

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 8-K

CURRENT REPORT
PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Date of Report (Date of earliest event reported): July 23, 2020

VistaGen Therapeutics, Inc.

(Exact name of registrant as specified in its charter)

NEVADA
(State or other jurisdiction of incorporation)

000-54014
(Commission File Number)

20-5093315
(IRS Employer Identification Number)

343 Allerton Ave.
South San Francisco, California 94090
(Address of principal executive offices)

(650) 577-3600
(Registrant's telephone number, including area code)

Not Applicable
(Former name or former address, if changed since last report)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
 Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
 Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
 Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Trading Symbol(s)</u>	<u>Name of each exchange on which registered</u>
Common Stock, par value \$0.001 per share	VTGN	Nasdaq Capital Market

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (17 CFR 230.405) or Rule 12b-2 of the Securities Exchange Act of 1934 (17 CFR 240.12b-2)

Emerging Growth Company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act

Item 7.01 Regulation FD Disclosure.

On July 23, 2020, VistaGen Therapeutics, Inc. (the “Company”) announced the results of a positive meeting with the U.S. Food and Drug Administration (“FDA”) regarding Phase 3 development of PH94B for the acute treatment of anxiety in adult patients with social anxiety disorder (“SAD”), including consensus on key aspects of a unique initial pivotal Phase 3 clinical trial of PH94B involving a single-event, laboratory-simulated public speaking challenge in adult patients with SAD. A copy of the Company’s press release is attached hereto as Exhibit 99.1.

On July 23, 2020, the Company began utilizing a new corporate presentation, a copy of which is attached to this Current Report on Form 8-K as Exhibit 99.2.

The information in Item 7.01 of this Current Report on Form 8-K, including the information set forth in Exhibit 99.1 and 99.2, is being furnished and shall not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), nor shall Exhibit 99.1 and 99.2 filed herewith be deemed incorporated by reference in any filing under the Securities Act of 1933, as amended, or the Exchange Act, except as shall be expressly set forth by specific reference in such a filing.

Item 9.01 Financial Statements and Exhibits.

(d) Exhibits Index

Exhibit No.	Description
99.1	Press Release issued by VistaGen Therapeutics, Inc., dated July 23, 2020.
99.2	VistaGen Therapeutics, Inc. Corporate Presentation, dated Summer 2020.

Signatures

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

VistaGen Therapeutics, Inc.

Date: July 24, 2020

By: /s/ Shawn K. Singh
Shawn K. Singh
Chief Executive Officer



VistaGen Therapeutics Announces Positive Meeting with FDA Regarding Pivotal Phase 3 Study of PH94B for Acute Treatment of Anxiety in Patients with Social Anxiety Disorder

Company Reaches Consensus with FDA on Key Aspects of Novel Pivotal Phase 3 Study

Agency Guidance May Provide Significant Time- and Cost-Efficiency for Phase 3 Program

Approximately 17 Million American Adults Suffer from Social Anxiety Disorder

SOUTH SAN FRANCISCO, Calif., July 23, 2020 – VistaGen Therapeutics (NASDAQ: VTGN), a biopharmaceutical company developing new generation medicines for anxiety, depression and other central nervous system (CNS) disorders, announced the results of a positive meeting with the U.S. Food and Drug Administration (FDA) regarding Phase 3 development of PH94B for the acute treatment of anxiety in adult patients with social anxiety disorder (SAD).

VistaGen and the FDA reached consensus on key aspects of a unique initial pivotal Phase 3 clinical trial of PH94B involving a single-event, laboratory-simulated public speaking challenge in adult patients with SAD.

PH94B is an investigational rapid-onset neurosteroid nasal spray that is fundamentally differentiated from all FDA-approved treatments for anxiety disorders. According to the U.S. National Institute of Mental Health (NIMH), there are approximately 17 million adults in the U.S. with SAD.

“Much like a rescue inhaler is used in an asthma attack or a migraine drug is used in an acute migraine episode, PH94B is a potential fit for the acute treatment of anxiety symptoms in anticipation of an often predictable, anxiety-provoking situation for individuals suffering from SAD,” said [Shawn Singh, Chief Executive Officer of VistaGen](#).

“Notably, the FDA concurred that our initial pivotal Phase 3 efficacy study may be conducted in a manner substantially similar to the highly statistically significant Phase 2 study of PH94B, which study involved a single event, laboratory-simulated public speaking challenge in adult patients with SAD. The FDA’s specific guidance will enable us to simplify the process of assessing efficacy among SAD patients in our Phase 3 studies and contribute to significant time- and cost-efficiency in the clinic,” Singh added.

Key Aspects of Consensus with FDA Regarding the Initial Pivotal Phase 3 Study of PH94B

VistaGen’s initial pivotal Phase 3 study of PH94B for acute treatment of anxiety in adult patients with SAD will be a randomized, double-blind, placebo-controlled, parallel comparison study conducted at approximately 12 to 15 sites in North America.

Dr. Michael Liebowitz, Professor of Clinical Psychiatry at Columbia University, director of the Medical Research Network in New York City, and creator of the Liebowitz Social Anxiety Scale (LSAS), will be the Principal Investigator of the study. Target enrollment will be approximately 182 adult patients with SAD.

As in the successful Phase 2 study of PH94B in SAD, the study will involve a single laboratory-simulated anxiety-provoking public speaking challenge. The Subjective Units of Distress Scale (SUDS) will be used to assess the primary efficacy endpoint in the study.

About PH94B

PH94B is a first-in-class, odorless, rapid-onset (within approximately 15 minutes) synthetic neurosteroid nasal spray with therapeutic potential across a broad range of anxiety-related disorders. Easily self-administered in microgram-level doses, PH94B does not require systemic uptake and distribution to produce its rapid-onset anti-anxiety effects.

