediatric patients in the pivotal clinical study (*see section 4.8 Adverse effects (Undesirable effects)*). Median time to initial onset of events was 226 days. A small number of serious reports of LVEF reduction associated with selumetinib have been reported in paediatric patients who participated in an expanded access program.

Paediatric patients with a history of impaired left ventricular function or a baseline LVEF below institutional LLN have not been studied. LVEF should be evaluated before initiation of treatment to establish baseline values. Prior to starting KOSELUGO treatment, patients should have an ejection fraction above the institutional LLN.

Evaluate LVEF at approximately 3-month intervals, or more frequently as clinically indicated, during treatment. Reduction in LVEF can be managed using treatment interruption, dose reduction or treatment discontinuation (*see section 4.2 Dosage and Method of Administration*).

Ocular Toxicity

Advise patients to report any new visual disturbances. Adverse events of blurred vision have been reported in paediatric patients receiving selumetinib. Isolated cases of RPED, CSR and RVO in adult patients with multiple tumour types, receiving treatment with selumetinib monotherapy and in combination with other anti-cancer agents, and in a single paediatric patient with pilocytic astrocytoma on selumetinib monotherapy, have been observed (*see section 4.8 Adverse effects (Undesirable effects)*).

In line with clinical practice an ophthalmological evaluation prior to treatment initiation and at any time a patient reports new visual disturbances is recommended. In patients diagnosed with RPED or CSR without reduced visual acuity, ophthalmic assessment should be conducted every 3 weeks until resolution. If RPED or CSR is diagnosed and visual acuity is affected selumetinib therapy should be interrupted and the dose reduced when treatment is resumed (see Table 2). If RVO is diagnosed, treatment with selumetinib should be permanently discontinued (*see section 4.2 Dosage and Method of Administration*).

Gastrointestinal Toxicity

Diarrhoea occurred in 77% of 74 paediatric patients who received KOSELUGO in SPRINT, including Grade 3 in 15% of patients. Diarrhoea resulting in permanent discontinuation occurred in 1.4% of patients. Diarrhoea resulting in dose interruption or dose reduction occurred in 15% and 1.4% of patients, respectively. The median time to first onset of diarrhoea was 17 days and the median duration was 2 days.

Serious gastrointestinal toxicities, including perforation, colitis, ileus, and intestinal obstruction, occurred in an unapproved population of adult patients with multiple tumour types who received KOSELUGO as a single agent or in combination with other anti-cancer agents. Colitis occurred in an unapproved population of paediatric patients with multiple tumour types who received KOSELUGO as a single agent.

Advise patients to start an anti-diarrhoeal agent (e.g., loperamide) immediately after the first episode of unformed, loose stool and to increase fluid intake during diarrhoea episodes. Withhold, reduce dose, or permanently discontinue KOSELUGO based on severity of adverse reaction (*see section 4.2 Dosage and Method of Administration*).

Skin Toxicity

Rash occurred in 91% of 74 paediatric patients who received KOSELUGO in SPRINT. The most frequent rashes included dermatitis acneiform (54%), maculopapular rash (39%), and eczema (28%). Grade 3 rash occurred in 8% of patients. Rash resulted in dose interruption in 11% of patients and dose reduction in 4% of patients.

Other skin toxicities, including severe palmar-plantar erythrodysesthesia syndrome, occurred in an unapproved population of adult patients with multiple tumour types who received KOSELUGO as a single agent or in combination with other anti-cancer agents.

Monitor for severe skin rashes. Withhold, reduce dose, or permanently discontinue KOSELUGO based on severity of adverse reaction (*see section 4.2 Dosage and Method of Administration*).

Increased Creatine Phosphokinase

Increased creatine phosphokinase (CPK) occurred in 76% of 74 paediatric patients who received KOSELUGO in SPRINT, including Grade 3 or 4 in 9% of patients. Increased CPK resulted in dose reduction in 7% of patients. Increased CPK concurrent with myalgia occurred in 8% of patients, including one patient who permanently discontinued KOSELUGO for myalgia.

Rhabdomyolysis occurred in an unapproved adult population who received KOSELUGO as a single agent.

Obtain serum CPK prior to initiating KOSELUGO, periodically during treatment, and as clinically indicated. If increased CPK occurs, evaluate patients for rhabdomyolysis or other causes. Withhold, reduce dose, or permanently discontinue KOSELUGO based on severity of adverse reaction (*see section 4.2 Dosage and Method of Administration*).

Embryo-Fetal Toxicity

Based on findings from animal studies and its mechanism of action, KOSELUGO can cause fetal harm when administered to a pregnant woman. In animal reproduction studies, administration of selumetinib to mice during organogenesis caused reduced fetal weight, adverse structural defects, and effects on embryo-fetal survival at approximate exposures > 5 times the human exposure at the clinical dose of 25 mg/m² twice daily. Advise pregnant women of the potential risk to a fetus. Advise females of reproductive potential to use effective contraception during treatment with KOSELUGO and for 1 week after the last dose. Advise males with female partners of reproductive potential to use effective contraception during treatment with KOSELUGO and for 1 week after the last dose (*see section 4.6 Fertility, pregnancy and lactation*).

