BMB-101

Novel 5-HT_{2C} Selective Agonist

Breaking through

Drug resistant epilepsies

February 2025

Disclaimer and Cautionary Note regarding Forward Looking Statements

This corporate presentation (this "Presentation") of Bright Minds Biosciences Inc. (the "Company") is current as of January 2025, except as otherwise provided herein. It is information in a summary form and does not purport to be complete. It is not intended to be relied upon as advice to investors or potential investors and does not take into account the investment objectives, financial situation or needs of any particular investor. An investment in the Company is speculative and involves substantial risk and is only suitable for investors that are able to bear the risk of losing their entire investment.

No representation or warranty, express or implied, is made or given by or on behalf of the Company or any of its affiliates, directors, officers or employees as to the accuracy, completeness or fairness of the information or opinions contained in this Presentation and no responsibility or liability is accepted by any person for such information or opinions. The Company does not undertake or agree to update this Presentation or to correct any inaccuracies in, or omissions from, this Presentation that may become apparent. No person has been authorized to give any information or make any representations other than those contained in this Presentation and, if given and/or made, such information or representations must not be relied upon as having been so authorized. The contents of this Presentation are not to be construed as legal, financial or tax advice.

Certain statements in this Presentation may constitute forward-looking information within the meaning of applicable securities laws, including the Private Securities Litigation Reform Act of 1995. Generally, forward-looking information can be identified by the use of forward-looking terminology such as "expects," "believes," "anticipates," "budget," "scheduled," "estimates," "forecasts," "intends," "plans," and variations of such words and phrases, or by statements that certain actions, events or results "may," "will," "could," "would," or "might," "be taken," "occur," or "be achieved." Certain statements, beliefs and opinions in this Presentation (including those contained in graphs, tables and charts), which reflect the Company's or, as appropriate, the Company's management's current expectations and projections about future events, constitute forward-looking information. Forward-looking information contained in this Presentation is based on certain assumptions regarding, among other things, expected growth, results of operations, performance, industry trends, existing legislative and regulatory landscape, general business and economic conditions, market competition, and growth opportunities. While management considers these assumptions to be reasonable, based on information available, they may prove to be incorrect. By its nature, forward-looking information involve a number of risks, uncertainties and assumptions that could cause actual results or events to differ materially from those expressed or implied by the forward-looking information. These risks, uncertainties and other factors include, but are not limited to: (i) the ultimate efficacy and safety of both first generation and second generation drug therapies discussed in the Presentation; (ii) the ability to obtain necessary regulatory approvals; (iii) the status and development of the Company's intellectual property and licenses thereto; (iv) the ability to attract and retain skilled staff; (v) the ability to maintain current good relationships with suppliers, service providers and other third parties, including the support of the National Institutes of Health; (vi) changes to patent laws or the interpretation thereof; (vii) obtaining patent protection for second generation drug therapies; (viii) the ability to protect intellectual property rights throughout the world; (ix) market viability for second generation drug therapies; (x) the impact of novel psychedelic drugs on specific disorders; (xi) the ability to implement and successfully execute the Company's plans, strategies and intentions; (xii) the expected growth and results of operations; (xiii) the ability to achieve the expected drug pipeline; (xiv) the continued operation of the Company as a going concern; (xv) the ability to obtain partnerships; (xvi) commercial prices of drugs, including the price differentials between patented drugs and generic drugs; (xvii) the willingness and ability of third parties to honor their contractual obligations; (xvii) the decision of third parties over which the Company has no control; (xix) the availability of financing on reasonable terms; (xx) judicial proceedings, including those related to product liability; (xxi) force majeure events, including pandemics such as COVID-19; (xxii) general business and economic conditions; (xxiii) adverse industry events, including the reputation associated with the Company and its research, as well as any eventual products; (xxiv) the eventual ability to market, sell and distribute products, as well as the associated costs thereto; (xxv) loss of markets; (xxvi) future legislative and regulatory changes or developments; (xxvii) inability to access sufficient capital from internal and external sources, and/or inability to access sufficient capital on favorable terms; (xxviii) income tax and regulatory matters; and (xxix) market competition, including the prices, products, services and technology offered by competitors. The foregoing factors are not intended to be exhaustive. These risks, uncertainties and assumptions could adversely affect the outcome and financial effects of the plans and events described herein. For further information regarding the risks, uncertainties and other factors that may cause differences between our expectations and actual results, you should review the "Risk Factors" section of our Annual Report on Form 20-F for the year ended September 30, 2023 filed with the Securities and Exchange Commission ("SEC") and our other filings with the SEC as well as on SEDAR+. Forward-looking statements contained in this Presentation regarding past trends or activities should not be taken as a representation that such trends or activities will continue in the future. The Company does not undertake any obligation to update or revise any forward-looking statement, whether as a result of new information, future events or otherwise.

By your acceptance of this Presentation, if delivered, you and any person reviewing this Presentation agrees not to distribute, copy, reproduce, transmit, make available, or condone any of the foregoing, without the prior written consent of the Company. Any unauthorized use of this Presentation is strictly prohibited.

