

Emerging Large Biopharma Interest in CNS

November 17, 2023

- **Bottom Line:** As a follow-up to our M&A note earlier this quarter (note [here](#)), we look at large biopharma CNS clinical-stage pipelines to get a sense of where the current activity is within the space and potential areas for increased interest and expansion. SMID-cap biotech remains committed to CNS and there is so much development going on at that level (as well as on the private side) across neurodegeneration, psychiatry, sleep, and rare disease, and we often get questions from investors about M&A potential in the CNS space.
- It's clear from looking at large biopharma pipelines that interest in CNS has increased from a few years ago and that companies are still actively looking for interesting CNS deals; out of 124 large biopharma CNS programs, at least 40 are partnered or acquired. Practically every SMID-cap name in our coverage universe is a potential take-out candidate, and some (e.g., epilepsy, rare disease, sleep, and neuropsychiatry) could serve to de-risk large biopharma CNS development pipelines that often skew towards higher risk/reward areas of neurodegenerative disease. Overall, we remain optimistic for the continued renaissance occurring in neuroscience and look forward to another important year for clinical trial catalysts in 2024 to transform the space.
- In this note we include CNS pipelines organized by company on pages 3-16 and by therapeutic area on pages 17-26.
- *Continued inside...*

Reason for report:

PROPRIETARY INSIGHTS

S&P 500 Health Care Index:

1,492.44

Companies Highlighted

ABBV, AZN, BMY, JNJ, LLY, SNY

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Please refer to Page 27 for Analyst Certification and important disclosures. Price charts, disclosures specific to covered companies and statements of valuation and risk are available on <https://leerink.bluematrix.com/sellside/Disclosures.action> or by contacting Leerink Partners Editorial Department.

Key takeaways:

- **Lilly, Novartis, Bristol and Sanofi** have CNS pipelines that are heavily weighted towards neurodegenerative diseases (like Alzheimer's, Parkinson's and multiple sclerosis), which remain significant areas of investment for large biopharma.
- **AbbVie, Lilly, Sanofi, Roche, and Takeda** have expanded their pipelines through several partnerships/deals across a spectrum of CNS assets, including small molecules, biologics, and gene therapies. Lilly acquired Disarm and Prevail. Sanofi has a deal with Denali. The AbbVie CEO recently spoke about an interest in psychiatry. Takeda has in-licensed Ovid's soticlestat, yet it also partnered several late-stage assets with Neurocrine Biosciences. Bristol at its recent R&D Day had a section on CNS, which was a surprise.
- **UCB** has deepened its epilepsy franchise with a few deals (Engage Therapeutics, Zogenix) over the years.
- **Sunovion** is almost totally focused on neuropsychiatry and is the only large biopharma company with this strategy. It has 6 assets being investigated or planned in 9 neuropsychiatric disease programs (8 distinct disease areas), and only one other program in neuropathic pain.
- **There are >50 programs in neurodegeneration, >20 in neuropsych, and >30 in other neurology.**
- Abeta and tau remain key targets in **Alzheimer's disease** for large biopharma. However, there is increased interest in the Alzheimer's space for assets that target neuroinflammation, and we would expect to see more large biopharma investment in those mechanisms with key validation data points (e.g. TREM2) expected in the coming years.
- Alpha synuclein remains the primary target for **Parkinson's disease** with several approaches like anti-alphaSyn mAbs and misfolding inhibitors. We are waiting for the first disease modifying therapy approval to spark more innovation in this space, similar to what the anti-Abeta mAbs did for Alzheimer's.
- For **multiple sclerosis**, BTKis from Merck, Sanofi, Roche and Novartis are all in late-stage development. Earlier stage assets from Sanofi and Roche with other mechanisms have less supportive data for potential efficacy in MS so far.
- Rare neurodegenerative conditions like **ALS and FTD** are areas of interest as well, where FDA's stance on regulatory flexibility for areas of high unmet need may be changing the risk/reward equation for biopharma when considering development in rare disease.
- **Other neurological areas like rare epilepsies, metabolic disorders involving the CNS, neuromuscular disorders and pain** are not as much of a current focus for large biopharma, which we think is indicative of the difficulty of developing drugs in several of these areas and the high level of specialized capabilities required particularly for metabolic and neuromuscular disorders (each of these categories only have 1-2 major players).
- **Major depressive disorder** is a popular area within neuropsych, and there are several programs across anxiety, PTSD, schizophrenia, and bipolar disorder as well.



