

# NEW ZEALAND DATA SHEET

## 1. PRODUCT NAME

Rozlytrek (entrectinib) 100 mg and 200 mg hard capsules.

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each 100 mg hard capsule contains 100 mg entrectinib.

Each 200 mg hard capsule contains 200 mg entrectinib.

### Excipients with known effect

Each 100 mg hard capsule contains 65 mg lactose. Each 200 mg hard capsule contains 130 mg lactose.

For the full list of excipients, see section *6.1 List of excipients*.

## 3. PHARMACEUTICAL FORM

Hard capsule.

Rozlytrek 100 mg hard capsules are yellow with “ENT 100” imprinted in blue on the body.

Rozlytrek 200 mg hard capsules are orange with “ENT 200” imprinted in blue on the body.

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

#### **Solid tumours**

Rozlytrek is indicated for the treatment of adult and paediatric patients 12 years of age and older, with neurotrophic tyrosine receptor kinase (NTRK) fusion-positive locally advanced or metastatic solid tumours, who have progressed following prior therapies, or as initial therapy when there are no acceptable standard therapies.

This indication was approved based on objective response rate and response duration in single-arm trials. Continued approval for this indication depends on verification and description of clinical benefit in the confirmatory trials.

#### **Non-small cell lung cancer (NSCLC)**

Rozlytrek is indicated for the treatment of adult patients with ROS1-positive, locally advanced or metastatic NSCLC.

### 4.2 Dose and method of administration

#### **General**

#### Patient selection

##### *Solid tumours*

A validated assay is required for the selection of patients with NTRK fusion-positive locally advanced or metastatic solid tumours. NTRK fusion-positive status should be established prior to initiation of Rozlytrek therapy.

## NSCLC

A validated assay is required for the selection of patients with ROS1-positive locally advanced or metastatic NSCLC. ROS1-positive status should be established prior to initiation of Rozlytrek therapy.

## Dose

### Adult patients

The recommended dose of Rozlytrek for adult patients is 600 mg given orally, once daily (see section 5.2 *Pharmacokinetic properties*).

### Paediatric patients

The recommended dose of Rozlytrek for paediatric patients 12 years of age and older, who have the ability to swallow capsules is 300 mg/m<sup>2</sup> orally, once daily (see Table 1) (see section 5.2 *Pharmacokinetic properties*).

**Table 1. Recommended dosing for paediatric patients**

Body surface area (BSA)	Once daily dose
0.81 - 1.10 m <sup>2</sup>	300 mg
1.11 - 1.50 m <sup>2</sup>	400 mg
≥ 1.51 m <sup>2</sup>	600 mg

## Duration of Treatment

It is recommended that patients are treated with Rozlytrek until disease progression or unacceptable toxicity.

## Delayed or Missed Dose

If a planned dose of Rozlytrek is missed, patients can make up that dose unless the next dose is due within 12 hours. If vomiting occurs immediately after taking a dose of Rozlytrek, patients may repeat that dose.

## Dose Modifications

Management of adverse events may require temporary interruption, dose reduction, or discontinuation of treatment with Rozlytrek, based on the prescriber's assessment of the patient's safety or tolerability.

### *Adults*

For adults, the dose of Rozlytrek may be reduced up to 2 times, based on tolerability. Table 2 provides general dose reduction advice for adult patients. Rozlytrek treatment should be permanently discontinued if patients are unable to tolerate a dose of 200 mg once daily.

**Table 2. Dose reduction schedule for adult patients**

Dose reduction schedule	Dose level
Starting Dose	600 mg once daily
First dose reduction	400 mg once daily
Second dose reduction	200 mg once daily

### Paediatric patients

Table 3 provides specific dose reduction advice for paediatric patients 12 years and older. For paediatric patients 12 years and older, the dose of Rozlytrek may be reduced up to 2 times, based on tolerability.

For some patients an intermittent dosing schedule is required to achieve the recommended reduced total weekly paediatric dose. Rozlytrek treatment should be permanently discontinued if patients are unable to tolerate the lowest reduced dose.

**Table 3. Dose reduction schedule for paediatric patients**

Starting Dose once daily	First dose reduction	Second dose reduction
300 mg	200 mg once daily	100 mg once daily
400 mg	300 mg once daily	200 mg, once/day for 5 days each week*
600 mg	400 mg once daily	200 mg once daily

\*5 days each week: Monday, Wednesday, Friday, Saturday, and Sunday

\*\*3 days each week: Monday, Thursday and Saturday

### Dose modifications for specific adverse reactions

Recommendations for Rozlytrek dose modifications for adults and paediatric patients for specific adverse reactions are provided in Table 4 (see sections 4.4 *Special warnings and precautions for use* and 4.8 *Undesirable effects*).

**Table 4. Recommended dose modifications for specified adverse drug reactions for adult and paediatric patients**

Adverse Drug Reaction	Severity *	Dose modification
<b>Anaemia or neutropenia</b>	Grade 3 or Grade 4	Withhold Rozlytrek until recovery to $\leq$ Grade 2 or to baseline, then resume treatment at same dose level or reduce dose, as clinically needed.
<b>Cognitive disorders</b>	Grade $\geq$ 2	Withhold Rozlytrek until recovery to $\leq$ Grade 1 or to baseline, then resume treatment at reduced dose. If event recurs, further reduce dose. For prolonged, severe, or intolerable events, discontinue as clinically appropriate.
<b>Transaminase elevations</b>	Grade 3	Withhold Rozlytrek until recovery to less than or equal to Grade 1 or to baseline. Resume at same dose if resolution occurs within 4 weeks. Permanently discontinue if adverse reaction does not resolve within 4 weeks. Resume at a reduced dose for recurrent Grade 3 events that resolve within 4 weeks.
	Grade 4	Withhold Rozlytrek until recovery to less than or equal to Grade 1 or to baseline. Resume at reduced dose if resolution occurs within 4 weeks. Permanently discontinue if adverse reaction does not resolve within 4 weeks.

<b>Adverse Drug Reaction</b>	<b>Severity *</b>	<b>Dose modification</b>
		Permanently discontinue for recurrent Grade 4 events.
	ALT or SST elevation greater than 3 times ULN with total bilirubin elevation greater than 2 times ULN in the absence of cholestasis or haemolysis	Permanently discontinue Rozlytrek.
<b>Hyperuricemia</b>	Symptomatic or Grade 4	Initiate urate-lowering medication. Withhold Rozlytrek until improvement of signs or symptoms. Resume Rozlytrek at same or reduced dose.
<b>Congestive heart failure</b>	Grade 2 or 3	Withhold Rozlytrek until recovered to $\leq$ Grade 1. Resume treatment at reduced dose.
	Grade 4	Withhold Rozlytrek until recovered to $\leq$ Grade 1. Resume treatment at reduced dose or discontinue as clinically appropriate.
<b>QT interval prolongation</b>	QTc 481 to 500 ms	Withhold Rozlytrek until recovered to baseline. Resume treatment at same dose.
	QTc greater than 500 ms	Withhold Rozlytrek until QTc interval recovers to baseline. Resume treatment at same dose if factors that cause QT prolongation are identified and corrected. Resume at reduced dose if other factors that cause QT prolongation are not identified.
	Torsade de pointes; polymorphic ventricular tachycardia; signs/symptoms of serious arrhythmia	Permanently discontinue Rozlytrek.
<b>Other clinically relevant adverse reactions</b>	Grade 3 or 4	Withhold Rozlytrek until adverse reaction resolves or improvement to Grade 1 or baseline. Resume at the same or reduced dose, if resolution occurs within 4 weeks. Consider permanent discontinuation if adverse reaction does not resolve within 4 weeks. Permanently discontinue for recurrent Grade 4 events.

\*Severity as defined by National Cancer Institute Common Terminology Criteria for Adverse Events (NCI CTCAE)

### Dose modifications for specific medicine interactions

#### *Concomitant strong or moderate CYP3A inhibitors*

##### *Adults*

The concomitant use of strong or moderate CYP3A inhibitors and Rozlytrek in adults should be avoided or limited to 14 days or less. If concomitant use of strong or moderate CYP3A inhibitors cannot be avoided, Rozlytrek dose should be reduced to 100 mg once daily for use

with strong CYP3A inhibitors and to 200 mg once daily for use with moderate CYP3A inhibitors.

After discontinuation of the concomitant strong or moderate CYP3A inhibitors, the Rozlytrek dose that was taken prior to initiating the strong or moderate CYP3A inhibitor can be resumed. A wash out period may be required for CYP3A4 inhibitors with a long half-life (see section 4.5 *Interactions with other medicines and other forms of interactions*).

#### *Paediatric patients*

The concomitant use of strong or moderate CYP3A inhibitors in paediatric patients should be avoided (see section 4.5 *Interactions with other medicines and other forms of interactions*).

#### *Concomitant CYP3A inducers*

Co-administration of Rozlytrek with CYP3A inducers in adult and paediatric patients should be avoided (See section 4.5 *Interactions with other medicines and other forms of interactions*).

### Special populations

#### *Elderly*

No dose adjustment of Rozlytrek is required in patients  $\geq 65$  years of age (see section 5.2 *Pharmacokinetic properties*).

#### *Paediatric populations*

The dosage for patients is based on body surface area ( $\text{mg}/\text{m}^2$ ) with a maximum daily dose of 600 mg (see Table 1 for paediatric dosing).