Risk of Choking

Selumetinib is available as a capsule which must be swallowed whole. Some patients, in particular children < 6 years of age, may be at risk of choking on a capsule formulation due to developmental, anatomical or psychological reasons. Therefore, selumetinib should not be administered to patients who are unable or unwilling to swallow the capsule whole (*see section 4.2 Dosage and Method of Administration*).

Vitamin E Supplementation

Advise patients not to take any supplemental vitamin E.

KOSELUGO 10 mg capsules contain 32 mg vitamin E as the excipient, Tocofersolan (Australian Approved Name). KOSELUGO 25 mg capsules contain 36 mg vitamin E as Tocofersolan. High doses of vitamin E may increase the risk of bleeding in patients taking concomitant anticoagulant or antiplatelet medications (e.g., warfarin or aspirin). Perform anticoagulant assessments, including international normalized ratio (INR) or prothrombin time (PT) more frequently to detect when the dose adjustments of the anticoagulant or antiplatelet medications are warranted (*see Section 4.5 Interactions with other medicines and other forms of interaction*).

Use in the elderly

No data are available for use in elderly patients.

Paediatric use

Safety and effectiveness have been established in paediatric patients 3 years of age and older with NF1 who have inoperable PN and information supporting this use is discussed throughout the Product Information. This indication was expanded to paediatric patients who are 2 years of age and older, because the safety, efficacy and pharmacokinetics of KOSELUGO in patients who are 2 years of age is expected to be similar to patients at 3 years of age and older.

Effects on laboratory tests

Please refer to *section 4.8 Adverse effects (Undesirable effects)*.

4.5 INTERACTIONS WITH OTHER MEDICINES AND OTHER FORMS OF INTERACTIONS

Pharmacokinetic interactions

Interaction studies have only been performed in healthy adults (aged ≥ 18 years).

Active substances that may increase selumetinib plasma concentration

Co-administration with a strong CYP3A4 inhibitor (200 mg itraconazole twice daily for 4 days) increased selumetinib C_{max} by 19% (90% CI 4, 35) and AUC by 49% (90% CI 40, 59) in healthy adult volunteers.

Co-administration with a strong CYP2C19/moderate CYP3A4 inhibitor (200 mg fluconazole once daily for 4 days) increased selumetinib C_{max} by 26% (90% CI 10, 43) and AUC by 53% (90% CI 44, 63) in healthy adult volunteers, respectively.

Concomitant use of erythromycin (moderate CYP3A4 inhibitor) or fluoxetine (strong CYP2C19/CYP2D6 inhibitor) is predicted to increase selumetinib AUC by ~30-40% and C_{max} by ~20%.

Co-administration with medicinal products that are strong inhibitors of CYP3A4 (e.g., clarithromycin, grapefruit juice, oral ketoconazole) or CYP2C19 (e.g., ticlopidine) should be avoided. Co-administration with medicinal products that are moderate inhibitors of CYP3A4 (e.g., erythromycin and fluconazole) or CYP2C19 (e.g., omeprazole) should be avoided. If co-administration is unavoidable, patients should be carefully monitored for adverse events and the selumetinib dose should be reduced (see section 4.2 and Table 4).

Active substances that may decrease selumetinib plasma concentrations

Co-administration with a strong CYP3A4 inducer (600 mg rifampicin daily for 8 days) decreased selumetinib C_{max} by -26% (90% CI -17, -34) and AUC by -51% (90% CI -47, -54).

Avoid concomitant use of strong CYP3A4 inducers (e.g. phenytoin, rifampicin, carbamazepine, St. John's Wort) or moderate CYP3A4 inducers with KOSELUGO.

Active substances whose plasma concentrations may be altered by selumetinib

In vitro, selumetinib is an inhibitor of OAT3 and the potential for a clinically relevant effect on the pharmacokinetics of concomitantly administered substrates of OAT3 cannot be excluded

The effect of selumetinib on the exposure of oral contraceptives has not been evaluated. Therefore, use of an additional barrier method should be recommended to women using hormonal contraceptives.

Interactions with Minimal Clinical Impact

In vitro, selumetinib is not an inhibitor of CYP1A2, CYP2A6, CYP2B6, CYP2C8, CYP2C9, CYP2C19, CYP2D6, CYP3A4 and CYP2E1. *In vitro*, selumetinib is not an inducer of CYP3A4, CYP1A2 and CYP2B6. *In vitro*, selumetinib inhibits UGT1A3, UGT1A4, UGT1A6 and UGT1A9, however these effects are not expected to be clinically relevant.

Based on *in vitro* studies, selumetinib is a substrate for BCRP and P-gp transporters but is unlikely to be subjected to clinically relevant drug interactions at the recommended paediatric dose. *In vitro* studies suggest that selumetinib does not inhibit the breast cancer resistance protein (BCRP), P-glycoprotein (P-gp), OATP1B1, OATP1B3, OCT2, OAT1, MATE1 and MATE2K at the recommended paediatric dose.

Vitamin E

KOSELUGO capsules contain vitamin E as the excipient TPGS. Therefore, patients should avoid taking supplemental vitamin E and anticoagulant assessments should be performed more frequently in patients taking concomitant anticoagulant or antiplatelet medications (*see section 4.4 Special warnings and precautions for use*).

