

Novel Drugs for Targeted Treatment of CNS & Neuropsychiatric Disorders

June 2025



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Bright Minds Biosciences (NASDAQ: DRUG)





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	<u>DEE</u> Absence epilepsy	Clinical Studies – Phase 2				
BMB-10x	Obesity and feeding behaviour	ADME/PK profiling				
Non-hallu	cinogenic psychoplastogen	<u>S</u>				
BMB-201	Treatment-resistant depression	IND-enabling studies				
5-HT _{2A} agonists for the treatment of depression						
BMB-202	<u>Depression</u> (Fast-onset)	IND-enabling tox				
BMB-xxx	Neurology / Neuropsychiatric Indication	ADMEPK profiling				
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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.

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



High unmet need beyond Dravet



Addressable targets for BMB-101 range across multiple epilepsies



Today

Suppression of seizures in Broad Epilepsy Population (~65 Million)

Future

Focus on epilepsies without treatments

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

 $5\text{-}HT_{2C}$ Selective Agonist

First-in-class

G-protein biased agonist

BMB-101 is uniquely positioned to address major unmet needs in epilepsy



Proof of mechanism Safety and PK/PD The only G protein-**Highly selective** demonstrated in Ph.1 biased properties validated **Increased gamma-**5-HT2C agonist 5-HT2C agonist in Phase 1 power on qEEG Gamma absolute power 5-HT_{2A} 5-HT28 5-HT20 Compound 200 1300 Active dose Placebo 175 1200 ation (ng/mL) - Log-Linear Scale BRET Gq Dissociation 1100 150 1000 β-Arr Recruitment **BMB-101** 2280 >10000 16.2 125 900 5-HT NET 800 700 75 Nor-600 **50** Fenfluramin 82.8 11.6 2.5 500 400 ESD) Con % 25 200 50.1 67.4 2.4 Lorcaserin -12 -11 -10 -9 -8 -7 -6 -5 -4 log [ligand M] Schedule Timepoint (Hours) BMB-101 40 mg/70 kg (BID) (N-6 >10000 >10000 120 Bexicaserin 4B-101 120 mg/70 kg (BID) (N-6

Validated mechanism of action in DEEs Improved safety profile Sustained chronic effect via reduced tolerance Potential for a more convenient once daily formulation 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)

¹He 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)	\checkmark	Х	\checkmark
5-HT _{2C} Biased Agonism (Sustained efficacy)	\checkmark	Х	Х
Can be Dose-optimized	\checkmark	Х	Х
Increased Frontal Gamma power on qEEG	\checkmark	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

MIN

E.

BMB-101 Phase 1 study

Favorable Safety & Tolerability Results Observed

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

Food Effects

12 subjects

Multiple Ascending Dose

4 cohorts (6 drug and 2 placebo)

Single Ascending Dose

4 cohorts (6 drug and 2 placebo)

Quantitative electroencephalogram (qEEG) recording in Cohort 4

BMB-101 Phase 1 study

Favorable Safety & Tolerability Results Observed

40-80 mg BID

• Drug slightly better tolerated in fed state at 120 mg

Expected Therapeutic dose

• 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

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BMB-101 – Clinical Data from Phase 1



Changes in absolute power pre/post-dose

	Delta	Alpha	Beta	Gamma	
Broad spectrum ASMs					
Valproate	Û	Û	Û	Û	
Leviracetam	Û	Û	Û	NA	
Carbamazepine	Û	Û	Û	NA	
Lacosamide	Û	Û	Û	NA	
5-HT _{2C} agonists					
Bexicaserin	Û	Û	Û	Not reported	
BMB-101	Û	Û	Û	<u></u> ٢	

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

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

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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
- Developmental and 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)

Estimates indicate a total absence prevalence of at least 280K in the USA only





Indication	Prevalent Patients	% with Absence Seizures	Prevalent with Absence
Juvenile Absence Epilepsy (JAE)	74,000	100%	74,000
Childhood Absence Epilepsy (CAE)	53,500	100%	53,500
Juvenile Myoclonic Epilepsy (JME)	150,000	20%	30,000
Jeavons Syndrome (EEM)	64,000	80%	51,000
Lennox-Gastaut Syndrome (LGS)	49,000	60%	29,500
Dravet Syndrome (DS)	13,000	55%	7,200
Other DEEs*			33,500
Total			278.700

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* Other DEEs included in this estimate are Dup15q, EMAS, Angelman Syndrome, SNYGAP1, DEE-SWAS, and SCN8A; ASM: Anti-seizure medication; EEM: Epilepsy with Eyelid Myoclonia 16 * Prevalence estimates are presented as median values, source: research from Trinity Life Sciences

Opportunity for BMB-101





ABBREVIATIONS:

CAE: Childhood Absence Epilepsy; DEE: Developmental and Epileptic Encephalopathy; JAE: Juvenile Absence Epilepsy; JME: Juvenile Myoclonic Epilepsy; LGS: Lennox-Gastaut Syndrome; TSC: Tuberous Sclerosis Complex

Potential for best-in-class drug in DEE and absence seizures





ABBREVIATIONS:

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Undervalued relative to rare epilepsy peers