#### *Renal impairment*

No dose adjustment is required in patients with mild or moderate renal impairment. The safety and efficacy of Rozlytrek have not been studied in patients with severe renal impairment. However, since entrectinib elimination via the kidney is negligible, no dose adjustment is required in patients with severe renal impairment (see sections 4.4 *Special warnings and precautions for use* and 5.2 *Pharmacokinetic properties*).

#### *Hepatic impairment*

The safety and efficacy of Rozlytrek have not been studied in patients with hepatic impairment (see sections 4.4 *Special warnings and precautions for use* and 5.2 *Pharmacokinetic properties*).

#### *Ethnicity*

No dose adjustment is necessary for patients of different ethnicities (see section 5.2 *Pharmacokinetic properties*).

### **Method of Administration**

Rozlytrek can be taken with or without food. Capsules should be swallowed whole. Capsules must not be opened or dissolved.

### **4.3 Contraindications**

Rozlytrek is contraindicated in patients with a known hypersensitivity to entrectinib or any of the excipients.

## 4.4 Special warnings and precautions for use

### **Congestive heart failure**

Congestive heart failure (CHF) has been reported across clinical trials with Rozlytrek (see Table 5 in section 4.8 *Undesirable effects*). These reactions were observed in patients with or without a history of cardiac disease and resolved upon treatment with diuretics and/or dose reduction/interruption of Rozlytrek.

For patients with symptoms or known risk factors of CHF, left ventricular ejection fraction (LVEF) should be assessed prior to initiation of Rozlytrek treatment. Patients receiving Rozlytrek should be carefully monitored and those with clinical signs and symptoms of CHF, including shortness of breath or oedema, should be evaluated and treated as clinically appropriate.

Based on the severity of CHF, Rozlytrek treatment should be modified as described in Table 4 in section 4.2 *Dose and method of administration*.

### **Cognitive disorders**

Cognitive disorders, including confusion, mental status changes, memory impairment, and hallucinations, were reported in clinical trials with Rozlytrek, (see section 4.8 *Undesirable effects*). Patients should be monitored for signs of cognitive changes.

Based on the severity of the cognitive disorder, Rozlytrek treatment should be modified as described in Table 4 in section 4.2 *Dose and method of administration*.

Patients should be counselled on the potential for cognitive changes with Rozlytrek treatment. Patients should be instructed not to drive or use machines until symptoms resolve, if they experience symptoms of cognitive disorders (see section 4.7 *Effects on ability to drive and use machines*).

### **Fractures**

Rozlytrek increases the risk of fractures (see description of selected ADRs). Patients with signs or symptoms (e.g., pain, changes in mobility, deformity) of fractures should be evaluated promptly. In adult patients, some fractures occurred in the setting of a fall or other trauma to the affected area, while in paediatric patients fractures occurred in patients with minimal or no trauma. There are no data on the effects of Rozlytrek on healing of known fractures and the risk of occurrence of future fractures. In the majority of paediatric patients treatment was continued with Rozlytrek and the fracture healed.

### **QTc interval prolongation**

QT interval prolongation has been observed in patients treated with Rozlytrek in clinical trials (see section 4.8 *Undesirable effects*).

The use of Rozlytrek should be avoided in patients with congenital long QT syndrome and in patients taking medications that are known to prolong QT interval. Assessment of ECG at baseline and periodic monitoring of ECGs and electrolytes are recommended.

Based on the severity of QTc prolongation, Rozlytrek treatment should be modified as described in Table 4 in section 4.2 *Dose and method of administration*.

### **Use in the elderly**

No differences in safety or efficacy were observed between patients  $\geq 65$  years of age and younger patients. No dose adjustment is required in patients  $\geq 65$  years of age (see sections 4.2 *Dose and method of administration* and 5.2 *Pharmacokinetic properties*).

### **Paediatric use**

The safety and efficacy of Rozlytrek have been studied in paediatric patients. In addition, the use of Rozlytrek in paediatric patients is supported by the extrapolation of evidence from clinical trials in adults to the paediatric population, based on population pharmacokinetic data demonstrating similar drug exposure in adults and paediatric patients (see sections 4.2 *Dose and method of administration*, 5.1 *Pharmacodynamic properties* and 5.2 *Pharmacokinetic properties*).

Rozlytrek was associated with a higher incidence of skeletal fractures in the paediatric patients compared to adult patients (see section 4.4 *Special warnings and precautions for use* and 4.8 *Undesirable effects*).

### **Renal impairment**

No dose adjustment is required in patients with mild or moderate renal impairment based on population pharmacokinetic analysis. The safety and efficacy of Rozlytrek in patients with severe renal impairment have not been studied (see sections 4.2 *Dose and method of administration* and 5.2 *Pharmacokinetic properties*).

### **Hepatic impairment**

The safety and efficacy of Rozlytrek in patients with hepatic impairment have not been studied (see sections 4.2 *Dose and method of administration* and 5.2 *Pharmacokinetic properties*).

## **4.5 Interactions with other medicines and other forms of interactions**

### **Effects of entrectinib on others drugs**

#### CYP substrates

Based on *in vitro* studies in human liver microsomes, entrectinib exhibits inhibitory potential toward CYP3A.

*In vitro* studies indicate that entrectinib and its major active metabolite, M5, do not inhibit CYP1A2, CYP2B6, CYP2C8, CYP2C9, CYP2C19 and CYP2D6 at clinically relevant concentrations.

*In vitro* results indicate entrectinib has weak induction potential toward CYP3A and CYP2C8/9.

In a clinical study, co-administration of multiple doses of entrectinib and midazolam (a sensitive CYP3A substrate) increased the systemic exposure of midazolam by approximately 50%, indicating a weak inhibitory effect of entrectinib on the metabolism of midazolam (Geometric mean ratio [GMR] with/without entrectinib for  $AUC_{inf}$  was 150% [90% CI: 129%, 173%]).

Therefore, no dose adjustment is required when Rozlytrek is co-administered with CYP3A substrates.

#### P-glycoprotein (P-gp) substrates

*In vitro* data suggest that entrectinib has inhibitory potential towards P-gp.

In a clinical study, co-administration of a single oral dose of entrectinib with a sensitive P-gp substrate, digoxin, increased the digoxin  $C_{max}$  by approximately 28% and overall exposure by approximately 18% (GMR with/without entrectinib for  $C_{max}$  was 128% [90% CI: 98.2%, 167%] and  $AUC_{inf}$  was 118% [90% CI: 106%, 132%]). The renal clearance of digoxin was similar between treatments of digoxin alone and digoxin co-administered with entrectinib, indicating minimal effect of entrectinib on renal clearance of digoxin.

These results indicate that entrectinib is a weak P-gp inhibitor and that no clinically significant interaction exists between digoxin, as a P-gp substrate, and entrectinib. Therefore, no dose adjustment is required when Rozlytrek is co-administered with P-gp substrates.

#### Breast cancer resistance protein (BCRP) substrates

As with P-gp, a mild inhibition of BCRP was observed in *in vitro* studies. Given that no clinically significant interaction was observed with the P-gp substrate digoxin, an interaction with BCRP is not predicted. No dose adjustment is required when Rozlytrek is co-administered with BCRP substrates

#### Other transporter substrates

*In vitro* data indicate that entrectinib has weak inhibitory potential toward organic anion-transporting polypeptide (OATP) 1B1 and multidrug and toxin extrusion protein 1 (MATE1).

#### Oral contraceptives

Physiologically-based pharmacokinetic simulation of the effects of co-administration of multiple oral doses of entrectinib with ethinyl estradiol, an oral contraceptive, predicted no drug-drug interaction. GMR with/without entrectinib for  $AUC_{inf}$  of 112% (90% CI: 111%, 113%) and  $C_{max}$  was 112% (90% CI: 111%, 113%).

Therefore Rozlytrek can be co-administered with an oral contraceptive.

#### **Effects of other drugs on entrectinib**

Based on *in vitro* data, CYP3A4 is the predominant enzyme mediating the metabolism of entrectinib and formation of its major active metabolite M5.

#### CYP3A inducers

Co-administration of multiple oral doses of rifampin, a strong CYP3A inducer, with a single oral dose of entrectinib, reduced the systemic exposure of entrectinib by 77%. GMR with/without rifampin for  $AUC_{inf}$  was 23.3% (90% CI: 18.4%, 29.5%) and  $C_{max}$  was 44.4% (90% CI: 35.3%, 55.9%).

Co-administration of Rozlytrek with CYP3A inducers should be avoided (see section 4.2 *Dose and method of administration*).

#### CYP3A inhibitors

Co-administration of a single oral dose of entrectinib with multiple oral doses of itraconazole, a strong CYP3A4 inhibitor, increased the systemic exposure of entrectinib by 500%. GMR with/without itraconazole for  $AUC_{inf}$  was 604% (90% CI: 454%, 804%) and  $C_{max}$  was 173% (90% CI: 137%, 218%).

Co-administration of strong and moderate CYP3A inhibitors (including, but not limited to, anti-fungal agents and anti-retroviral agents) with Rozlytrek should be avoided or limited to



14 days. If concurrent use is unavoidable, dose adjustment of Rozlytrek is required as described in section 4.2 *Dose and method of administration*.

#### Medicinal products that increase gastric pH

The aqueous solubility of entrectinib *in vitro* is pH dependent. In a clinical study, administration of entrectinib with lansoprazole (a proton pump inhibitor [PPI]), resulted in a 25% decrease in entrectinib systemic exposure which is not clinically relevant. GMR with/without lansoprazole for AUC<sub>inf</sub> was 74.5% (90% CI: 64.7%, 85.9%) and C<sub>max</sub> was 76.5% (90% CI: 67.6%, 86.6%).

