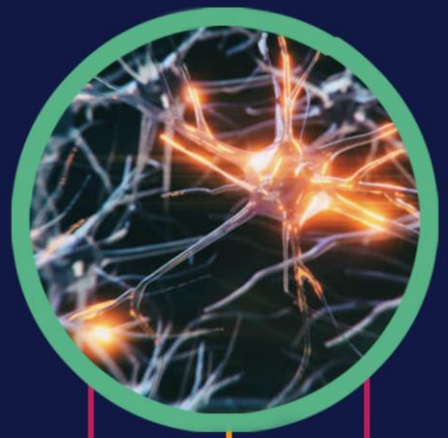
Contemporary Considerations in MULTIPLE SCLEROSIS TREATMENT

A Post-Pandemic Educational Curriculum

Outline

- Choosing a therapy at multiple sclerosis diagnosis
- Multiple sclerosis and COVID-19
- Patient perspectives on disease-modifying therapy



Choosing Therapy at Diagnosis

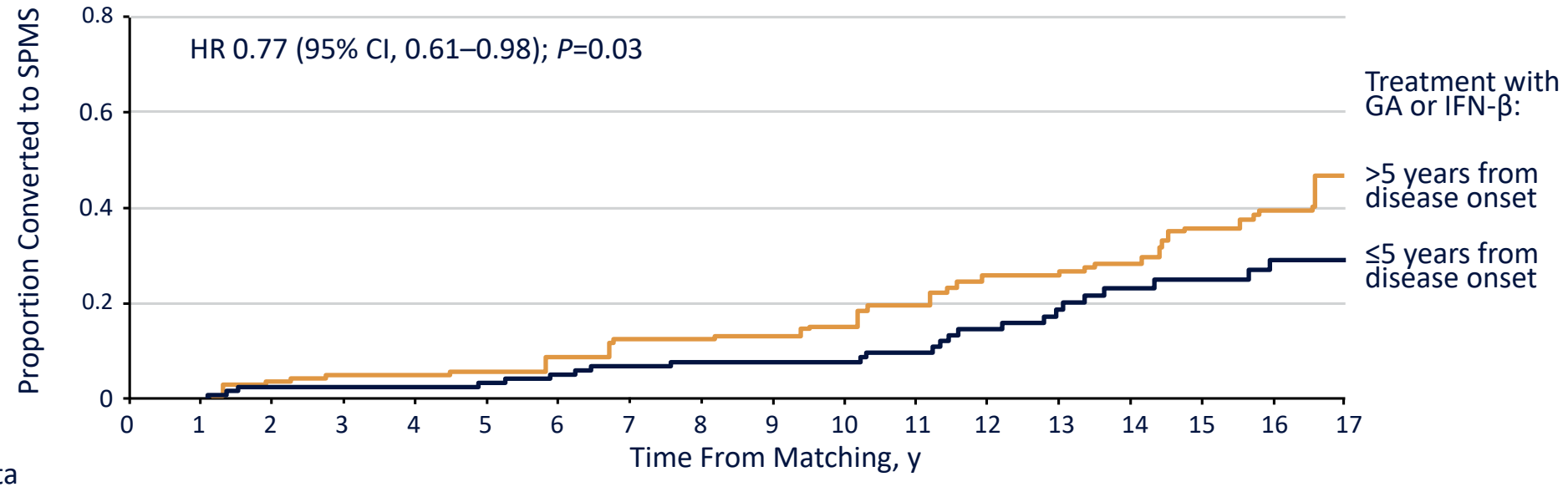
Benefits of Early Treatment

- Neural damage begins from onset of disease[1]
- Starting DMT earlier in disease course leads to better long-term outcomes[2]
  - Delays time to disability progression significantly[3]
- Longer DMT exposure time more likely to provide protection against disability progression[4]

DMT, disease-modifying therapy.

1. Cerqueira JJ et al. *J Neurol Neurosurg Psychiatry*. 2018;89:844-850; 2. Goldschmidt G, McGinley MP. *Neurol Clin*. 2021;39:21-33; 3. Lublin FD et al. *Brain*. 2022;145:3147-3161; 4. Amato MP et al. *Brain*. 2020;143:3013-3024.

Benefits of Early Treatment – Conversion to SPMS



No. with follow-up data
Treatment with GA or IFN-β:

>5 years from disease onset	38	38	38	38	36	31	23	15	11
≤5 years from disease onset	120	120	120	119	115	102	77	60	44

Comparison of cumulative hazard of conversion to secondary progressive multiple sclerosis by timing of treatment. Mean follow-up was 13.4 years (IQR, 11.0–18.1 years). Cohort study with prospective data from 68 neurology centers in 21 countries, 1555 patients with relapsing-remitting MS commencing DMTs (or clinical monitoring) between 1988–2012 with minimum 4 years' follow-up.

DMT, disease-modifying therapy; GA, glatiramer acetate; HR, hazard ratio; IFN-β, interferon beta; IQR, interquartile range; SPMS, secondary progressive multiple sclerosis.

Brown JWL et al. *N Engl J Med*. 2019;32:175-187.

