BRUKINSA® (zanubrutinib) capsules, for oral use
Initial U.S. Approval: 2019

INDICATIONS AND USAGE
Mantle cell lymphoma (MCL) who have received at least one prior therapy. (1.1)
This indication is approved under accelerated approval based on overall response rate. Continued approval for this indication may be contingent upon verification and description of clinical benefit in a confirmatory trial. (2.4)

Mantle cell lymphoma (MCL) who have received at least one anti-CD20-based regimen. (1.3)
This indication is approved under accelerated approval based on overall response rate. Continued approval for this indication may be contingent upon verification and description of clinical benefit in a confirmatory trial. (2.4)

Relapsed or refractory marginal zone lymphoma (MZL) who have received at least one anti-CD20-based regimen. (1.3)
This indication is approved under accelerated approval based on overall response rate. Continued approval for this indication may be contingent upon verification and description of clinical benefit in a confirmatory trial. (2.4)

Dosage and Administration
Recommended dosage: 160 mg orally twice daily or 320 mg orally once daily; swallow whole with water and with or without food. (2.1)
Reduce BRUKINSA dose in patients with severe hepatic impairment. (2.2, 8.7)
Advise patients not to open, break, or chew capsules. (2.1)
Manage toxicity using treatment interruption, dose reduction, or discontinuation. (2.4)

Dosage Modifications for Drug Interactions
CYP3A inhibitors: Modify BRUKINSA dose with moderate or strong CYP3A inhibitors as described. (2.3, 7.1)
CYP3A Inducers: Avoid co-administration with moderate or strong CYP3A inducers. (7.1)

Dosage Modifications for Adverse Reactions
To report SUSPECTED ADVERSE REACTIONS, contact BeiGene at 1-877-828-5596 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

Drug Interactions
CONTRAINDICATIONS

Hemorrhage: Monitor for bleeding and manage appropriately. (5.1)
Infections: Monitor patients for signs and symptoms of infection, including opportunistic infections, and treat as needed. (5.2)
Cytopenias: Monitor complete blood counts during treatment. (5.3)
Second Primary Malignancies: Other malignancies have occurred in patients including skin cancers. Advise patients to use sun protection. (5.4)
Cardiac Arrhythmias: Monitor for atrial fibrillation and atrial flutter and manage appropriately. (5.5)
Embryo-Fetal Toxicity: Can cause fetal harm. Advise women of the potential risk to a fetus and to avoid pregnancy. (5.6)

ADVERSE REACTIONS
The most common adverse reactions (≥30%) include neutrophil count decreased, upper respiratory tract infection, platelet count decreased, hemorrhage, lymphocyte count decreased, rash and musculoskeletal pain. (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact BeiGene at 1-877-828-5596 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

Dosage and Administration:

Capsules: 80 mg. (3)

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FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE

1.1 Mantle Cell Lymphoma
BRUKINSA is indicated for the treatment of adult patients with mantle cell lymphoma (MCL) who have received at least one prior therapy.

This indication is approved under accelerated approval based on overall response rate [see Clinical Studies (14.1)]. Continued approval for this indication may be contingent upon verification and description of clinical benefit in a confirmatory trial.

1.2 Waldenström’s Macroglobulinemia
BRUKINSA is indicated for the treatment of adult patients with Waldenström’s macroglobulinemia (WM).

1.3 Marginal Zone Lymphoma
BRUKINSA is indicated for the treatment of adult patients with relapsed or refractory marginal zone lymphoma (MZL) who have received at least one anti-CD20-based regimen.

This indication is approved under accelerated approval based on overall response rate [see Clinical Studies (14.3)]. Continued approval for this indication may be contingent upon verification and description of clinical benefit in a confirmatory trial.

2 DOSAGE AND ADMINISTRATION

2.1 Recommended Dosage
The recommended dosage of BRUKINSA is 160 mg taken orally twice daily or 320 mg taken orally once daily until disease progression or unacceptable toxicity.

BRUKINSA can be taken with or without food. Advise patients to swallow capsules whole with water. Advise patients not to open, break, or chew the capsules. If a dose of BRUKINSA is missed, it should be taken as soon as possible on the same day with a return to the normal schedule the following day.

2.2 Dosage Modification for Use in Hepatic Impairment
The recommended dosage of BRUKINSA for patients with severe hepatic impairment is 80 mg orally twice daily [see Use in Specific Populations (8.7) and Clinical Pharmacology (12.3)].

2.3 Dosage Modifications for Drug Interactions
Recommended dosage modifications of BRUKINSA for drug interactions are provided in Table 1 [see Drug Interactions (7.1)].
Table 1: Dosage Modifications for Use With CYP3A Inhibitors or Inducers

<table>
<thead>
<tr>
<th>Co-administered Drug</th>
<th>Recommended BRUKINSA Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong CYP3A inhibitor</td>
<td>80 mg once daily</td>
</tr>
<tr>
<td></td>
<td>Interrupt dose as recommended for adverse reactions [see Dosage and Administration (2.4)].</td>
</tr>
<tr>
<td>Moderate CYP3A inhibitor</td>
<td>80 mg twice daily</td>
</tr>
<tr>
<td></td>
<td>Modify dose as recommended for adverse reactions [see Dosage and Administration (2.4)].</td>
</tr>
<tr>
<td>Moderate or strong CYP3A inducer</td>
<td>Avoid concomitant use.</td>
</tr>
</tbody>
</table>

After discontinuation of a CYP3A inhibitor, resume previous dose of BRUKINSA [see Dosage and Administration (2.1, 2.2) and Drug Interactions (7.1)].

2.4 Dosage Modifications for Adverse Reactions

Recommended dosage modifications of BRUKINSA for Grade 3 or higher adverse reactions are provided in Table 2:

Table 2: Recommended Dosage Modification for Adverse Reaction

<table>
<thead>
<tr>
<th>Event</th>
<th>Adverse Reaction Occurrence</th>
<th>Dosage Modification (Starting Dose: 160 mg twice daily or 320 mg once daily)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematological toxicities [see Warnings and Precautions (5.3)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 3 febrile neutropenia</td>
<td>First</td>
<td>Interrupt BRUKINSA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Once toxicity has resolved to Grade 1 or lower or baseline: Resume at 160 mg twice daily or 320 mg once daily.</td>
</tr>
<tr>
<td>Grade 3 thrombocytopenia with significant bleeding</td>
<td>Second</td>
<td>Interrupt BRUKINSA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Once toxicity has resolved to Grade 1 or lower or baseline: Resume at 80 mg twice daily or 160 mg once daily.</td>
</tr>
<tr>
<td>Grade 4 neutropenia (lasting more than 10 consecutive days)</td>
<td>Third</td>
<td>Interrupt BRUKINSA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Once toxicity has resolved to Grade 1 or lower or baseline: Resume at 80 mg once daily.</td>
</tr>
<tr>
<td>Grade 4 thrombocytopenia (lasting more than 10 consecutive days)</td>
<td>Fourth</td>
<td>Discontinue BRUKINSA</td>
</tr>
</tbody>
</table>

Non-hematological toxicities [see Warnings and Precautions (5.5) and Adverse Reactions (6.1)]

| Grade 3 or 4 non-hematological toxicities * | First | Interrupt BRUKINSA |
|                                            |       | Once toxicity has resolved to Grade 1 or lower or baseline: Resume at 160 mg twice daily or 320 mg once daily. |
### Event Adverse Reaction Occurrence

<table>
<thead>
<tr>
<th>Event</th>
<th>Adverse Reaction Occurrence</th>
<th>Dosage Modification (Starting Dose: 160 mg twice daily or 320 mg once daily)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second</td>
<td>Interrupt BRUKINSA</td>
<td>Once toxicity has resolved to Grade 1 or lower or baseline: Resume at 80 mg twice daily or 160 mg once daily.</td>
</tr>
<tr>
<td>Third</td>
<td>Interrupt BRUKINSA</td>
<td>Once toxicity has resolved to Grade 1 or lower or baseline: Resume at 80 mg once daily.</td>
</tr>
<tr>
<td>Fourth</td>
<td>Discontinue BRUKINSA</td>
<td></td>
</tr>
</tbody>
</table>

* Evaluate the benefit-risk before resuming treatment at the same dose for a Grade 4 non-hematological toxicity.

