MINERVA NEUROSCIENCES

Milestones on the Horizon

May 2018

Forward-Looking Statement Safe-Harbor

This presentation contains forward-looking statements about Minerva Neurosciences which are subject to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995, as amended. Forward-looking statements are statements that are not historical facts, reflect management's expectations as of the date of this presentation, and involve certain risks and uncertainties. Forward-looking statements include, but are not limited to: the benefits, efficacy and safety of our new formulations; the potential of the diagnosis and treatment of negative symptoms of schizophrenia and other diseases; whether studies performed on analogs or backups of our compounds are a good predictor of the clinical efficacy of our compounds; statements with respect to the timing and results of future clinical milestones with roluperidone (MIN-101), seltorexant (MIN-202) and MIN-117, including the Phase 3 trial of roluperidone, the Phase 2b trials of seltorexant and the Phase 2b trial of MIN-117; statements regarding our ability to successfully develop and commercialize our therapeutic products; our expectations regarding approval for our products by the U.S. Food and Drug Administration or equivalent foreign regulatory agencies; estimates regarding the market potential for our products; and future performance. All of such statements are subject to certain risks and uncertainties, many of which are difficult to predict and generally beyond the control of the Company, that could cause actual results to differ materially from those expressed in, or implied or projected by, the forward-looking statements. These forward-looking statements are based on our current expectations and may differ materially from actual results due to a variety of factors including, without limitation, whether any of our therapeutic products will advance further in the clinical trials process and whether and when, if at all, they will receive final approval from the U.S. Food and Drug Administration or equivalent foreign regulatory agencies and for which indications; whether the results of future clinical trials of roluperidone, seltorexant, MIN-117 and MIN-301, if any, will be consistent with the results of past clinical trials; whether roluperidone, seltorexant, MIN-117 and MIN-301 will be successfully marketed if approved; whether our therapeutic product discovery and development efforts will be successful; our ability to achieve the results contemplated by our co-development agreements; the strength and enforceability of our intellectual property rights; competition from pharmaceutical and biotechnology companies; the development of and our ability to take advantage of the market for our therapeutic products; our ability to raise additional capital to fund our operations on terms acceptable to us; and general economic conditions. These and other potential risks and uncertainties that could cause actual results to differ from the results predicted are more fully detailed under the caption "Risk Factors" in our filings with the Securities and Exchange Commission, including our Quarterly Report on Form 10-Q for the quarter ended March 31, 2018, filed with the Securities and Exchange Commission on May 3, 2018, as well as our Annual Report on Form 10-K for the year ended December 31, 2017, filed with the Securities and Exchange Commission on March 12, 2018. Copies of reports filed with the SEC are posted on our website at www.minervaneurosciences.com. Our audience is cautioned not to place undue reliance on these forward-looking statements that speak only as of the date hereof, and we disclaim any obligation to update any forward-looking statements, except as required by law.

MINERVA NEUROSCIENCES

Pipeline of four innovative CNS compounds

Program	Primary Indications	MoA	Preclinical	Phase 1	Phase 2	Phase 3
Roluperidone MIN-101	Negative symptoms in schizophrenia	• 5-HT_{2A} antagonist • $Sigma_2$ antagonist	**Phase 3 initiated Dec 2017 (MIN-101C07)** →			
Seltorexant MIN-202	Primary insomnia Major depressive disorder, as adjunctive therapy	• Selective orexin2 antagonist	**Phase 2b initiated Dec 2017 (ISM2005)** →			
			Phase 2b initiated Sep 2017 (aMDD2001) →			
			Phase 2b initiated Dec 2017 (aMDD2002) →			
MIN-117	Major depressive disorder, as monotherapy	• 5-HT_{1A} • 5HT transporter • Alpha-1a, b • Dopamine transporter • 5-HT_{2A} antagonist	**Phase 2b initiated Apr 2018 (MIN-117C03)** →			
MIN-301	Parkinson's disease	• Neuregulin-1β1 activating ErbB4	**Pre-clinical** →			

MoA=mechanism of action.

MINERVA NEUROSCIENCES

Roluperidone (MIN-101)

Potentially the first and only treatment of negative symptoms in schizophrenia

Phase 3 initiated December 2017

Data read-out expected in first half of 2019

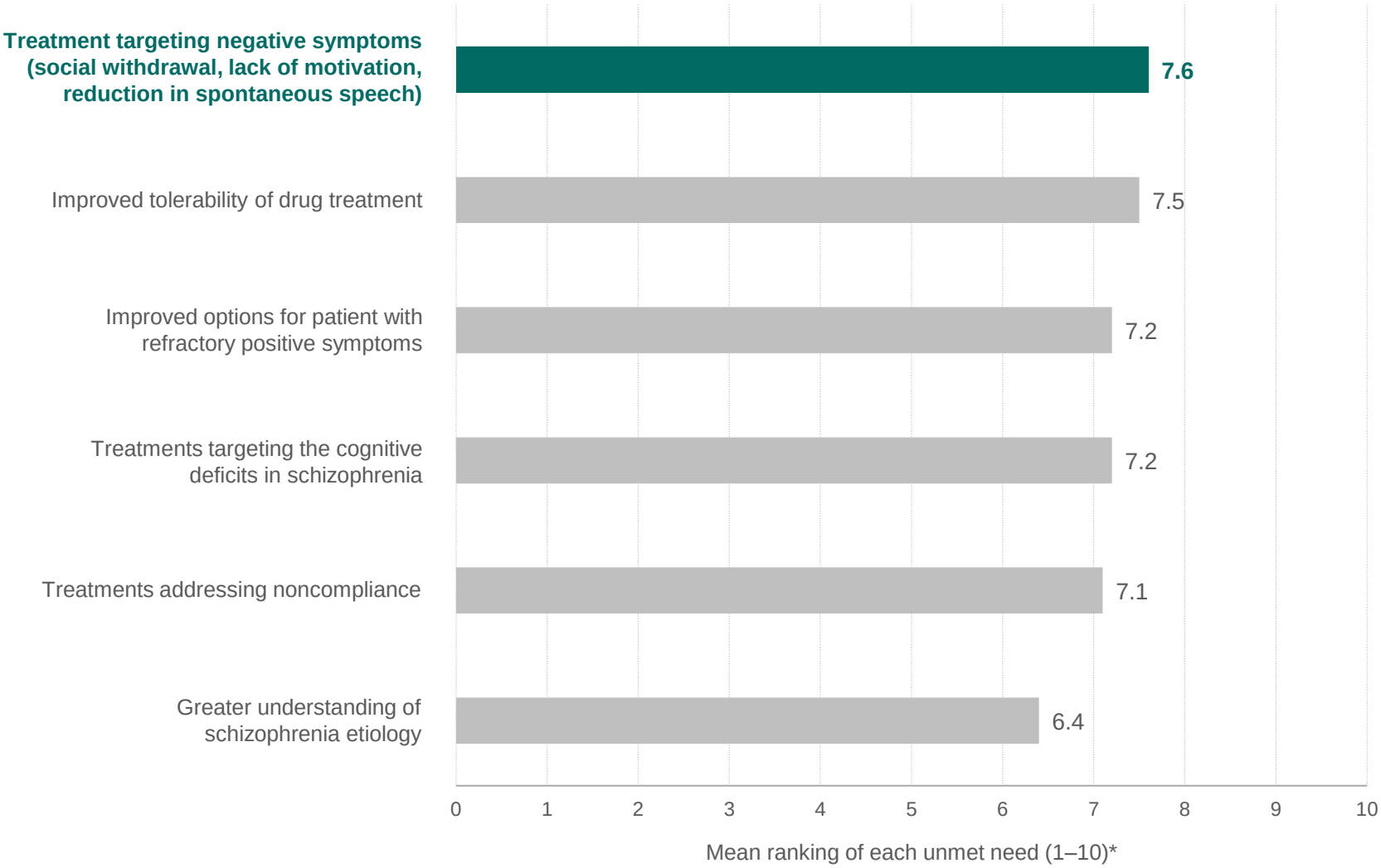
MINERVA NEUROSCIENCES

What are negative symptoms, and do they represent an unmet medical need?