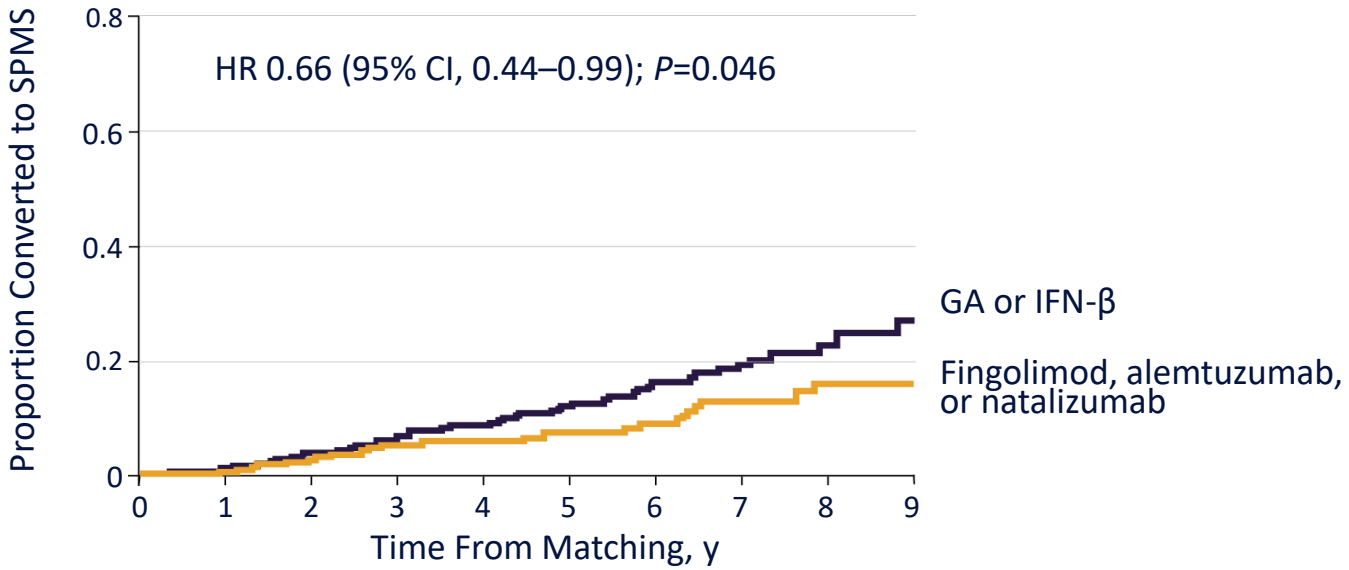
Escalation Therapy vs Early High-efficacy Therapy

- Strategy that gives precedence to safety over efficacy and, if necessary, to sequentially advance in the treatment pyramid[1]

- Earlier escalation (≤5 years vs > 5 years) of GA/IFN-β therapy to fingolimod/alemtuzumab/natalizumab associated with lower risk of conversion to SPMS[2]

1. Freedman MS et al. *Can J Neurol Sci*. 2018;45:489-503; 2. Brown JWL et al. *N Engl J Med*. 2019;32:175-187.

Escalation Therapy vs **Early High-efficacy Therapy**



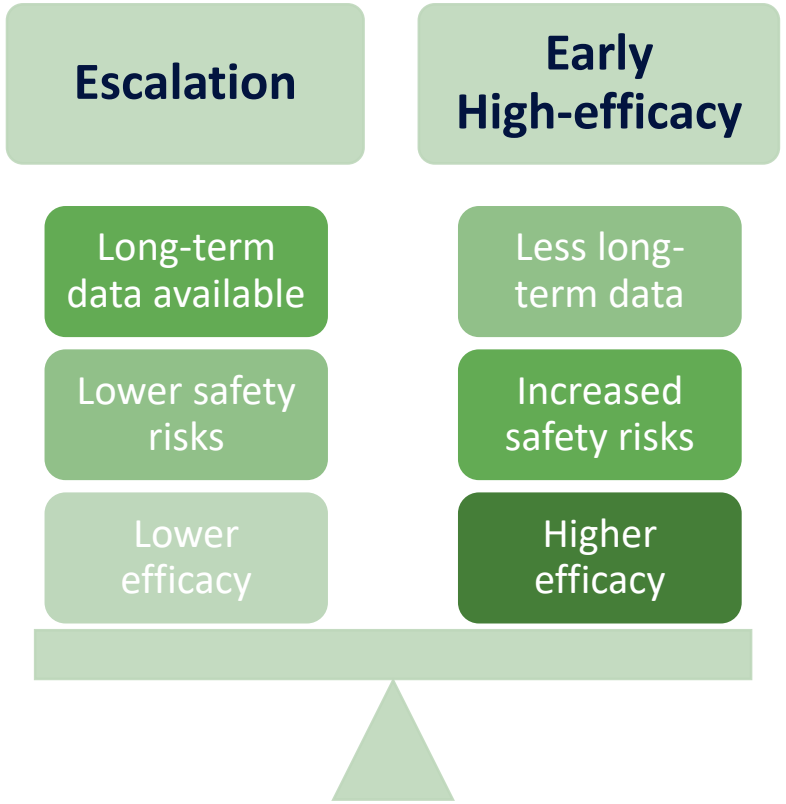
No. with follow-up data

Initial treatment										
GA or IFN-β	380	380	380	380	380	252	182	142	93	44
Fingolimod, alemtuzumab, or natalizumab	235	235	235	235	235	148	103	80	54	30

Comparison of cumulative hazard of conversion to secondary progressive multiple sclerosis for initial treatment. Mean follow-up was 5.8 years (IQR, 4.7–8.0 years). Cohort study with prospective data from 68 neurology centers in 21 countries, 1555 patients with relapsing-remitting MS commencing DMTs (or clinical monitoring) between 1988–2012 with minimum 4 years' follow-up.

Brown JWL et al. *N Engl J Med*. 2019;32:175-187.

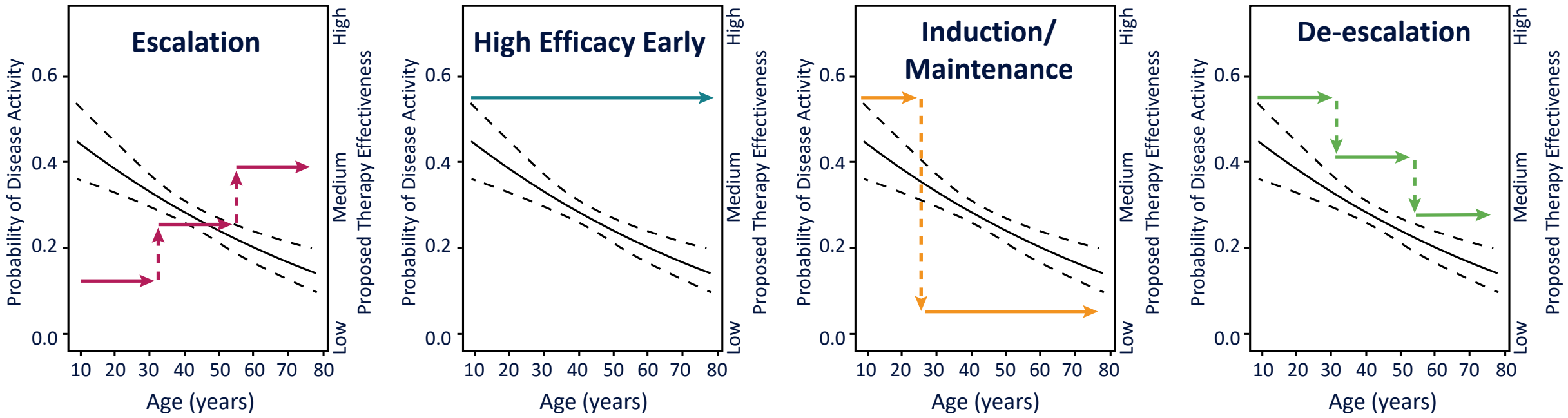
Escalation Therapy vs Early High-efficacy Therapy