This Presentation does not constitute an offer to sell or the solicitation of an offer to buy, nor shall there be any sale of the securities of the Company in any jurisdiction in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of such jurisdiction. Information concerning the assets and operations of the Company included in this Presentation has been prepared in accordance with Canadian standards and is not comparable in all respects to similar information for United States companies. No securities regulatory authority has expressed an opinion about the securities of the Company and it is an offence to claim otherwise

Bright Minds Biosciences (NASDAQ: DRUG)

2041
BMB-101
IP Protection

$2Bn
DEE
Market opportunity

$2Bn
Absence epilepsies
Market opportunity

2027
Cash Runway

5-HT_{2C}

Best-in-class mechanism in DEE epilepsies

Relevant M&A deals

GW pharmaceuticals → **$7.2Bn (2021)** → Jazz Pharmaceuticals

ZOGENIX → **$1.9Bn (2022)** → UCB

LONGBOARD PHARMACEUTICALS → **$2.6Bn (2024)** → Lundbeck

Pipeline

Rich and diverse portfolio in neurology and psychiatry with multiple programs

Lead	Indications	Research	Ph-1	Ph-2
5-HT$_{2C}$ agonists for CNS disorders				
BMB-101	Rare epilepsies			Clinical Studies – Phase 2
BMB-10x	Obesity and feeding behaviour			ADME/PK profiling
Non-hallucinogenic psychoplastogens				
BMB-201	Treatment-resistant depression			IND-enabling studies
5-HT$_{2A}$ agonists for the treatment of depression				
BMB-202	Depression (Fast-onset)			IND-enabling tox
BMB-xxx	Neurology / Neuropsychiatric Indication			ADMEPK profiling

Drug-resistant epilepsy is still a significant issue

~30%

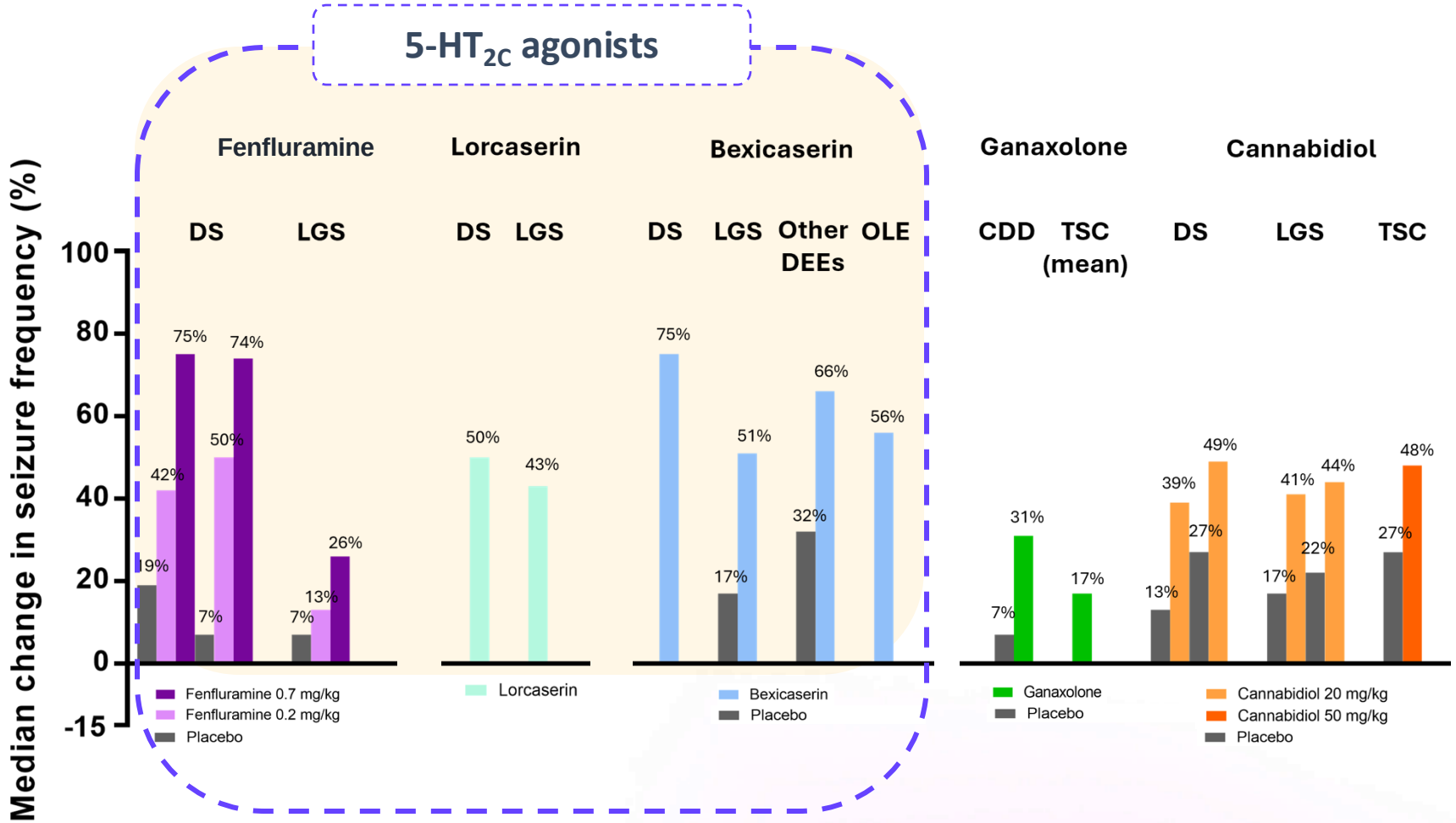
of Epilepsy patients develop drug resistance

Definition:
Drug-resistant epilepsy is characterized by the persistence of seizures despite the use of at least two appropriate antiseizure medications (ASMs) at effective doses

Despite the availability of over 20 ASMs, achieving seizure control in DRE patients remains difficult.

