
EBV reactivation priming of the peripheral immune system in multiple sclerosis relapse

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Supplementary Table 1 – Cohort Summary	MS - PreRelapse	MS - Relapse	MS - Remission	Controls - Healthy	Total
Sample Size					
N	69	44	99	21	135
Sex					
Female, N (%)	53 (76.8%)	31 (83.8%)	5 (62.5%)	11 (52.4%)	100 (74.1%)
Male, N (%)	16 (23.2%)	6 (16.2%)	3 (37.5%)	10 (47.6%)	35 (25.9%)
Age					
(yrs), mean ± SD	37.1 ± 8.0	41.5 ± 7.0	39.3 ± 7.8	36.7 ± 10.7	38.4 ± 8.4
(yrs), range	21.0–50.4	27.9–50.8	31.3–56.7	22.7–57.9	21.0–57.9
Race					
Asian, N (%)	0	0	0	1 (4.8%)	1 (0.7%)
Black or African American, N (%)	3 (4.3%)	1 (2.7%)	0	1 (4.8%)	5 (3.7%)
East Asian and South-East, N (%)	0	0	0	1 (4.8%)	1 (0.7%)
More than one race, N (%)	2 (2.9%)	0	0	0	2 (1.5%)
Native Hawaiian or Other Pacific Islander, N (%)	1 (1.4%)	0	0	0	1 (0.7%)
South Asian, N (%)	0	0	0	1 (4.8%)	1 (0.7%)
Unknown or not reported, N (%)	1 (1.4%)	1 (2.7%)	0	0	2 (1.5%)
White, N (%)	62 (89.9%)	35 (94.6%)	8 (100.0%)	17 (81.0%)	122 (90.4%)
Ethnicity					
Hispanic or latino, N (%)	8 (11.6%)	1 (2.7%)	0	0	9 (6.7%)
Not hispanic or latino, N (%)	61 (88.4%)	36 (97.3%)	7 (87.5%)	21 (100.0%)	125 (92.6%)
Unknown, N (%)	0	0	1 (12.5%)	0	1 (0.7%)
Diagnosis					
Clinically Isolated Syndrome, N (%)	3 (4.3%)	0	1 (12.5%)	0	4 (3.0%)
Healthy, N (%)	0	0	0	21 (100.0%)	21 (15.6%)
Relapsing-Remitting MS, N (%)	62 (89.9%)	37 (100.0%)	7 (87.5%)	0	106 (78.5%)
Secondary Progressive MS, N (%)	4 (5.8%)	0	0	0	4 (3.0%)
Treatment					
Avonex, N (%)	9 (13.0%)	1 (2.7%)	2 (25.0%)	0	12 (8.9%)

Betaseron, N (%)	2 (2.9%)	3 (8.1%)	0	0	5 (3.7%)
Cellcept, N (%)	1 (1.4%)	0	0	0	1 (0.7%)
Copaxone, N (%)	13 (18.8%)	19 (51.4%)	0	0	32 (23.7%)
Cytosan, N (%)	2 (2.9%)	0	0	0	2 (1.5%)
Gilenya, N (%)	22 (31.9%)	0	1 (12.5%)	0	23 (17.0%)
Ocrevus, N (%)	0	0	1 (12.5%)	0	1 (0.7%)
Rebif, N (%)	10 (14.5%)	7 (18.9%)	1 (12.5%)	0	18 (13.3%)
Tecfidera (BG-12), N (%)	2 (2.9%)	0	1 (12.5%)	0	3 (2.2%)
Tysabri, N (%)	2 (2.9%)	1 (2.7%)	0	0	3 (2.2%)
Untreated, N (%)	5 (7.2%)	6 (16.2%)	2 (25.0%)	21 (100.0%)	34 (25.2%)
Zenapax, N (%)	1 (1.4%)	0	0	0	1 (0.7%)
Samples					
Total samples	69	46	104	21	240
Samples per patient, mean	1	1	1.1	1	1.8

Supplementary Table 2 – Patient Demographics

Donor ID	Sex	Age (yrs)	Race	Ethnicity	Diagnosis	Treatment	Assays	EBV Serostatus	EBV Seropositive	EBNA1 Ratio	EBNA1 Mean
HC001	F	42.7	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	1.7734	1.0437
HC002	F	41.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.0906	1.2304
HC003	F	37.9	Black or African American	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	1.5841	0.9324
HC004	M	38.7	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	3.0415	1.79
HC005	F	53.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.0443	1.2032
HC006	M	25.9	East Asian and South-East	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.4963	1.4692
HC007	F	33.7	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.9946	1.7624
HC008	M	25.3	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seronegative	FALSE	0.2357	0.1388
HC009	M	31.1	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.0644	1.215
HC010	M	24.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seronegative	FALSE	0.445	0.2619
HC011	M	30.3	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.2687	1.3352

HC012	M	29.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	1.5299	0.9004
HC013	F	36.4	South Asian	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	3.7105	2.1838
HC014	F	25.4	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.5079	1.476
HC015	F	44.6	Asian	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.95	1.7362
HC016	F	25.1	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.4406	1.4364
HC017	F	22.7	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	1.5207	0.895
HC018	M	57.9	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	3.5915	2.1138
HC019	M	44.3	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.5736	1.5147
HC020	F	54.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.2566	1.3282
HC021	M	44.3	White	Not hispanic or latino	Healthy	Untreated	SCRNA	Seropositive	TRUE	2.6163	1.5398
MS001	M	21.6	Native Hawaiian or Other Pacific Islander	Hispanic or latino	Relapsing-Remitting MS	Rebif	SCRNA	Not tested			
MS002	F	48.5	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRNA	Seropositive	TRUE	3.2109	1.8898