Large Biopharma CNS Pipelines

AbbVie (ABBV)

= Neurodegeneration

= Other neurology

= Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
ABBV-951		Parkinson's disease	SubQ delivery of levodopa / carbidopa	Filing	--	--
Botox		Essential tremor	Blocks release of acetylcholine	3	3/14/2025	NCT05028569
ABBV-CLS-7262	Calico Life Sci	<i>Amyotrophic lateral sclerosis</i>	eIF2B activator	2/3	7/1/2025	NCT04297683
Elezanumab (ABT-555)		Spinal cord injury	RGMa inhibitor (mAb)	2	9/6/2020	NCT04295538
ABBV-552	Syndesi Tx	Alzheimer's disease	SV2A modulator	2	6/22/2024	NCT05771428
Botox		Episodic migraine prophylaxis	Blocks release of acetylcholine	2	6/28/2024	NCT05216250
Elezanumab (ABT-555)		Acute ischemic stroke	RGMa inhibitor (mAb)	2	1/29/2025	NCT04309474
AL002	Alector	Alzheimer's disease	TREM2 activator	2	9/1/2025	NCT05744401
ABBV-916		Alzheimer's disease	Anti-AβpE3 mAb	2	1/18/2030	NCT05291234
ABBV-CLS-7262	Calico Life Sci	<i>Vanishing white matter disease</i>	eIF2B activator	1	3/1/2025	NCT05757141
ABBV-932	Gedeon Richter	Generalized anxiety disorder	DRD2/DRD3 Modulator	1	3/12/2025	NCT06024239

Sources: Company reports and publications; Leerink Partners Research

DR = dopamine receptor

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AstraZeneca (AZN)

= Neurodegeneration

= Other neurology

= Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
MEDI7352		Osteoarthritis pain	NGF/TNF bispecific mAb	2b	8/16/2023	NCT04675034
Gefurulumab	Alexion	<i>Myasthenia gravis</i>	Anti-C5 bispecific mAb	2		--
Vemircopan	Alexion	<i>Myasthenia gravis</i>	Factor D inhibitor	2		--
Ultomiris	Alexion	<i>Dermatomyositis</i>	Long-acting C5 inhibitor	2	11/30/2026	NCT04999020
MEDI1341	Takeda	<i>Multiple System Atrophy</i>	anti-alphaSyn mAb	2	8/1/2025	NCT05526391
AZD4041	Eolas	Opioid use disorder	orexin 1 receptor antagonist	1	6/7/2022	NCT05233085
MEDI0618		Migraine	PAR2 antagonist mAb	1	12/26/2023	NCT05714254
MEDI1814		Alzheimer's disease	anti-Abeta mAb (targeting C terminus)	1		--

Bristol Myers Squibb (BMY)

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
BMS-986446 (PRX005)	Prothena	Alzheimer's disease	anti-tau mAb (MTBR)	2	1H24 (trial initiation)	--
BMS-986419		<i>Amyotrophic lateral sclerosis</i>	eIF2B activator	2	2024 (trial initiation)	--
--		Unspecified	BTKi	1		--
--		Unspecified	FAAH/MGLL dual inhibitor	1		--

Sources: Company reports and publications; Leerink Partners Research

Eisai (ESALY)

= Neurodegeneration

= Other neurology

= Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
lorcaserin/E2023	Arena	Dravet syndrome	serotonin 2C receptor agonist	3	3/5/2025	NCT04572243
E2027		Parkinson's dementia	PDE9 inhibitor	2		--
E2814		Alzheimer's disease	anti-MTBR tau mAb	1/2	4/22/2025	NCT04971733
E2511		Alzheimer's disease	TrkA allosteric modulator	1		--
E2086		Narcolepsy	Orexin agonist	1	1/14/2024	NCT05745207
E2025		Alzheimer's disease	--	--		--
E2086		Narcolepsy	--	--		--

Eli Lilly (LLY)

= Neurodegeneration

= Other neurology

= Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Donanemab		Alzheimer's disease	anti-Abeta mAb	Filing		--
Remternetug		Alzheimer's disease	anti-Abeta mAb	3	10/1/2025	NCT05463731
Donanemab		Preclinical Alzheimer's disease	anti-Abeta mAb	3	10/25/2027	NCT05026866
LY3372689		Alzheimer's disease	O-GlcNAcase inhibitor	2	5/16/2024	NCT05063539
		Pain	P2X7 inhibitor	2		--
LY3884961 (PR001)	Prevail	<i>Gaucher disease (type 2)</i>	GBA1 gene therapy	1/2	9/1/2028	NCT04411654
LY3884961 (PR001)	Prevail	<i>Parkinson's disease (GBA1+)</i>	GBA1 gene therapy	1/2	6/1/2029	NCT04127578
LY3884963	Prevail	<i>FTD-GRN</i>	GRN gene therapy	1/2	8/31/2029	NCT04408625
LY3884961 (PR001)	Prevail	<i>Gaucher disease (type 1)</i>	GBA1 gene therapy	1/2	9/11/2030	NCT05487599
		Neurodegeneration (unspecified)	SARM1 inhibitor	1		--
		Pain	Undisclosed	1		--
		Pain	AT2R antagonist	1		--

