



Corporate Overview

December 2020

Forward-Looking Statements

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Zynerba Pharmaceuticals (NASDAQ: ZYNE)





A Rare/Near-Rare Neuropsychiatric Company

- Deep pipeline targeting high unmet medical needs; translating into multi-billion dollar market opportunity with Zygel™ (Cannabidiol Gel)
- Focused on completing development of Zygel in Fragile X Syndrome (FXS)
 - Pre-planned ad hoc analyses of CONNECT-FX data identified patient population who appear to benefit from Zygel
 - As a result of meeting with FDA in 4Q2020, Zynerba plans to conduct a trial in patients with a highly methylated *FMR1* gene to confirm positive results seen in CONNECT-FX responders
- Continuing to pursue three additional neuropsychiatric indications:
 - 22q11.2 deletion syndrome (22q) – Phase 2 ongoing
 - Autism spectrum disorder (ASD) – Phase 2 complete
 - Developmental and epileptic encephalopathies (DEE) – Phase 2 complete
- Experienced team with development and commercial expertise in transdermal delivery, orphan diseases, neurology, and psychiatry
- Cash runway expected to be sufficient to fund operations into 2023



Deep Clinical Pipeline & Near-term Milestones



Indication	Preclinical	Phase 1	Phase 2	Pivotal	Expected Milestones	
Fragile X Syndrome (FXS)*						
	Preparing for confirmatory trial					<p>Review trial design and protocol with FDA in 1H21; initiate confirmatory pivotal trial before the end of 2021</p> <p>Completion of enrollment once COVID-19 restrictions in Australia are eased</p> <p>Discuss Phase 2 results and regulatory path forward with FDA in 1H2021</p> <p>Finalize target syndrome selection in 2021</p>
22q Deletion Syndrome (22q)**						
	INSPIRE: Ongoing					
Autism Spectrum Disorder (ASD)						
	BRIGHT: Topline data released					
Developmental and Epileptic Encephalopathies (DEE)						
	BELIEVE: Topline data released					

*Orphan Drug and Fast Track designation

**Orphan Drug designation



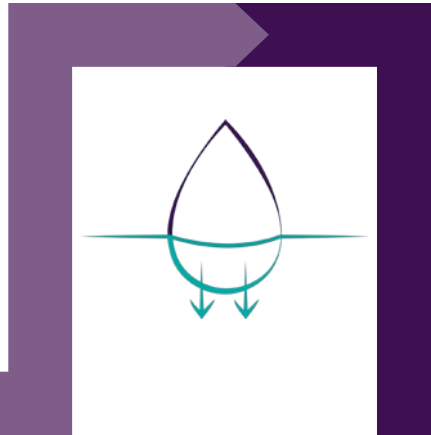
Zygel (ZYN002) Cannabidiol Gel

Differentiated



First & only patent-protected (2038), permeation-enhanced, pharmaceutically-produced cannabidiol gel

Transdermal



Formulation delivers Cannabidiol through the epidermis and into the circulatory system

Unique Mechanism of Action



Cannabidiol modulates multiple receptors and mediates numerous pathways, including the endocannabinoid pathway

Neuropsych Indications



Potential utility in rare / near-rare neuropsychiatric conditions



Fragile X Syndrome (FXS)



FXS

- Rare genetic developmental disability
- Leading known cause of both inherited intellectual disability and ASD
- No approved drugs indicated for FXS
- Symptoms linked to deficiencies in the endocannabinoid system (ECS)
- Mutation impacts *FMR1* gene and causes ECS dysregulation, causing core cognitive, social, and behavioral symptoms of FXS
 - Easily identified mutation manifests as multiple CGG repeats in *FMR1* (full mutation = >200 repeats)
- U.S. patents provide IP protection to 2038

~70K U.S. patients with full mutation FXS

Role of *FMR1* Methylation

- *FMR1* gene codes for production of FMRP* which is vital to synapse development
- Methylation of *FMR1* also plays a role in determining functionality of the gene
 - When methylation of *FMR1* silences the gene, no FMRP is produced: Systems and processes affected by FMRP become dysregulated
- These patients are generally the most severely impacted by the disorder: lower IQ, more impacted behaviors
 - ~60% of patients are believed to fall into this category