MS003	F	42.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	SCRNA	Not tested			
MS004	F	39.4	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	SCRNA	Seropositive	TRUE	3.0531	1.7969
MS005	F	42.7	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	SCRNA	Not tested			
MS006	F	33.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	SCRNA	Not tested			
MS007	M	42.9	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRNA	Not tested			
MS008	F	25.7	White	Not hispanic or latino	Clinically Isolated Syndrome	Copaxone	BULK, SCRNA	Not tested			
MS009	F	44.7	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRNA	Seropositive	TRUE	2.9896	1.7595
MS010	F	24.7	White	Not hispanic or latino	Clinically Isolated Syndrome	Untreated	SCRNA	Not tested			
MS011	F	40.3	White	Not hispanic or latino	Clinically Isolated Syndrome	Copaxone	SCRNA	Not tested			
MS012	M	40.9	White	Not hispanic or latino	Relapsing-Remitting MS	Ocrevus	SCRNA	Not tested			
MS013	M	31.3	White	Unknown	Relapsing-Remitting MS	Untreated	SCRNA	Not tested			
MS014	F	56.7	White	Not hispanic or latino	Clinically Isolated Syndrome	Tecfidera (BG-12)	SCRNA	Not tested			

MS015	F	36.5	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRN A	Not tested			
MS016	F	45.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	FLOW	Not tested			
MS017	F	49.8	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	QPCR	Not tested			
MS018	F	49.2	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR	Not tested			
MS019	F	47.7	Black or African American	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Seropositive	TRUE	2.2778	1.3406
MS020	M	48.2	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK	Seropositive	TRUE	2.9221	1.7198
MS021	F	40.8	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR	Not tested			
MS022	F	50	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Not tested			
MS023	M	44	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK, FLOW	Seropositive	TRUE	2.4035	1.4146
MS024	F	42.6	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW	Not tested			
MS025	F	44.2	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR	Not tested			
MS026	F	47.3	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR	Not tested			
MS027	F	41.6	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK	Not tested			

MS028	F	46.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Not tested			
MS029	F	44.9	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Seropositive	TRUE	2.1094	1.2415
MS030	F	45.5	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	QPCR	Not tested			
MS031	F	48	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Not tested			
MS032	F	45.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Seropositive	TRUE	1.9664	1.1573
MS033	F	43	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK, FLOW	Seropositive	TRUE	1.9684	1.1585
MS034	F	46.3	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK	Not tested			
MS035	F	31	Black or African American	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR	Not tested			
MS036	F	48.8	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK	Not tested			
MS037	F	50.3	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Seropositive	TRUE	2.2785	1.341
MS038	F	39	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Seropositive	TRUE	2.682	1.5785
MS039	F	47.2	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK	Seropositive	TRUE	2.813	1.6556

MS040	M	34.8	Unknown or not reported	Hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Seropositive	TRUE	2.1465	1.2633
MS041	F	36.4	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK	Seropositive	TRUE	3.0572	1.7993
MS042	F	28.6	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK, FLOW, QPCR	Not tested			
MS043	F	38.9	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK	Seropositive	TRUE	2.1437	1.2617
MS044	F	37	White	Not hispanic or latino	Relapsing-Remitting MS	Tysabri	BULK	Not tested			
MS045	F	42.5	White	Not hispanic or latino	Relapsing-Remitting MS	Zenapax	QPCR	Not tested			
MS046	F	49.3	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK	Seropositive	TRUE	2.6805	1.5776
MS047	M	29.8	More than one race	Not hispanic or latino	Relapsing-Remitting MS	Cytosan	QPCR	Not tested			
MS048	M	37.1	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK	Not tested			
MS049	M	34.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK	Not tested			
MS050	F	35.7	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	QPCR	Not tested			
MS051	F	44	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	FLOW	Not tested			

MS05 2	F	41. 6	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxon e	BULK	Seropositive	TRUE	3.9171	2.3054
MS05 3	F	47. 2	White	Not hispanic or latino	Secondary Progressiv e MS	Gilenya	FLOW, QPCR	Not tested			
MS05 4	M	34. 5	Black or African America n	Not hispanic or latino	Relapsing- Remitting MS	Copaxon e	BULK	Seropositive	TRUE	3.1059	1.828
MS05 5	F	34. 8	White	Not hispanic or latino	Relapsing- Remitting MS	Avonex	BULK, FLOW	Not tested			
MS05 6	F	34. 3	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxon e	BULK	Not tested			
MS05 7	M	39. 1	White	Not hispanic or latino	Relapsing- Remitting MS	Rebif	BULK	Seropositive	TRUE	2.1961	1.2925
MS05 8	F	47. 8	White	Not hispanic or latino	Relapsing- Remitting MS	Avonex	BULK, FLOW	Seropositive	TRUE	2.7848	1.639
MS05 9	F	35. 8	White	Not hispanic or latino	Relapsing- Remitting MS	Betasero n	BULK	Not tested			
MS06 0	F	37	More than one race	Not hispanic or latino	Secondary Progressiv e MS	Tecfidera (BG-12)	QPCR	Not tested			
MS06 1	M	24	White	Not hispanic or latino	Relapsing- Remitting MS	Avonex	BULK, FLOW	Not tested			
MS06 2	F	45	White	Not hispanic or latino	Relapsing- Remitting MS	Rebif	BULK	Not tested			
MS06 3	F	32. 9	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	BULK	Seropositive	TRUE	2.6188	1.5413

