



The MicroCap Conference
October 2 , 2018 | OTCQB:NMUS

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**Improving health through
cannabinoid-based therapies**

BRIAN MURPHY, MD, MPH, MBA
Chief Executive Officer

Partnership Highlights

- Built on the value of Nemus' intellectual capital and exclusive agreement with UM for novel cannabinoid technologies
- EHS BOD Committee provides access to key clinical and development expertise
- Ability to leverage EHS financial and life science network to advance development programs

A global operating company focused on the medicinal potential of cannabis and cannabinoids



A leading biopharmaceutical company focused on the development of cannabinoid-based therapeutics

University of Mississippi (UM): Leading Cannabis Research in the US for Over 50 Years



The only entity in the US authorized to cultivate cannabis on behalf of the federal government for 50 years



NEMUS has perpetual, worldwide exclusivity for all licensed compounds from UM



Global patent estate



NB1111

For the Treatment of
Glaucoma

Glaucoma: A Global Cause of Blindness



Normal Vision



Early Glaucoma



Advanced Glaucoma

- Glaucoma is a leading cause of blindness globally with more than 70 million patients affected worldwide.²
- Damage to the retinal ganglion cells (RGCs) is irreversible so therapy is designed to slow disease progression by lowering IOP and thereby preserving remaining vision.³
- Current therapies work by lowering IOP thus enhancing drainage of fluid from the eye via canals in the anterior chamber or by decreasing fluid production.¹
- African Americans are at highest risk of developing glaucoma in the US.⁴

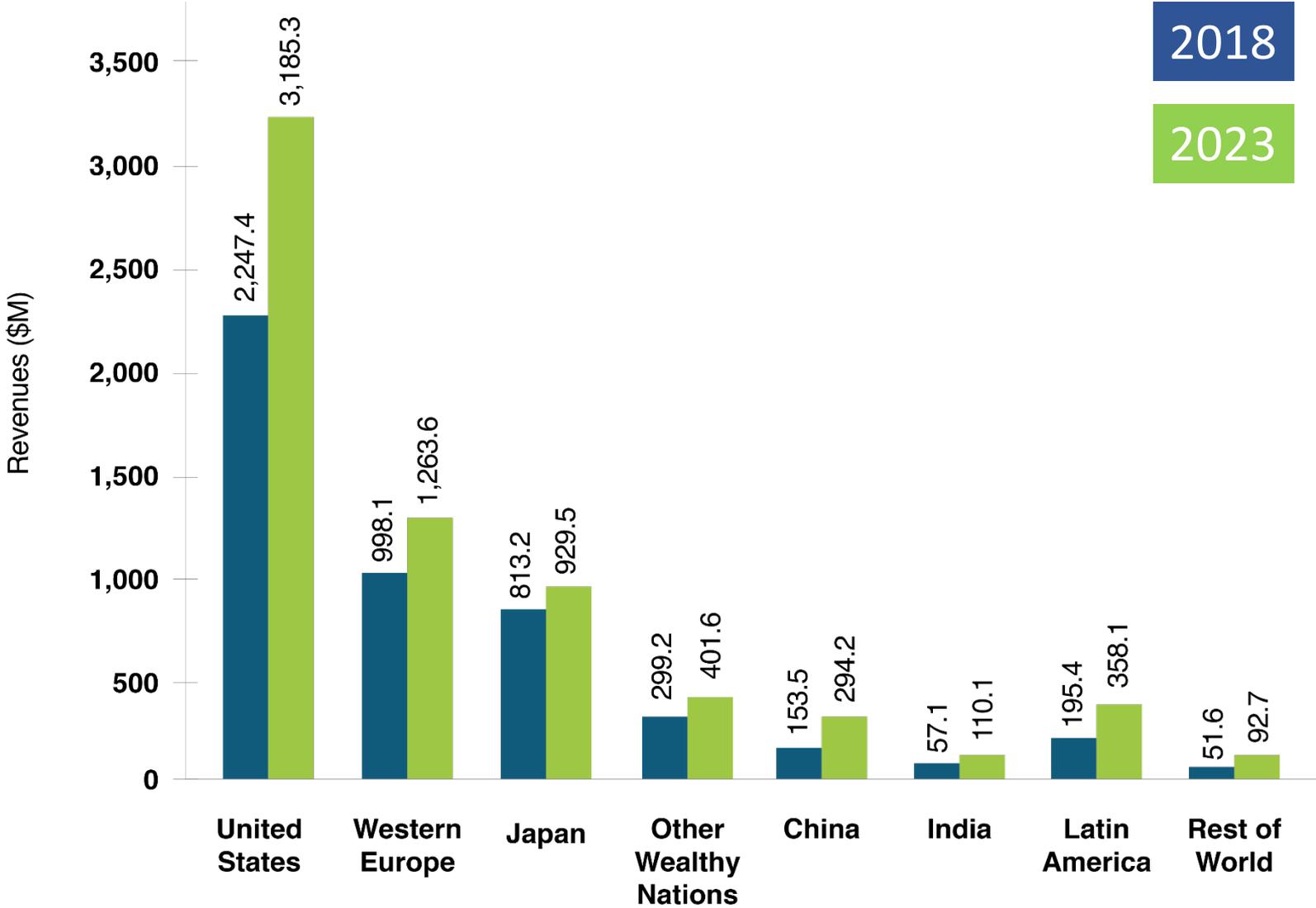
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2. Quigley HA, et al; Br J Ophthalmol, 2006; 90(3): 262-267

3. Nickells RW, et al; Ann Rev NeuroSci, 2012; 35:153-179

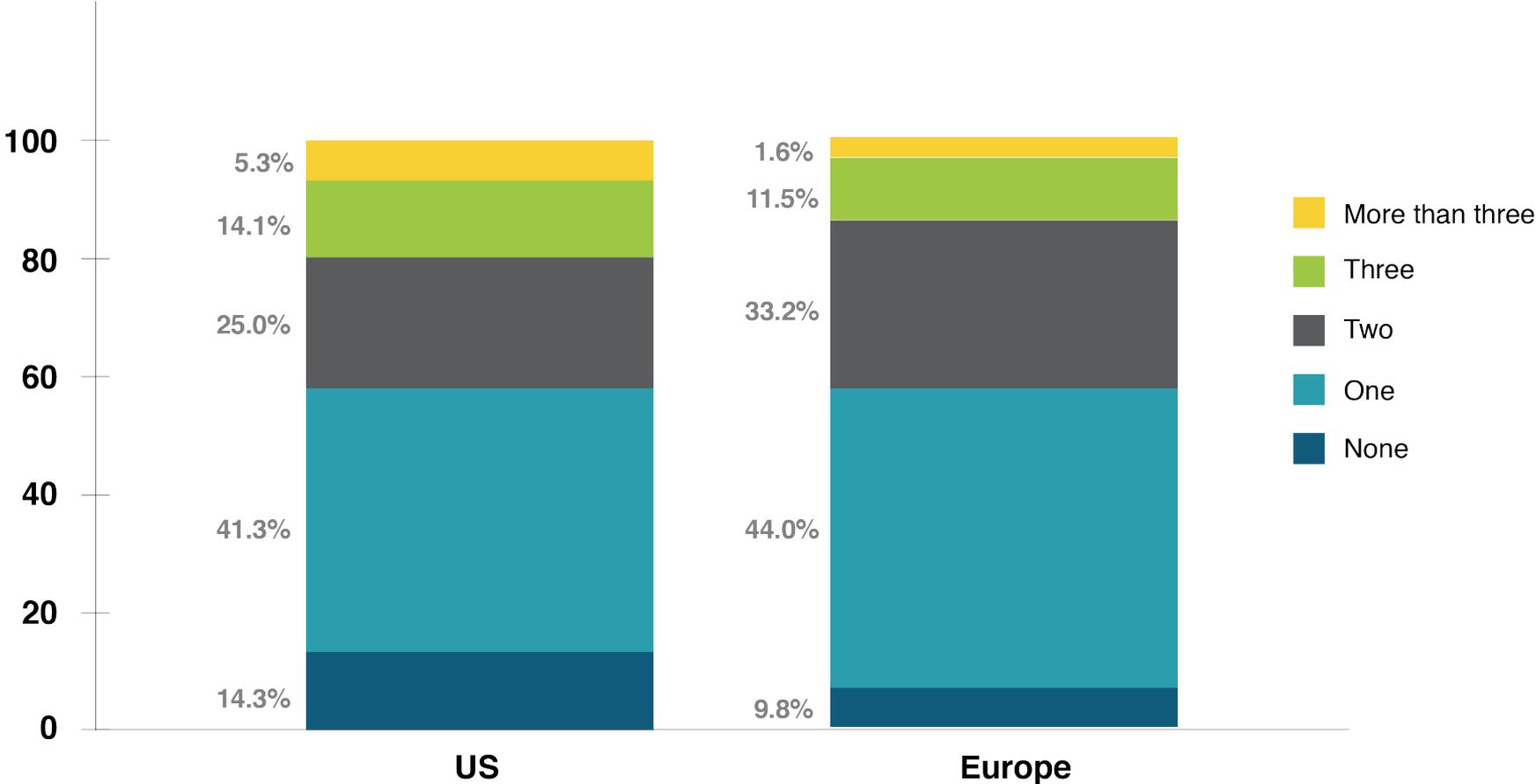
4. Kwon YH, et al; NEJM, 2009; 360(11): 1113-1124