~40K U.S. patients ≥90% *FMR1* methylation

FXS is routinely diagnosed by assessing (1) CGG repeats and (2) methylation status

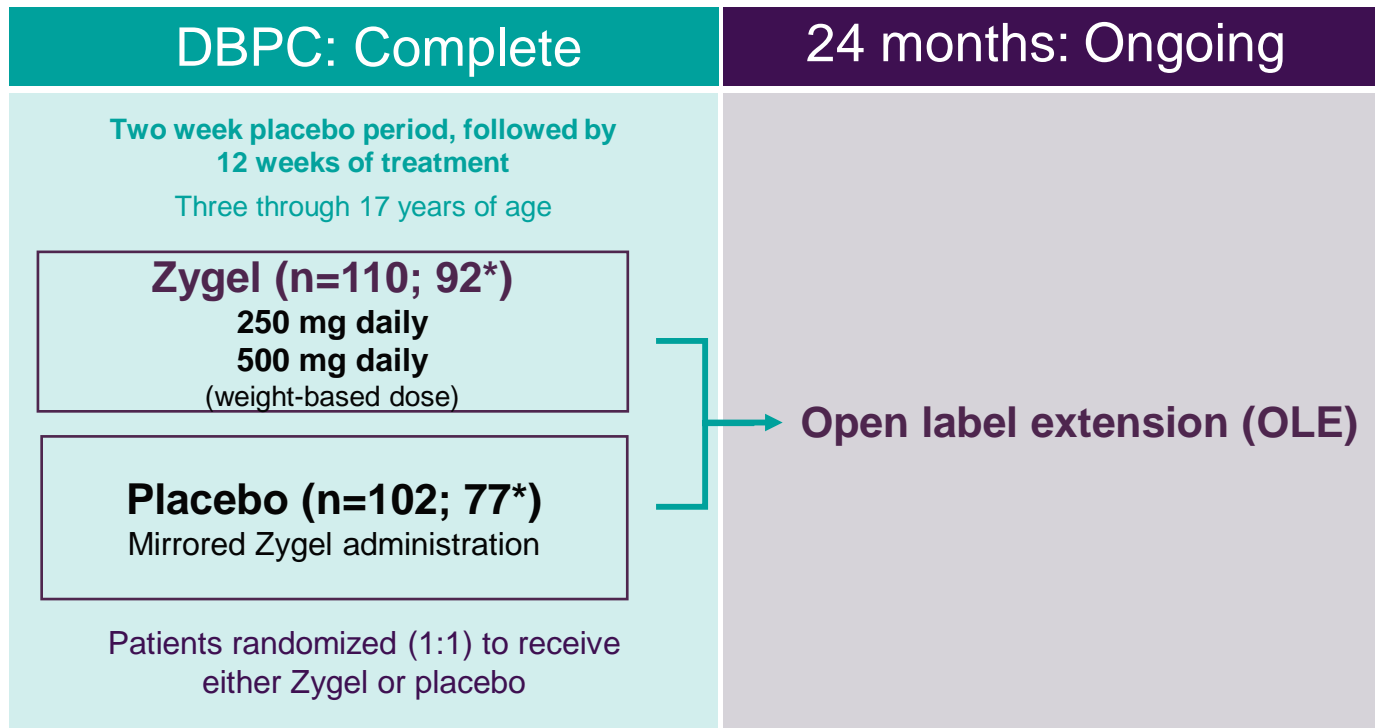


*FMR Protein; RNA-binding protein that helps regulate synaptic development and plasticity 6



CONNECT-FX Trial Design

Clinical study Of CaNNabidiol in ChildrEn and AdolesCenTs with Fragile X (CONNECT-FX)



*Patients with $\geq 90\%$ *FMR1* methylation (167 total ~ 80% of trial population) included in pre-planned ad hoc analyses