Johnson & Johnson (JNJ)

= Neurodegeneration

= Other neurology


= Neuropsych


Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
JNJ-63733657		Alzheimer's disease	anti-pTau mAb	3	3/7/2025	NCT04619420
Seltorexant		Adjunctive MDD with insomnia symptoms	Orexin 2 antagonist	3	4/25/2023	NCT04951609
Aticaprant	Cerecor	Adjunctive MDD	KOR antagonist	3	10/17/2024	NCT05455684
Nipocalimab		<i>Chronic inflammatory demyelinating polyneuropathy</i>	anti-FcRn mAb	3	5/14/2027	NCT05327114
Spravato		MDD with suicidal ideation (pediatrics)	NMDA receptor agonist	2	3/31/2023	NCT03185819
JNJ-40411813		Epilepsy	mGlu2 PAM	2	4/1/2024	NCT04836559
P2X7 antagonist		Bipolar depression	P2X7 antagonist	2		--
Seltorexant		Agitation in Alzheimer's	Orexin 2 antagonist	2	10/16/2023	NCT05307692
Nipocalimab		<i>Myasthenia gravis</i>	anti-FcRn mAb	2	3/19/2025	NCT04951622
ACI-35.030	AC Immune	Alzheimer's disease	anti-pTau vaccine	1b/2a	9/5/2023	NCT04445831
JNJ-0376	Yumanity	Parkinson's disease	stearoyl-CoA desaturase inhibitor	1		--

Novartis (NVS)

 = Neurodegeneration

 = Other neurology

 = Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
OAV101		<i>Spinal muscular atrophy (Type 2)</i>	SMN1 gene replacement	3	7/31/2024	NCT05089656
Remibrutinib		Multiple sclerosis	BTKi	3	4/30/2026	NCT05156281
DLX313 (UCB0599)	UCB	Parkinson's disease	alphaSyn misfolding inhibitor	2	4/11/2024	NCT04658186
BLZ945 (sotuletinib)		<i>Amyotrophic lateral sclerosis</i>	CSF-1R inhibitor	2	3/27/2025	NCT04066244
NIO752		<i>Progressive supranuclear palsy</i>	Tau antagonist	1	11/12/2024	NCT04539041
NIO752		Alzheimer's disease	Tau antagonist	1	10/30/2024	NCT05469360
DFT383		Cystinosis pre/post kidney transplant	CTNS gene delivery			--

Roche (RHHBY) – Late Stage

= Neurodegeneration

= Other neurology

= Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Satralizumab (Enspryng)		<i>Myasthenia gravis</i>	anti-IL-6 mAb	3	1/31/2024	NCT04963270
Satralizumab (Enspryng)		Autoimmune encephalitis	anti-IL-6 mAb	3	6/23/2025	NCT05503264
Satralizumab (Enspryng)		<i>Myelin oligodendrocyte glycoprotein antibody disease</i>	anti-IL-6 mAb	3	4/30/2026	NCT05271409
Ocrelizumab SC (Ocrevus)		Multiple sclerosis (relapsing and primary progressive)	anti-CD20 monoclonal antibody	3	3/10/2023	NCT05232825
Fenebrutinib		Multiple sclerosis (relapsing)	BTKi	3	10/2/2025	NCT04586023
RG6356 (SRP-9001)	Sarepta	<i>Duchenne muscular dystrophy</i>	gene therapy	3	1/31/2026	NCT05881408
Prasinezumab	Prothena	Parkinson's disease	anti-alphaSyn mAb	2b	9/20/2024	NCT04777331
RG6237	PTC	<i>Spinal muscular atrophy</i>	anti-myostatin Ab	2/3	6/27/2026	NCT05115110