Glaucoma Worldwide Revenue (2018-2023)



Source: Market Scope, 2018

Most Treated Glaucoma Patients Require Two or More Medications



Source: Market Scope 2017 Survey of US Glaucoma Specialists and Q3-2016 Survey of European Ophthalmologists

Known Cannabinoid Benefits in Glaucoma

Delta-9-tetrahydrocannabinol (Δ^9 -THC), was isolated in the early 1960's.^{1,2}

The first report that THC lowered IOP appeared in 1971.

Non-ocular routes of delivery showed IOP reductions up to 65% decline in patients with glaucoma.³⁻⁶

Neuroprotective effect on retinal ganglion cells in multi-specie animal studies

Challenges of Cannabis Use

Short duration of action (45-90 min)

Cardiovascular side effects with prolonged use: systemic hypotension could compromise blood flow to the optic nerve

Chronic smoke inhalation potentially damages the lungs

Nemus NB1111

Direct application to the eye lowers risk of systemic side effects

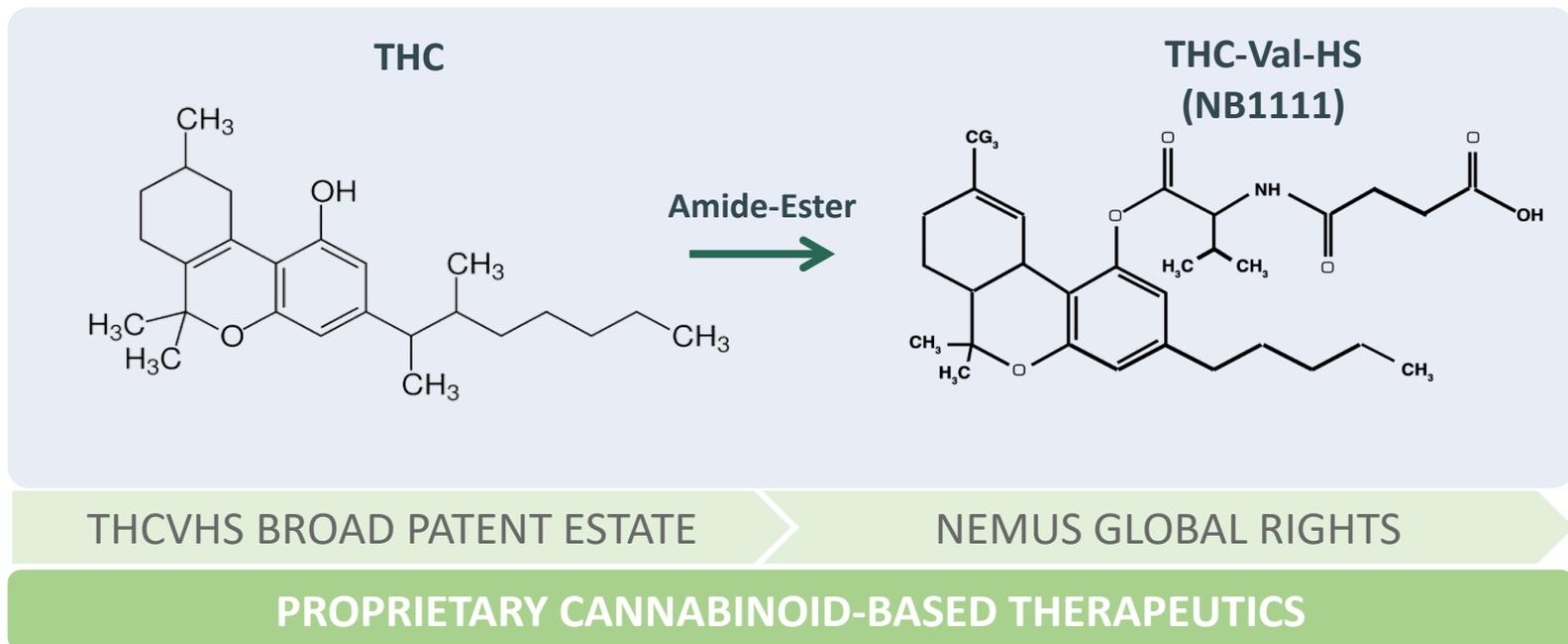
Molecular design enhances drug entry into eye

Prodrug technology delivers active moiety (THC) directly to cannabinoid receptors that regulate IOP

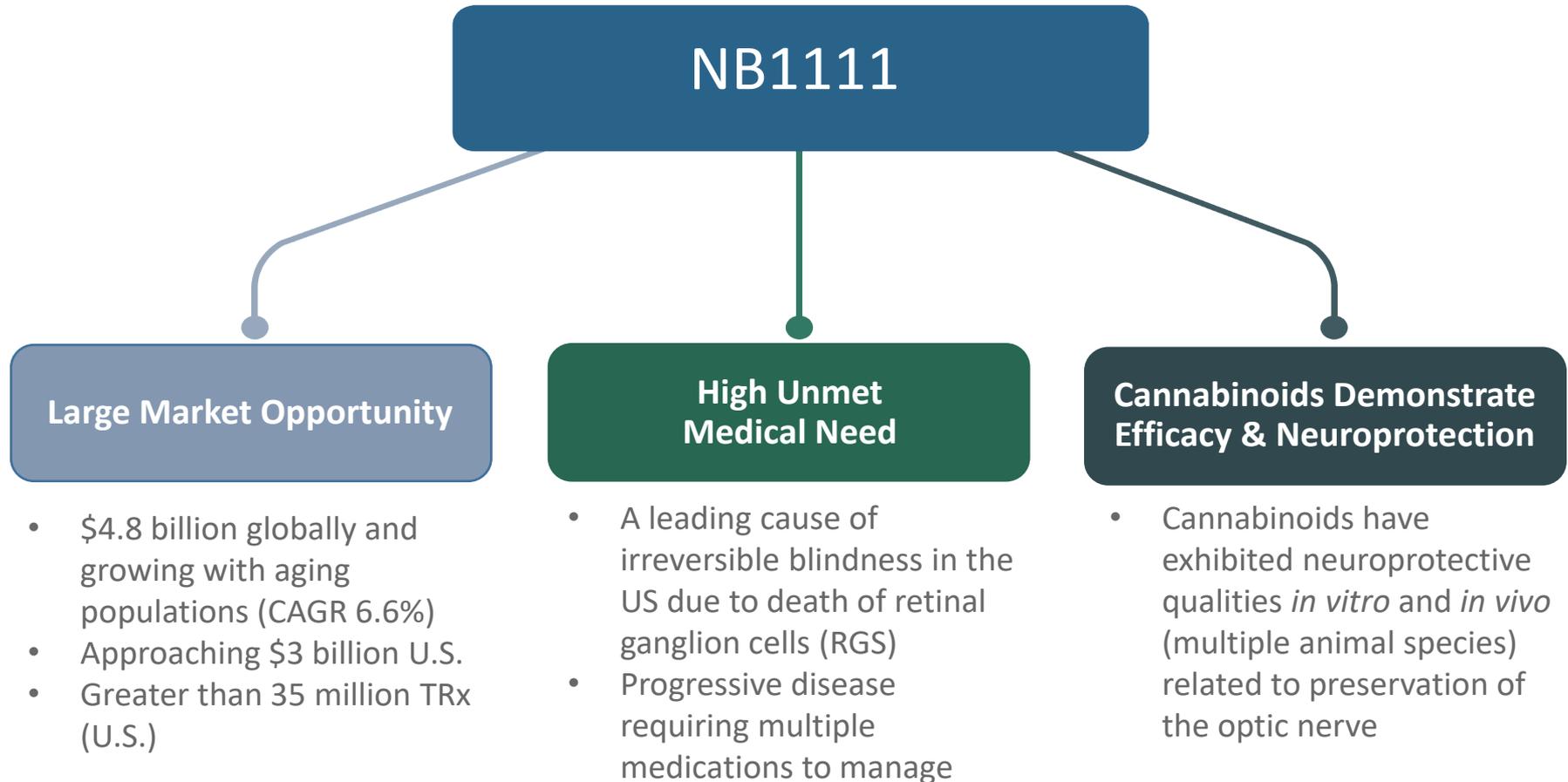
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2. Elsohly MA; Cannabis and Cannibinoids; New York: Haworth press, 2002; pgs 75-86
3. Hepler RS, Frank IR; JAMA, 1971; 217:1392
4. Cooler p et al; Southern Med J, 1977; 78:951
5. Green K et al; Proc Soc Exp Biol and Med, 1977; 154:228
6. Goldberg I et al; Australian J ophthalmol, 1979; 7(2):151-157