CONNECT-FX

Endpoints and Data Collected



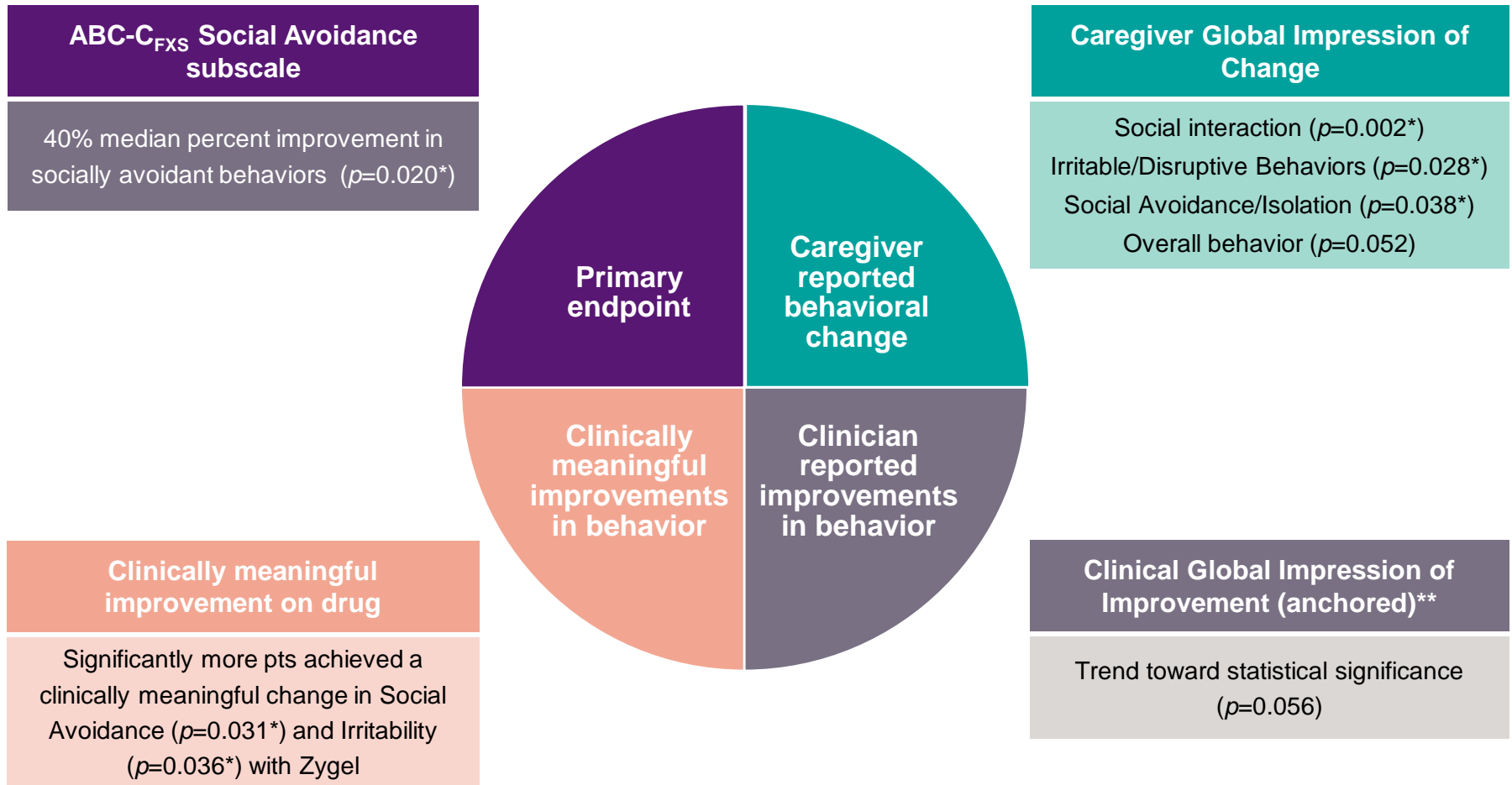
- Primary endpoint:
 - Change from baseline to end of treatment in ABC-C_{FXS} Social Avoidance subscale
- Key secondary endpoints:
 - Change from baseline to end of the treatment in
 - ABC-C_{FXS} Irritability subscale score
 - ABC-C_{FXS} Socially Unresponsive/Lethargic subscale score
 - Improvement in Clinical Global Impression (CGI-I) at end of treatment, anchored to FXS behaviors
- Aligned with FDA's 'Voice of the Patient' Guidance
 - Captured qualitative data on clinical relevance of FXS behaviors



