ViroMed

A Leader in the Development of New and Innovative Biopharmaceuticals

This document has been prepared by ViroMed for the sole purpose of providing information through investigator relations presentation targeting institutional and general investors. The presented material contains future projection and forecasts of the business. The future projection and forecasts provided have been faithfully composed based on rationale and assumption. Such projection and forecasts, however, contain uncertainty and risks and may result different outcomes. The innate uncertainty and risks include changes in overall management, financial markets, related laws and regulations.

ViroMed

- ViroMed Overview -

※ Pioneer and global leader in plasmid DNA-based gene therapy, with a particular emphasis on diseases associated with neurological, muscular or ischemic problems

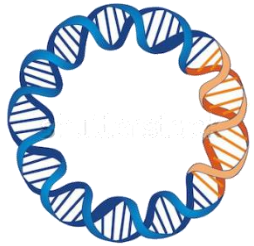
- **Listed on KOSDAQ (084990)**
- **Seoul (HQ, R & D):** 90+ people in Seoul
- **San Diego (Clinical Development, Production):** 30+ people in San Diego

HQ and R&D (Seoul)

HQ and R&D (Dec. 2019) **(Seoul)**

DNA Production Facility (San Diego)

- Gene Therapy Pipeline -



Plasmid DNA

Phase Ⅰ completed

- **VM206**
  - Her2⁺ cancers (Breast)

Phase Ⅰ (Planned in 2021, US)

- **pMUN**
  - Muscular atrophy
  - Sarcopenia
  - Traumatic nerve injury

US

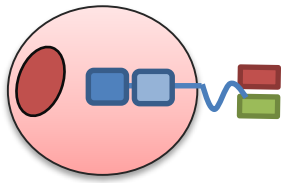
- **VM202**
  - Diabetic Peripheral Neuropathy — Phase Ⅲ
  - Diabetic Foot Ulcers — Phase Ⅲ
  - ALS (Lou Gehrig's disease) — Phase Ⅱ
  - Coronary Artery Disease — Phase Ⅰ completed

- **pIKO**
  - Coronary artery disease
  - Peripheral arterial disease
  - Chronic wound
  - Claudication

Phase Ⅰ (Planned in 2021, US)

Phase Ⅰ (Planned in 2021, Korea)

- **VM803** (Claudin3)
  - Ovarian
  - Colorectal
  - Prostate
  - Pancreatic
- **VM804** (L1CAM)
  - Neuroblastoma
  - Lung
  - Pancreatic
  - Renal
- **VM801** (TAG 72)
  - Colorectal
  - Ovarian
  - Prostate



