FcRn Targeting, A Novel Mechanism for Treatment of Generalized Myasthenia Gravis Focus on an Anti-Neonatal Fc Receptor IgG1 Antibody Fragment

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Abbreviations

- Ab = antibody
- ACh = acetylcholine
- AChE = acetylcholine esterase
- AChR = acetylcholine receptor
- AChR-Ab = acetylcholine receptor antibody
- AEs = adverse events
- BLA = biologics license application
- CMI = clinically meaningful improvement
- ColQ = collagen Q
- CT = current treatment
- EQ-5D-5L = Equol questionnaire
- Fc = fragment crystallizable region of an antibody
- FcRn = neonatal Fc receptor
- gMG = generalized myasthenia gravis
- IgG = immunoglobulin G
- IQR = interquartile range
- IR = incidence rate
- IV = intravenous
- IVIg = intravenous immunoglobulin
- Kv1.4 = voltage-gated potassium channel 1.4
- LRP4 = lipoprotein receptor-related protein 4

- MAC = membrane attack complex
- MG-ADL = Myasthenia Gravis Activities of Daily Living
- MGC = MG Composite
- MGFA = Myasthenia Gravis Foundation of America
- MGQoL15r = revised 15-item MG Quality of Life
- MIR = main immunogenic region
- MuSK = muscle-specific kinase
- NMJ = neuromuscular junction
- NNT = Number needed to treat
- NSIST = nonsteroidal immunosuppressive therapy
- OLE = open-label extension
- PLEX = plasma exchange
- PY = patient-year
- QMG = Quantitative Myasthenia Gravis
- rHuPH20 = recombinant human hyaluronidase PH20
- RyR = ryanodine receptor
- SAEs = serious adverse events
- SC = subcutaneous
- SE = standard error
- VGSC = voltage-gated sodium channels

Learning Objectives

- Understand the direct pathogenic effect of IgG autoantibodies against acetylcholine receptors (AChR) in generalized myasthenia gravis (gMG)
- Explore the role of FcRn inhibition in the treatment of gMG
- Explore in-depth data for the anti-FcRn fragment, in terms of structure, potential impact, tolerability profile, and efficacy and safety in gMG patients receiving either IV infusion or subcutaneous injectable treatment

Generalized Myasthenia Gravis Mechanisms of Disease

Generalized Myasthenia Gravis (gMG)

- Prototypical autoimmune disease^a
- IgG autoantibodies target structures in the neuromuscular junction (NMJ)^a
- Results in muscle weakness^a
 - Generalized or localized
 - Increases with exercise/repetitive movement
 - May fluctuate from day to day or throughout the day
 - Eye muscles almost always involved (diplopia, ptosis)



Age	Incidence rate ^b
6-11	0.2
12-17	0.4
18-49	1.5
50-64	4.0
65+	10.2

- Incidence rate of gMG is higher than previously understood: 3.2 per 100,000.^b
- Males and females equally affected ^b
 - Older people are disproportionately burdened^b

Autoantibody Subtypes in gMG

- Major disease subtypes are defined by NMJ protein targets of pathogenic IgG autoantibodies¹⁻⁵
 - AChR: ~85% most common
 - MuSK: ~5%-8%
 - LRP4: ~1-2%
- In ~10% of patients, no known autoantibodies can be found¹

1. Fichtner ML et al. Front Immunol. 2020;27(11):776.

- 2. Lazaridis K, Tzartos S. Front Immunol. 2020;11:212.
- 3. Zisimopoulou P et al. J Autoimmun. 2014;52:139-145.
- 4. Rodolico C et al. Front Neurol. 2020;11:660.
- 5. Hoffmann S et al. Neuromuscul Disord. 2023 Feb;33(2):139-144



Distinct Immune Mechanisms with AChR, MuSK, and LPR4 IgG Autoantibodies

	AChR MG Subtype	MuSK MG Subtype	LRP4 Subtype*
Thymus	Hyperplasia (in a subset)	Normal	Hyperplasia (in some patients)
Autoantibody IgG subclass	lgG1 and lgG3	lgG4	IgG1 and IgG2
Role for complement	Yes	Not significant	Yes
B cell subtype responsible for autoantibody production	CD20 ^{neg} plasma cells	Plasmablasts	Unclear

*Scant data is available to characterize immune mechanisms for the LRP subtype

There are key autoimmune characteristics that differentiate AChR MG, MuSK MG, and LRP4 MG subsets — with possible implications for response to immunomodulating therapies

1. Binding and complement activation at the NMJ

Impact of Anti-AChR Ab

IgG autoantibodies to AChR cause

Complement-mediated damage Crosslinking and accelerated AChR degradation (antigenic modulation) Functional AChR blockade

Leading to

Diminished structural integrity of the NMJ Reduced number/function of AChRs Failure of neuronal transmission



Antibodies to AChR in Patients with gMG Are Polyclonal and Heterogeneous

- Serum from patients with gMG may include antibodies that recognize any of the 4 extracellular subunits (α, β, ε/γ, or δ) that make up AChR¹
- Antibodies to the α subunit make up ~50% of all IgG autoantibodies and are more pathogenic^{2,3}
- Overall, IgG autoantibody titers do not correlate well with *disease severity*; however, for individual patients, IgG autoantibody titers have been associated with both *symptom severity* and *response to treatment*¹
- MAC formation appears to correlate modestly with disease severity⁴
- Some IgG autoantibodies activate MAC formation, others do not^{4,5}

4. Obaid AH, Neurol Neuroimmunol Neuroinflamm. 2022;9(4):e1169





Image source: Koneczny I, Herbst R. Cells. 2019;8(7):672.