Woldman W, Cook MJ, Terry JR. Evolving dynamic networks: An underlying mechanism of drug resistance in epilepsy? Epilepsy Behav. 2019

5-HT_{2C} agonism provides superior efficacy in DEE epilepsies



DEE - Developmental and Epileptic Encephalopathy
DS – Dravet Syndrome
LGS – Lennox Gastaut Syndrome
TSC - Tuberous sclerosis
CDD - CDKL5 deficiency disorder
OLE – Open-Label Extension

High unmet need

Recent drug development focused on Dravet Syndrome, LGS and other DEEs

Semah F, et al. Is the underlying cause of epilepsy a major prognostic factor for recurrence? Neurology. 1998;(51):1256-1262
Brenner T et al. Prevalence of neurologic autoantibodies in cohorts of patients with new and established epilepsy. Epilepsia. 2013;54(6):1028–1035
Image credits: UCB

BMB-101

Best-in-class

5-HT_{2C} Selective Agonist

First-in-class

G-protein biased agonist

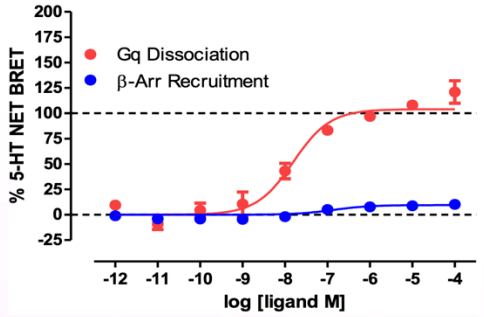
BMB-101 is uniquely positioned to address major unmet needs

Highly selective 5-HT2C agonist

Compound	5-HT$_{2A}$	5-HT$_{2B}$	5-HT$_{2C}$
BMB-101	2280	>10000	16.2
Nor-Fenfluramine	82.8	11.6	2.5
Lorcaserin	50.1	67.4	2.4
Bexicaserin	>10000	>10000	120

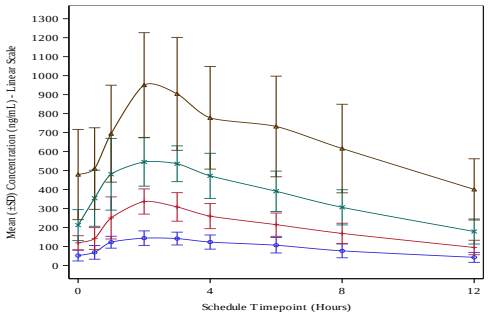
- Validated mechanism of action in DEEs
- Improved safety profile

G-protein biased agonist



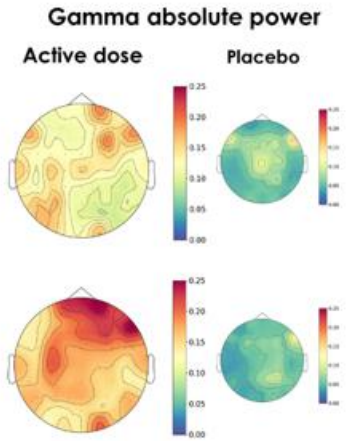
- Sustained chronic effect
- Reduced tolerance