MINERVA
NEUROSCIENCES

Recent survey of psychiatrists ranks negative symptoms as the #1 unmet medical need for patients with schizophrenia

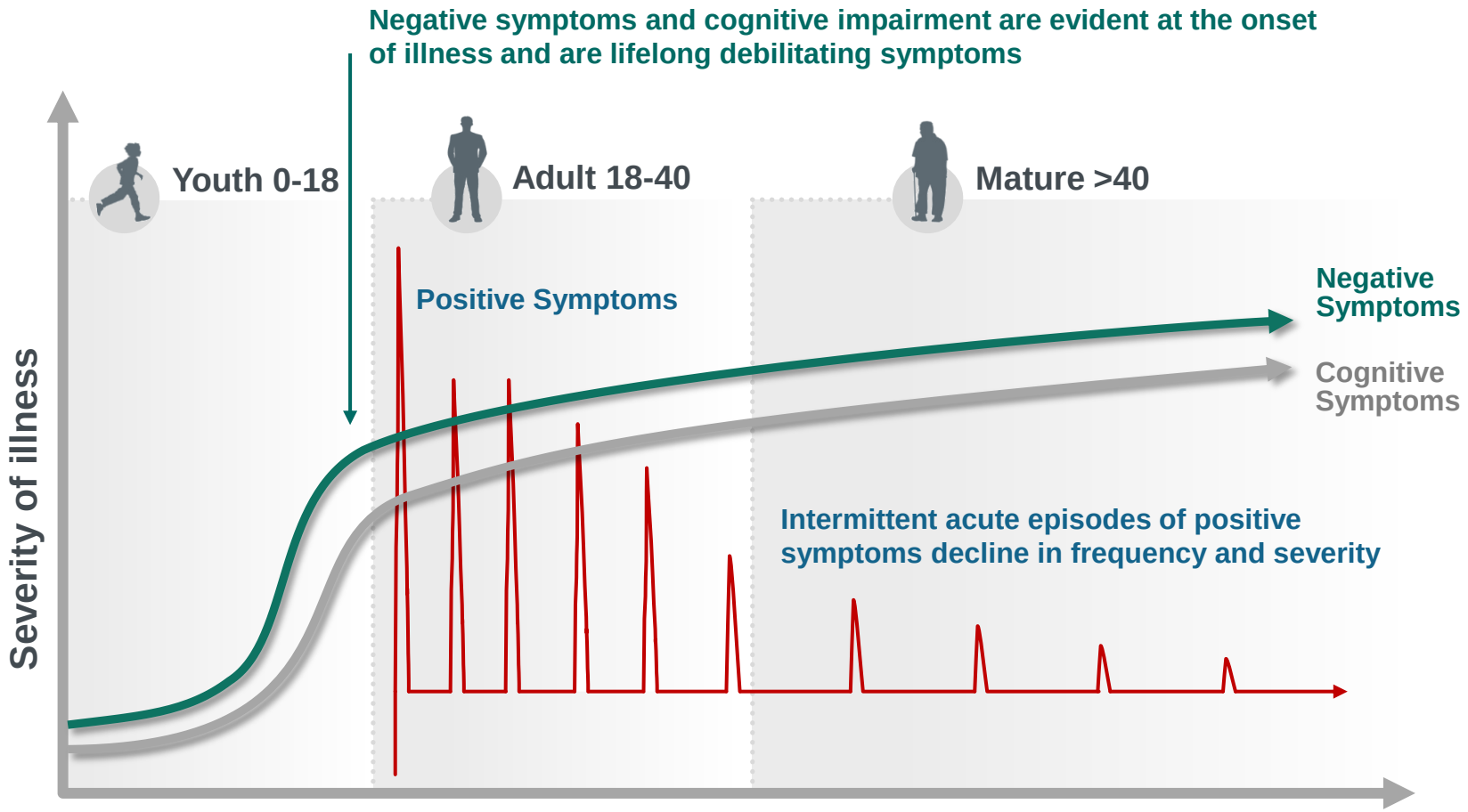
Key unmet needs for schizophrenia, 2017



*Higher scores denote greater importance assigned to the unmet need.
Source: Datamonitor Healthcare's proprietary schizophrenia survey, September 2017

MINERVA NEUROSCIENCES

Antipsychotics do not address negative symptoms (and maybe worsen them?)



All antipsychotics directly target dopamine (DA) receptors and have shown efficacy only against positive symptoms; none is indicated for negative symptoms or cognitive impairment

Source of chart and captions: Minerva Corporate Presentation. Slide 7. January 2018.
Source of statements: KOL Exploratories. January 9-10, 2018. Cello Health Advantage Inc.

MINERVA NEUROSCIENCES

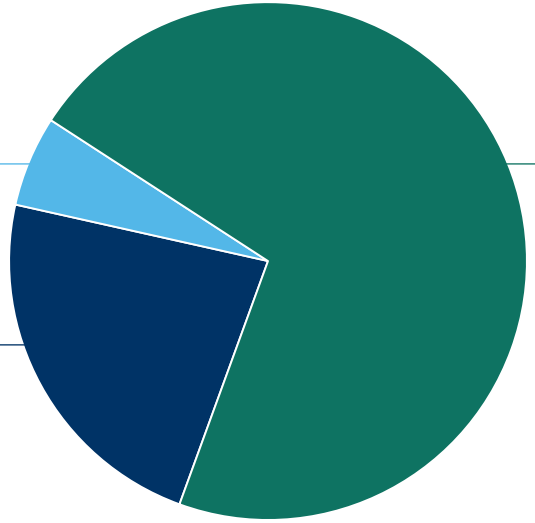
The total economic burden of schizophrenia in the US is high, estimated to be $155.7 billion

The economic burden of schizophrenia includes[1]

$9.3B
Direct non-healthcare costs

Includes:
Law enforcement, homeless shelters, research, and training

$37.7B
Direct healthcare costs



$117.3B
Indirect costs

Includes:
Loss of productivity, premature mortality (suicide), and caregiving

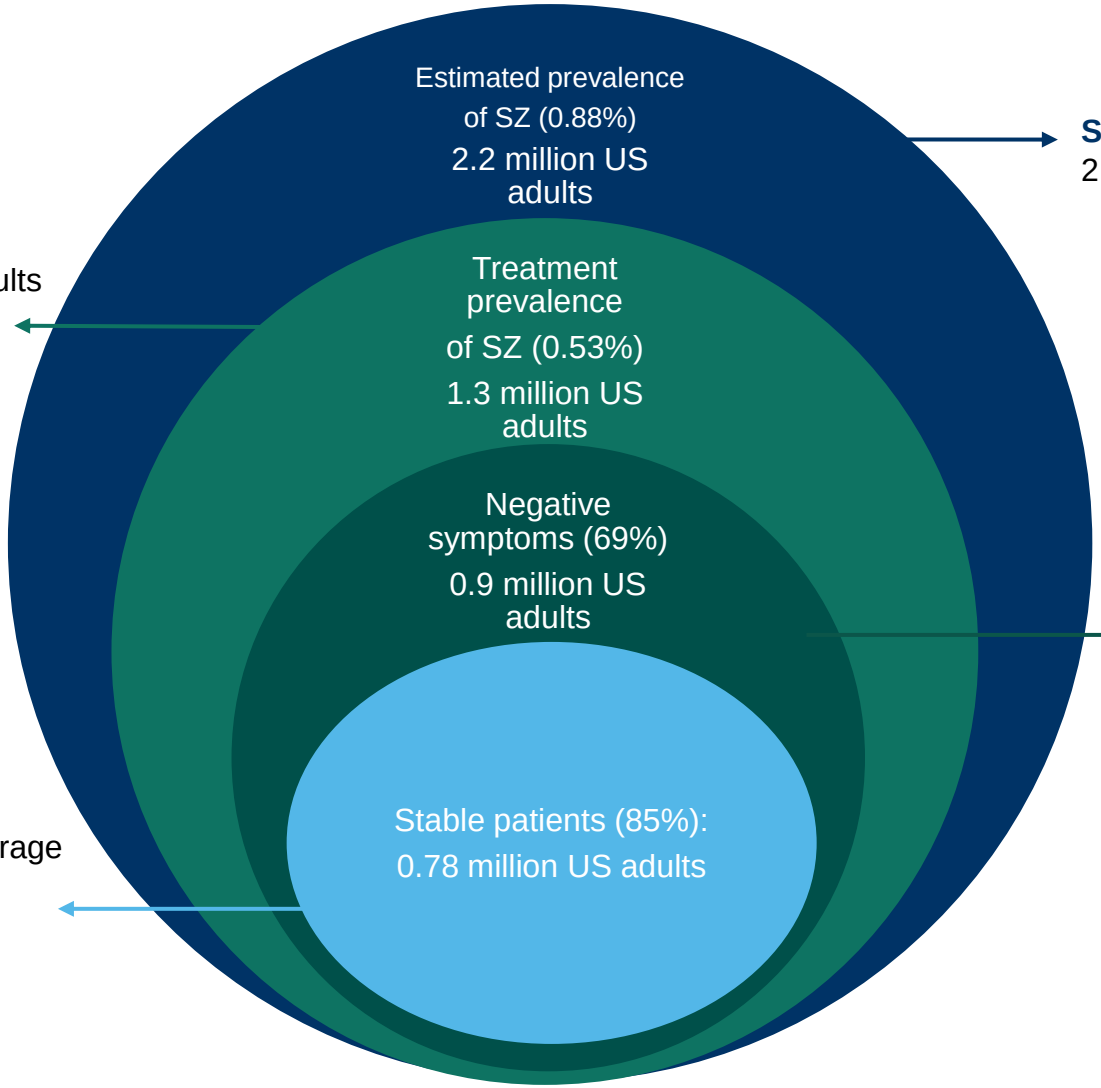
- The economic burden is particularly great during the first year following the index episode, mainly due to higher hospitalization rates vs chronic patients[2]
  - The average annual healthcare costs for newly diagnosed patients are $20,654 vs $15,489 for chronic patients[2]
- There is also a great burden on caregivers, including loss of productivity and emotional stress[2]
- WHO estimates that the direct costs of schizophrenia range from 1.6% to 2.6% of total healthcare expenditures in western countries[3]

WHO=World Health Organization.