NEMUS is developing an optimized cannabinoid technology that **enhances bioavailability** and offers more **predictable pharmacokinetics**

Biochemically Engineered Technology



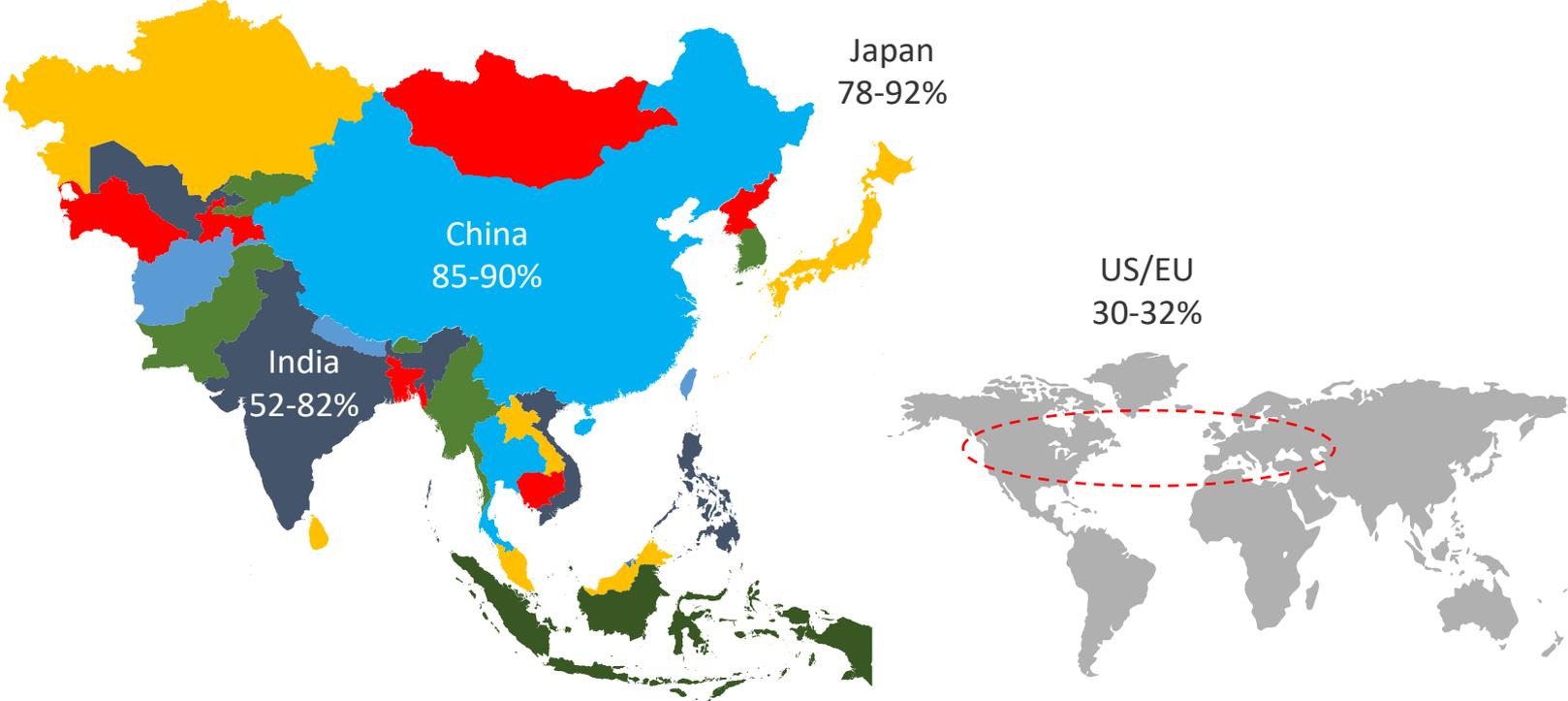
Glaucoma Represents a Significant Global Unmet Medical Need



Asian Glaucoma Markets: Cannabinoid-Based Neuroprotection Could Secure Major Market Share



Prevalence of Normal Tension Glaucoma (NTG) as a % of Primary Open Angle Glaucoma (POAG) in Key Asian Countries



Normal tension glaucoma is characterized by glaucomatous changes to optic nerve without elevated intraocular pressure (IOP)

Source: Published Glaucoma Prevalence Studies.