Safety and PK/PD properties validated in Phase 1



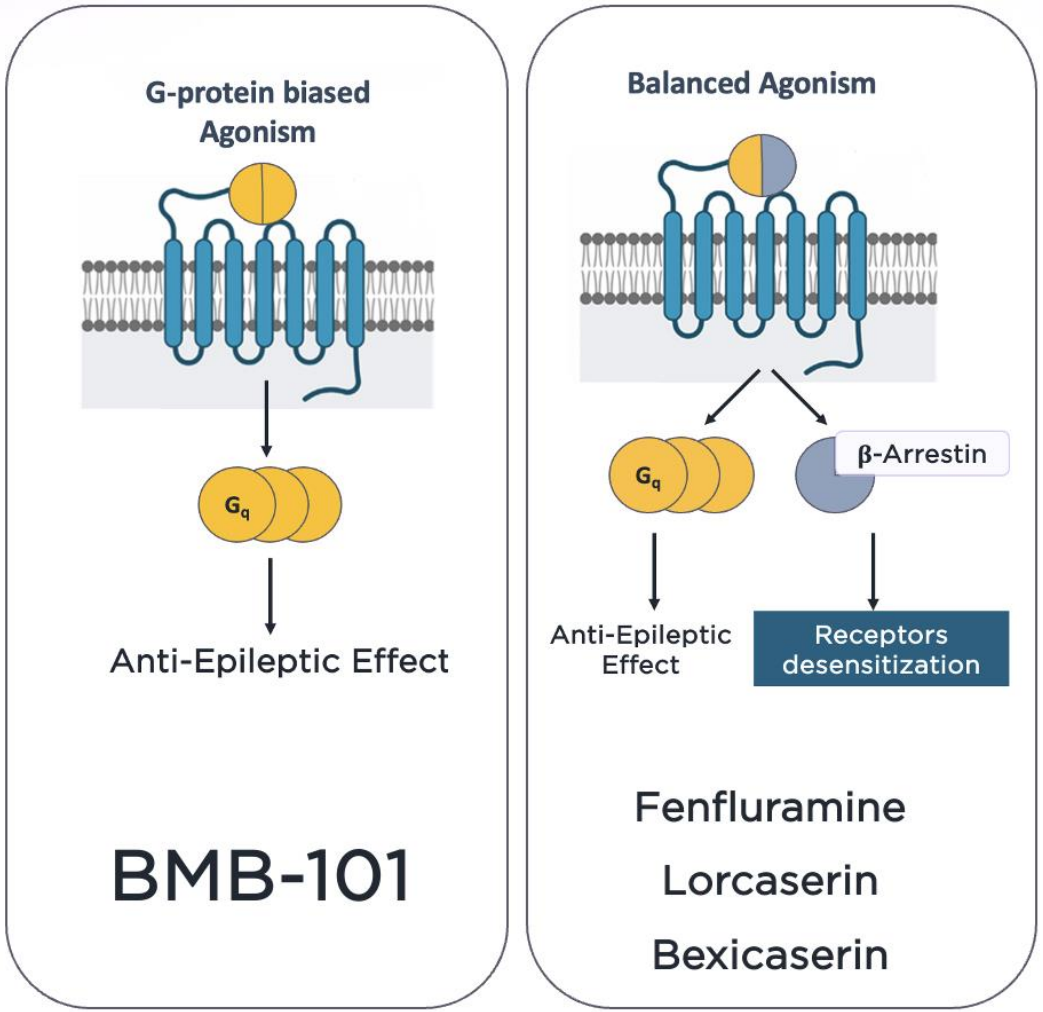
- Potential for a more convenient once daily formulation

Proof of mechanism demonstrated in Ph.1 Increased gamma-power on qEEG



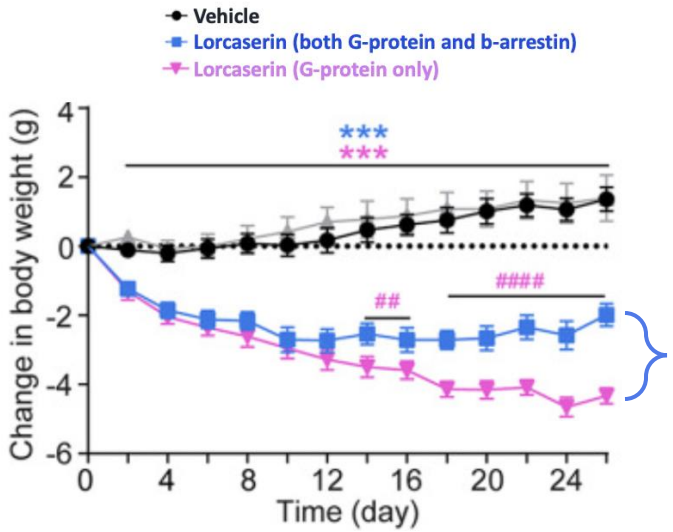
- Additional behavioral/cognitive benefits

Novel 5-HT$_{2C}$ mechanism to avoid tolerance pathways



Beta-arrestin activation is associated with receptor desensitization and the development of tolerance.

BMB-101 is designed to avoid b-arrestin activation and produce sustained effect.



Deactivation of β-arrestin produced a superior and sustained effect in long-term Lorcaserin use (in vivo DIO study)

[1]He Y, et al. **Barbadin Potentiates Long-Term Effects of Lorcaserin on POMC Neurons and Weight Loss.** J Neurosci. 2021 Jun 30;41(26):5734-5746. doi: 10.1523/JNEUROSCI.3210-20.2021.

BMB-101 – Novel scaffold 5-HT_{2C} agonist

	BMB-101	Fenfluramine/ Norfenfluramine	LP352/ Bexicaserin
Lack of 5-HT_{2B} liability *(related to cardiac toxicity)*	✓	x	✓
5-HT_{2C} Biased Agonism *(Sustained efficacy)*	✓	x	x
Can be Dose-optimized	✓	x	x
Increased Frontal Gamma power on qEEG	✓	Not reported	Not reported
Dosing	Once/Twice daily	Twice daily	Three times daily
Development Stage	Phase 2	Approved	Phase 3
Indications	**Broad DEE** **Absence Epilepsy**	Dravet Syndrome LGS	Dravet Syndrome/LGS → Broad DEE

BMB-101 Phase 1 study

Favorable Safety & Tolerability Results Observed

Single Ascending Dose
4 cohorts (6 drug and 2 placebo)