Effect of food on KOSELUGO

In separate clinical studies, in healthy adult subjects and in adult patients with advanced solid malignancies at a dose of 75 mg, co-administration of KOSELUGO with a high-fat meal resulted in a mean decrease in C_{max} of 50% and 62%, respectively, compared to fasting administration. Selumetinib mean AUC was reduced by 16% and 19%, respectively, and the time to reach maximum concentration (t_{max}) was delayed by approximately 1.5 hours (*see section 4.2 Dosage and Administration*).

In healthy adult subjects at a dose of 50 mg, co-administration of KOSELUGO with a low-fat meal resulted in 60% lower C_{max} when compared to fasting administration. Selumetinib AUC was reduced by 38%, and the time to reach maximum concentration (t_{max}) was delayed by approximately 0.9 hours (*see section 4.2 Dosage and Administration*).

4.6 FERTILITY, PREGNANCY AND LACTATION

Effects on fertility

There are no data on the effect of KOSELUGO on human fertility.

In mice, selumetinib did not affect male mating performance after 10 weeks of dosing up to 20 mg/kg twice daily corresponding to approximately 28-times the human clinical exposure based on AUC at the MRHD. In female mice exposed to selumetinib at up to 37.5 mg/kg twice daily (approximately 90 times the human clinical exposure at the MRHD based on AUC), mating performance and fertility were not affected, but the number of live fetuses was slightly reduced at \geq 12.5 mg/kg twice daily (27 times the human clinical exposure). Following a three-week treatment withdrawal period, no effects were apparent on any parameter. The no observed adverse effect level (NOAEL) for both maternal toxicity and effects on reproductive performance was 2.5 mg/kg twice daily (approximately 5 times the human clinical exposure).

Use in pregnancy– Category D

There are no data on the use of selumetinib in pregnant women.

In embryofetal development studies in mice, administration of selumetinib during organogenesis caused a reduction in the number of live fetuses due to an increase in post-implantation loss, a reduction in mean fetal and litter weights, an increase in unossified or incompletely ossified bones, increased occurrence of open eye and cleft palate at dose levels that did not induce significant maternal toxicity. These effects were seen at ≥ 2.5 mg/kg twice daily (>4.5 times the clinical exposure at the MRHD based on AUC) and indicate that selumetinib may have potential to cause defects in the fetus in patients.

Administration of selumetinib to pregnant mice from gestation Day 6 through to lactation Day 20 resulted in reduced pup body weights, and fewer pups met the pupil constriction criterion on Day 21 post-partum at 7.5 mg/kg twice daily (approximately 6 times the clinical exposure based on C_{max}). The incidence of malformations (prematurely open eye(s) and/ or cleft palate) was increased at all dose levels (0.5 -7.5 mg/kg twice daily). Malformations occurred at maternal exposure 0.6 times the mean clinical exposure at MRHD based on C_{max} .

KOSELUGO is not recommended during pregnancy.

It is recommended that a pregnancy test should be performed on women of childbearing potential prior to initiating treatment.

Advise women of childbearing potential to avoid becoming pregnant while receiving selumetinib. If a female patient or a female partner of a male patient receiving KOSELUGO becomes pregnant, she should be apprised of the potential hazard to the fetus.

Both male and female patients (of reproductive potential) should be advised to use effective contraception during and for at least 1 week after completion of treatment with KOSELUGO. It cannot be excluded that selumetinib may reduce the effectiveness of oral contraceptives, therefore women using hormonal contraceptives should be recommended to add a barrier method.

KOSELUGO is not recommended in women of child-bearing potential not using contraception.

Use in lactation

Selumetinib and its active metabolite are excreted in the milk of lactating mice. It is not known whether selumetinib, or its metabolites, are excreted in human milk. A risk to the breast-fed infant cannot be excluded, therefore breast-feeding mothers are advised not to breast-feed during treatment with KOSELUGO.

4.7 EFFECTS ON ABILITY TO DRIVE AND USE MACHINES

No studies on the effects on the ability to drive and use machines have been performed. KOSELUGO may have a minor influence on the ability to drive and use machines. Fatigue, asthenia and visual disturbances have been reported during treatment with selumetinib and patients who experience these symptoms should observe caution when driving or using machines.

4.8 ADVERSE EFFECTS (UNDESIRABLE EFFECTS)

Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse event rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The safety of selumetinib monotherapy has been evaluated in a combined safety population of 74 paediatric patients (20-30 mg/m² twice daily) with NF1 PN and 347 adult patients (75-100 mg twice daily) with multiple tumour types.

Neurofibromatosis Type 1 (NF1) with Inoperable Plexiform Neurofibromas (PN)

The safety of KOSELUGO was evaluated in SPRINT Phase II Stratum 1 (*see section 5.1 Pharmacodynamic properties, Clinical Trials*). Eligible patients were 2-18 years of age with NF1 who had inoperable PN that was causing significant morbidity. Patients were excluded for abnormal LVEF, uncontrolled hypertension (blood pressure > the 95th percentile for age, height, and sex), any current or past history of RVO or RPED, intraocular pressure > 21 mmHg (or upper limit of normal adjusted by age), uncontrolled glaucoma, and inability to swallow whole capsules. Patients received KOSELUGO 25 mg/m² orally twice daily (n=50). Among these patients, 88% were exposed for 12 months or longer and 66% were exposed for greater than 2 years.

