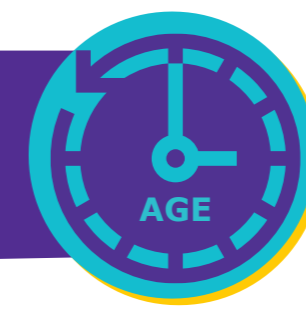


Addressing Aging in Multiple Sclerosis: A Growing Concern



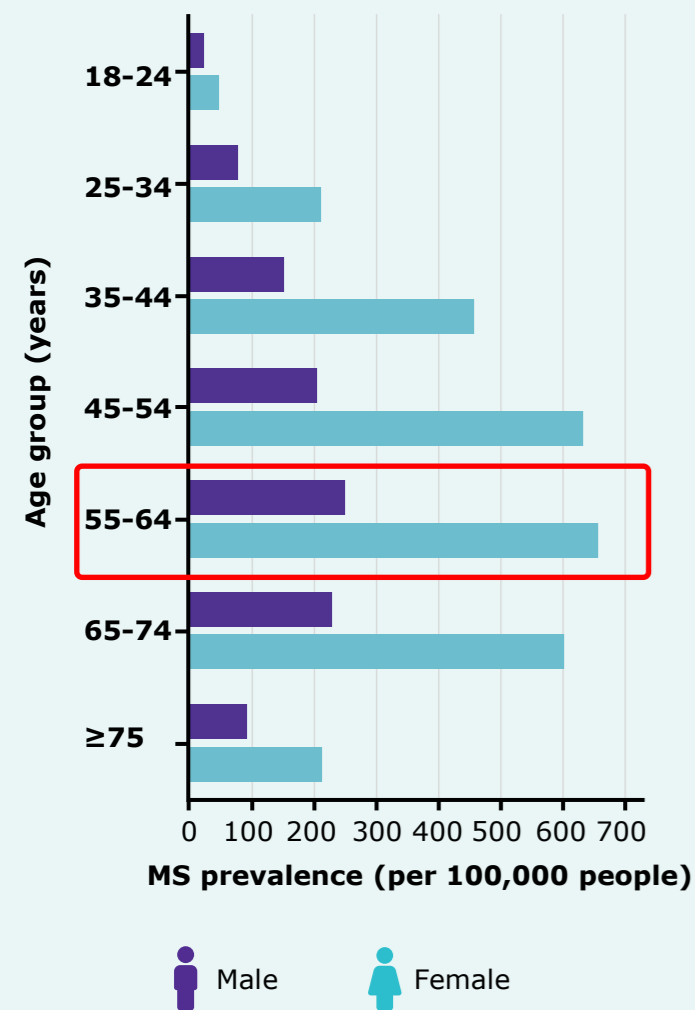
**EMD
SERONO**

The Growing Population of older adults with MS

Rising Prevalence and Medical Needs¹⁻⁴:

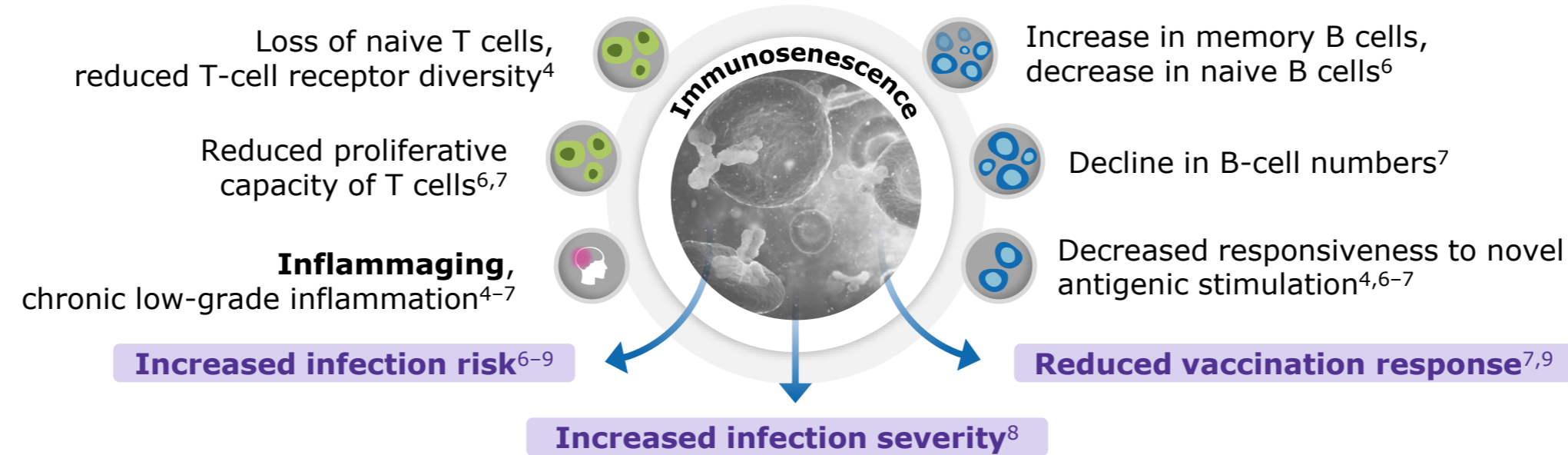
A significant increase in MS prevalence among individuals aged ≥50 years highlights urgent medical needs