Food Effects
12 subjects

Multiple Ascending Dose
4 cohorts (6 drug and 2 placebo)

Quantitative electroencephalogram (qEEG) recording in Cohort 4

Safety and tolerability

- **No SAEs observed, all AEs were transient**
- **Most common adverse effect - oral paresthesias (related to the sweet taste of the drug product)**
- **Most common on target AE – Headache, Nausea and photophobia**
  - **Common AEs for serotonergic drugs**
  - **Only seen at the top dose (2-3x of predicted therapeutic dose)**
- **Lower incidence of somnolence and GI side effects than with other 5-HT_{2C} agonists**

BMB-101 Phase 1 study

Favorable Safety & Tolerability Results Observed

40-80 mg BID

Expected Therapeutic dose

- Drug slightly better tolerated in fed state at 120 mg
- No SAEs observed, all AEs were transient

	Placebo (n=9)	20 mg (n=6)	60 mg (n=6)	120 mg (n=7)	180 mg (n=6)
Oral paresthesias	1 (11.1%)	1 (16.7%)	-	2 (28.6%)	5 (83.3%)
Nausea	-	-	2 (33.3%)	-	3 (50%)
Sedation	-	-	-	-	3 (50%)
Headache	1 (11.1%)	-	-	-	2 (33.3%)
Balance Disorder	-	-	-	-	2 (33.3%)
Photophobia	-	-	-	-	2 (33.3%)
Dizziness	-	-	-	-	1 (16.7%)
Decreased Appetite	-	-	-	1 (14.3%)	-
Euphoria	-	-	-	1 (14.3%)	-

Single Ascending Dose

	Placebo (n=8)	40 mg BID (n=6)	80 mg BID (n=6)	120 mg BID (n=6)	150 mg BID (n=6)
Headache	2 (25%)	-	1 (16.7%)	1 (16.7%)	3 (50%)
Balance Disorder	-	-	-	-	3 (50%)
Photophobia	-	-	-	-	3 (50%)
Visual Impairment	-	-	-	1 (16.7%)	-
Oscillopsia	-	-	-	-	1 (16.7%)
Oral Paresthesias	-	1 (16.7%)	1 (16.7%)	1 (16.7%)	-
Nausea	-	-	-	1 (16.7%)	1 (16.7%)
Somnolence	-	-	-	1 (16.7%)	1 (16.7%)
Cognitive Disorder	-	-	-	-	1 (16.7%)
Dizziness	-	-	-	-	1 (16.7%)
Decreased Appetite	-	-	-	-	1 (16.7%)
Dysphoria	-	-	-	1 (16.7%)	-

Multiple Ascending Dose

BMB-101 – Clinical Data from Phase 1

Target engagement:

- ✓ Transient dose-dependent prolactin release
- ✓ Central target engagement by qEEG and Potential for improved cognitive performance (increase in gamma power)*

Favorable PK:

- ✓ Dose proportionality observed in SAD and MAD study. No significant food effects observed

Changes in absolute power pre/post-dose

	Delta	Alpha	Beta	Gamma
Broad spectrum ASMs				
Valproate	⇩	⇩	⇩	⇩
Leviracetam	⇩	⇩	⇩	NA
Carbamazepine	⇧	⇩	⇩	NA
Lacosamide	⇧	⇩	⇩	NA
5-HT$_{2C}$ agonists				
Bexicaserin	⇧	⇩	⇩	Not reported
BMB-101	⇧	⇩	⇩	⇧

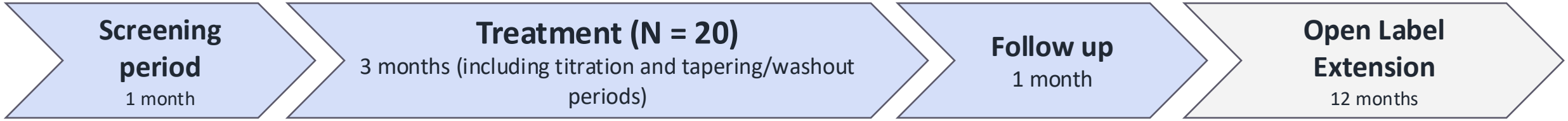
*Increases in gamma power can be related to increased cognitive demands, higher attention, better processing of attended stimuli, and response inhibition

BMB-101 Phase 2 BREAKTHROUGH Study

An Open-Label Phase 2 Study

To Evaluate the Efficacy, Safety and Tolerability of BMB-101 in Adults with:

- Absence Epilepsy (with or without Eyelid Myoclonia (Jeavons syndrome))
- Developmental Epileptic Encephalopathy (DEE)



start at 0.67 mg/kg, +0.33 mg/kg/w, max 2 mg/kg

KEY ENDPOINTS:

