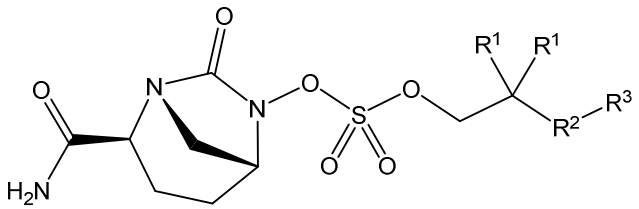
## CLAIMS

1. A pharmaceutical composition comprising:

a β-lactam antibiotic or a pharmaceutically acceptable salt thereof; and

an avibactam derivative of Formula (1):



(1)

or a pharmaceutically acceptable salt thereof, wherein,

each $R^1$ is independently selected from $C_{1-6}$ alkyl, or each $R^1$ and the geminal carbon atom to which they are bonded forms a $C_{3-6}$ cycloalkyl ring, a $C_{3-6}$ heterocycloalkyl ring, a substituted $C_{3-6}$ cycloalkyl ring, or a substituted $C_{3-6}$ heterocycloalkyl ring;

$R^2$ is selected from a single bond, $C_{1-6}$ alkanediyl, $C_{1-6}$ heteroalkanediyl, $C_{5-6}$ cycloalkanediyl, $C_{5-6}$ heterocycloalkanediyl, $C_6$ arenediyl, $C_{5-6}$ heteroarenediyl, substituted $C_{1-6}$ alkanediyl, substituted $C_{1-6}$ heteroalkanediyl, substituted $C_{5-6}$ cycloalkanediyl, substituted $C_{5-6}$ heterocycloalkanediyl, substituted $C_6$ arenediyl, and substituted $C_{5-6}$ heteroarenediyl;

$R^3$ is selected from $C_{1-6}$ alkyl, –O–C(O)–$R^4$, –S–C(O)–$R^4$, –NH–C(O)–$R^4$, –O–C(O)–O–$R^4$, –S–C(O)–O–$R^4$, –NH–C(O)–O–$R^4$, –C(O)–O–$R^4$, –C(O)–S–$R^4$, –C(O)–NH–$R^4$, –O–C(O)–O–$R^4$, –O–C(O)–S–$R^4$, –O–C(O)–NH–$R^4$, –S–S–$R^4$, –S–$R^4$, –NH–$R^4$, –CH(–$NH_2$)(–$R^4$), $C_{5-6}$ heterocycloalkyl, $C_{5-6}$ heteroaryl, substituted $C_{5-6}$ cycloalkyl, substituted $C_{5-6}$ heterocycloalkyl, substituted $C_{5-6}$ aryl, substituted $C_{5-6}$ heteroaryl, and –CH=C($R^4$)$_2$, wherein,

$R^4$ is selected from hydrogen, $C_{1-8}$ alkyl, $C_{1-8}$ heteroalkyl, $C_{5-8}$ cycloalkyl, $C_{5-8}$ heterocycloalkyl, $C_{5-10}$ cycloalkylalkyl, $C_{5-10}$ heterocycloalkylalkyl, $C_{6-8}$ aryl, $C_{5-8}$ heteroaryl, $C_{7-10}$ arylalkyl, $C_{5-10}$ heteroarylalkyl, substituted $C_{1-8}$ alkyl, substituted $C_{1-8}$ heteroalkyl, substituted $C_{5-8}$ cycloalkyl, substituted $C_{5-8}$ heterocycloalkyl, substituted $C_{5-10}$ cycloalkylalkyl, substituted $C_{5-10}$ heterocycloalkylalkyl, substituted $C_{6-8}$ aryl, substituted $C_{5-8}$ heteroaryl, substituted $C_{7-10}$ arylalkyl, and substituted $C_{5-10}$ heteroarylalkyl;

$R^5$ is selected from hydrogen, $C_{1-6}$ alkyl, $C_{5-8}$ cycloalkyl, $C_{6-12}$ cycloalkylalkyl, $C_{2-6}$ heteroalkyl, $C_{5-8}$ heterocycloalkyl, $C_{6-12}$ heterocycloalkylalkyl, substituted $C_{1-6}$ alkyl, substituted $C_{5-8}$ cycloalkyl, substituted $C_{6-12}$ cycloalkylalkyl, substituted $C_{2-6}$ heteroalkyl, substituted $C_{5-8}$ heterocycloalkyl, and substituted $C_{6-12}$ heterocycloalkylalkyl; and

$R^6$ is selected from hydrogen, $C_{1-6}$ alkyl, $C_{5-8}$ cycloalkyl, $C_{6-12}$ cycloalkylalkyl, $C_{2-6}$ heteroalkyl, $C_{5-8}$ heterocycloalkyl, $C_{6-12}$ heterocycloalkylalkyl, substituted $C_{1-6}$ alkyl,

substituted $C_{5-8}$ cycloalkyl, substituted $C_{6-12}$ cycloalkylalkyl, substituted $C_{2-6}$ heteroalkyl, substituted $C_{5-8}$ heterocycloalkyl, and substituted $C_{6-12}$ heterocycloalkylalkyl,

wherein the pharmaceutical composition comprises:

from 200 mg to 1,400 mg of the β-lactam antibiotic; and

from 200 mg to 1,400 mg of the avibactam derivative,

wherein the β-lactam antibiotic comprises ceftibuten or a pharmaceutically acceptable salt thereof, and

wherein the avibactam derivative is ethyl 3-(((((1*R*,2*S*,5*R*)-2-carbamoyl-7-oxo-1,6-diazabicyclo[3.2.1]octan-6-yl)oxy)sulfonyl)oxy)-2,2-dimethylpropanoate (3), or a pharmaceutically acceptable salt thereof.

2. The pharmaceutical composition of claim 1, wherein the pharmaceutical composition comprises:

from 100 mg to 500 mg of ceftibuten or a pharmaceutically acceptable salt thereof; and

from 300 mg to 1,400 mg of the avibactam derivative or a pharmaceutically acceptable salt thereof.

3. The pharmaceutical composition of claim 1, wherein, following oral administration to a patient the composition provides a β-lactam antibiotic plasma concentration greater than 40% *f*T>MIC for a bacterial strain.

4. The pharmaceutical composition of claim 1, wherein, following oral administration to a patient, the composition provides an avibactam plasma concentration greater than 40% *f*T>$C_t$.

5. The pharmaceutical composition of claim 1, wherein, following oral administration to a patient, the composition provides an avibactam plasma concentration characterized by a *f*AUC:MIC ratio from 10 to 40.

6. The pharmaceutical composition of claim 1, wherein the pharmaceutical composition comprises an oral formulation.