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Mechanism of Action

Cannabinoid receptors are located in the key ocular tissues that regulate IOP

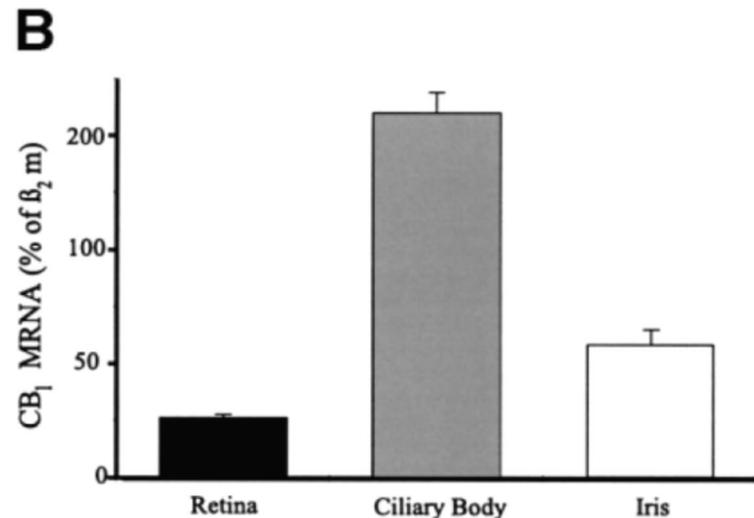
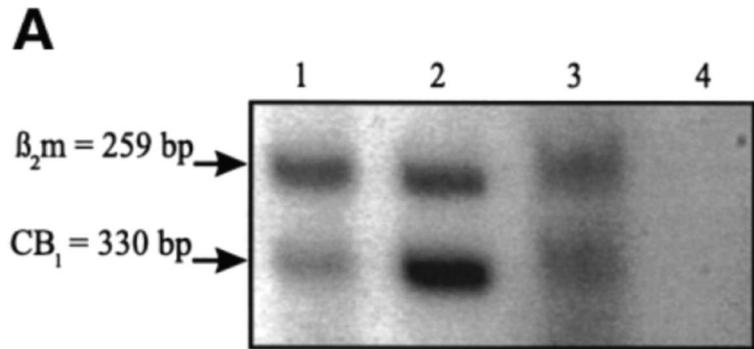
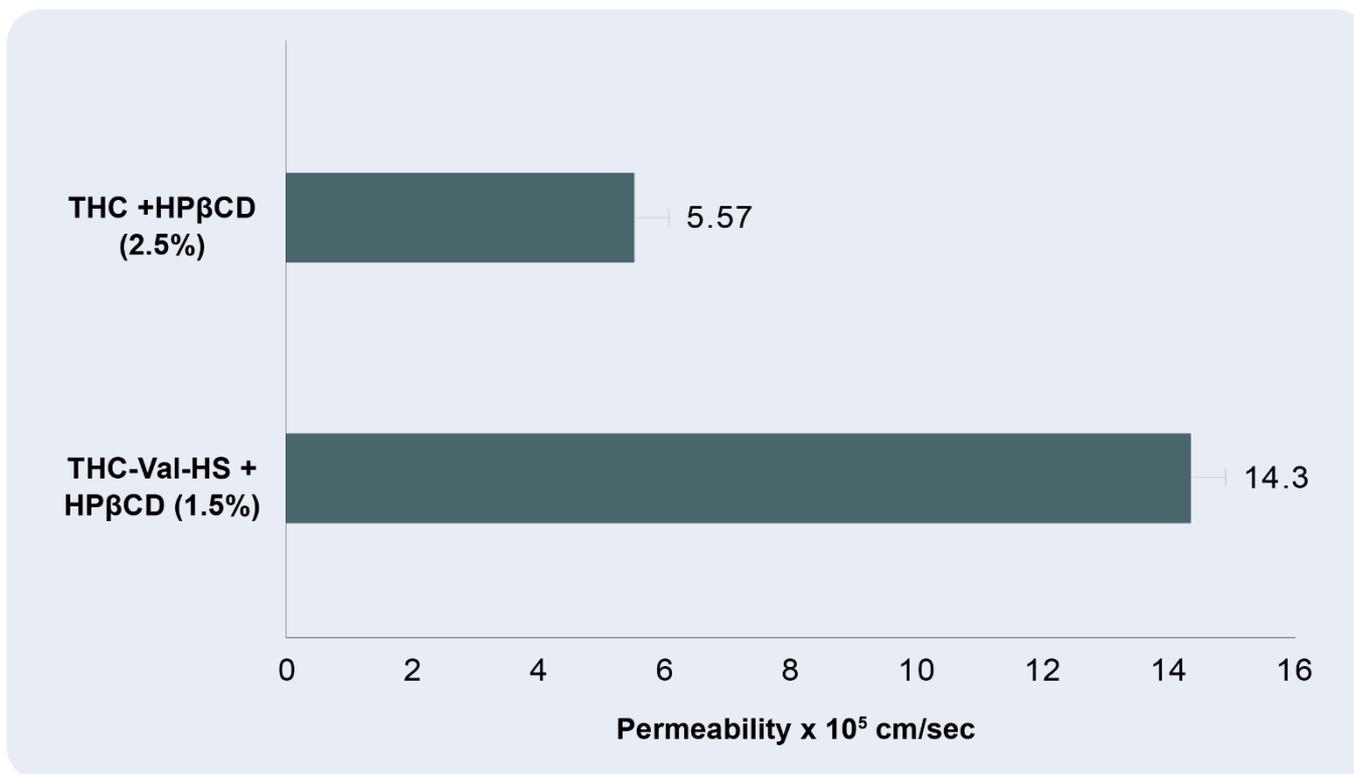


FIG. 1. (A) RT-PCR of CB₁ and β_2m from human eye: retina (lane 1); ciliary body (lane 2); iris (lane 3); negative control (lane 4); run on a non-denaturing 5% polyacrylamide gel. (B) Relative differences of CB₁ transcripts in the human eye. The level of mRNA in the retina ($25.8 \pm 2.46\%$), ciliary body ($210 \pm 11.55\%$) and iris ($62.7 \pm 5.94\%$) were compared by RT-PCR. CB₁ mRNA content was normalized with that of β_2m and expressed relative to the β_2m mRNA level ($n=5$; bars are SEM).

- Modulation of cannabinoid receptor tone already exists by virtue of the endocannabinoid system located in the eye and other organs
- CB₁ receptors display a higher density in the anterior compartment than the posterior (1)
- CB₁ receptors have been localized to ciliary epithelium, ciliary muscle, trabecular meshwork, canal of Schlemm, iris; organs that help regulate intra-ocular pressure (IOP) (2)
- CB₂ receptors are more prevalent in the posterior compartment of the eye (1)

1. Porcella A et al; Eur J Neuroscience, 2000; 12:1123-1127
2. Chien FY, et al. Arch Ophthal, 2003; 121:87-90
3. Wei Y, et al. Molecular Vision, 2009; 15: 1243-1251

NB1111 (TCHVHS) Achieves Improved Permeability into the Eye vs. THC in Ocular Surfactant* Model

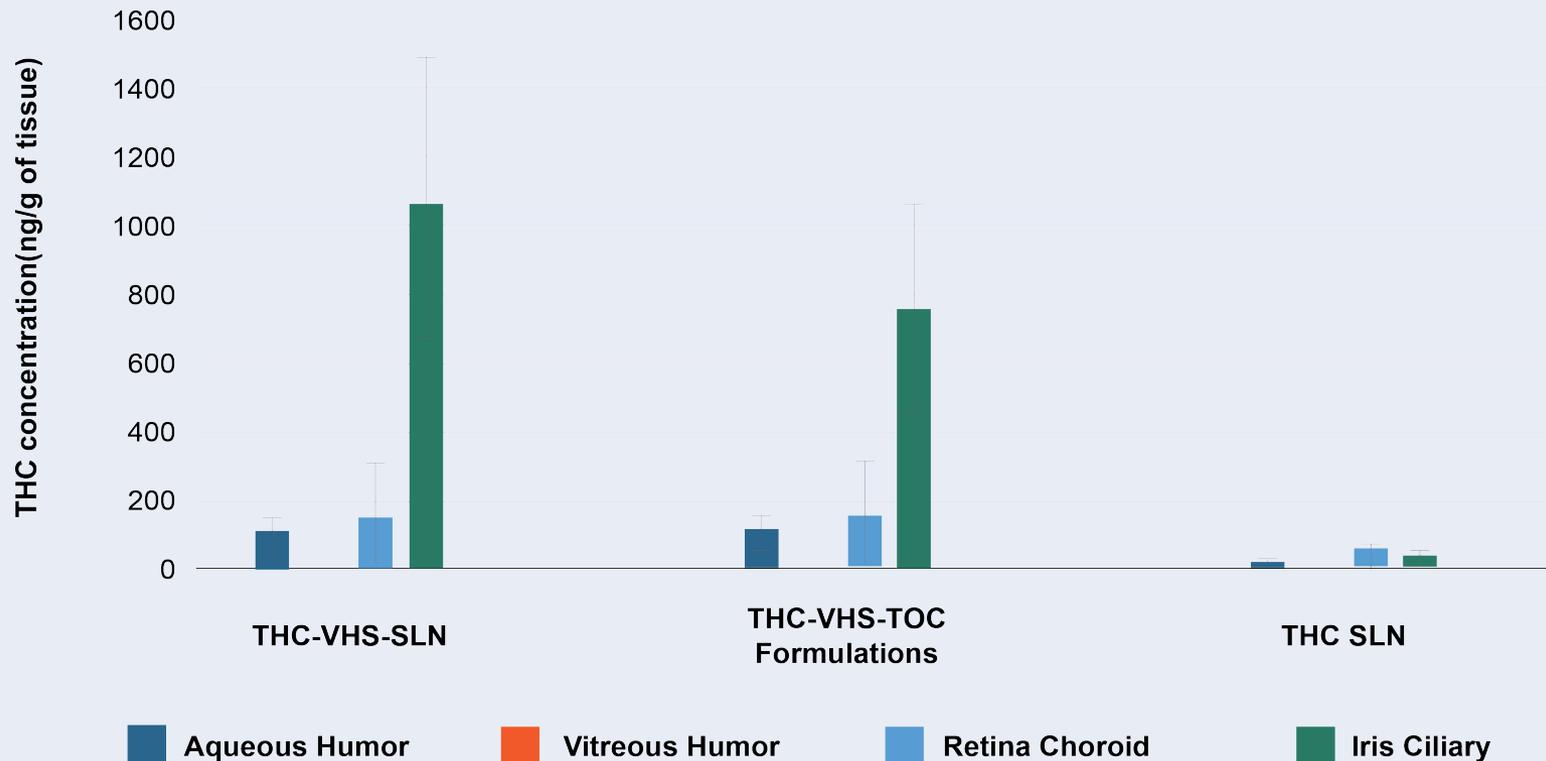


NB1111 exhibited greater permeability into the eye vs. THC

*HPβCD = 2-hydroxy propyl-beta-cyclodextrin

NB1111 (THCVHS) Achieves Tissue Penetration in Organs Regulating IOP in Glaucoma Model

