# Pepinemab – Anti-SEMA4D Antibody for Neurodegenerative Disease and Cancer Immunotherapy



Novel Mechanisms New Medicines

#### **Corporate Presentation**

January 2023

VCNX

#### **Forward Looking Statements**

To the extent that statements contained in this presentation are not descriptions of historical facts regarding Vaccinex, Inc. ("Vaccinex," "we," "us," or "our"), they are forward-looking statements reflecting management's current beliefs and expectations. Such statements include, but are not limited to, statements about the Company's plans, expectations and objectives with respect to the results and timing of clinical trials of pepinemab in various indications, the use and potential benefits of pepinemab in Head and Neck cancer, Huntington's and Alzheimer's disease and other indications, and other statements identified by words such as "may," "will," "appears," "expect," "planned," "anticipate," "estimate," "intend," "hypothesis," "potential," "advance," and similar expressions or their negatives (as well as other words and expressions referencing future events, conditions, or circumstances). Forward-looking statements involve substantial risks and uncertainties that could cause the outcome of the Company's research and pre-clinical development programs, clinical development programs, future results. performance, or achievements to differ significantly from those expressed or implied by the forward-looking statements. Such risks and uncertainties include, among others, uncertainties inherent in the execution, cost and completion of preclinical and clinical trials, uncertainties related to regulatory approval, the risks related to the Company's dependence on its lead product candidate pepinemab, the ability to leverage its ActivMAb<sup>®</sup> platform, the impact of the COVID-19 pandemic, and other matters that could affect the Company's development plans or the commercial potential of its product candidates. Except as required by law, the Company assumes no obligation to update these forward-looking statements. For a further discussion of these and other factors that could cause future results to differ materially from any forward-looking statement, see the section titled "Risk Factors" in the Company's periodic reports filed with the Securities and Exchange Commission ("SEC") and the other risks and uncertainties described in the Company's most recent year end Annual Report on Form 10-K and subsequent filings with the SEC.





# Lead Product: Pepinemab

Novel Mechanistic	First-in-class immunotherapy targeting Semaphorin4D
Approach	Regulates inflammatory processes that exacerbate disease pathology
Broad application	Neuro-immunology: Huntington's Disease, Alzheimer's Disease, etc Immuno-Oncology
Favorable safety and	Well-tolerated in >400 patients
tolerability	Non-invasive route of administration: Intravenous infusion
<ul> <li>Clinical Proof of</li></ul>	<ul> <li>Neurology</li> <li>Target engagement in brain</li> <li>Documented improvements in cognitive function and</li></ul>
Concept	brain metabolic activity in Huntington's Disease
	<ul> <li>Oncology</li> <li>Enhances activity but does <u>not</u> enhance toxicities of immune checkpoint inhibitors</li> <li>Demonstrated clinical benefit in refractory/resistant cancers</li> </ul>
In-house expertise and partnerships to realize value	Reck, KGaA Darmstadt

3



# Pepinemab Antibody for treatment of Neurodegenerative Disease

A novel mechanism of action with broad application in emerging neuro-immunology field

> Demonstrated favorable clinical safety and proof of concept

### SEMA4D IS OBSERVED TO BE UPREGULATED IN NEURONS DURING DISEASE PROGRESSION



Semaphorin 4D is upregulated in neurons of diseased brains and triggers astrocyte reactivity Elizabeth E Evans, Vikas Mishra, Crystal Mallow, Elaine Gersz, Leslie Balch, Alan Howell, Ernest S. Smith, Terrence L. Fisher, Maurice Zauderer\* Journal of Neuroinflammation, 2022,.



# SEMA4D regulates neuron-astrocyte communication



precursors

inflammatory

factors

# **PEPINEMAB FOR NEURO-IMMUNOLOGY** 2 key publications in 2022

### **Clinical Experience in HD**

ARTICLES

Check for undates

https://doi.org/10.1038/s41591-022-01919-8

#### OPEN

medicine

#### Pepinemab antibody blockade of SEMA4D in early Huntington's disease: a randomized, placebo-controlled, phase 2 trial