CONNECT-FX Results: $\geq 90\%$ *FMR1* Methylation



Consistent Improvements Observed with Zygel vs. Placebo



* Statistically significant

** Not specific to Social Avoidance



CONNECT-FX: Safety



- Zygel was very well tolerated
- No serious or severe adverse events reported during the trial
- All treatment-emergent adverse events (TEAEs; any event, whether unrelated or related to study drug) were mild or moderate
 - Most common treatment-related TEAE: application site pain
 - Zygel: 6.4%; placebo: 1.0%
 - Seven total psychiatric disorder TEAEs; 5 were in placebo group
- Laboratory values for chemistry and hematology comparable between placebo and Zygel groups; no clinically relevant abnormalities in either group
 - No clinically significant changes to liver function tests



The Path Forward For Zygel in FXS



Regulatory Update

- Zynerba plans to conduct a single double blind, placebo controlled pivotal trial in patients with a highly methylated *FMR1* gene to confirm results seen in CONNECT-FX responders
 - If results are positive, we believe this trial will be sufficient to support an NDA submission
 - Primary endpoint will be the Social Avoidance subscale of the ABC-C_{FXS}

Next Steps

- Trial design and protocol development ongoing for planned confirmatory trial in CONNECT-FX responder population
 - Type C meeting with FDA expected in 1H21 to review trial design and protocol
 - Initiation of confirmatory trial is expected before the end of 2021 and timing will be clarified after Type C meeting



Autism Spectrum Disorder (ASD)



ASD

- Near-rare disorder
- Symptoms include irritability; anxiety, restricted, repetitive patterns of behavior; impairments in social communication; deficits in verbal and non-verbal communication; deficits in developing, understanding and maintaining relationships
- Most diagnosed after age 4; can be diagnosed as early as age 2
- Significant unmet medical need
 - Accelerating rate of diagnosis but only two FDA approved products; both atypical antipsychotics
 - Neither address the key symptoms of social impairment and anxiety

~1M U.S. children and adolescents with ASD

Rationale for Developing Zygel in ASD

- Results from clinical trials of Zygel suggest spectrum of activity against core behaviors
- Newer studies suggest ASD is linked to disruption of the ECS
 - Altered anandamide signaling may contribute to ASD-related social and communication impairments
 - ECS system modulates many cellular functions and molecular pathways altered in ASD
 - Cannabidiol may modulate the EC system and improve certain autism-related behaviors
- Evidence suggests that cannabidiol may improve social avoidance and anxiety

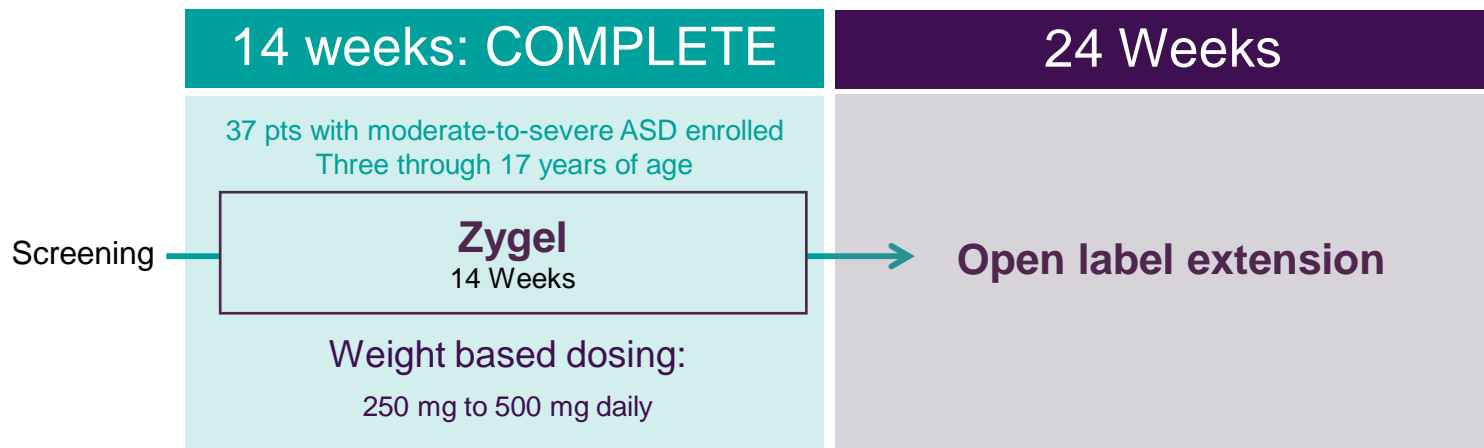
Recent U.S. patents provide IP protection to 2038



