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# Santhera Pharmaceuticals Company Snapshot

01

## North American headquarters in Boston, MA, USA

Global Headquarters in Pratteln, Switzerland

02

## Working in Duchenne muscular dystrophy (DMD) since 2008

Focus on developing innovative medicines for rare neuromuscular and pulmonary diseases

03

## Lead program: vamorolone in DMD

Potential foundational therapy for a broad segment of patients with DMD  
Investigational therapy licensed from ReveraGen in September 2020



# Steroids are standard of care in DMD due to their impact on disease progression...<sup>1,2</sup>



Median age at loss of ability to stand from floor is  
**11.62 for steroid users**  
**9.56 for non-users**



Median age at loss of ability to climb stairs is  
**13.17 for steroid users**  
**10.81 for non-users**



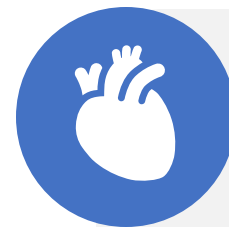
Median age at loss of ambulation is  
**13.4 for steroid users**  
**10.0 for non-users**  
(range 9.3–14)



Median age at loss of ability to bring hand to mouth is  
**20.48 for steroids users**  
**15.41 for non-users**



Median age at loss of ability to use hands/digits is  
**31.11 for steroid users**  
**23.09 for non-users**



Mean age of cardiomyopathy onset is  
**15.2 for steroid users**  
**13.1 for non-users**

# Common side effects associated with the use of corticosteroids in patients with DMD



## Approximate Frequency of Corticosteroid-Mediated Adverse Events in Two Studies<sup>1,2</sup>



**76%**

Spine Compression Fractures<sup>1</sup>



**38%**

Decreased Bone Mineral Density Lumbar Spine<sup>1</sup>



**30%**

Long Bone Fractures<sup>1</sup>



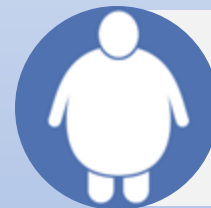
**37%**

Behavioral Changes<sup>2</sup>



**37%**

Growth Failure/Delay<sup>1,2</sup>



**65%**

Weight Gain<sup>2</sup>



**31%**

Hypertrichosis<sup>1</sup>



**55%**

Cushingoid Appearance<sup>2</sup>

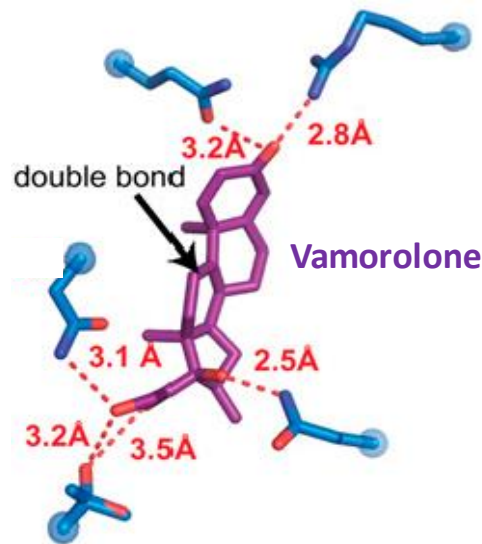


**15%–19%**

Cataracts<sup>1,2</sup>

# Vamorolone: Engineered to uncouple anti-inflammatory effects from corticosteroid-mediated adverse effects<sup>1-5</sup>

## Glucocorticoid Receptor Ligand Binding Domain



Double bond in vamorolone chemical structure attenuates GC receptor binding and ultimately leads to less activation of genes responsible for side effects<sup>4-5</sup>



## Like corticosteroids<sup>4-5</sup>

- inhibition of NF- $\kappa$ B pro-inflammatory transcription factors

Retained efficacy due to potent anti-inflammatory action



## Unlike corticosteroids<sup>4-5</sup>

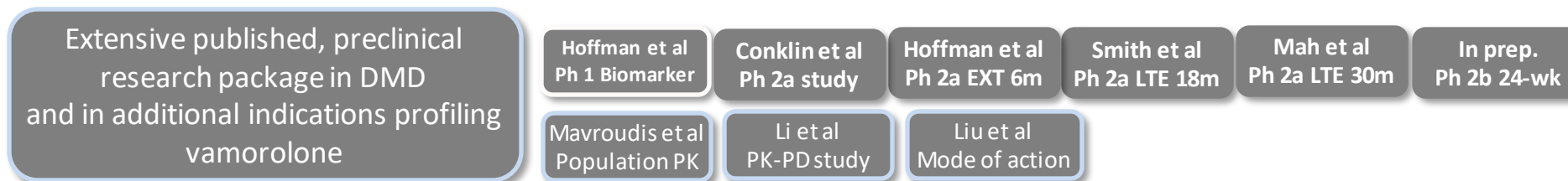
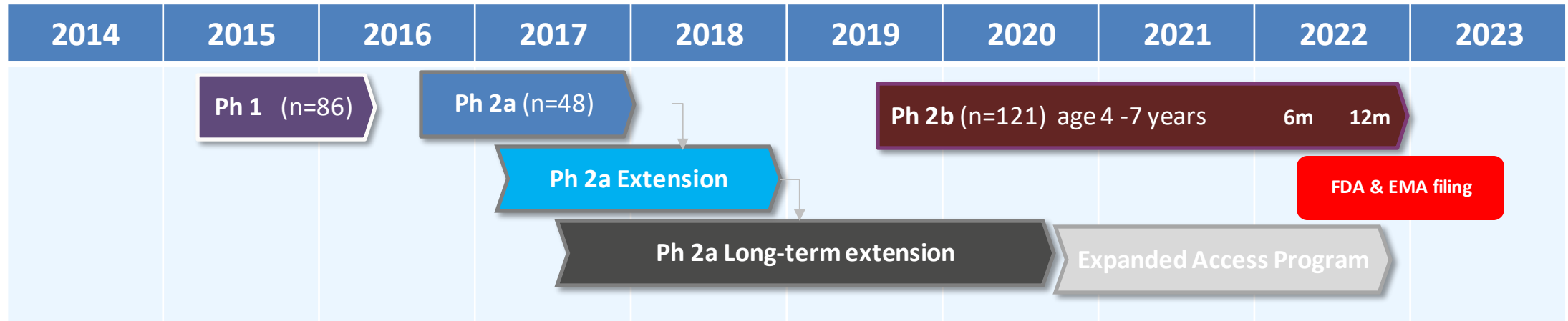
- Not a substrate of 11-B Hydroxysteroid Dehydrogenase
- Less activation of genes responsible for side effects
- Potent mineralocorticoid antagonist (eplerenone-like)
- Membrane stabilizer

Potential for reduction of steroid-associated side effects

# Robust clinical development program consistent with Phase 2b study

~ 200 patient-years exposure in 160 DMD boys treated with vamorolone for up to 2.5 years<sup>11</sup>

Vamorolone pharmacology and clinical evidence has been published in more than 20 peer reviewed articles



Data on File VAM-2021-001, Hoffman et al. Steroids (2018); Conklin et al. Ph. Res. (2018); Hoffman et al. Neurology. (2019); Smith et al. PLOS Med. (2020); Mah et al. JAMA Netw ork Open (2022); Dang et al. MDA Abstr. #47 (2021); Mavroudis et al. J. Clin. Ph. (2019); Li et al. J. Clin Ph. (2020); Liu et al. PNAS (2020),



Thank you to all the families who participated in  
vamorolone clinical trials and to all who supported  
the investigation of this potential therapy

Questions?