^ Evaluate the benefit-risk before resuming treatment at the same dose for Grade 4 non-hematological toxicity.

Asymptomatic lymphocytosis should not be regarded as an adverse reaction, and these patients should continue taking BRUKINSA.

### 3 DOSAGE FORMS AND STRENGTHS
Capsules: Each 80 mg capsule is a size 0, white to off-white opaque capsule marked with “ZANU 80” in black ink.

### 4 CONTRAINDICATIONS
None.

### 5 WARNINGS AND PRECAUTIONS

#### 5.1 Hemorrhage

Fatal and serious hemorrhagic events have occurred in patients with hematological malignancies treated with BRUKINSA monotherapy. Grade 3 or higher hemorrhage including intracranial and gastrointestinal hemorrhage, hematuria and hemothorax have been reported in 3.4% of patients treated with BRUKINSA monotherapy. Hemorrhage events of any grade, excluding purpura and petechiae, occurred in 35% of patients.

Bleeding events have occurred in patients with and without concomitant antiplatelet or anticoagulation therapy. Co-administration of BRUKINSA with antiplatelet or anticoagulant medications may further increase the risk of hemorrhage.

Monitor for signs and symptoms of bleeding. Discontinue BRUKINSA if intracranial hemorrhage of any grade occurs. Consider the benefit-risk of withholding BRUKINSA for 3-7 days pre- and post-surgery depending upon the type of surgery and the risk of bleeding.
5.2 Infections
Fatal and serious infections (including bacterial, viral, or fungal) and opportunistic infections have occurred in patients with hematological malignancies treated with BRUKINSA monotherapy. Grade 3 or higher infections occurred in 27% of patients, most commonly pneumonia. Infections due to hepatitis B virus (HBV) reactivation have occurred.
Consider prophylaxis for herpes simplex virus, pneumocystis jiroveci pneumonia, and other infections according to standard of care in patients who are at increased risk for infections. Monitor and evaluate patients for fever or other signs and symptoms of infection and treat appropriately.

5.3 Cytopenias
Grade 3 or 4 cytopenias, including neutropenia (26%), thrombocytopenia (11%) and anemia (8%) based on laboratory measurements, developed in patients treated with BRUKINSA monotherapy [see Adverse Reactions (6.1)]. Grade 4 neutropenia occurred in 13% of patients, and Grade 4 thrombocytopenia occurred in 3.6% of patients.
Monitor complete blood counts regularly during treatment and interrupt treatment, reduce the dose, or discontinue treatment as warranted [see Dosage and Administration (2.4)]. Treat using growth factor or transfusions, as needed.

5.4 Second Primary Malignancies
Second primary malignancies, including non-skin carcinoma, have occurred in 14% of patients treated with BRUKINSA monotherapy. The most frequent second primary malignancy was non-melanoma skin cancer reported in 8% of patients. Other second primary malignancies included malignant solid tumors (4.0%), melanoma (1.7%) and hematologic malignancies (1.2%). Advise patients to use sun protection and monitor patients for the development of second primary malignancies.

5.5 Cardiac Arrhythmias
Atrial fibrillation and atrial flutter were reported in 3.2% of patients treated with BRUKINSA monotherapy. Patients with cardiac risk factors, hypertension and acute infections may be at increased risk. Grade 3 or higher events were reported in 1.1% of patients treated with BRUKINSA monotherapy. Monitor signs and symptoms for atrial fibrillation and atrial flutter and manage as appropriate [see Dosage and Administration (2.4)].

5.6 Embryo-Fetal Toxicity
Based on findings in animals, BRUKINSA can cause fetal harm when administered to a pregnant woman. Administration of zanubrutinib to pregnant rats during the period of organogenesis caused embryo-fetal toxicity, including malformations at exposures that were 5 times higher than those reported in patients at the recommended dose of 160 mg twice daily. Advise women to avoid becoming pregnant while taking BRUKINSA and for 1 week after the last dose. Advise men to avoid fathering a child during treatment and for 1 week after the last dose. If this drug is used during pregnancy, or if the patient becomes pregnant while taking this drug, the patient should be apprised of the potential hazard to a fetus [see Use in Specific Populations (8.1)].
6  ADVERSE REACTIONS

The following clinically significant adverse reactions are discussed in more detail in other sections of the labeling:

- Hemorrhage [see Warnings and Precautions (5.1)]
- Infections [see Warnings and Precautions (5.2)]
- Cytopenias [see Warnings and Precautions (5.3)]
- Second Primary Malignancies [see Warnings and Precautions (5.4)]
- Cardiac Arrhythmias [see Warnings and Precautions (5.5)]

6.1  Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction 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 data in the WARNINGS AND PRECAUTIONS reflect exposure to BRUKINSA in seven clinical trials, administered as a single agent at 160 mg twice daily in 730 patients, at 320 mg once daily in 105 patients, and at 40 mg to 160 mg once daily (0.125 to 0.5 times the recommended dosage) in 12 patients. Among 847 patients receiving BRUKINSA, 73% were exposed for at least 1 year, 57% were exposed for at least 2 years and 26% were exposed for at least 3 years.

In this pooled safety population, the most common adverse reactions, including laboratory abnormalities, in ≥ 30% of patients included neutrophil count decreased (54%), upper respiratory tract infection (47%), platelet count decreased (41%), hemorrhage (35%), lymphocyte count decreased (31%), rash (31%) and musculoskeletal pain (30%).

Mantle Cell Lymphoma (MCL)

The safety of BRUKINSA was evaluated in 118 patients with MCL who received at least one prior therapy in two single-arm clinical trials, BGB-3111-206 [NCT03206970] and BGB-3111-AU-003 [NCT02343120] [see Clinical Studies (14.1)]. The median age of patients who received BRUKINSA in studies BGB-3111-206 and BGB-3111-AU-003 was 62 years (range: 34 to 86), 75% were male, 75% were Asian, 21% were White, and 94% had an ECOG performance status of 0 to 1. Patients had a median of 2 prior lines of therapy (range: 1 to 4). The BGB-3111-206 trial required a platelet count ≥ 75 x 10^9/L and an absolute neutrophil count ≥ 1 x 10^9/L independent of growth factor support, hepatic enzymes ≤ 2.5 x upper limit of normal, total bilirubin ≤ 1.5 x ULN. The BGB-3111-AU-003 trial required a platelet count ≥ 50 x 10^9/L and an absolute neutrophil count ≥ 1 x 10^9/L independent of growth factor support, hepatic enzymes ≤ 3 x upper limit of normal, total bilirubin ≤ 1.5 x ULN. Both trials required a CLcr ≥ 30 mL/min. Both trials excluded patients with prior allogeneic hematopoietic stem cell transplant, exposure to a BTK inhibitor, known infection with HIV and serologic evidence of active hepatitis B or hepatitis C infection and patients requiring strong CYP3A inhibitors or strong CYP3A inducers. Patients received BRUKINSA 160 mg twice daily or 320 mg once daily. Among patients receiving BRUKINSA, 79% were exposed for 6 months or longer, and 68% were exposed for greater than one year.
Fatal events within 30 days of the last dose of BRUKINSA occurred in 8 (7%) of 118 patients with MCL. Fatal cases included pneumonia in 2 patients and cerebral hemorrhage in one patient.

Serious adverse reactions were reported in 36 patients (31%). The most frequent serious adverse reactions that occurred were pneumonia (11%) and hemorrhage (5%).

Of the 118 patients with MCL treated with BRUKINSA, 8 (7%) patients discontinued treatment due to adverse reactions in the trials. The most frequent adverse reaction leading to treatment discontinuation was pneumonia (3.4%). One (0.8%) patient experienced an adverse reaction leading to dose reduction (hepatitis B).

Table 3 summarizes the adverse reactions in BGB-3111-206 and BGB-3111-AU-003.