VistaGen is preparing for Phase 3 clinical development of PH94B as a potential new generation fast-acting, non-sedating, non-addictive acute treatment of anxiety in adults with social anxiety disorder (SAD). The FDA has granted Fast Track designation for development of PH94B for this indication, the first such designation by the FDA for a drug candidate for SAD.

With its rapid-onset pharmacology, lack of systemic exposure and excellent safety profile in earlier studies, PH94B has potential as a novel treatment for multiple anxiety-related disorders. VistaGen is also preparing for Phase 2A development of PH94B for adjustment disorder related to the diverse impact of the COVID-19 pandemic. [View more background information on SAD and a video on PH94B’s mechanism of action](#).

About VistaGen

VistaGen Therapeutics is a clinical-stage biopharmaceutical company developing new generation medicines for anxiety, depression and certain CNS diseases and disorders where current treatments are inadequate, resulting in high unmet need. Each of VistaGen's three drug candidates has a differentiated mechanism of action, an exceptional safety profile, and therapeutic potential in several large global CNS markets. For more information, please visit www.vistagen.com and connect with VistaGen on [Twitter](#), [LinkedIn](#) and [Facebook](#).

Forward-Looking Statements

Various statements in this release are "forward-looking statements" concerning VistaGen's future expectations, plans and prospects, including the potential for successful New Drug Application (NDA)-enabling Phase 3 development of PH94B. These forward-looking statements are neither promises nor guarantees of future performance, and are subject to a variety of risks and uncertainties which could cause actual results to differ materially from those contemplated in these forward-looking statements, including the risks that: development and approval of PH94B may not be achieved in any market; the FDA may decide that the results of the Company's PH94B Phase 3 clinical program are not sufficient for regulatory approval for acute treatment of anxiety in adult patients with SAD or any other anxiety-related disorder; development of PH94B may not be successful in any indication; success in nonclinical studies or in earlier-stage clinical trials may not be repeated or observed in future studies which may not support further development or be sufficient to gain regulatory approval to market PH94B; adverse events may be encountered at any stage of development that negatively impact further development. Other risks and uncertainties include, but are not limited to, issues related to: adverse healthcare reforms and changes of laws and regulations; general industry and market conditions; manufacturing and marketing risks, which may include, but are not limited to, unavailability of or delays in delivery of raw materials for manufacture of PH94B; inadequate and/or untimely supply of PH94B to meet demand; entry of competitive products; and other technical and unexpected hurdles in the development, manufacture and commercialization of PH94B, as well as those risks more fully discussed in the section entitled "Risk Factors" in VistaGen's most recent Annual Report on Form 10-K for the year ended March 31, 2020, as well as discussions of potential risks, uncertainties, and other important factors in either company's other filings with the Securities and Exchange Commission. In addition, any forward-looking statements represent the Company's views only as of today, and should not be relied upon as representing its views as of any subsequent date. The Company explicitly disclaims any obligation to update any forward-looking statements.

Company Contact

Mark A. McPartland
VistaGen Therapeutics Inc.
Phone: +1 (650) 577-3600
Email: IR@vistagen.com



VistaGen[®]
Therapeutics

www.vistagen.com

 **Nasdaq: VTGN**

Summer 2020

LOOKING BEYOND CURRENT TREATMENTS FOR CNS DISEASES AND DISORDERS WITH HIGH UNMET NEED

Forward-looking Statements



This presentation contains “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995. These forward-looking statements concern our product candidates, development efforts, collaborations, intellectual property, financial condition, plans and development programs. These statements involve risks, uncertainties and assumptions, and are based on the current estimates and assumptions of the management of VistaGen Therapeutics, (Company) as of the date of this presentation and are subject to uncertainty and changes. Given these uncertainties, you should not place undue reliance on these forward-looking statements. Important factors that could cause actual results to differ materially from those indicated by such forward-looking statements include, among others, those set forth in our Annual Report on Form 10-K for the year ended March 31, 2020, filed with the Securities and Exchange Commission (SEC) on June 29, 2020, as well as any updates to those risk factors filed with the SEC from time to time in our current and periodic reports on Forms 8-K and 10-Q, respectively. All statements contained in this presentation are made only as of the date of this presentation, and the Company undertakes no duty to update this information unless required by law.

A Growing Mental Health Pandemic



"In a Pandemic-Stressed America, Protests Add to Mental Strain"



The Washington Post

"A third of Americans now show signs of clinical anxiety or depression, Census Bureau finds amid coronavirus pandemic"



"The coronavirus pandemic is causing a mental health crisis, the UN warns"



"Lots of Time on Social Media Linked to Anxiety, Depression in Teens"



"The Coronavirus Pandemic May Be Causing an Anxiety Pandemic"



A Growing “Benzo Epidemic” is Upon Us

PsychiatryAdvisor

“Anti-anxiety medication prescriptions up 34 percent since coronavirus”

TIME

“Benzodiazepines: Primary Care’s New Drug Problem”

“It’s not just opioids: What doctors want you to know about benzos”

CNN health



“Use of Opioids, Benzodiazepines at Same Time is Skyrocketing.”