RRIGHT

N/A

Public -

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



Ideal Properties Well-Tolerated **Favorable PK Optimal 5-HT_{2C}** for Commercial Safety & Flexible **Pharmacology** Profile Dosing Supply • Reduced on-target Biased G-protein API stable at room • BID dosing; potential adverse events agonism of $5-HT_{2c}$ temperature and for QD with sustained attributed to lower 40°C: no cold chain C_{max} compared to receptor activation is required for Well-tolerated in Ph1 bexicaserin commercial supply SAD/MAD (most AE • Lack of β-arrestin only seen at the high No significant food pathway recruitment API stability: no dose) effects observed in ensuring lack of degradation for at Ph1 SAD/MAD least 3 years in the receptor No daily dose desensitization ongoing studies limitations allowing • PK linear and dosefor flexible dosing in proportional over Decades-long safety • Liquid formulation: both adult and the therapeutic profile of parent at least 2 years pediatric patients molecule range

Appendix

Absence Epilepsy & Seizures

Absence seizures impact on patients' lives



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

Consequences of the absence seizures ("Silent killers")

- Impaired attention difficulties with learning and social interactions.
- Reduced safety of mobility risk of falls, no driving, no swimming, etc
- Disrupted frontal connectivity.
 - Functional impairment
 - Memory and cognition deficits
 - Impaired learning

Fonseca Wald ELA, Hendriksen JGM, Drenthen GS, Kuijk SMJV, Aldenkamp AP, Vles JSH, Vermeulen RJ, Debeij-van Hall MHJA, Klinkenberg S. Towards a Better Understanding of Cognitive Deficits in Absence Epilepsy: a Systematic Review and Meta-Analysis. Neuropsychol Rev. 2019 Dec;29(4):421-449.

Sun J, Li Y, Zhang K, Sun Y, Wang Y, Miao A, Xiang J, Wang X. Frequency-Dependent Dynamics of Functional Connectivity Networks During Seizure Termination in Childhood Absence Epilepsy: A Magnetoencephalography Study. Front Neurol. 2021 Oct 25;12:744749.

Idiopathic Generalized Epilepsies (IGE) overlap in age and presentation

Prevalence across age

IGE syndromes transition from one to another

Absence seizures remain common even in adulthood (~20-40% of JME)



ABBREVIATIONS:

CAE: Childhood Absence Epilepsy; DEE: Developmental and Epileptic Encephalopathy; JAE: Juvenile Absence Epilepsy; JME: Juvenile Myoclonic Epilepsy; EGTCS: Epilepsy with generalized tonic-clonic seizures

What is an absence seizure?



Absence seizure is defined as:

- A distinct 3/s spike-and-wave discharge an abnormal, and unique paroxysmal pattern of a high velocity spike followed by a slower dome shaped wave on the background of a normal EEG.
- The 3/s spike-and-wave on EEG is the clinically accepted proof of absence seizure, has extremely high specificity and sensitivity, and has been so defined for over 70 years



Source: ILAE https://www.epilepsydiagnosis.org/seizure/absence-typical-eeg.html

Egenasi CK, Moodley AA, Steinberg WJ, Adefuye AO. Current norms and practices in using a seizure diary for managing epilepsy: A scoping review. South African Fam Pract Off J South African Acad Fam Pract Care 2022;64:e1-9. https://doi.org/10.4102/safp.v64i1.5540. Buchhalter J, Neuray C, Cheng JY, D'Cruz O, Datta AN, Dlugos D, French J, Haubenberger D, Hulihan J, Klein P, Komorowski RW, Kramer L, Lothe A, Nabbout R, Perucca E, der Ark PV. EEG parameters as endpoints in epilepsy clinical trials - An expert panel opinion paper. Epilepsy Res. 2022 Nov;187:107028. Porter, R. J. (1993). The Absence Epilepsies. Epilepsia, 34, S42–S48

How are we documenting absence seizures?



Primary Method

24h EEG Ambulatory



- ✓ Quantitative seizure detection
- Potential for sleep assessment

Exploratory Method

Wearable EEG device



- Designed and validated for absence seizure detection
- Convenient absence seizure monitoring

Why are we developing novel drugs for absence seizures?

Absence epilepsies have high unmet need

- Current drugs don't effectively treat all patients and have tolerability and potentially even severe safety issues
- The unmet need is in both people with typical absence and those with mixed seizure disorders, including DEE's. All of these patients need an effective, wide-spectrum, safe and well-tolerated therapy.

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





Ethosuximide

- Standard-of-care drug for CAE only manages absence seizures (narrow-spectrum)
- Associated with GI disturbance

Valproate (three FDA black boxes)

- Not preferred for first-line in females due to its association with birth defects
- Also associated with hepatotoxicity, it requires liver monitoring which adds additional burden for patients

Lamotrigine (one FDA black box)

- more limited in effectiveness against absence seizures
- often selected in 2L, particularly in females due to lack of terratogenicity

Levetiracetam (FDA warning - DRESS) 🛦

 often used later-line and not preferred in patients with comorbid behavioral issues

4L+ options are limited due few antiseizure medicines with proven efficacy against typical and atypical absence seizures

A "black box" warning, also known as a boxed warning, is the strictest and most serious warning issued by the FDA for prescription drugs. This warning is displayed alert healthcare providers and patients to serious or life-threatening risks associated with the medication

DRESS - Drug Reaction with Eosinophilia and Systemic Symptoms

Kessler SK, McGinnis E. A practical guide to treatment of childhood absence epilepsy. Paediatr Drugs Internet. 2019 Albuja A, Ighodaro E, Khan GQ. Absence Seizure Internet. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024

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		
Descr	iption		
 ✓ To be used in conjunction with GLP1 agonists ✓ Improved fat-mass weight-loss ✓ Designed improve feeding behaviour after GLP1 agonist treatment 	 PWS is debilitating neuropsychiatric disorder Will treat compulsive over-eating (hyperphagia) 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

- \checkmark 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