BRIGHT Phase 2 Trial in ASD



Open-Label Tolerability and Efficacy Study of ZYN002 Administered as a Transdermal Gel to Children and Adolescents with Autism Spectrum Disorder



Efficacy assessments (primary efficacy assessment = week 14 vs baseline)

- Aberrant Behavior Checklist (ABC-C)
- Parent Rated Anxiety Scale – Autism Spectrum Disorder (PRAS-ASD)
- Autism Parenting Stress Index
- Autism Impact Measure (AIM)
- Clinical Global Impression – Improvement (CGI-I) and Severity (CGI-S)
- Qualitative Caregiver Reported Behavioral Problems Survey



Results of BRIGHT Phase 2 Trial



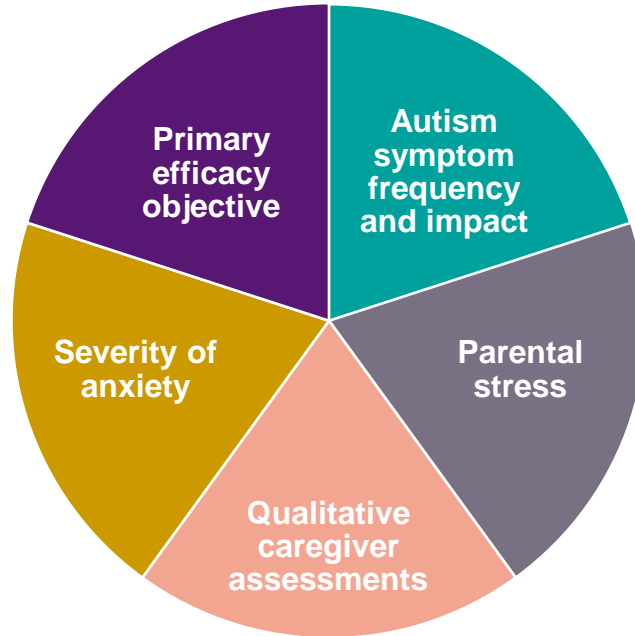
Statistically Significant Results at Week 14 Compared to Baseline

ABC-C subscales % improvement

Irritability: 39.1% ($p < 0.0001^*$)
Inappropriate Speech: 42.5% ($p = 0.0002^*$)
Stereotypy: 39.1% ($p < 0.0001^*$)
Social Withdrawal: 36.4% ($p < 0.0001^*$)
Hyperactivity: 35.6% ($p < 0.0001^*$)

Parent Rated Anxiety Scale for ASD (PRAS-ASD)

Mean improvement of 46%
($p < 0.0001^*$)



Autism Impact Measure (AIM) % improvement

Atypical behavior: 34.1% ($p < 0.001^*$)
Communication: 19.7% ($p < 0.001^*$)
Peer interaction: 19.8% ($p < 0.001^*$)
Repetitive behavior: 32.1% ($p < 0.0001^*$)
Social reciprocity: 10.7% ($p = 0.0053^*$)

Autism Parenting Stress Index

Mean improvement of 38.9%
($p < 0.0001^*$)