Therefore, no dose adjustments are required when Rozlytrek is co administered with PPIs or other drugs that raise gastric pH (e.g., H<sub>2</sub> receptor antagonists or antacids).

#### **Effect of transporters on entrectinib disposition**

Based on the *in vivo* brain-to-plasma concentration ratio ( $\geq 0.6$ ) at steady-state in rats and dogs as well as lack of sensitivity to a P-gp inhibitor *in vitro* in a P-gp expressing cell assay, entrectinib is considered a poor substrate of P-gp. M5 is a substrate of P-gp.

Entrectinib is not a substrate of BCRP but M5 is a substrate of BCRP. Entrectinib and M5 are not substrates of OATP1B1 or OATP1B3.

### **4.6 Fertility, pregnancy and lactation**

#### **Pregnancy - Category D**

Based on the findings in animal studies and its mechanism of action, Rozlytrek may cause foetal harm when administered to a pregnant woman.

Female patients receiving Rozlytrek should be advised of the potential harm to the foetus.

Female patients of child-bearing potential must be advised to avoid pregnancy while receiving Rozlytrek.

Female patients should be advised to contact the doctor, should pregnancy occur.

There is no available data on the use of Rozlytrek in pregnant women. In an embryofoetal developmental study in rats, maternal toxicity (decreased body weight gain and food consumption) and foetal malformations (including body closure defects and malformations of the vertebrae and ribs), were observed at 200 mg/kg/day of entrectinib, which represents approximately 2-fold the human exposure by AUC at the recommended dose. Lower foetal weights and reduced skeletal ossification were observed at exposures equivalent to 0.7 times the human exposure by AUC at the recommended dose.

The safe use of Rozlytrek during labour and delivery has not been established.

#### Contraception in male and female patients

Female patients of child-bearing potential should have medically supervised pregnancy testing prior to initiating Rozlytrek therapy.

Female patients of child-bearing potential, must use highly effective contraceptive methods during treatment and for 5 weeks following the last dose of Rozlytrek.

Based on the potential for genotoxicity, male patients with female partners of child-bearing potential must use highly effective contraceptive methods during treatment and for 3 months following the last dose of Rozlytrek.

Patients receiving Rozlytrek should be advised of the potential harm to the foetus.

### **Breast-feeding**

It is not known whether entrectinib or its metabolites are excreted in human breast milk. No studies have been conducted to assess the effects of Rozlytrek on milk production or its presence in breast milk. As the potential for harm to the nursing infant is unknown, mothers should be advised to discontinue breast-feeding during treatment with Rozlytrek.

### **Fertility**

No fertility studies in animals have been performed to evaluate the effect of entrectinib. With the exception of dose dependent decreases in prostate weight in male dogs, no effects of entrectinib on reproductive organs were observed in the repeat-dose toxicology studies in rats and dogs at approximately 2.4-fold and 0.6-fold, respectively, the human exposure by AUC at the recommended human dose.

#### **4.7 Effects on ability to drive and use machines**

Rozlytrek may influence the ability to drive and use machines. Patients should be instructed to not drive or use machines until the symptoms resolve, if they experience cognitive adverse reactions, syncope, blurred vision, or dizziness, during treatment with Rozlytrek (see sections *4.4 Special warnings and precautions* and *4.8 Undesirable effects*).

#### **4.8 Undesirable effects**

##### **Summary of the safety profile**

For the clinical development program of Rozlytrek, a total of 504 patients have received Rozlytrek in 4 clinical trials (ALKA, STARTRK-1, STARTRK-2 and STARTRK-NG). The safety of Rozlytrek was evaluated as integrated analyses of these 4 clinical trials. The median duration of exposure to Rozlytrek was 5.5 months.

The safety of Rozlytrek in adult patients has been evaluated in a total of 475 patients with NTRK fusion-positive, ROS1-positive or ALK-positive solid tumours, in studies ALKA, STARTRK-1, STARTRK-2.

The safety of Rozlytrek has been evaluated in 29 paediatric patients with solid tumours (27 patients enrolled in STARTRK-NG, and 2 patients enrolled in STARTRK-2). Of these, 1 patient was less than 1 year old, 21 patients were 2 to 11 years old, 7 patients were 12 to 17 years old.

The most common adverse reactions ( $\geq 20\%$ ) were fatigue, constipation, dysgeusia, oedema, dizziness, diarrhoea, nausea, dyspnoea, dysaesthesia, anaemia, pain, blood creatinine increased, weight increased, cough, vomiting, pyrexia, arthralgia, myalgia. Fatal events included dyspnoea (0.6%), pneumonia (0.6%), sepsis (0.6%), completed suicide (0.3%), large intestine perforation (0.3%) and tumour lysis syndrome (0.3%).

##### **Tabulated summary of adverse drug reactions from clinical trials**

Table 5 summarises the adverse drug reactions (ADRs) occurring in adult and paediatric patients treated with Rozlytrek. ADRs from clinical trials are listed by MedDRA system organ class. The following categories of frequency have been used: 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  $< 1/1000$ ), very rare ( $< 1/10,000$ ).

**Table 5. Summary of adverse drug reactions occurring in patients treated with Rozlytrek in clinical trials (integrated safety population)**

System Organ Class/ Adverse Drug Reaction	Rozlytrek n = 504		Frequency Category (All Grades)
	All Grades (%)	Grade ≥3 (%)	
<b>General Disorders and Administration Site Conditions</b>			
Fatigue <sup>14</sup>	45.0	5.0	very common
Oedema <sup>6</sup>	37.3	1.4	very common
Pain <sup>7</sup>	24.4	1.6	very common
Pyrexia	20.0	0.8	very common
<b>Gastrointestinal Disorders</b>			
Constipation	42.9	0.4	very common
Diarrhoea	33.5	2.6	very common
Nausea	32.1	0.8	very common
Vomiting	23.2	1.2	very common
Abdominal pain	11.1	0.6	very common
Dysphagia	10.1	0.4	very common
<b>Nervous System Disorders</b>			
Dysgeusia	42.3	0.4	very common
Dizziness <sup>5</sup>	39.7	1.2	very common
Dysasthesia <sup>3</sup>	29.0	0.2	very common
Cognitive Disorders <sup>1</sup>	24.2	4.4	very common
Headache	17.5	1.0	very common
Peripheral sensory neuropathy <sup>2</sup>	15.7	1.0	very common
Ataxia <sup>4</sup>	15.7	0.8	very common
Sleep disturbances <sup>16</sup>	13.5	0.4	very common
Mood disorders <sup>17</sup>	9.1	0.6	common
Syncope	4.6	3.0	common
<b>Respiratory Disorders</b>			
Dyspnoea	27.0	5.8*	very common
Cough	21.4	0.6	very common
<b>Blood Disorders</b>			
Anaemia	28.2	9.7	very common
Neutropenia <sup>10</sup>	11.3	4.4	very common
<b>Metabolism and Nutritional Disorders</b>			
Weight increased	26.4	7.3	very common
Decreased appetite	11.9	0.2	very common
Hyperuricaemia	9.1	1.8	common
Dehydration	7.9	1.0	common
Tumour lysis syndrome	0.2	0.2*	uncommon
<b>Renal and urinary disorders</b>			
Blood creatinine increased	25.4	0.6	very common
<b>Musculoskeletal Disorders</b>			
Myalgia	19.6	0.6	very common

System Organ Class/ Adverse Drug Reaction	Rozlytrek n = 504		Frequency Category (All Grades)
	All Grades (%)	Grade ≥3 (%)	
Arthralgia	19.0	0.6	very common
Muscular weakness	12.3	1.2	very common
Fractures <sup>11</sup>	6.2	2.4	common
<b>Hepatobiliary Disorders</b>			
AST increased	17.5	3.6	very common
ALT increased	16.1	3.4	very common
<b>Infections and Infestations</b>			
Lung infection <sup>8</sup>	13.1	6.0*	very common
Urinary tract infection	12.7	2.6	very common
<b>Eye Disorders</b>			
Vision blurred <sup>13</sup>	11.9	0.4	very common
<b>Skin and Subcutaneous Tissue Disorders</b>			
Rash <sup>12</sup>	11.5	1.4	very common
<b>Vascular Disorders</b>			
Hypotension <sup>15</sup>	16.5	2.4	very common
<b>Cardiac Disorders</b>			
Congestive heart failure <sup>9</sup>	3.0	2.2	common
Electrocardiogram QT prolonged	2.0	0.6	common

ALT = alanine aminotransferase; AST = aspartate aminotransferase

\* Grades 3 to 5, inclusive of fatal adverse reactions (including 2 reactions of pneumonia, 2 reactions of dyspnoea, and 1 reaction of tumour lysis syndrome)

<sup>1</sup> Includes the preferred terms: cognitive disorder, confusional state, disturbance in attention, memory impairment, amnesia, mental status changes, hallucination, delirium, 'hallucination visual' and mental disorder

<sup>2</sup> Includes the preferred terms: neuralgia, neuropathy peripheral, peripheral motor neuropathy, peripheral sensory neuropathy

<sup>3</sup> Includes the preferred terms: paraesthesia, hyperesthesia, hypoesthesia, dysesthesia