Table 3: **Adverse Reactions (≥ 10%) in Patients Receiving BRUKINSA in BGB-3111-206 and BGB-3111-AU-003 Trials**

<table>
<thead>
<tr>
<th>Body System</th>
<th>Adverse Reaction</th>
<th>Percent of Patients (N=118)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All Grades %</td>
</tr>
<tr>
<td>Biology and lymphatic system disorders</td>
<td>Neutropenia and Neutrophil count decreased</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Thrombocytopenia and Platelet count decreased</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Leukopenia and White blood count decreased</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Anemia and Hemoglobin decreased</td>
<td>14</td>
</tr>
<tr>
<td>Infections and infestations</td>
<td>Upper respiratory tract infection ¶</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Pneumonia §</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Urinary tract infection</td>
<td>11</td>
</tr>
<tr>
<td>Skin and subcutaneous tissue disorders</td>
<td>Rash l</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Bruising *</td>
<td>14</td>
</tr>
<tr>
<td>Gastrointestinal disorders</td>
<td>Diarrhea</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Constipation</td>
<td>13</td>
</tr>
<tr>
<td>Vascular disorders</td>
<td>Hypertension</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Hemorrhage †</td>
<td>11</td>
</tr>
<tr>
<td>Musculoskeletal and connective tissue disorders</td>
<td>Musculoskeletal pain ¶</td>
<td>14</td>
</tr>
<tr>
<td>Metabolism and nutrition disorders</td>
<td>Hypokalemia</td>
<td>14</td>
</tr>
<tr>
<td>Respiratory, thoracic and mediastinal disorders</td>
<td>Cough</td>
<td>12</td>
</tr>
</tbody>
</table>

^ Includes fatal adverse reaction.
* Bruising includes all related terms containing bruise, bruising, contusion, ecchymosis.
† Hemorrhage includes all related terms containing hemorrhage, hematoma.
‡ Musculoskeletal pain includes musculoskeletal pain, musculoskeletal discomfort, myalgia, back pain, arthralgia, arthritis.
§ Pneumonia includes pneumonia, pneumonia fungal, pneumonia cryptococcal, pneumonia streptococcal, atypical pneumonia, lung infection, lower respiratory tract infection, lower respiratory tract infection bacterial, lower respiratory tract infection viral.
ǁ Rash includes all related terms containing rash.
¶ Upper respiratory tract infection includes upper respiratory tract infection, upper respiratory tract infection viral.

Other clinically significant adverse reactions that occurred in < 10% of patients with mantle cell lymphoma include major hemorrhage (defined as ≥ Grade 3 hemorrhage or CNS hemorrhage of any grade) (5%), hyperuricemia (6%) and headache (4.2%).

Table 4: Selected Laboratory Abnormalities* (> 20%) in Patients with MCL in Studies BGB-3111-206 and BGB-3111-AU-003

<table>
<thead>
<tr>
<th>Laboratory Parameter</th>
<th>Percent of Patients (N=118)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Grades (%)</td>
</tr>
<tr>
<td><strong>Hematologic abnormalities</strong></td>
<td></td>
</tr>
<tr>
<td>Neutrophils decreased</td>
<td>45</td>
</tr>
<tr>
<td>Platelets decreased</td>
<td>40</td>
</tr>
<tr>
<td>Hemoglobin decreased</td>
<td>27</td>
</tr>
<tr>
<td>Lymphocytosis †</td>
<td>41</td>
</tr>
<tr>
<td><strong>Chemistry abnormalities</strong></td>
<td></td>
</tr>
<tr>
<td>Blood uric acid increased</td>
<td>29</td>
</tr>
<tr>
<td>ALT increased</td>
<td>28</td>
</tr>
<tr>
<td>Bilirubin increased</td>
<td>24</td>
</tr>
</tbody>
</table>

* Based on laboratory measurements.
† Asymptomatic lymphocytosis is a known effect of BTK inhibition.

Waldenström’s Macroglobulinemia (WM)

The safety of BRUKINSA was investigated in two cohorts of Study BGB-3111-302 (ASPEN). Cohort 1 included 199 patients with MYD88 mutation (MYD88<sup>MUT</sup>) WM, randomized to and treated with either BRUKINSA (101 patients) or ibrutinib (98 patients). The trial also included a non-randomized arm, Cohort 2, with 26 wild type MYD88 (<sup>WT</sup>) WM patients and 2 patients with unknown MYD88 status [see Clinical Studies (14.2)].

Among patients who received BRUKINSA, 93% were exposed for 6 months or longer, and 89% were exposed for greater than 1 year.

In Cohort 1 of the ASPEN study safety population (N=101), the median age of patients who received BRUKINSA was 70 years (45-87 years old); 67% were male, 86% were White, 4% were Asian and 10% were not reported (unknown race). In Cohort 2 of the ASPEN study safety population (N=28), the median age of patients who received BRUKINSA was 72 (39-87 years old); 50% were male, 96% were White and 4% were not reported (unknown race).
In Cohort 1, serious adverse reactions occurred in 44% of patients who received BRUKINSA. Serious adverse reactions in > 2% of patients included influenza (3%), pneumonia (4%), neutropenia and neutrophil count decreased (3%), hemorrhage (4%), pyrexia (3%) and febrile neutropenia (3%). In Cohort 2, serious adverse reactions occurred in 39% of patients. Serious adverse reactions in > 2 patients included pneumonia (14%).

Permanent discontinuation of BRUKINSA due to an adverse reaction occurred in 2% of patients in Cohort 1 and included hemorrhage (1 patient), neutropenia and neutrophil count decreased (1 patient); in Cohort 2, permanent discontinuation of BRUKINSA due to an adverse reaction occurred in 7% of patients and included subdural hemorrhage (1 patient) and diarrhea (1 patient).

Dosage interruptions of BRUKINSA due to an adverse reaction occurred in 32% of patients in Cohort 1 and in 29% in Cohort 2. Adverse reactions which required dosage interruption in > 2% of patients included neutropenia, vomiting, hemorrhage, thrombocytopenia and pneumonia in Cohort 1. Adverse reactions leading to dosage interruption in > 2 patients in Cohort 2 included pneumonia and pyrexia.

Dose reductions of BRUKINSA due to an adverse reaction occurred in 11% of patients in Cohort 1 and in 7% in Cohort 2. Adverse reactions which required dose reductions in > 2% of patients included neutropenia in Cohort 1. Adverse reaction leading to dose reduction occurred in 2 patients in Cohort 2 (each with one event: diarrhea and pneumonia).

Table 5 summarizes the adverse reactions in Cohort 1 in ASPEN.

<table>
<thead>
<tr>
<th>Table 5:</th>
<th>Adverse Reactions (≥ 10%) Occurring in Patients with WM Who Received BRUKINSA in Cohort 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body System</td>
<td>Adverse Reaction</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Infections and infestations</td>
<td>Upper respiratory tract infection ¶</td>
</tr>
<tr>
<td></td>
<td>Pneumonia §</td>
</tr>
<tr>
<td></td>
<td>Urinary tract infection</td>
</tr>
<tr>
<td>Gastrointestinal disorders</td>
<td>Diarrhea</td>
</tr>
<tr>
<td></td>
<td>Nausea</td>
</tr>
<tr>
<td></td>
<td>Constipation</td>
</tr>
<tr>
<td></td>
<td>Vomiting</td>
</tr>
<tr>
<td>General disorders and administration site conditions</td>
<td>Fatigue #</td>
</tr>
<tr>
<td></td>
<td>Pyrexia</td>
</tr>
<tr>
<td></td>
<td>Edema peripheral</td>
</tr>
<tr>
<td>Body System</td>
<td>Adverse Reaction</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td>All Grades (%)</td>
</tr>
<tr>
<td>Skin and subcutaneous tissue disorders</td>
<td>Bruising *</td>
</tr>
<tr>
<td></td>
<td>Rash ‖</td>
</tr>
<tr>
<td></td>
<td>Pruritus</td>
</tr>
<tr>
<td>Musculoskeletal and connective tissue disorders</td>
<td>Musculoskeletal pain ‡</td>
</tr>
<tr>
<td></td>
<td>Muscle spasms</td>
</tr>
<tr>
<td>Nervous system disorders</td>
<td>Headache</td>
</tr>
<tr>
<td></td>
<td>Dizziness</td>
</tr>
<tr>
<td>Respiratory, thoracic and mediastinal disorders</td>
<td>Cough</td>
</tr>
<tr>
<td></td>
<td>Dyspnea</td>
</tr>
<tr>
<td>Vascular disorders</td>
<td>Hemorrhage †</td>
</tr>
<tr>
<td></td>
<td>Hypertension</td>
</tr>
</tbody>
</table>