Guidelines suggest starting each patient on optimal therapy for clinical condition, prognosis, needs

Goldschmidt C, McGinley MP. *Neurol Clin*. 2021;39:21-33; Ford CC et al. *CMSC DMT Guidelines*. 2019; Rae-Grant A et al. *Neurology*. 2018;90:777-788.

Other Sequencing Modes of DMT



The probability of disease activity decreases over the lifetime of a patient with MS. Probability of disease activity (clinical relapse, new T2 lesions, or enhancing lesions) observed in real-world study of 1246 patients with MS. Dashed lines show 95% confidence interval.
Vollmer BL et al. *Front Neurol*. 2022;12:799138.

Individual Considerations

- **Provide a DMT that the patient is likely to continue for long term**[1]

- Factors to consider:[2-4]
  - Disease characteristics (prognosis, severity)
  - Comorbidities, risk factors for adverse events
  - Existing/expected pregnancy
  - Patient preferences
  - Challenges regarding medication adherence and safety monitoring
  - Insurance coverage

1.Hillert J et al. *Front Neurol*. 2021;12:647811; 2. Freedman MS et al. *Can J Neurol Sci*. 2018;45:489-503; 3. Pardo G, Jones DE. *J Neurol*. 2017;264:2351-2374; 4. Wingerchuk DM, Weinshenker BG. *BMJ*. 2016;354:i3518.

DMT Mechanisms of Action

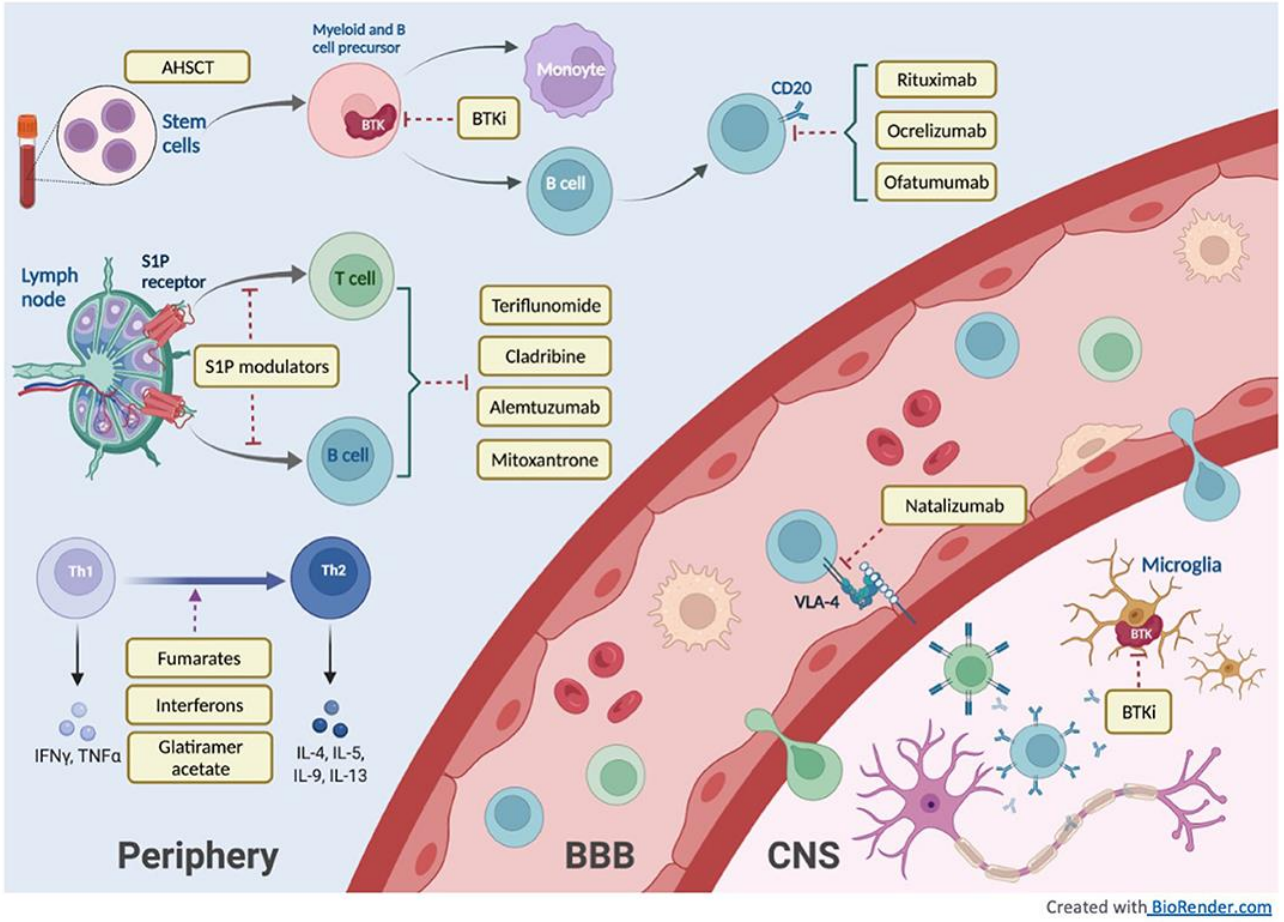


Figure reprinted under Creative Commons-BY license from Yang JH et al. *Front Neurol*. 2022;13:824926.
Alborghetti M et al. *Curr Neuropharmacol*. 2022;20:107-125; Bierhansl L et al. *Nat Rev Drug Discov*. 2022;21:578-600.