^{1.} Lazaridis K, Tzartos S. *Front Immunol*. 2020;11:212. 2. Keller CW et al. *Int J Mol Sci*. 2021:22:5755.

^{3.} Koneczny I, Herbst R. Cells. 2019;8(7):672.

^{5.} Rose N et al. Acta Neuropathol. 2022;144(5):1005-1025

Functions of FcRn and Role in gMG Treatment

Functions of FcRn

- Primary function: IgG and albumin salvage from lysosomal degradation via recycling and transcytosis of IgG within cells^{1,2}
- Binding preserves the integrity of IgG so that it will remain available for subsequent antigen presentation^{1,2}
- Found in multiple tissues and organs^{1,3}
 - Vascular endothelial cells
 - Intestines
 - Liver
 - Lung
 - Central nervous system
 - Kidney





Image adapted from: Roopenian DC, Akilesh S. Nat Rev Immunol. 2007;7(9):715-725.

2. Gable KL, Guptill JT. Front Immunol. 2020;10:3052.

3. Roopenian DC, Akilesh S. Nat Rev Immunol. 2007;7(9):715-725.

^{1.} Pyzik M et al. Front Immunol. 2019;10;10:1540.

IgG Recycling and Mechanism of Action of FcRn Inhibitors in Patients with gMG

- By protecting IgG from intracellular degradation, FcRn provides ~21-day circulating IgG half-life and high IgG plasma levels¹
- This mechanism can be blocked by agents that target and interfere with FcRn binding²
- In gMG, FcRn inhibition leads to enhanced IgG catabolism and reduced overall IgG and pathogenic autoantibody levels³



Patel DD, Bussell JB. J Allergy Clin Immunol. 2020;146(3):467-478.
 Keller CW et al. Int J Mol Sci. 2021;22(11):5755.
 Wolfe GI et al. J Neurol Sci. 2021;430:118074.

Image adapted from: Vanoli F, Mantegazza R. *TouchREVIEWS in Neurology*. 2022;18(2):Online ahead of journal publication; Keller CW et al. *Int J Mol Sci*. 2021;22(11):5755; and Wolfe GI et al. *J Neurol Sci*. 2021;430:118074.

New and Emerging FcRn Inhibitors

Compound	Туре	Admin. Route	Clinical Development Phase	References
Efgartigimod*	Human IgG1 antibody Fc-fragment	IV, SC	Phase III (complete) <i>Approved</i> ¹	 Howard JF Jr et al. <i>Neurology.</i> 2019;92:e2661-e2673. Howard JF Jr et al. <i>Lancet Neurol.</i> 2021;20(7):526-536. Ongoing Phase III ADAPT-NX: NCT04980495. Ongoing Phase III ADAPT-SC: NCT04735432. ADAPT+: NCT03770403. Vu T et al. AANEM 2022; Sep 21-24; Nashville, TN. Howard JF et al. AANEM 2022; Sep 21-24; Nashville, TN.
Rozanolixizumab	Humanized, anti-human FcRn IgG4P monoclonal antibody	SC	Phase III (complete) <i>Approved</i> ²	 Bril V et al. AANEM 2022; Sep 21-24; Nashville, TN. Abstract 204. Bril V et al. <i>Neurology</i>. 2021;96(6):e853-e865.
Batoclimab	Fully human IgG1 monoclonal antibody	SC	Phase III (recruiting)	Singh V. Seeking Alpha. Aug 25, 2020.NCT05403541
Nipocalimab	Fully human, monoclonal IgG1 anti-FcRn antibody	IV	Phase III (recruiting)	 Ling LE et al. <i>Clin Pharmacol Ther.</i> 2019;105:1031-1039. Guptill J et al. 2021 AAN Meeting; Apr 17-22, Abstract S29.002. Ongoing Phase II/III trials: NCT05265273 NCT04951622

*IV-administered efgartigimod (efgartigimod alfa) was FDA-approved December 17, 2021; SC-administered efgartigimod was FDA-approved June 20, 2023.

1. Meglio M. Neurology Live. 6/20/23. <u>https://www.neurologylive.com/view/fda-approves-subcutaneous-efgartigimod-vyvgart-hytrulo-generalized-myasthenia-gravis</u>. 2. Meglio M. Neurology Live. 6/27/23. <u>https://www.neurologylive.com/view/rozanolixizumab-becomes-first-fda-approved-therapy-achr-musk-antibody-positive-generalized-myasthenia-gravis</u>. Wolfe GI et al. *J Neurol Sci*. 2021;430:118074. National Institutes of Health. ClinicalTrials.gov.