Andrew Feigin<sup>1</sup>, Elizabeth E. Evans<sup>©<sup>2</sup></sup>, Terrence L. Fisher<sup>©<sup>2</sup></sup>, John E. Leonard<sup>©<sup>2</sup></sup>, Ernest S. Smith<sup>2</sup>, Alisha Reader<sup>2</sup>, Vikas Mishra<sup>©<sup>2</sup></sup>, Richard Manber<sup>3</sup>, Kimberly A. Walters<sup>©<sup>4</sup></sup>, Lisa Kowarski<sup>©<sup>4</sup></sup>, David Oakes<sup>5</sup>, Eric Siemers<sup>6</sup>, Karl D. Kieburtz<sup>5</sup>, Maurice Zauderer<sup>©<sup>2</sup> ⊠</sup> and the Huntington Study Group SIGNAL investigators<sup>\*</sup>

#### Mechanism of Action

Evans et al. Journal of Neuroinflammation (2022) 19:200 https://doi.org/10.1186/s12974-022-02509-8

Journal of Neuroinflammation

**Open Access** 

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#### RESEARCH

# Semaphorin 4D is upregulated in neurons of diseased brains and triggers astrocyte reactivity

Elizabeth E. Evans<sup>1</sup><sup>(0)</sup>, Vikas Mishra<sup>1</sup><sup>(0)</sup>, Crystal Mallow<sup>1</sup>, Elaine M. Gersz<sup>1</sup>, Leslie Balch<sup>1</sup>, Alan Howell<sup>1</sup>, Christine Reilly<sup>1</sup>, Ernest S. Smith<sup>1</sup>, Terrence L. Fisher<sup>1</sup><sup>(0)</sup> and Maurice Zauderer<sup>1,2\*</sup><sup>(0)</sup>



# HUNTINGTON'S DISEASE



**Genetic Disease** HD is caused by dominant mutation in a single gene.



**~40,000 individuals** with manifest disease in US

#### >150,000 more at risk of inheriting mutation



**Unmet need** No approved treatments to alter the course of Huntington's Disease.



Symptoms Cognitive impairment = most significant impact on daily life (FDA Voice of the Patient)



When I grow up, my mind and body will slowly deteriorate until I choke to death trying to swallow.



Photo credit: Huntington Society of Canada



Orphan Disease and Fast Track Designations

**Post-hoc Subgroup Analyses** 

# HUNTINGTON'S DISEASE Clinical Trial Design





NCT02481674

DCL 2 or 3

### HD-COGNITIVE ASSESSMENT BATTERY (HD-CAB)

Exploratory and Post-hoc analysis



- "Learning effect" is lost when HD symptoms become manifest
- Pepinemab treatment restores the ability to benefit from experience (i.e., to learn)



• Treatment effect is most evident in patients with early signs of cognitive deficits (MoCA<26)

Feigin, A et al. *Nature Medicine* (2022) https://doi.org/10.1038/s41591-022-01919-8







### FDG-PET CORRELATES WITH COGNITIVE FUNCTION

#### Pre-specified Exploratory Endpoint, Early Manifest cohort

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Change in FDG-PET at Month 18 **Difference (PEPI-PBO) at Month 18** Decline Increase **FDG-PET** measures **Extended Frontal Composite-Extended Frontal Composite Expanded Cortical Composite-Expanded Cortical Composite** brain metabolic activity. Posterior Cingulate-Posterior Cingulate Lingual gyrus-Lingual gyrus Decline in FDG-PET is Thalamus-Thalamus Middle frontal gyrus-Middle frontal gyrus reported to correlate Occipital lobe-**Occipital lobe** Precentral Gyrus-**Precentral Gyrus** with cognitive Paracentral lobule-Paracentral lobule impairment in Superior frontal gyrus-Superior frontal gyrus Post central gyrus-Post central gyrus neurodegenerative Precuneus Cortex-Precuneus Cortex Inferior parietal-Inferior parietaldiseases. Middle temporal gyrus-Middle temporal gyrus Inferior temporal gyrus Inferior temporal gyrus-Superior parietal-Superior parietal Superior temporal Gyrus Pepinemab Superior temporal Gyrus-Medial orbitofrontal Medial orbitofrontaltreatment appears to Supramarginal Gyrus Supramarginal Gyrus-Amygdala Amygdala-Anterior Cingulate reverse loss of Anterior Cingulate-Total white matter Total white matter-\*p ≤ 0.05 **Hippocampus** metabolic activity. Hippocampus-Caudate Caudate-PBO n=31 Globus pallidus Globus pallidus-Putamen PEPI n=28 Putamen-2 -0.10 -0.05 0.00 0.05 0.10 Difference in Mean Percent Change (SUVR) Change in SUVR from baseline (Mean, SEM)

