



# Newest disease modifying therapies: recently approved and on the horizon

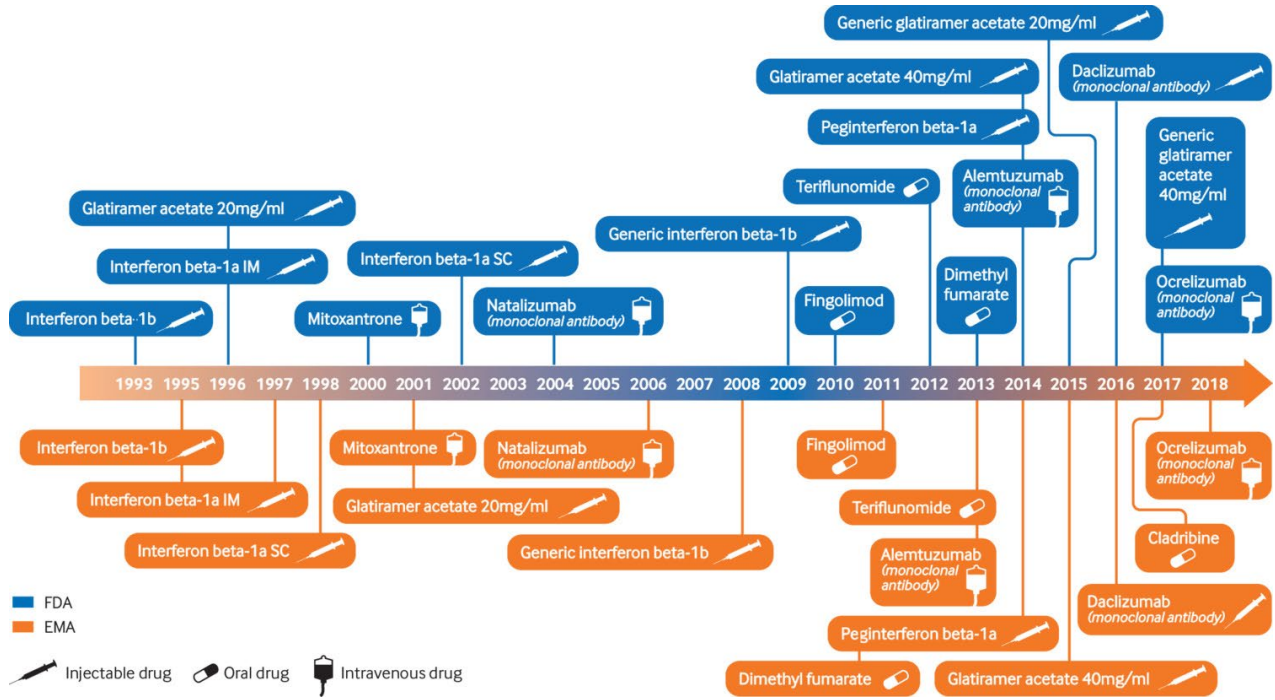


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# Disease modifying therapies (DMTs)

- There are currently 22 approved DMTs for MS
  - Variety of formulations
    - Injection
    - Oral pill
    - Infusion
- Indications
  - Most DMTs are approved for relapsing remitting MS (RRMS)
  - Several approved for active secondary progressive MS (SPMS)
  - Ocrelizumab is the only approved DMT for primary progressive MS (PPSM)

# DMT timeline 1993-2018



# Disease modifying therapies

## Injections

- Glatiramer acetate
- Interferon Beta

## Oral drugs

- Fingolimod
- Dimethyl fumerate
- Teriflunomide

## Infusions

- Natalizumab
- Ocrelizumab
- Alemtuzumab
- Mitoxantrone

### New

- Kesimpta®  
(ofatumumab)

### New

- Vumerity®
- Zeposia®
- Bafiertam®
- Mayzent®
- Mavenclad®

# Ofatumumab (Kesimpta®)

- Approved by the FDA in August 2020
  - Relapsing remitting MS (RRMS) and clinically isolated syndrome (CIS)
  - Active secondary progressive MS (SPMS)
- How does it work and how effective is it?
  - It works by depleting B lymphocytes
  - It reduced relapse rate by 50-60% compared to Aubagio in clinical studies
- How is it taken?
  - Injection – starts weekly then advances to monthly
- Who should not take this drug?
  - Individuals with active hepatitis B infection