* Bruising includes all related terms containing “bruise,” “contusion,” or “ecchymosis.”
† Hemorrhage includes epistaxis, hematuria, conjunctival hemorrhage, hematoma, rectal hemorrhage, periorbital hemorrhage, mouth hemorrhage, post procedural hemorrhage, hemoptyis, skin hemorrhage, hemorrhoidal hemorrhage, ear hemorrhage, eye hemorrhage, hemorrhagic diathesis, periorbital hematoma, subdural hemorrhage, wound hemorrhage, gastric hemorrhage, lower gastrointestinal hemorrhage, spontaneous hematoma, traumatic hematoma, traumatic intracranial hemorrhage, tumor hemorrhage, retinal hemorrhage, hematocoezia, diarrea hemorrhagic, hemorrhage, melena, post procedural hematoma, subdural hematoma, anal hemorrhage, hemorrhagic disorder, pericardial hemorrhage, postmenopausal hemorrhage, stoma site hemorrhage, subarachnoid hemorrhage.
# Fatigue includes asthenia, fatigue, lethargy.
‡ Musculoskeletal pain includes back pain, arthralgia, pain in extremity, musculoskeletal pain, myalgia, bone pain, spinal pain, musculoskeletal chest pain, neck pain, arthritis, musculoskeletal discomfort.
§ Pneumonia includes lower respiratory tract infection, lung infiltration, pneumonia, pneumonia aspiration, pneumonia viral.
¶ Upper respiratory tract infection includes upper respiratory tract infection, laryngitis, nasopharyngitis, sinusitis, rhinitis, viral upper respiratory tract infection, pharyngitis, rhinovirus infection, upper respiratory tract congestion.

Clinically relevant adverse reactions in < 10% of patients who received BRUKINSA included localized infection, atrial fibrillation or atrial flutter and hematuria.

Table 6 summarizes the laboratory abnormalities in ASPEN.
Table 6: Select Laboratory Abnormalities* (≥ 20%) That Worsened from Baseline in Patients with WM Who Received BRUKINSA in Cohort 1

<table>
<thead>
<tr>
<th>Laboratory Abnormality</th>
<th>BRUKINSA¹</th>
<th>Ibrutinib¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Grades (%)</td>
<td>Grade 3 or 4 (%)</td>
</tr>
<tr>
<td>Hematologic Abnormalities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutrophils decreased</td>
<td>50</td>
<td>24</td>
</tr>
<tr>
<td>Platelets decreased</td>
<td>35</td>
<td>8</td>
</tr>
<tr>
<td>Hemoglobin decreased</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>Chemistry Abnormalities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilirubin increased</td>
<td>12</td>
<td>1.0</td>
</tr>
<tr>
<td>Calcium decreased</td>
<td>27</td>
<td>2.0</td>
</tr>
<tr>
<td>Creatinine increased</td>
<td>31</td>
<td>1.0</td>
</tr>
<tr>
<td>Glucose increased</td>
<td>45</td>
<td>2.3</td>
</tr>
<tr>
<td>Potassium increased</td>
<td>24</td>
<td>2.0</td>
</tr>
<tr>
<td>Urate increased</td>
<td>16</td>
<td>3.2</td>
</tr>
<tr>
<td>Phosphate decreased</td>
<td>20</td>
<td>3.1</td>
</tr>
</tbody>
</table>

* Based on laboratory measurements.
1 The denominator used to calculate the rate varied from 86 to 101 based on the number of patients with a baseline value and at least one post-treatment value.

Marginal Zone Lymphoma

The safety of BRUKINSA was evaluated in 88 patients with previously treated MZL in two single-arm clinical studies, BGB-3111-214 and BGB-3111-AU-003 [see Clinical Studies (14.3)]. The trials required an absolute neutrophil count ≥ 1 x 10⁹/L, platelet count ≥ 50 or ≥ 75 x 10⁹/L and adequate hepatic function and excluded patients requiring a strong CYP3A inhibitor or inducer. Patients received BRUKINSA 160 mg twice daily (97%) or 320 mg once daily (3%). The median age in both studies combined was 70 years (range: 37 to 95), 52% were male, 64% were Caucasian and 19% were Asian. Most patients (92%) had an ECOG performance status of 0 to 1. Eighty percent received BRUKINSA for 6 months or longer, and 67% received treatment for more than one year.

Two fatal adverse reactions (2.3%) occurred within 30 days of the last dose of BRUKINSA, including myocardial infarction and a Covid-19 related death.

Serious adverse reactions occurred in 40% of patients. The most frequent serious adverse reactions were pyrexia (8%) and pneumonia (7%).

Adverse reactions lead to treatment discontinuation in 6% of patients, dose reduction in 2.3%, and dose interruption in 34%. The leading cause of dose modification was respiratory tract infections (13%).

Reference ID: 4856734
Table 7 summarizes selected adverse reactions in BGB-3111-214 and BGB-3111-AU-003.

### Table 7: Adverse Reactions Occurring in ≥ 10% Patients with MZL Who Received BRUKINSA

<table>
<thead>
<tr>
<th>Body System</th>
<th>Adverse Reaction</th>
<th>BRUKINSA (N=88)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All Grades (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(% )</td>
</tr>
<tr>
<td>Infections and infestations</td>
<td>Upper respiratory tract infections a</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Urinary tract infection b</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Pneumonia c†</td>
<td>10</td>
</tr>
<tr>
<td>Gastrointestinal disorders</td>
<td>Diarrhea d</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Abdominal pain e</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Nausea</td>
<td>13</td>
</tr>
<tr>
<td>Skin and subcutaneous tissue disorders</td>
<td>Bruising f</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Rash g</td>
<td>21</td>
</tr>
<tr>
<td>Musculoskeletal and connective tissue disorders</td>
<td>Musculoskeletal pain h</td>
<td>27</td>
</tr>
<tr>
<td>Vascular disorders</td>
<td>Hemorrhage i</td>
<td>23</td>
</tr>
<tr>
<td>General disorders</td>
<td>Fatigue j</td>
<td>21</td>
</tr>
<tr>
<td>Respiratory, thoracic and mediastinal disorders</td>
<td>Cough k</td>
<td>10</td>
</tr>
</tbody>
</table>

† Includes 2 fatal events of COVID-19 pneumonia.

a Upper respiratory tract infections includes upper respiratory tract infection, nasopharyngitis, sinusitis, tonsillitis, rhinitis, viral upper respiratory tract infection.

b Urinary tract infection includes urinary tract infection, cystitis, Escherichia urinary tract infection, pyelonephritis, cystitis.

c Pneumonia includes COVID-19 pneumonia, pneumonia, bronchopulmonary aspergillosis, lower respiratory tract infection, organizing pneumonia.

d Diarrhea includes diarrhea and diarrhea hemorrhagic.

e Abdominal pain includes abdominal pain, abdominal pain upper, abdominal discomfort.

f Bruising includes contusion, ecchymosis, increased tendency to bruise, post procedural contusion.

g Rash includes rash, rash maculo-papular, rash pruritic, dermatitis, dermatitis allergic, dermatitis atopic, dermatitis contact, drug reaction with eosinophilia and systemic symptoms, erythema, photosensitivity reaction, rash erythematous, rash papular, seborrheic dermatitis.

h Musculoskeletal pain includes back pain, arthralgia, musculoskeletal pain, myalgia, pain in extremity, musculoskeletal chest pain, bone pain, musculoskeletal discomfort, neck pain.

i Hemorrhage includes epistaxis, hematuria, hemorrhoidal hemorrhage, hematoma, hemoptysis, conjunctival hemorrhage, diarrhea hemorrhagic, hemorrhage urinary tract, mouth hemorrhage, pulmonary hematoma, subcutaneous hematoma, gingival bleeding, melena, upper gastrointestinal hemorrhage.

j Fatigue includes fatigue, lethargy, asthenia.

k Cough includes cough and productive cough.
Clinically relevant adverse reactions in < 10% of patients who received BRUKINSA included peripheral neuropathy, second primary malignancies, dizziness, edema, headache, petechiae, purpura and atrial fibrillation or flutter.