Approved DMT Mechanisms of Action

MS Therapy	Route	Mechanism/Site of Action
Interferon-β	Injectable	Cytokine; downregulates antigen presentation, blocks T cell migration, induces IL10
Glatiramer acetate	Injectable	Binds to myelin-specific autoantibodies
Dimethyl fumarate	Oral	Activates nuclear factor-like 2 pathway, protects against neuronal/astrocyte cell injury, loss
Teriflunomide	Oral	Inhibits pyrimidine synthesis, prevents proliferation of activated T and B cells
Fingolimod	Oral	Sphingosine-1 phosphate receptor modulator; inhibits lymphocyte egress from lymph nodes
Siponimod	Oral	
Ozanimod	Oral	
Ponesimod	Oral	
Alemtuzumab	IV	MAb targeting CD52 on lymphocytes and monocytes; changes adaptive immunity
Natalizumab	IV	MAb targeting α4β1 integrins; prevents leukocyte migration across blood-brain barrier
Ocrelizumab	IV	MAb targeting CD20 on B cells; induces antibody-dependent and complement-mediated lysis of B cells
Ofatumumab	Injectable	
Mitoxantrone	IV	Intercalates with DNA, breaks strands and inhibits DNA repair in T and B cells and macrophages
Cladribine	Oral	Disrupts cell metabolism, DNA synthesis and repair, mostly in lymphocytes

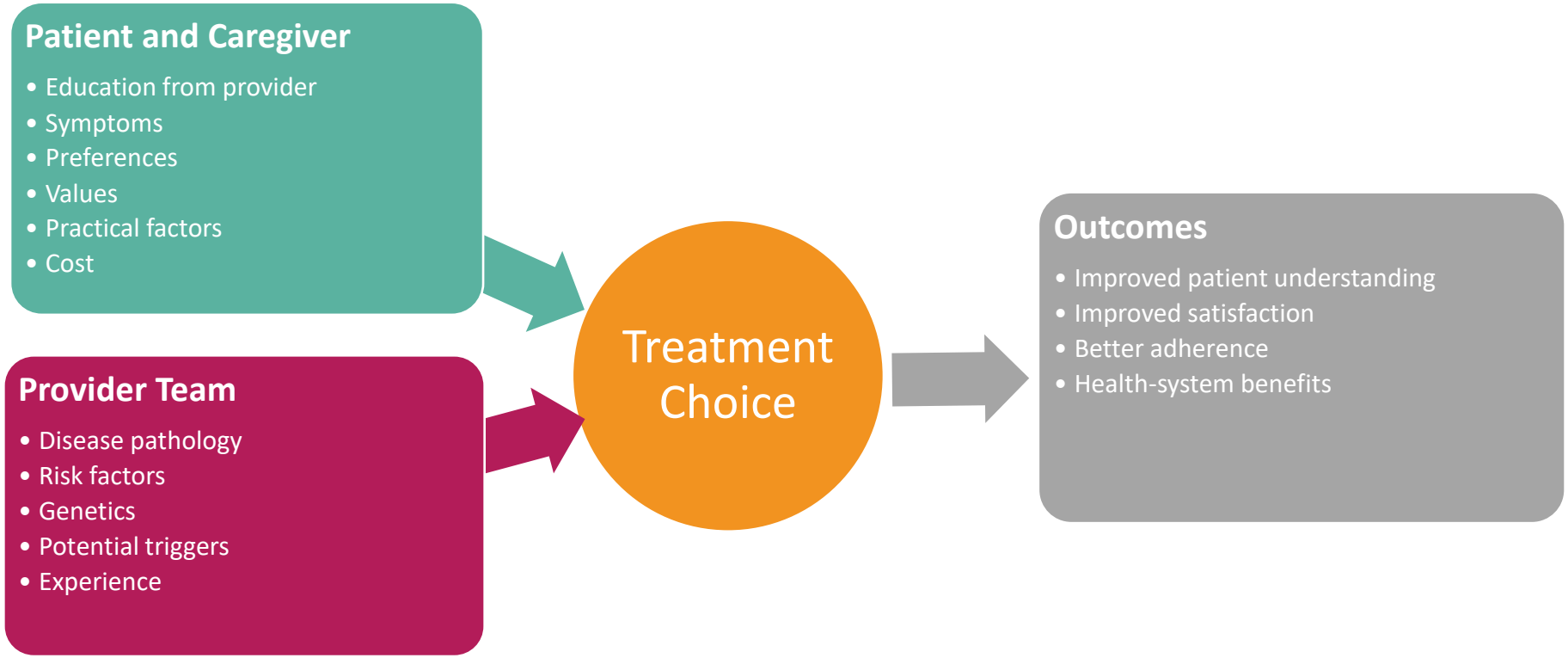
Alborghetti M et al. *Curr Neuropharmacol*. 2022;20:107-125; Bierhansl L et al. *Nat Rev Drug Discov*. 2022;21:578-600; Yang JH et al. *Front Neurol*. 2022;13:824926; Pardo G, Jones DE. *J Neurol*. 2017;264:2351-2374.

DMT Impact on the Immune System

- Short term
  - Suppress T cell activity, migration
  - Inhibit lymphocyte trafficking
  - Inhibit T cell, B cell proliferation
  - Upregulate anti-inflammatory cytokines
  - Disrupt lymphocyte metabolism, DNA synthesis
  - Increase risk of infection
- Long term
  - Develop new autoimmune disorder
  - High-grade lymphopenia
  - Risk of malignancy

Alborghetti M et al. *Curr Neuropharmacol*. 2022;20:107-125; Baecher-Allan C et al. *Neuron*. 2018;97:742-768; Bierhansl L et al. *Nat Rev Drug Discov*. 2022;21:578-600; Yang JH et al. *Front Neurol*. 2022;13:824926.