CAR-T

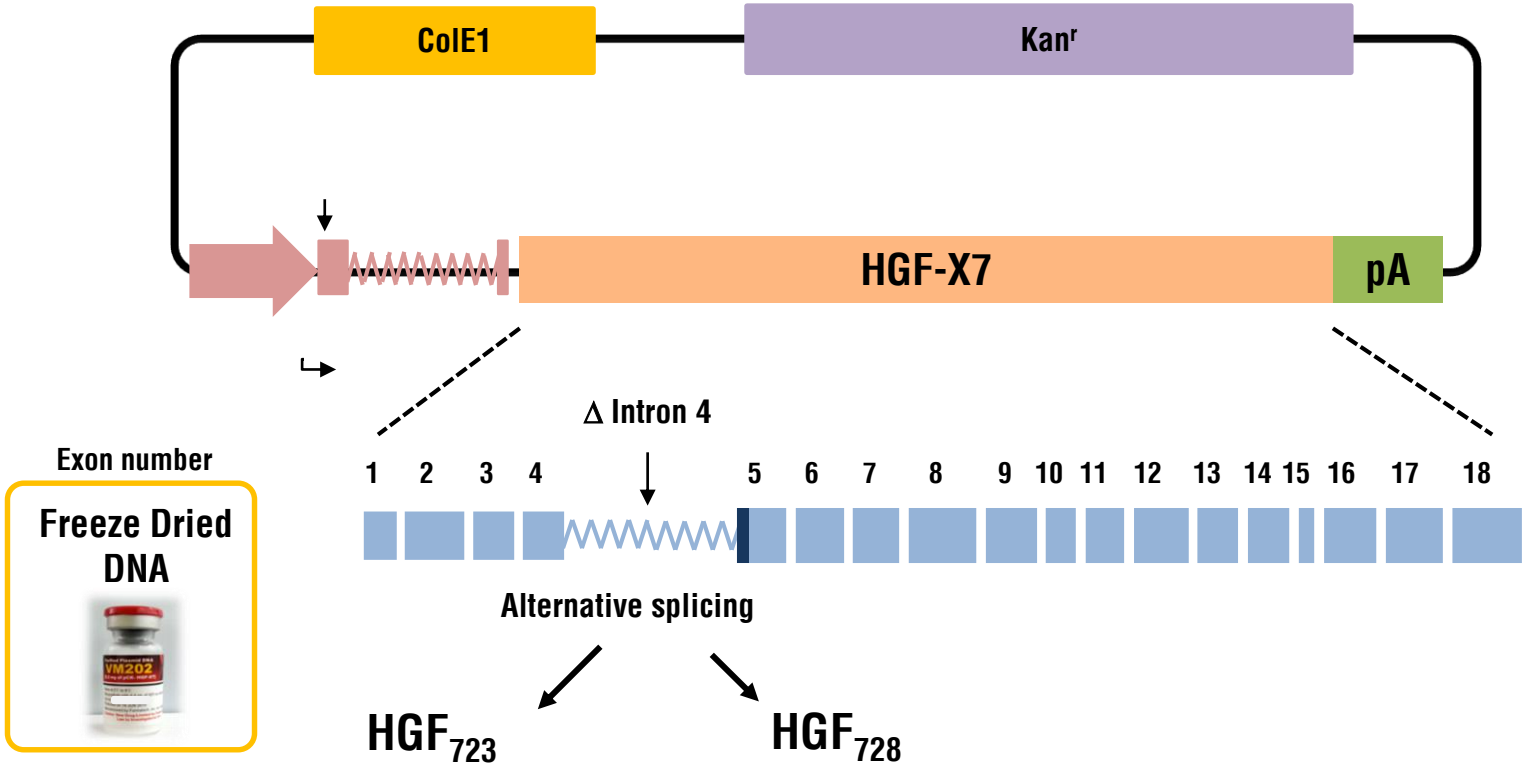
AAV

Phase Ⅰ (Planned in 2021, US)

- **VM301**
  - ALS
  - Spinal cord injury

- Flagship Product VM202 -

Plasmid DNA designed to simultaneously express two isoforms of HGF



※ Special Features

□ Therapeutic gene:
- HGF

□ Two isoforms:
- HGF_{723} + HGF_{728}

□ Expression level:
- Promoter
- UTR
- Intron

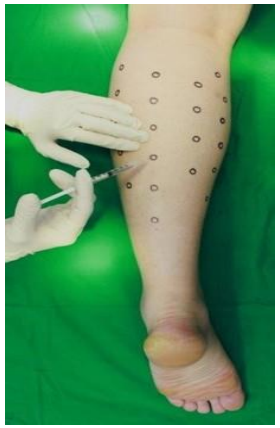
□ Formulation

ViroMed has a strong patent position with VM202, covering DNA constructs, indications, formulation, and manufacturing, among others

- Biological Outcomes of IM Injections of VM202 -

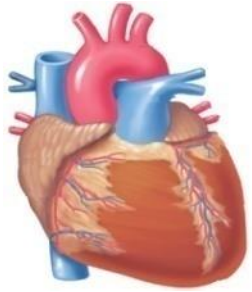
DPN
DFU

[Calf Muscle]



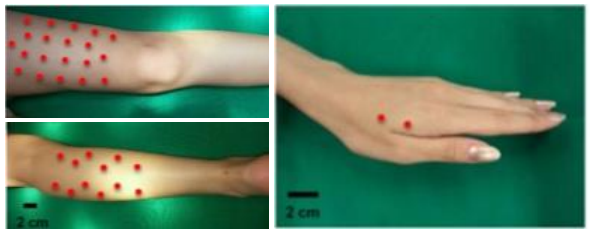
CAD

[Cardiac Muscle]

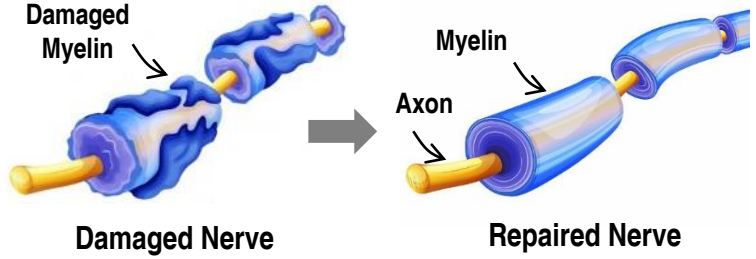


ALS

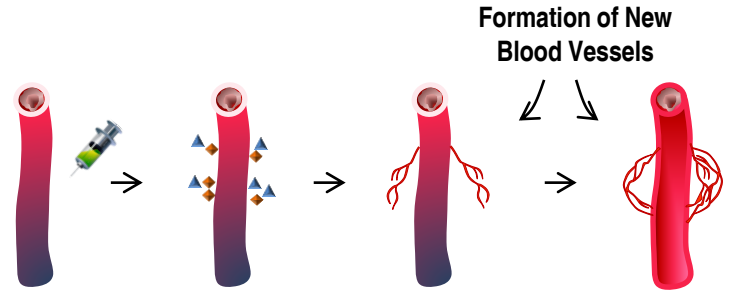
[Upper and Lower Limbs]



① Regeneration of damaged nerves



② Angiogenesis



③ Reduction in the level of pain factors

(CSF-1, IL-6, α2δ1, 5-HTT, etc.)