Table 8 summarizes selected laboratory abnormalities.

Table 8: Select Laboratory Abnormalities (≥ 20%) That Worsened from Baseline in Patients with MZL

<table>
<thead>
<tr>
<th>Laboratory Abnormality⁴</th>
<th>BRUKINSA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Grades (%)</td>
</tr>
<tr>
<td>Hematologic abnormalities</td>
<td></td>
</tr>
<tr>
<td>Neutrophils decreased</td>
<td>43</td>
</tr>
<tr>
<td>Platelets decreased</td>
<td>33</td>
</tr>
<tr>
<td>Lymphocytes decreased</td>
<td>32</td>
</tr>
<tr>
<td>Hemoglobin decreased</td>
<td>26</td>
</tr>
<tr>
<td>Chemistry abnormalities</td>
<td></td>
</tr>
<tr>
<td>Glucose increased</td>
<td>54</td>
</tr>
<tr>
<td>Creatinine increased</td>
<td>34</td>
</tr>
<tr>
<td>Phosphate decreased</td>
<td>27</td>
</tr>
<tr>
<td>Calcium decreased</td>
<td>23</td>
</tr>
<tr>
<td>ALT increased</td>
<td>22</td>
</tr>
</tbody>
</table>

¹ The denominator used to calculate the rate varied from 87 to 88 based on the number of patients with a baseline value and at least one post-treatment value.

7 DRUG INTERACTIONS

7.1 Effect of Other Drugs on BRUKINSA

Table 9: Drug Interactions that Affect Zanubrutinib

<table>
<thead>
<tr>
<th>Moderate and Strong CYP3A Inhibitors</th>
<th>Clinical Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Co-administration with a moderate or strong CYP3A inhibitor increases zanubrutinib C&lt;sub&gt;max&lt;/sub&gt; and AUC [see Clinical Pharmacology (12.3)] which may increase the risk of BRUKINSA toxicities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Prevention or management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Reduce BRUKINSA dosage when co-administered with moderate or strong CYP3A inhibitors [see Dosage and Administration (2.3)].</td>
</tr>
</tbody>
</table>

Moderate and Strong CYP3A Inducers
### Clinical Impact
- Co-administration with a moderate or strong CYP3A inducer decreases zanubrutinib $C_{\text{max}}$ and AUC [see Clinical Pharmacology (12.3)] which may reduce BRUKINSA efficacy.

### Prevention or management
- Avoid co-administration of BRUKINSA with moderate or strong CYP3A inducers [see Dosage and Administration (2.3)].

## 8 USE IN SPECIFIC POPULATIONS

### 8.1 Pregnancy

#### Risk Summary
Based on findings in animals, BRUKINSA can cause fetal harm when administered to pregnant women. There are no available data on BRUKINSA use in pregnant women to evaluate for a drug-associated risk of major birth defects, miscarriage or adverse maternal or fetal outcomes. In animal reproduction studies, oral administration of zanubrutinib to pregnant rats during the period of organogenesis was associated with fetal heart malformation at approximately 5-fold human exposures (see Data). Women should be advised to avoid pregnancy while taking BRUKINSA. If BRUKINSA is used during pregnancy, or if the patient becomes pregnant while taking BRUKINSA, the patient should be apprised of the potential hazard to the fetus.

The estimated background risk of major birth defects and miscarriage for the indicated population is unknown. All pregnancies have a background risk of birth defect, loss, or other adverse outcomes. In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2% to 4% and 15% to 20%, respectively.

#### Data

##### Animal Data
Embryo-fetal development toxicity studies were conducted in both rats and rabbits. Zanubrutinib was administered orally to pregnant rats during the period of organogenesis at doses of 30, 75, and 150 mg/kg/day. Malformations in the heart (2- or 3-chambered hearts) were noted at all dose levels in the absence of maternal toxicity. The dose of 30 mg/kg/day is approximately 5 times the exposure (AUC) in patients receiving the recommended dose of 160 mg twice daily.

Administration of zanubrutinib to pregnant rabbits during the period of organogenesis at 30, 70, and 150 mg/kg/day resulted in post-implantation loss at the highest dose. The dose of 150 mg/kg is approximately 32 times the exposure (AUC) in patients at the recommended dose and was associated with maternal toxicity.

In a pre- and post-natal developmental toxicity study, zanubrutinib was administered orally to rats at doses of 30, 75, and 150 mg/kg/day from implantation through weaning. The offspring from the middle and high dose groups had decreased body weights preweaning, and all dose groups had adverse ocular findings (e.g., cataract, protruding eye). The dose of 30 mg/kg/day is approximately 5 times the AUC in patients receiving the recommended dose.
8.2 Lactation

Risk Summary

There are no data on the presence of zanubrutinib or its metabolites in human milk, the effects on the breastfed child, or the effects on milk production. Because of the potential for serious adverse reactions from BRUKINSA in a breastfed child, advise lactating women not to breastfeed during treatment with BRUKINSA and for two weeks following the last dose.

8.3 Females and Males of Reproductive Potential

Pregnancy Testing

Pregnancy testing is recommended for females of reproductive potential prior to initiating BRUKINSA therapy.

Contraception

Females

BRUKINSA can cause embryo-fetal harm when administered to pregnant women [see Use in Specific Populations (8.1)]. Advise female patients of reproductive potential to use effective contraception during treatment with BRUKINSA and for 1 week following the last dose of BRUKINSA. If this drug is used during pregnancy, or if the patient becomes pregnant while taking this drug, the patient should be informed of the potential hazard to a fetus.

Males

Advise men to avoid fathering a child while receiving BRUKINSA and for 1 week following the last dose of BRUKINSA.

8.4 Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

8.5 Geriatric Use

Of the 847 patients in clinical studies with BRUKINSA, 53% were ≥ 65 years of age, and 20% were ≥ 75 years of age. No overall differences in safety or effectiveness were observed between younger and older patients.

8.6 Renal Impairment

No dosage modification is recommended in patients with mild, moderate, or severe renal impairment (CLcr ≥ 15 mL/min, estimated by Cockcroft-Gault). Monitor for BRUKINSA adverse reactions in patients on dialysis [see Clinical Pharmacology (12.3)].

8.7 Hepatic Impairment

Dosage modification of BRUKINSA is recommended in patients with severe hepatic impairment [see Dosage and Administration (2.2)]. The safety of BRUKINSA has not been evaluated in patients with severe hepatic impairment. No dosage modification is recommended in patients
with mild to moderate hepatic impairment. Monitor for BRUKINSA adverse reactions in patients with hepatic impairment [see Clinical Pharmacology (12.3)].

11 DESCRIPTION
BRUKINSA (zanubrutinib) is a kinase inhibitor. The empirical formula of zanubrutinib is C_{27}H_{29}N_{5}O_{3} and the chemical name is (S)-7-(1-acryloylpiperidin-4-yl)-2-(4-phenoxyphenyl)-4,5,6,7-tetrahydropyrazolo[1,5-a]pyrimidine-3-carboxamide. Zanubrutinib is a white to off-white powder, with a pH of 7.8 in saturated solution. The aqueous solubility of zanubrutinib is pH dependent, from very slightly soluble to practically insoluble.

The molecular weight of zanubrutinib is 471.55 Daltons.

Zanubrutinib has the following structure:

![Chemical Structure of Zanubrutinib]

Each BRUKINSA capsule for oral administration contains 80 mg zanubrutinib and the following inactive ingredients: colloidal silicon dioxide, croscarmellose sodium, magnesium stearate, microcrystalline cellulose and sodium lauryl sulfate. The capsule shell contains edible black ink, gelatin, and titanium dioxide.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action
Zanubrutinib is a small-molecule inhibitor of Bruton’s tyrosine kinase (BTK). Zanubrutinib forms a covalent bond with a cysteine residue in the BTK active site, leading to inhibition of BTK activity. BTK is a signaling molecule of the B-cell antigen receptor (BCR) and cytokine receptor pathways. In B-cells, BTK signaling results in activation of pathways necessary for B-cell proliferation, trafficking, chemotaxis and adhesion. In nonclinical studies, zanubrutinib inhibited malignant B-cell proliferation and reduced tumor growth.