SUVR = standardized uptake value ratio



### ALZHEIMER'S DISEASE Phase 1b/2 Trial Design



# **Pepinemab for Neuro-immunology**

#### Well-tolerated

#### >300 patients dosed

AEs and discontinuation rates comparable to Placebo

# Non-invasive route of administration

Intravenous, monthly dosing

Crosses blood brain barrier

Confirmed target saturation in CSF

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Demonstrated clinical proof of concept

Improves cognition (HD-CAB)

Improves brain metabolic activity (FDG-PET) Novel mechanism of action Broad application

Demonstrated safety and activity in Huntington's Disease (~188K)

Ongoing Phase1/2 in Alzheimer's (~134M) Potential application in Parkinson's, Primary Progressive MS, Rett Syndrome

Potential for combination therapy





## Pepinemab Antibody for Cancer Immunotherapy

# A novel mechanism of action that enhances activity but does <u>not</u> enhance toxicity of existing therapies when used in combination

### WHY DOES IMMUNE RESPONSE FAIL IN TUMORS?

#### SEMA4D regulates

Immune Exclusion
 Myeloid Suppression



Sema4D is expressed at tumor margin

Sema4D binds PLXN receptors on DCs and restricts penetration

T-cells are excluded from tumor



Pro-inflammatory cells are excluded from tumor and build up at the invasive edge

CD8 T cells align with Sema4D at the invasive edge of the tumor. Most of these excluded T-cells express Sema4D. Dendritic Cells express receptors for SEMA4D and are heavily excluded at the invasive edge.

Biopsy of Human metastatic colorectal tumor, in collaboration with Emory University (NCT03373188) <sup>15</sup>

## PEPINEMAB: UNIQUE MECHANISM



**↑** cytotoxic T cells



↓ inhibitory suppressor cells



**SEMA4D blockade reduces suppressive capacity of Myeloid Derived Suppressor Cells in the tumor.** Left: SEMA4D induces secretion of factors from myeloid suppressor cells that inhibit recruitment and activity of CD8 T cells. Right: **Pepinemab treatment reverses inhibitory suppressive cells and facilitates T cell infiltration and activity.** 



**Biopsy of Human metastatic colorectal tumor**, in collaboration with Emory University (NCT03373188)

### **PEPINEMAB: UNIQUE MECHANISM**



Pepinemab Nivolumab **Ipilimumab** pCR



Pepinemab Nivolumab pCR

Pepinemab

Ipilimumab pCR

Nivolumab near pCR

SOC

Non-Responder



CD20+ B cells in pepinemab Tx arms

CD20+ B cells and CD8+ T cells are *organized* in Pepi Tx arms

CD8 are not organized

Biopsies of Human melanoma tumors, in collaboration with Emory University (NCT03769155), oral presentation at SITC, Nov 2022





# Neoadjuvant immunotherapy trial Integrated biomarker analysis







Sponsored by: Collaboration with:

#### **Safety & Tolerability**



Pepinemab is well-tolerated and adds NO additional toxicity to PD-1 and CTLA-4 inhibitors in the **neoadjuvant setting** 

#### **Biomarker analysis**



### **Recurrence-free Survival**



# KEYNOTE-B84 HEAD AND NECK CANCER TRIAL

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JUL

- All patients receive standard of care Keytruda®, plus pepinemab for first- line treatment of recurrent or metastatic head and neck cancer
   Open-label, continuous monitoring
- KEYNOTE-048 for historical comparison
   same inclusion / exclusion criteria
- > 18 sites in USA now open
- > Ph1b Safety: COMPLETE
  - Well tolerated
  - RP2D: 20mg/kg pepi and 200mg pembro, Q3W
- > Ph2 Expansion: ENROLLING
  - 33 patients enrolled, as of Jan01





hase 1b: Safet	ty	<ul> <li>Phase 2: Expansion Phase</li> <li>PD-L1 high (CPS ≥20)</li> <li>PD-L1 low/negative (CPS &lt;20)</li> </ul>	
Total of 3 patients		• Total: up to 62 patients	
2021	JAN 2022	1H 2023	2H 2023
Safety Period		Interim Report	<b>Topline Data</b>
$\bigcirc$		<u> </u>	
		~midpoint of enrollment ~ Q1 2023	Objective Response
Phase 1b Sa 2	fety Reviev CR observe	w: Complete ed	

# **Pepinemab for Immuno-Oncology**

Well-tolerated

Does **not** enhance toxicity of companion drug Novel and Independent Mechanism of Action