How and Why Efgartigimod Safely Controls gMG Symptoms

Efgartigimod Alfa Structure and MOA in gMG

- First-in-class human anti-IgG1-derived Fc fragment
- Engineered to increase Fc/FcRn binding at neutral and acidic pH
- High affinity and avidity for FcRn
 - Greater retention in FcRn-positive compartments within cells
 - Increased lysosomal accumulation
- Binds to FcRn, blocking IgG binding and enhancing catabolism of pathogenic IgG autoantibodies



Gable KL, Guptill JT. *Front. Immunol.* 2020;10:3052. Efgartigimod alpha. Available at: <u>www.guidetopharmacology.org/GRAC/.</u> LigandDisplayForward?tab=structure&ligandId=9777.

Efgartigimod Alfa for gMG: Two Routes of Administration

Intravenous (IV) Infusion¹

- 10 mg/kg given over 1 hour
- Given in loading doses (1x per week for 4 weeks)
- Subsequent doses based on clinical evaluation (ie, as needed)*
- Weight stratification: patients weighing 120 kg or more should receive 1,200 mg per infusion

Subcutaneous (SC) Injection²

- 1,008 mg efgartigimod alfa + 11,200 units hyaluronidase
- Given as SC injection over approximately 30 to 90 seconds
- Given in loading doses (1x per week for 4 weeks)
- Subsequent doses based on clinical evaluation (ie, as needed)*
- Must be administered by an HCP

ADAPT-SC demonstrated that the efficacy of SC 1,000 mg efgartigimod was noninferior to IV infusion³

* Clinical evaluation based on MG-ADL scale.

1. Efgartigimod alfa-fcab [package insert]. Boston, MA. argenx; 2021. 2. Efgartigimod alfa and hyaluronidase-qvfc [package insert]. Boston, MA. argenx; 2023. 3. Li G, et al. AAN 2023. Abstract P1.017.

Phase III Clinical Trials with Efgartigimod in gMG: Spotlight on ADAPT

Efgartigimod Alfa – Phase III ADAPT Trial Study Design

ADAPT^a

Patients randomized 1:1 to receive cycles of 4 infusions at weekly intervals of 10 mg/kg efgartigimod alfa + CT or placebo + CT



- MGFA class II, III, IV
- AChR-Ab positive or negative
- MG-ADL score ≥5 (>50% nonocular)
- On ≥1 stable gMG treatment^b
- IgG ≥6 g/L



26 weeks (≤3 cycles^c)

Initiation of new treatment cycles:

- ≥5 weeks between cycles
- MG-ADL score ≥5^d
- MG-ADL score within 2 points of baseline

Note: Rectangles within arrows indicate day of efgartigimod alfa IV infusion.

^aThe ADAPT study was started on August 22, 2018 and was completed on April 6, 2020.

^bAcetylcholinesterase inhibitor, steroid +/or nonsteroidal immunosuppressive therapy. Patients could not change concomitant therapies. ^c \leq 3 cycles dosed at \geq 8 weeks after initial cycle. ^dWith >50% from nonocular items.

Howard JF Jr et al. Lancet Neurol. 2021;20(7):526-536.

Howard J. Presented at: American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM) 2022. September 21-24; Nashville, TN. Poster 108.

Primary endpoint:

Percent of MG-ADL responders in treatment cycle 1 (AChR-Ab+ patients)

Key secondary endpoints:

- Percent of QMG responders in treatment cycle 1 (AChR-Ab+ patients)
- Percent of MG-ADL responders in treatment cycle 1 (overall population)

Key exploratory endpoint:

 Percent attaining minimal symptom expression in treatment cycle 1 (AChR-Ab+ patients)

Efgartigimod Alfa – Phase III ADAPT Trial *Primary and Exploratory Endpoints*



Percent of AChR Ab+ Patients Who Attained Minimal Symptom Expression[†] in Treatment Cycle 1 (Exploratory Endpoint)



*>2-point MG-ADL improvement sustained for >4 weeks. *MG-ADL score of 0 or 1.

Efgartigimod Alfa: Phase III ADAPT Trial

Minimum Improvements in MG-ADL and QMG Scores in Cycle 1 in ACHR-Ab+ Patients



More patients on efgartigimod alfa vs placebo achieved greater improvements on MG-ADL and QMG scores (up to 9-point and 10-point reductions, respectively) at week 4

Efgartigimod Alfa – Phase III ADAPT Trial Impact on MG-ADL, MGC, MGQOL15r, QMG, IgG and Total IgG and AChR-Ab Levels



Patients on efgartigimod alfa + CT vs placebo + CT had greater improvements in MG-ADL, QMG, MCG, and MG-QQL15r and consistent reductions in IgG, total IgG and AChR antibodies in cycle 1; statistically significant differences were observed week 1 through week 7 in all

Efgartigimod Alfa – Phase III ADAPT Trial Impact on MGQOL15r in AChR-Ab+ patients across treatment cycles







**P* < 0.0001

Response to efgartigimod in the treatment cohort was durable and repetitive across treatment cycles.