In-vivo ocular disposition at 180 min



No THC or 11-OH-THC was detected in the plasma of study animals even after 5 days of dosing (ng sensitivity level of detection)

NB1111 (THCVHS) vs pilocarpine and timolol achieves 45% reduction in IOP*

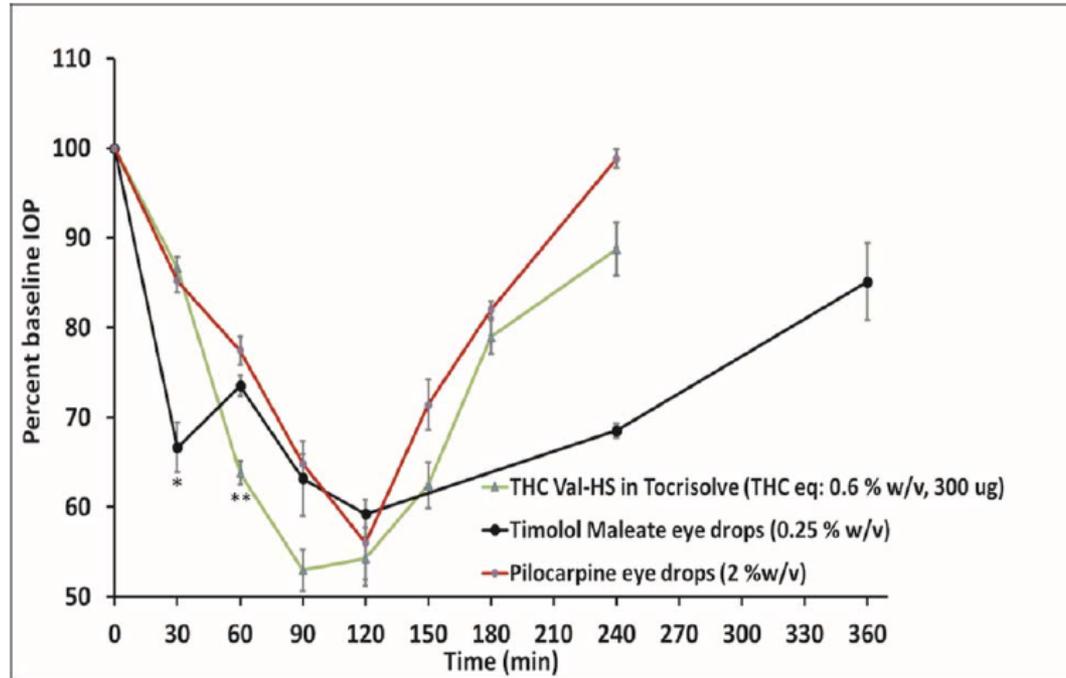


FIGURE 5. IOP-Time profiles obtained with THC-Val-HS, timolol maleate, and pilocarpine eye drops (marketed) in rabbit glaucoma model. Numbers in brackets represent concentration (%w/v) and dose equivalent to THC (μg). Actual baseline values (mean \pm SEM in mm Hg) for IOP in the following different formulations: THC-Val-HS in Tocrisolve (26.8 ± 0.4), timolol maleate eye drops (24.0 ± 1.9), and pilocarpine eye drops (27.1 ± 0.3). *IOP drop from timolol maleate is significantly different from THC-Val-HS and pilocarpine ($P < 0.05$). **IOP drop from THC-Val-HS is significantly different from timolol maleate and pilocarpine ($P < 0.05$).

Cannabinoids Shown to Be Neuroprotective in Multiple Animal Models

American Journal of Pathology, Vol. 163, No. 5, November 2003
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Neuroprotective Effect of (-) Δ^9 -Tetrahydrocannabinol and Cannabidiol in N-Methyl-D-Aspartate-Induced Retinal Neurotoxicity

Involvement of Peroxynitrite



Experimental Eye Research

Volume 136, July 2015, Pages 45-58



Synthetic and endogenous cannabinoids protect retinal neurons

Arch Soc Esp Oftalmol. 2011 Jan;86(1):16-23. doi: 10.1016/j.oftal.2010.11.015. Epub 2011

[Cannabinoid applications in glaucoma].

[Article in Spanish]

Pinar-Sueiro S¹, Rodríguez-Puertas R, Vecino E

Author information

Abstract

INTRODUCTION: Glaucoma is a slowly progressive optic neuropathy that is one of the leading causes of legal blindness throughout the world. Currently there is a limited group of topical drugs for the medical treatment of glaucoma is currently limited, and research needs to be focused on new therapeutic horizons, such as the potential usefulness of the cannabinoid agonists for the treatment of glaucoma.

AIM: To review the current scientific literature related to the beneficial effects derived from the different ways of administration of cannabinoids indicated for the glaucomatous optic neuropathy.

DEVELOPMENT: Cannabinoid receptors have shown an intense expression in ocular tissues implicated in the regulation of the intraocular pressure, as well as inner layers of the retina. Through activation of CB1 and CB1 specific receptors and through other still unknown pathways, the cannabinoid agonists have shown both a clear hypotensive, as well as an experimentally proved neuroprotective effect on retinal ganglion cells.

CONCLUSIONS: Some cannabinoid agonists (WIN 55212-2, anandamide) have demonstrated, in experimental studies, to act as «ideal drugs» in the management of glaucoma, as they have been shown to have good tolerability after topical application, efficiently reduce intraocular pressure, and behave as neuroprotectors on retinal ganglion cells. Further studies as regards the safety and clinical assays must be carried out in order to examine the effectiveness of these drugs for the treatment of glaucoma in our daily clinical practice.

2010 Sociedad Española de Oftalmología. Published by Elsevier Espana. All rights reserved.

PMID: 21414525 DOI: 10.1016/j.oftal.2010.11.015



Experimental Eye Research

Volume 110, May 2013, Pages 55-58



Neuroprotective effects of topical CB1 agonist WIN 55212-2 on retinal ganglion cells after acute rise in intraocular pressure induced ischemia in rat

Sergio Pinar-Sueiro ^{a, b, c, d, e}, José Ángel Zorrilla Hurtado ^{a, e}, Patricia Veiga-Crespo ^{a, e}, Sansar C. Sharma ^{d, e}, Elena Vecino ^{a, e}

- Cannabinoid agonists have shown both a clear hypotensive and neuroprotective effect on retinal ganglion cells
- CB1 receptors to a greater extent than CB2 receptors, have been implicated in mediating cannabinoid-induced neuroprotection
- Experimentally, in multiple animal species, synthetic and endogenous cannabinoids have displayed a protective effect on neurons

Cannabinoids and glaucoma

I Tomida, R G Pertwee, and A Azuara-Blanco

Abstract

Glaucoma is one of the leading causes of blindness in the world. In spite of the diverse therapeutic possibilities, new and better treatments for glaucoma are highly desirable. Cannabinoids effectively lower the intraocular pressure (IOP) and have neuroprotective actions. Thus, they could potentially be useful in the treatment of glaucoma. The purpose of this article is to provide the reader with an overview of the latest achievements in research into the potential use of cannabinoids for glaucoma.