Shared Decision-making



"The more patients are involved in shared decision-making, the more likely they will be adherent to the therapy and lifestyle recommendations we might be making for them."[1]

1. Ross AP. *Pract Neurol*. April 2017; 2. Day GS et al. *Neurol Clin Pract*. 2018;8:179-185.

Discussing DMT with Patients/Caregivers

- Patients' goals often differ from clinicians'[1]
  - Feeling better, keeping their jobs, and caring for their families
- Provide realistic and accurate information
- Discuss new/emerging therapies as appropriate
- Avoid rushing into DMT immediately after diagnosis; give patient time to clearly decide
- Explore reasons for nonadherence
- Patients may need more in-depth discussion at DMT switch[2]

1. Ross AP. *Pract Neurol*. April 2017; 2. Manzano A et al. *Mult Scler Relat Disord*. 2020;46:102507.

When to Switch DMT

Suboptimal Response to Therapy

- One significant relapse
- Relapse within 1 year of starting therapy
- Evidence of new activity on consecutive MRIs
- Unexpected change in progression of disability
- Confirmed worsening on neurologic exam, including cognition

Patient-related Reasons

- Adherence
- Patient desire to change
  - Try different administration route
- Perceived lack of efficacy
- Lifestyle- or job-related
- Insurance reason
- Newer DMT is better fit for patient
- Symptoms
- Quality of life

MRI, magnetic resonance imaging.

Lublin FD. *CMSC Best Practices in Multiple Sclerosis Therapies*. 2022.

Safety and Implications for Treatment Sequence

- Need for washout period between therapies
  - Reset of effects on immune system
  - Risk of disease worsening?
  - How long should it last?
  - Need for monitoring?
- Emergence of new autoimmune disorders
- Cumulative risk of adverse effects with longer-duration therapy

Goldschmidt C, McGinley MP. *Neurol Clin*. 2021;39:21-33; Freedman MS et al. *Can J Neurol Sci*. 2018;45:489-503; Baecher-Allan C et al. *Neuron*. 2018;97:742-768; Yang JH et al. *Front Neurol*. 2022;13:824926.

Discontinuing MS Therapy?

- Older age
  - Pathology changes with age: less actively inflamed lesions; fewer relapses[1,2]
  - Increased risk of infection in general with age; concomitant medications[3]
  - Younger more likely for relapse with discontinuation[4,5]
    - More lesion changes on MRI, shorter duration of stable disease
- Stable disease for a long period of time
- 2/3 of adults ≥55 years with MS unlikely to stop DMT[6]
  - Possible reason: stable on medication for a long time and uncertain about recurrence

1. Cerqueira JJ et al. *J Neurol Neurosurg Psychiatry*. 2018;89:844-850; 2. Hartung H-P et al. *Curr Opin Neurol*. 2021;34:598-603; 3. Schweitzer F et al. *Curr Opin Neurol*. 2019;32:305-312; 4. O'Connor PW et al. *Neurology*. 2011;76:1858-1865; 5. Bsteh G et al. *Eur J Neurol*. 2021;28:1609-1616; 6. McGinley MP et al. *Mult Scler J*. 2020;26:1581-1589.

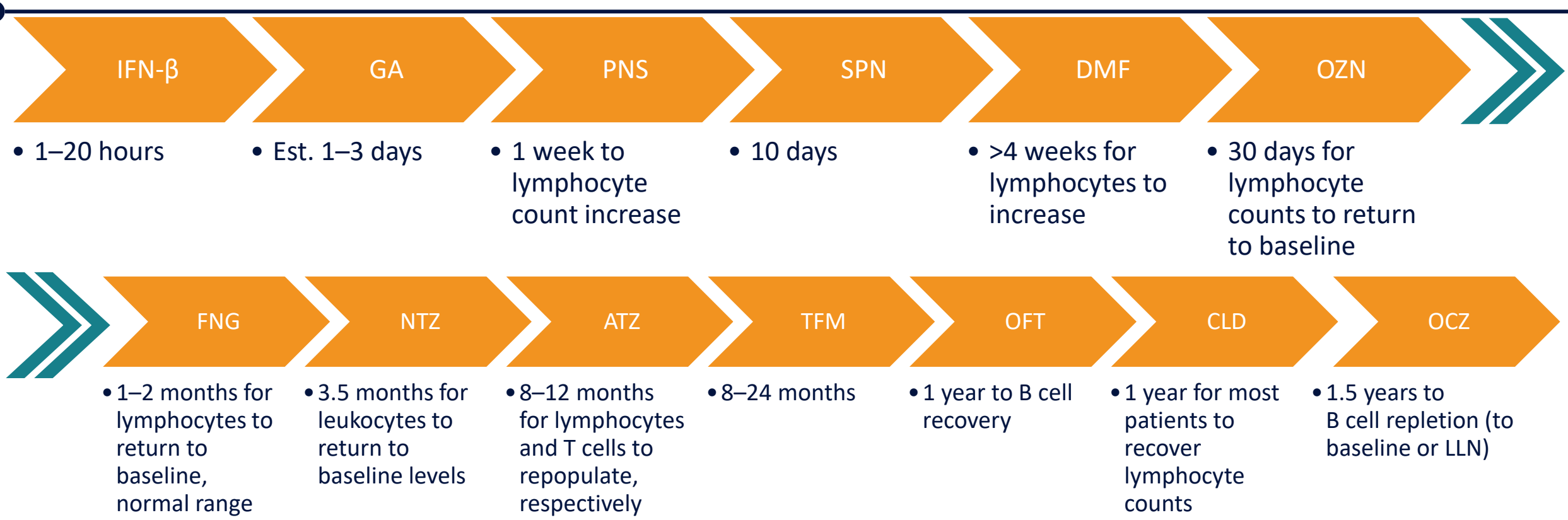
Discontinuing MS Therapy – DISCO-MS Study

- DISCO-MS study (**Disco**ntinuation of DMTs in **MS**)[1]
  - Goal: define group for whom it is safe to discontinue
  - Rater-blinded, randomized, controlled trial; 2017–2021 (NCT03073603)
  - 259 people with any MS phenotype, aged ≥55 years; 5^{+} years of continuous DMT (approved therapy by 2017)
  - ~30–35% of group taking each IFN-β or GA; ≈15% taking DF
  - Relapse rate low, not inferior statistically but higher in Discontinue group than in Continue group (2.3% vs 0.8%)
  - Noninferiority not demonstrated for new T2 lesions on MRI (10.7% vs 3.9%)
  - EDSS showed no mean change over 24 months in either group

DF, dimethyl fumarate; EDSS, expanded disability status scale.