12.2 Pharmacodynamics

BTK Occupancy in PBMCs and Lymph Nodes
The median steady-state BTK occupancy in peripheral blood mononuclear cells was maintained at 100% over 24 hours at a total daily dose of 320 mg in patients with B-cell malignancies. The median steady-state BTK occupancy in lymph nodes was 94% to 100% following the approved recommended dosage.
Cardiac Electrophysiology
At the approved recommended doses (160 mg twice daily or 320 mg once daily), there were no clinically relevant effects on the QTc interval. The effect of BRUKINSA on the QTc interval above the therapeutic exposure has not been evaluated.

12.3 Pharmacokinetics
Zanubrutinib maximum plasma concentration (C_{max}) and area under the plasma drug concentration over time curve (AUC) increase proportionally over a dosage range from 40 mg to 320 mg (0.13 to 1 time the recommended total daily dose). Limited systemic accumulation of zanubrutinib was observed following repeated administration.

The geometric mean (%CV) zanubrutinib steady-state daily AUC is 2,099 (42%) ng·h/mL following 160 mg twice daily and 1,917 (59%) ng·h/mL following 320 mg once daily. The geometric mean (%CV) zanubrutinib steady-state C_{max} is 295 (55%) ng/mL following 160 mg twice daily and 537 (55%) ng/mL following 320 mg once daily.

Absorption
The median t_{max} of zanubrutinib is 2 hours.

Effect of Food
No clinically significant differences in zanubrutinib AUC or C_{max} were observed following administration of a high-fat meal (approximately 1,000 calories with 50% of total caloric content from fat) in healthy subjects.

Distribution
The geometric mean (%CV) apparent volume of distribution (Vz/F) of zanubrutinib is 537 (73%) L. The plasma protein binding of zanubrutinib is approximately 94% and the blood-to-plasma ratio is 0.7 to 0.8.

Elimination
The mean half-life (t_{1/2}) of zanubrutinib is approximately 2 to 4 hours following a single oral zanubrutinib dose of 160 mg or 320 mg. The geometric mean (%CV) apparent oral clearance (CL/F) of zanubrutinib is 128 (58%) L/h.

Metabolism
Zanubrutinib is primarily metabolized by cytochrome P450(CYP)3A.

Excretion
Following a single radiolabeled zanubrutinib dose of 320 mg to healthy subjects, approximately 87% of the dose was recovered in feces (38% unchanged) and 8% in urine (less than 1% unchanged).

Specific Populations
No clinically significant differences in the pharmacokinetics of zanubrutinib were observed based on age (19 to 90 years), sex, race (Asian, Caucasian, and Other), body weight (36 to 144 kg) or mild, moderate or severe renal impairment (creatinine clearance [CLcr] ≥ 15 mL/min as
estimated by Cockcroft-Gault). The effect of dialysis on zanubrutinib pharmacokinetics is unknown.

**Hepatic Impairment**

The total AUC of zanubrutinib increased by 11% in subjects with mild hepatic impairment (Child-Pugh class A), by 21% in subjects with moderate hepatic impairment (Child-Pugh class B), and by 60% in subjects with severe hepatic impairment (Child-Pugh class C) relative to subjects with normal liver function. The unbound AUC of zanubrutinib increased by 23% in subjects with mild hepatic impairment (Child-Pugh class A), by 43% in subjects with moderate hepatic impairment (Child-Pugh class B) and by 194% in subjects with severe hepatic impairment (Child-Pugh class C) relative to subjects with normal liver function.

**Drug Interaction Studies**

**Clinical Studies and Model-Informed Approaches**

**CYP3A Inhibitors:** Co-administration of multiple doses of CYP3A inhibitors increases zanubrutinib \( C_{\text{max}} \) and AUC (Table 10).

<table>
<thead>
<tr>
<th>Co-administered CYP3A Inhibitor</th>
<th>Increase in Zanubrutinib ( C_{\text{max}} )</th>
<th>Increase in Zanubrutinib AUC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Observed</em></td>
<td></td>
</tr>
<tr>
<td>Itraconazole (200 mg once daily)</td>
<td>157%</td>
<td>278%</td>
</tr>
<tr>
<td></td>
<td><em>Predicted</em></td>
<td></td>
</tr>
<tr>
<td>Clarithromycin (250 mg twice daily)</td>
<td>175%</td>
<td>183%</td>
</tr>
<tr>
<td>Diltiazem (60 mg three times daily)</td>
<td>151%</td>
<td>157%</td>
</tr>
<tr>
<td>Erythromycin (500 mg four times daily)</td>
<td>284%</td>
<td>317%</td>
</tr>
<tr>
<td>Fluconazole (200 mg once daily)</td>
<td>179%</td>
<td>177%</td>
</tr>
<tr>
<td>Fluconazole (400 mg once daily)</td>
<td>270%</td>
<td>284%</td>
</tr>
</tbody>
</table>

**CYP3A Inducers:** Co-administration of multiple doses of rifampin (strong CYP3A inducer) decreased the zanubrutinib \( C_{\text{max}} \) by 92% and AUC by 93%.

Co-administration of multiple doses of efavirenz (moderate CYP3A inducer) is predicted to decrease zanubrutinib \( C_{\text{max}} \) by 58% and AUC by 60%.

**CYP3A Substrates:** Co-administration of multiple doses of zanubrutinib decreased midazolam (CYP3A substrate) \( C_{\text{max}} \) by 30% and AUC by 47%.

**CYP2C19 Substrates:** Co-administration of multiple doses of zanubrutinib decreased omeprazole (CYP2C19 substrate) \( C_{\text{max}} \) by 20% and AUC by 36%.

**Other CYP Substrates:** No clinically significant differences were observed with warfarin (CYP2C9 substrate) pharmacokinetics when co-administered with zanubrutinib.
**Transporter Systems:** Co-administration of multiple doses of zanubrutinib increased digoxin (P-gp substrate) $C_{\text{max}}$ by 34% and AUC by 11%. No clinically significant differences in the pharmacokinetics of rosuvastatin (BCRP substrate) were observed when co-administered with zanubrutinib.

**Gastric Acid Reducing Agents:** No clinically significant differences in zanubrutinib pharmacokinetics were observed when co-administered with gastric acid reducing agents (proton pump inhibitors, H2-receptor antagonists).

**In Vitro Studies**

**CYP Enzymes:** Zanubrutinib is an inducer of CYP2B6 and CYP2C8.

**Transporter Systems:** Zanubrutinib is likely to be a substrate of P-gp. Zanubrutinib is not a substrate or inhibitor of OAT1, OAT3, OCT2, OATP1B1 or OATP1B3.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Carcinogenicity studies have not been conducted with zanubrutinib.

Zanubrutinib was not mutagenic in a bacterial mutagenicity (Ames) assay, was not clastogenic in a chromosome aberration assay in mammalian (CHO) cells, nor was it clastogenic in an *in vivo* bone marrow micronucleus assay in rats.

A combined male and female fertility and early embryonic development study was conducted in rats at oral zanubrutinib doses of 30 to 300 mg/kg/day. Male rats were dosed 4 weeks prior to mating and through mating and female rats were dosed 2 weeks prior to mating and to gestation day 7. No effect on male or female fertility was noted but at the highest dose tested, morphological abnormalities in sperm and increased post-implantation loss were noted. The high dose of 300 mg/kg/day is approximately 10 times the human recommended dose, based on body surface area.

14 CLINICAL STUDIES

14.1 Mantle Cell Lymphoma

The efficacy of BRUKINSA was assessed in BGB-3111-206 [NCT03206970], a Phase 2, open-label, multicenter, single-arm trial of 86 previously treated patients with MCL who had received at least one prior therapy. BRUKINSA was given orally at a dose of 160 mg twice daily until disease progression or unacceptable toxicity.