Cannabis/marijuana is the most frequent illicit drug used today for recreational purposes. Yet it is not widely known that the cannabis plant (*Cannabis sativa*; Latin for "planted hemp") (fig 1) is one of the oldest drugs used for medical purposes. Its therapeutic use was first recorded in a classical medicine book by the Chinese emperor Shen Nung in 2737 bc. The medical use of cannabis was also known in other ancient cultures throughout India, Assyria, Greece, Africa, South America, Egypt, and the Roman Empire.¹



Figure 1
Photograph of the Cannabis sativa plant (provided by GW Pharmaceuticals, Wiltshire, UK)



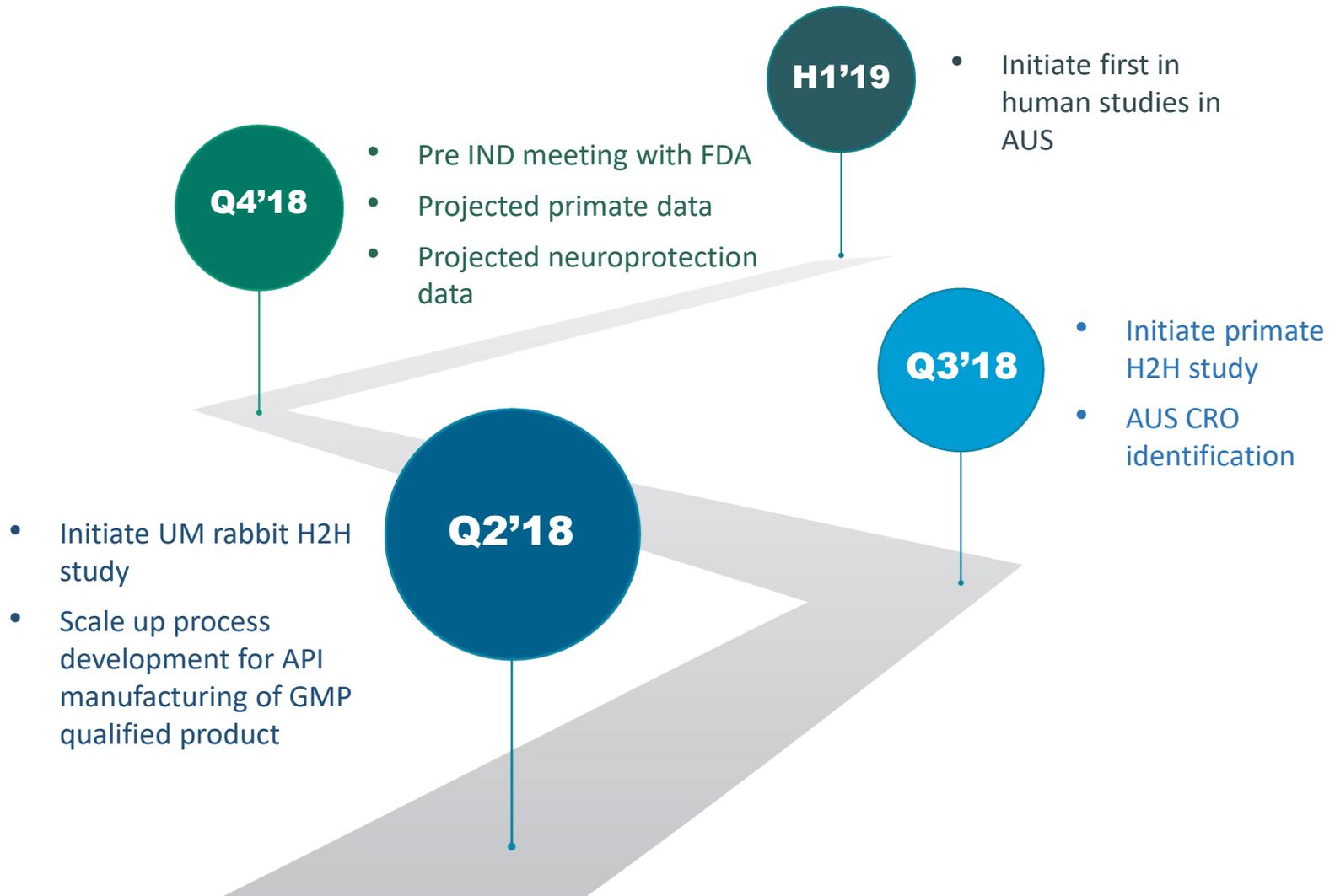
NB1111

Development Plan

Advancing to Clinical Studies: NB1111

Objective	NB1111 Clinical Study		
Perform Phase 1b/2a clinical studies in patients utilizing sites in Australia to generate safety, efficacy, and pharmacokinetic data	Therapy: 	NB1111	<ul style="list-style-type: none"> • Australia offers centers of excellence with a pool of qualifying patients as well as economic incentives that when leveraged, could possibly lead to expedited enrollments and quality data • Nemus has identified an API synthesis partner in AMRI which has expertise in cannabinoid manufacturing, scale-up capability, and a global footprint
	Patients: 	Patients with Glaucoma	
	Timeline: 	H1'2019	
	Dosing: 	Anticipated dosing design will permit patients to act as their own controls (contra-lateral eye dosing)	
	Study Design: 	Traditional single-ascending dose (SAD) and multiple-ascending dose (MAD) designs consistent with validated regulatory pathways	

Near-Term Value Creating Milestones for NB1111





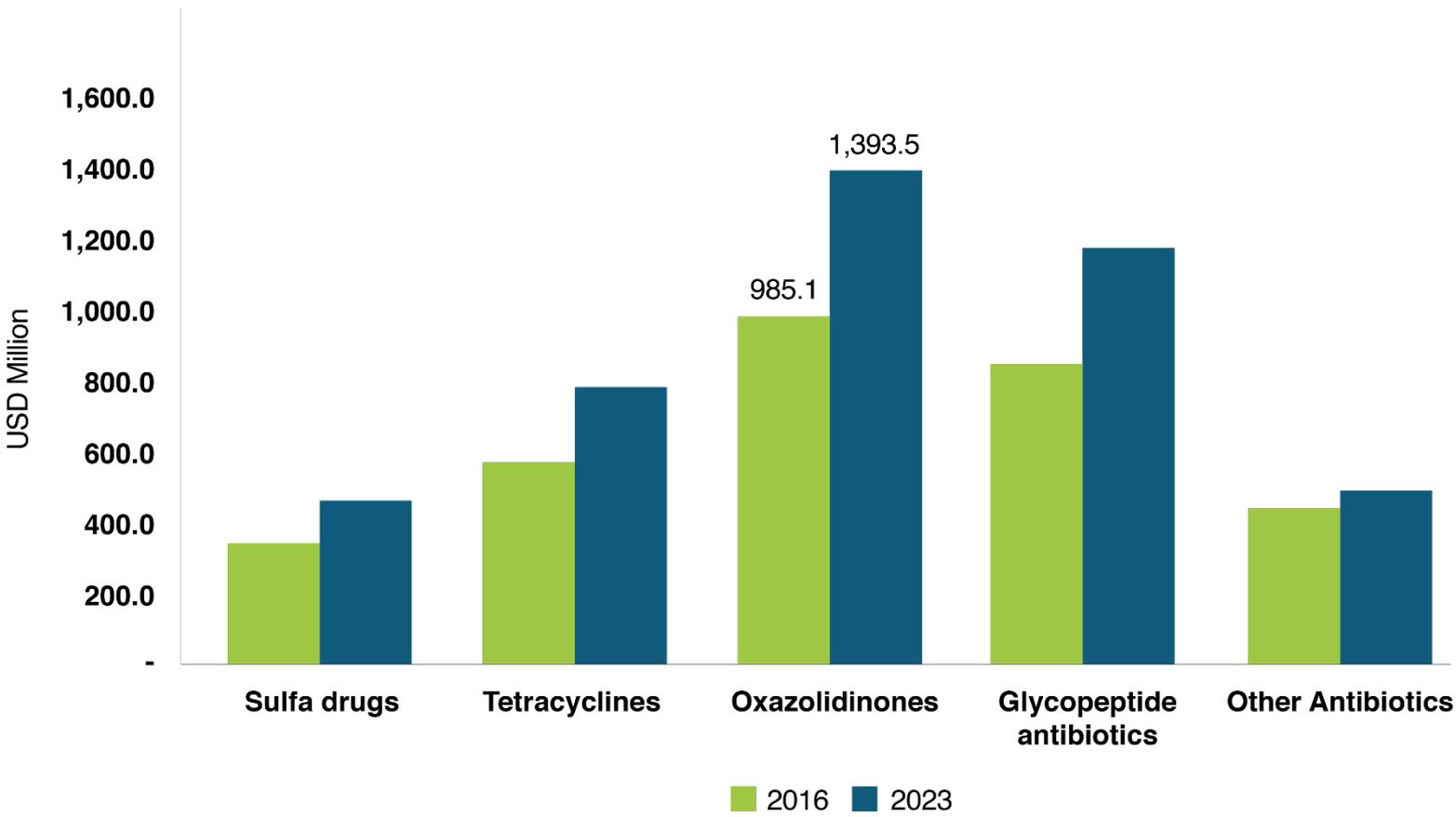
NB3000

For the Treatment of
Methicillin-resistant
Staphylococcus aureus (MRSA)