1. Corboy JR et al. Presented at: 2022 CMSC Annual Meeting; June 1-4; National Harbor, MD. Rocky Mountain MS Center webinar. https://www.youtube.com/watch?v=AGRsfIoEl5I. Accessed 22 September 2022.

Approximate Time for Immune System Reconstitution after DMT Cessation



ATZ, alemtuzumab; CLD, cladribine; DMF, dimethyl fumarate; FNG, fingolimod; GA, glatiramer acetate; IFN-β, interferon-beta; LLN, lower limit of normal; NTZ, natalizumab; OCZ, ocrelizumab; OFT, ofatumumab; PNS, ponesimod; SPN, siponimod; TFM, teriflunomide. Data are not available for mitoxantrone.

Pardo G, Jones DE. *J Neurol*. 2017;264:2351-2374; Cada DJ et al. *Hosp Pharm*. 2013;48:231-240; Schweitzer F et al. *J Neurol*. 2021;268:2379-2389; Fronza M et al. *Drug Des Devel Ther*. 2021;15:1993-2004; KESIMPTA [package insert]. 2022; East Hannover, NJ: Novartis Pharmaceuticals Corp; PONVORY [package insert]. 2021. Titusville, NJ: Janssen Pharmaceuticals, Inc.

MS and COVID-19

Infection, Vaccines, Treatments

Impact of COVID-19 Pandemic in MS

Patients

- Delayed infusion
- Interrupted rehab services
- Interrupted mental health services

- Could be related to change in employment status, ability to pay

Providers, Health Systems

- Providing work release to patients
- Changed DMT prescribing habits
  - Less comfortable starting, monitoring some medications during pandemic
  - Extended dosing intervals
- Recommending less frequent MRI
- Increased use of telehealth
- Personal concerns for workplace safety

Fitzgerald KC et al. *Clin Infect Dis*. 2022;74:427-436; Morrison EH et al. *Mult Scler Relat Disord*. 2021;51;102913.

MS and Outcomes of COVID-19 Infection

- COViMS North American registry of 1626 people with MS who had SARS-CoV-2 infection[1]
  - 20% were hospitalized, 6% admitted to ICU, 3% died
  - Increased neurologic disability associated with large increase in risk of severe COVID-19 outcome
- Single center survey of patients with autoimmune diseases (n=4666)[2]
  - Glucocorticoid therapy in past year associated with 43% increased odds of SARS-CoV-2 infection (OR 1.43; 95% CI: 1.08, 1.89)
  - Comorbidities with increased odds: diabetes, CVD, CKD*

*In multivariate analysis. Odds ratios: diabetes, 1.72 [95% CI: 1.08, 2.73]; CVD, 1.68 [95% CI: 1.24, 2.28}; CKD, 1.76 [95% CI: 1.04, 2.97]
CVD, cardiovascular disease; CKD, chronic kidney disease.

1. Salter A et al. *JAMA Neurol*. 2021;78:699-708; 2. Fitzgerald KC et al. *Clin Infect Dis*. 2022;74:427-436.

MS and Outcomes of COVID-19 Infection

- US-based COVID-19 registry, retrospective study of people with ≥1 dose SARS-CoV-2 vaccine (n=665,000)[1]
  - Overall rate of breakthrough infections = 7.1/1000 person-months (during Delta variant wave)
  - Breakthrough infections in MS = 8.9/1,000 person-months (12% increased risk)

- In people with MS/NMOSD/MOGAD who completed ≥2 doses of mRNA SARS-CoV-2 vaccination[2]
  - Prospective single center in South Korea, n=365; 70% of patients on DMT
  - Majority of infections were mild, and no patients required oxygen supplementation

1. Sun J et al. *JAMA Intern Med*. 2022;182:153-162; 2. Yeo T et al. *Mult Scler Relat Disord*. 2022;65:104003.

Data on MS and COVID-19 Vaccination

- Neutralizing antibodies (often measured in studies) not complete picture of immune response
- Available data vary
  - Different study designs, populations; not standardized

- 49% (102/208) of patients on DMT had detectable humoral antibody response[1]
  - Anti-CD20 therapy appears to decrease vaccine response[1-5]
    - Improved vaccine response with longer time between anti-CD20 therapy and vaccination; more recent initiation of anti-CD20 therapy
  - S1P receptor modulator therapy may decrease vaccine response[1,5,6]

1. Wallach AI et al. *Mult Scler Relat Disord*. 2022;63:103856; 2. Trümpelmann S et al. *Clin Transl Sci*. 2022;15:1606-1612; 3. Baker D et al. *Clin Exp Immunol*. 2022;207:263-271; 4. Tolf A et al. *JAMA Netw Open*. 2022;5:e2211497; 5. Cabeza VP et al. *Neurol Neuroimmunol Neuroinflamm*. 2022;9:e1178; 6. Guerrieri S et al. *J Neurol*. 2022;269:39-43.

Addressing Vaccine Response with Anti-CD20 Therapy

- CD20 depletion may be risk factor for severe COVID-19

- Optimize seroconversion by:
  - Vaccinating before beginning anti-CD20 therapy
  - Extended dosing of anti-CD20 therapy
  - Extra, booster SARS-CoV-2 vaccines

Extended-interval dosing

- 3–6-month extension
- B-cell monitoring until repopulation (1–3%)
- May allow for greater vaccine response

Baker D et al. *Clin Exp Immunol*. 2022;207:263-271.

Recommendations for MS and COVID-19 Vaccination

- Recommendations have evolved since onset of pandemic
- Recommendations include use of bivalent vaccines against variants
- Vaccination schedule can occur as convenient, for most people with MS
- Continue DMTs
- Individual patient factors to consider

Bottom Line: All people with MS should be encouraged to receive COVID-19 primary and booster vaccines

National Multiple Sclerosis Society. COVID-19 vaccine guidance for people living with MS. https://www.nationalmssociety.org/coronavirus-covid-19-information/covid-19-vaccine-guidance. Accessed 27 September 2022.