Efgartigimod Alfa – Phase III ADAPT Trial Impact on Total IgG and MGQOL15r in AChR-Ab+ patients

Mean Changes From Baseline Total IgG and MG-QOL15r





- The largest between-group differences (>5 points) was seen at weeks 3, 4, and 5 in the efgartigimod-treated group.
 - More patients on efgartigimod alfa vs placebo achieved greater improvements in MGQOL15r scores, and total IgG levels, at week 10; *demonstrating the clinically relevant relationship between IgG and QoL*.

MG-QOL15r and total IgG for TC 1 in AChR-Ab+ participants. *AChR-Ab+* acetylcholine receptor antibody receptor—positive, *IgG* immunoglobulin G, *MG-QOL* Myasthenia Gravis-Quality of Life, *MG-QOL15r* Myasthenia Gravis-Quality of Life 15-item revised, *TC* treatment cycle. *indicates treatment administration (efgartigimod or matching placebo) timepoints (weeks 0, 1, 2, and 3)

Efgartigimod Alfa Phase III ADAPT Trial Summary of Findings for Primary and Secondary Endpoints*

	Efgartigimod alfa + CT	Placebo + CT	OR (95% CI)	<i>P</i> value
Primary Endpoint				
MG-ADL responder in treatment cycle 1 (AChR-Ab+ patients)	44/65 (68%) 19/64 (30%)		4.95 (2.21-11.53)	<0.0001
Secondary Endpoints				
Percent of QMG responders in treatment cycle 1 (AChR-Ab+ patients)	41/65 (63%)	9/64 (14%)	10.84 (4.18-31.20)	<0.0001
Percent of MG-ADL responder in treatment cycle 1 (all patients)	57/84 (68%)	31/83 (37%)	3.70 (1.85-7.58)	<0.0001
Percent of time with ≥2-point improvement in MG-ADL up to day 126 (AChR-Ab+ patients)	48.7%	26.6%	-	0.0001
Median time from day 28 until no clinically meaningful improvement, days (AChR-Ab+ patients)	35 (18-71)	8 (1-57)	-	0.26
Percent of early MG-ADL responders in treatment cycle 1 (AChR-Ab+ patients)	37/65 (57%)	16/64 (25%)	-	Not assessed [†]

*Data are n/N (%) or median (IQR), unless stated otherwise. Analyses were done in acetylcholine receptor antibody-positive patients unless otherwise stated. *Secondary endpoints were tested in hierarchical order. The fifth secondary endpoint was not assessed because the fourth secondary endpoint was not significant.

Efgartigimod Alfa Phase III ADAPT Trial EQ-5D-5L survey tool

- The EQ-5D-5L is a 2-page validated questionnaire available in 150 languages
- Measures 5 dimensions of health
- Each dimension has 5 levels of response
 - No problems, slight problems, moderate problems, severe problems, unable to/extreme problems
- Patients also rate their perception of their overall health using a visual analog scale (EQ-VAS)



Efgartigimod Alfa Phase III ADAPT Trial Effects shown across all dimensions of the EG-5D-5L



Saccà F, Barnett C, Vu T, et al. J Neurol. 2023;270(4):2096-2105

Efgartigimod Alfa Phase III ADAPT Trial Effects shown across all dimensions of the EG-5D-5L (cont.)



Saccà F, Barnett C, Vu T, et al. J Neurol. 2023;270(4):2096-2105

Efgartigimod Alfa Phase III ADAPT Trial Effects shown across all dimensions of the EG-5D-5L (cont.)



For each dimension of the EQ-5D-5L, those who received efgartigimod demonstrated improvement. The same was not true of those who received the placebo.

Efgartigimod Alfa Phase III ADAPT Trial Adverse Events

	Efgartigimod alfa + CT (n=84)	Placebo + CT (n=83)				
Any adverse event	65 (77%)	70 (84%)				
Any serious adverse event	4 (5%)	7 (8%)				
Any adverse event leading to study drug discontinuation	3 (4%)	3 (4%)				
Any infection	39 (46%)	31 (37%)				
Infusion-related reaction event	3 (4%)	8 (10%)				
Most common adverse events						
Headache	24 (29%)	23 (28%)				
Nasopharyngitis	10 (12%)	15 (18%)				
Nausea	7 (8%)	9 (11%)				
Diarrhea	6 (7%)	9 (11%)				
Upper respiratory tract infection	9 (11%)	4 (5%)				
Urinary tract infection	8 (10%)	4 (5%)				

There was no difference in the proportion of participants who left ADAPT due to adverse events in the efgartigimod vs placebo groups (3.6% rate in each)

FDA Approves New Treatment for Myasthenia Gravis

Approval is the First of a New Class of Medication for this Rare, Chronic, Autoimmune, Neuromuscular Disease

For Immediate Release: December 17, 2021

In the United States, efgartigimod alfa is indicated for the treatment of gMG in adult patients who are AchR-Ab+

Subsequently approved in Japan (January 2022) for treatment of gMG regardless of antibody status, in Europe (August 2022) for treatment of AChR-Ab+ gMG, and in China for treatment of AChR-Ab+ gMG in adults

VYVGART (efgartigimod alfa injection) package insert. argenx US. Boston, MA; May 2022.