MS064	M	44.6	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR	Not tested			
MS065	M	32.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Seropositive	TRUE	1.7171	1.0106
MS066	F	34	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK, FLOW	Not tested			
MS067	F	49.6	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Seropositive	TRUE	2.8185	1.6588
MS068	F	32.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Not tested			
MS069	F	37	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW, QPCR	Not tested			
MS070	M	27.4	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK, FLOW	Not tested			
MS071	M	42.1	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK, FLOW, QPCR	Seropositive	TRUE	3.5243	2.0742
MS072	F	43.7	White	Not hispanic or latino	Relapsing-Remitting MS	Cellcept	QPCR	Not tested			
MS073	F	46.7	White	Hispanic or latino	Secondary Progressive MS	Gilenya	QPCR	Not tested			
MS074	F	32	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	FLOW, QPCR	Not tested			
MS075	F	36	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK, FLOW	Seropositive	TRUE	2.5717	1.5136

MS076	F	20.6	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK	Seropositive	TRUE	2.8365	1.6694
MS077	F	43.6	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR	Not tested			
MS078	F	40.9	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK	Seropositive	TRUE	2.4265	1.4281
MS079	F	34.7	White	Not hispanic or latino	Relapsing-Remitting MS	Betasero n	BULK	Seropositive	TRUE	2.0664	1.2162
MS080	F	28.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, FLOW	Not tested			
MS081	F	48.1	White	Not hispanic or latino	Relapsing-Remitting MS	Betasero n	BULK	Not tested			
MS082	F	30.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, QPCR	Not tested			
MS083	F	34.4	White	Not hispanic or latino	Relapsing-Remitting MS	Tysabri	BULK	Not tested			
MS084	M	45.3	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, FLOW	Not tested			
MS085	F	35.2	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	QPCR	Not tested			
MS086	M	36.9	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR	Not tested			
MS087	F	28	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK	Not tested			
MS088	M	50.6	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR	Not tested			

MS089	F	48	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Not tested			
MS090	F	32.2	White	Not hispanic or latino	Secondary Progressive MS	Cytosan	QPCR	Not tested			
MS091	F	29.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, QPCR	Not tested			
MS092	M	38.4	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK	Seropositive	TRUE	0.6973	0.4104
MS093	F	37	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Not tested			
MS094	F	35.4	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW, QPCR	Not tested			
MS095	F	39.1	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK	Not tested			
MS096	F	33.9	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK, FLOW	Seropositive	TRUE	3.7671	2.2171
MS097	F	49.4	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK	Seropositive	TRUE	2.5964	1.5281
MS098	F	29.8	White	Not hispanic or latino	Relapsing-Remitting MS	Tysabri	BULK, FLOW	Not tested			
MS099	F	35	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK	Not tested			
MS100	M	38.4	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK	Not tested			

MS10 1	M	25. 8	Unknown or not reported	Hispanic or latino	Relapsing- Remitting MS	Copaxon e	BULK	Seropositive	TRUE	1.9427	1.1434
MS10 2	F	45. 2	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	BULK	Seropositive	TRUE	2.7829	1.6379
MS10 3	F	30. 6	White	Not hispanic or latino	Relapsing- Remitting MS	Tecfidera (BG-12)	BULK	Not tested			
MS10 4	F	25. 9	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	QPCR	Not tested			
MS10 5	F	26. 3	Black or African America n	Hispanic or latino	Relapsing- Remitting MS	Gilenya	BULK, FLOW	Seropositive	TRUE	2.3232	1.3673
MS10 6	F	39. 4	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxon e	BULK	Seropositive	TRUE	1.7086	1.0056
MS10 7	F	30. 6	White	Not hispanic or latino	Relapsing- Remitting MS	Avonex	BULK	Seropositive	TRUE	2.4073	1.4168
MS10 8	F	49. 8	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	FLOW	Not tested			
MS10 9	F	45. 6	White	Not hispanic or latino	Relapsing- Remitting MS	Untreated	BULK	Seropositive	TRUE	2.9607	1.7425
MS11 0	M	30	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	QPCR	Not tested			
MS11 1	F	27. 4	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxon e	BULK	Not tested			
MS11 2	F	33. 3	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	BULK	Seropositive	TRUE	2.5141	1.4797

MS11 3	F	23. 1	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxon e	QPCR	Not tested			
MS11 4	M	32. 6	White	Hispanic or latino	Relapsing- Remitting MS	Gilenya	BULK	Not tested			

Supplementary Table 3 – PBMC samples										
Sample_ID	Donor_ID	Condition	Time to relapse (d)	Sex	Age (yrs)	Race	Ethnicity	Diagnosis	Treatment	Assays
S001	MS002	PreRelapse	-27	F	48.5	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRNA
S002	MS016	PreRelapse	-69	F	44.7	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	FLOW
S003	MS016	Remission	267	F	45.6	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	FLOW
S004	MS017	PreRelapse	-35	F	50.4	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	QPCR
S005	MS017	Remission	-429	F	49.3	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	QPCR
S006	MS018	PreRelapse	-6	F	49.8	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S007	MS018	Remission	-391	F	48.7	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S008	MS019	PreRelapse	-29	F	47.7	Black or African American	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S009	MS019	Relapse	60	F	48.1	Black or African American	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S010	MS019	Remission	-198	F	47.3	Black or African American	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S011	MS020	Relapse	17	M	48.5	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK
S012	MS020	Remission	-197	M	47.9	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK
S013	MS014	Remission	223	F	56.7	White	Not hispanic or latino	Clinically Isolated Syndrome	Tecfidera (BG-12)	SCRNA
S014	MS021	PreRelapse	-90	F	39.9	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR

S015	MS021	Remission	582	F	41.7	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR
S016	MS022	Relapse	32	F	50.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S017	MS022	Remission	-212	F	49.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S018	MS023	PreRelapse	-41	M	43.4	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK, FLOW
S019	MS023	Remission	338	M	44.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	FLOW
S020	MS024	PreRelapse	-132	F	41.8	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW
S021	MS024	Remission	407	F	43.3	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW
S022	MS025	PreRelapse	-98	F	43.6	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S023	MS025	Remission	314	F	44.8	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S024	MS026	PreRelapse	-111	F	46.9	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR
S025	MS026	Remission	193	F	47.7	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR
S026	MS027	Relapse	33	F	42.1	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S027	MS027	Remission	202	F	41.1	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S028	MS028	Relapse	58	F	47.3	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S029	MS028	Remission	-355	F	46.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S030	MS003	PreRelapse	-29	F	42.1	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	SCRNA
S031	MS003	Remission	483	F	43.5	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	SCRNA
S032	MS029	Relapse	72	F	45.4	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S033	MS029	Remission	-300	F	44.4	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK

S034	MS030	PreRelapse	-28	F	44.9	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	QPCR
S035	MS030	Remission	403	F	46.1	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	QPCR
S036	MS031	Relapse	74	F	48.6	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S037	MS031	Remission	-325	F	47.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S038	MS032	Relapse	82	F	45.7	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S039	MS032	Remission	-289	F	44.7	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S040	MS033	PreRelapse	-85	F	42.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	FLOW
S041	MS033	Remission	118	F	43.4	White	Not hispanic or latino	Relapsing-Remitting MS	Cellcept; Copaxone	BULK, FLOW
S042	MS034	Relapse	88	F	46.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S043	MS034	Remission	-296	F	45.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S044	MS035	PreRelapse	-11	F	30.8	Black or African American	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR
S045	MS035	Remission	169	F	31.3	Black or African American	Not hispanic or latino	Relapsing-Remitting MS	Untreated	QPCR
S046	MS036	Relapse	25	F	49.3	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S047	MS036	Remission	-281	F	48.4	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S048	MS037	Relapse	49	F	50.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S049	MS037	Remission	-344	F	49.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S050	MS038	Relapse	70	F	38.7	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK

S051	MS038	Remission	316	F	39.3	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S052	MS039	PreRelapse	-48	F	46.7	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S053	MS039	Remission	322	F	47.7	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S054	MS040	Relapse	27	M	35.1	Unknown or not reported	Hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S055	MS040	Remission	-182	M	34.5	Unknown or not reported	Hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S056	MS041	Remission	-352	F	36.4	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK
S057	MS042	PreRelapse	-145	F	28.3	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	FLOW, QPCR
S058	MS042	Relapse	63	F	28.8	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK
S059	MS042	Remission	-338	F	27.8	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	FLOW
S060	MS042	Remission	203	F	29.3	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK, QPCR
S061	MS043	Relapse	39	F	39.4	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK
S062	MS043	Remission	-331	F	38.4	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK
S063	MS044	PreRelapse	-78	F	37	White	Not hispanic or latino	Relapsing-Remitting MS	Tysabri	BULK
S064	MS004	PreRelapse	-29	F	38.4	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	SCRNA
S065	MS004	Remission	179	F	40.5	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	SCRNA
S066	MS045	PreRelapse	-42	F	42.1	White	Not hispanic or latino	Relapsing-Remitting MS	Zenapax	QPCR
S067	MS045	Remission	169	F	42.9	White	Not hispanic or latino	Relapsing-Remitting MS	Zenapax	QPCR
S068	MS046	Relapse	14	F	49.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK

S069	MS046	Remission	-336	F	48.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S070	MS047	PreRelapse	-60	M	29.4	More than one race	Not hispanic or latino	Relapsing-Remitting MS	Cytosan	QPCR
S071	MS047	Remission	269	M	30.3	More than one race	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S072	MS048	PreRelapse	-75	M	36.6	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S073	MS048	Remission	303	M	37.6	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S074	MS049	PreRelapse	-25	M	34.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S075	MS050	PreRelapse	-27	F	35.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	QPCR
S076	MS050	Remission	185	F	36.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	QPCR
S077	MS001	PreRelapse	-63	M	22.2	Native Hawaiia n or Other Pacific Islander	Hispanic or latino	Relapsing-Remitting MS	Rebif	SCRNA
S078	MS001	Remission	372	M	21.1	Native Hawaiia n or Other Pacific Islander	Hispanic or latino	Relapsing-Remitting MS	Rebif	SCRNA
S079	MS051	PreRelapse	-43	F	43.5	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	FLOW
S080	MS051	Remission	336	F	44.5	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	FLOW
S081	MS009	Relapse	5	F	43.2	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRNA
S082	MS009	Remission	1085	F	46.2	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRNA

S083	MS052	Relapse	37	F	41.6	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S084	MS053	PreRelapse	-114	F	47.4	White	Not hispanic or latino	Secondary Progressive MS	Gilenya	FLOW, QPCR
S085	MS053	Remission	-303	F	46.9	White	Not hispanic or latino	Secondary Progressive MS	Gilenya	FLOW, QPCR
S086	MS054	Relapse	49	M	34.5	Black or African American	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S087	MS055	PreRelapse	-68	F	34.2	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK, FLOW
S088	MS055	Remission	315	F	35.3	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK, FLOW
S089	MS056	Relapse	77	F	34.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S090	MS056	Remission	-287	F	33.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S091	MS057	Relapse	44	M	38.8	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S092	MS057	Relapse	28	M	40.8	White	Not hispanic or latino	Relapsing-Remitting MS	Cytosan; Rebif	BULK
S093	MS057	Remission	-358	M	37.7	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S094	MS058	PreRelapse	-17	F	48.3	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK, FLOW
S095	MS058	Remission	-357	F	47.4	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK, FLOW
S096	MS059	Relapse	17	F	36.3	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S097	MS059	Remission	-324	F	35.4	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S098	MS060	PreRelapse	-96	F	37.5	More than one race	Not hispanic or latino	Secondary Progressive MS	Tecfidera (BG-12)	QPCR
S099	MS060	Remission	-495	F	36.4	More than	Not hispanic or latino	Secondary Progressive MS	Tecfidera (BG-12)	QPCR

						one race				
S100	MS061	PreRelapse	-87	M	23.6	White	Not hispanic or latino	Relapsing- Remitting MS	Avonex	BULK, FLOW
S101	MS061	Remission	128	M	24.5	White	Not hispanic or latino	Relapsing- Remitting MS	Avonex	FLOW
S102	MS062	Relapse	45	F	45.5	White	Not hispanic or latino	Relapsing- Remitting MS	Rebif	BULK
S103	MS062	Remission	-333	F	44.5	White	Not hispanic or latino	Relapsing- Remitting MS	Rebif	BULK
S104	MS063	PreRelapse	0	F	32.9	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	BULK
S105	MS064	PreRelapse	-4	M	44.9	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	QPCR
S106	MS064	Remission	-187	M	44.4	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	QPCR
S107	MS065	Relapse	54	M	33.4	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxone	BULK
S108	MS065	Remission	-358	M	32.2	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxone	BULK
S109	MS066	PreRelapse	-87	F	33.5	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxone	BULK, FLOW
S110	MS066	Remission	258	F	34.5	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxone	BULK, FLOW
S111	MS067	Relapse	34	F	50.1	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxone	BULK
S112	MS067	Remission	-345	F	49.1	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxone	BULK
S113	MS068	Relapse	0	F	32.7	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxone	BULK
S114	MS068	Remission	126	F	31.8	White	Not hispanic or latino	Relapsing- Remitting MS	Copaxone	BULK
S115	MS069	PreRelapse	-148	F	36.5	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	FLOW, QPCR
S116	MS069	Remission	248	F	37.6	White	Not hispanic or latino	Relapsing- Remitting MS	Gilenya	FLOW, QPCR
S117	MS070	PreRelapse	-43	M	27.8	White	Not hispanic or latino	Relapsing- Remitting MS	Avonex	FLOW

S118	MS070	Remission	-342	M	26.9	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK, FLOW
S119	MS071	PreRelapse	-112	M	40.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	FLOW, QPCR
S120	MS071	Relapse	65	M	41.3	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S121	MS071	Remission	225	M	42.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S122	MS071	Remission	141	M	43.3	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK, FLOW
S123	MS071	Remission	-209	M	42.4	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S124	MS071	Remission	266	M	41.9	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK, QPCR
S125	MS072	PreRelapse	-40	F	43.3	White	Not hispanic or latino	Relapsing-Remitting MS	Cellcept	QPCR
S126	MS072	Remission	247	F	44.1	White	Not hispanic or latino	Relapsing-Remitting MS	Cellcept	QPCR
S127	MS073	PreRelapse	-53	F	46.1	White	Hispanic or latino	Secondary Progressive MS	Gilenya	QPCR
S128	MS073	Remission	-195	F	47.3	White	Hispanic or latino	Secondary Progressive MS	Gilenya	QPCR
S129	MS074	PreRelapse	-116	F	31.6	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	FLOW, QPCR
S130	MS074	Remission	196	F	32.5	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	FLOW, QPCR
S131	MS075	PreRelapse	-88	F	36.2	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK, FLOW
S132	MS075	Remission	-253	F	35.8	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK, FLOW
S133	MS076	PreRelapse	-49	F	21	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK
S134	MS076	Relapse	7	F	20.1	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK
S135	MS077	PreRelapse	-120	F	43.9	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S136	MS077	Remission	-365	F	43.3	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR

S137	MS078	Remission	428	F	40.9	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK
S138	MS079	PreRelapse	-82	F	34.7	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S139	MS080	PreRelapse	-79	F	28.3	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, FLOW
S140	MS080	Remission	263	F	29.2	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, FLOW
S141	MS081	Relapse	41	F	50.5	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S142	MS081	Relapse	44	F	44.4	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S143	MS081	Remission	-358	F	49.4	White	Not hispanic or latino	Relapsing-Remitting MS	Betaseron	BULK
S144	MS082	PreRelapse	-13	F	30.3	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, QPCR
S145	MS082	Remission	330	F	31.3	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, QPCR
S146	MS083	Relapse	1	F	34	White	Not hispanic or latino	Relapsing-Remitting MS	Tysabri	BULK
S147	MS083	Remission	322	F	34.9	White	Not hispanic or latino	Relapsing-Remitting MS	Tysabri	BULK
S148	MS084	PreRelapse	-11	M	45.7	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, FLOW
S149	MS084	Remission	-303	M	44.9	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, FLOW
S150	MS085	PreRelapse	-48	F	34.7	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	QPCR
S151	MS085	Remission	343	F	35.8	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	QPCR
S152	MS086	PreRelapse	-3	M	37.4	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S153	MS086	Remission	109	M	36.4	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S154	MS087	Relapse	78	F	28	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S155	MS088	PreRelapse	-18	M	50	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR

S156	MS088	Remission	438	M	51.3	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S157	MS089	Relapse	28	F	48.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S158	MS089	Remission	-336	F	47.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S159	MS090	PreRelapse	-85	F	32.8	White	Not hispanic or latino	Secondary Progressive MS	Cytosan	QPCR
S160	MS090	Remission	-461	F	31.7	White	Not hispanic or latino	Secondary Progressive MS	Cytosan	QPCR
S161	MS091	PreRelapse	-22	F	29.3	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, QPCR
S162	MS091	Remission	-253	F	30.2	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK, QPCR
S163	MS092	Remission	349	M	38.4	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S164	MS093	Relapse	79	F	37.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S165	MS093	Remission	-300	F	36.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S166	MS094	PreRelapse	-145	F	35.1	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW, QPCR
S167	MS094	Remission	402	F	36.6	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW
S168	MS094	Remission	-327	F	34.6	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S169	MS095	Relapse	85	F	39.5	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S170	MS095	Remission	-237	F	38.7	White	Not hispanic or latino	Relapsing-Remitting MS	Rebif	BULK
S171	MS012	Remission	-364	M	40.9	White	Not hispanic or latino	Relapsing-Remitting MS	Ocrevus	SCRNA
S172	MS096	PreRelapse	-52	F	33.4	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK, FLOW
S173	MS096	Remission	194	F	34.4	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK, FLOW
S174	MS097	Relapse	52	F	49.8	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK

S175	MS097	Remission	-270	F	49	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK
S176	MS098	PreRelapse	-22	F	29.3	White	Not hispanic or latino	Relapsing-Remitting MS	Tysabri	BULK, FLOW
S177	MS098	Relapse	8	F	30.2	White	Not hispanic or latino	Relapsing-Remitting MS	Tysabri	FLOW
S178	MS099	PreRelapse	-73	F	34.4	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S179	MS099	Remission	458	F	35.5	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S180	MS005	PreRelapse	-8	F	43.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	SCRNA
S181	MS005	Remission	-366	F	42.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	SCRNA
S182	MS100	PreRelapse	-84	M	38.8	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S183	MS100	Remission	192	M	38.1	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S184	MS101	PreRelapse	-70	M	25.4	Unknown or not reported	Hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S185	MS101	Remission	215	M	26.2	Unknown or not reported	Hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S186	MS102	PreRelapse	-76	F	45.5	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S187	MS102	Remission	153	F	45	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S188	MS103	PreRelapse	-17	F	30.1	White	Not hispanic or latino	Relapsing-Remitting MS	Tecfidera (BG-12)	BULK
S189	MS103	Remission	347	F	31.1	White	Not hispanic or latino	Relapsing-Remitting MS	Tecfidera (BG-12)	BULK
S190	MS010	PreRelapse	-14	F	24.7	White	Not hispanic or latino	Clinically Isolated Syndrome	Untreated	SCRNA
S191	MS104	PreRelapse	-88	F	26.5	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S192	MS104	Relapse	6	F	25.3	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR

S193	MS105	PreRelapse	-30	F	26.6	Black or African American	Hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK, FLOW
S194	MS105	Remission	-226	F	26	Black or African American	Hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK, FLOW
S195	MS106	Relapse	88	F	39.2	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S196	MS106	Remission	284	F	39.7	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S197	MS008	PreRelapse	-48	F	25.2	White	Not hispanic or latino	Clinically Isolated Syndrome	Copaxone	BULK, SCRNA
S198	MS008	Relapse	21	F	26.2	White	Not hispanic or latino	Clinically Isolated Syndrome	Copaxone	BULK
S199	MS007	Relapse	10	M	42.9	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRNA
S200	MS006	Relapse	5	F	34.4	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	SCRNA
S201	MS006	Remission	-486	F	33.1	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	SCRNA
S202	MS107	Relapse	55	F	30.2	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK
S203	MS107	Remission	355	F	31	White	Not hispanic or latino	Relapsing-Remitting MS	Avonex	BULK
S204	MS011	PreRelapse	-73	F	40.3	White	Not hispanic or latino	Clinically Isolated Syndrome	Copaxone	SCRNA
S205	MS108	PreRelapse	-118	F	50.1	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW
S206	MS108	Remission	302	F	49.6	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	FLOW
S207	MS109	Relapse	37	F	46	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK
S208	MS109	Remission	-251	F	45.2	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	BULK
S209	MS110	PreRelapse	-113	M	29.7	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR

S210	MS110	Remission	-483	M	30.3	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	QPCR
S211	MS111	Relapse	90	F	27.9	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S212	MS111	Remission	-255	F	27	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	BULK
S213	MS112	Remission	284	F	33.3	White	Not hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S214	MS113	PreRelapse	-116	F	23.8	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	QPCR
S215	MS113	Remission	-457	F	22.4	White	Not hispanic or latino	Relapsing-Remitting MS	Copaxone	QPCR
S216	MS015	Remission	199	F	36.5	White	Not hispanic or latino	Relapsing-Remitting MS	Untreated	SCRNA
S217	MS013	Remission	321	M	31.3	White	Unknown	Relapsing-Remitting MS	Untreated	SCRNA
S218	MS114	PreRelapse	-48	M	32	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S219	MS114	Remission	365	M	33.1	White	Hispanic or latino	Relapsing-Remitting MS	Gilenya	BULK
S220	HC005	Healthy		F	53.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S221	HC013	Healthy		F	36.4	South Asian	Not hispanic or latino	Healthy	Untreated	SCRNA
S222	HC020	Healthy		F	54.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S223	HC012	Healthy		M	29.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S224	HC016	Healthy		F	25.1	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S225	HC010	Healthy		M	24.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S226	HC007	Healthy		F	33.7	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S227	HC006	Healthy		M	25.9	East Asian and South-East	Not hispanic or latino	Healthy	Untreated	SCRNA

S228	HC019	Healthy		M	44.3	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S229	HC017	Healthy		F	22.7	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S230	HC011	Healthy		M	30.3	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S231	HC018	Healthy		M	57.9	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S232	HC009	Healthy		M	31.1	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S233	HC014	Healthy		F	25.4	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S234	HC002	Healthy		F	41.6	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S235	HC008	Healthy		M	25.3	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S236	HC001	Healthy		F	42.7	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S237	HC003	Healthy		F	37.9	Black or African American	Not hispanic or latino	Healthy	Untreated	SCRNA
S238	HC004	Healthy		M	38.7	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S239	HC021	Healthy		M	44.3	White	Not hispanic or latino	Healthy	Untreated	SCRNA
S240	HC015	Healthy		F	44.6	Asian	Not hispanic or latino	Healthy	Untreated	SCRNA

Supplementary Table 4 – scRNAseq Libraries														
Library ID	Sample ID	Donor ID	Original ID	Prior Sample ID	Condition	Time to relapse (d)	Sex	Age (yrs)	Diagnosis	Treat ment	Pool ID	Pooled	Batch	Replicate
L1	S077	MS001	MS1PreR1	MS01_PreRelapse	PreRelapse	-63	M	22.2	Relapsing-Remitting MS	Rebif	W01	TRUE	A1	1
L2	S181	MS005	MS5RemR1	MS05_Remission	Remission	-366	F	42.2	Relapsing-Remitting MS	Copaxone	W01	TRUE	A1	1
L3	S200	MS006	MS6RelR1	MS06_Relapse	Relapse	5	F	34.4	Relapsing-Remitting MS	Copaxone	W01	TRUE	A1	1
L4	S078	MS001	MS1RemR1	MS01_Remission	Remission	372	M	21.1	Relapsing-Remitting MS	Rebif	W02	TRUE	A1	1
L5	S200	MS006	MS6RelR2	MS06_Relapse	Relapse	5	F	34.4	Relapsing-Remitting MS	Copaxone	W02	TRUE	A1	2
L6	S082	MS009	MS9RemR1	MS09_Remission	Remission	1085	F	46.2	Relapsing-Remitting MS	Untreated	W02	TRUE	A1	1
L7	S077	MS001	MS1PreR2	MS01_PreRelapse	PreRelapse	-63	M	22.2	Relapsing-Remitting MS	Rebif	W03	TRUE	A1	2
L8	S201	MS006	MS6RemR1	MS06_Remission	Remission	-486	F	33.1	Relapsing-Remitting MS	Copaxone	W03	TRUE	A1	1
L9	S081	MS009	MS9RelR1	MS09_Relapse	Relapse	5	F	43.2	Relapsing-Remitting MS	Untreated	W03	TRUE	A1	1
L10	S078	MS001	MS1RemR2	MS01_Remission	Remission	372	M	21.1	Relapsing-Remitting MS	Rebif	W04	TRUE	A1	2
L11	S180	MS005	MS5PreR1	MS05_PreRelapse	PreRelapse	-8	F	43.2	Relapsing-Remitting MS	Copaxone	W04	TRUE	A1	1
L12	S201	MS006	MS6RemR2	MS06_Remission	Remission	-486	F	33.1	Relapsing-Remitting MS	Copaxone	W04	TRUE	A1	2
L13	S180	MS005	MS5PreR2	MS05_PreRelapse	PreRelapse	-8	F	43.2	Relapsing-Remitting MS	Copaxone	W05	FALSE	A1	2