Global MRSA Market by Drug Class 2016 & 2023 (USD Million)

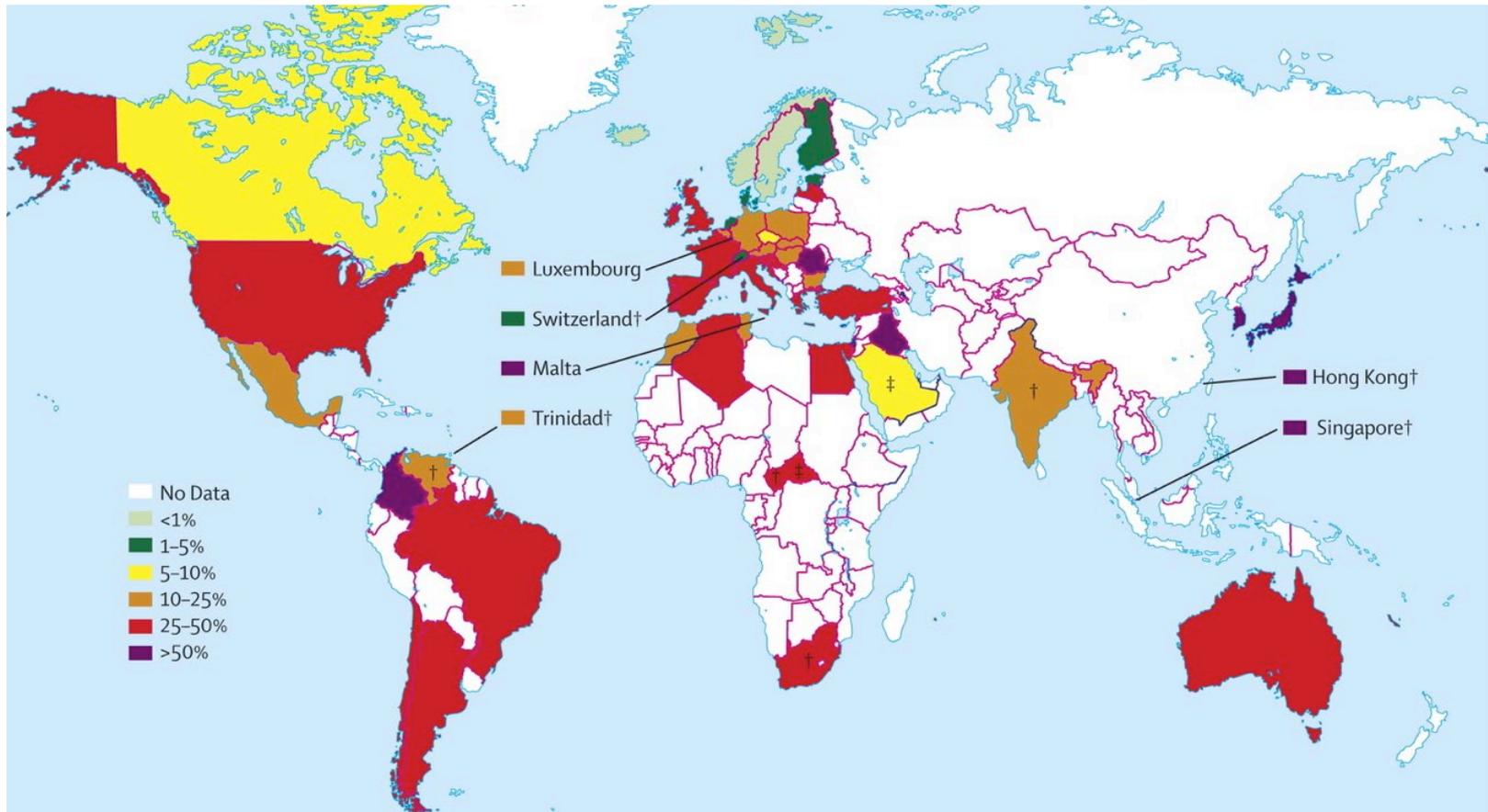


The global MRSA drugs market is expected to reach USD \$4.3B by 2023, a projected CAGR of ~ 4.4 % during the forecast period 2017-2023

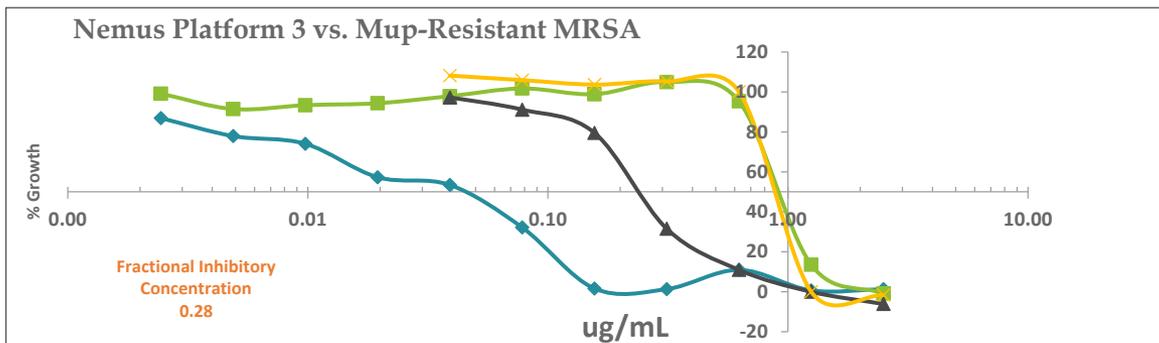
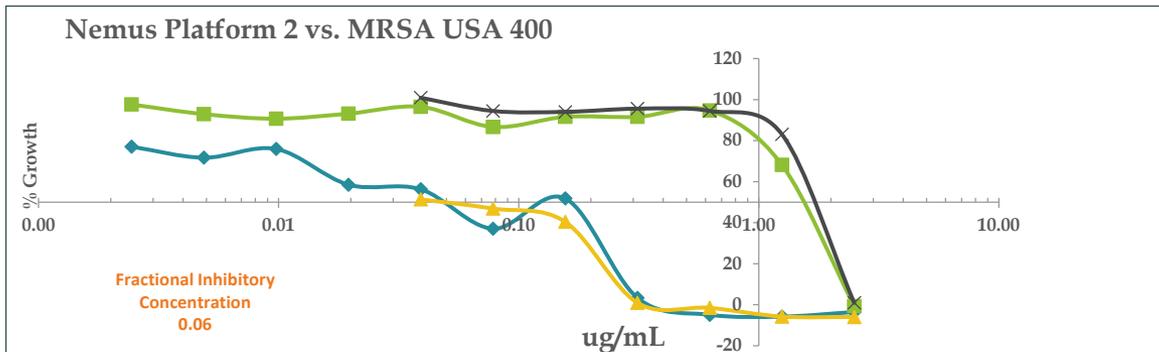
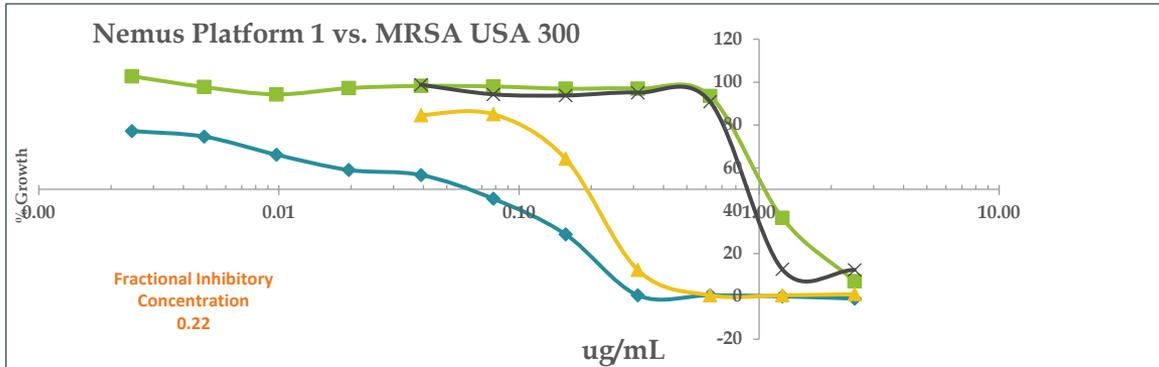


Worldwide Estimate MRSA Prevalence

High MRSA proportions imply increased risk for patients and a need for second-line more toxic drug treatment. This will increase costs and side-effects, and may drive resistance further in staphylococci or other species (or both).