FORTUNE

VistaGen is committed to developing and commercializing new generation medicine for large global anxiety, depression and neurology markets where current treatments are inadequate to meet the needs of millions of patients.

www.vistagen.com



LOOKING BEYOND CURRENT TREATMENTS FOR CNS DISEASES AND DISORDERS WITH HIGH UNMET NEED

Our CNS Pipeline



Product Candidate	Indication	Preclinical	Phase 1	Phase 2	Phase 3
PH94B Neuroactive Nasal Spray*	Social Anxiety Disorder ^{1,2}	Completed	Completed	Completed	Completed
	Generalized Anxiety Disorder ⁵	Completed	Completed	Completed	Completed
	Adjustment Disorder with Anxiety ⁴	Completed	Completed	Completed	Completed
	Postpartum Anxiety ⁵	Completed	Completed	Completed	Completed
	Perioperative Anxiety ⁵	Completed	Completed	Completed	Completed
	Panic Disorder ⁵	Completed	Completed	Completed	Completed
	PTSD ⁵	Completed	Completed	Completed	Completed
PH10 Neuroactive Nasal Spray*	Major Depressive Disorder ³	Completed	Completed	Completed	Completed
	Postpartum Depression ⁵	Completed	Completed	Completed	Completed
	Treatment-resistant Depression ⁵	Completed	Completed	Completed	Completed
	Suicidal Ideation ⁵	Completed	Completed	Completed	Completed
AV-101 (oral)*	Major Depressive Disorder ^{1,6}	Completed	Completed	Completed	Completed
	Neuropathic Pain ^{1,6}	Completed	Completed	Completed	Completed
	LID associated with Parkinson's Therapy ⁶	Completed	Completed	Completed	Completed
	Epilepsy ⁶	Completed	Completed	Completed	Completed
	Suicidal Ideation ⁶	Completed	Completed	Completed	Completed

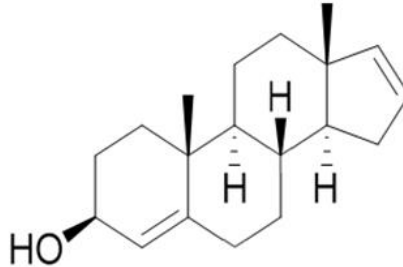
* The commencement of all potential studies noted above with dashed arrow bars is subject to U.S. FDA regulatory approval and the availability of sufficient funding.
 † FDA Fast Track designation granted

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Successful Phase 2 program completed; preparing for Phase 3 clinical development 2. EverInsight Therapeutics has exclusive rights to develop and commercialize in certain Asian markets 3. Successful Phase 2A program completed; preparing for Phase 2B program | <ol style="list-style-type: none"> 4. Preparing for U.S. Phase 2A program 5. Assessing for potential Phase 2A program 6. Planning for Phase 1B study with probenecid |
|---|---|

PH94B neuroactive nasal spray

(3 β)-androsta-4,16-dien-3-ol

- Social Anxiety Disorder
- Adjustment Disorder
- Postpartum Anxiety
- PTSD
- Generalized Anxiety Disorder
- Preoperative/Pre-testing Anxiety
- Panic Disorder

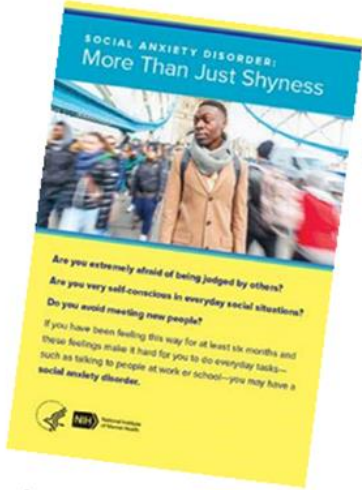


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Therapeutics



LOOKING BEYOND CURRENT TREATMENTS FOR CNS DISEASES AND DISORDERS WITH HIGH UNMET NEED

Social Anxiety Disorder (SAD) in the U.S.



National Institutes of Health

More than Just Shyness

One of the most prevalent mental health conditions in the U.S.

Affects as many as

20 million¹

Americans



Anxiety and fear in everyday social and performance situations

meeting new people



making a work presentation 

giving a speech



interviewing for a job

eating/drinking in front of others



¹Harvard Medical School, 2007. National Comorbidity Survey (NCS). (Update - 2017, August 21); Kessler, et al, US National Comorbidity Survey Replication, 2005 <https://www.nimh.nih.gov/health/publications/social-anxiety-disorder-more-than-just-shyness/index.shtml>

Current SAD Drug Treatments Fall Short



Not FDA-Approved
*** Prescribed Off-label ***

Antidepressants

- ✗ Slow onset, chronic administration
- ✗ May worsen anxiety initially
- ✗ Significant potential side effects
 - ❖ Nausea and vomiting, weight gain, sleepiness, sexual problems
- ✗ Potential drug-drug interaction

Benzodiazepines & Beta Blockers

- ✗ Addiction risk
- ✗ Significant potential side effects
 - ❖ Nausea and vomiting, blurred vision, dizziness, sedation, confusion and cognitive impairment

There is no FDA-approved, fast-acting, as needed treatment for SAD

PH94B for Social Anxiety Disorder

- Odorless, synthetic neurosteroid nasal spray
- Successful Phase 2 completed
- Recent FDA consensus on unique Phase 3 program
- Rapid-onset (ca. 10-15 minutes), exceptional safety
- Non-systemic, non-sedating and non-addictive
- FDA Fast Track designation; first ever granted for SAD

Potential to be the first FDA-approved rapid-onset acute treatment of anxiety for adults with SAD