1. Cloutier M et al. The economic burden of schizophrenia in the United States in 2013. *J Clin Psychiatry*. 2016;77:764-71. https://www.ncbi.nlm.nih.gov/pubmed/27135986. Accessed May 2, 2018. 2. Nicholl D, Akhras KS, Diels J, Schadrack J. Burden of schizophrenia in recently diagnosed patients: Healthcare utilization and cost perspective. *Curr Med Res Opin.* 2010;26:943-955. https://www.ncbi.nlm.nih.gov/pubmed/20163295. Accessed May 2, 2018. 3. WHO. Nations for Mental Health. Schizophrenia and public health. http://www.who.int/mental_health/media/en/55.pdf?ua=1. Accessed May 2, 2018.

MINERVA NEUROSCIENCES

≈60% of adult patients with schizophrenia who are treated have negative symptoms and are relapse free over 6 months



Schizophrenia.com: 2.2 million patients in US

Prevalence of US adults with schizophrenia in treatment/yr: **0.53%**[1]

69% of patients have negative symptoms: ≈42%[2,3] predominant/ prominent symptoms; ≈27%[4] mild symptoms

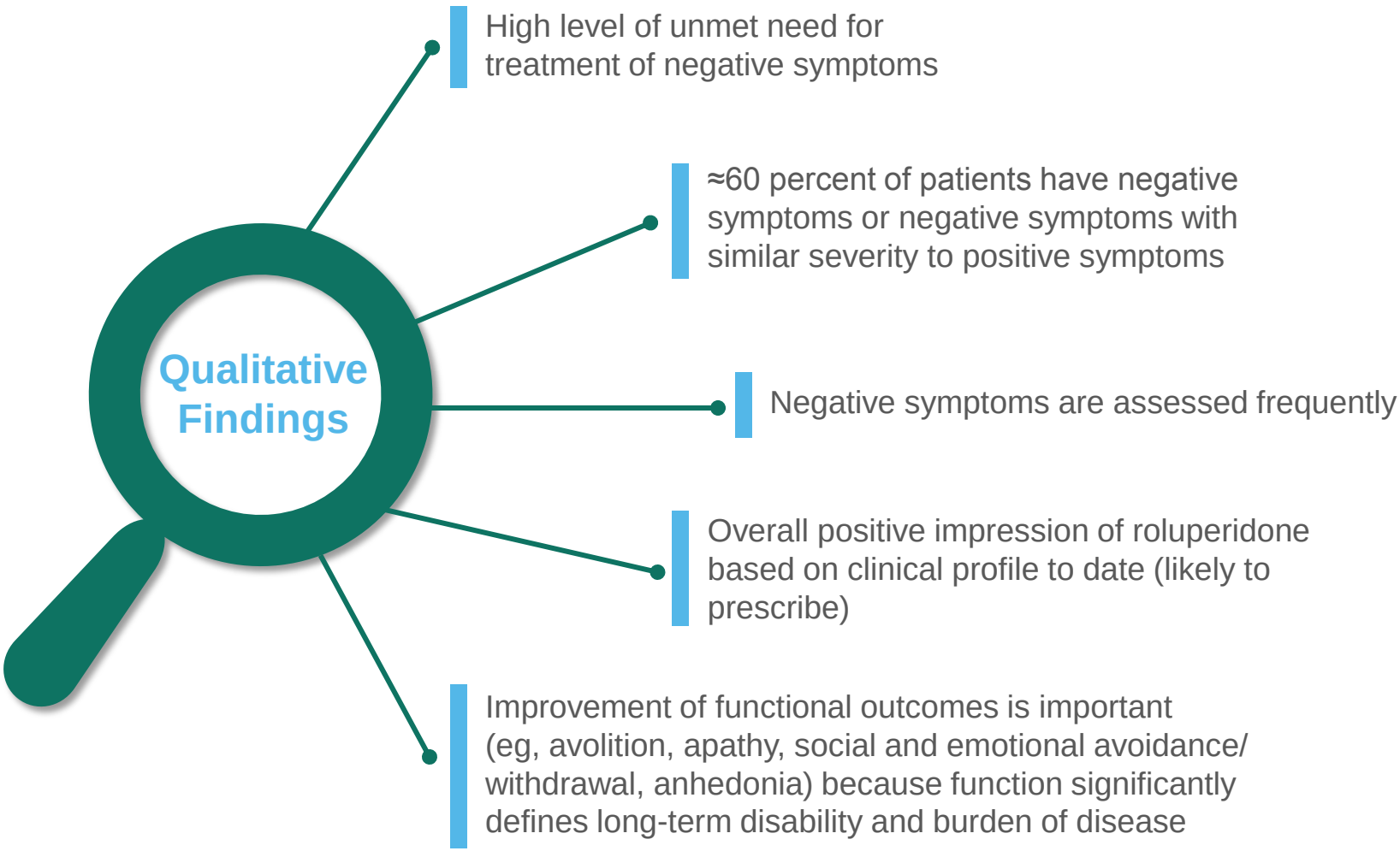
15%[2,3] weighted-average 6-month relapse rate among patients with varying severity of negative symptoms

SZ=schizophrenia.

1.Wu et al. *Psychol Medicine.* 2006; 2. Millier et al. *J Market Acc Health Policy.* 2017; 3.Haro et al. *Schizophr Research.* 2015; 4. Nordstroem et al. *J Social Psychiatry.* 2017.

MINERVA NEUROSCIENCES

Survey of 150 psychiatrists defines significant commercial opportunity



MINERVA NEUROSCIENCES

Potential first to market

MINERVA
NEUROSCIENCES

Roluperidone is positioned to launch in negative symptoms without competitors - only compound in Phase 3 - only study in monotherapy

Clinical trials in negative symptoms in schizophrenia on ClinicalTrials.Gov

Companies & Compounds

Phase 3 in Negative Symptoms

MINERVA NEUROSCIENCES

MIN-101 (monotherapy)
5-HT_{2A} & σ_2 receptors antagonist

Phase 3 study:
- Study results anticipated by **Jun 2019**

Primary endpoint:
- Positive and Negative Symptoms Scale (PANSS) Negative Symptoms Factor Score (NSFS)

Secondary endpoints:
- Personal and Social Performance (PSP) scale, measure of functioning
- Clinical Global Impression-Severity (CGI-S), clinician-rated overall severity of schizophrenia

Phase 2 in Negative Symptoms

Otsuka / AVANIR pharmaceuticals

AVP-786 (adjunctive use)
Fixed-dose quinidine + dextromethorphan (weak NMDA antagonist + σ_1 R agonist)
Phase 2 completed **Aug 2017, awaiting results**

Lilly

LY500307 (adjunctive use)
Selective estrogen receptor ß agonist
Phase 2a anticipated to complete in **Jun 2018**

ACADIA® Pharmaceuticals

ACP-103 (adjunctive use)
5-HT_{2A} inverse agonist
Phase 2 anticipated to complete in **Jun 2019**

Takeda

TAK-831 (adjunctive use)
DAAO inhibitor
Phase 2 anticipated to complete **Apr 2020**

Allergan

Vraylar
Refusal to file for negative symptoms Sep 2017

Source: Clinical Trials.gov. Accessed Feb 13, 2018.