Roche (RHHBY) – Early Stage

= Neurodegeneration

= Other neurology

= Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Balovaptan		Post traumatic stress disorder	vasopressin V1A receptor antagonist	2	12/15/2023	NCT05401565
Bepranemab	UCB	Alzheimer's disease	anti-tau mAb	2	5/20/2024	NCT04867616
RO7204239 / GYM329		<i>Facioscapulohumeral muscular dystrophy</i>	anti-myostatin Ab	2	6/15/2024	NCT05548556
Tominersen	Ionis	<i>Huntington's disease</i>	ASO against huntingtin	2	1/3/2025	NCT05686551
Alogabat		Autism Spectrum Disorder	GABA modulator	2	3/21/2025	NCT05630066
Trontinemab (RO7126209)		Alzheimer's disease	Brain shuttle gantenerumab	1/2	9/30/2027	NCT04639050
RG6182	Spark	Multiple sclerosis	MAGLi	1		--
RG6035		Multiple sclerosis	Brain shuttle anti-CD20 mAb	1		--
RG6163		Psychiatric disorders	undisclosed	1		--
Selnoflast		Parkinson's disease	NLRP3 inhibitor	1	3/3/2025	NCT05924243
RG6289		Alzheimer's disease	Gamma secretase modulator	1		--

Sanofi (SNY)

= Neurodegeneration

= Other neurology

= Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Tolebrutinib		Multiple sclerosis (Primary progressive)	BTKi	3	8/1/2024	NCT04458051
Tolebrutinib		Multiple sclerosis (Secondary progressive)	BTKi	3	8/1/2024	NCT04411641
Tolebrutinib		Multiple sclerosis (relapsing)	BTKi	3	11/29/2024	NCT03996291
Frexalimab	ImmuNext	Multiple sclerosis	Anti-CD40L mAb	2	9/21/2022	NCT04879628
SAR443820 (DNL788)	Denali	<i>Amyotrophic lateral sclerosis</i>	RIPK1 inhibitor	2	1/16/2024	NCT05237284
SAR445088		<i>Chronic inflammatory demyelinating polyneuropathy</i>	Complement C1s inhibitor	2	8/2/2024	NCT04658472
SAR443820 (DNL788)	Denali	Multiple sclerosis	RIPK1 inhibitor	2	8/27/2025	NCT05630547
SAR446159 (ABL301)	ABL Bio	Parkinson's disease	anti-alphaSyn mAb	1	9/21/2023	NCT05756920

Shionogi (SGIOY)


Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Zatolmilast	Tetra	Fragile X Syndrome	PDE4D negative allosteric modulator	3	2/1/2024	NCT05163808
Resiniferatoxin	Sorrento	Pain associated with osteoarthritis of the knee	TRPV1 agonist	3	3/1/2023	NCT04044742
Zatolmilast	Tetra	Alzheimer's disease	PDE4D negative allosteric modulator	2		--
S-151128		Chronic pain	undisclosed	1		--

Sources: Company reports and publications; Leerink Partners Research

Sunovion (private)

 = Neurodegeneration

 = Other neurology

 = Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Ulotaront (SEP-363856)		Schizophrenia	TAAR1 agonist with 5-HT1A agonist activity	3	9/8/2023	NCT04092686
Ulotaront (SEP-363856)		Major depressive disorder (adjunctive)	TAAR1 agonist with 5-HT1A agonist activity	3	5/1/2025	NCT05593029
Ulotaront (SEP-363856)		Generalized anxiety disorder	TAAR1 agonist with 5-HT1A agonist activity	3	2/8/2025	NCT05729373
SEP-4199		Bipolar depression	5-HT7R antagonist (non-racemic ratio of amisulpride)	3	5/31/2025	NCT05169710
Ulotaront (SEP-363856)		Parkinson's disease psychosis	TAAR1 agonist with 5-HT1A agonist activity	2		--
DSP-3905		Neuropathic pain	NaV1.7 inhibitor	1		--
SEP-378614	Psychogenics	Treatment resistant depression	Undefined	1		--
SEP-380135	Psychogenics	Agitation in Alzheimer's	Undefined	1		--
DSP-0038		Alzheimer's disease psychosis	Dual-targeted 5-HT1a receptor agonist and 5-HT2a receptor antagonist	1		--
DSP-3456		Treatment resistant depression	mGlu2/3 receptor negative allosteric modulator	1		--

Takeda (TAK)