Serious adverse reactions occurred in 24% of patients who received KOSELUGO. Serious adverse reactions that occurred in 2 or more patients were anaemia, hypoxia and diarrhoea.

Permanent discontinuation due to an adverse event occurred in 12% of patients who received KOSELUGO. Adverse events resulting in permanent discontinuation of KOSELUGO included increased creatine, increased weight, diarrhoea, paronychia, malignant peripheral nerve sheath tumour, acute kidney injury, and skin ulcer.

Dosage interruptions and dose reductions due to adverse events occurred in 80% and 24% of patients who received KOSELUGO, respectively. Adverse events requiring a dosage interruption or reduction in ≥ 5% of patients were vomiting, paronychia, diarrhoea, nausea, abdominal pain, rash, skin infection, influenza-like illness, pyrexia and weight gain.

The most common adverse events (≥ 40%) were vomiting, rash (all), abdominal pain, diarrhoea, nausea, dry skin, fatigue, musculoskeletal pain, pyrexia, acneiform rash, stomatitis, headache, paronychia, and pruritus.

Table 5 presents the adverse events in SPRINT Phase II Stratum 1.

Table 5 Adverse Events (≥ 20%) in Patients Who Received KOSELUGO in SPRINT Phase II Stratum 1

Adverse Event	KOSELUGO N=50	
	All Grades (%)	Grade ≥ 3 (%)*
Gastrointestinal		
Vomiting	82	6

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Adverse Event	KOSELUGO N=50	
	All Grades (%)	Grade ≥ 3 (%)*
Abdominal pain ¹	76	0
Diarrhoea	70	16
Nausea	66	2
Stomatitis ²	50	0
Constipation	34	0
Skin and Subcutaneous Tissue		
Rash (all) ³	80	6
Dry skin	60	0
Rash acneiform ⁴	50	4
Paronychia ⁵	48	6
Pruritus	46	0
Dermatitis ⁶	36	4
Hair changes ⁷	32	0
Musculoskeletal and Connective Tissue		
Musculoskeletal pain ⁸	58	0
General		
Fatigue ⁹	56	0
Pyrexia	56	8
Oedema ¹⁰	20	0
Nervous System		
Headache	48	2
Respiratory, Thoracic and Mediastinal		
Epistaxis	28	0
Renal and Urinary System		
Haematuria	22	2
Proteinuria	22	0
Metabolism and Nutrition		
Decreased appetite	22	0
Cardiac System		
Decreased ejection fraction	22	0
Sinus tachycardia	20	0
Infections		
Skin infection ¹¹	20	2

* All events were Grade 3.

¹ Abdominal pain includes abdominal pain; abdominal pain upper

² Stomatitis includes stomatitis; mouth ulceration

³ Rash (all) includes dermatitis acneiform; rash maculo-papular; erythema; rash pustular; rash; urticaria; exfoliative rash; rash pruritic; rash erythematous

⁴ Rash (acneiform) includes dermatitis acneiform

⁵ Paronychia includes paronychia, nail infection

- 6 Dermatitis includes dermatitis; dermatitis atopic; dermatitis diaper; eczema; seborrheic dermatitis; skin irritation
7 Hair changes include alopecia, hair colour change
8 Musculoskeletal pain includes pain in extremity; back pain; neck pain; musculoskeletal pain
9 Fatigue includes fatigue, malaise
10 Oedema includes peripheral swelling, oedema, localized oedema
11 Skin infection includes skin infection; abscess; cellulitis; impetigo; staphylococcal skin infection

Clinically relevant adverse reactions that occurred < 20% of patients include:

- *Eye*: vision blurred
- *Gastrointestinal Disorders*: dry mouth
- *General Disorders*: facial oedema, including periorbital oedema and face oedema
- *Respiratory, Thoracic & Mediastinal*: dyspnoea, including exertional dyspnoea and dyspnoea at rest
- *Vascular*: hypertension, blood pressure increased

Table 6 presents the laboratory abnormalities in SPRINT Phase II Stratum 1.

Table 6 Select Laboratory Abnormalities (≥ 15%) Worsening from Baseline in Patients Who Received KOSELUGO in SPRINT Phase II Stratum 1

Laboratory Abnormality	KOSELUGO	
	All Grades (%)*	Grade ≥ 3 (%)
Chemistry		
Increased creatine phosphokinase (CPK)	79	7 [§]
Decreased albumin	51	0
Increased aspartate aminotransferase (AST)	41	2
Increased alanine aminotransferase (ALT)	35	4
Increased lipase	32	5
Increased potassium	27	4
Decreased potassium	18	2 [§]
Increased alkaline phosphatase	18	0
Increased amylase	18	0
Increased sodium	18	0
Decreased sodium	16	0
Haematology		
Decreased haemoglobin	41	4
Decreased neutrophils	33	4
Decreased lymphocytes	20	2

* The denominator used to calculate the rate varied from 39 to 49 based on the number of patients with a baseline value and at least one post-treatment value.

[§] Includes one Grade 4 increased CPK and one Grade 4 increased potassium.