<sup>4</sup> Includes the preferred terms: ataxia, balance disorder, gait disturbances

<sup>5</sup> Includes the preferred terms: dizziness, vertigo, dizziness postural

<sup>6</sup> Includes the preferred terms: face oedema, fluid retention, generalised oedema, localised oedema, oedema, oedema peripheral, peripheral swelling

<sup>7</sup> Includes the preferred terms: back pain, neck pain, musculoskeletal chest pain, musculoskeletal pain, pain in extremity

<sup>8</sup> Includes the preferred terms: bronchitis, lower respiratory tract infection, lung infection, pneumonia, respiratory tract infection, upper respiratory tract infection

<sup>9</sup> Includes the preferred terms: acute right ventricular failure, cardiac failure, cardiac failure congestive, chronic right ventricular failure, ejection fraction decreased, pulmonary oedema

<sup>10</sup> Includes the preferred terms: neutropenia, neutrophil count decreased

<sup>11</sup> Includes the preferred terms: humerus fracture, foot fracture, ankle fracture, femoral neck fracture, stress fracture, fibula fracture, fracture, rib fracture, spinal fracture, wrist fracture, femur fracture, pathological fracture

<sup>12</sup> Includes the preferred terms: rash, rash maculopapular, rash pruritic, rash erythematous, rash papular

<sup>13</sup> Includes the preferred terms: diplopia, vision blurred, visual impairment

<sup>14</sup> Includes the preferred terms: fatigue, asthenia

<sup>15</sup> Includes the preferred terms: hypotension, orthostatic hypotension

<sup>16</sup> Includes the preferred terms: hypersomnia, insomnia, sleep disorder, somnolence

<sup>17</sup> Includes the preferred terms: anxiety, affect lability, affective disorder, agitation, depressed mood, euphoric mood, mood altered, mood swings, irritability, depression, persistent depressive disorder, psychomotor retardation

## **Description of selected adverse drug reactions**

### Cognitive disorders

A variety of cognitive symptoms were reported across clinical trials (see section 4.4 *Special warnings and precautions for use*). These included events reported as cognitive disorders (6.3%), confusional state (7.3%), disturbance in attention (3.8%), memory impairment (4.2%), amnesia (2.8%), mental status changes (1.2%), hallucination (1.0%), delirium (0.8%), hallucination visual (0.4%) and mental disorder (0.2%). Grade 3 events were reported in 4.4% of patients. In the paediatric population, 3.4% (1/29) paediatric patients experienced disturbance in attention of Grade 1 severity. Patients who had brain metastases at baseline had a higher frequency of these events (29.7%) compared to those without brain metastases (23.1%).

### Fractures

Fractures were experienced by 5.3% (n = 475) of adult patients and 20.7% (n = 29) of paediatric patients. In general, there was inadequate assessment for tumour involvement at the site of fracture; however, radiologic abnormalities possibly indicative of tumour involvement were reported in some patients. In both adult and paediatric patients, most fractures were hip or other lower extremity fractures (e.g., femoral or tibial shaft). In 2 paediatric patients, bilateral femoral neck fractures occurred. No patients discontinued Rozlytrek due to fractures.

In adult patients, some fractures occurred in the setting of a fall or other trauma to the affected area. The median time to fracture was 3.42 months (range: 0.26 months to 18.5 months) in adults. Rozlytrek was interrupted due to fractures in 36.0% of adult patients.

In paediatric patients, all fractures occurred in patients with minimal or no trauma. The median time to fracture was 3.38 months (range: 1.77 months to 7.39 months) in paediatric patients. Rozlytrek was interrupted due to fractures in 33.3% of paediatric patients.

### Ataxia

Ataxia (including events of ataxia, balance disorder, and gait disturbances) was reported in 15.7% of patients. The median time to onset for ataxia was 0.36 months (range: 0.03 months to 28.19 months) and the median duration was 0.66 months (range: 0.03 months to 11.99 months). The majority of patients (67.1%) recovered from ataxia. Ataxia related adverse events were observed more frequently in elderly patients (23.8%) compared to patients below 65 years of age (12.8%).

### Syncope

Syncope events were reported in 4.6% of patients. In some patients, syncope was reported with concurrent hypotension, dehydration, or QTc prolongation and in other patients no other concurrent related conditions were reported.

### QTc interval prolongation

Among the 504 patients who received entrectinib across clinical trials, 17 (4.0%) patients with at least one post-baseline ECG assessment experienced QTcF interval prolongation of > 60 ms after starting entrectinib, and 12 (2.8%) patients had a QTcF interval of  $\geq 500$  ms.

### Peripheral sensory neuropathy

Peripheral sensory neuropathy was reported in 15.7% of patients. The median time to onset was 0.49 months (range 0.03 months to 20.93 months) and the median duration was 0.76

months (range: 0.07 months to 6.01 months). The majority of patients (55.7%) recovered from peripheral neuropathy.

### Eye Disorders

Eye disorders reported across clinical trials included events of vision blurred (8.5%), diplopia (2.6%), and visual impairment (1.6%). The median time to onset for eye disorders was 1.87 months (range: 0.03 months to 21.59 months). The median duration of eye disorders was 1.02 months (range 0.03 months to 14.49 months). The majority of patients (61.7%) recovered from the eye disorder events.

### Laboratory Abnormalities

The following table provides treatment-emergent shifts from baseline in laboratory abnormalities occurring in patients treated with Rozlytrek across the 4 clinical trials.

**Table 6. Treatment-emergent shifts from baseline in key laboratory abnormalities**

Laboratory Test Abnormality <sup>1</sup>	Rozlytrek NCI-CTCAE Grade n = 504 <sup>2</sup>	
	Change from Baseline All Grades (%)	Change from Baseline to Grade 3 or 4 (%) <sup>3</sup>
<b>Chemistry</b>		
Increased blood creatinine	94.8	3.1
Hyperuricaemia	50.8	6.8
Increased AST	43.3	3.3
Increased ALT	38.4	3.1
<b>Haematology</b>		
Decreased neutrophils	27.8	6.3
Decreased haemoglobin	65.7	9.2

AST = Aspartate aminotransferase; ALT = Alanine aminotransferase

<sup>1</sup> Based on number of patients with available baseline and at least one on-treatment test value

<sup>2</sup> n = 480 for blood creatinine; n = 478 for AST; n = 479 for and ALT; n = 382 for hyperuricemia; n = 457 for neutrophils; n = 487 for haemoglobin

<sup>3</sup> Patients with change from baseline values of Grade of 0 - 2 to a post-baseline value of Grade 3 or Grade 4 at any time

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicine is important. It allows continued monitoring of the benefit/risk balance of the medicine. Healthcare professionals are asked to report any suspected adverse reactions <https://nzphvc.otago.ac.nz/reporting/>.

### 4.9 Overdose

There is no experience with overdose in clinical trials with Rozlytrek. Patients who experience overdose should be closely supervised and supportive care instituted. There are no known antidotes for Rozlytrek.

For advice on the management of overdose please contact the National Poisons Centre on 0800 POISON (0800 764 766).

## 5. PHARMACOLOGICAL PROPERTIES

## 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Antineoplastic agent, tyrosine kinase inhibitor, ATC code: L01XE56.

### Mechanism of Action

Entrectinib is a potent inhibitor of receptor tyrosine kinases TRKA, TRKB and TRKC (encoded by the NTRK genes NTRK1, NTRK2 and NTRK3, respectively), proto-oncogene tyrosine-protein kinase ROS (ROS1; encoded by the gene ROS1), and anaplastic lymphoma kinase (ALK; encoded by the gene ALK). The major active metabolite of entrectinib, M5, showed similar *in vitro* potency and activity.

Fusion proteins that include TRK, ROS1 or ALK kinase domains drive tumourigenic potential through hyperactivation of downstream signalling pathways leading to unconstrained cell proliferation. Entrectinib potently inhibits the TRK kinases, ROS1 and ALK, leading to inhibition of downstream signalling pathways, cell proliferation and induction of tumour cell apoptosis. Entrectinib demonstrates potent inhibition of cancer cell lines harbouring NTRK, ROS1 and ALK fusion genes, irrespective of tumour type. Entrectinib has anti-tumour potency in NTRK and ROS1 fusion-driven tumour models, driving tumour regressions across multiple tumour types, including sarcomas, head and neck carcinoma, non-small cell lung carcinoma (NSCLC), colorectal cancer (CRC), acute myeloid leukemia (AML), and gliomas.

Entrectinib is a central nervous system (CNS)-penetrant molecule that showed brain-to-plasma concentration ratios of 0.4 - 2.2 in multiple animal species (mice, rats and dogs). It has demonstrated potent anti-tumour activity in three TRKA-driven intracranial tumour models and one ALK-driven intracranial tumour model. This data is consistent with entrectinib dosing, resulting in sufficient brain exposure achieving target pharmacological activities at steady-state and at clinically relevant systemic exposures.

### Clinical trials

#### NTRK fusion-positive solid tumours

##### *Efficacy in adult patients*

The efficacy of Rozlytrek in the treatment of NTRK fusion-positive solid tumours in adult patients was evaluated by combining the results from 3 single-arm, open label clinical trials (ALKA, STARTRK-1 and STARTRK-2) through a pre-specified integrated analysis.