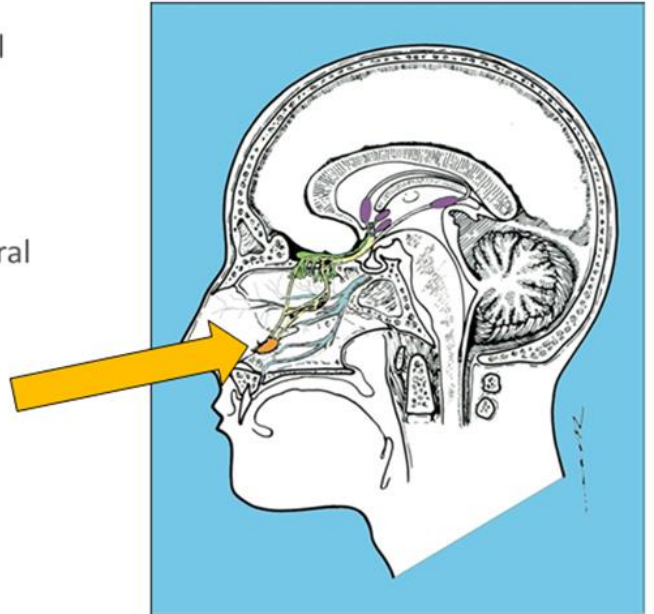
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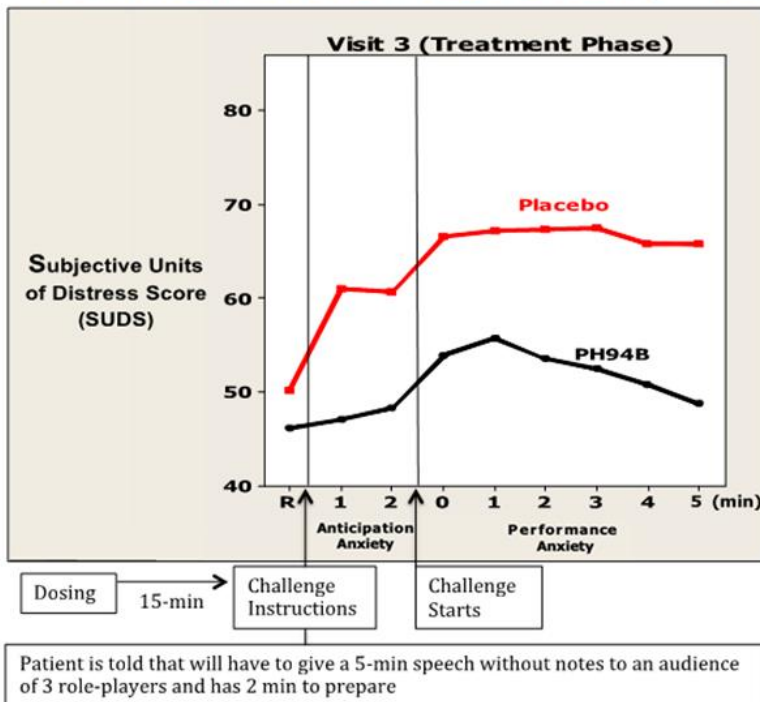
LOOKING BEYOND CURRENT TREATMENTS FOR CNS DISEASES AND DISORDERS WITH HIGH UNMET NEED

PH94B Mechanism of Action

- Microgram level dose (3.2 mcg) engages specific nasal chemosensory neurons (NCNs)
- NCNs activate olfactory bulb neurons (OBNs) on the base of the brain
- OBNs send neural connections to neurons in the central limbic amygdala, the brain center where fear and anxiety are regulated
- Neurons in the limbic amygdala modulate inhibitory/excitatory neurotransmitters, resulting in rapid anti-anxiety effects
- **Systemic uptake and distribution not required to produce rapid-onset anti-anxiety effects**



Published PH94B Phase 2 Study – Public Speaking (n = 91)



PH94B Rapidly Reduced Anxiety in Response to Public Speaking Challenge

Active Group:

Mean Difference = 26.7

Standard Deviation = 21.6

Number of Subjects = 45

Placebo Group:

Mean Difference = 14.0

Standard Deviation = 16.3

Number of subjects = 46

t = 3.16

p = 0.002

**Cohen's d
(Effect Size)
.72**

PH94B Phase 3 Study: Acute Treatment of Anxiety in Adult Patients with Social Anxiety Disorder

Principal Investigator: Dr. Michael Liebowitz, Columbia University, New York

- Recent FDA agreement on study design will substantially reduce cost (50%+), time and variability
- Same as highly statistically significant ($p=0.002$) Phase 2 public speaking study
 - Single event, laboratory-simulated, anxiety-provoking public speaking challenge
 - Single dose, 3.2 μg
 - Primary efficacy endpoint assessed with Subjective Units of Distress Scale (SUDS)
- 12-15 sites in North America
- Target enrollment (completed subjects), 182
- Estimated cost, \$5.75 million

PH94B Commercial Opportunity – U.S. SAD Market

SUBSTANTIAL UNMET NEED

There are few novel medications in development. PH94B promotion, SAD disease education and DTC efforts will drive physician urgency to diagnose and treat.

UNIQUE MOA

Most clinicians are cautiously optimistic that PH94B is not habit-forming due to its novel, differentiated MOA and non-systemic administration.



STRONG INTENT TO PRESCRIBE

Motivated by safety/tolerability, efficacy and as needed use, most clinicians intend to offer PH94B to a majority of their patients with SAD. Most patients are interested in trying PH94B and would be motivated to discuss with an HCP after seeing an advertisement.

EASE OF USE

Patients and clinicians will likely prefer PH94B's faster onset and exceptional safety profile vs. antidepressants and benzodiazepines.