Qualitative Caregiver Behavioral Problems Survey % Improvements

Behavioral: 69% improved
Social: 63% improved
Emotional: 72% improved

* Statistically significant



Well Tolerated Safety Profile in BRIGHT Trial in ASD



- Well tolerated; consistent with previously released data
- Fewer than half of patients experienced an adverse event (AE); most were mild and transient
- Only 14% of patients experienced a treatment-related AE
 - All application site-related
- No severe or serious AEs reported during the trial



Next Steps in ASD Program



- In 1H2021, Zynerva intends to discuss data supporting the potential efficacy of Zygel in ASD, including the results of the Phase 2 BRIGHT trial, with the FDA to determine the regulatory path forward
- Present additional data at future medical meetings



22q11.2 Deletion Syndrome (22q)



22q

- Rare disorder; most common contiguous gene deletion syndrome
- Midline condition with abnormalities affecting palate, face, heart and other organs; surgically corrected in infancy
- Neuropsychiatric illnesses (anxiety disorders, ASD) and learning disabilities common
 - 22q associated with increased anxiety, withdrawn behavior and social interaction problems
 - Early onset of neuropsychiatric symptoms disrupts development and quality of life, and heightens risk of later psychotic disorders
 - 25-fold increased risk of developing schizophrenia
- No drugs currently approved to treat 22q

~81K U.S. patients with 22q

Rationale for Developing Zylgel in 22q

- Overlapping target symptoms in FXS and ASD have been shown to respond to Zylgel in trials to date
- Cannabidiol may treat neuropsychiatric symptoms due to activity as:
 - Modulator of endocannabinoid system
 - Agonist at serotonin_{1A} receptors
 - Antagonist at GPR55 receptors
- Phase 2 trial underway in pediatric and adolescent patients with 22q
 - Enrollment delayed due to COVID-19 restrictions in Australia; topline results timeline to be announced following lifting of restrictions

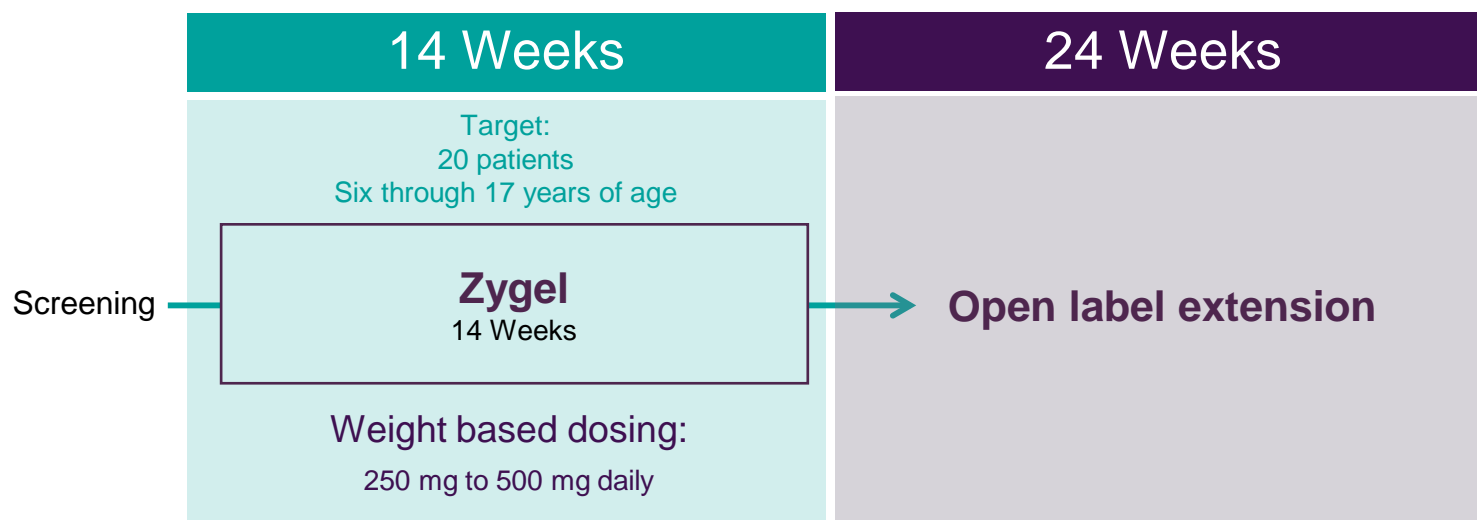
Orphan Drug designation for treatment of 22q



