

# Coexistence of multiple sclerosis and Alzheimer's disease





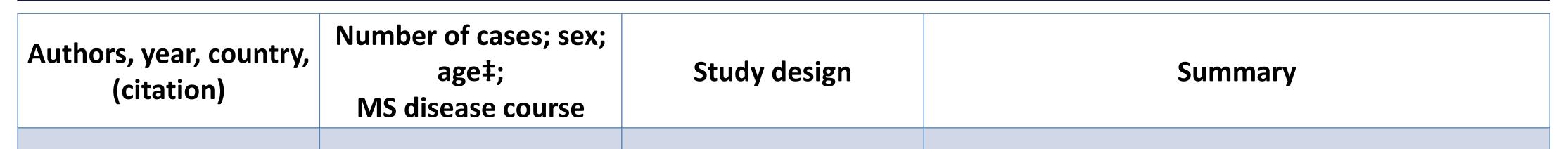
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#### INTRODUCTION

People with multiple sclerosis (MS) are living longer than ever (1, 2) and will likely face the same age-related diseases

### **STEP 1: FOCUSED LITERATURE REVIEW**



- as other seniors.
- Little is known about the coexistence of MS with Alzheimer's disease (AD), the common form of dementia most worldwide (3).

#### **OBJECTIVES**

- To determine if MS and AD can coexist in the same patient.
- То the 2. identify clinical and neuropathological features of an individual with both MS and AD.

**Approach:** 

Step 1: A literature review

Step 2: Create original case-series of AD/ MS

Weber & Ulrich, 1976, Switzerland, (4)	N=1; F; 63 years; N/R	Case report, included autopsy Autopsy revealed MS, encephalitis, and AD.		
Barkhof et al., 1993, The Netherlands, (5)	N=1; M; 73 years; 'clinically silent'	Case report, included autopsy	Clinical diagnosis of 'probable' AD. Pre-mortem MRI: periventricular white matter lesion. Autopsy confirmed AD diagnosis and inactive MS lesion. MS lesion also found in the cervical spinal cord.	
Dal Bianco et al., 2007, Austria, (6)	N=8; N/R; >64 years; 'progressive'	Case series, autopsies only	Archival autopsy material from 45 patients with MS examined. 8 'probable AD' cases; criteria: Consortium to Establish AD Registry.	
Frischer et al., 2009, Austria, (7)	N=11; N/R; N/R; RRMS, SPMS, PPMS, & 'benign'	Case series, autopsies only	Archival autopsy material from 67 MS patients. 11 had evidence of AD - cortical lesions containing amyloid plaques and neurofibrillary tangles fulfilling same criteria as above.	
Stewart et al., 2011, USA, (8)	N=10; N/R; N/R; N/R	Self-report online survey	USA's National Health and Wellness online Survey: 549 MS cases compared to 74,451 controls. MS cases more likely to report coexisting AD vs. controls (10 [1.9%] vs. 77 [0.1%], respectively, p<0.001).	
Flanagan et al., 2014, USA, (9)	N=3; 2F & 1M; 53-56 years; suggestive of PPMS	Case report, included one autopsy	All 3 had progressive dementia. 1 case had post-mortem diagnosis of MS and AD. 2 cases diagnosed premortem by decreased CSF amyloid- $\beta_{1-42}$ /tau index, MRI, and 18F-flourodeoxyglucose-PET patterns.	

F = female; M = male; MRI = magnetic resonance imaging; N/R = not reported; PET = positron emission tomography; PPMS = primary progressive multiple sclerosis; RRMS = relapsing remitting multiple sclerosis; SPMS = secondary progressive multiple sclerosis. ‡Age or age range at death.

#### **METHODS**

#### **STEP 2: PATHOLOGY DATABASE SEARCH**

#### **Step 1: Focused literature review**

- We searched PubMed (to May, 2017) to published articles reporting find coexisting cases of MS and AD.
- Of 2216 possible articles, 6 reported  $\bullet$ both MS and AD.
- Of the 6 included articles, 1 was an  $\bullet$ abstract from an observational selfreport survey, 3 were case reports, and 2 were case series.

#### Step 2: Create original case-series using a pathology database search

• The Vancouver Coastal Health Authority, anatomical pathological Canada, database was searched for possible

Case ID	Sex; Race	Year birth-death (age); Cause of death	MS disease course	AD disease course	MS & AD pathology
1	Female; N/R	1922-1997 (74 years); Pneumonia and empyema.	SPMS Onset symptoms: Diplopia, reduced visual acuity, fatigue, weakness & loss of sensation, unstable gait, and urinary incontinence.	Visual hallucinations memory	Multiple areas of demyelination in brain and spinal cord. Moderate number of neuritic plaques in the neocortex.
2	Female; Caucasian	1935-2013 (77 years); Disseminate adenocarcinoma	weakness & sensory loss,	cognitive slowing, memory	Multiple demyelinated areas. Occasional to moderate neuritic plaques in the neocortex.
3	Female; Caucasian	1950-2010 (60 years); Not determined – autopsy limited to head and spinal cord.	MRI, age 56: multiple foci of demyelination. No pre-mortem MS diagnosis ('clinical symptoms not consistent with MS').	deficits. Worsening motor weakness.	Consistent with MS.
4	Male; N/R	1911-1986 (75 years); Ischemic heart disease	N/R	N/R	Multiple demyelinated areas in brain & spinal cord. AD-like changes of cerebral degeneration.

cases of coexisting MS and AD (January, 1980 – May, 2017).

- Of 14,007 total autopsy reports, 8 were  $\bullet$ retrieved and 4 included; i.e. had sufficient information confirm to existence of AD & MS.
- pathological Post-mortem (autopsy) reports were extracted and linked to medical records.

#### CONCLUSION

- highlight a critical gap in our We understanding of two relatively common, challenging neurological conditions.
- As populations age, it is increasingly important to recognize and understand how to manage individuals living with both complex neurological conditions -MS and AD.

#### DISCLOSURES

PL currently receives research support from the Foundation of the Consortium of MS Centres (Medical Student Research Scholarship, funded by Genentech) and the UBC MS Connect Education Program. CL receives research support from the MS Society of Canada and the Natural Sciences and Research Council of Canada. GYRH is supported by the Ralph Fisher and Alzheimer Society of BC Professorship in dementia research. GRWM receives research support from the Multiple Sclerosis Society of Canada. HT currently receives research support from the National Multiple Sclerosis Society, the Canadian Institutes of Health Research, the Multiple Sclerosis Society of Canada and the Multiple Sclerosis Scientific Research Foundation.

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