④ Amelioration of muscle atrophy

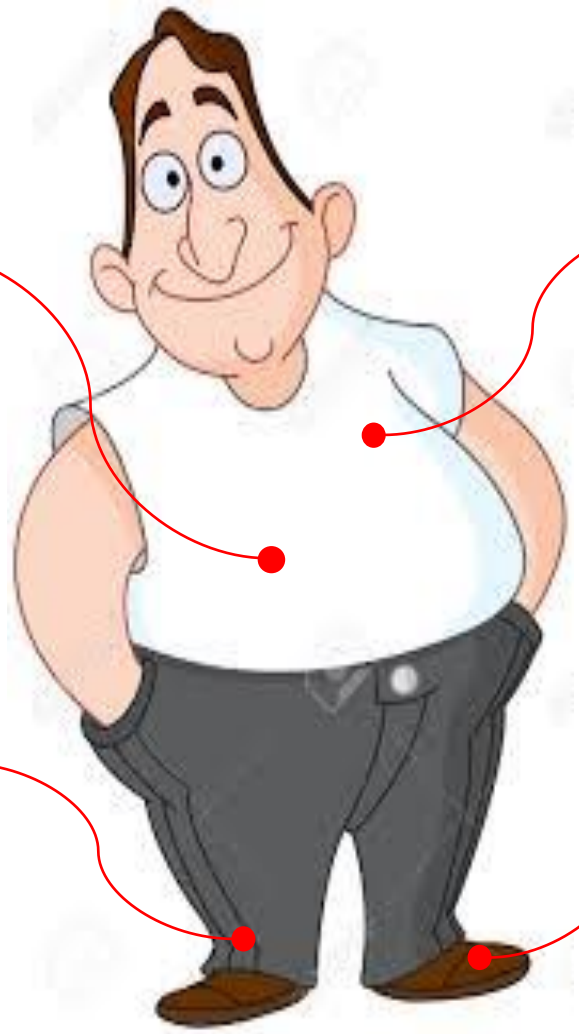
- Target Indications under Clinical Studies -

∗Amyotrophic Lateral Sclerosis
(Lou Gehrig's disease)

Phase II
Planned in US

∗Acute Myocardial Infarction

Phase II
Planned in Korea



∗Painful Diabetic Peripheral Neuropathy

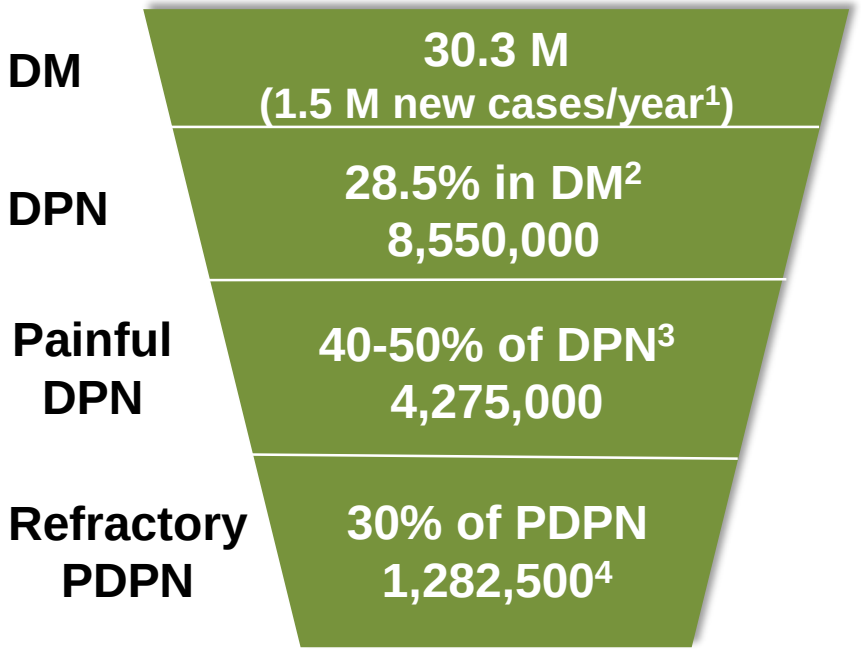
Phase III
Ongoing in US

∗Diabetic Foot Ulcer

Phase III
Ongoing in US

- Most Advanced Indication -
Painful Diabetic Peripheral Neuropathy (PDPN)

- US -



[Currently Used Medicines]

- ✓ Pregabalin (Lyrica®, Pfizer), Gabapentin (Neurotin, Pfizer) (Anticonvulsants)
- ✓ Duloxetine (Cymbalta®, Eli Lilly), (Antidepressant)
- ✓ Tapentadol (Nucynta® ER, Depomed), (Opioid)
- ✓ Capsaicin (Qutenza, Averitas Pharma), (Topical patch)

- **Patients suffer from burning, tingling, throbbing, and stabbing pain**

- **PDPN market size (2017) ~5 billion [5]**
- **US DPN market accounts for 71% among 7 MM[6]**

[1] 2015, ADA
[2] A Boulton et al, Management of diabetic peripheClin J Pain 2015 Mayral neuropathy; Clinical diabetes 2005 Jan; 23(1): 9-15
[3] MJ Young et al, A multicenter study of the prevalence of diabetic peripheral neuropathy in the United Kingdom hospital clinic population
[4] PDPN market research, The Dominion Group 2018, [5] Opioid use in the management of diabetic peripheral neuropathy in a large commercially insured population, Patil PR et al, Clin J Pain. 2015 May
[5] Painful diabetic neuropathy drugs market by drug type-growth, future prospects & competitive analysis, 2018-2026, Credence Research, May 2018
[6] Painful Diabetic Neuropathy, GlobalData 2018 1

