Clinical Experience and Use of Cell & Gene Therapies (CGTs)

THBI – The Future of Medicine

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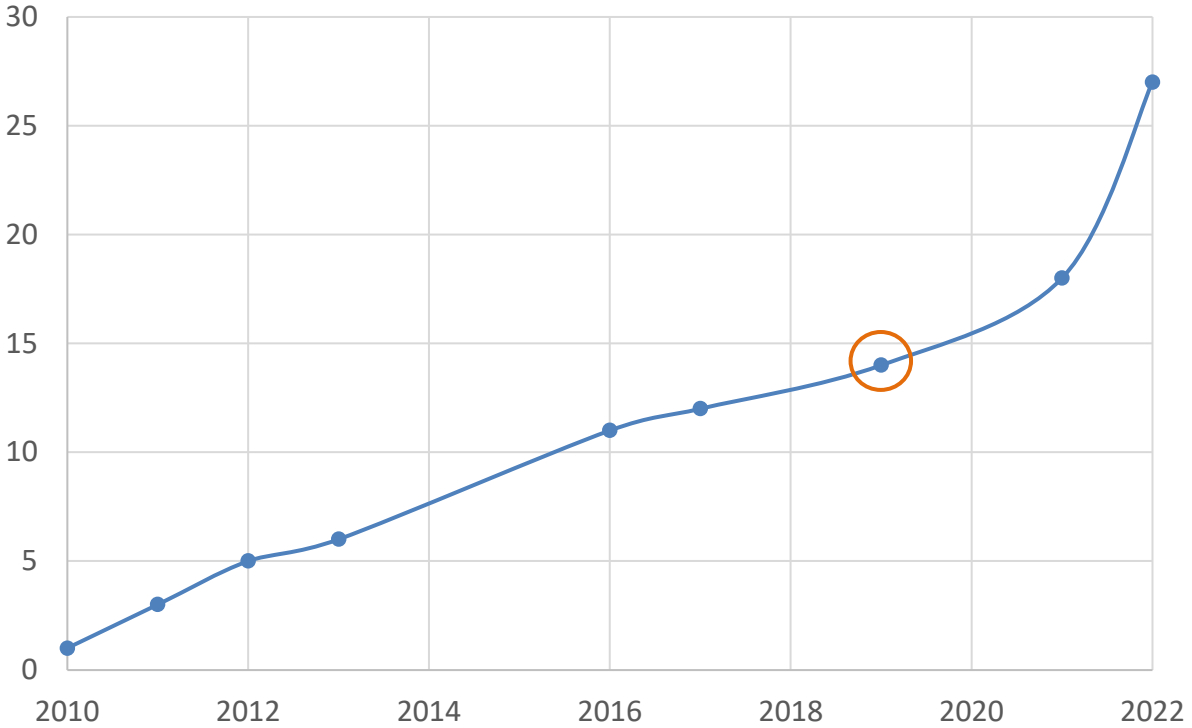
I have no relevant financial disclosures.

Number of FDA-approved CGTs



Data source: https://www.fda.gov/

Spinal Muscular Atrophy (SMA)

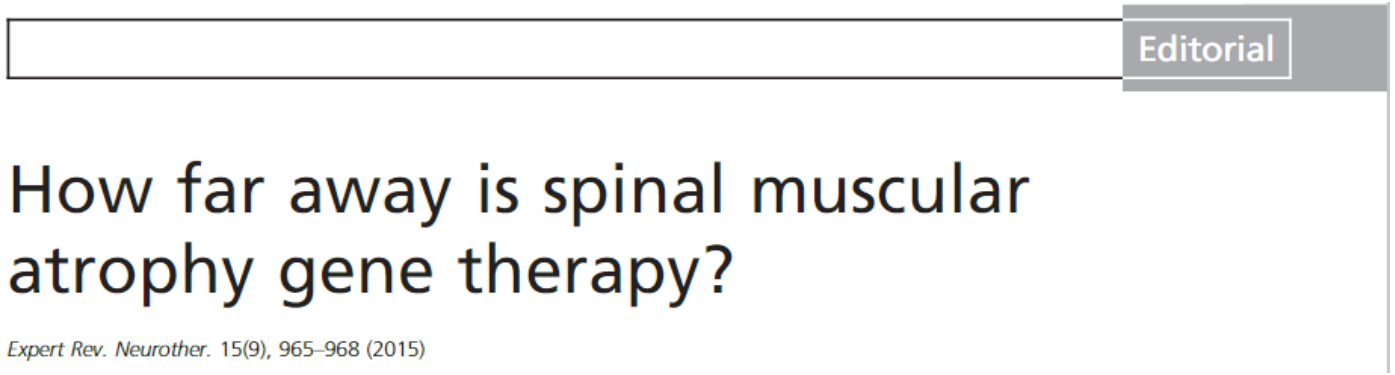
- SMA causes progressive muscle weakness and breathing issues
- SMA affects 1:10,000 babies
- SMA type 1 is the leading genetic cause of death in young children with a life expectancy of < 2 years

What is SMA?