Adverse Drug Reactions Identified in Other Clinical Trials

Table 7 presents the adverse drug reactions identified from other clinical trial experience in adult patients (N=347), with multiple tumour types, receiving treatment with selumetinib (75 mg twice daily):

Table 7 Adverse Drug Reactions Reported in Adult Patients with multiple tumour types but not Reported in SPRINT Phase II Stratum I

MedDRA SOC	MedDRA Term	Overall Frequency (All CTCAE Grades)	Frequency of CTCAE Grade 3 and Above [†]
Eye disorders	Retinal Pigment Epithelial Detachment (RPED)/Central Serous Retinopathy (CSR)*	Uncommon (0.6%)	-
	Retinal Vein Occlusion (RVO)*	Uncommon (0.3%)	-

* ADRs based on grouping of individual Preferred Terms (PT):

CSR/RPED: Detachment of macular retinal pigment epithelium, Chorioretinopathy

RVO: Retinal vein occlusion, Retinal vein thrombosis, Retinal vascular disorder

In addition, a single event of RPED was reported in a paediatric patient receiving selumetinib monotherapy (25 mg/m² twice daily) for pilocytic astrocytoma involving the optic pathway in an externally sponsored paediatric study, see *sections 4.2 Dose and method of administration and 4.4 Special warnings and precautions*.

Reporting suspected adverse effects

Reporting suspected adverse reactions after registration of the medicinal product is important. It allows continued monitoring of the benefit-risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions at www.tga.gov.au/reporting-problems.

4.9 OVERDOSE

There is no specific treatment for overdose. If overdose occurs, patients should be treated supportively with appropriate monitoring as necessary. Dialysis is ineffective in the treatment of overdose.

For information on the management of overdose, contact the Poison Information Centre on 131126 (Australia).

5 PHARMACOLOGICAL PROPERTIES

5.1 PHARMACODYNAMIC PROPERTIES

Mechanism of action

Selumetinib is an orally available, inhibitor of mitogen-activated protein kinase kinases 1 and 2 (MEK1/2) that is not competitive with respect to ATP. MEK1/2 proteins are critical components of the RAS-regulated RAF-MEK-ERK pathway, which is often activated in different types of cancers. Selumetinib blocks MEK activity and inhibits growth of RAF-MEK-ERK pathway activated cell

lines. Therefore, MEK inhibition can block the proliferation and survival of tumour cells in which the RAF-MEK-ERK pathway is activated.

Pharmacodynamics

In genetically modified mouse models of NF1 that generate neurofibromas that recapitulate the genotype and phenotype of human type 1 neurofibromas, oral dosing of selumetinib inhibits ERK phosphorylation, reduces neurofibroma volume, proliferation, number and growth.

Cardiac electrophysiology

At a dose 1.5 times the maximum recommended dose, KOSELUGO does not prolong the QT/QTc interval to any clinically relevant extent.

Clinical trials

SPRINT

The efficacy of KOSELUGO was evaluated in an open-label, multi-centre, single-arm study [SPRINT Phase II Stratum 1 (NCT01362803)] of 50 paediatric patients with NF1 inoperable PN that caused significant morbidity. Inoperable PN was defined as a PN that could not be surgically completely removed without risk for substantial morbidity due to encasement of, or close proximity to, vital structures, invasiveness, or high vascularity of the PN. Patients received 25 mg/m² (BSA) twice daily, for 28 days (1 treatment cycle), on a continuous dosing schedule. Treatment was discontinued if a patient was no longer deriving clinical benefit, experienced unacceptable toxicity or PN progression, or at the discretion of the investigator.

The target PN, the PN that caused relevant clinical symptoms or complications (PN-related morbidities), was evaluated for response rate using centrally read volumetric magnetic resonance imaging (MRI) analysis per Response Evaluation in Neurofibromatosis and Schwannomatosis (REINS) criteria. Tumour response was evaluated at baseline and while on treatment after every 4 cycles for 2 years, and then every 6 cycles.

Patients had target PN MRI volumetric evaluations and clinical outcome assessments, which included functional assessments and patient reported outcomes.

The median age of the patients was 10.2 years (range: 3.5 - 17.4 years), 60% were male, 84% were Caucasian.

Disease characteristics at baseline are provided in Table 8.

Table 8 Baseline disease characteristics	
Characteristics	SPRINT (N = 50)
Target PN volume (mL):	
Median (range)	487.5 (5.6 - 3820)
Number of PN related morbidities:	
Median (range)	3 (1 - 4)
Target PN related morbidities (%):	

Table 8 Baseline disease characteristics

Characteristics	SPRINT (N = 50)
Disfigurement	88%
Motor dysfunction	66%
Pain	52%
Airway dysfunction	32%
Visual impairment	20%
Bladder/bowel dysfunction	20%

The primary efficacy endpoint was Objective Response Rate (ORR), defined as the percentage of patients with complete response (defined as disappearance of the target PN) or confirmed partial response (defined as $\geq 20\%$ reduction in PN volume, confirmed at a subsequent tumour assessment within 3-6 months), based on NCI centralised review. Duration of Response (DoR) was also evaluated.

The primary endpoint, ORR was 66% (95% CI, 51.2 – 78.8). Time to onset of response for the majority of patients (24/33 [72.7%]) was within 8 cycles (range 4 – 20 cycles).