FlandersBio. https://flanders.bio/en/news/argenx-european-commission-approval-vyvgart.

Businesswire. www.businesswire.com/news/home/20220119006179/en/argenx-Announces-VYVGART%E2%84%A2-Approval-in-Japan-for-the-Treatment-of-Generalized-Myasthenia-Gravis.

Efgartigimod Alfa Phase III ADAPT Trial Subgroup Analysis: Disease Duration

Improvement = decrease of 2 or more MG-ADL points and reduction of total IgG

Participants with <3 yrs disease duration responded better after 1 treatment cycle and achieved a greater degree of minimal symptom expression (MSE), than those who had <u>></u>6 yrs disease duration:

VS

<3 years gMG disease duration</p>

- 78.6% (n=11/14) efgartigimod-treated were MG-ADL responders vs placebo (23.5%, n=4/17)
- 42.9% (n=6/14) efgartigimod-treated achieved MSE vs placebo (12.5%, n=2/16)

<u>>6 years gMG disease duration</u>

- 58.6% (n=21/37) efgartigimod-treated were MG-ADL responders vs placebo (21.9% (n=7/32)
- 40.5% (n=15/37) efgartigimod-treated achieved MSE vs placebo (9.4%,n=3/32)

Efgartigimod Alfa Phase III ADAPT Trial

Subgroup Analysis: Responders by Disease Duration and Concomitant Medication

Participants who received efgartigimod had improved MG-ADL and QMG scores regardless of their disease duration or concomitant medications taken.



Responders by disease duration

Efgartigimod Alfa Phase III ADAPT Trial

Subgroup Analysis: Responders by Disease Duration and Concomitant Medication

Participants who received efgartigimod had improved MG-ADL and QMG scores regardless of their disease duration or concomitant medications taken.



Responders by concomitant medication

Phase III ADAPT Trial

Subgroup Analysis: Improvements in Refractory AChR-Ab+ Patients

Exposure to prior treatments did not affect efgartigimod's efficacy or safety in refractory gMG.†



[†] Refractory = prior exposure to ≥2 immunosuppressive therapies (IT), or ≥1 IT requiring plasma exchange or IV immunoglobulin multiple times within 1 year prior to the study.

Phase III ADAPT Trial, Biological Sex Subgroup Analysis

MG-ADL and QMG Responders by AChR Ab+ and Modified Intent-To-Treat Population

	Overall AChR-Ab+ Population		Female (n=86)		Male (n=43)			
Endpoint, n (%)	Efgartigimod (n=65)	Placebo (n=64)	Between-Treatment Analysis OR (95% CI)*	Efgartigimod (n=46)	Placebo (n=40)	Efgartigimod (n=19)	Placebo (n=24)	Between-Sex Subgroup Analysis [†]
MG-ADL responders	44 (67.7)	19 (29.7)	4.95 (2.21–11.53) <i>P</i> <.0001	31 (67.4)	13 (32.5)	13 (68.4)	6 (25.0)	<i>P</i> =.7014
QMG responders	41 (63.1)	9 (14.1)	10.84 (4.18–31.20) <i>P</i> <.0001	26 (56.5)	7 (17.5)	15 (78.9)	2 (8.3)	<i>P</i> =.1595

AChR-Ab+, acetylcholine receptor antibody-positive; CI, confidence interval; MG-ADL, Myasthenia Gravis Activities of Daily Living; OR, odds ratio; QMG, Quantitative Myasthenia Gravis. *Treatment effect was tested using exact conditional logistic regression. ⁺Homogenous ORs were tested using Zelen's Exact Test.

ADAPT participants had demographic and baseline disease characteristic differences between assigned male and female participants.

However, efgartigimod was equally effective in participants regardless of their sex.

ADAPT+ Study Design



^aParticipants who completed ADAPT were eligible to be rolled over to ADAPT+. Participants who required retreatment but were unable to complete a treatment cycle within the timeframe of ADAPT were also eligible to be rolled over. ^bThe ADAPT study was started on August 22, 2018 and was completed on April 6, 2020. ^cThe ADAPT+ study was started on March 1, 2019 and the current data cutoff was January 31, 2022. ^dAcetylcholinesterase inhibitor, steroid +/or nonsteroidal immunosuppressive therapy. Patients could not change concomitant therapies in ADAPT or during dosing in Part A of ADAPT+. Physicians could change concomitant therapies between doses in Part A and at any time in Part B of ADAPT+. ^eS3 cycles dosed at ≥8 weeks after initial cycle. ^fWith >50% from nonocular items.

Howard J. Presented at: American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM) 2022. September 21-24; Nashville, TN. Poster 108. US National Library of Medicine. ClinicalTrials.gov. NCT03770403.

Primary endpoint:

Safety and tolerability as

measured by the incidence of
Phase III ADAPT/ADAPT+ Trials: Concluding Analyses

Consistent and Repeatable Improvements in MG-ADL Score Among Patients with AChR-Ab+ gMG



Change in MG-ADL Score

^aOnly cycles with data out to Week 11 are included.