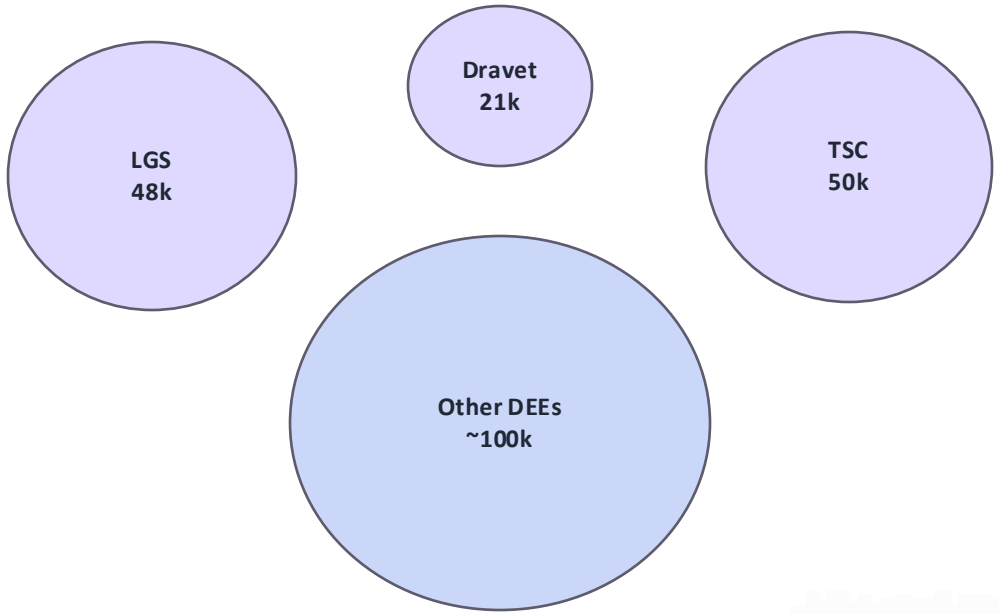
- **Safety and tolerability of BMB-101**
- **Efficacy**
  - **Absence Epilepsy:**
    - Number of generalized spike-wave discharges seen on EEG
    - Seizure frequency based on seizure diary
    - Quality of Life (QOLIE-31)
  - **DEEs:**
    - Seizure frequency based on seizure diary
    - Number of electrographic seizures seen on EEG
    - Quality of Life (QOLIE-31)

US Market Entry Strategy and Revenue Potential

DEE Approach

~200-250k Patients with DEEs in the US

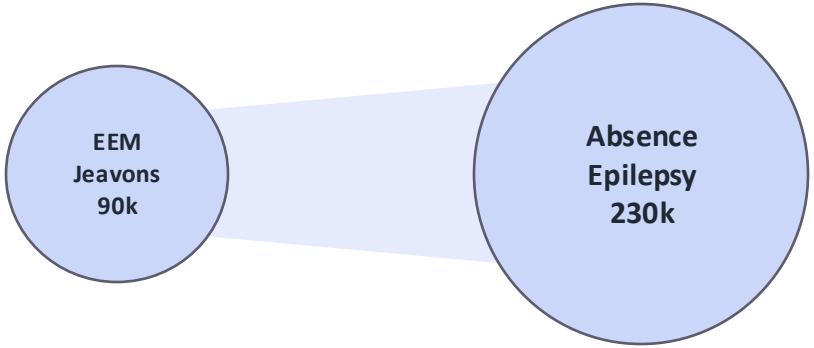
Individual DEE Subtypes:



Market Entry Strategy

Absence Epilepsy Opportunities

Rare Absence Epilepsy + Absence Seizures Across Epilepsy
(High unmet need)