= Neurodegeneration

= Other neurology


= Neuropsych


Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Soticlestat	Ovid	<i>Dravet syndrome</i>	CH24H inhibitor	3	5/22/2026	NCT05163314
Soticlestat	Ovid	<i>Lennox gastaut syndrome</i>	CH24H inhibitor	3	5/22/2026	NCT05163314
Pabinafusp alfa	JCR Pharma	<i>MPS II (Hunter syndrome)</i>	TfR enabled IDS	3	1/31/2026	NCT04573023
TAK-861		<i>Narcolepsy type 1</i>	Orexin 2R agonist	2	5/29/2024	NCT05687903
TAK-861		<i>Narcolepsy type 2</i>	Orexin 2R agonist	2	5/17/2024	NCT05687916
TAK-611		<i>Metachromatic leukodystrophy</i>	Human arylsulfatase A	2	3/8/2023	NCT03771898
TAK-041	Neurocrine	Anhedonia in MDD	GPR139 agonist	2	7/7/2023	NCT05165394
TAK-653	Neurocrine	Inadequate response in MDD	AMPA receptor potentiator	2	12/1/2023	NCT05203341
Danavorexton (TAK-925)		Obstructive sleep apnea	Orexin 2R agonist	2	5/31/2024	NCT05814016
TAK-341	Astra Zeneca	<i>Multiple system atrophy</i>	anti-alphaSyn mAb	2	8/1/2025	NCT05526391
TAK-594	Denali	<i>Frontotemporal dementia</i>	TfR enabled PGN fusion protein	2	11/1/2025	NCT05262023
TAK-071		Parkinson's disease	M1 positive allosteric modulator	2	2/27/2023	NCT04334317

UCB Pharma (UCBJY)

 = Neurodegeneration

 = Other neurology

 = Neuropsych

Rare CNS

Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Rozanolixizumab		<i>Myelin oligodendrocyte glycoprotein (MOG) antibody disease</i>	FcRn inhibitor	3	8/10/2026	NCT05063162
Doxecitine and doxribtimine		<i>Thymidine kinase 2 deficiency (TK2d)</i>	MT1621, nucleoside therapy	3	6/24/2024	NCT03845712
STACCATO® alprazolam		Stereotypical prolonged seizures	Benzo	3	4/17/2024	NCT05077904
Fenfluramine (Fintepla)	Zogenix	<i>CDKL5 Deficiency Disorder</i>	5-HT agonist	3		--
Rozanolixizumab		<i>Autoimmune encephalitis</i>	FcRn inhibitor	2	10/13/2023	NCT04875975
Rozanolixizumab		<i>Severe fibromyalgia syndrome</i>	FcRn inhibitor	2	9/11/2024	NCT05643794
Bepranemab		Alzheimer's disease	anti-tau mAb	2	5/20/2024	NCT04867616
Minzasolmin		Parkinson's disease	alphaSyn misfolding inhibitor	2	12/10/2029	NCT05543252

Other companies

= Neurodegeneration

= Other neurology

= Neuropsych

Rare CNS

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary completion	Trial ID
Merck & Co	MK-8189		Schizophrenia	PDE10A inhibitor	2b	6/19/2024	NCT04624243
Merck KgGA	Evobrutinib		Multiple sclerosis	BTKi	3	10/2/2023	NCT04338061
Regeneron	ALN-APP	Alnylam	Alzheimer's disease (early onset)	APP gene silencing	1	7/1/2025	NCT05231785
Gilead	No CNS assets in development						
GSK	No CNS assets in development						
Pfizer	No CNS assets in development						



CNS Pipeline by Therapeutic Area

Alzheimer's Disease

MoA: = Amyloid = Tau = Other

Company	Asset	Partner / Deal	Mechanism	Phase	Primary Completion	Trial ID
Eli Lilly	Donanemab		anti-Abeta mAb	Filing		--
Johnson&Johnson	JNJ-63733657		anti-pTau mAb	3	3/7/2025	NCT04619420
Eli Lilly	Remternetug		anti-Abeta mAb	3	10/1/2025	NCT05463731
Eli Lilly	LY3372689		O-GlcNAcase inhibitor	2	7/01/2024	NCT05063539
Roche	Bepranemab	UCB	anti-Tau mAb	2	5/20/2024	NCT04867616
AbbVie	ABBV-552	Syndesi Tx	SV2A modulator	2	6/22/2024	NCT05771428
AbbVie	AL002	Alector	TREM2 activator	2	9/1/2025	NCT05744401
AbbVie	ABBV-916		Anti-AβpE3 mAb	2	1/18/2030	NCT05291234
Bristol Myers Squibb	BMS-986446 (PRX005)	Prothena	anti-Tau mAb (MTBR)	2		1H24 start
Shionogi	Zatolmilast	Tetra	PDE4D negative allosteric modulator	2		--
Johnson & Johnson	ACI-35.030	AC Immune	anti-pTau vaccine	1b/2a	9/5/2023	NCT04445831
Novartis	NIO752		Tau antagonist	1b	10/30/2024	NCT05469360
Eisai	E2814		anti-Tau mAb (MTBR)	1/2	4/22/2025	NCT04971733
Roche	Trontinemab		Brain shuttle gantenerumab	1/2	9/30/2027	NCT04639050
Regeneron	ALN-APP	Alnylam	APP gene silencing	1	7/1/2025	NCT05231785
Astra Zeneca	MEDI1814		anti-Abeta mAb	1		--
Eisai	E2511		Synapse regnerant	1		--
Roche	RG6289		Gamma secretase modulator	1		--
Eisai	E2511		TrkA negative allosteric modulator			--
Eisai	E2025		Undisclosed			--