Nemus cannabinoid-platform exerts potent killing power against multiple species of MRSA (community, hospital acquired and mupirocin-resistant)



- Antimicrobial activity of single agents are often assessed with an assigned value called the minimum inhibitory concentration (MIC)
- The lower the MIC, the more potent the killing activity of the molecule
- When agents are combined for anti-microbial effect, the potency value assessed is the fractional inhibitory concentration (FIC)
- The lower the FIC value, the more potent the combination of the two agents; the higher the synergy
- When the FIC value is < 1.0 there is synergy, the compounds exert inhibitory effects on the bacteria more than the sum of their effects alone
- If the FIC is < 0.5 , this indicates highly synergistic killing

Next Steps: Nemus Anti-MRSA Cannabinoid Platform

Q4'18

Perform validation experiments related to the mechanism of action of the cannabinoid-platform (Q4'18)

H1'19

Advance the cannabinoid-platform testing into in vivo studies assessing activity against multiple strains of MRSA (H1'19)

Continue screening against other species of bacteria as well as follow-up testing against viral species (H1'19)

2019+

Pursue partnering opportunity for the further development of the bacterial anti-infective opportunity so it can be advanced to human testing

Pipeline

			Research	Preclinical	Phase 1
Ocular Indications					
THCVHS	NB1111	Glaucoma			
CBDVHS	NB2222	Dry Eye			
		Macular Degeneration			
		Diabetic Retinopathy			
Other Indications					
THCVHS	NB1222	CINV			
CBDVHS	NB2111	CIPN			
Cannabinoid Platform	NB3000	MRSA			

NEMUS Value Proposition: Disrupting the cannabinoid therapeutic space



Developing Biosynthetic Cannabinoids

- Currently, the only cannabinoid company with potential cost-effective and enhanced life-cycle scale-up production related to biosynthetic manufacturing of cannabinoids
- The only cannabinoid company with a re-engineered cannabinoid prodrug designed for multiple routes of administration

Targeting Unmet Needs in Multi-Billion Dollar Global Markets

- Developing cannabinoids for the treatment and/or management of acute and chronic diseases

Primary Development & Commercialization Partner with UM

- NEMUS is the primary development and commercialization partner of the University of Mississippi, drawing on 50 years of intellectual capital in cannabinoid chemistry and physiology from the only entity with a Federal license to directly study cannabinoids

Proprietary Molecule with Global Patent Footprint

- The proprietary prodrug of THC has a global patent footprint including the world's largest pharma markets of USA, Japan and the EU

Capitalization

OTCQB	All Shareholders	Largest Shareholder: Emerald Health Sciences
Common Shares Outstanding	133.35 M	73.1 M (55%)
Options & Warrants	53. M	40.8 M (77%)
Fully Diluted	186.4 M	113.9 M (61%)
Market Cap	\$34.54M ¹	
Base of Operations	Long Beach, California & Oxford, Mississippi	



¹ Based on 18/09/5 OTCQB per share prices of \$.259

BRIAN MURPHY, MD, MPH, MBA – Chief Executive Officer; Chief Medical Officer, Director

Dr. Murphy has almost two decades of experience in drug development and evaluation, both from the academic and industry perspective. He most recently served as the CMO of Eiger Biosciences. Previously, Dr. Murphy was CMO at Valeant Pharmaceuticals International (VRX) where his responsibilities also included oversight of Global Medical Affairs, Clinical Development, Biostatistics, and Pharmacovigilance. Dr. Murphy also served as Medical Director, then VP of Marketing and Commercial Strategy of Hepatology for InterMune, Inc. (ITMN). Prior to InterMune, Dr. Murphy was Medical Director of North America for Antivirals/Interferons at Hoffmann-LaRoche. Murphy is board-certified in internal medicine and completed his residency at Tufts-New England Medical Center. He served as Chief Medical Resident in the Boston University Internal Medicine program. He went on to complete parallel fellowship tracts at Harvard Medical School (HMS) and the Massachusetts General Hospital in medicine and clinical epidemiology. He also completed a fellowship in Medical Ethics at HMS-Brigham and Women's Hospital. Dr. Murphy earned his MD, MPH (general public health), and MS (pharmacology) degrees from New York Medical College and is a graduate of the Harvard School of Public Health (MPH in Health Policy and Management). He earned his MBA at the Columbia University Graduate School of Business.

DOUG CESARIO, MBA – Chief Financial Officer

Mr. Cesario brings over 15 years of financial and operational experience across many industries. Prior to joining Nemus, Mr. Cesario served as Chief Financial Officer of Kaiser Permanente Foundation Hospitals and Health Plan in the Orange County, California marketplace, where he managed the financial performance of the health system with an operating budget of over \$1 billion per year. Previously Mr. Cesario held various financial leadership positions, including founder of Community Capital Advisory Group, a real estate advisory and investment company; director of Skye Automotive, a private equity fund; and corporate finance associate at both full service and boutique investment banking firms. Mr. Cesario earned a Master's in Business Administration from the UCLA Anderson School of Management.

WENDY CUNNING – Vice President of Operations

Ms. Cunning brings over 20 years of extensive expertise in U.S. sales, marketing, global new product development, commercialization, and lifecycle management in the biopharmaceutical industry. Prior to joining Nemus, Ms. Cunning served as Director, New Products, U.S. Eye Care at Allergan, where she led the creation of the business unit strategy for the U.S. ocular franchise. She was the Associate Director of Marketing at Amylin Pharmaceuticals, leading the global life-cycle management for Byetta®. Additionally, she held leadership positions at Valeant Pharmaceuticals, a multi-billion dollar pharmaceutical company, as the global marketing and commercial development lead for both the viral hepatitis and HIV franchises. Prior to joining Valeant, Ms. Cunning worked in Hepsera® marketing at Gilead Sciences and sales in HIV and respiratory medicine at GlaxoSmithKline. Ms. Cunning earned a bachelor's degree in biology from West Virginia University.

Board of Directors and Strategic Advisors



Avtar Dhillon, MD
Executive Chairman of Emerald Health Sciences and Strategic Advisor to Nemus

Dr. Dhillon is currently the Executive Chairman for Emerald Life Sciences and the former President and CEO of Inovio Pharmaceuticals Inc. He is a life sciences entrepreneur with more than 20 years' experience building public companies.



Punit Dhillon, BA
Board of Directors

Mr. Dhillon is the Co-founder and Director of OncoSec Medical, Inc. and the former Vice President of Finance and Operations at Inovio Pharmaceuticals, Inc. He has extensive management experience spanning corporate finance, M&A and strategy implementation.



Jim Heppell, Esq
Board of Directors

Mr. Heppell is the former founder, CEO and director of BC Advantage Life Sciences I fund and is currently a director at a number of public and private life science companies. Mr. Heppell has extensive experience in corporate finance law.



MAHMOUD A. ELSOHLY, PHD
Scientific Advisor

World's foremost expert on the science of cannabinoids. 300+ scientific publications. Research professor at The University of Mississippi.



DONALD I. ABRAMS, M.D.
Scientific Advisor

Chief, Hematology/Oncology at UCSF Cancer and Integrative Medicine specialist with research interests in the development of anti-cancer therapeutics and palliative care medicines.

Thank you!

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