MS Prevalence in US by Age²



The red box highlights rising peak prevalence of MS at age range of 55-64 years

Immunosenescence⁴⁻¹⁰



Age-related decline in immune function can lead to diminished responses to infections and vaccinations

Changes in immune cell function due to immunosenescence

Cell type	T cells ⁴	B cells ^{4,6}	Neutrophils/ macrophages ^{4,6}	Microglia ⁴	Oligodendrocyte progenitor cell ⁴	Astrocytes ⁴	Leukocytes ⁴
Function affected by aging	<ul style="list-style-type: none"> ↑ Memory T cells ↑ Pro-inflammatory phenotype ↑ Age-sensitive immune markers ↓ TCR diversity ↓ Naive T cells 	<ul style="list-style-type: none"> ↑ Age-associated B cells ↑ Pro-inflammatory secretome ↑ Production of autoantibodies ↓ BCR diversity ↓ Inability of antibodies to respond to antigens 	<ul style="list-style-type: none"> ↑ Pro-inflammatory gene expression ↓ Phagocytosis ↓ Cytokine response and antimicrobial activity 	<ul style="list-style-type: none"> ↑ Pro-inflammatory cytokines, ROS and complement ↓ Phagocytosis 	<ul style="list-style-type: none"> ↓ Proliferation, migration and differentiation 	<ul style="list-style-type: none"> ↑ Pro-inflammatory phenotype ↓ Support capacity 	<ul style="list-style-type: none"> ↑ Pro-inflammatory profile ↓ Telomere length ↓ Mitochondrial function