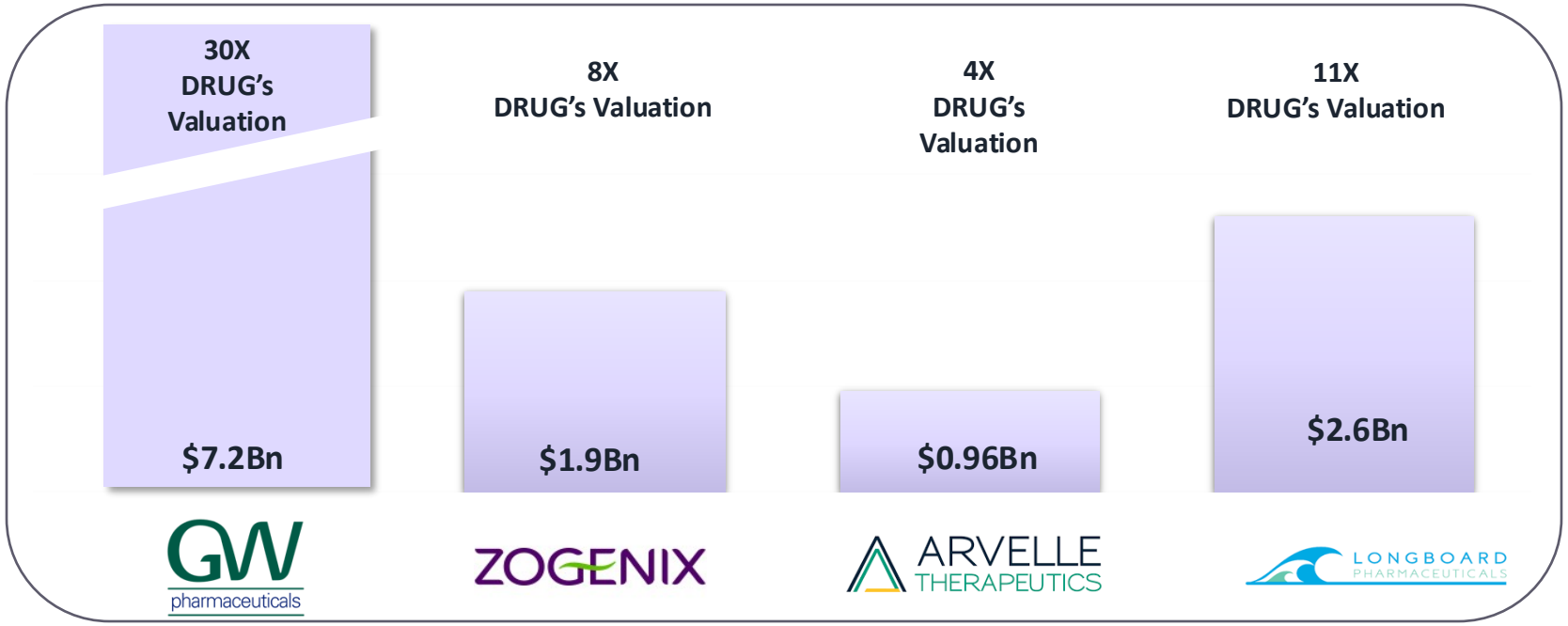
Revenue potential

DEE ~2Bn
Absence epilepsies ~2Bn

Approved Therapies

No Approved Therapies

Undervalued relative to rare epilepsy peers



Transaction Value	$7.2Bn	$1.9Bn	$0.96Bn	$2.6Bn	$240M M CAP
% Premium (30-day volume)	50%	72%	N/A (Private)	77%	N/A
Indication	Epidiolex (Dravet, LGS, TSC)	Fintepla (Dravet syndrome)	Cenobamate (Focal seizures) - EU Rights	Bexicaserin Dravet Syndrome and DEE basket	**BMB-101** Absence/DEE basket
Date of Transaction	May, 2021	March, 2022	January, 2021	October 2024	Public - NASDAQ:DRUG
Stage of Development	Marketed	Marketed	Marketed	Phase 3	Phase 2
Acquirer Name	JAZZ Pharmaceuticals	UCB	Angelini Pharma	Lundbeck	

*as of January 31, 2025

BMB-101 – Opportunity for Best-In-Class 5-HT_{2C} agonist

Well-Tolerated Safety & Flexible Dosing

- BID dosing; potential for QD
- Well-tolerated in Ph1 SAD/MAD (most AE only seen at the high dose)
- No daily dose limitations allowing for flexible dosing in both adult and pediatric patients

Favorable PK Profile

- Reduced on-target adverse events attributed to lower C_{max} compared to bexicaserin
- No significant food effects observed in Ph1 SAD/MAD
- PK linear and dose-proportional over the therapeutic range

Optimal 5-HT_{2C} Pharmacology

- Biased G-protein agonism of 5-HT_{2c} with sustained receptor activation
- Lack of β-arrestin pathway recruitment ensuring lack of receptor desensitization
- Decades-long safety profile of parent molecule

Ideal Properties for Commercial Supply

- API stable at room temperature and 40°C; no cold chain is required for commercial supply
- API stability: no degradation for at least 3 years in the ongoing studies
- Liquid formulation: at least 2 years