Data on MS and COVID-19 Medication

- Limited data to date, mainly case reports/series

- COVID-19 Treatments (eg, antivirals, monoclonal antibodies)
  - Monoclonal antibodies in high-risk patients with MS led to full recovery, no long-term symptoms[1]
  - Patients receiving cladribine: adjust treatment schedule with antivirals[2]

- COVID-19 Prophylactics (eg, tixagevimab/cilgavimab)
  - Prophylactics after suboptimal response to primary vaccine series (receiving B-cell depleters) increased IgG antibodies (n=18)[3]

1. Moccia M et al. *J Neurol Sci*. 2022;439:120306; 2. Marzolini C et al. *Clin Pharmacol Ther*. 2022; epub ahead of print: doi:10.1002/cpt.2646;
3. Conte WL, Golzarri-Arroyo L. *Mult Scler Relat Disord*. 2022;63:103905.

Data on MS and Other Immunizations

- No evidence of association between developing MS and vaccination for: diphtheria, hepatitis B, influenza, measles, mumps, rubella, typhoid, or varicella zoster
- Lower likelihood of developing MS after vaccination for: HPV, pertussis, smallpox, and tetanus
- Data not robust on whether vaccination increases risk of exacerbations

Farez MF et al. *Neurology*. 2019;93:584-594.

Data on MS and Other Immunizations

- Influenza vaccine effectiveness in MS[1]
  - It is possible that people with MS have higher likelihood of insufficient response [Low confidence, Level III evidence]

- Effects of immunosuppressive/modulatory therapy on influenza vaccine[2,3]
  - Reduced likelihood of response: glatiramer acetate; fingolimod; mitoxantrone; ocrelizumab
  - Similar likelihood of response: interferon-β; teriflunomide; dimethyl fumarate
  - Equivocal or limited data: natalizumab; alemtuzumab; siponimod; ozanimod; fingolimod

1. Farez MF et al. *Neurology*. 2019;93:584-594; 2. Ciotti J et al. *Mult Scler Relat Disord*. 2020;45:102439; 3. Coyle PK et al. *Adv Ther*. 2021;38:3550-3588.

Recommendations for MS and Other Immunizations

- Recommend that all people with MS follow local vaccination standards
- Weigh local risk of vaccine-preventable diseases
- Recommend annual influenza vaccination
  - Contraindicated if prior severe reaction
- Counsel patients appropriately for infection risks with DMT and treatment-specific vaccine guidance
- Assess/reassess vaccination status prior to initiating therapy
  - Vaccinate as needed, at least 4–6 weeks before initiating therapy
- Delay vaccination until exacerbation has resolved

Farez MF et al. *Neurology*. 2019;93:584-594; Coyle PK et al. *Adv Ther*. 2021;38:3550-3588.

Patient Perspectives on DMT

Patient Preference for DMT

- Oral preferable if low dosing frequency; injectable preferable if oral would be 3x/day[1]
- Higher probability of side effects becomes more important for decision[2]
- Decision to switch DMT influenced by clinical and psychosocial outcomes[3]
  - Often an immediate emotional reaction: fear, devastation, worry
  - Need for information on next DMT option(s) and time for discussion with HCPs

1. Utz KS et al. *Ther Adv Neurol Disord*. 2014;7:263-275; 2. Garcia-Dominguez J-M et al. *Patient Pref Adher*. 2016;10:1945-1956;
3. Manzano A et al. *Mult Scler Relat Disord*. 2020;46:102507.

Patient Tolerability of DMT

- Reasons for stopping/switching DMT:[1]
  - Lack of efficacy (pooled across all DMTs), 23%
  - Adverse effects, 16%
  - **Tolerability, 14%**

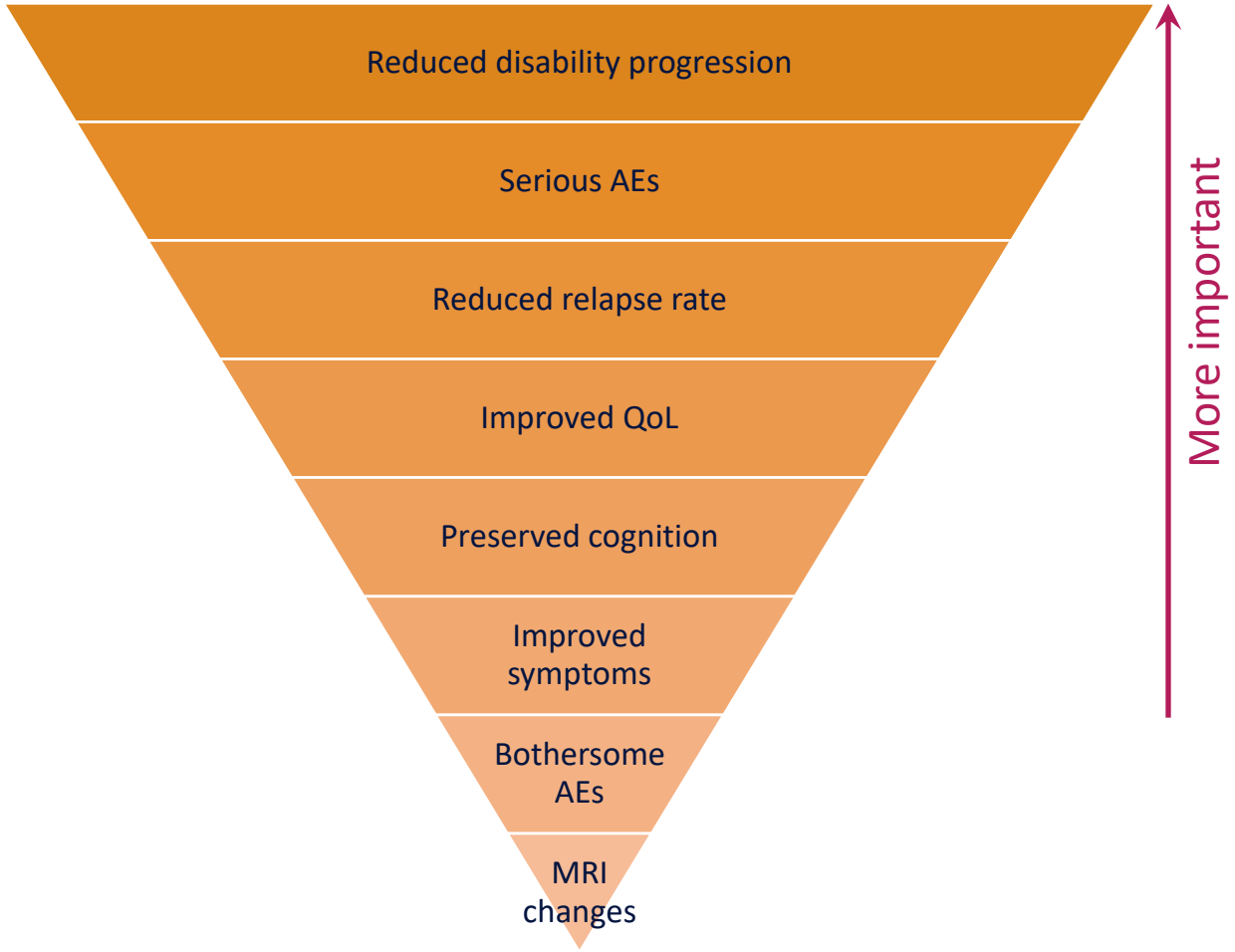
- Patients who need to switch DMT due to tolerability often feel unheard by clinicians[2]