*Includes Pediatric indication, peak year sales; excludes all other anxiety-related disorders; market research and commercial assessment prepared by i3 Strategy, Winter 2019

EverInsight/CBC Group Collaboration June 2020

Phase 3 Development and Commercialization of PH94B in Key Asian Markets



- Obligations:
 - EverInsight (funded by CBC Group) will be responsible for clinical development, regulatory submissions and commercialization of PH94B in the Territory
- Territory:
 - Greater China
 - South Korea
 - Southeast Asia
- Financial terms:
 - \$5 million upfront payment
 - Potential milestone payments up to \$172 million
 - Royalties

Adjustment Disorder Related to COVID-19

Adjustment Disorder

- An emotional or behavioral reaction considered excessive or out of proportion to a stressful event or major life change
- Occurs within three months of the stressor
- Significantly impairs a person's social, occupational and/or other important areas of functioning



Adjustment Disorder and COVID-19

- COVID-19 pandemic has created fear, anxiety and uncertainty about health, economy, unemployment, and new social norms
- Constant changes and inconsistencies of standards and guidelines and ever-evolving knowledge of effects of COVID-19 are resulting in increased anxiety and individuals are uncertain when there will be relief
- Current anti-anxiety medicines have significant limitations and problematic side effects and safety concerns

PH94B Phase 2 Program for Adjustment Disorder

Principal Investigator: **Dr. Michael Liebowitz, Columbia University, New York**

- Treatment of Adjustment Disorder related to the COVID-19 Pandemic

PART A

- Pilot, open-label Phase 2A single site study in NYC
- 3.2 µg of PH94B up to 4 times a day for 4 weeks
- Target enrollment, ca. n = 30
- Target start, Q4 2020/Q1 2021

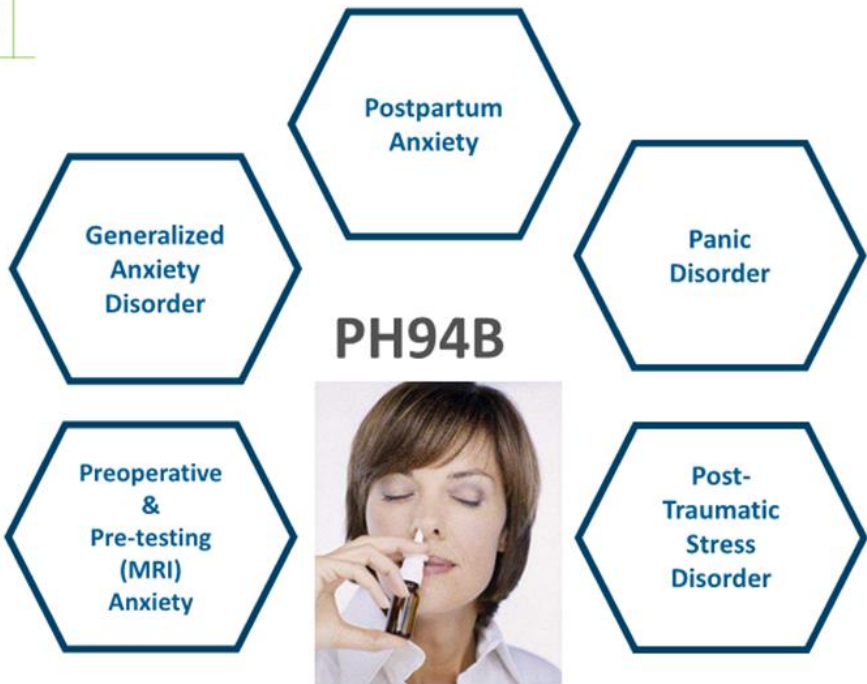
Primary Endpoint: Change in Hamilton Anxiety Scale (HAM-A) from baseline

PART B

- Randomized, double-blind, placebo-controlled study
- 3.2 µg of PH94B up to 4 times a day for 4 weeks
- Multi-center, ca. 15 sites
- Target enrollment, n = 150

Primary Endpoint: Change in Hamilton Anxiety Scale (HAM-A) from baseline compared to placebo

PH94B: Additional Indications Beyond SAD & Adjustment Disorder



**Potential Next Steps:
Phase 2A POC studies**

PH10 neuroactive nasal spray

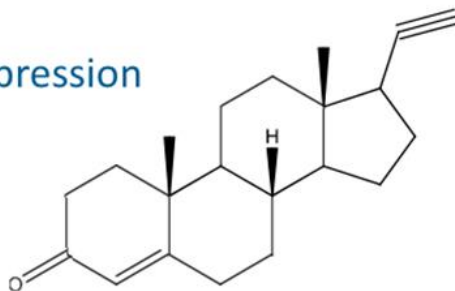
Pregn-4-en-20-yne-3-one



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Novel, safe, fast-acting therapy for:

- Major Depressive Disorder
- Postpartum Depression
- Treatment-Resistant Depression
- Suicidal Ideation



LOOKING BEYOND CURRENT TREATMENTS FOR CNS DISEASES AND DISORDERS WITH HIGH UNMET NEED

Major Depressive Disorder in the U.S.

1 in 4 women



diagnosed with depressive disorders

1 in 6 men



1 in 8



age 12 and over takes an antidepressant¹

LARGE ADDRESSABLE MARKET WITH HIGH UNMET NEED^{2,3}

11.6M

Drug-treated patients with
Major Depressive Disorder

7.3M

Inadequate response
to 1st antidepressant

5.1M

Treatment-resistant after
2nd antidepressant

1. CDC – NCHS – National Center for Health Statistics, August 2017; 2. Rush AJ, et al. Am J. Psychiatry. 2006, 163(11): 1905-1917 (STAR*D Study); 3. Decision Resources 2016.