- High Unmet Medical Needs in PDPN -

- ✓ Average number of Rx medications used for PDPN

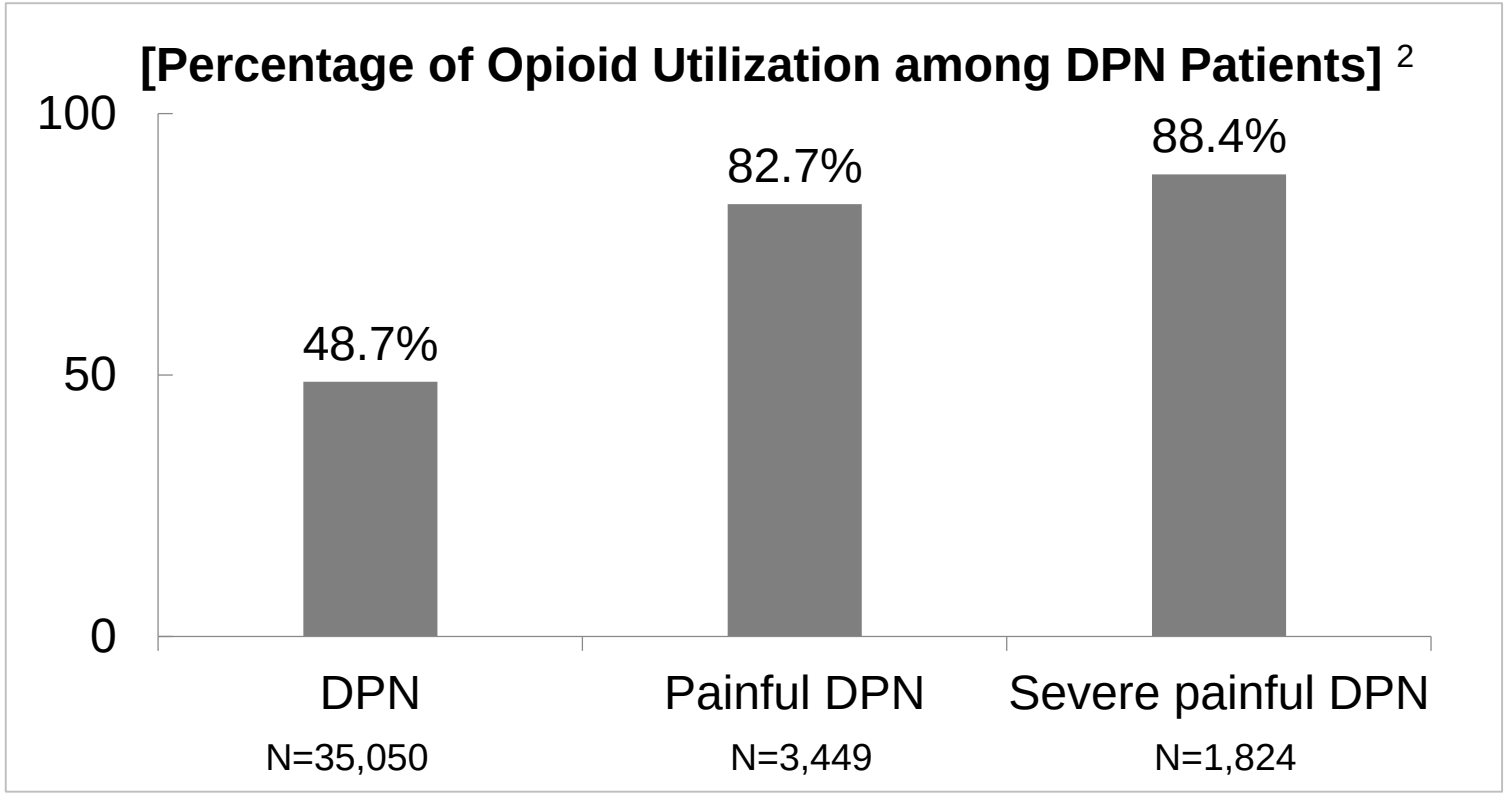
  in the preceding week[2]: 3.8 (NSAIDs, SAO & LAO, anticonvulsants, antidepressant, etc.)
- ✓ Modest treatment benefits
- ✓ Current treatments provide pain relief only without any disease modifying capability
- ✓ Safety and tolerability profile minimize compliance
- ✓ About 40% PDPN patients remain untreated[3]
- ✓ 76% of patients take opioids 6 mon before and/or 1 year after taking pregabalin[1]

Market size expected to grow to $ 11 billion by 2026**

[1] Kozma CM et al, Opioid before and after initiation of pregabalin in patients with diabetic peripheral neuropathy, Curr Med Res Opin. 2012 Sep;28(9):1485-96
[2] Burden of illness in painful diabetic peripheral neuropathy: the patients' [erspectives, Gore M et al., The Journal of Pain. Vol 7. no 12 (Dec), 2006: pp 892-900
[3] MJ Snyder et al., Treating painful diabetic peripheral neuropathy: An update, Am Fm Physician. 2016 Aug 1;94(3):227-34
** *Global neuropathic pain management market, Persistence market research 2018

- Opioid Usage in PDPN (Opioid Crisis in US) -

68% of 70,200 drug overdose deaths in 2017 involved an opioid[1]



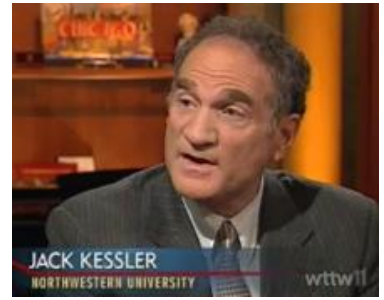
- Among treated DPN patients, 33% use opioid as first line treatment[3] because there is no other option to manage pain
- 62% of PDPN patients have chronic use of short-acting-opioid[4]