Roluperidone clinical data

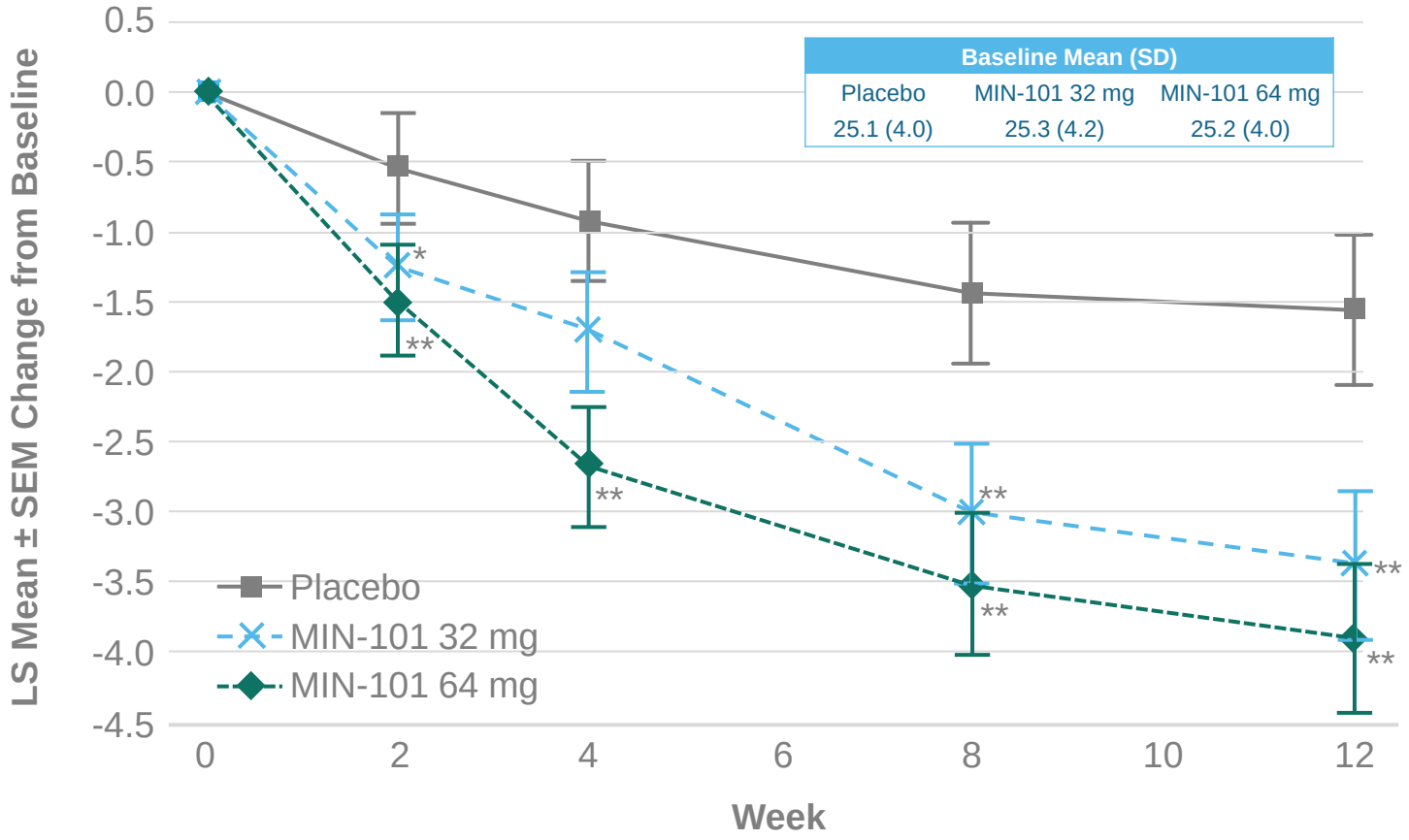
MINERVA NEUROSCIENCES

Roluperidone exposure summary through 1Q2018 (not including ongoing Phase 3 trial)

- 13 clinical studies
  - 10 Phase 1 studies (including 1 ongoing)
  - 3 clinical studies
- Subjects exposed to roluperidone
  - 260 patients
  - 230 healthy volunteers
- Efficacy observed at the 2 tested doses on primary endpoint and most secondary outcome measures in double-blind core Phase 2b study
- Well tolerated in healthy volunteers and patients

Phase 2b study showed clinically significant improvements in negative symptoms over 12 weeks with both doses

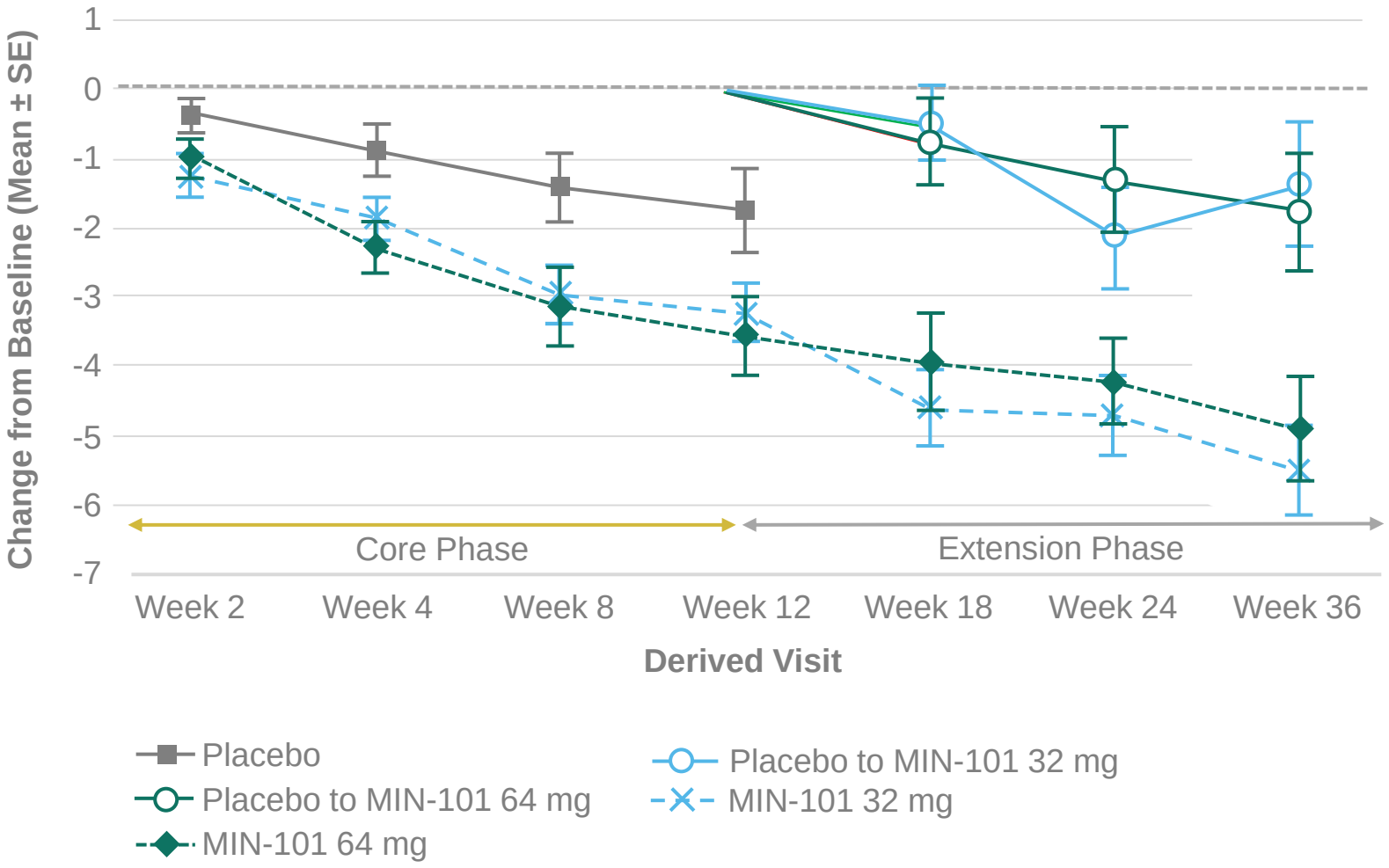
PANSS Negative Symptoms Factor Score (Marder) Change from Baseline (MMRM) (ITT Population)



P value: *≤0.05; **≤0.01 vs placebo.
MMRM=mixed-effect model repeated measures; ITT=intent-to-treat; LS=least squares; SEM=standard error of mean.