INSPIRE Phase 2 Trial in 22q



Assessing the Impact of Zygel (Transdermal Cannabidiol Gel) on Pediatric Behavioral and Emotional Symptoms of 22q11.2 Deletion Syndrome



Efficacy assessments (week 14 vs baseline) include:

- Aberrant Behavior Checklist-Community (ABC-C)
- Anxiety, Depression and Mood Scale (ADAMS)
- Qualitative Caregiver Reported Behavioral Problem Survey
- Clinical Global Impression – Severity and Improvement



Developmental and Epileptic Encephalopathies (DEE)



DEE

- Group of rare / ultra rare childhood-onset epilepsies with impaired or regressed developmental progress
- Cognitive impairment, psychiatric problems, and behavioral disturbances are phenotypic
- Medically fragile population
 - Comorbidities include cerebral palsy, chronic respiratory infections, gait disturbances, movement disorders, scoliosis, and feeding problems
 - Includes wheelchair bound individuals, feeding tubes
- Most common and debilitating seizure types:
 - Focal impaired-awareness (FIAS) – complex partial
 - Focal to bilateral tonic-clonic and generalized tonic-clonic (TCS) – convulsive seizures (CS)

Developing Zigel in DEE

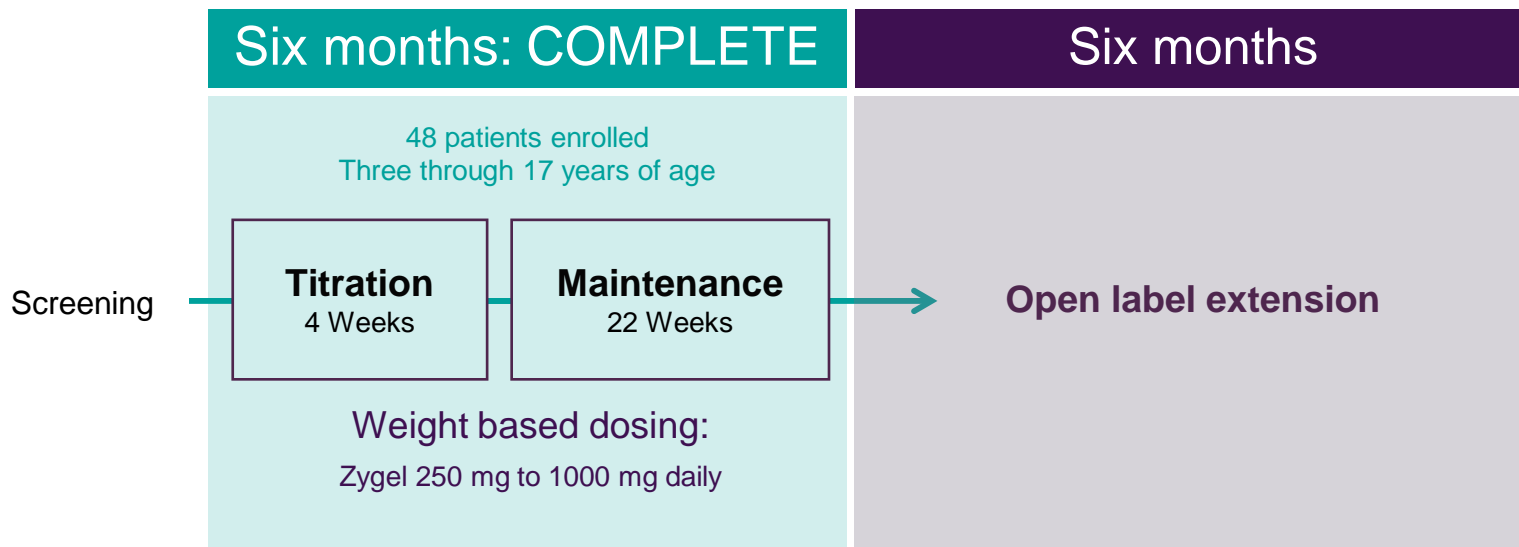
- Strong positive data observed in open label BELIEVE trial
- Due to the heterogeneity of DEE patients, FDA suggests pursuing individual syndromes rather than considering DEE as a single condition
- Evaluation of potential target indication(s) is ongoing
- Expect to finalize target syndrome selection in 2021 in one or more DEE syndromes