[1] Opioid overdose, Understanding the Epidemic, CDC
[2] An Independent Evaluation of VM202 Market Potential in the United States for the Treatment of Painful Diabetic Peripheral Neuropathy (PDPN), Xcenda, March 2016
[3] Patil PR et al., Opioid Use in the Management of Diabetic Peripheral Neuropathy (DPN) in a Large Commercially Insured Population, *Clin J Pain*. 2015 May;31(5):414-424.
[4] Pesa J et al., Opioid utilization patterns among medicare patients with diabetic peripheral neuropathy, Am Health Drug Benefits. 2013 May;6(4):188-96

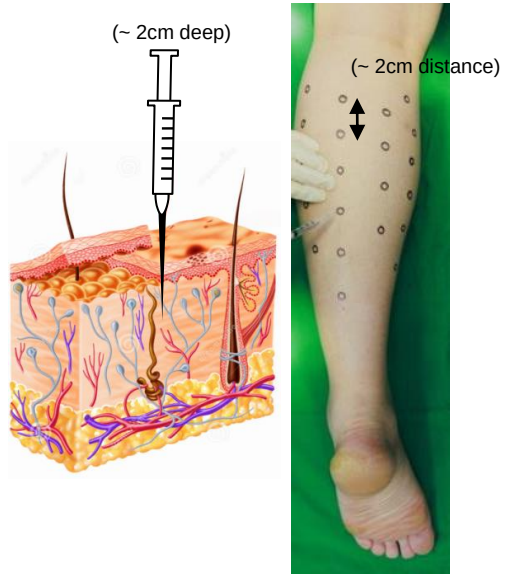
- Study Outline of VM202-DPN Phase II -

A Double-Blind, Randomized, Placebo-Controlled, Multicenter Study

Principal Investigator
JOHN (JACK) A. KESSLER, M.D.
(Northwestern Medical School)



1. **Indication**
   Painful Diabetic Peripheral Neuropathy
2. **Treatment groups** (Total: 102 subjects)
   - 16 mg VM202 (8mg/leg): 39 subjects
   - 32 mg VM202 (16mg/leg): 42 subjects
   - Placebo (0.9% normal saline): 21 subjects
3. **Injection scheme**
   Bilateral 2 injection cycles along the calf line (day 0 & 14)
4. **Follow-up period:** 9 months
5. **Efficacy**
   - **Pain score (Daily Pain and Sleep Interference Diary)***
   - **VAS***, **BPI-DPN***, MNSI, and **PGIC*** among others
6. **Safety**