Sources: Company reports and publications; Leerink Partners Research

Parkinson's, MSA

MoA: = Alpha syn = Other

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
AbbVie	ABBV-951		Parkinson's disease	SubQ delivery of levodopa / carbidopa	Filing		--
Roche	Prasinezumab	Prothena	Parkinson's disease	anti-alphaSyn mAb	2b	9/20/2024	NCT04777331
Takeda	TAK-071		Parkinson's disease	M1 positive allosteric modulator	2	2/27/2023	NCT04334317
Novartis	DLX313 (UCB0599)	UCB	Parkinson's disease	alphaSyn misfolding inhibitor	2	4/11/2024	NCT04658186
UCB Pharma	minzasolmin		Parkinson's disease	alphaSyn misfolding inhibitor	2	12/10/2029	NCT05543252
Takeda	TAK-341 /MEDI1341	Astra Zeneca	Multiple system atrophy	anti-alphaSyn mAb	2	8/1/2025	NCT05526391
Eisai	E2027		Parkinson's dementia	PDE9 inhibitor	2		--
Eli Lilly	LY3884961 (PR001)	Prevail	GBA1+ Parkinson's	GBA1 gene therapy	1/2	6/1/2029	NCT04127578
Sanofi	SAR446159 (ABL301)	ABL Bio	Parkinson's disease	anti-alphaSyn mAb	1	9/21/2023	NCT05756920
Johnson & Johnson	JNJ-0376	Yumanity	Parkinson's disease	stearoyl-CoA desaturase inhibitor	1		--
Roche	Selnoflast		Parkinson's disease	NLRP3 inhibitor	1	3/3/2025	NCT05924243

Sources: Company reports and publications; Leerink Partners Research

Multiple sclerosis and other demyelinating diseases

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
Merck KgGA	Evobrutinib		Multiple sclerosis	BTKi	3	10/2/2023	NCT04338061
Roche	Ocrelizumab SC (Ocrevus)		Multiple sclerosis (RMS, PPMS)	anti-CD20 monoclonal antibody	3	3/10/2023	NCT05232825
Roche	Satralizumab (Enspryng)		MOG antibody disease	anti-IL-6 mAb	3	4/30/2026	NCT05271409
Sanofi	Tolebrutinib		Multiple sclerosis (RMS, PPMS, SPMS)	BTKi	3		Multiple trials
Roche	Fenebrutinib		Multiple sclerosis (RMS)	BTKi	3	10/2/2025	NCT04586023
Novartis	Remibrutinib		Multiple sclerosis	BTKi	3	4/30/2026	NCT05156281
UCB Pharma	rozanolixizumab		MOG antibody disease	FcRn inhibitor	3	8/10/2026	NCT05063162
Johnson&Johnson	Nipocalimab		CIDP	anti-FcRn mAb	3	5/14/2027	NCT05327114
Sanofi	frexalimab	ImmuNext	Multiple sclerosis	Anti-CD40L mAb	2	9/21/2022	NCT04879628
Sanofi	SAR445088		CIDP	Complement C1s inhibitor	2	8/2/2024	NCT04658472
Sanofi	SAR443820 (DNL788)	Denali	Multiple sclerosis	RIPK1 inhibitor	2	8/27/2025	NCT05630547
Bristol Myers Squibb	--		Multiple sclerosis	TYK2i	1		--
Roche	RG6182	Spark	Multiple sclerosis	MAGLi	1		--
Roche	RG6035		Multiple sclerosis	Brain shuttle anti-CD20 mAb	1		--

Sources: Company reports and publications; Leerink Partners Research

MOG = Myelin oligodendrocyte glycoprotein; CIDP = Chronic inflammatory demyelinating polyneuropathy