Study ALKA was a Phase I single arm, open-label study in patients  $\geq 18$  years of age with solid tumours with NTRK1/2/3, ROS1, or ALK molecular alterations to determine the maximum tolerated dose. Study STARTRK-1 was a Phase I multicentre single arm, open label study in patients  $\geq 18$  years of age with solid tumours with NTRK1/2/3, ROS1, or ALK molecular alterations. The study included a dose escalation segment and a dose expansion segment. In the dose expansion segment, patients received 600 mg daily doses in repeated 4-week cycles and the primary objective was to evaluate the recommended Phase 2 dose. Study STARTRK-2 was a multicentre, international Phase II single-arm basket study in patients with solid tumours with NTRK1/2/3, ROS1, or ALK gene rearrangements. Patients received 600 mg Rozlytrek once daily doses in 4-week cycles.

The primary efficacy outcome measures in the integrated analyses were objective response rate (ORR) and duration of response (DOR) as evaluated by Blinded Independent Central Review (BICR) according to Response Evaluation Criteria in Solid Tumours (RECIST) v1.1.

The secondary efficacy outcome measures included clinical benefit rate (CBR), progression-free survival (PFS), time to CNS progression, overall survival (OS), and in patients presenting with CNS metastases at baseline: intracranial (IC) ORR, IC-DOR, and IC-PFS (also evaluated by BICR using RECIST v1.1).

The efficacy evaluable analyses set comprised a total of 54 adult patients with confirmed NTRK fusion-positive solid tumours treated with Rozlytrek, not previously treated with a TRK inhibitor, presenting with measurable disease at baseline assessed by investigator, and with  $\geq 6$  months of follow-up. NTRK fusion-positive status was determined by a validated nucleic acid-based test performed at a Clinical Laboratory Improvement Amendments (CLIA)-certified or equivalently accredited laboratory, prior to enrolment in the study.

The baseline demographic and disease characteristics of the efficacy evaluable population were: 40.7% males, median age of 57 years (range: 21 to 83 years), 79.6% Caucasian, 13.0% Asian, 7.5% Hispanic or Latino and 56.6% never smokers. The ECOG (Eastern Cooperative Oncology Group) performance status at baseline was 0 (42.6%), 1 (46.3%), or 2 (11.1%). Most patients (96.3%) had metastatic disease (most common sites being lung [61.1%], lymph nodes [55.6%] and brain [22.2%]), 3.7% patients had locally advanced disease, and 25.9% patients had no prior systemic therapies. The overall median duration of follow-up was 13 months.

Efficacy results from patients with NTRK fusion-positive solid tumours are summarised in Table 7.

**Table 7. Overall efficacy by BICR in adults with NTRK fusion-positive solid tumours**

<b>Efficacy Endpoints</b>	<b>Rozlytrek n = 54</b>
<b>Primary endpoints (BICR-assessed, RECIST v1.1)</b>	
<b>Objective response rate</b>	
Number of CR + PR	31/54
ORR% (95% CI)	57.4% (43.2, 70.8)
CR, n (%)	4 (7.4%)
PR, n (%)	27 (50.0%)
SD, n (%)	9 (16.7%)
PD, n (%)	4 (7.4%)
<b>Duration of response*</b>	
Number (%) of patients with events	16/31 (51.6%)
Median, months (95% CI)	10.4 (7.1, NE)
6-month durable response % (95% CI)	69% (0.5, 0.9)
9-month durable response % (95% CI)	59% (0.4, 0.8)
12-month durable response % (95% CI)	49% (0.3, 0.7)
<b>Secondary endpoints (BICR-assessed, RECIST v1.1)</b>	
<b>Clinical benefit rate</b>	
Number of CR + PR + SD 6 months	36/54
CBR% (95% CI)	64.8% (50.6, 77.3)
<b>Progression-free survival*</b>	
Number (%) of patients with events	29/54 (53.7)
Median, months (95% CI)	11.2 (8.0, 14.9)
<b>Time to CNS progression</b>	
Number (%) of patients with events	17/54 (31.5%)
Median, months (95% CI)	17.0 (14.3, NE)



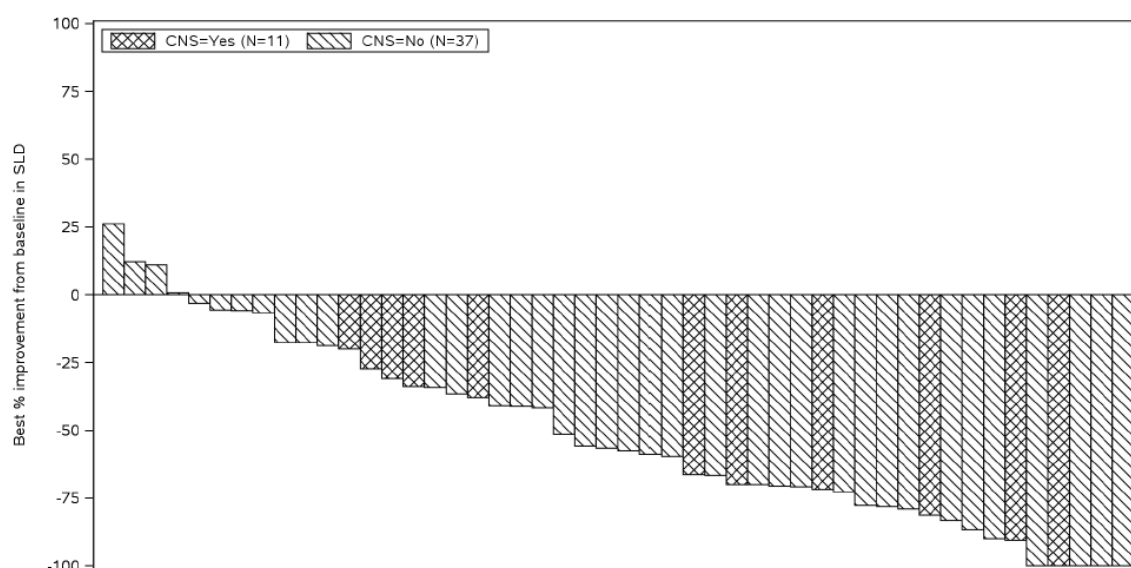
<b>Efficacy Endpoints</b>	<b>Rozlytrek n = 54</b>
<b>Overall Survival</b>	
Number (%) of patients with events	16/54 (29.6%)
Median, months (95% CI)	20.9 (14.9, NE)

CR = complete response; PR = partial response; SD = stable disease; PD = progressive disease; NE = not estimable. Confidence Intervals (CI) calculated using the Clopper-Pearson method.

\*Median and percentiles based on Kaplan-Meier estimates

As shown in Figure 1, most adult patients with NTRK fusion-positive solid tumours experienced tumour shrinkage, as assessed by BICR according to RECIST v1.1.

**Figure 1. Best percentage change in the sum of target lesions from baseline (BICR Assessment) in adults with NTRK fusion-positive solid tumours, shaded by CNS metastases at baseline**



Subjects with missing SLD percent change were excluded from the plot.

SLD: Sum of Longest Diameter

Of the 54 adult patients with NTRK fusion-positive solid tumours in the efficacy evaluable analysis set, 12 patients were identified by the Investigator to have CNS metastases at baseline. Efficacy results by BICR according to RECIST v1.1 in this subgroup of patients with CNS metastases at baseline are summarised in Table 8.

**Table 8. Efficacy in adults with NTRK fusion-positive solid tumours with CNS metastases at baseline**

<b>Secondary Endpoint (BICR-assessed, RECIST v1.1)</b>	<b>CNS Metastases at Baseline (by Investigator)</b>	
	<b>Yes n = 12</b>	<b>No n = 42</b>
<b>Objective response rate</b>		
Number of CR+PR	6	25
ORR% (95% CI)	50.0% (21.1, 78.9)	59.5% (43.3, 74.4)
CR, n (%)	0	4 (9.5%)
PR, n (%)	6 (50.0%)	21 (50.0%)
SD, n (%)	4 (33.3%)	5 (11.9%)
PD, n (%)	0	4 (9.5%)
<b>Duration of response</b>		
Number of patients with events	3 (50.0%)	13 (52.0%)

Median, months (95% CI)	NE (4.2, NE)	12.9 (7.1, NE)
<b>Progression-free survival</b>		
Number of patients with events	6 (50.0%)	23 (54.8%)
Median, months (95% CI)	7.7 (4.7, NE)	12.0 (8.7, 15.7)

CR = complete response; PR = partial response; SD = stable disease; PD = progressive disease; NE = not estimable. Confidence Intervals (CI) calculated using the Clopper-Pearson method.

Objective response rate by tumour type in all efficacy evaluable adult patients with NTRK fusion-positive solid tumours is presented in Table 9.

**Table 9. Objective response rate (BICR Assessment) by tumour type in adults with NTRK fusion-positive solid tumours**

Tumour type	n	Responders n (%)	95% CI
All	54	31 (57.4%)	(43.2, 70.8)
Breast cancer	6	5 (83.3%)	(35.9, 99.6)
Cholangiocarcinoma	1	1 (100%)	(2.5, 100)
Colorectal cancer	4	1 (25.0%)	(0.6, 80.6)
Gynecological cancers	2	1 (50.0%)	(1.3, 98.7)
Neuroendocrine cancers	3	1 (33.3%)	(0.8, 90.6)
Non-small cell lung cancer	10	7 (70.0%)	(34.7, 93.3)
Pancreatic cancer	3	2 (66.7%)	(9.4, 99.2)
Salivary (MASC)	7	6 (85.7%)	(42.1, 99.6)
Sarcoma	13	6 (46.2%)	(19.2, 74.9)
Thyroid cancer	5	1 (20.0%)	(0.5, 71.6)

MASC: mammary analogue secretory carcinoma

Confidence Intervals (CI) are calculated using the Clopper-Pearson method.

