# Alemtuzumab and prescription medication use in the MS population

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## BACKGROUND AND OBJECTIVES

- Polypharmacy is associated with increased risk of adverse drug reactions or drug interactions, hospitalizations and emergency room visits.
- Patients with multiple sclerosis (MS) may be exposed to polypharmacy.
- Alemtuzumab typically requires short-term co-administration of corticosteroids, antihistamines, antipyretics and antivirals to minimize adverse effects.
- We characterized prescription medication use before, during and after the first alemtuzumab infusion in a 'real world' setting and identified new medication classes that were initiated at the time of the infusion. We also assessed the global drug burden.

## MATERIALS AND METHODS

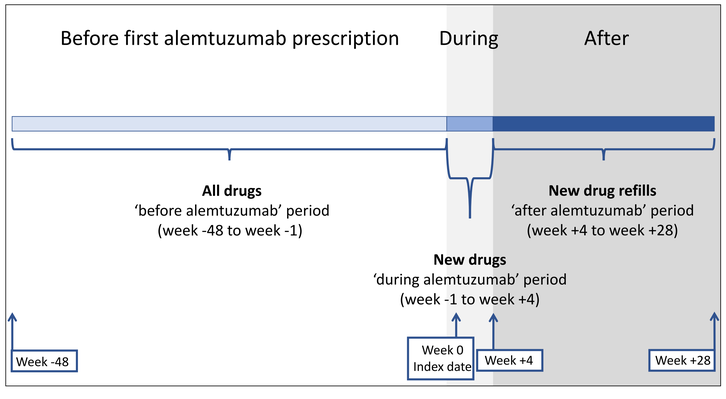
- We used linked health administrative data from British Columbia (BC), Canada
- All data were available from 1-Jan-1996 to 31-Dec-2017 and included: age, sex, socioeconomic status (SES), and all drug prescriptions filled at community and outpatient pharmacies. Over-the-counter medications and those administered directly by hospital-based infusion centres were not captured.
- Residents of BC who filled their first prescription for alemtuzumab (Lemtrada®) between 1-Dec-2013 and 18-Jun-2017 were eligible.
- The date the first alemtuzumab prescription was filled was the **index date.**
- Residency in the province of BC for at least 48 weeks before, and 28 weeks after, the index date was required.
- All prescriptions were mapped to the World Health Organization's Anatomical Therapeutic Chemical (ATC) system and grouped by drug class (3rd level).
- Medication burden was described (see also Figure 1).
  Firstly during three time windows:
  **Before alemtuzumab (all drugs)**:
  - Total drug burden before the alemtuzumab infusion (week -48 to week -1 before the index date)

  **During alemtuzumab (new drugs):**
  - New drug classes initiated during the infusion period (excluding alemtuzumab)

  **After alemtuzumab (new drug refills)**
  - Refills of these new drugs (by class) after the infusion period

  Secondly as:
- **Global drug burden** (all drugs before, during and after alemtuzumab) defined as all prescriptions filled during the infusion period, and a 48-week period split equally either side of the infusion period.
- Logistic regression was used to assess if patient characteristics (age, sex, SES, prior disease modifying therapy (DMT) use) were associated with new prescription fills (0 vs. ≥1) in the 'during alemtuzumab' period.

Figure 1. Time windows for analysis of medication burden




## RESULTS

Table 1. Characteristics of the study population (n=160) at the index date.

| Characteristics | Cohort (n=160) |
|---|---|
| Age in years; mean (SD) | 37.6 (8.8) |
| Age group (years); n (%) | |
| <30 | 30 (18.8) |
| 30-39 | 62 (38.8) |
| 40-49 | 57 (35.6) |
| ≥50 | 11 (6.9) |
| Women; n (%) | 114 (71.3) |
| Socioeconomic status; n (%) | |
| 1 (lowest income quintile) | 28 (17.5) |
| 2 | 27 (16.9) |
| 3 or missing[a] | 44 (27.5) |
| 4 | 38 (23.8) |
| 5 (highest income quintile) | 23 (14.4) |
| Prior DMT use[b]; n (%) | 113 (70.6) |
| Beta-interferon | 21 (13.1) |
| Glatiramer acetate | 21 (13.1) |
| Natalizumab | 18 (11.3) |
| Fingolimod | 29 (18.1) |
| Dimethyl fumarate | 19 (11.9) |
| Teriflunomide | 18 (11.3) |

[a] A minority (<6) had a missing SES and were assigned to quintile 3.
[b] At least one prescription for a DMT in the 48 weeks before the index date; 13 individuals filled a prescription for more than one DMT hence the sum of individual DMTs exceeds the total. No prescriptions were filled for daclizumab, cladribine or ocrelizumab during the study period.
DMT: disease modifying therapy.

Table 2. Drug burden, new prescriptions and refills: summary of prescriptions filled (unique drug classes, ATC 3rd level) in relation to the first alemtuzumab administration

| **Drug burden before alemtuzumab** | **Cohort, n=160** |
|---|---|
| Number of individuals filling at least one prescription; n (%) | 152 (95.0) |
| Number of unique drug classes (n= 87) | |
| Per individual; mean (SD) | 5.3 (3.5) |
| **New prescriptions and refills** | **Cohort, n=160** |
| New prescriptions **during** the alemtuzumab administration period | |
| Number of individuals filling at least one prescription for a new drug class; n (%) | 145 (90.6) |
| Number of unique new drug classes (n = 40) | |
| Per individual; mean (SD) | 2.2 (1.4) |
| Refills **after** the alemtuzumab administration period | |
| Number of individuals refilling a prescription for the new drug class; n (%) | 39 (24.4) |
| Number of unique new drug classes for which a prescription was refilled (n=17) | |
| Per individual; mean (SD) | 0.3 (0.6) |

[a]Alemtuzumab and other MS disease modifying drugs were excluded.

- Most common drug classes during the three time Windows (filled by n (%) of patients):
  - **Before alemtuzumab (all drugs):** antidepressants (61, 38%); anxiolytics (58, 36%); systemic corticosteroids (54, 33%); antiepileptics (45, 28%); and hypnotics/sedatives (38, 23%).
  - **During alemtuzumab (new drugs):** antivirals (127, 79%); systemic corticosteroids (54, 33%); hypnotics/sedatives (41, 25%); peptic ulcer and gastro-oesophageal reflux drugs (19, 11%); and anxiolytics (18, 11%).
  - **After alemtuzumab (new drug refills): :** (most common refills) antivirals (12, 7%); and hypnotics/sedatives (10, 6%).
- There was no association between the patient characteristics (sex, age, SES, prior DMT use) and new prescription fills (0 vs. ≥1) during alemtuzumab
- **The global drug burden** was high around the time of alemtuzumab treatment. During each window patients filled 3 to 4 different drug classes on average (median; interquartile range: shortly before alemtuzumab = 4; 2–7; during alemtuzumab = 3; 2-5; and after alemtuzumab = 3; 1-5).

## CONCLUSIONS

- Patients receiving alemtuzumab present with a substantial medication burden both before and after its use. Several medications initiated with alemtuzumab were beyond those recommended to minimize or prevent adverse drug reactions. Some newly introduced medications extended beyond the initial infusion period.

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