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Other neurodegeneration

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
AbbVie	ABBV-CLS-7262	Calico Life Sci	Amyotrophic lateral sclerosis	eIF2B activator	2/3	7/1/2025	NCT04297683
Sanofi	SAR443820 (DNL788)	Denali	Amyotrophic lateral sclerosis	RIPK1 inhibitor	2	1/16/2024	NCT05237284
Novartis	BLZ945 (sotuletinib)		Amyotrophic lateral sclerosis	CSF-1R inhibitor	2	3/27/2025	NCT04066244
Bristol Myers Squibb	BMS-986419		Amyotrophic lateral sclerosis	eIF2B activator	2	2024 (trial initiation)	--
Takeda	TAK-594	Denali	Frontotemporal dementia	TfR enabled PGN fusion protein	2	11/1/2025	NCT05262023
Eli Lilly	LY3884963	Prevail	Frontotemporal dementia with GRN mutations	GRN gene therapy	1/2	8/31/2029	NCT04408625
Roche	Tominersen		Huntington's disease	ASO against huntingtin	2	1/3/2025	NCT05686551
Novartis	NIO752		Progressive supranuclear palsy	Tau antagonist	2	11/12/2024	NCT04539041
AbbVie	ABBV-CLS-7262	Calico Life Sci	Vanishing white matter disease	eIF2B activator	1	3/1/2025	NCT05757141

Sources: Company reports and publications; Leerink Partners Research

Epilepsy

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
UCB Pharma	STACCATO® alprazolam		Stereotypical prolonged seizures	Benzodiazepine	3	4/17/2024	NCT05077904
UCB Pharma	fenfluramine (Fintepla)		CDKL5 deficiency disorder	5-HT agonist	3		--
Eisai	lorcaserin/E2023	Arena	Dravet syndrome	5-HT2C receptor agonist	3	3/5/2025	NCT04572243
Takeda	soticlestat	Ovid	Dravet syndrome	CH24H inhibitor	3	5/22/2026	NCT05163314
Takeda	soticlestat	Ovid	Lennox gastaut syndrome	CH24H inhibitor	3	5/22/2026	NCT05163314
Shionogi	Zatolmilast	Tetra	Fragile X Syndrome	PDE4D negative allosteric modulator	3	2/1/2024	NCT05163808
Johnson & Johnson	JNJ-40411813		Epilepsy	mGlu2 PAM	2	4/1/2024	NCT04836559

Metabolic disorders involving the CNS

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
Takeda	pabinafusp alfa	JCR Pharma	MPS II (Hunter syndrome)	TfR enabled IDS	3	1/31/2026	NCT04573023
Takeda	TAK-611		Metachromatic leukodystrophy	Human arylsulfatase A	2	3/8/2023	NCT03771898
Eli Lilly	LY3884961 (PR001)	Prevail	Gaucher disease (type 1)	GBA1 gene therapy	1/2	9/11/2030	NCT05487599
Eli Lilly	LY3884961 (PR001)	Prevail	Gaucher disease (type 2)	GBA1 gene therapy	1/2	9/1/2028	NCT04411654

Sources: Company reports and publications; Leerink Partners Research

Neuromuscular

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
Novartis	OAV101		Spinal muscular atrophy (Type 2)	SMN1 gene replacement	3	7/31/2024	NCT05089656
Roche	RG6356 (SRP-9001)	Sarepta	Duchenne muscular dystrophy	gene therapy	3	1/31/2026	NCT05881408
Roche	Satralizumab (Enspryng)		Myasthenia gravis	anti-IL-6 mAb	3	1/31/2024	NCT04963270
Roche	RG6237	PTC	Spinal muscular atrophy	anti-myostatin Ab	2/3	6/27/2026	NCT05115110
Roche	RO7204239 / GYM329		Facioscapulohumeral muscular dystrophy	anti-myostatin Ab	2	6/15/2024	NCT05548556
Astra Zeneca	Gefurulumab	Alexion	Myasthenia gravis	Anti-C5 bispecific mAb	2		--
Astra Zeneca	Vemircopan	Alexion	Myasthenia gravis	Factor D inhibitor	2		--
Johnson & Johnson	Nipocalimab		Myasthenia gravis	anti-FcRn mAb	2	3/19/2025	NCT04951622