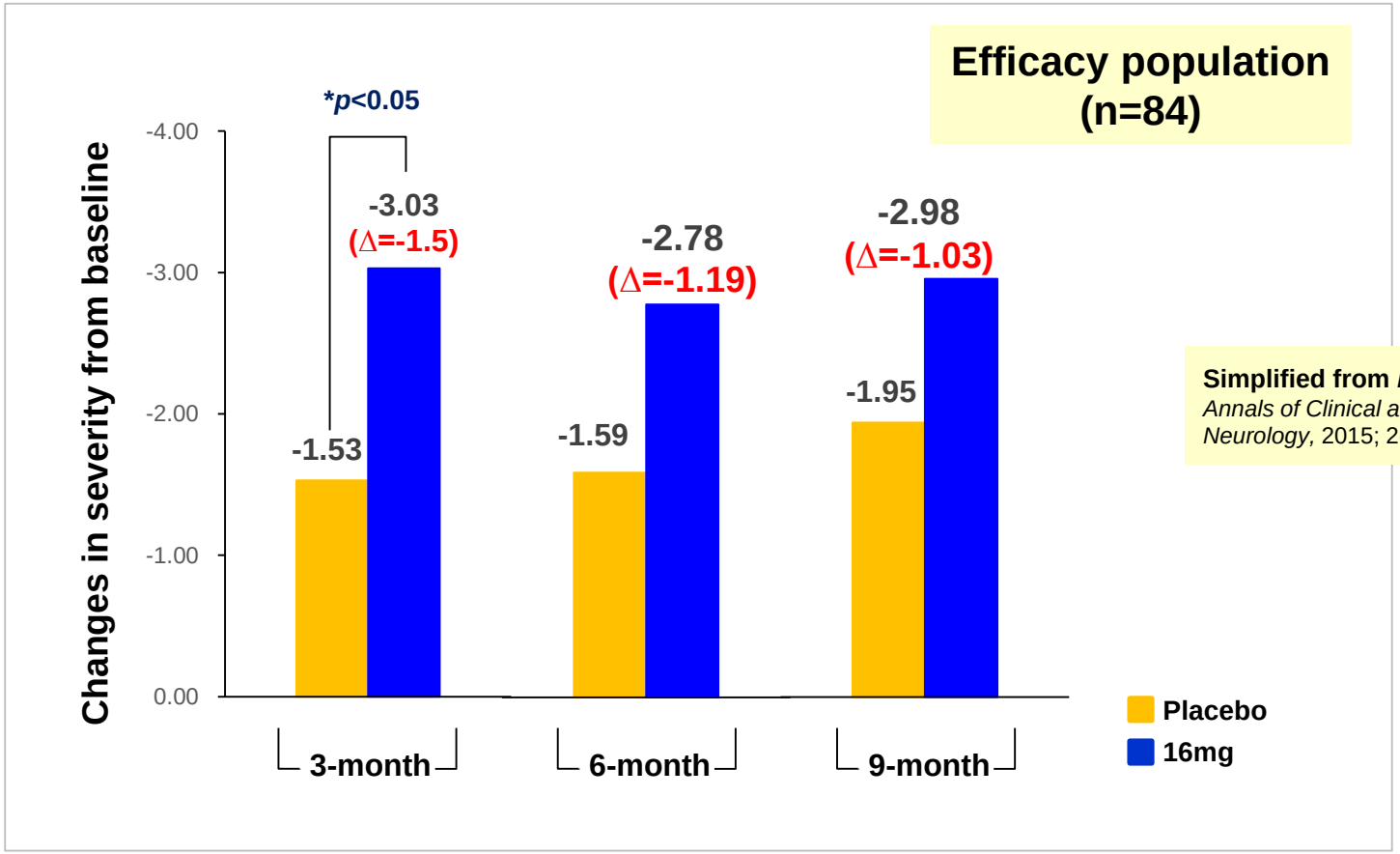


- Safety -

- **No deaths or drug related serious adverse events**
  - A total of 202 AEs in 69 out of 102 subjects: **None related to study drug**
  - A total of 13 SAEs in 10 out of 102 subjects: **None related to study drug**
- **Antibody to HGF: None**
- **No change in the serum level of HGF**
  - HGF protein in general population: 0.26 - 1.26 ng/mL
  - VM202 subjects showed HGF protein level relatively stable at all time points (mostly 1 - 2 ng/mL range)

※ VM202 showed an excellent safety profile

- Effect on Pain Severity (Daily Pain Diary) -



Simplified from *Kessler et al.,* *Annals of Clinical and Translational Neurology*, 2015; 2(5): 465–478

Δ (Drug-Placebo) :	-1.5	-1.2*	-1.1*	-1.3*	-1.4*
	VM202	Lyrica	Neurontin	Cymbalta	Nucynta

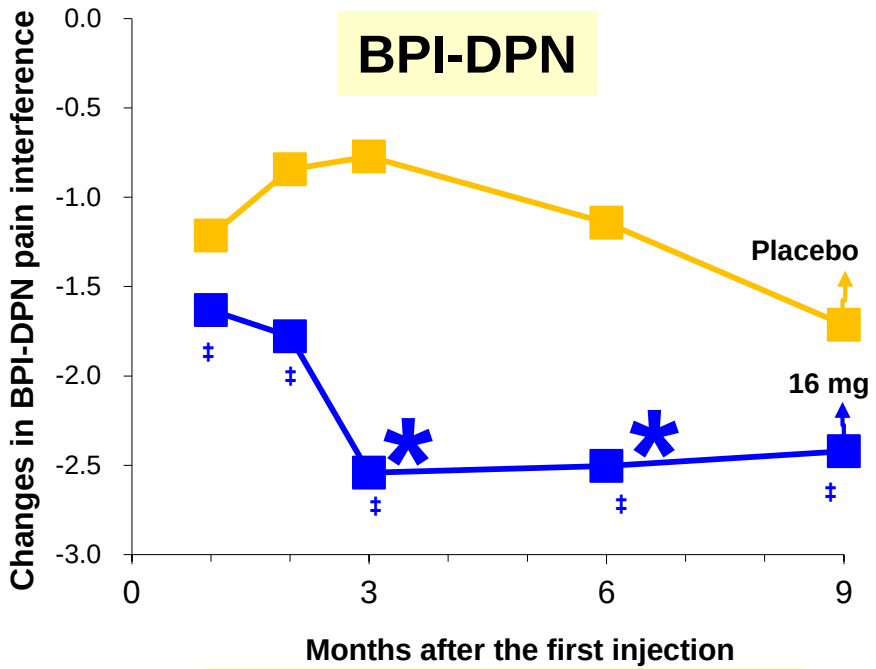
* Data for other pain killers were taken from public sources.

Long-term, high pain-relieving effects observed

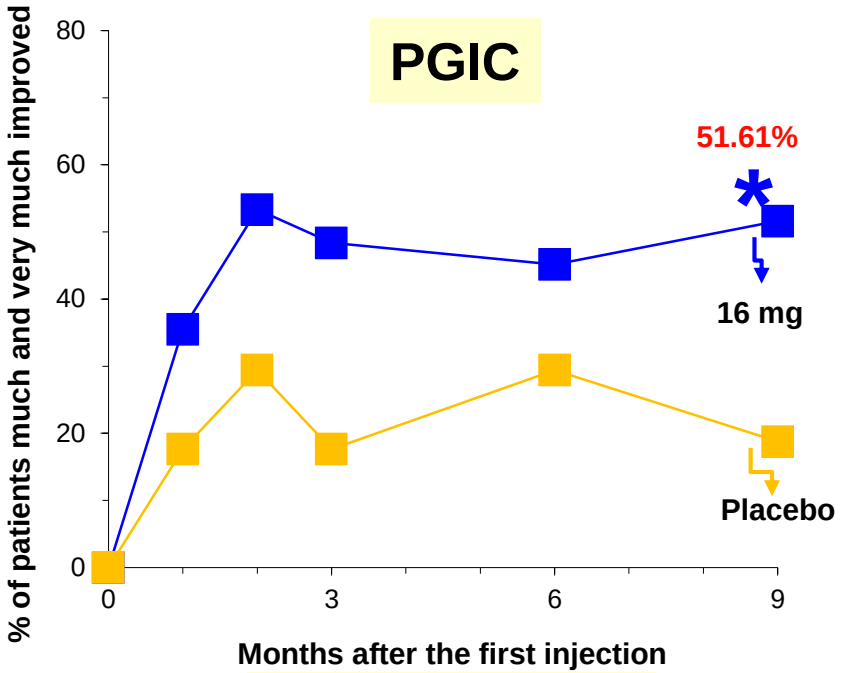
- Effect on Pain Interference and Quality of Life -