↑ T cell penetration/ organization ↓immune suppression

Demonstrated clinical activity in PD-L1 low = Unmet Need

~2-3X ↑ in ORR compared to single agent ICI in PD-L1 low NSCLC

**2/3 CR** in Phase1b segment of ongoing HNSCC trial

Established PK/PD

Confirmed target saturation in adult and pediatric patients

Can accommodate schedule of companion drug

Strong rationale for combination therapy

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Demonstrated safety and enhanced activity in combination with immune checkpoint therapy in Lung Cancer & Head and Neck cancer

> Neoadjuvant treatment for Melanoma





#### Science in the Service of Medicine

#### **Corporate Overview**

Unique Targets
Novel Mechanisms
New Medicines

# ACHIEVEMENTS AND MILESTONES



Publish Clinical Data for SIGNAL study in Huntington's Disease in <i>Nature Medicine</i> Publish mechanism of action paper for neurodegenerative diseases in <i>Journal of</i> <i>Neuroimmunology</i>	August 2022
Request End of Phase 2 meeting with FDA to discuss clinical development strategies in Huntington's disease	1H 2023
Expect topline data from randomized, double-blind, placebo-controlled Alzheimer's disease phase 1b/2a study	1H 2024
Presentation of mechanism of action and biomarker results from melanoma combination immunotherapy trial, in collaboration with Emory University.	4Q 2022
Completed safety run-in segment of Phase 1b/2 study of Peninemah in Combination	10 2022
with Keytruda <sup>®</sup> in front line Head & Neck Cancer	10/2022
Expect interim data and JSC meeting with Merck	1H 2023

**Currently exploring pharma collaborations** 

# **PIPELINE and MILESTONES**





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Ernest Smith, PhD CSO esmith@vaccinex.com



#### Science in the Service of Medicine



Unique Targets Novel Mechanisms New Medicines

# Vaccinex Selected References, Oncology

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Schematics created with BioRender.com

Vaccinex Selected References, Neurology



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Schematics created with BioRender.com

#### Vaccinex Leadership Team

Maurice Zauderer, Ph.D.	Founder, President and Chief Executive Officer. Formerly, Professor at University of Rochester and at Columbia University.
Scott E. Royer, CFA, MBA	<b>Chief Financial Officer</b> . Formerly, Chief Financial Officer and Director of Finance of the Medical Films Group of Carestream Health, a medical and dental imaging company and an independent subsidiary of Onex Corporation, a Canadian publicly traded private equity investment firm. Mr. Royer earned an Executive MBA from Villanova University, and is a credentialed Chartered Financial Analyst (CFA)
Elizabeth E. Evans, Ph.D.	Chief Operating Officer and Senior Vice President, Discovery and Translational Medicine. Dr. Evans received an M.S. in Immunology and a Ph.D. in Pathology from the University of Rochester. Dr. Evans has held several leadership roles at Vaccinex since 2001 and holds several patents on SEMA4D/pepinemab.
Ernest S. Smith, Ph.D.	<b>Chief Scientific Officer and Senior Vice President, Research</b> . Dr. Smith received a Ph.D. in Immunology from the University of Rochester. Dr. Smith has held several leadership roles at Vaccinex since 2001 and holds several patents, including ActivMab <sup>®</sup> technology and Semaphorin 4D/pepinemab.
John E. Leonard, Ph.D.	Senior Vice President, Development. Formerly Vice President, Program Executive of Biogen Idec, Inc., a publicly traded biotechnology company. Dr. Leonard received a Ph.D. in Biochemistry from the University of California, Riverside