Phase III ADAPT/ADAPT+ Trials: Concluding Analyses

Consistent and Repeatable Improvements in QMG Score Among Patients with AChR-Ab+gMG



Change in QMG Score

Distribution of Time Between Cycles and Number of Treatment Cycles Per Year in ADAPT/ADAPT+

AChR-Ab+ Population

Mean Time Between Cycles in AChR-Ab+ Population With >350 Days of Follow-Up in ADAPT/ADAPT+ (n = 95)



In the ADAPT/ADAPT+ trials, the median number of the cycles of efgartigmod that patients received per year was 5 cycles/year

- Time between cycles is defined as the time from the last infusion of the previous treatment cycle to the first infusion of the subsequent treatment cycle
- ADAPT+ demonstrated that individualization of cycle dosing allows for flexible or fixed time between cycles, and initiation of subsequent cycles is based on clinical evaluation and participant/health care professional goals

ADAPT/ADAPT+ Safety Findings (Overall Population)

Long-term Efgartigimod Alfa Treatment Is Well Tolerated

		ADAPT				ADAPT+	
	Placebo (n=83) [34.5 PY]		Efgartigimod (n=84) [34.9 PY]		Efgartigimod (n=145) [229.0 PY]		
	IR ^a	n (%)	IR ^a	n (%)	IRa	n (%)	
TEAEs ^b	7.83	70 (84)	7.23	65 (77)	3.53	124 (86)	
SAEs	0.29	7 (8)	0.11	4 (5) ^c	0.24	36 (25) ^c	
≥1 Infusion-related reaction event	0.26	8 (10)	0.09	3 (4)	0.09	15 (10)	
Infection TEAEs	1.22	31 (37)	1.61	39 (46)	0.73	80 (55)	
Discontinued due to TEAEs	0.09	3 (4)	0.20	3 (4)	0.06	12 (8)	
Severe TEAEs (grade ≥3)	0.35	8 (10)	0.29	9 (11)	0.33	40 (28)	
Death ^d	-	0 (0)	-	0 (0)	0.02	5 (3)	
Most frequent TEAEs							
Nasopharyngitis	0.49	15 (18)	0.34	10 (12)	0.10	20 (14)	
Upper respiratory tract infection	0.14	4 (5)	0.32	9 (11)	0.03	6 (4)	
Urinary tract infection	0.12	4 (5)	0.26	8 (10)	0.08	13 (9)	
Headache	1.13	23 (28)	1.15	24 (29)	0.45	36 (25)	
Nausea	0.43	9 (11)	0.20	7 (8)	0.06	9 (6)	
Diarrhea	0.41	9 (11)	0.17	6 (7)	0.08	14 (10)	
COVID-19 ^e	-	O (O)	-	0 (0)	0.10	23 (16) ^f	

^aIR was calculated as number of events per total PY of follow -up. ^bTEAEs were predominantly mild or moderate. ^cOnly 1 SAE was considered treatment related per investigator. ^dNone of the deaths in ADAPT+ were related to efgartigimod administration per the principal investigator.^eIncludes all preferred terms of COVID19, COVID-19 pneumonia, coronavirus infection, exposure to SARS-CoV-2, and SARS-CoV-2 test positive. ^fAmong participants reporting COVID-19 during ADAPT+, 83% had not received prior COVID-19 vaccination.

Numbers Needed to Treat

NNT for combination treatment

Efgartigimod IV Has Lowest NNT and Health Care Related costs



CT, conventional therapies





Observed Steroid-Sparing Effect of Efgartigimod *Real-World Experiences*

- In a single center from Nov 2021 to Feb 2023, efgartigimod was administered to 19 patients with gMG with fixed cycle dosing for the first 2 cycles and then as needed based on MG-ADL and QMG score changes¹
 - Clinically meaningful improvement was observed in the gMG patients
 - Among patients receiving prednisone (15/19), there was a 33% mean reduction in the use of prednisone
- In another study at an academic center treating 8 patients with gMG over 18 months (over 46 infusions)²
 - All patients receiving corticosteroids (7/8) reduced their doses
 - Mean reduction in prednisone dosing: 13.57 mg

Phase III Clinical Trials With Efgartigimod-SC in gMG: ADAPT-SC and ADAPT-SC+

ADAPT-SC Study Design Phase III Randomized Trial

Objective: To demonstrate that the pharmacodynamic effect of efgartigimod PH20 SC is noninferior to that of efgartigimod alfa (IV)



^aAcetylcholinesterase inhibitors, steroids, and/or NSIST. ^bCoformulated with 2000 U/mL rHuPH20. ^cPatients could not receive treatment in the 7-week follow-up period, except rescue therapy (steroids, IVIg, and PLEX).

Howard JF. MG Foundation of America Scientific Session. American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM) 2022. September 21; Nashville, TN.