MINERVA NEUROSCIENCES

Negative symptoms continued to improve over 36 weeks with both doses

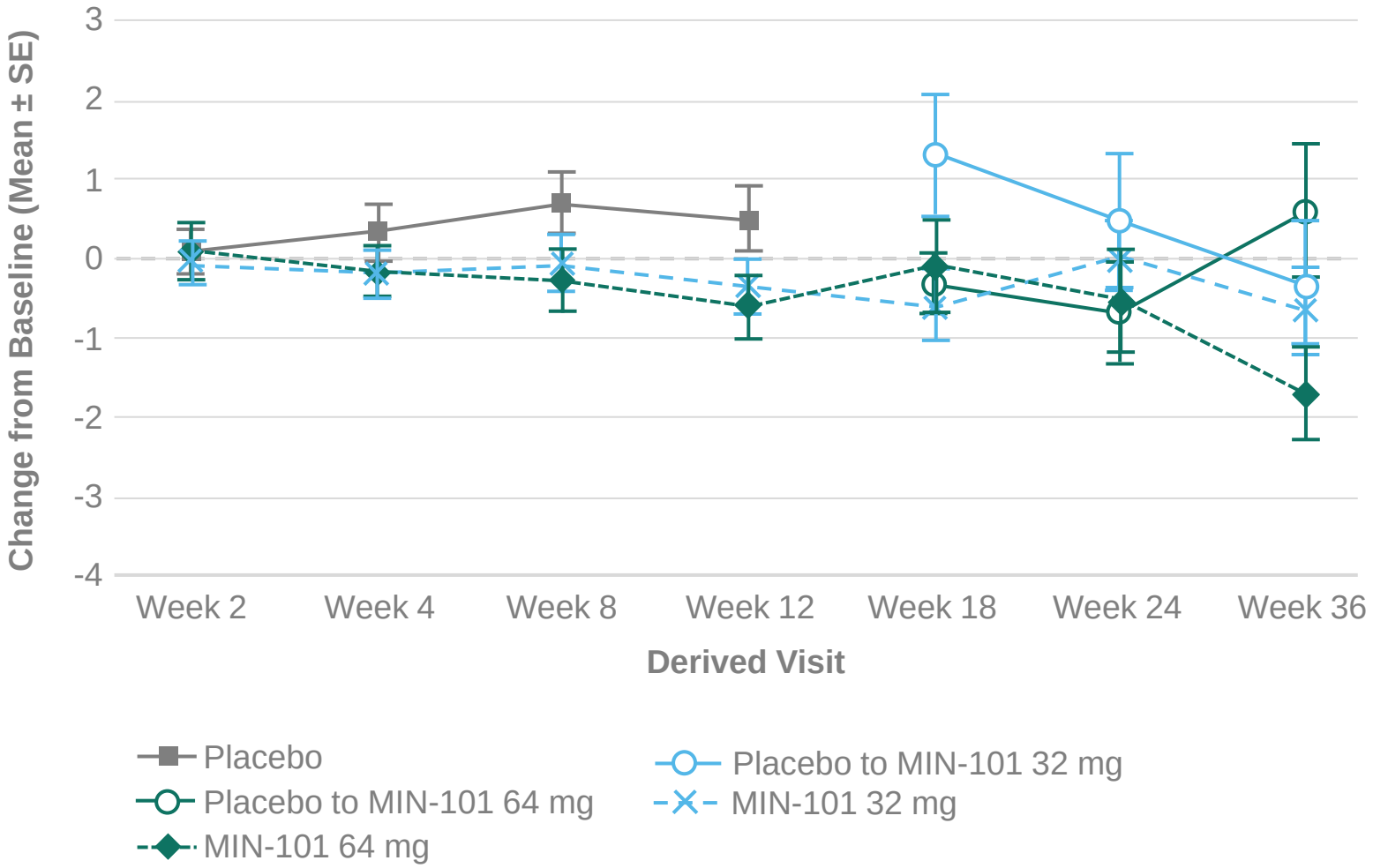


Baseline for Placebo-to-MIN-101 is From Start of Open Label (Week 12)

SE=standard error.

MINERVA NEUROSCIENCES

Positive symptoms also remained stable over 36 weeks



Baseline for Placebo-to-MIN-101 is From Start of Open Label

MINERVA NEUROSCIENCES

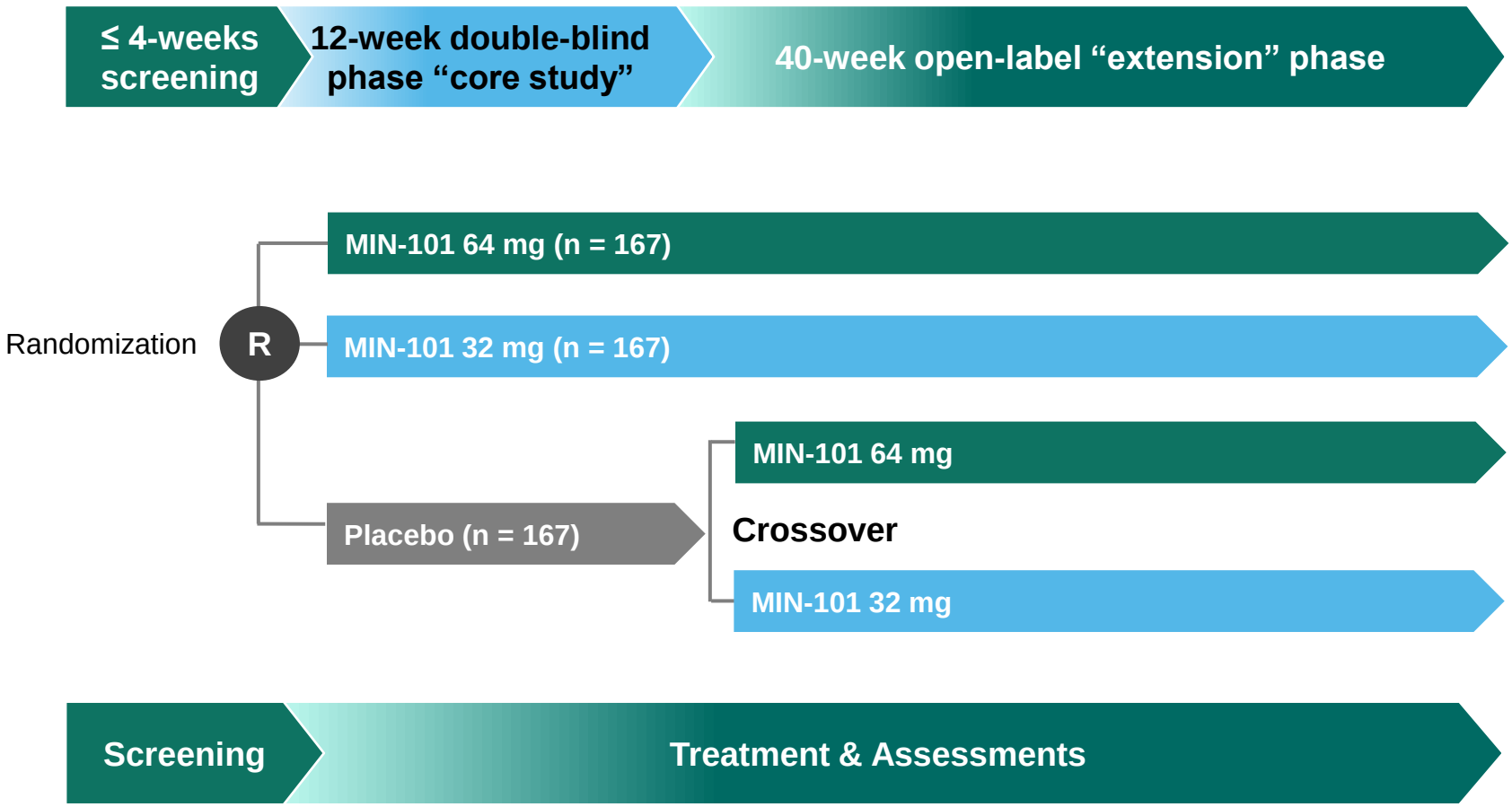
Roluperidone Phase 3

Designed to replicate successful Phase 2b

Design reviewed at end-of-Phase 2 meeting with FDA

MINERVA NEUROSCIENCES

Roluperidone Phase 3 study design: monotherapy, double-blind, placebo-controlled in schizophrenic patients with negative symptoms



Phase 3 compared to Phase 2b: same patient population; same double-blind duration; same doses; PANSS NSFS primary endpoint; CGI-S and PSP secondary endpoints; 40-week extension allows 1 year safety coverage.

MINERVA NEUROSCIENCES

Phase 3 efficacy study: confirmatory study design guided by insights from Phase 2b and dialogue with FDA

Primary endpoint

- PANSS Negative Symptoms Factor Score (NSFS) according to Marder after 12 weeks' administration

Secondary endpoints

- Clinical Global Impression of Severity (CGI-S)
- Personal and Social Performance scale (PSP)
- 40 weeks (9 months) open-label extension
- 501 patients randomized 1:1:1 to 32 mg and 64 mg doses of MIN-101 vs placebo
  - Symptomatically stable patients for several months with moderate to severe negative symptoms (>20 PANSS NSFS) and stable positive symptoms
- If patients are on antipsychotic medication, switch to MIN-101 without long wash-out periods so as to mimic clinical practice
- Study carried out in US (approximately 30% of patients) and Europe