The median DoR from onset of response was not reached; at the time of data cut-off the median follow-up time was 24 cycles. Of the 33 patients who had confirmed partial responses, 29 (87.9%) remained in response after 12 cycles; 4 patients were censored not due to progression. The probability to remain in response after 12 and 16 cycles, estimated using the Kaplan-Meier method, was 100% (95% CI not estimated) and 96.2% (95% CI 75.7 – 99.4), respectively. The median time from treatment initiation to disease progression while on treatment was not reached.

Table 9 NF1 PN efficacy results from SPRINT Phase II Stratum 1

Efficacy Parameter	SPRINT (N = 50)
Objective Response Rate^a	
Objective Response Rate, % (95% CI)	66.0 (51.2 – 78.8)
Best objective response, n (%)^{b, c}	
Complete Response	0
Confirmed Partial Response	33 (66%)
Unconfirmed Partial Response	4 (8%)
Stable Disease	11 (22%)
Progressive Disease	0
Duration of Response	
DoR ≥ 12 months, n (%)	27 (82%)

CI - confidence interval, NE – not estimated, NR - not reached

a Responses required confirmation at least 3 months after the criteria for first partial response were met.

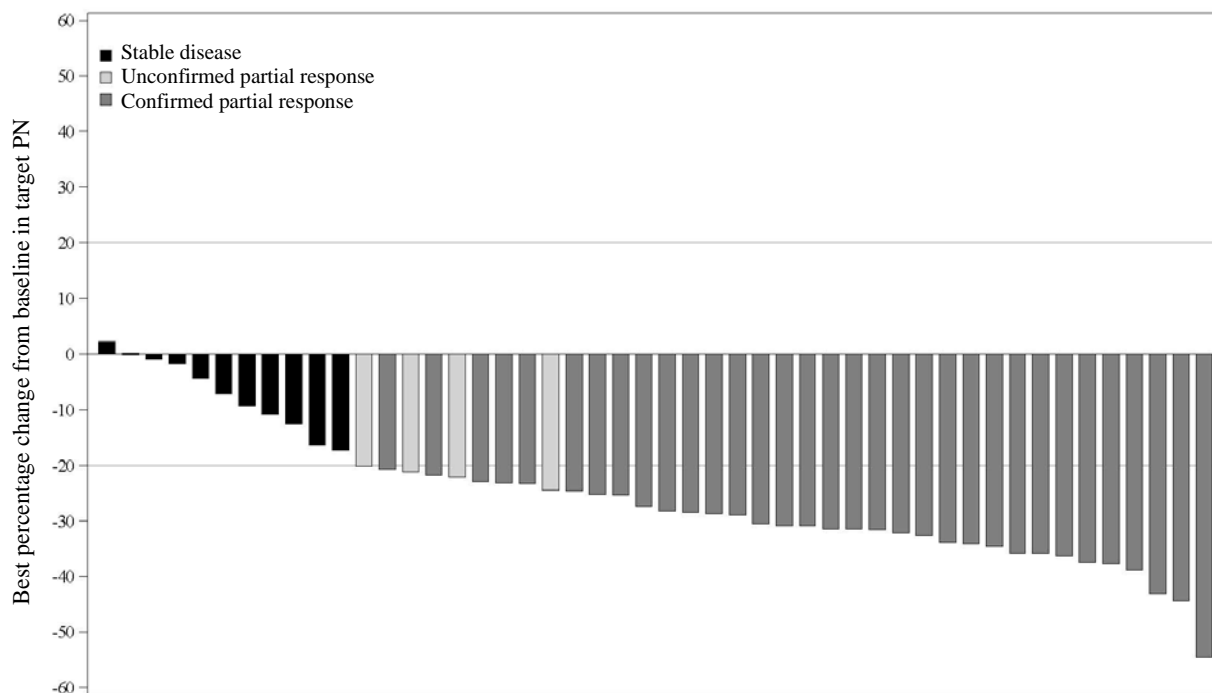
b Complete response: disappearance of the target lesion; Partial Response: decrease in target PN volume by $\geq 20\%$ compared to baseline; Stable Disease: insufficient volume change from baseline to qualify for either partial response or progressive disease; Progressive Disease: increase in target PN volume by $\geq 20\%$ compared to baseline or the documented time of best response.

c Two patients were not evaluable.

At the time of data cut-off, 28 (56%) patients remained in confirmed partial response, 2 (4%) had unconfirmed partial responses, 15 (30%) had stable disease and 3 (6%) had progressive disease.

The median best percentage change in PN volume from baseline was -27.85% (range: 2.2% to -54.5%). Figure 1 shows the best percentage change in target PN volume for each patient.

Figure 1 Waterfall plot of best percentage change from baseline in target PN volume^a



^a Best percentage change in target PN volume is the maximum reduction from baseline, or the minimum increase from baseline in the absence of a reduction. Two patients were not evaluable.

An independent centralized review of tumor response per REiNS criteria resulted in an ORR of 44% (95% CI: 30.0, 58.7).