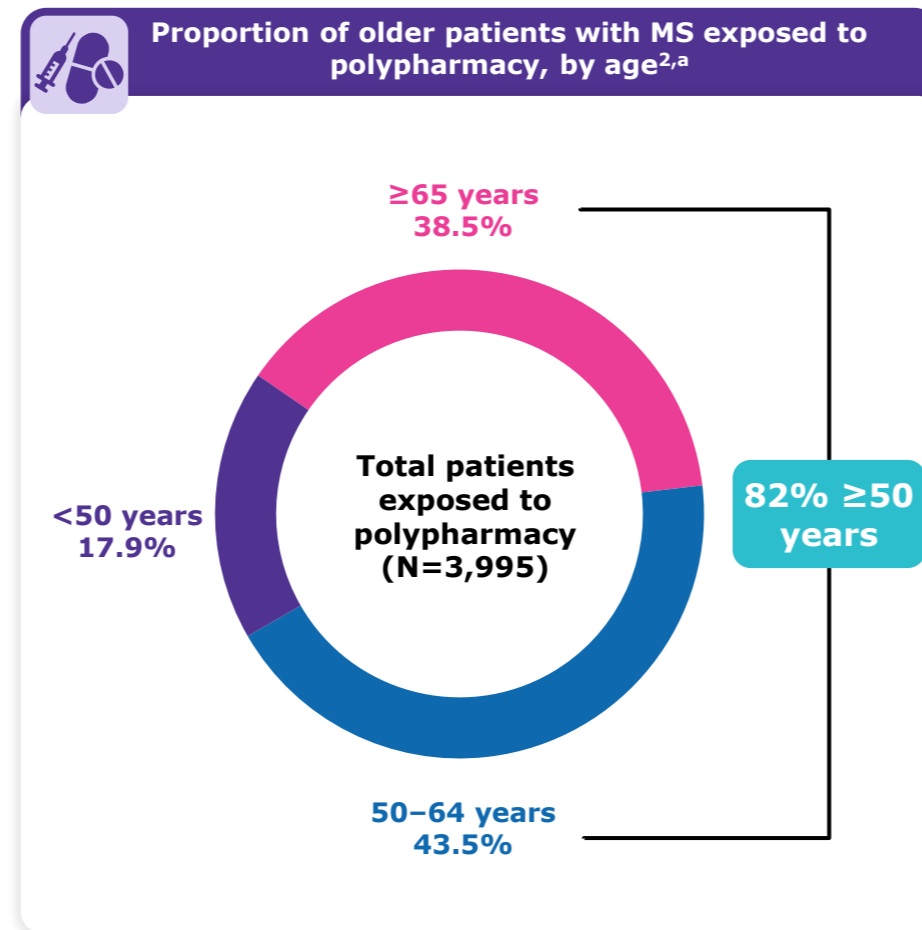
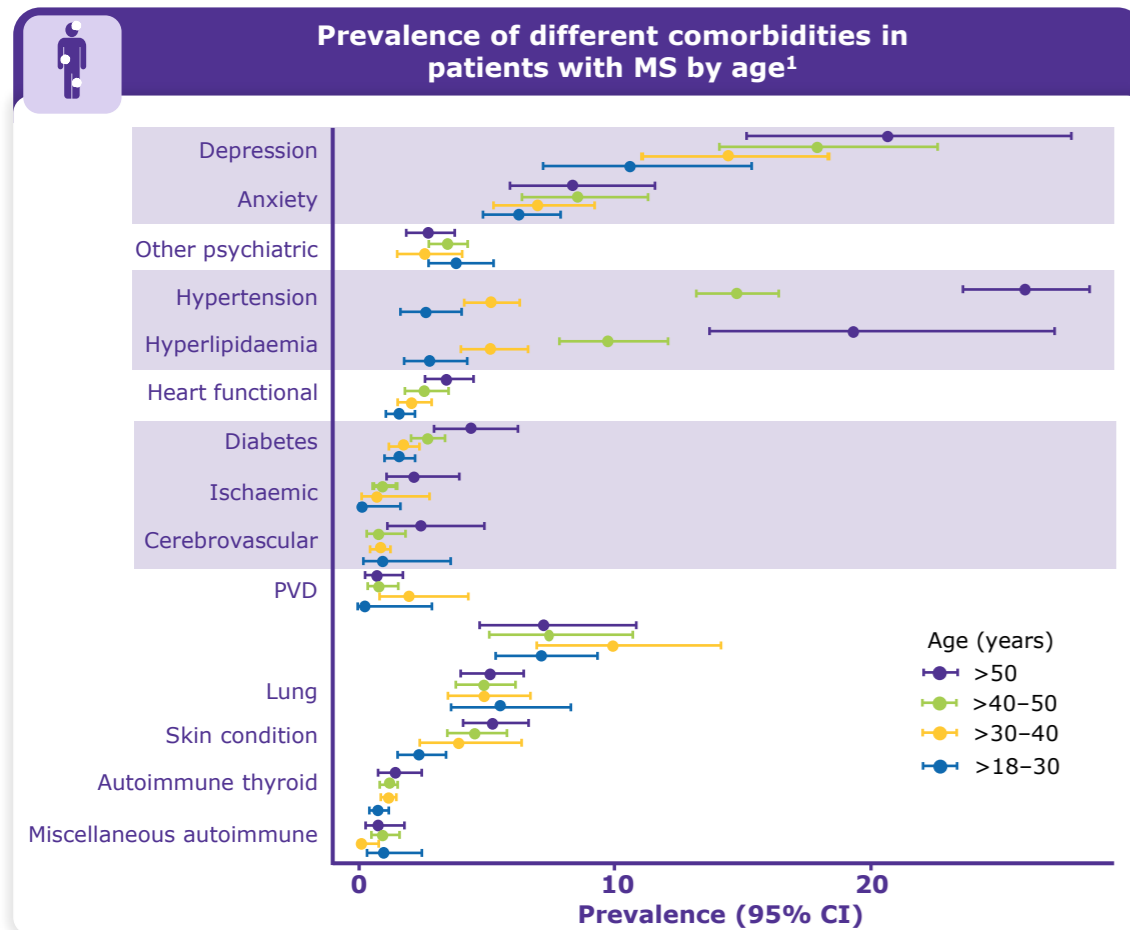
BCR, B-cell receptor; MS, multiple sclerosis; ROS, reactive oxygen species; TCR, T-cell receptor.
 1. Schweitzer F, et al. *Curr Opin Neurol.* 2019;32(3):305-312; 2. Wallin MT, et al. *Neurology.* 2019;92(10):e1029-e1040; 3. Hittle M, et al. *JAMA Neurol.* 2023;80(7):693-701; 4. Macaron G, et al. *Front Neurol.* 2023;14:1197212; 5. Weyand CM, Goronzy JJ. *Ann Am Thorac Soc* 2016;13:S422-8; 6. Lee K-A et al. *Front Aging* 2022;3:900028; 7. Grebenciucova E et al. *Curr Neurol Neurosci Rep* 2017;17:61; 8. Weinberger B. *Immun Ageing* 2018;15:3; 9. Eschborn M et al. *Neurol Neuroimmunol Neuroinflamm* 2021;8:e1094; 10. Vallejo AN. *Trends Mol Med* 2007;13:94-102.