#### **Vaccinex Scientific Advisors - Neurology**

- **Eric Siemers, MD** President of Siemers Integration LLC. Distinguished medical fellow for Eli Lilly and Company's Alzheimer's Disease Global Development Team, founded and headed the Indiana University Movement Disorder Clinic. Served on the Board of Directors of the American Society of Experimental Neurotherapeutics, as founding member and Chair of the Alzheimer's Association Research Roundtable, and Steering Committee member for the Alzheimer's Disease Neuroimaging Initiative (ADNI).
- Karl D. Kieburtz,President of Clintrex LLC, providing services regarding research and regulatory strategy for therapeutic<br/>development of interventions for brain disorders. Chair of the FDA Peripheral and Central Nervous System Drugs<br/>Advisory Committee and sits on the American Academy of Neurology (AAN) Clinical Research Subcommittee, the<br/>International Executive Committee of the Movement Disorders Society (MDS), the Board of Directors for the<br/>American Society for Experimental Neuro Therapeutics(ASENT), and the Council of the American Neurological<br/>Association (ANA), chair of the FDA Peripheral and Central Nervous System Drugs Advisory Committee.
- Ira Shoulson, MD Dr. Shoulson is a long time leader in Huntington's disease research. From 2011 to July 2018, Dr Shoulson was Professor of Neurology, Pharmacology and Human Science and Director of the Program for Regulatory Science and Medicine (PRSM) at Georgetown University where he was principal investigator of the FDA-Georgetown University Collaborating Center of Excellence in Regulatory Science and Innovation. From 1990 to 2011, Dr Shoulson was the Louis C. Lasagna Professor of Experimental Therapeutics and Professor of Neurology, Pharmacology and Medicine at the University of Rochester School of Medicine & Dentistry in Rochester, New York. Dr. Shoulson is an elected member of the National Academy of Medicine of the National Academy of Sciences.
- **Ralf Reilmann, MD** Founding Director and C.E.O. of the George-Huntington-Institute, Dept. of Radiology at the University of Muenster and the Dept. of Neurodegeneration and Hertie Institute for Clinical Brain Research at the University of Tuebingen.



#### Vaccinex Scientific Advisors - HNSCC Clinical Advisory Board

Barbara Burtness,Professor of Medicine (Medical Oncology) at Yale, leader of the Disease Aligned Research Team for the Head<br/>and Neck Cancers Program and Co-Leader of the Developmental Therapeutics Research Program at Yale Cancer<br/>Center. Chair of ECOG-ACRIN Head and Neck Therapeutics Committee, served on the NCCN and SITC Head and<br/>Neck Guidelines Committee, and the NCI Head and Neck Cancer Steering Committee. Co-chair of the NCI<br/>Clinical Trials Planning Meeting on TP53-Mutated Head and Neck Cancer and FDA Project 2025 for Head and<br/>Neck. Founding Director of the Yale Head and Neck Cancer SPORE and has led numerous clinical trials,<br/>including the international phase III trial which led to regulatory approval of immunotherapy in first-line<br/>treatment of head and neck cancer.

- **Robert Haddad, MD** Chief, Division of Head and Neck Oncology. McGraw Chair, Head and Neck Oncology, Dana-Farber Cancer Institute. Professor, Medicine, Harvard Medical School.
- Douglas Adkins, MDProfessor, Department of Medicine, Oncology Division, Medical Oncology, Washington University School of<br/>Medicine in St. Louis. NCI Head and Neck Steering Committee and Metastatic and Recurrent Head & Neck<br/>Cancer Task Force
- Nabil Saba, MDDirector of the Head and Neck Cancer Medical Oncology Program at Winship Cancer Institute of Emory<br/>University, Professor and Vice Chair for Quality and Safety in the Department of Hematology and Medical<br/>Oncology and holds a joint appointment as Professor in the Department of Otolaryngology at Emory University<br/>School of Medicine. Chair of the National Cancer Institute's task force for recurrent metastatic head and neck<br/>cancer and Chair of the Rare Tumors Task Force of the National Cancer Institute's Head and Neck Cancer<br/>Steering Committee. Member of the NRG Oncology and Eastern Cooperative Oncology Group (ECOG) Head and<br/>Neck Cancer Core Committees, the ASCO clinical guidelines committee, and the ASCO Head and Neck Guideline<br/>Advisory Group.



#### **Vaccinex Board of Directors**

Albert D. FriedbergChairman, President and CEO of Friedberg Mercantile Group, a Toronto-based<br/>commodities and investment management firm he founded in 1971. He served as<br/>Chairman of the Toronto Futures Exchange from March 1985 to June 1988.

Chrystyna M. Bedrij Co-Founder and Principal, Griffin Securities

Jacob B. Frieberg Principal, The WTF Group.

Bala S. Manian, Ph.D.Founder (or co-founder) of Quantum Dot Corporation, SurroMed, Biometric Imaging,<br/>LumisysInc., Molecular Dynamics and ReaMetrix.

**Gerald E. Van Strydonck** Formerly, Managing Partner at PricewaterhouseCoopers.

**Barbara Yanni** Formerly, Vice President and Chief Licensing Officer at Merck & Co., Inc.

Maurice Zauderer, Ph.D.Vaccinex Founder, President and Chief Executive Officer. Formerly, Professor at<br/>University of Rochester and at Columbia University.