FDA-Approved Oral MDD Treatments Fall Short

Oral Antidepressants

- **Often do not work; slow to work**
 - Initial ADT effective in 1 of 3 patients
 - May take 4 to 6 weeks or more for antidepressant effects
- **Significant potential side effects**
 - Anxiety, sexual dysfunction, insomnia, dizziness, nausea and vomiting, headache, sweating

Oral Atypical Antipsychotics

- **Often do not work**
 - Only ca. 20% of patients respond to augmentation
- **Significant potential side effects**
 - Weight gain, stomach pain, tiredness, dizziness, tardive dyskinesia, headache, nervousness, restlessness

PH10 for MDD

- Odorless synthetic neurosteroid nasal spray
- Successful Phase 2A completed
- Potential rapid-onset antidepressant effects
- Microgram-level dosing, non-systemic
- Well-tolerated, minimal side effects
- Preparing for Phase 2B

Potential stand-alone and adjunctive depression therapy with rapid-onset antidepressant effects, without side effects and safety concerns of ketamine-based therapy



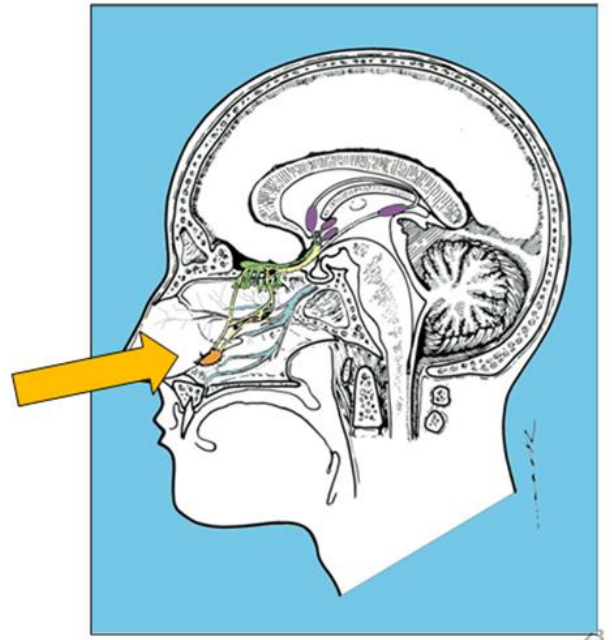
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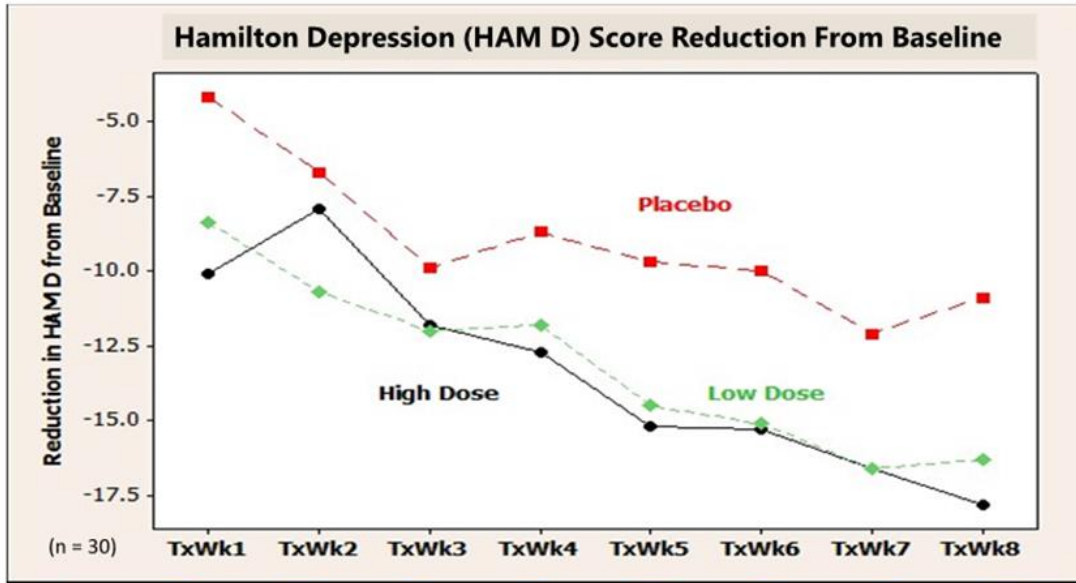
LOOKING BEYOND CURRENT TREATMENTS FOR CNS DISEASES AND DISORDERS WITH HIGH UNMET NEED

PH10 Mechanism of Action

- Microgram level dose (6.4 mcg) engages specific nasal chemosensory neurons (NCNs)
- NCNs activate olfactory bulb neurons (OBNs) on the base of the brain
- OBNs send neural connections to neurons in the central limbic amygdala, the brain center where mood is regulated
- Neurons in the limbic amygdala stimulate release of excitatory neurotransmitters (glutamate, norepinephrine) resulting in rapid-onset antidepressant effects
- **Systemic uptake and distribution not required to produce rapid-onset anti-anxiety effects**



PH10 Published Phase 2A MDD Monotherapy Study (n = 30)



Microgram doses of PH10 neuroactive nasal spray improved MDD symptoms with rapid-onset efficacy

PH10 Dose	HAM D Score	P (PH10 vs Placebo)	Cohen's D (Effect Size)
3.2 µg (Low Dose)	16.3	.101	0.74
6.4 µg (High Dose)	17.8	.022	0.95
Placebo	10.9		