ADAPT-SC

Primary and Secondary Efficacy Endpoints, Overall Population







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Mean

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ADAPT-SC Safety Summary of AEs, Overall Population

	Efgartigimod PH20 SC (n=55)	Efgartigimod alfa (n=55)
Any AE , n (%)	37 (67.3)	28 (50.9)
Any AE Grade ≥3 *, n (%)	9 (16.4)	4 (7.3)
Any SAE, n (%)	8 (14.5)	4 (7.3)
≥1 injection-site reaction (localized), n (%)	21 (38.2) [†]	1 (1.8) [‡]
Any infection, n (%)	10 (18.2)	9 (16.4)
Discontinued study treatment owing to AEs, n (%)	2 (3.6)§	0 (0.0)
Most commonly observed AEs occurring in ≥5 participants, n (%) Injection-site rash Headache Injection-site erythema Myasthenia gravis Injection-site pruritus	8 (14.5) [¶] 7 (12.7) 7 (12.7) 6 (10.9)** 5 (9.1)	0 (0) 7 (12.7) 0 (0) 1 (1.8) 0 (0)

AEs were predominantly mild or moderate in severity. No deaths were reported. Based on efficacy and safety findings, a BLA was submitted to FDA September 21, 2022.

AE = adverse event; BLA = Biologics License Application; IV = intravenous; OLE = open-label extension; SAE = serious adverse event; SC = subcutaneous

*No Grade 4 or 5 AEs were reported. [†]Injection site reactions were mild or moderate; most were transient and resolved without treatment. [‡]No preferred-term AEs of injection-site reaction were recorded. This AE was incorrectly coded (should have been catheter-site reaction). [§]One treatment discontinuation was due to COVID-19 infection and the other to MG worsening on Day 1. [¶]Incidence of injection site reactions did not increase with subsequent injections. **Re-emergence of symptoms typically happened at the end of the follow-up period; all patients who rolled over to the OLE were responders when re-treated with efgartigimod.

Howard JF. MG Foundation of America Scientific Session. American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM) 2022. September 21; Nashville, TN. Bloomberg Business Press Release. <u>www.bloomberg.com/press-releases/2022-09-21/argenx-submits-biologics-license-application-to-u-s-food-and-drug-administration-for-subcutaneous-efgartigimod-for-treatment-of</u>.

ADAPT-SC+ Interim Results Long-Term Efficacy

Mean Change in MG-ADL from Baseline



^aValues for MG-ADL range from 0-24, with higher total scores indicating more impairment. ^bThe mean (SE) change of MG-ADL baseline from Cycle 1 to Cycle 6 was -1.3 (0.29).

Efgartigimod PH20 SC treatment resulted in consistent and repeatable improvements in MG-ADL, MG-QOL15r, and EQ-5Q-5L VAS total scores over multiple cycles in AChR-Ab+ participants, with improvements noted as early as the week after the first administration

ADAPT-SC+ Interim Results Long-Term Efficacy



The majority of AChR-Ab+ participants experienced a CMI in MG-ADL, and a subset were able to achieve MSE; the proportions of participants achieving CMI or MSE were consistent across multiple cycles

ADAPT-SC+ Interim Results No New Safety Signals Compared with ADAPT-SC

		Efgartigimod PH20 SC (n=179; PYFU=193.4)		
	IR ^a	n (%)		
Any AE, n (%)	9.0	152 (84.9)		
Any AE grade ≥3, n (%)	0.4	36 (20.1)		
Any SAE, n (%)	0.3	33 (18.4)		
Any ISR, n (%)	3.2	82 (45.8)		
Any infection, n (%)	1.0	91 (50.8)		
Fatal event ^b	<0.1	4 (2.2)		
Discontinued study treatment owing to AEs ^c , n (%)	<0.1	4 (2.2)		
Most commonly observed AEs ^d , n (%) Injection site erythema COVID-19 Headache Nasopharyngitis Diarrhea Injection site pain Injection site pruritus Injection site bruising	1.7 0.2 0.6 0.2 0.2 0.2 0.2 0.2 0.2	52 (29.1) 40 (22.3) 36 (20.1) 28 (15.6) 24 (13.4) 21 (11.7) 19 (10.6) 18 (10.1)		

All ISRs were mild or moderate and decreased with subsequent cycles, and no ISRs led to treatment discontinuation

^aIR was calculated as number of events per total PYFU. ^bFatal events (metastatic renal cell cancer, cardiac arrest, pulmonary mass, and COVID-19/respiratory failure) were not related to efgartigimod PH20 SC treatment, as determined by investigators. ^cTreatment discontinuation due to metastatic renal cell cancer (Cycle 1, death), cardiac arrest (Cycle 2, death), COVID-19/respiratory failure (Cycle 3, death), and MG crisis (Cycle 1). ^dMost frequent AEs occurring in >10% of participants receiving efgartigimod PH20 SC.

Howard JF Jr et al. Presented at: AANEM 2023. Poster 222.