The median age of patients was 60.5 years (range: 34 to 75) and the majority were male (78%). The median time since diagnosis to study entry was 30 months (range: 3 to 102) and the median number of prior therapies was 2 (range: 1 to 4). The most common prior regimens were CHOP-based (91%) followed by rituximab-based (74%). The majority of patients had extranodal involvement (71%) and refractory disease (52%). Blastoid variant of MCL was present in 14% of patients. The MIPI score was low in 58%, intermediate in 29%, and high risk in 13%.
The efficacy of BRUKINSA was also assessed in BGB-3111-AU-003 [NCT02343120], a Phase 1/2, open-label, dose-escalation, global, multicenter, single-arm trial of B-cell malignancies including 32 previously treated MCL patients treated with BRUKINSA. BRUKINSA was given orally at doses of 160 mg twice daily or 320 mg daily. The median age of patients with previously treated MCL was 70 years (range: 42 to 86) and 38% of patients were ≥ 75 years old. Most patients were male (69%) and Caucasian (78%). The MIPI score was low in 28%, intermediate in 41%, and high risk in 31%.

Tumor response was according to the 2014 Lugano Classification for both studies, and the primary efficacy endpoint was overall response rate as assessed by an Independent Review Committee.

### Table 11: Efficacy Results in Patients with MCL by Independent Review Committee

<table>
<thead>
<tr>
<th>Study BGB-3111-206 (N=86)</th>
<th>Study BGB-3111-AU-003 (N=32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORR (95% CI)</td>
<td>84% (74, 91)</td>
</tr>
<tr>
<td>CR</td>
<td>59%</td>
</tr>
<tr>
<td>PR</td>
<td>24%</td>
</tr>
<tr>
<td>Median DoR in months (95% CI)</td>
<td>19.5 (16.6, NE)</td>
</tr>
</tbody>
</table>


* FDG-PET scans were not required for response assessment.

### 14.2 Waldenström’s Macroglobulinemia

The efficacy of BRUKINSA was evaluated in ASPEN [NCT03053440], a randomized, active control, open-label trial, comparing BRUKINSA and ibrutinib in patients with MYD88 L265P mutation (MYD88MUT) WM. Patients in Cohort 1 (n=201) were randomized 1:1 to receive BRUKINSA 160 mg twice daily or ibrutinib 420 mg once daily until disease progression or unacceptable toxicity. Randomization was stratified by number of prior therapies (0 versus 1-3 versus > 3) and CXCR4 status (presence or absence of a WHIM-like mutation as measured by Sanger assay).

The major efficacy outcome was the response rate defined as PR or better as assessed by IRC based on standard consensus response criteria from the International Workshop on Waldenström’s Macroglobulinemia (IWWM)-6 criteria. An additional efficacy outcome measure was duration of response (DOR).

The median age was 70 years (range: 38 to 90) and 68% were male. Of those enrolled, 2% were Asian, 91% were White and 7% were of unknown race. ECOG performance status of 0 or 1 was present in 93% patients at baseline and 7% had a baseline ECOG performance status of 2. A total of 82% had relapsed/refractory disease with 85% having received prior alkylating agents and 91% prior anti-CD20 therapy. The median number of prior therapies in those with relapsed/refractory disease was 1 (range: 1 to 8). A total of 91 (45%) patients had International Prognostic Scoring System (IPSS) high WM.
The study did not meet statistical significance for the pre-specified efficacy outcome of superior CR+VGPR as assessed by IRC, tested first in patients with R/R disease in ASPEN.

Table 12 shows the response rates in ASPEN based on IRC assessment.

Table 12: Response Rate and Duration of Response Based on IRC Assessment in ASPEN

<table>
<thead>
<tr>
<th>Response Category</th>
<th>Standard IWWM-6*</th>
<th>Modified IWWM-6#</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BRUKINSA (N=102)</td>
<td>Ibrutinib (N=99)</td>
</tr>
<tr>
<td>Response rate (CR+VGPR+PR), (%)</td>
<td>79 (77.5)</td>
<td>77 (77.8)</td>
</tr>
<tr>
<td>95% CI (%)a</td>
<td>(68.1, 85.1)</td>
<td>(68.3, 85.5)</td>
</tr>
<tr>
<td>Complete Response (CR)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Very Good Partial Response (VGPR)</td>
<td>16 (15.7)</td>
<td>7 (7.1)</td>
</tr>
<tr>
<td>Partial Response (PR), (%)</td>
<td>63 (61.8)</td>
<td>70 (70.7)</td>
</tr>
<tr>
<td>Duration of response (DOR), Event-free at 12 months (95% CI)b</td>
<td>94.4% (85.8, 97.9)</td>
<td>87.9% (77.0, 93.8)</td>
</tr>
</tbody>
</table>

a 2-sided Clopper-Pearson 95% confidence interval.

b Estimated by Kaplan-Meier method with 95% CIs estimated using the method of Brookmeyer and Crowley.

IWWM-6 criteria (Owen et al, 2013) require complete resolution of extramedullary disease (EMD) if present at baseline for VGPR to be assessed.

Modified IWWM-6 criteria (Treon, 2015) require a reduction in EMD if present at baseline for VGPR to be assessed.

ASPEN Cohort 2

Cohort 2 enrolled patients with MYD88 wildtype (MYD88WT) or MYD88 mutation unknown WM (N = 26 and 2, respectively) and received BRUKINSA 160 mg twice daily. The median age was 72 years (range: 39 to 87) with 43% > 75 years, 50% were male, 96% were White and 4% were not reported (unknown race). 86% patients had a baseline ECOG performance status 0 or 1 and 14% had a baseline performance status of 2. Twenty-three of the 28 patients in Cohort 2 had relapsed or refractory disease.

In Cohort 2, response (CR+VGPR+PR) as assessed by IRC using IWWM-6 or modified IWWM-6 was seen in 50% (13 out of 26 response evaluable patients; 95% CI: 29.9, 70.1).

14.3 Marginal Zone Lymphoma

The efficacy of BRUKINSA was assessed in Study BGB-3111-214 [NCT03846427], an open-label, multicenter, single-arm trial that evaluated 66 patients with MZL who received at least one prior anti-CD20-based therapy. BRUKINSA was given orally at a dosage of 160 mg twice daily until disease progression or unacceptable toxicity. The median age was 70 years (range: 37 to 85); 55% were male; 38% had extranodal MZL, 38% nodal, 18% splenic and 6% had unknown subtype. The median number of prior systemic therapies was 2 (range: 1 to 6), with 27% having 3 or more lines of systemic therapy; 88% had prior rituximab-based chemotherapy; 32% had refractory disease at study entry.
The efficacy of BRUKINSA was also assessed in BGB-3111-AU-003 [NCT02343120], an open-label, multicenter, single-arm trial that included 20 patients with previously treated MZL (45% having extranodal MZL, 25% nodal, 30% splenic). BRUKINSA was given orally at dosages of 160 mg twice daily or 320 mg once daily. The median age was 70 years (range: 52 to 85); 50% were male. The median number of prior systemic therapies was 2 (range: 1 to 5), with 20% having 3 or more lines of systemic therapy; 95% had prior rituximab-based chemotherapy.

Efficacy was based on overall response rate (ORR) and duration of response as assessed by an Independent Review Committee (IRC) using 2014 Lugano criteria (Table 13).

**Table 13: Efficacy Results per IRC in Patients with MZL**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Study BGB-3111-214 (N=66)</th>
<th>Study BGB-3111-AU-003 (N=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall Response Rate (CT-based) a</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORR, n</td>
<td>37 (56%)</td>
<td>16 (80%)</td>
</tr>
<tr>
<td>(95% CI, %)</td>
<td>(43, 68)</td>
<td>(56, 94)</td>
</tr>
<tr>
<td>CR, n</td>
<td>13 (20%)</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>PR, n</td>
<td>24 (36%)</td>
<td>12 (60%)</td>
</tr>
<tr>
<td><strong>Time to Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median (range), months</td>
<td>2.9 (1.8, 11.1)</td>
<td>2.9 (2.6, 23.1)</td>
</tr>
<tr>
<td><strong>Duration of Response b, c</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median DoR (95% CI), months</td>
<td>NE (NE, NE)</td>
<td>NE (8.4, NE)</td>
</tr>
<tr>
<td>Rate at 12 months (95% CI)</td>
<td>85% (67, 93)</td>
<td>72% (40, 88)</td>
</tr>
</tbody>
</table>

ORR: overall response rate, CR: complete response, PR: partial response, DoR: duration of response, CI: confidence interval, NE: not estimable

a Per 2014 CT-based Lugano criteria. FDG-PET scans were not considered for this response assessment.

b Based on Kaplan-Meier estimation. Estimated median follow-up for DoR was 8.3 months for Study BGB-3111-214 and 31.4 months for Study BGB-3111-AU-003.

c In study BGB-3111-214, ORR prioritizing PET-CT when available (55 patients, with the remainder assessed by CT scan) was 67% (95% CI: 54, 78) with a CR rate of 26%.