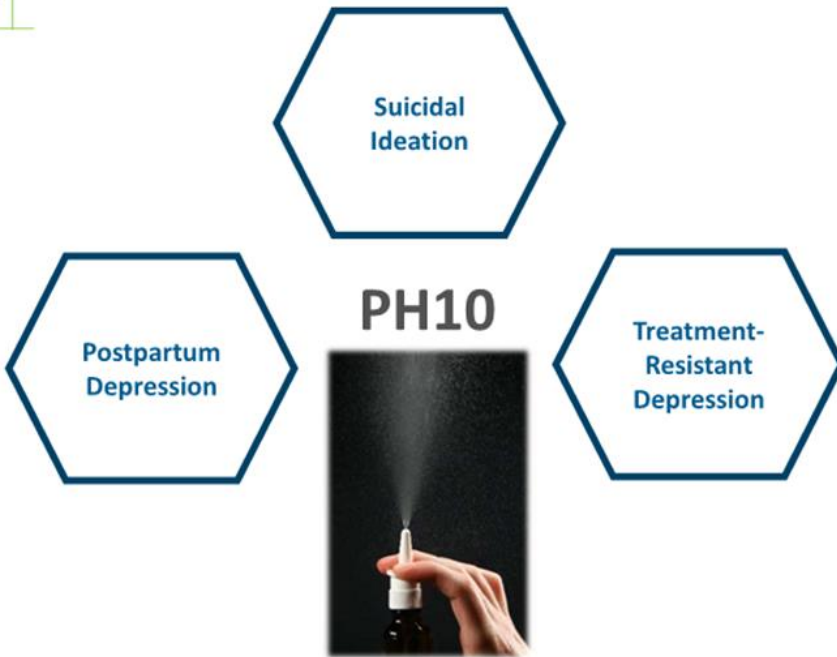
PH10 U.S. Phase 2B Development Plan for MDD

Principal Investigator: Dr. Michael Liebowitz, Columbia University, New York

- Randomized, double-blind, placebo-controlled, multi-center monotherapy study
- MDD patients with zero or 1 prior failure on a standard antidepressant
- Twice a day administration of PH10 (3.2 µg or 6.4 µg) or placebo for 4 weeks
- Rapid-onset potential within one week or less
- Target enrollment, n= ca. 150 patients

Primary Endpoint: Change in HAM-D-17 from baseline compared to placebo

PH10: Additional Indications Beyond MDD

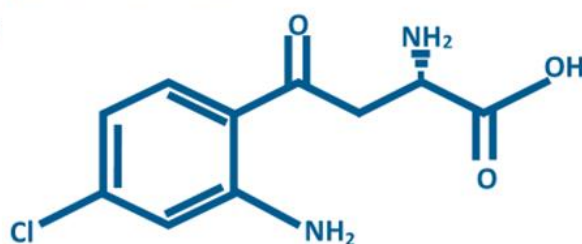


**Potential Next Steps:
Phase 2A studies**

AV-101

L-4-chlorokynurenine

- Major Depressive Disorder
- Suicidal Ideation
- Neuropathic Pain
- Levodopa-Induced Dyskinesia associated with Parkinson's Therapy
- Epilepsy



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LOOKING BEYOND CURRENT TREATMENTS FOR CNS DISEASES AND DISORDERS WITH HIGH UNMET NEED

AV-101

- Oral NMDA receptor glycine site antagonist
- Prodrug of 7-Cl-KYNA
- Well-tolerated in all clinical studies to date
- No dissociative side effects or treatment-related SAEs
- Non-addictive, non-sedating
- FDA Fast Track designations in MDD and pain
- Go forward plan in combination with probenecid



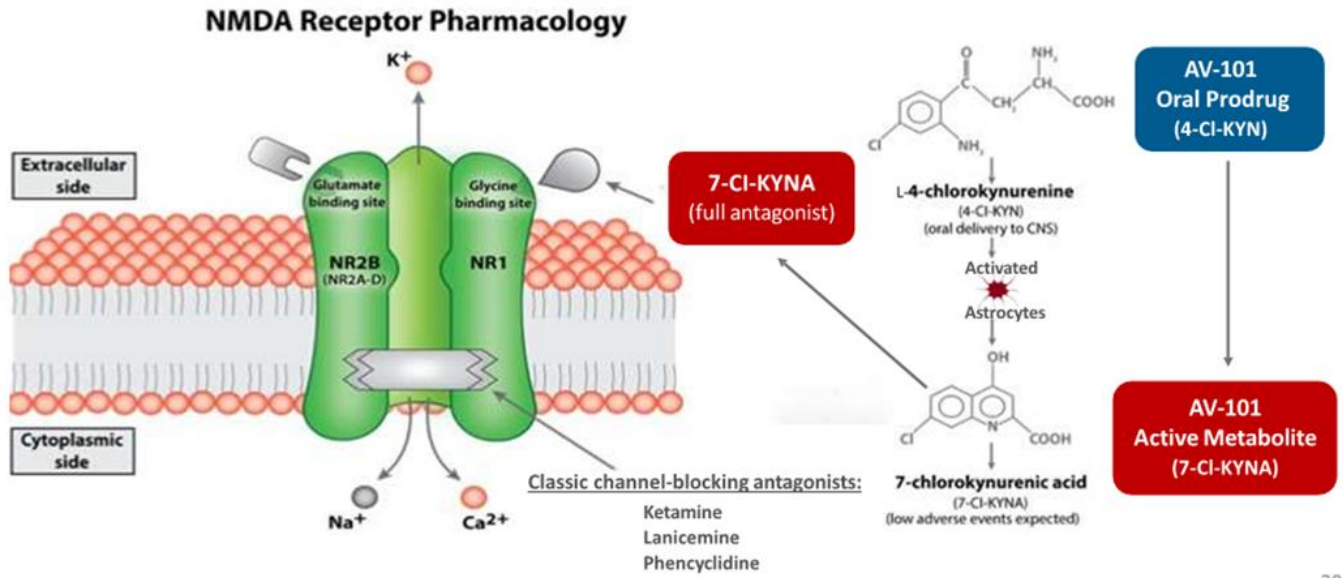
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 Nasdaq: VTGN