FDA Approves Vygart Hytrulo (efgartigimod alfa and hyaluronidase-qvfc) Injection for Subcutaneous Use in Generalized Myasthenia Gravis

June 20, 2023 approval is first FDA-approved subcutaneous injectable for generalized myasthenia gravis (gMG)

In the United States, efgartigimod alfa and hyraluronidase is indicated for the treatment of gMG in adult patients who are AchR-Ab+ Real World Experience with Efgartigimod and Individualized Dosing

Individualized Dosing in Efgartigimod Trials: Use of MG-ADL

- Several validated questionnaires measure signs and symptoms of gMG^a
- The Myasthenia Gravis Activities of Daily Living (MG-ADL): 8-item questionnaire measures signs and symptoms over time.^{a,b}
 - Frequently employed in clinical trials to measure patient-reported outcomes^a
- The Quantitative Myasthenia Gravis Score (QMG): 13-item questionnaire takes into account fluctuating nature of the disease.^a



Track your symptoms regularly. If you track them weekly,

a. Barnett C et al. Neurol Clin. 2018;36(2):339-353. b. MG-ADL scale: https://vyvgart.com/content/dam/brand-site-patient/site/pdf/MG-ADL-assessment-tool.pdf c. Howard JF, et al. Lancet Neurol. 2021;20(7):526-536. d.

Individualized Dosing in Efgartigimod Trials

ADAPT+ treatment frequency ^b

- Patients received 4 doses of 10 mg/kg body weight in an IV infusion treatment once per week for 4 weeks
- Subsequent flexible treatment cycles were initiated <u>></u>28 days after the last dose based on clinical evaluation (MG-ADL scores >5)
- Participants (n=95) who were followed for ≥1 year, received a median of 5 cycles (20 doses) within a year

ADAPT-SC+ treatment schedule ^c

- Patients received 4 doses of 1,000 mg SC injections, one per week for 4 weeks (on days 1, 8, 15, and 22) ^d
- They were then followed for 3 weeks ^d
- In ADAPT-SC+, subsequent flexible treatment cycles were initiated >28 days after the last dose based on clinical evaluation (MG-ADL scores >5) ^c
- Participants (n=164) received ~3 cycles (12 doses) over a mean study duration of 170 days, or ~24.2 weeks ^c

a. Howard JF, et al. Lancet Neurol. 2021;20(7):526-536. b. Pasnoor M et al. AAN 2023. Boston, MA. Abstract S5.006. c. Howard JF et al. AAN 2023. Boston, MA. Abstract P1.04. d. NCT04735432.

Clinical Experience With Efgartigimod Real-World Outcomes in Treating AChR+ gMG Patients



Two-thirds of patients with AChR+ MG had clinically meaningful improvement after 1 cycle with efgartigimod

In an analysis of an efgartigimod patient support-group program, a total of 705 patients with a baseline score of ≥ 2 and who had ≥ 4 MG-ADL scores post treatment initiation with efgartigimod were included



- The dataset was obtained from My VYVGART Path, a patient support program that provides personalized Nurse Case Manager support for enrolled patients with gMG.
- Through phone contact, My VYVGART Path captures:
 - Baseline characteristics (age, gender, etc.)
 - Dates of efgartigimod infusions
 - MG-ADL scores (limited collection, highly dependent on patient availability)
- These data were integrated with dispense and MG-ADL data from specialty pharmacies.



 Adults enrolled in My VYVGART Path who:

> Initiated efgartigimod by July 28, 2023

> > AND

Had baseline MG-ADL (of ≥2 points) and at least 4 MG-ADL scores postefgartigimod initiation captured



Clinically meaningful improvement in MG-ADL was observed after efgartigimod initiation

Largest observed response (n=705 data points)

▼ 5.8 points mean reduction from baseline, with 93% of patients experiencing clinically meaningful improvement (≥2 points)

Average observed response (n=4318 data points)

▼ 3.7 points mean reduction from baseline, with 73% of patients experiencing clinically meaningful improvement (≥2 points) Minimum point improvements in MG-ADL

Largest observed response



Average observed response





At their best state, the majority of patients achieved an MG-ADL score ≤4, with response across all subdomains

MSE rate (overall and by baseline MG-ADL score)



- Minimum symptom expression (MSE) has recently been examined as an endpoint in clinical trials.
- At their best state, 35.5% of patients had achieved MSE
- MSE was achieved by patients with a wide range of baseline MG-ADL scores



- Patients with gMG have IgG autoantibodies against the AChR and other components of the NMJ
- FcRn plays a central role in prolonging the half-life of IgG and contributes to the pathogenesis of gMG
- Efgartigimod alfa is a human anti-IgG1-derived Fc fragment that binds to FcRn and reduces IgG recycling, available as IV or SC Formulation
- In individuals with gMG who are anti-AChR autoantibody-positive, efgartigimod alfa:
 - Enhances IgG catabolism
 - Reduces levels of IgG and pathogenic IgG autoantibodies
 - Is well tolerated
 - Is efficacious in people with refractory disease
- Efgartigimod has been FDA approved as IV and SC formulation
- Real life experience with efgartigimod have reproduced clinical trial experience and have demonstrated that individualized dosing in gMG is possible

This presentation has been developed by PlatformQ Health Education in consultation with Drs. Ali A. Habib, Nicholas J. Silvestri, Jeffrey Rosenfeld, James F. Howard Jr., and Jon Durrani.

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