Addressing Aging in Multiple Sclerosis: A Growing Concern



**EMD
SERONO**

Comorbidities and Polypharmacy



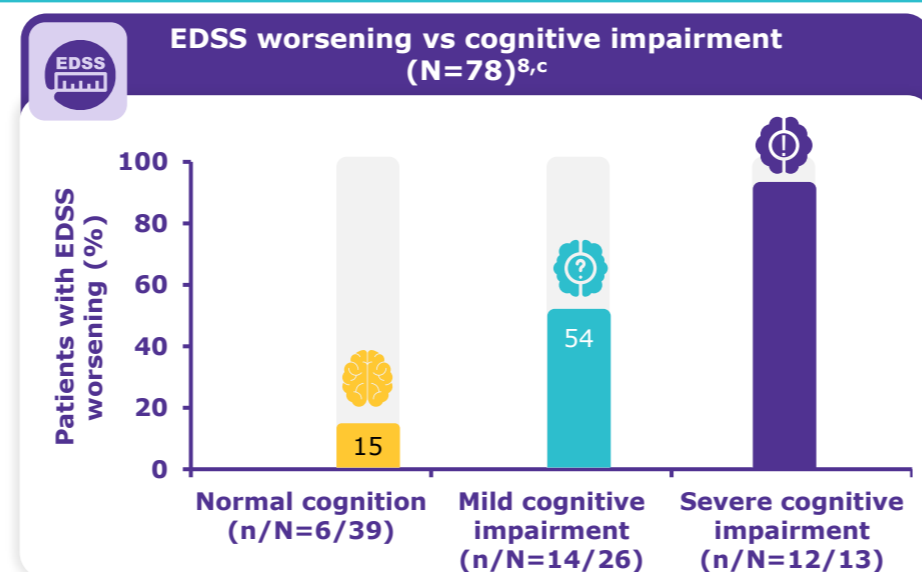
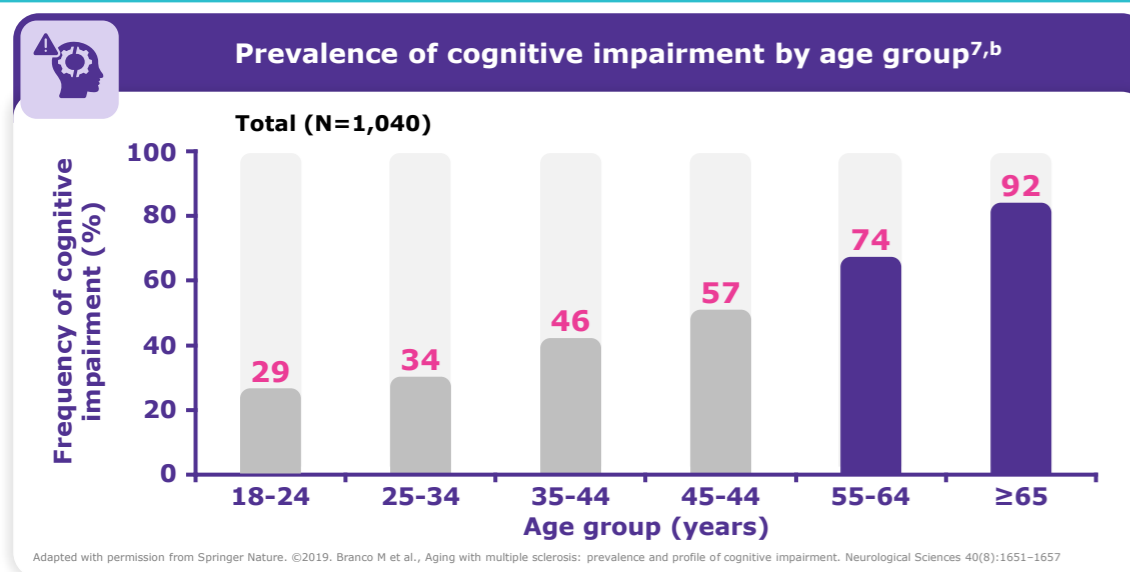
Older adults with MS often experience multiple chronic conditions and polypharmacy, which can result in³⁻⁶:

- Greater levels of fatigue and cognitive impairment
- Prolonged recovery times and disease duration
- An increased risk of drug-drug interactions and hospitalizations
- Poorer treatment adherence

Key takeaways:

- The age distribution of the MS population is shifting towards an older demographic
- Age-related decline in immune function increasing the risks of serious infections in older adults with MS
- Older adults with MS are more likely to have increased comorbidities, cognitive impairment, and experience polypharmacy, which may have implications for MS management

Cognitive Impairment



Cognitive challenges are notably prevalent among older adults with MS. There is a correlation between cognitive decline and worsening EDSS scores. Patients with cognitive impairment were found to be less adherent to DMTs⁷⁻¹⁰