#### *Intracranial Response*

Of the 54 adult patients with NTRK fusion-positive solid tumours in the efficacy evaluable analysis set, 11 patients had CNS metastases at baseline as assessed by BICR, including 7 patients with measurable CNS lesions. Intracranial ORR, DOR, and PFS assessed by BICR according to RECIST v1.1, in this subgroup of patients with measurable CNS lesions at baseline are summarised in Table 10.

**Table 10. Intracranial efficacy in adults with NTRK fusion-positive solid tumours with CNS metastases at baseline by BICR**

Secondary Endpoint (BICR-assessed, RECIST v1.1)	CNS Metastases at Baseline (by BICR)	
	Measurable disease n = 7	All patients n = 11
<b>Intracranial objective response rate</b>		
Responders	4	6
IC-ORR% (95% CI)	57.1% (18.41, 90.10)	54.5% (23.4, 83.3)
CR, n (%)	1 (14.3%)	3 (27.3%)
PR, n (%)	3 (42.9%)	3 (27.3%)
<b>Intracranial duration of response</b>		
Number of patients with events (%)	1 (25.0%)	2 (33.3%)
Median, months (95%)	NE (5.0, NE)	NE (5.0, NE)
<b>Intracranial progression-free survival</b>		
Number of patients with events (%)	3 (42.9%)	5 (45.5%)
Median, months (95% CI)	NE (2.8, NE)	14.3 (5.1, NE)

CR = complete response; PR = partial response; NE = not estimable.  
 IC-ORR derived using RECIST v1.1 criteria applied only to CNS lesions.  
 Confidence Intervals (CI) calculated using the Clopper-Pearson method.

### *Primary CNS tumours*

Across the 3 trials, 6 adult patients with CNS primary tumours were treated with Rozlytrek with a minimum of 6 months of follow-up. IC-ORR, DOR and PFS were assessed by BICR according to Response Assessment in Neuro-Oncology Criteria (RANO). One patient had an objective response with a DOR of 2.79 months and PFS of 6.34 months.

### *Patient Reported Outcomes*

Study STARTRK-2 evaluated patient-reported outcomes (PRO) of the treatment impact on symptoms, functioning and health-related quality of life (HRQoL) based on the EORTC Core Quality of Life Questionnaire (QLQ-C30), Lung Cancer Module (QLQ-LC13), and the Colorectal Cancer Module (QLQ-CR29).

Most patients indicated that the symptoms commonly associated with Rozlytrek treatment (lack of appetite, nausea, diarrhoea and vomiting) were of low severity, if present. Patients also reported low lung-related and gastric-related symptoms burden at baseline with qualitative trends towards improvement for patients with NSCLC tumour (n = 9). Qualitative trends towards improvement in functioning and HRQoL were observed for patients with NTRK fusion-positive solid tumours with most of the patients (> 70%) reporting no change to clinically meaningful improvement (change from baseline of  $\geq 10$  points on a 1-100 scale) while receiving Rozlytrek as measured by the physical function, the pole function and the global health status from the EORTC QLQ-C30.

### *Efficacy in paediatric patients*

The efficacy of Rozlytrek in paediatric patients 12 years and older with NTRK fusion-positive solid tumours was evaluated in study STARTRK-NG. This study is a multicentre Phase I/II, open-label dose-escalation and expansion study in paediatric patients with relapsed or refractory solid tumours, including primary CNS tumours, with or without NTRK, ROS1 or ALK molecular alterations. Patients received 250mg/m<sup>2</sup> to 750mg/m<sup>2</sup> once daily doses of Rozlytrek in 4-week cycles. The duration of survival follow-up ranged from 6.5 months to 12.1 months.

Table 11 summarises the efficacy of Rozlytrek in 5 paediatric patients (less than 18 years of age) with NTRK fusion-positive solid tumours as assessed by the Investigator according to RECIST v1.1 for extracranial tumours and according to RANO for CNS primary tumours. Efficacy data in paediatric patients 12 years and older with NTRK fusion-positive solid tumours is further supported by extrapolation from results in the respective adult populations.

**Table 11. Efficacy in paediatric patients with NTRK fusion-positive solid tumours assessed by the Investigator**

<b>Tumour Type</b>	<b>Best Overall Response</b>	<b>Duration of Response (months)</b>
Infantile fibrosarcoma	PR	9.10 <sup>a</sup>
Infantile fibrosarcoma	SD	-
Epitheloid glioblastoma	CR <sup>b</sup>	3.94 <sup>a</sup>

High grade glioma	PR <sup>b</sup>	6.47 <sup>a</sup>
Metastatic melanoma	PR	6.47 <sup>a</sup>

CR = complete response; PR = partial response; SD = stable disease

<sup>a</sup> Response ongoing at time of clinical cut-off date (31 October 2018)

<sup>b</sup> Response assessment was by RANO criteria

### ROS1-positive NSCLC

The efficacy of Rozlytrek in the treatment of ROS1-positive locally advanced or metastatic NSCLC was evaluated by combining the results from 3 single-arm, open label clinical trials (ALKA, STARTRK-1 and STARTRK-2) described above, through a pre-specified integrated analysis.

The primary efficacy outcome measures in the integrated analyses were ORR and DOR, as evaluated by BICR according to RECIST v1.1. The secondary efficacy outcome measures included CBR, PFS, time to CNS progression, OS, and in patients presenting with CNS metastases at baseline: IC-ORR, IC-DOR, and IC-PFS (also evaluated by BICR using RECIST v1.1).

The efficacy evaluable analyses set comprised a total of 53 patients with histologically confirmed ROS1-positive NSCLC treated with Rozlytrek, not previously treated with a ROS1-inhibitor, presenting with measurable disease at baseline, as assessed by the investigator, and with  $\geq 12$  months of follow-up from the time of first response. ROS1-positive status was determined by a validated nucleic acid-based test performed at a CLIA-certified or equivalently accredited laboratory, prior to enrolment in the study.

The baseline demographics and disease characteristics of the efficacy evaluable population were: 35.8% males, median age of 53.5 years (range: 27 to 73 years), 79.2% patients < 65 years of age, 58.5% Caucasian, 35.8% Asian, 5.7% Black, 4.5% Hispanic or Latino and 58.5% never smokers. The Eastern Cooperative Oncology Group (ECOG) performance status at baseline was 0 (37.7%), 1 (50.9%), or 2 (11.3%). Most patients (94.3%) had metastatic disease with 43.4% having brain metastases (other common sites were lung [71.7%] and lymph nodes [77.7%]), 3.8% patients had locally advanced disease, and 26.4% patients had no prior systemic therapies. The overall median duration of follow-up was 16.6 months.

Efficacy results from patients with ROS1-positive NSCLC are summarised in Table 12.

**Table 12. Overall efficacy by BICR in patients with ROS1-positive NSCLC**

Efficacy Endpoint	Rozlytrek n = 53
<i>Primary endpoints (BICR-assessed, RECIST v1.1)</i>	
<b>Objective response rate</b>	
Number of CR + PR	41/53
ORR% (95% CI)	77.4% (63.8, 87.7)
CR, n (%)	3 (5.7%)
PR, n (%)	38 (71.7%)
SD, n (%)	1 (1.9%)
PD, n (%)	4 (7.5%)
<b>Duration of response*</b>	
Number (%) of patients with events	19/41 (46.3%)
Median, months (95% CI)	24.6 (11.4, 34.8)
6-month durable response % (95% CI)	0.82 (0.7, 0.9)

9-month durable response % (95% CI)	0.77 (0.6, 0.9)
12-month durable response % (95% CI)	0.65 (0.5, 0.8)
<b>Secondary endpoints (BICR-assessed, RECIST v1.1)</b>	
<b>Clinical benefit rate</b>	
Number of CR+PR+SD 6 months	41/53
CBR% (95% CI)	77.4% (63.8, 87.7)
<b>Progression-free survival*</b>	
Number (%) of patients with events	25/53 (47.2)
Median, months (95% CI)	19.0 (12.2, 36.6)
<b>Time to CNS Progression</b>	
Number (%) of patients with events	18/53 (34.0%)
Median, months (95% CI)	NE (15.1, NE)
<b>Overall Survival</b>	
Number (%) of patients with events	9/53 (17%)
Median, months (95% CI)	NE (NE)

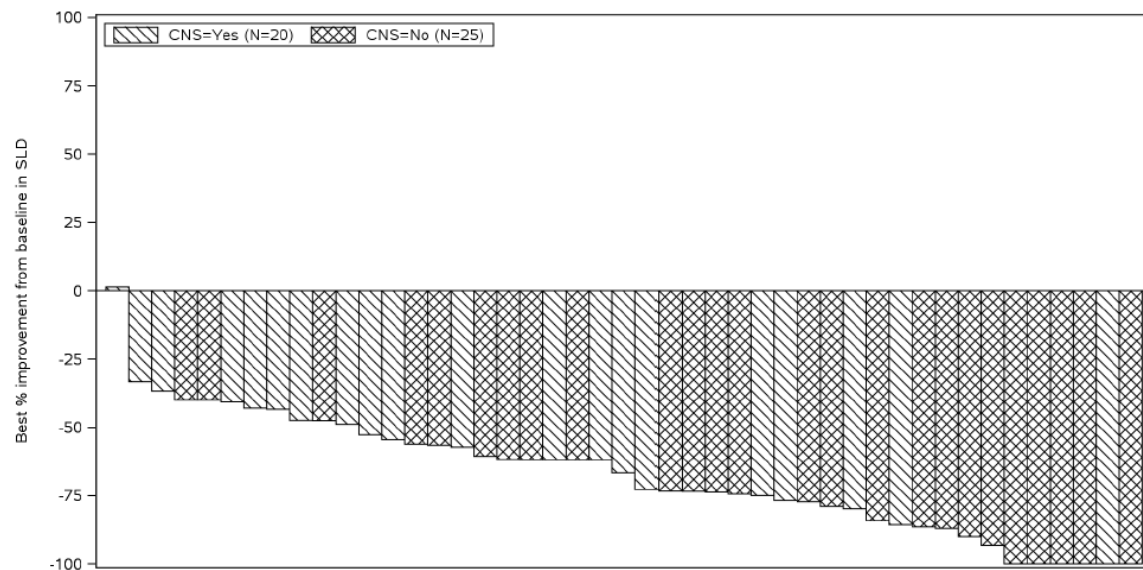
CR = complete response; PR = partial response; SD = stable disease; PD = progressive disease; NE = not estimable.