AV-101's Mechanism of Action

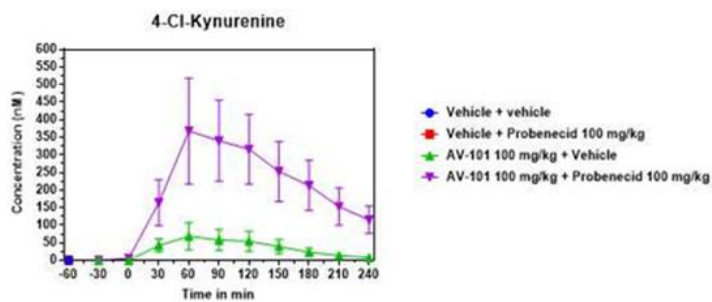
4-Cl-KYN (prodrug) → 7-Cl-KYNA (active metabolite)



AV-101 and Probenecid Synergy

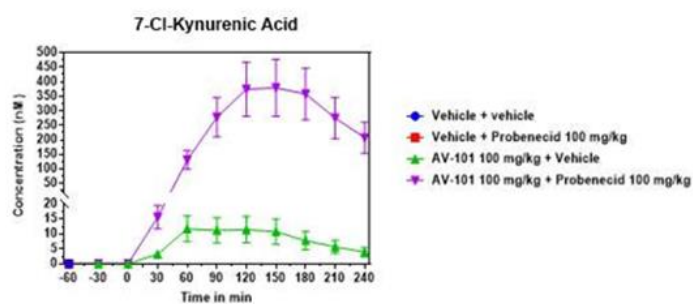
Recent preclinical studies demonstrate substantial increases in rodent brain concentrations of both AV-101 (4-Cl-KYN) and 7-Cl-KYNA

Probenecid increases AV-101 (4-Cl-KYN) brain levels by ~ 7-fold



• **Figure-1** → Levels of 4-Cl-KYN in PFC of adult male Sprague-Dawley rats following IP administration (T=0) of AV-101 and probenecid alone or in combination (100 mg/kg, each). Data are represented as mean ± SEM. N = 4-6/group. ¶

Probenecid increases 7-Cl-KYNA brain levels by > 35-fold



• **Figure-2** → Levels of 7-Cl-KYNA in PFC of adult male Sprague-Dawley rats following IP administration (T=0) of AV-101 and probenecid alone or in combination (100 mg/kg, each). Data are represented as mean ± SEM. N = 4-6/group. ¶

AV-101 with Probenecid for Multiple CNS Indications



**Potential Next Steps:
Phase 1B study with
adjunctive probenecid**

Distinguished Clinical and Regulatory Advisors



Maurizio Fava, M.D.

Professor of Psychiatry, Harvard Medical School; Director, Division of Clinical Research, Massachusetts General Hospital (MGH) Research Institute; Executive Director, MGH Clinical Trials Network and Institute



Sanjay Mathew, M.D.

Associate Professor of Psychiatry and Behavioral Sciences, Marjorie Bintliff Johnson and Raleigh White Johnson; Jr. Chair for Research in Psychiatry and Menninger Department of Psychiatry & Behavioral Sciences, Baylor College of Medicine



Michael Liebowitz, M.D.

Professor of Clinical Psychiatry, Columbia University; Managing Director and Founder, The Medical Research Network, LLC; Director (retired), Anxiety Disorders Clinic at the New York State Psychiatric Institute



Gerard Sanacora, Ph.D., M.D.

Professor of Psychiatry, Yale School of Medicine; Director, Yale Depression Research Program; Scientific Director, Yale-New Haven Hospital Interventional Psychiatry Service



Thomas Laughren, M.D.

Director (retired), U.S. Food and Drug Administration (FDA) Division of Psychiatry Products, Office of New Drugs, Center for Drug Evaluation and Research (CDER)



Mark Wallace, M.D.

Professor of Clinical Anesthesiology, Chair of the Division of Pain Medicine, Medical Director and Director at the University of California, San Diego

Experienced Team Leading Execution



Shawn K. Singh
Chief Executive Officer

- 25 years of experience with biopharmaceutical companies, a healthcare venture capital firm and a profitable CRO
- Artemis Neuroscience; SciClone Pharmaceuticals; Cato BioVentures; Cato Research; Morrison & Foerster

Ralph Snodgrass, Ph.D.
President, Chief Scientific Officer

- 23 years of experience in senior biotechnology management
- Progenitor; Lineberger Comprehensive Cancer Center



Jerrold D. Dotson, CPA
Chief Financial Officer, Secretary

- 20 years of experience in senior management finance and administration
- Calypso Biomedical; Discovery Foods; California & Hawaiian Sugar; Clorox



Mark A. Smith, M.D., Ph.D.

Chief Medical Officer

- 20 years of large Pharma CNS drug development experience
- Teva Pharmaceuticals; Shire Pharmaceuticals; AstraZeneca Pharmaceuticals; DuPont Pharmaceutical Company; U.S. National Institute of Mental Health



Mark A. McPartland
Vice President, Corporate Development

- 20 years of experience in corporate development, capital markets and management consulting
- Stellar Biotechnologies; MZ Group; Hayden Communications; Alliance Advisors

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- Rapid-onset potential
- Exceptional safety profiles
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