MINERVA NEUROSCIENCES

Seltorexant

MIN-202 / JNJ-42847922

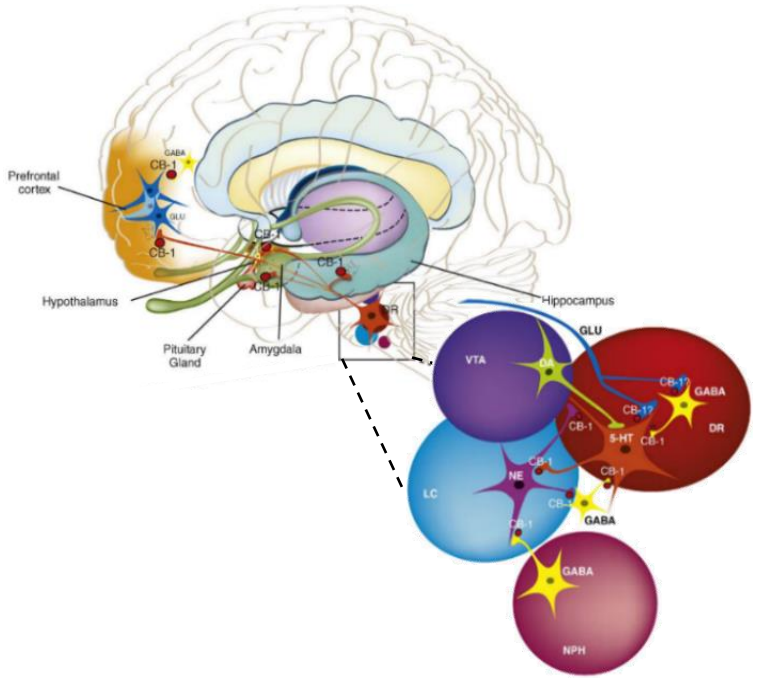
A drug to treat insomnia and major depressive disorder by restoring physiological sleep

A co-development/co-commercialization program with:

janssen | PHARMACEUTICAL COMPANIES OF Johnson & Johnson

MINERVA NEUROSCIENCES

Orexin system: Neurobiology targets circuits that mediate sleep and mood symptoms



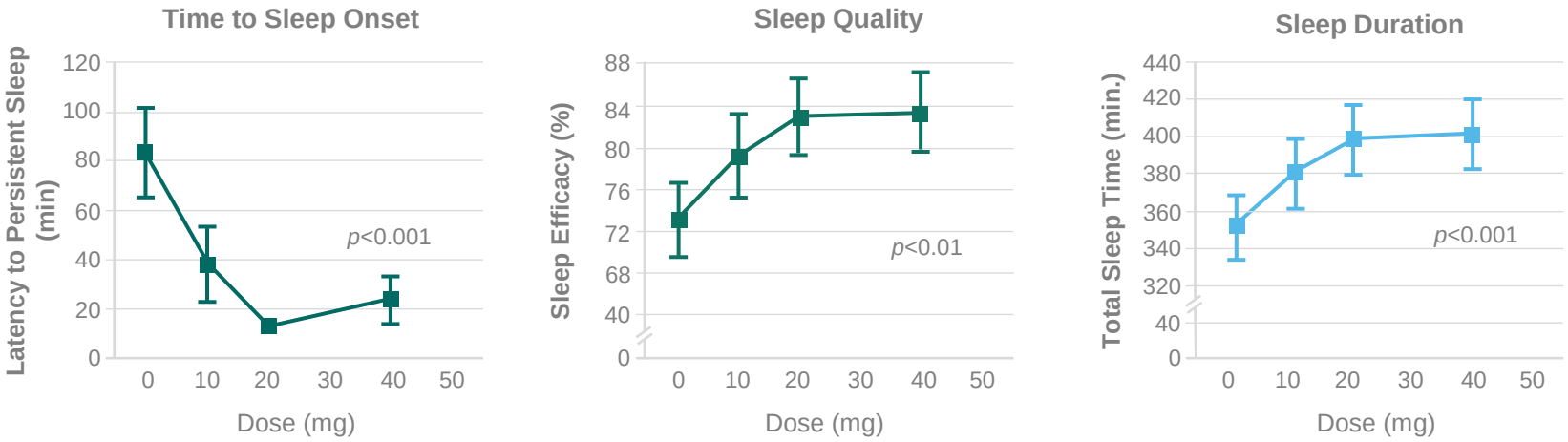
Depressive Symptom		Orexinergic Domain
Depression/irritability	➡	Emotion/arousal
Low self view/guilt	➡	Emotion
Loss of interest and pleasure	➡	Reward/motivation
Suicide/death ideation	➡	Reward/motivation
Sleep disturbance	➡	Sleep-wake
Agitation, restlessness	➡	Arousal/energy balance

Name	MoA	PK/PD profile
Seltorexant	Selective orexin-2 Antagonist	• Highly selective for orexin-2 (relative to orexin-1) • Short Tmax (30 minutes) – produces rapid onset of effect • Short half-life (2 hours) – minimizes daytime “hangover”

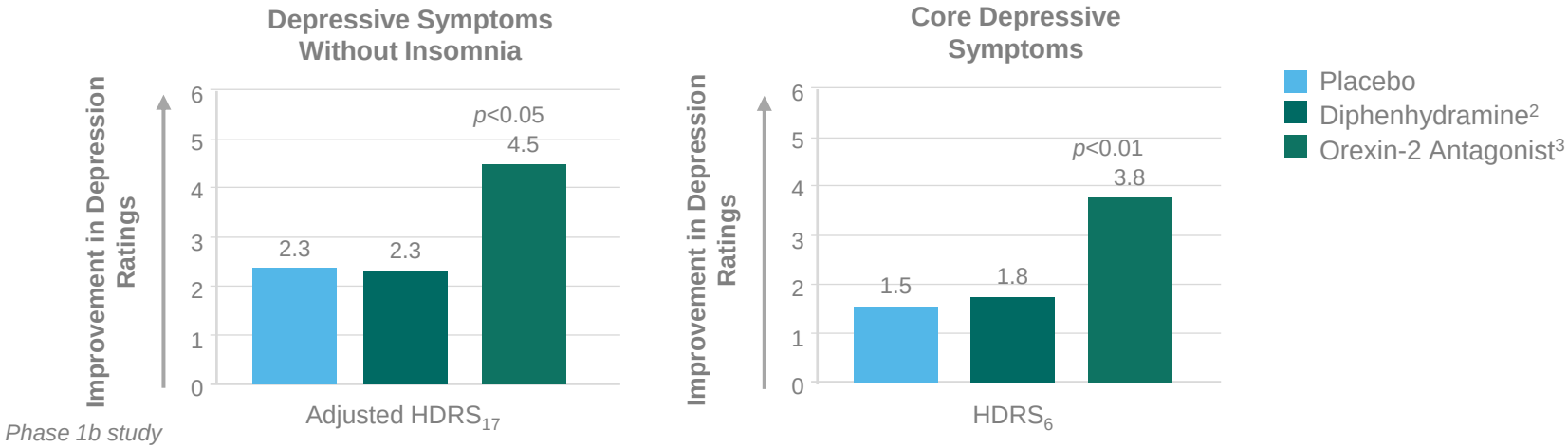
MINERVA NEUROSCIENCES

Seltorexant study in MDD with comorbid insomnia shows improvements in insomnia and depressive symptoms

Exploratory Phase 1a study in patients with major depressive disorder and insomnia (N = 20)



Minerva Neurosciences, internal data, study 42847922ED1002; disclosed Q1 2015.



Phase 1b study
Day 11, N = 47

$HDRS_{17}$=17-item Hamilton Depression Rating Scale; adjusted $HDRS_{17}$=HDRS with the 3 items related to sleep subtracted; $HDRS_6$=6-item subscale encompassing the core symptoms of depression.

1. ACNP. 2016; ClinicalTrials.gov NCT02476058; 2. Diphenhydramine (Benadryl), included as a nocebo; 3. JNJ-7922.

MINERVA NEUROSCIENCES

Seltorexant Phase 2b program: 2 trials in MDD and 1 in insomnia ongoing

- **First aMDD trial initiated Sep 2017** (clinicaltrials.gov: NCT03227224)
  - Double-blind, randomized, parallel-group, placebo-controlled adaptive dose-finding study
  - 4-week screening, 6-week double-blind treatment, and 2-week follow-up
  - ≈280 patients planned to be enrolled at >85 clinical sites in the US, Europe, Russia, and Japan
    - Safety and tolerability and dose-response and efficacy for up to 3 doses of seltorexant

---

- **Second aMDD trial initiated Dec 2017** (clinicaltrials.gov: NCT03321526)
  - Double-blind, randomized, flexible-dose parallel-group study
  - 4-week screening, 6-month double-blind treatment, and 2-week follow-up
  - ≈100 patients planned to be enrolled at ≈34 clinical sites in the US
    - Assess the efficacy of flexibly dosed seltorexant compared with flexibly dosed quetiapine as adjunctive therapy to baseline antidepressant therapy (either an SSRI or SNRI) in delaying time to all-cause discontinuation of study drug over a 6-month treatment period

---

- **Insomnia trial initiated Dec 2017** (clinicaltrials.gov: NCT03375203)
  - Double-blind, randomized, parallel-group, active- and placebo-controlled dose-finding study
  - Up to 61-day duration, including screening and follow-up
  - ≈360 patients planned to be enrolled at clinical sites in the US, Europe, and Japan
    - Assess the dose-response of 3 doses of seltorexant compared to placebo on sleep onset as measured by latency to persistent sleep (LPS) using polysomnography (PSG)
    - Assess the dose-response of these doses compared with placebo on wake after sleep onset (WASO) over the first 6 hours using PSG
    - Compare the effects of seltorexant on sleep and cognition to those effects of zolpidem

SSRI=selective serotonin reuptake inhibitor; SNRI=serotonin and norepinephrine reuptake inhibitor.