Confidence Intervals (CI) calculated using the Clopper-Pearson method.

\*Median and percentiles based on Kaplan-Meier estimates.

Most ROS1-positive NSCLC patients treated with Rozlytrek experienced tumour shrinkage of their defined target lesions, as assessed by BICR according to RECIST v1.1 (see Figure 2).

**Figure 2. Best percentage change in the sum of target lesions from baseline (BICR Assessment) in patients with ROS1-positive NSCLC, shaded by CNS metastases at baseline**



Subjects with missing SLD percent change were excluded from the plot.

SLD: Sum of Longest Diameter

Of the 53 patients with ROS1-positive NSCLC in the efficacy evaluable analysis set, 23 patients were identified by the Investigator to have CNS metastases at baseline. Efficacy results by BICR according to RECIST v1.1 in this subgroup of patients with CNS metastases at baseline are summarised in Table 13.

**Table 13. Efficacy in ROS1-positive NSCLC patients with CNS metastases at baseline**

Secondary Endpoints	CNS Metastases at Baseline (by Investigator)
---------------------	--

<i>(BICR-assessed, RECIST v1.1)</i>	<b>Yes n = 23</b>	<b>No n = 30</b>
<b>Objective response rate</b>		
Number of CR + PR	17/23	24/30
ORR% (95% CI)	73.9% (51.6, 89.8)	80.0% (61.4, 92.3)
CR, n (%)	0	3 (10.0)
PR, n (%)	17 (73.9)	21 (70.0)
SD, n (%)	0	1 (3.3)
PD, n (%)	4 (17.4)	0
<b>Duration of response</b>		
Number of patients with events (%)	6/17 (35.3%)	13/24 (54.2%)
Median, months (95% CI)	12.6 (6.5, NE)	24.6 (11.4, 34.8)
<b>Progression-free survival</b>		
Number of patients with events	11/23 (47.8%)	14/30 (46.7%)
Median, months (95% CI)	13.6 (4.5, NE)	26.3 (15.7, 36.6)

CR = complete response; PR = partial response; SD = stable disease; PD = progressive disease; NE = not estimable.

Confidence Intervals (CI) calculated using the Clopper-Pearson method.

### *Intracranial Response*

Of the 53 patients with ROS1-positive NSCLC in the efficacy evaluable analysis set, 20 patients had CNS metastases at baseline as assessed by BICR, including 12 patients with measurable CNS lesions. Intracranial ORR, DOR, and PFS assessed by BICR according to RECIST v1.1 in this subgroup of patients with measurable CNS lesions at baseline are summarised in Table 14 and Figure 3 below.

**Table 14. Intracranial Efficacy in ROS1-positive NSCLC patients with CNS metastases at baseline by BICR**

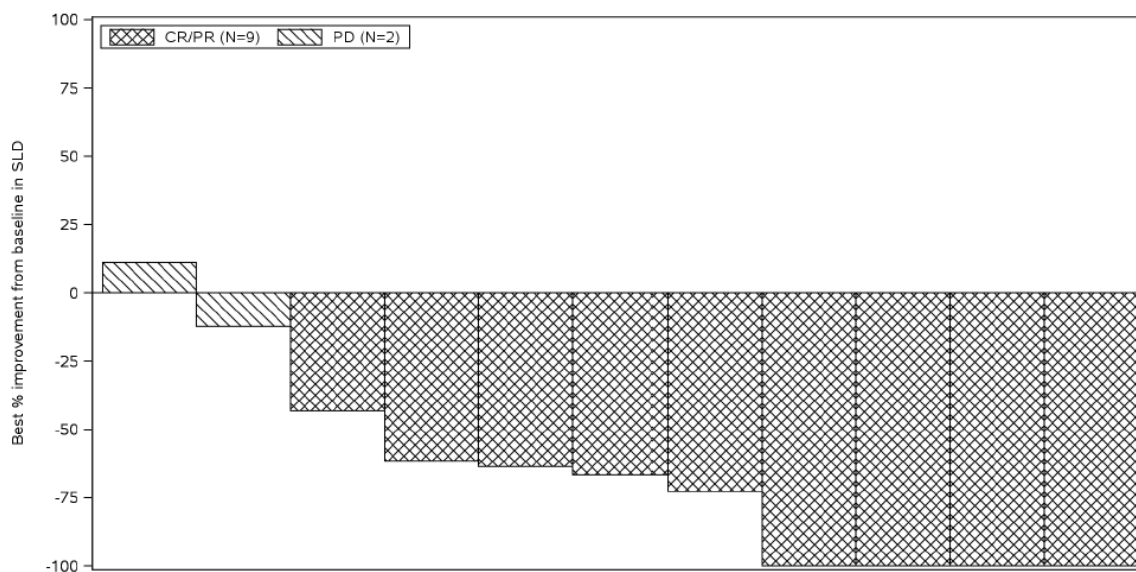
<b>Secondary Endpoint</b> <i>(BICR-assessed, RECIST v1.1)</i>	<b>CNS Metastases at Baseline (by BICR)</b>	
	<b>Measurable disease n = 12</b>	<b>All patients n = 20</b>
<b>Intracranial objective response rate</b>		
Responders	9	11
IC-ORR% (95% CI)	75.0% (42.8, 94.5)	55.0% (31.5, 76.9)
CR, n (%)	2 (16.7%)	4 (20.0%)
PR, n (%)	7 (58.3%)	7 (35.0%)
<b>Intracranial duration of response</b>		
Number of patients with events (%)	4 (44.4%)	5 (45.5%)
Median, months (95%)	12.9 (4.6, NE)	12.9 (5.6, NE)
<b>Intracranial progression-free survival</b>		
Number of patients with events (%)	6 (50.0%)	13 (65.5%)
Median, months (95% CI)	19.3 (3.8, 19.3)	7.7 (3.8, 19.3)

CR = complete response; PR = partial response; NE = not estimable.

IC-ORR derived using RECIST v1.1 criteria applied only to CNS lesions.

Confidence Intervals (CI) calculated using the Clopper-Pearson method.

**Figure 3. Best percent change from baseline in tumour sum in ROS1-positive NSCLC patients with measurable CNS metastases at baseline by BICR**



Subjects with missing SLD percent change were excluded from the plot.

SLD: Sum of Longest Diameter

Patients without measurable CNS disease at baseline or without post-baseline measurements were excluded from the plot

### *Patient Reported Outcomes*

Patients with ROS1-positive NSCLC reported rapid and durable clinically meaningful improvement (change from baseline of  $\geq 10$  points on a 1 - 100 scale) in lung-cancer symptoms (cough, dyspnoea, chest pain) as measured by the EORTC QLQ LC13. Patients maintained their day-to-day function, resulting in an improvement in HRQoL while on Rozlytrek treatment (evaluated by the physical function, role function and global health status from the EORTC QLQ-C30). In addition, most patients, indicated that the symptoms commonly associated with Rozlytrek treatment (lack of appetite, nausea, diarrhoea and vomiting) were of low severity, if present.

## **5.2 Pharmacokinetic properties**

The pharmacokinetic parameters for entrectinib and its major active metabolite (M5), have been characterised in patients with NTRK-positive solid tumours and ROS1-positive NSCLC and healthy subjects.

Following administration of a single 600 mg dose of entrectinib, the estimated entrectinib mean  $C_{max}$  was 1990 (SD:  $\pm 1050$ ) nM and  $AUC_{0-24}$  was 33900 (SD:  $\pm 15800$ ) nM\*h and for M5  $C_{max}$  was 765 (SD:  $\pm 598$ ) nM and  $AUC_{0-24}$  was 13300 (SD:  $\pm 10200$ ) nM\*h. At steady-state, the estimated entrectinib mean  $C_{max}$  was 3490 (SD:  $\pm 1600$ ) nM and  $AUC_{0-24}$  was 62800 (SD:  $\pm 29100$ ) nM\*h and for M5  $C_{max}$  was 1340 (SD:  $\pm 934$ ) nM and  $AUC_{0-24}$  was 25500 (SD:  $\pm 29100$ ) nM\*h.