(BPI-DPN* and PGIC**)

Efficacy population
(n=84)



*p<0.05, *vs.* placebo group, ‡p<0.05, *vs.* baseline



*p<0.05, *vs.* placebo group

Simplified from *Kessler et al.,*
Annals of Clinical and Translational Neurology, 2015; 2(5): 465–478

Significant improvements were achieved particularly in the area of activity, mood, walking ability, ability to work, relationship with other people, sleep, and overall enjoyment of life, resulting in improved QoL.

*** Brief Pain Inventory**

**** Patient's Global Impression of Change**

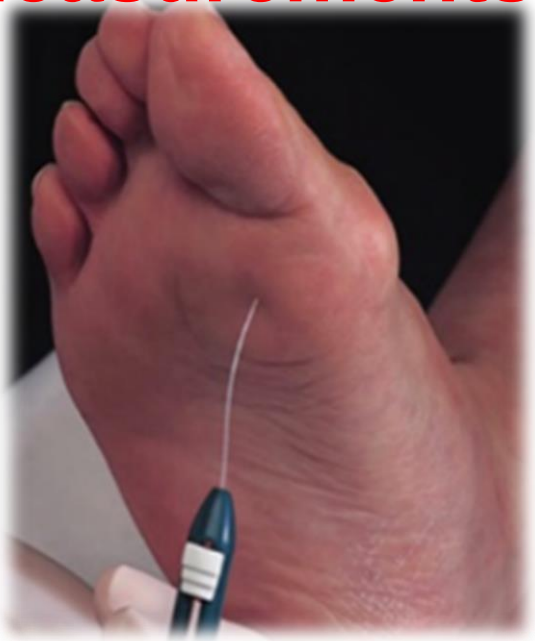
- Summary of DPN Phase II Trial -

1. Excellent safety profile

- No antibody to HGF, no changes in HGF serum level
- No drug-related AEs or SAEs except Grade I

2. Significant improvements in all pain measurements for a long period of time.

(Daily pain diary, BPI-DPN, VAS, PGIC)



3. Disease-modifying potential

Monofilament tests suggested that VM202 might aid sensory functions recovery and have the potential to be disease-modifying.

- DPN Phase III Study Outline -

Double-Blind, Randomized, Placebo-Controlled, Multicenter Center

1. Target indication - Painful DPN

2. Treatment arms - 477 (Placebo: 159, VM202: 318)

3. Sites - Geographically well distributed 25 sites in the US

4. Injection scheme - 2 treatments in 9 months

16 mg + 16 mg

(Days 0, 14) (Days 90, 104)

5. Follow-up - 9 months

6. Primary endpoint
- Daily pain diary at 3 month
- ≥ 50% responder at 3 month

7. Secondary endpoint
- Daily pain diary at 6 month
- ≥ 50% responder at 6 month

- DPN Phase III Current Status -

- ✓ **Enrollment Goal**:
  - 477 subjects randomized in a 2:1 ratio of VM202 to placebo
- ✓ **Enrollment as of 24 Dec, 2018**:
  - 507 randomized
  - 493 completed day 0 treatment (103%)
  - 308 completed study to full 9 months
- ✓ **Dropouts**: 51 discontinued study (10.1%, much lower than other trials)
- ✓ **Concomitant DPN medications as of 24 Dec, 2018:**

of 507 subjects in total:

- ❖ Receiving Lyrica (36) or Neurontin (212) or Both (4) = 252
- ❖ Not receiving Lyrica and Neurontin = 255

- Genopis Inc -

Manufacturing Facility (San Diego)

Keith Hall

✓ Plasmid DNA production facility

- GMP ready production facility
  with successful experience in regulatory due diligence
- In partnership with a private equity investment firm
- 68,400 sq ft plant
- 500 L fermenter, cell culture lab and QC test lab, etc.
- Extra space for future expansion (> 174,000 ft^2)
- 27 workers highly experienced in large scale production of plasmid DNA

✓ Strategic benefits for ViroMed

- **High quality, reliable in-house production capability**
  for both clinical and commercial drug supply
- **Less reliance on third-party manufacturers**
- Likely the **first commercial plasmid DNA manufacturing** facility

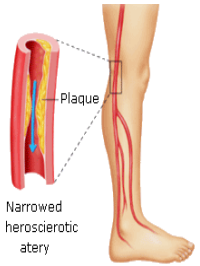
- Status of VM202 Studies for Other Indications -

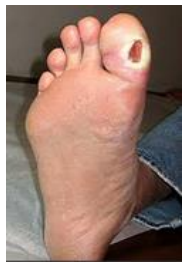
Diabetic Foot Ulcer

- ✓ Phase III ongoing in the US for chronic non-healing foot ulcers in diabetic patients with concomitant peripheral artery disease
- ✓ Total administered subjects: 300
  - As of Dec 2018, 37 randomized, 10 completed
- ✓ Follow-up: 7 months
- ✓ Efficacy endpoint: complete wound closure at 4 months