- From 3171 people with MS in NARCOMS and NMSS registries:[3]
  - The highest risk tolerance was for infection or thyroid complications
  - Lowest risk tolerance was for kidney injury and PML

1. Hillert J et al. *Front* Neurol. 2021;12:647811; 2. Manzano A et al. *Mult Scler Relat Disord*. 2020;46:102507; 3. Fox RJ et al. *Neurology*. 2019;92:1-9.

Patient Priority of Outcomes

- From a survey of 2056 NARCOMS participants with a mean disease duration of 27 years, the most important factors in selecting DMT were:



Day GS et al. *Neurol Clin Pract*. 2018;8:179-185.

Patient Reported Outcomes in MS Therapy

MS-specific Measure

Generic Measure

Neurology-specific Measure

Common PRO Measures in Multiple Sclerosis	
Disability/Overall Health	Fatigue Scale for Motor and Cognitive Functions (FSMC)
MS Impact Scale-29 (MSIS-29)	Fatigue Severity Scale (FSS)
Patient Determined Disease Steps (PDDS)	Modified Fatigue Impact Scale (MFIS)
UK Neurological Disability Scale/Guy's Neurological Disability Scale (GNDS)	Wuerzburger Erschoepfungsinventar Bei MS (WEIMuS)
HRQoL	**Affect/Mood**
EuroQol 5-Dimension instrument (EQ5-D)	Beck's Depression Inventory (BDI)
Functional Assessment of MS (FAMS)	Center for Epidemiologic Studies Depression Scale (CES-D)
Hamburg Quality of Life Questionnaire in MS (HAQUAMS)	Hospital Anxiety and Depression Scale (HADS)
MS Quality of Life Inventory (MSQLI)	**Mobility**
MS Quality of Life-54 (MSQOL-54)	Early Mobility Impairment Questionnaire (EMIQ)
MS International Quality of Life questionnaire (MusiQoL)	MS Walking Scale-12 (MSWS-12)
Patient-reported Outcome Indices for MS (PRIMUS)	**Treatment related** – Treatment Satisfaction Questionnaire for Medication (TSQM)
Cognition/Neuropsychology – MS Neuropsychological Questionnaire (MSNQ)	**Socioeconomic**
Fatigue	MS Health Resource Utilization Survey (MS-HRS)
Chalder Fatigue Scale-11 (CFQ 11)	Work Productivity and Activity Impairment Questionnaire (WPAI)

D'Amico E et al. *Mult Scler Relat Disord*. 2019;33:61-66.

Patient Reported Outcomes in MS Therapy

- What is the appropriate outcome to measure?
- What is most important to patients?
- How can we interpret the results in clinical context?
- Generic vs targeted assessment?

D'Amico E et al. *Mult Scler Relat Disord*. 2019;33:61-66.

Patient-reported Outcomes (PROMs) in MS Therapy

- Lack of standard set of measures, confirmed validity for existing PROMs[1]
  - Difficult to compare PROM outcomes across agents b/c different measures used in RCTs[2]

- NIH proposed measures:
  - Neuro-QoL: brief assessment of quality of life in neurological conditions[3]
  - PROMIS: robust measure of symptoms and function for any disease[4]

Neuro-QoL, Quality of Life in Neurological Disorders; PROMIS, Patient-Reported Outcomes Measurement Information System.

1. Zaratin P et al. *Mult Scler Relat Disord*. 2022;61:103757; 2. Brichetto G, Zaratin P. *Curr Opin Neurol*. 2020;33:295-299; 3. Cella D et al. *Neurology*. 2012;78:1860-1867; 4. Cella D et al. *J Clin Epidemiol*. 2010;63:1179-1194.

PROMS Initiative

- Global **P**atient **R**eported **O**utcome for **M**ultiple **S**clerosis (PROMS) initiative launched at 35th ECTRIMS meeting, 2019
- Goals include:
  - Identifying gaps in PROMs for the most important functional domains
  - Develop new PROMs with patients
  - Validate new PROMs
  - Recommend PROMs for clinical practice

Zaratin P et al. *Mult Scler Relat Disord*. 2022;61:103757.

Concluding Remarks

- Earlier treatment of MS associated with better long-term outcomes
- Escalation therapy and early high-efficacy therapy are common treatment paradigms in MS
  - Depends on disease presentation, prognosis, patient factors, among others
- Consider discontinuing DMT in older people with MS, with stable disease
- All people with MS should be encouraged to receive SARS-CoV-2 vaccines and boosters
- Patient-reported outcome measures in MS not standardized
  - What outcomes are most important to patient?

Question and Answer Session