BELIEVE Phase 2 Trial in DEE

Open LaBel Study to Assess the Safety and Efficacy of ZYN002 Administered as a Transdermal Gel to Children and Adolescents with Developmental and Epileptic Encephalopathy



Results of BELIEVE Phase 2 Trial



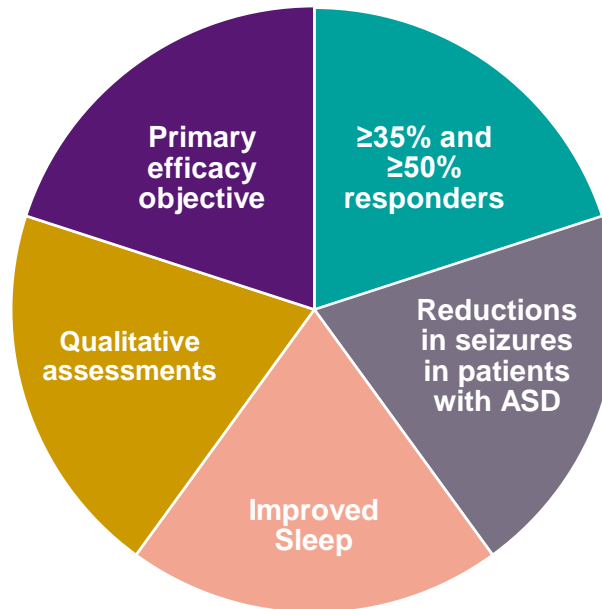
Clinically Meaningful Improvements in FIAS / TCS and QoL vs. Baseline

Mean % Reductions in Seizures

Month 3 (n=33): 44%
 Month 6 (n=29): 51%
 Month 9 (n=18): 60%
 Month 12 (n=18): 73%

% of patients with ≥35% and ≥50% Reductions in FIAS and TCS

≥35% reductions	≥50% reductions
Month 3: 58%	Month 3: 46%
Month 6: 62%	Month 6: 55%
Month 12: 89%	Month 12: 83%



Mean % Reductions in Seizures: Comorbid ASD

Month 3 (n=33): 45%
 Month 6 (n=29): 59%
 Month 9 (n=18): 67%
 Month 12 (n=18): 74%

ELDQOL

Statistically significant reductions in subscale scores for seizure severity, behavior, and mood ($p < 0.01$)

Caregiver Feedback

Verbatim feedback included improved vitality, concentration and cognition, and school improvement

Sleep Disturbance Scale for Children (SDSC) % Improvement

Statistically significant improvements observed in

Total Score: 36%; $p=0.012$
 Disorders of initiating/maintaining sleep: 22%; $p=0.006$
 Disorders of arousal/nightmares: 100%; $p=0.031$
 Sleep wake transition disorder: 31%; $p=0.030$



BELIEVE Safety



Zygel Well Tolerated over 12 months: No Safety Signal Identified

- Tolerability profile consistent with the safety database for Zygel
- Most treatment-emergent adverse events (TEAEs) (any event, whether unrelated or related to study drug) were mild or moderate
- Two SAEs deemed possibly drug-related (LRTI and status epilepticus)
- No drug-related clinically significant changes in vital signs, ECGs, or laboratory findings







Financial Strength

- Clean balance sheet
 - No debt, 29.4 M shares outstanding (as of November 5, 2020)
- Cash and cash equivalent position of \$64.3M as of September 30, 2020
- Cash runway expected to be sufficient to fund operations and capital requirements into 2023



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