# Ozanimod (Zeposia®)

- Approved by the FDA in March 2020
  - RRMS, CIS and active SPMS
- How does it work and how effective is it?
  - It keeps lymphocytes locked inside lymph nodes
  - It reduced relapse rate by 40% compared interferon Beta in clinical studies
- How is it taken?
  - Oral pill, once a day
- Who should not take this drug?
  - Individuals
    - - with recent a heart attack or stroke
    - - with certain heart conditions and sleep apnea
    - - taking certain antidepressants



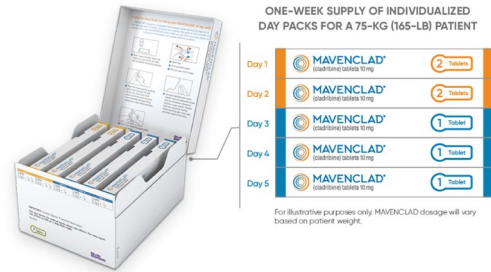
# Siponimod (Mayzent®)

- Approved by the FDA in March 2019
  - Relapsing remitting MS and clinically isolated syndrome
  - Active secondary progressive MS
- How does it work and how effective is it?
  - Keeps lymphocytes sequestered in lymph nodes
  - Reduction of relapse rate by 55% compared to placebo
- How is it taken?
  - Oral pill, once a day
- Who should not take this drug?
  - Patients with a recent heart attack or recent stroke
  - Patients with certain heart conditions



# Cladribine (Mavenclad®)

- Approved by the FDA in March 2019
  - RRMS and active SPMS
- How does it work and how effective is it?
  - It depletes B and T lymphocytes
  - It reduced relapse rate by 60% compared to placebo in studies
- How is it taken?
  - It is given orally as two-yearly treatment courses
  - Each course comprises of 2 weeks of treatment
- Who should not take this drug?
  - Women that are pregnant or breast feeding
  - Individuals that have cancer or certain infections





## Vumerity® (diroximel fumarate)

- Approved – Oct 2019
- RRMS, CIS, active SPMS
- Very similar to Tecfidera®
- Oral pill taken twice a day
- May have less gastrointestinal side effects than Tecfidera®
- May increase infection risk

## Bafiertam ® (monomethyl fumarate)

- Approved – April 2020
- RRMS, CIS, active SPMS
- Very similar to Tecfidera®
- Oral pill taken twice a day
- May increase infection risk

# Drugs under investigation

- **Bruton's tyrosine kinase inhibitors (BTKi)**
  - **Evobrutinib, Fenebrutinib**
  - Currently in phase 3 clinical studies – RRMS, SPMS and PPMS
    - OSU will be taking part in these studies
- **Masitinib – Tyrosine kinase inhibitor**
  - Preliminary studies show promise for progressive types of MS
  - Currently in phase 3 clinical trials
- **Ublituximab**
  - Like ocrelizumab, this infusion depletes B lymphocytes
  - Currently under investigation for RRMS

# Drugs under investigation

- **Ibudilast**

- Potential neuroprotective benefit in progressive MS
- Slowed down loss of brain volume in phase 2 studies
- More studies are needed

- **Opicinumab (anti-LINGO-1)**

- May help with myelin repair – remyelination
- Being studied in combination with other DMTs
- Some preliminary studies were disappointing

- **Biotin**

- High dose biotin has been studied in progressive MS
- In recent study, it failed to show improvement in disability

# Switching/stopping DMTs

- Common reasons to switch/stop DMT
  1. Current DMT is not working
    - Relapse, new MRI lesion, progression
  2. Side effects or poor tolerance
  3. Safety reasons
    - Infection, cancer, immune suppression
  4. Pregnancy
  
- Talk with your neurologist before you stop/switch your DMT

# References

- De Angelis F, John NA, Brownlee WJ. Disease-modifying therapies for multiple sclerosis. *BMJ*. 2018 Nov 27;363:k4674. doi: 10.1136/bmj.k4674. PMID: 30482751.

# Thank You



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