MINERVA NEUROSCIENCES

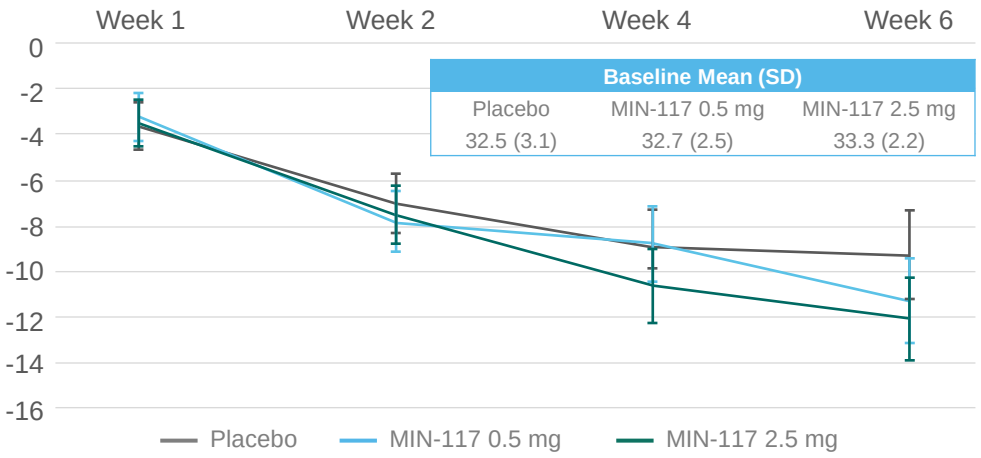
MIN-117

Addressing the unmet medical needs of patients with major depressive disorder and anxiety symptoms

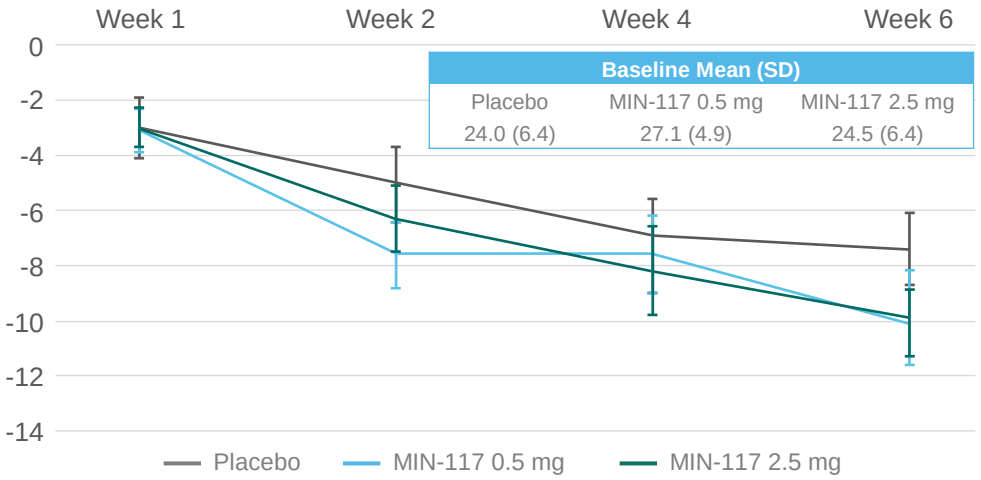
MINERVA NEUROSCIENCES

The Phase 2a results show effect on primary endpoint in depression as well as noted effect on anxiety

MADRS Change from Baseline (MMRM LS Mean) by Treatment Arm (ITT Population)



HAM-A Change from Baseline (Observed data) by Treatment Arm (ITT Population)



Exploratory study for dose-finding, safety and efficacy – not statistically powered

Results

- Efficacy on depressive symptoms
- Onset evident as early as 2 weeks
- Efficacy on anxiety symptoms
- Both doses of MIN-117 are well tolerated, no sexual s/e, cognitive benefits

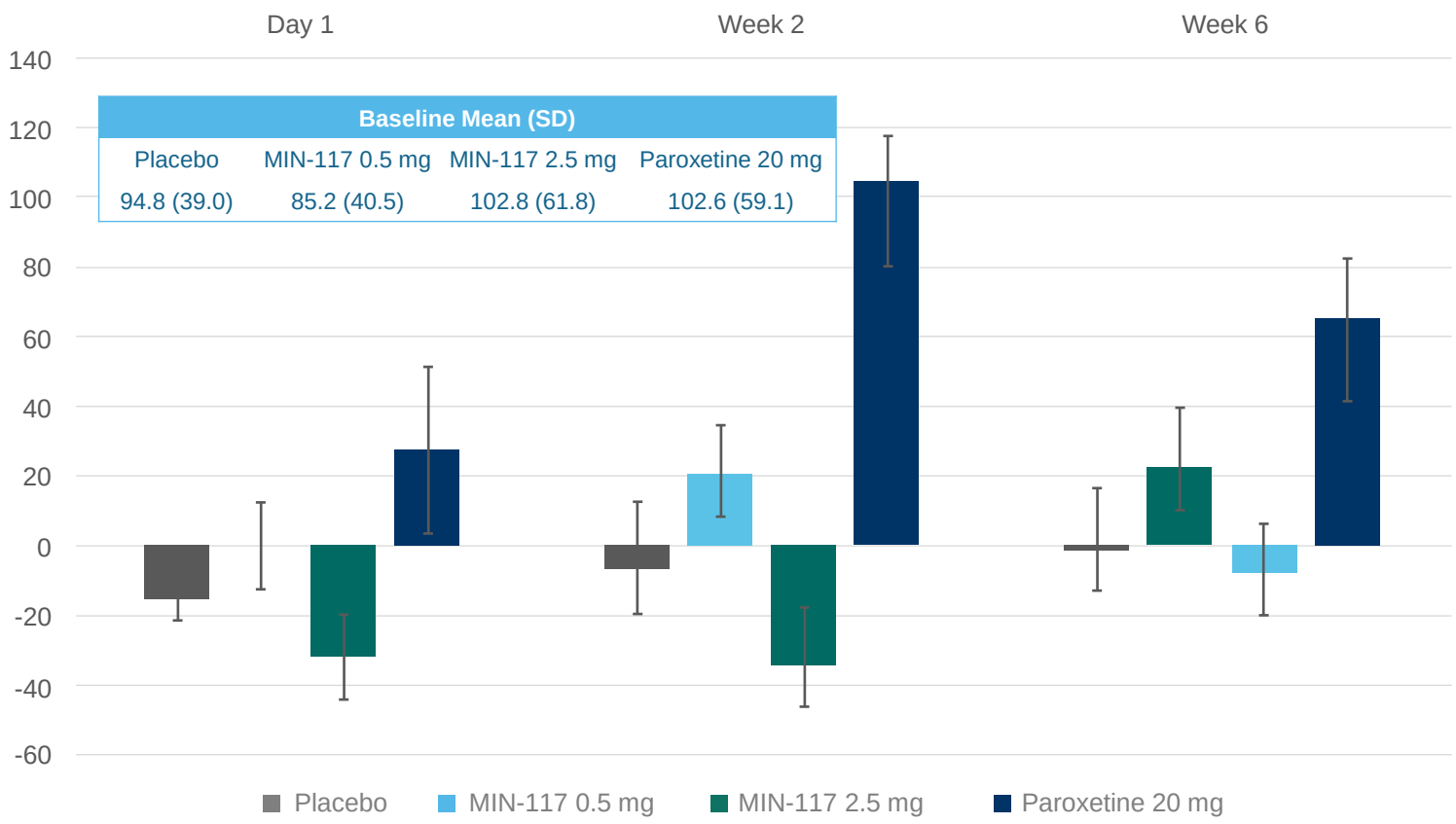
Assay sensitivity confirmed by positive separation of paroxetine from placebo

MADRS=Montgomery-Asberg Rating Depression Scale.