The population PK model estimated mean accumulation at steady-state following 600 mg once daily administration of entrectinib was 1.89 (SD:  $\pm 0.381$ ) and 2.01 (SD:  $\pm 0.437$ ) for M5.

### **Absorption**

Following a single 600 mg oral administration of Rozlytrek to patients with NTRK fusion-positive and ROS1-positive NSCLC under fed conditions, entrectinib was rapidly absorbed reaching time-to-maximum plasma concentration ( $T_{max}$ ) after approximately 4 - 6 hours.

Based on population pharmacokinetic analysis, steady-state was achieved within 5 days for entrectinib with 600 mg once daily dosing.

The estimated absolute bioavailability of entrectinib based on physiologically based pharmacokinetic (PBPK) modelling was 55%.

No clinically significant effect of food on entrectinib bioavailability was observed. Following a single 600 mg oral administration of Rozlytrek to healthy subjects under fasting conditions and following a high fat, high calorie meal, the GMR under fed/fasted condition for  $AUC_{inf}$  was 115% (90% CI: 107, 124) and for  $C_{max}$  was 106% (90% CI: 98.9, 115). Entrectinib can be administered with or without food (see section 4.2 *Dose and method of administration*).

### **Distribution**

Entrectinib and its major active metabolite M5 are highly bound to human plasma proteins independent of drug concentrations. In human plasma, entrectinib and M5 had similar protein binding with > 99% bound at a clinically relevant concentration.

After a single oral dose of [<sup>14</sup>C]-labelled entrectinib, the geometric mean volume of distribution ( $V_z/F$ ) was 860 L, suggesting extensive distribution into tissues. Population pharmacokinetic analysis estimated volume of distribution of 551 L and 81.1 L for entrectinib and M5, respectively.

### **Metabolism**

Entrectinib is metabolised predominantly by CYP3A4 (~76%). Minor contributions from several other CYPs and UGT1A4 were estimated at < 25% in total. The active metabolite M5 (formed by CYP3A4) and the direct N-glucuronide conjugate, M11 (formed by UGT1A4), are the two major circulating metabolites identified.

### **Excretion**

Following administration of a single dose of [<sup>14</sup>C]-labelled entrectinib administered orally to healthy subjects, the majority of radioactivity was excreted in faeces (82.9%) with minimal excretion in urine (3.06%). In faeces, 35.7% and 22.1% of the dose was excreted as unchanged entrectinib and M5, respectively, indicating hepatic clearance is the major route of elimination.

Entrectinib and M5 account for approximately 73% of radioactivity in systemic circulation at  $C_{max}$ , and approximately half of total radioactivity  $AUC_{inf}$ .

Population PK analysis estimated a  $CL/F$  of 19.6 L/h and 52.4 L/h for entrectinib and M5, respectively. The elimination half-lives of entrectinib and M5 were estimated to be 20 and 40 hours, respectively.

### **Pharmacokinetics in Special Populations**

#### Paediatric population

Non-compartmental analysis and population pharmacokinetic modelling approaches demonstrated that the pharmacokinetics of entrectinib and M5 were comparable in adults and children allowing extrapolation of data in adults to paediatric patients 12 years and older.

Data obtained from population pharmacokinetic analyses show that a dose of 300 mg/m<sup>2</sup> of Rozlytrek once daily in paediatric patients 12 years and older results in a similar systemic exposure attained in adults treated with 600 mg of Rozlytrek, once daily. Population



pharmacokinetic analysis data support dosing of paediatric patients with BSA  $\geq 1.5 \text{ m}^2$  with 600 mg of Rozlytrek once daily.

#### Elderly population

No differences in entrectinib exposure were noted in patients older than 65 years and adult patients younger than 65 years based on pharmacokinetic analysis.

#### Renal impairment

Negligible amounts of entrectinib and the active metabolite M5 are excreted unchanged in urine (~3% of the dose) indicating renal clearance plays a minor role in the elimination of entrectinib. Population pharmacokinetics data obtained in patients with mild and moderate impairment show that pharmacokinetics of entrectinib are not significantly affected in renal impairment. No formal pharmacokinetic study has been conducted and no population pharmacokinetic data was collected in patients with severe renal impairment. However, since entrectinib elimination via the kidney is negligible, no dose adjustment is required in patients with renal impairment.

#### Hepatic impairment

As elimination of entrectinib is predominantly through metabolism in the liver, hepatic impairment may increase the plasma concentration of entrectinib and/or its major active metabolite M5. Limited clinical data is available in patients with hepatic impairment and a dedicated pharmacokinetic study in patients with hepatic impairment has not been conducted. Based on population pharmacokinetics analysis, entrectinib and M5 exposures were similar in patients with mild, moderate or severe hepatic impairment and normal hepatic function.

#### Ethnicity

Following a single oral dose of Rozlytrek in Japanese and Caucasian healthy volunteers, no clinically relevant differences in the exposure of Rozlytrek were observed. Based on population pharmacokinetics analysis, there was no relationship between systemic exposure of entrectinib and race/ethnicity (Asian, Japanese, Caucasian and other ethnicities). No dose adjustment is required for patients of different race/ethnicities (see section 4.2 *Dose and method of administration*).

### **5.3 Preclinical safety data**

#### **Genotoxicity**

Entrectinib was not mutagenic *in vitro* in the bacterial reverse mutation (Ames) assay. Entrectinib was not clastogenic in the *in vivo* micronucleus assay in rats and did not induce DNA-damage in a comet assay in rats. A potential for abnormal chromosome segregation (aneugenicity) has been detected under *in vitro* conditions in cultured human peripheral blood lymphocytes (HPBL) but was not detected in the *in vivo* micronucleus assay in rats

#### **Carcinogenicity**

No carcinogenicity studies have been performed to establish the carcinogenic potential of entrectinib.

#### **Other**

In a 13-week juvenile rat toxicology study from post-natal day 7 to day 97 (approximately equivalent to neonate to 16 years of age in humans), effects on growth and development were observed in the dosing and recovery phases including decreased body weight gain and delayed sexual maturation (at  $\geq 4 \text{ mg/kg/day}$ , approximately 0.1 times the human exposure by AUC at the recommended dose), deficits in neurobehavioral assessments including

functional observational battery and learning and memory (at  $\geq 8$  mg/kg/day, approximately 0.2 times the human exposure by AUC at the recommended dose) and decreased femur length (at 16 mg/kg/day, approximately 0.3 times the human exposure by AUC at the recommended dose).

Entrectinib penetrates the CNS with brain-to-plasma concentration ratios of  $\sim 0.4$  in mice, 0.6-1.5 in rats and 1.4 - 2.2 in dogs following repeated oral daily dosing. Consistent with being a weak P-gp substrate, entrectinib demonstrated high retention in the CNS following IV infusion in rats, achieving sufficient steady-state concentrations in the brain to cover target pharmacological activity at clinically relevant systemic exposure. M5 was also detected in a brain homogenate in rats following a single oral dose or an IV infusion of entrectinib for 5 - 6 hours, but the exposures of M5 were lower than entrectinib in both plasma and brain in rats.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

#### **Capsule content**

Lactose  
Microcrystalline cellulose  
Tartaric acid  
Hypromellose  
Crospovidone  
Magnesium stearate  
Silicon dioxide

#### **Capsule shell**

Hypromellose  
Titanium dioxide  
Iron oxide yellow (100 mg capsule only)  
Sunset yellow FCF (200 mg capsule only)

#### **Printing ink**

Shellac  
Propylene glycol  
Strong ammonia solution  
Indigo carmine aluminium lake

### **6.2 Incompatibilities**

Not applicable.

### **6.3 Shelf life**

24 months.

### **6.4 Special precautions for storage**

Store below 30°C.

This medicine should not be used after the expiry date (EXP) shown on the pack.

### **6.5 Nature and contents of container**

Rozlytrek hard capsules are packaged in white high-density polyethylene bottles with desiccant and a child-resistant screw cap.

100 mg hard capsules are supplied in bottles of 30 capsules.

200 mg hard capsules are supplied in bottles of 90 capsules.

#### **6.6 Special precautions for disposal**

The release of pharmaceuticals in the environment should be minimised. Medicines should not be disposed of via wastewater and disposal through household waste should be avoided. Unused or expired medicine should be returned to a pharmacy for disposal.

### **7. MEDICINE SCHEDULE**

Prescription

### **8. SPONSOR**

Roche Products (New Zealand) Limited  
PO Box 109113 Newmarket  
Auckland 1149  
NEW ZEALAND

Medical enquiries: 0800 276 243

### **9. DATE OF FIRST APPROVAL**

11 June 2020

### **10. DATE OF REVISION OF THE TEXT**

03 July 2020

### **SUMMARY TABLE OF CHANGES**

<b>Section Changed</b>	<b>Summary of new information</b>
4.2	Inclusion of additional dose modification guidance for specified adverse drug reactions.
4.4	Addition of recommendations for LVEF assessment for patients with at risk for Congestive Heart Failure Inclusion of the increased risk of skeletal fractures in paediatric patients
4.8	Inclusion of all patients <18 years from studies STARTR-NG and STARTRK-2 Update of the Adverse Events table and the Laboratory Abnormalities tables based on the 504 safety evaluable patients and addition of new adverse events to the Adverse Events table. Addition of information on information on fractures, ataxia, syncope, QTc interval prolongation, peripheral sensory neuropathy and eye disorders
5.1	Addition of the ATC code and correction of errors in the current approved DS.