5.2 PHARMACOKINETIC PROPERTIES

At the recommended dosage of 25 mg/m² twice daily in paediatric patients (3 to ≤18 years old), the geometric mean (coefficient of variation [CV%]) maximum plasma concentration (C_{max}) was 731 (62%) ng/mL and that of the area under the plasma drug concentration curve (AUC₀₋₁₂) following the first dose was 2009 (35%) ng·h/mL. Minimal accumulation of ~1.1 fold was observed at steady state upon twice daily dosing.

In paediatric patients, at a dose level of 25 mg/m², selumetinib has an apparent oral clearance of 8.8 L/h, mean apparent volume of distribution at steady state of 78 L and mean elimination half-life of ~6.2 hours.

Absorption

In healthy adult subjects, the mean absolute oral bioavailability of selumetinib was 62%.

Following oral dosing, selumetinib is rapidly absorbed, producing peak steady state plasma concentrations (t_{max}) between 1-1.5 hours post-dose.

Effect of gastric acid reducing agents on selumetinib

Selumetinib capsules do not exhibit pH dependent dissolution. KOSELUGO can be used concomitantly with gastric pH modifying agents (i.e. H₂-receptor antagonists and proton pump inhibitors) without restrictions, except for omeprazole which is a CYP2C19 inhibitor.

Distribution

The mean apparent volume of distribution at steady state of selumetinib across 20 to 30 mg/m² ranged from 78 to 171 L in paediatric patients, indicating moderate distribution into tissue.

In vitro plasma protein binding is 98.4% in humans. Selumetinib mostly binds to serum albumin (96.1%) than α -1 acid glycoprotein (<35%).

Metabolism

In vitro, selumetinib undergoes Phase 1 metabolic reactions including oxidation of the side chain, N-demethylation, and loss of the side chain to form amide and acid metabolites. CYP3A4 is the predominant isoform responsible for selumetinib oxidative metabolism with CYP2C19, CYP1A2, CYP2C9, CYP2E1 and CYP3A5 involved to a lesser extent. *In vitro* studies indicate that selumetinib also undergoes direct Phase 2 metabolic reactions to form glucuronide conjugates principally involving the enzymes UGT1A1 and UGT1A3. Glucuronidation is a significant route of elimination for selumetinib Phase 1 metabolites involving several UGT isoforms.

Following oral dosing of ¹⁴C-selumetinib to healthy male subjects, unchanged selumetinib (~40% of the radioactivity) with other metabolites including glucuronide of imidazoindazole metabolite (M2; 22%), selumetinib glucuronide (M4; 7%), N-desmethyl selumetinib (M8; 3%), and N-desmethyl carboxylic acid (M11; 4%) accounted for the majority of the circulating radioactivity in human plasma. The active metabolite, N-desmethyl selumetinib represents less than 10% of selumetinib levels in human plasma but is approximately 3 to 5 times more potent than the parent compound, contributing to about 21% to 35% of the overall pharmacologic activity. N-desmethyl selumetinib is mainly generated by CYP2C19 and catabolised by CYP3A4.

Excretion

In healthy adult volunteers, following a single oral 75 mg dose of radiolabelled selumetinib, 59% of the dose was recovered in faeces (19% unchanged) while 33% of the administered dose (<1% as parent) was found in urine by 9 days of sample collection.

Special populations

Renal impairment

The exposure of 50 mg oral selumetinib was investigated in adult subjects with normal renal function (n=11) and subjects with ESRD (n=12). The ESRD group showed 16% and 28% lower C_{max} and AUC, respectively, with the fraction of unbound selumetinib being 35% higher in ESRD subjects. As a result, the unbound C_{max} and AUC ratios were 0.97 and 1.13 in the ESRD group when compared to the group with normal renal function. A small increase, approximately 20%

AUC, in the N-desmethyl metabolite to parent ratio was detected in the ESRD group when compared to the normal group. As exposure in ESRD subjects was similar to those with normal renal function, investigations in mild, moderate and severe renally impaired subjects were not performed. Renal impairment is expected to have no meaningful influence on the exposure of selumetinib (*see section 4.2 Dose and method of administration*).

Hepatic impairment

Adult subjects with normal hepatic function (n=8) and mild hepatic impairment (Child-Pugh A, n=8) were dosed with 50 mg selumetinib, subjects with moderate hepatic impairment (Child-Pugh B, n=8) were administered a 50 or 25 mg dose, and subjects with severe hepatic impairment (Child-Pugh C, n=8) were administered a 20 mg dose. Selumetinib total dose normalised AUC and unbound AUC were 86% and 69% respectively, in mild hepatic impairment patients, compared to the AUC values for subjects with normal hepatic function. Selumetinib exposure (AUC) was higher in patients with moderate (Child-Pugh B) and severe (Child-Pugh C) hepatic impairment; the total AUC and unbound AUC values were 159% and 141% (Child-Pugh B) and 157% and 317% (Child-Pugh C), respectively, of subjects with normal hepatic function (*see section 4.2 Dose and method of administration*).

Ethnicity

Following a single-dose, selumetinib exposure appears to be higher in Japanese, non-Japanese-Asian and Indian healthy adult volunteers compared to Western adult volunteers. However, there is considerable overlap with Western subjects when corrected for body weight or BSA (*see section 4.2 Dose and method of administration*).