- SMA is caused by a defect in the *SMN1* gene
- Defects in both copies of the *SMN1* gene result in irreparable loss of spinal cord cells that control muscle movements
- 1:50 people are asymptomatic carriers of an *SMN1* mutation

SMA type 1

- At 2-3 months of age loss of head control
- Progressive weakness leading to inability to move body
- Require breathing and feeding tubes
- Cognition and facial muscles are spared



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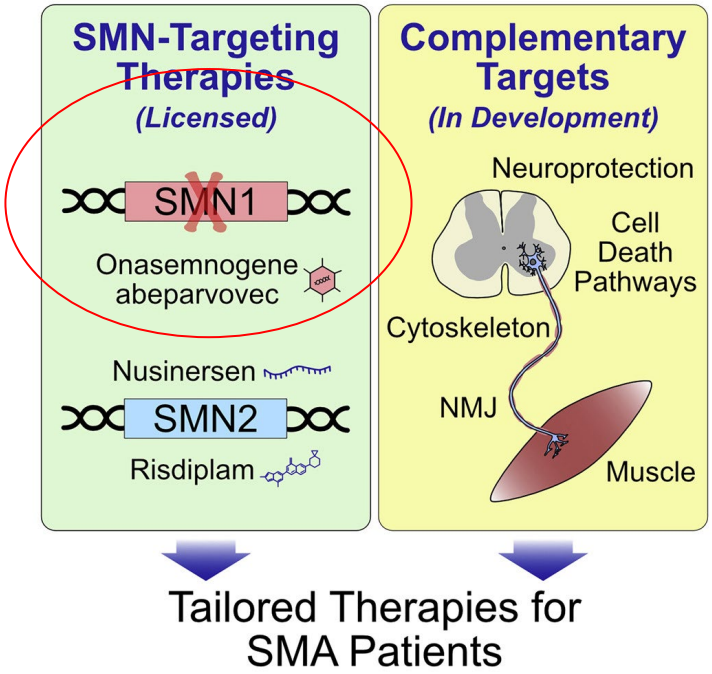
Single-Dose Gene-Replacement Therapy for Spinal Muscular Atrophy

J.R. Mendell, S. Al-Zaidy, R. Shell, W.D. Arnold, L.R. Rodino-Klapac, T.W. Prior, L. Lowes, L. Alfano, K. Berry, K. Church, J.T. Kissel, S. Nagendran, J. L'Italien, D.M. Sproule, C. Wells, J.A. Cardenas, M.D. Heitzer, A. Kaspar, S. Corcoran, L. Braun, S. Likhite, C. Miranda, K. Meyer, K.D. Foust, A.H.M. Burghes, and B.K. Kaspar

How can we help in 2023?



From: Chaytow et al, Cell Reports, 2021

No CGT will restore lost nerve cells - early diagnosis is **very important**!

How do we identify babies with SMA 1?

Since June 1, 2021, SMA is included in the Texas Newborn Screening Program

Medical Emergency: You Should Take the Following IMMEDIATE Actions

- Contact family to inform them of the newborn screening result, ascertain clinical status, arrange immediate clinical evaluation, and provide them with basic information about SMA.
- Take a family history
- Telephone consultation and referral to a neurologist or neurogeneticist within 24 hours for comprehensive clinical evaluation, and initiation of treatment. Genetic counseling is strongly recommended.
- Take immediate steps to ensure rapid molecular (DNA) confirmation of the NBS result, including SMN1 and SMN2 gene dosage (copy number).
- Report findings to state newborn screening program.

Goal is treatment in the first six weeks of life!

From: dshs.texas.gov

From: https://www.youtube.com/watch?v=KKFPy7eAtgo

CGTs and Health Equity

- Disparities already exist:
  - Underserved populations are less likely to see specialists and receive genetic workup
- Cost of CGTs may worsen disparities

The Future of CGTs in Child Neurology

- CGTs are currently being developed for numerous genetic disorders affecting the brain
- Early diagnosis and rapid treatment is important (Newborn Screening)
- High costs and requirement of specialists are a risk factor for worsening healthcare disparities

Thank you!