Appendix

Absence Epilepsy & Seizures

Absence Epilepsy & Seizures Overview

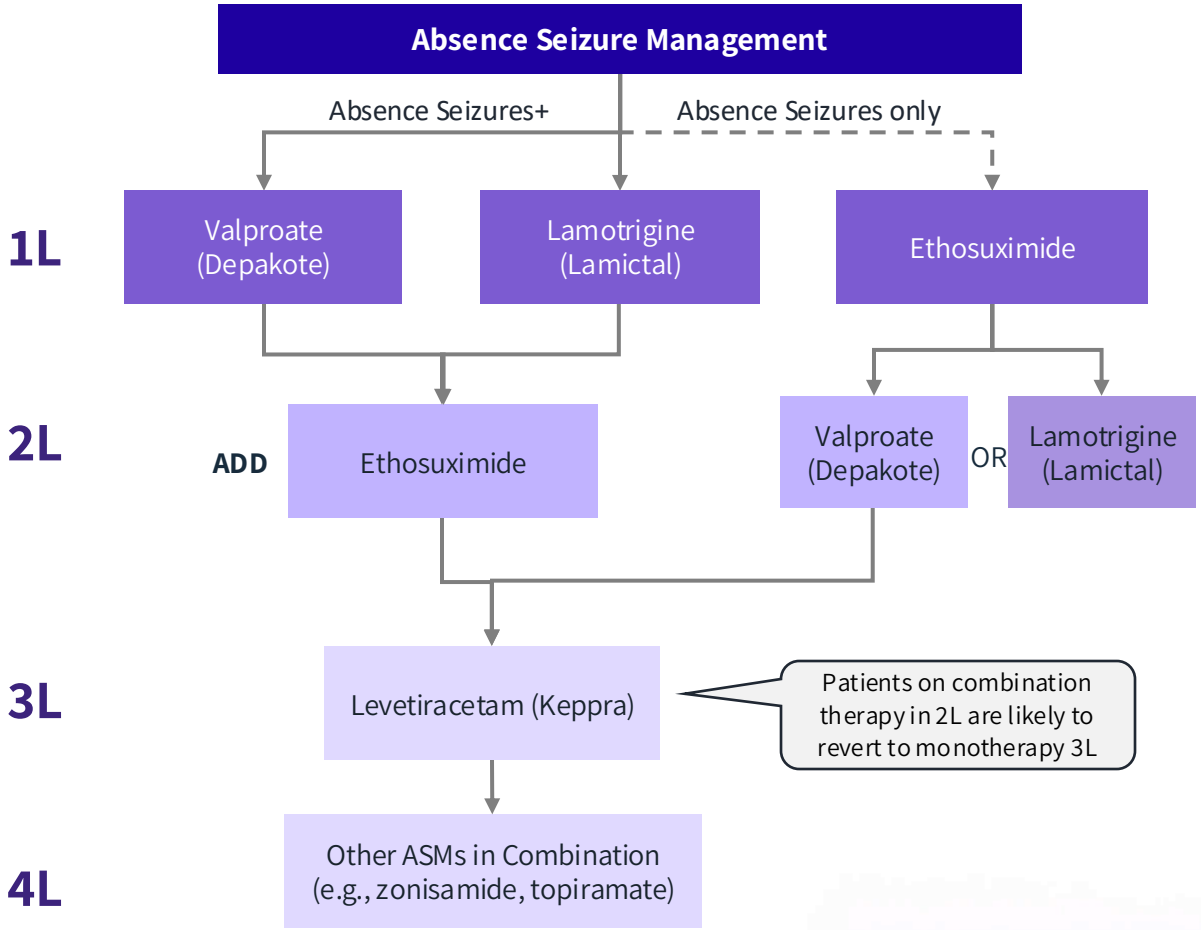
- **Absence seizures are defined as profound impairments of consciousness:**
  - Typical Absence Seizures last 10-30 seconds
  - Atypical Absence Seizures last up to 90 seconds

- **Absence seizures are common across the epilepsy continuum and represent significant morbidity but are often underrecognized**
    - Reduced QoL
    - Reduced Safety of Mobility (Falls, No Driving, No swimming etc)
    - Psychosocial factors

Illustrative epilepsies with absence seizures as a co-morbid feature of the disease

	Prevalent Patients	% with Absence Seizures	Prevalent w/ Absence
Focal-Onset Epilepsy	2,000,000	10%	200,000
JME	170,000	20%	34,000
LGS	48,000	60%	28,800
Dravet	21,000	51%	10,710
Total	**2,239,000**	**12.21%**	**273,510**

Absence Treatment Paradigm and Opportunity



- First-line treatment decisions for absence seizures are dependent on a variety of factors including age, age of onset, sex and seizure semiology
- **Ethosuximide** considered narrow-spectrum, standard-of-care drug effective in only managing absence seizures
  - Associated with GI disturbance
- **Valproate** not preferred for first-line in females due to association with birth defects
  - Also associated with hepatotoxicity, requires liver monitoring which adds additional burden for patients
- **Lamotrigine** considered more limited in effectiveness against absence seizures but often selected in 2L, particularly in females, due to clean safety profile and limited adverse effects
- **Levetiracetam** often used later-line and not preferred in patients with co-morbid behavioral issues
- 4L+ options are limited due few antiseizure medicines with proven efficacy against typical and atypical absence seizures

Limited treatment options represent significant opportunity for new branded agent in the absence treatment paradigm

Opportunities for other BMB 5-HT2 agonists

Opportunities for 5-HT_{2C} agonists

In the treatment of feeding disorders and obesity

BMB-10X Feeding behaviour and Obesity	BMB-10X Genetic Obesity and Rare Metabolic Disorder
Description	
✓ To be used in conjunction with GLP1 agonists	✓ PWS is debilitating neuropsychiatric disorder
✓ Improved fat-mass weight-loss	✓ Will treat compulsive over-eating (hyperphagia)
✓ Designed improve feeding behaviour after GLP1 agonist treatment	✓ Will also treat neuropsychiatric symptoms of PWS: Compulsivity, Anxiety.
✓ Proprietary NCE	✓ Proprietary NCE
✓ ADMEPK profiling ongoing	✓ ADMEPK profiling ongoing
✓ Designed for chronic use	✓ Designed for chronic use

BMB-201 and 202 – potential for best-in-class 5-HT_{2A} agonists

BMB-201 **Potent inducer of neuroplasticity**	BMB-202 **The most selective 5-HT_{2A} agonist in development***
Description	
✓ Designed to have minimal or absent psychoactive effects ✓ Efficacy in rodent models of depression, anxiety, pain, substance use disorder ✓ Proprietary NCE ✓ ADMEPK profiling completed	✓ Designed to have short psychoactive effects time ✓ Durable effects in rodent models of depression and anxiety ✓ Proprietary NCE ✓ ADMEPK profiling completed
Treatment paradigm	
Designed for chronic use and use at home	Designed for fast relief of depression and Infrequent use

*Based on publicly available information as of December 2024