Sources: Company reports and publications; Leerink Partners Research

Pain and related

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
Shionogi	Resiniferatoxin	Sorrento	Pain associated with osteoarthritis of the knee	TRPV1 agonist	3	3/1/2023	NCT04044742
Astra Zeneca	MEDI7352		Osteoarthritis pain	NGF/TNF bispecific mAb	2b	8/16/2023	NCT04675034
Eli Lilly			Pain	P2X7 inhibitor	2		--
UCB Pharma	rozanolixizumab		Severe fibromyalgia syndrome	FcRn inhibitor	2	9/11/2024	NCT05643794
Eli Lilly	--		Pain	AT2R antagonist	1		
Shionogi	S-151128		Chronic pain	undisclosed	1		--
Sunovion	DSP-3905		Neuropathic pain	NaV1.7 inhibitor	1		--
Eli Lilly	--		Pain	--			

Sources: Company reports and publications; Leerink Partners Research

Major depressive disorder and related symptoms

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
Johnson & Johnson	Seltorexant		Adjunctive MDD with insomnia symptoms	Orexin 2 antagonist	3	4/25/2023	NCT04951609
Johnson & Johnson	Aticaprant	Cerecor	Adjunctive MDD	KOR antagonist	3	10/17/2024	NCT05455684
Sunovion	Ulotaront (SEP-363856)		Adjunctive MDD	TAAR1 agonist with 5-HT1A agonist activity	3	5/1/2025	NCT05593029
Johnson & Johnson	Spravato		MDD with suicidal ideation pediatrics	NMDA receptor agonist	2	3/31/2023	NCT03185819
Takeda	TAK-653	Neurocrine	Treatment resistant depression	AMPA receptor potentiator	2	12/1/2023	NCT05203341
Sunovion	SEP-378614	Psychogenics	Treatment resistant depression	Undefined	1		--
Sunovion	DSP-3456		Treatment resistant depression	mGlu2/3 receptor negative allosteric modulator	1		--

Anxiety, PTSD

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
Sunovion	Ulotaront (SEP-363856)		Generalized anxiety disorder	TAAR1 agonist with 5-HT1A agonist activity	3	2/8/2025	NCT05729373
Roche	Balovaptan		Post traumatic stress disorder	vasopressin V1A receptor antagonist	2	12/15/2023	NCT05401565
AbbVie	ABBV-932	Gedeon Richter	Generalized anxiety disorder	DRD2/DRD3 Modulator	1	3/12/2025	NCT06024239

Sources: Company reports and publications; Leerink Partners Research

Schizophrenia and bipolar disorder

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
Sunovion	Ulotaront (SEP-363856)		Schizophrenia	TAAR1 agonist with 5-HT1A agonist activity	3	9/8/2023	NCT04092686
Sunovion	SEP-4199		Bipolar depression	5-HT7R antagonist (non-racemic ratio of amisulpride)	3	5/31/2025	NCT05169710
Merck & Co	MK-8189		Schizophrenia	PDE10A inhibitor	2b	6/19/2024	NCT04624243
Johnson & Johnson	P2X7 antagonist		Bipolar depression	P2X7 antagonist	2		--

Other neuropsych

Company	Asset	Partner / Deal	Indication	Mechanism	Phase	Primary Completion	Trial ID
Roche	Alogabat		Autism Spectrum Disorder	GABA modulator	2	3/21/2025	NCT05630066
Eisai	E2027		Parkinson's dementia	PDE9 inhibitor	2		--
Johnson&Johnson	Seltorexant		Agitation in Alzheimer's	Orexin 2 antagonist	2	10/16/2023	NCT05307692
Sunovion	Ulotaront (SEP-363856)		Parkinson's disease psychosis	TAAR1 agonist with 5-HT1A agonist activity	2		--
Roche	RG6163		Psychiatric disorders	undisclosed	1		--
Sunovion	DSP-0038		Alzheimer's disease psychosis	Dual-targeted 5-HT1a receptor agonist and 5-HT2a receptor antagonist	1		--
Sunovion	SEP-380135	Psychogenics	Agitation in Alzheimer's	Undefined	1		--

Sources: Company reports and publications; Leerink Partners Research

Disclosures Appendix

Completion: November 17, 2023 18:22 P.M. EDT.
Distribution: November 17, 2023 18:22 P.M. EDT.

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I, Marc Goodman, certify that the views expressed in this report accurately reflect my views and that no part of my compensation was, is, or will be directly related to the specific recommendation or views contained in this report.

I, David Risinger, CFA, certify that the views expressed in this report accurately reflect my views and that no part of my compensation was, is, or will be directly related to the specific recommendation or views contained in this report.

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Rating	Count	Percent	IB Serv./Past 12 Mos.	
			Count	Percent
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HOLD [MP]	101	31.2	7	6.9
SELL [UP]	12	3.7	0	0

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