Adult patients (>18 years old)

The PK parameters in adult healthy volunteers and adult patients with advanced solid malignancies, are similar to those in paediatric patients (3 to ≤18 years old) with NF1.

In adult patients with solid malignancies, at a dose of 75 mg twice daily, C_{max} and geometric mean (%CV) AUC were 1307 (76%) ng/mL and 4736 (37%) ng·h/mL, respectively. Peak plasma concentrations of selumetinib were achieved 1.5-hour post-dose with a mean elimination half-life of 7.8 hours. C_{max} and AUC increased dose proportionally over a 25 mg to 100 mg dose range, and administration of 75 mg selumetinib twice daily resulted in minimal accumulation of ~1.2 fold.

5.3 PRECLINICAL SAFETY DATA

Genotoxicity

Selumetinib showed no mutagenic or clastogenic potential in *in vitro* bacterial reverse mutation [Ames] and mammalian mutagenesis [tk locus TK] assays, and in an *in vitro* micronucleus assay (in mouse lymphoma L5178Y cells) but produced an increase in micronucleated immature erythrocytes (chromosome aberrations) in *in vivo* micronucleus assays in mice at ≥121 mg/kg, predominantly via an aneugenic mode of action. The exposure at the No Observed Effect Level (NOEL) of 24 mg/kg was approximately 40 times the clinical exposure at the MRHD based on C_{max} . The weight of evidence indicates selumetinib has a low genotoxic potential.

Carcinogenicity

No evidence of tumourigenicity by selumetinib was observed in a 6-month study in transgenic (Tg.rasH2) mice and in a conventional 2-year study in rats. The highest doses tested (15 mg/kg BID in mice and 2.5 mg/kg once daily in male rats and 1 mg/kg once daily in female rats) yielded exposures 20 (male mice), 31 (female mice), 17 (male rat) and 13 (female rat) times the human clinical exposure at the MRHD based on AUC).

6 PHARMACEUTICAL PARTICULARS

6.1 LIST OF EXCIPIENTS

10 mg hard capsule

- Capsule content: Tocofersolan
- Capsule shell: Hypromellose, Carrageenan, Potassium chloride, Titanium dioxide, Carnauba wax and Purified water.
- Printing ink: Shellac, Iron oxide black, Propylene glycol, Strong ammonia solution.

25 mg hard capsule

- Capsule content: Tocofersolan
- Capsule shell: Hypromellose, Carrageenan, Potassium chloride, Titanium dioxide, Indigo carmine, Iron oxide yellow. Purified water, Carnauba wax and/or maize starch.
- Printing ink: Iron oxide red, Iron oxide yellow, Indigo carmine aluminium lake, Carnauba wax, Shellac, Glyceryl monooleate.

6.2 INCOMPATIBILITIES

Incompatibilities were either not assessed or not identified as part of the registration of this medicine.

6.3 SHELF LIFE

In Australia, information on the shelf life can be found on the public summary of the Australian Register of Therapeutic Goods (ARTG). The expiry date can be found on the packaging.

6.4 SPECIAL PRECAUTIONS FOR STORAGE

Store below 30°C.

Store in the original bottle to protect from moisture. Keep the bottle tightly closed

Do not remove desiccant.

6.5 NATURE AND CONTENTS OF CONTAINER

HDPE plastic bottle with child-resistant closure and silica gel desiccant, containing 60 hard capsules.

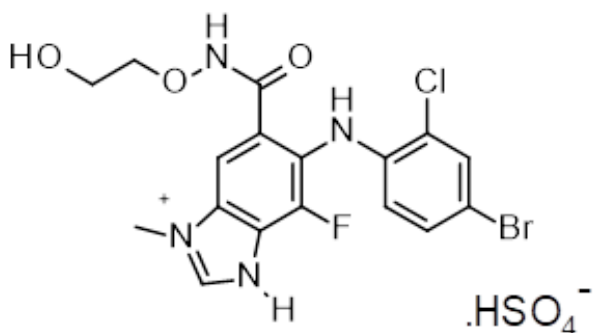
6.6 SPECIAL PRECAUTIONS FOR DISPOSAL

In Australia, any unused medicine or waste material should be disposed of by taking to your local pharmacy.

6.7 PHYSICOCHEMICAL PROPERTIES

Chemical structure

Figure 2 Chemical structure of selumetinib (as sulfate)



CAS number

CAS 943332-08-9 (selumetinib sulfate)

7 MEDICINE SCHEDULE (POISONS STANDARD)

Prescription only medicine (Schedule 4)

8 SPONSOR

AstraZeneca Pty Ltd
ABN 54 009 682 311
66 Talavera Road
MACQUARIE PARK NSW 2113

Telephone: 1800 805 342

9 DATE OF FIRST APPROVAL

02 December 2021

10 DATE OF REVISION

Not Applicable

AusPAR – Koselugo – selumetinib sulfate - Alexion Pharmaceuticals, Inc. - PM-2020-05290-1-4 FINAL 6 August 2024 This is the Product Information that was approved with the submission described in this AusPAR. It may have been superseded. For the most recent PI, please refer to the TGA website at <<https://www.tga.gov.au/product-information-pi>>

Summary table of changes

Section changed	Summary of new information
N/A	New product

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