### 16 HOW SUPPLIED/STORAGE AND HANDLING

**How Supplied**

<table>
<thead>
<tr>
<th>Package Size</th>
<th>Content</th>
<th>NDC Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-count</td>
<td>Bottle with a child-resistant cap containing 120 capsules 80 mg, white to off-white opaque capsule, marked with “ZANU 80” in black ink</td>
<td>72579-011-02</td>
</tr>
</tbody>
</table>
Storage
Store at 20°C to 25°C (68°F to 77°F); excursions permitted between 15°C to 30°C (59°F to 86°F) [See USP Controlled Room Temperature].

17 PATIENT COUNSELING INFORMATION
Advise patients to read the FDA-approved patient labeling (Patient Information).

Hemorrhage
Inform patients to report signs or symptoms of severe bleeding. Inform patients that BRUKINSA may need to be interrupted for major surgeries or procedures [see Warnings and Precautions (5.1)].

Infections
Inform patients to report signs or symptoms suggestive of infection [see Warnings and Precautions (5.2)].

Cytopenias
Inform patients that they will need periodic blood tests to check blood counts during treatment with BRUKINSA [see Warnings and Precautions (5.3)].

Second Primary Malignancies
Inform patients that other malignancies have been reported in patients who have been treated with BRUKINSA, including skin cancer and other solid tumors. Advise patients to use sun protection and have monitoring for development of other cancers [see Warnings and Precautions (5.4)].

Cardiac Arrhythmias
Counsel patients to report any signs of palpitations, lightheadedness, dizziness, fainting, shortness of breath, and chest discomfort [see Warnings and Precautions (5.5)].

Embryo-Fetal Toxicity
Advise women of the potential hazard to a fetus and to avoid becoming pregnant during treatment and for 1 week after the last dose of BRUKINSA [see Warnings and Precautions (5.6)]. Advise males with female sexual partners of reproductive potential to use effective contraception during BRUKINSA treatment and for 1 week after the last dose of BRUKINSA [see Use in Specific Populations (8.3)].

Lactation
Advise females not to breastfeed during treatment with BRUKINSA and for 2 weeks after the last dose [see Use in Specific Populations (8.2)].

Administration Instructions
BRUKINSA may be taken with or without food. Advise patients that BRUKINSA capsules should be swallowed whole with a glass of water, without being opened, broken, or chewed [see Dosage and Administration (2.1)].
Missed Dose
Advise patients that if they miss a dose of BRUKINSA, they may still take it as soon as possible on the same day with a return to the normal schedule the following day [see Dosage and Administration (2.1)].

Drug Interactions
Advise patients to inform their healthcare providers of all concomitant medications, including over-the-counter medications, vitamins, and herbal products [see Drug Interactions (7)].
What is BRUKINSA?
BRUKINSA is a prescription medicine used to treat adults with:
- Mantle cell lymphoma (MCL) who have received at least one prior treatment for their cancer.
- Waldenström’s macroglobulinemia (WM).
- Marginal zone lymphoma (MZL) when the disease has come back or did not respond to treatment and who have received at least one certain type of treatment.

It is not known if BRUKINSA is safe and effective in children.

Before taking BRUKINSA, tell your healthcare provider about all of your medical conditions, including if you:
- have bleeding problems.
- have had recent surgery or plan to have surgery. Your healthcare provider may stop BRUKINSA for any planned medical, surgical, or dental procedure.
- have an infection.
- have or had heart rhythm problems.
- have high blood pressure.
- have liver problems, including a history of hepatitis B virus (HBV) infection.
- are pregnant or plan to become pregnant. BRUKINSA can harm your unborn baby. If you are able to become pregnant, your healthcare provider may do a pregnancy test before starting treatment with BRUKINSA.
  - Females should avoid getting pregnant during treatment and for 1 week after the last dose of BRUKINSA. You should use effective birth control (contraception) during treatment and for 1 week after the last dose of BRUKINSA.
  - Males should avoid getting female partners pregnant during treatment and for 1 week after the last dose of BRUKINSA. You should use effective birth control (contraception) during treatment and for 1 week after the last dose of BRUKINSA.
- are breastfeeding or plan to breastfeed. It is not known if BRUKINSA passes into your breast milk. Do not breastfeed during treatment with BRUKINSA and for 2 weeks after the last dose of BRUKINSA.

Tell your healthcare provider about all the medicines you take, including prescription and over-the-counter medicines, vitamins, and herbal supplements. Taking BRUKINSA with certain other medications may affect how BRUKINSA works and can cause side effects.

How should I take BRUKINSA?
- Take BRUKINSA exactly as your healthcare provider tells you to take it.
- Do not change your dose or stop taking BRUKINSA unless your healthcare provider tells you to.
- Your healthcare provider may tell you to decrease your dose, temporarily stop, or completely stop taking BRUKINSA if you develop certain side effects.
- Take BRUKINSA with or without food.
- Swallow BRUKINSA capsules whole with a glass of water. Do not open, break, or chew the capsules.
- If you miss a dose of BRUKINSA, take it as soon as you remember on the same day. Return to your normal schedule the next day.

What are the possible side effects of BRUKINSA?
BRUKINSA may cause serious side effects, including:

- **Bleeding problems (hemorrhage)** that can be serious and may lead to death. Your risk of bleeding may increase if you are also taking a blood thinner medicine. Tell your healthcare provider if you have any signs or symptoms of bleeding, including:
  - blood in your stools or black stools (looks like tar)
  - pink or brown urine
  - unexpected bleeding, or bleeding that is severe or you cannot control
  - vomit blood or vomit that looks like coffee grounds
  - cough up blood or blood clots
  - increased bruising
  - dizziness
  - weakness
  - confusion
  - change in speech
  - headache that lasts a long time

Reference ID: 4856734
• **Infections** that can be serious and may lead to death. Tell your healthcare provider right away if you have fever, chills, or flu-like symptoms.

• **Decrease in blood cell counts.** Decreased blood counts (white blood cells, platelets, and red blood cells) are common with BRUKINSA, but can also be severe. Your healthcare provider should do blood tests during treatment with BRUKINSA to check your blood counts.

• **Second primary cancers.** New cancers have happened in people during treatment with BRUKINSA, including cancers of the skin or other organs. Your healthcare provider will check you for other cancers during treatment with BRUKINSA. Use sun protection when you are outside in sunlight.

• **Heart rhythm problems (atrial fibrillation and atrial flutter).** Tell your healthcare provider if you have any of the following signs or symptoms:
  - your heartbeat is fast or irregular
  - feel lightheaded or dizzy
  - pass out (faint)
  - shortness of breath
  - chest discomfort

The most common side effects of BRUKINSA include:

- decreased white blood cells
- upper respiratory tract infection
- decreased platelet count
- bleeding
- rash
- muscle or joint pain

These are not all the possible side effects of BRUKINSA.

Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

How should I store BRUKINSA?

• Store BRUKINSA capsules at room temperature between 68°F to 77°F (20°C to 25°C).
• BRUKINSA comes in a bottle with a child-resistant cap.

Keep BRUKINSA and all medicines out of the reach of children.

General information about the safe and effective use of BRUKINSA.

Medicines are sometimes prescribed for purposes other than those listed in a Patient Information leaflet. Do not use BRUKINSA for a condition for which it was not prescribed. Do not give BRUKINSA to other people, even if they have the same symptoms you have. It may harm them. You can ask your healthcare provider or pharmacist for more information about BRUKINSA that is written for healthcare professionals.

What are the ingredients in BRUKINSA?

**Active ingredient:** zanubrutinib

**Inactive ingredients:** colloidal silicon dioxide, croscarmellose sodium, magnesium stearate, microcrystalline cellulose, and sodium lauryl sulfate.

Capsule shell contains edible black ink, gelatin, and titanium dioxide.

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For more information, go to [www.BRUKINSA.com](http://www.BRUKINSA.com) or call 1-833-969-2463.