MINERVA NEUROSCIENCES

Sleep PSG shows intact REM latency resulting in preservation of sleep architecture and continuity of sleep, an important product differentiator

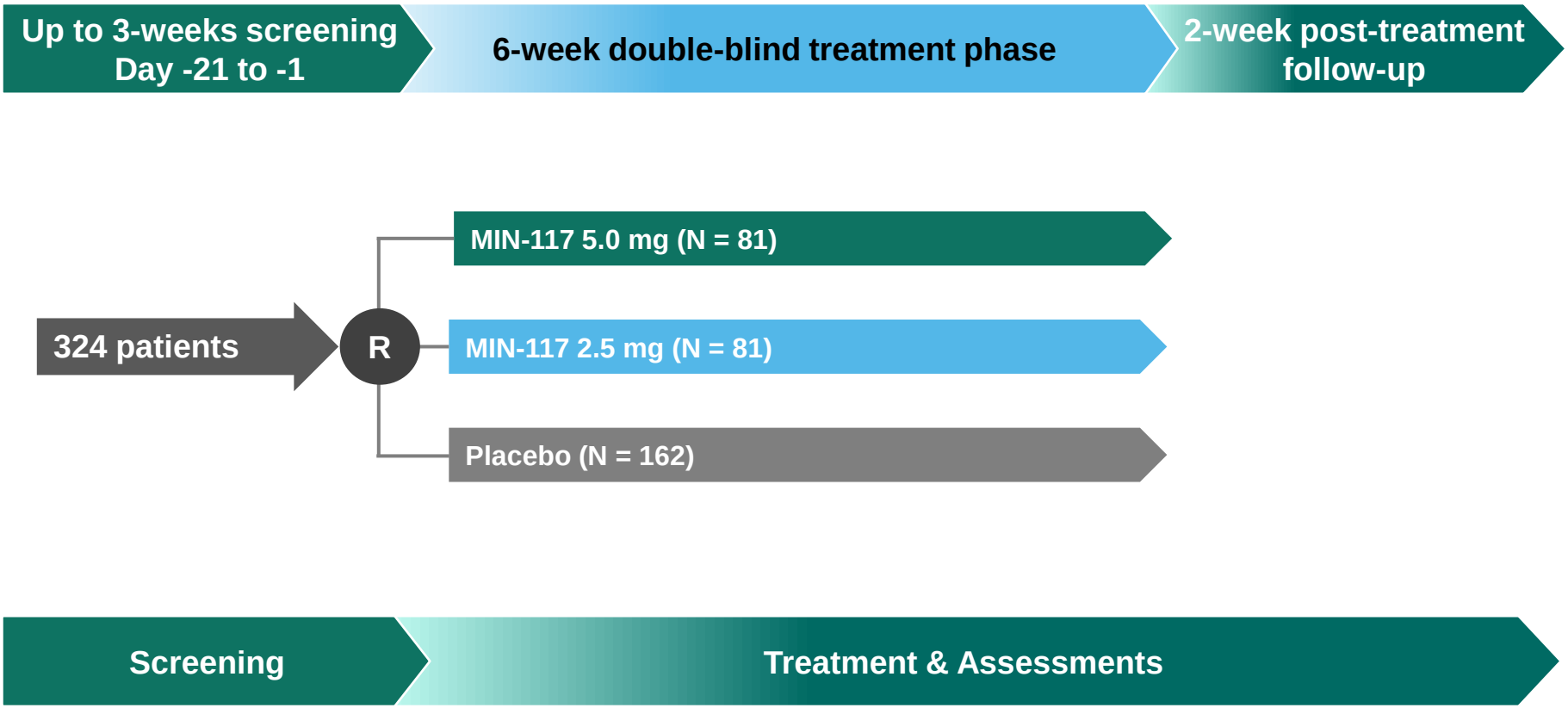
PSG REM Latency Change from Baseline (Observed Data) by Treatment Arm (ITT Population)



PSG=polysomnography; REM=rapid eye movement.

MINERVA NEUROSCIENCES

Ongoing Phase 2b study designed to evaluate MIN-117 in patients with moderate to severe MDD



MINERVA NEUROSCIENCES

MIN-117 Phase 2b study objectives

Primary:

- To evaluate the efficacy of 5.0 mg or 2.5 mg of MIN-117 compared with placebo in reducing the symptoms of MDD as measured by the change from baseline in MADRS score over 6 weeks of treatment

Secondary:

- To evaluate the efficacy of 5.0 mg or 2.5 mg of MIN-117 compared with placebo in reducing symptoms of anxiety measured by
  - Hamilton Anxiety Scale (HAM-A)
  - Severity of illness and improvement using the Clinical Global Impression of Severity Scale (CGI-S) and the Clinical Global Impression of Improvement Scale (CGI-I)

Safety:

- To evaluate the safety of MIN-117 over 6 weeks of treatment

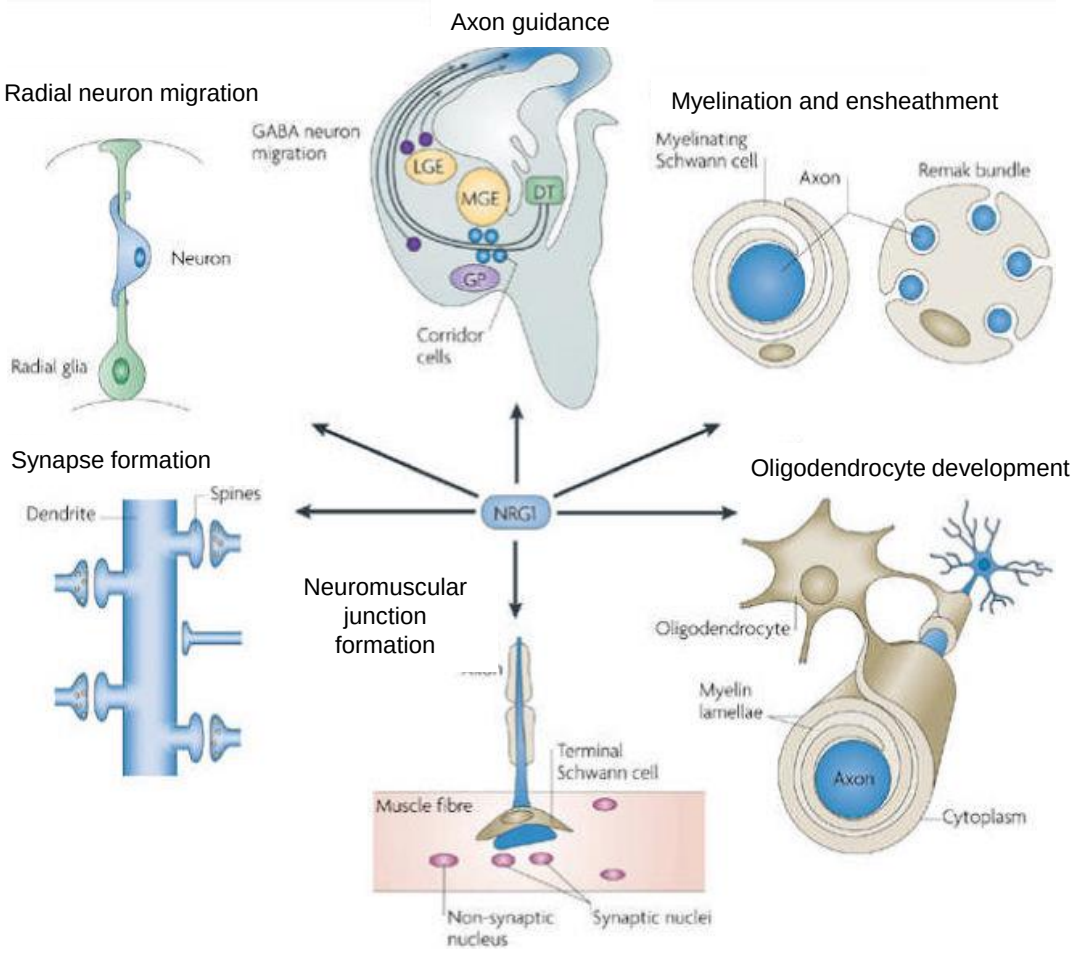
MINERVA NEUROSCIENCES

MIN-301

A protein drug with disease-modifying potential for the treatment of unmet medical needs in Parkinson's disease and other major CNS indications

MINERVA NEUROSCIENCES

Neuregulin-1 (NGR-1) has multiple roles in neuronal development offering potential for neuronal repair in several CNS indications; initial clinical focus will be Parkinson's disease



NRG-1 controls key neuronal development pathways

Image: Mei and Xiong, 2008.

MINERVA NEUROSCIENCES

Strong financial position to deliver on major milestones

≈$121.1 million cash balance

(cash, cash equivalents, and marketable securities)
at March 31, 2018

≈38.7 million shares outstanding

(≈45.5 M fully diluted)
at May 1, 2018

MINERVA NEUROSCIENCES

MINERVA NEUROSCIENCES

Minerva today

Differentiated assets

- Targeting clearly recognized unmet needs
- Innovative mechanisms of action

Advanced clinical development

- Lead product in pivotal Phase 3 trial
- 4 Phase 2b studies ongoing

Commercially attractive CNS markets

- Negative symptoms in schizophrenia and beyond
- Major depressive and anxiety disorders
- Insomnia with and without comorbid psychiatric symptoms
- Parkinson's disease and other neurodegenerative disorders

Funded through multiple significant data read-outs in 2019

- $121.1 million cash balance at March 31, 2018