ALS

- ✓ 18 subjects I/II in the US completed
- ✓ Evaluation measures include ALSFRS-R scale, FVC, muscle strength (MRC)
- ✓ Positive trend observed in slow down of disease progression at 2-3 months
- ✓ Phase IIa to be initiated in 2019 in the US

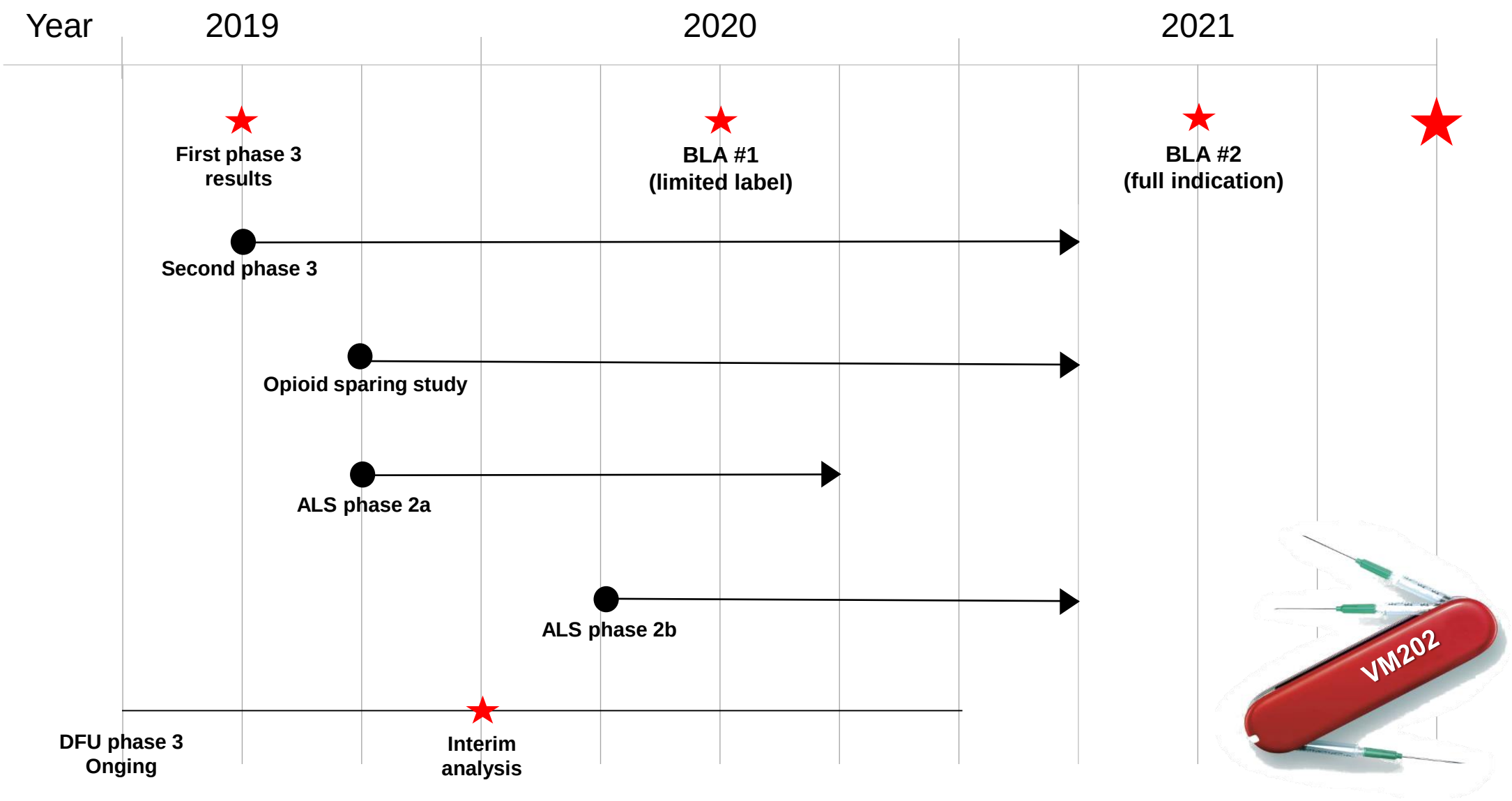




Chronic Foot Ulcer

• **Total Number:**	~ 4.5 Million
• **Amputation:**	82,000 / year
• **Medical Costs:**	$ 9-13 Billion

- 3 Years Outlook-



ViroMed's Goal Through 2025 in Gene Therapy

1. To be a global leader in plasmid DNA-based gene therapy

- 4 new clinical programs to be initiated using 4 other gene therapy products with exciting potential.

2. To be the most prominent biotech in gene therapy, both in science and business

(Basis: list of current phase IIIs)

- Partnering Opportunities with ViroMed -

- **Partnering opportunity**
  - **After phase 3 readout around June, 2018**
  - **After each BLA approval**
  - **Regional rights**
- **Investment in prospective "sales & commercialization entity" in the US**
- **Investment in Genopis Inc (San Diego)**
  - **Likely to become world's first commercial production site for plasmid DNA**
  - **Primary commercial production site for VM202**
  - **CMO business**