L14	S181	MS005	MS5RemR2	MS05_Relission	Remission	-366	F	42.2	Relapsing- Remitting MS	Copaxone	W06	FALSE	A1	2
L15	S236	HC001	HC1R1	HC01_Healthy	Healthy		F	42.7	Healthy	Untreated	W07	TRUE	A1	1
L16	S234	HC002	HC2R1	HC02_Healthy	Healthy		F	41.6	Healthy	Untreated	W07	TRUE	A1	1
L17	S237	HC003	HC3R1	HC03_Healthy	Healthy		F	37.9	Healthy	Untreated	W07	TRUE	A1	1
L18	S237	HC003	HC3R2	HC03_Healthy	Healthy		F	37.9	Healthy	Untreated	W08	FALSE	A1	2
L19	S001	MS002	MS2PreR1	MS02_PreRelapse	PreRelapse	-27	F	48.5	Relapsing- Remitting MS	Untreated	W09	TRUE	A2	1
L20	S030	MS003	MS3PreR1	MS03_PreRelapse	PreRelapse	-29	F	42.1	Relapsing- Remitting MS	Rebif	W09	TRUE	A2	1
L21	S064	MS004	MS4PreR1	MS04_PreRelapse	PreRelapse	-29	F	38.4	Relapsing- Remitting MS	Avonex	W09	TRUE	A2	1
L22	S031	MS003	MS3RemR1	MS03_Relission	Remission	483	F	43.5	Relapsing- Remitting MS	Rebif	W10	FALSE	A2	1
L23	S030	MS003	MS3PreR2	MS03_PreRelapse	PreRelapse	-29	F	42.1	Relapsing- Remitting MS	Rebif	W11	FALSE	A2	2
L24	S001	MS002	MS2PreR2	MS02_PreRelapse	PreRelapse	-27	F	48.5	Relapsing- Remitting MS	Untreated	W12	TRUE	A2	2
L25	S031	MS003	MS3RemR2	MS03_Relission	Remission	483	F	43.5	Relapsing- Remitting MS	Rebif	W12	TRUE	A2	2
L26	S065	MS004	MS4RemR1	MS04_Relission	Remission	179	F	40.5	Relapsing- Remitting MS	Avonex	W12	TRUE	A2	1
L27	S171	MS012	AMS1	MS12_Relission	Remission	-364	M	40.9	Relapsing- Remitting MS	Ocrevus	BW1	TRUE	B1	1
L29	S238	HC004	AHC1	HC04_Healthy	Healthy		M	38.7	Healthy	Untreated	BW1	TRUE	B1	1
L28	S217	MS013	AMS2	MS13_Relission	Remission	321	M	31.3	Relapsing- Remitting MS	Untreated	BW2	TRUE	B1	1
L30	S220	HC005	AHC2	HC05_Healthy	Healthy		F	53.6	Healthy	Untreated	BW2	TRUE	B1	1
L31	S227	HC006	AHC3	HC06_Healthy	Healthy		M	25.9	Healthy	Untreated	BW3	TRUE	B1	1

L32	S199	MS007	AMS4	MS07_Relapse	Relapse	10	M	42.9	Relapsing- Remitting MS	Untreated	BW4	TRUE	B2	1
L33	S226	HC007	AHC4	HC07_Healthy	Healthy		F	33.7	Healthy	Untreated	BW4	TRUE	B2	1
L34	S235	HC008	AHC5	HC08_Healthy	Healthy		M	25.3	Healthy	Untreated	BW5	TRUE	B2	1
L35	S232	HC009	AHC6	HC09_Healthy	Healthy		M	31.1	Healthy	Untreated	BW6	TRUE	B2	1
L37	S225	HC010	AHC7	HC10_Healthy	Healthy		M	24.6	Healthy	Untreated	BW7	TRUE	B3	1
L36	S013	MS014	AMS8	MS14_Remission	Remission	223	F	56.7	Clinically Isolated Syndrome	Tecfidera (BG-12)	BW8	TRUE	B3	1
L38	S230	HC011	AHC8	HC11_Healthy	Healthy		M	30.3	Healthy	Untreated	BW8	TRUE	B3	1
L39	S223	HC012	AHC9	HC12_Healthy	Healthy		M	29.6	Healthy	Untreated	BW9	TRUE	B3	1
L40	S197	MS008	AMS10	MS08_PreRelapse	PreRelapse	-48	F	25.2	Clinically Isolated Syndrome	Copaxone	BW10	TRUE	B4	1
L42	S221	HC013	AHC10	HC13_Healthy	Healthy		F	36.4	Healthy	Untreated	BW10	TRUE	B4	1
L41	S216	MS015	AMS11	MS15_Remission	Remission	199	F	36.5	Relapsing- Remitting MS	Untreated	BW11	TRUE	B4	1
L43	S233	HC014	AHC11	HC14_Healthy	Healthy		F	25.4	Healthy	Untreated	BW11	TRUE	B4	1
L44	S240	HC015	AHC12	HC15_Healthy	Healthy		F	44.6	Healthy	Untreated	BW12	TRUE	B4	1
L45	S224	HC016	AHC13	HC16_Healthy	Healthy		F	25.1	Healthy	Untreated	BW12	TRUE	B4	1
L46	S190	MS010	AMS15	MS10_PreRelapse	PreRelapse	-14	F	24.7	Clinically Isolated Syndrome	Untreated	BW13	TRUE	B5	1
L47	S229	HC017	AHC14	HC17_Healthy	Healthy		F	22.7	Healthy	Untreated	BW13	TRUE	B5	1
L48	S231	HC018	AHC15	HC18_Healthy	Healthy		M	57.9	Healthy	Untreated	BW13	TRUE	B5	1
L49	S228	HC019	AHC16	HC19_Healthy	Healthy		M	44.3	Healthy	Untreated	BW14	TRUE	B5	1
L50	S222	HC020	AHC17	HC20_Healthy	Healthy		F	54.6	Healthy	Untreated	BW14	TRUE	B5	1
L51	S239	HC021	AHC18	HC21_Healthy	Healthy		M	44.3	Healthy	Untreated	BW15	TRUE	B5	1
L52	S204	MS011	AMS24	MS11_PreRelapse	PreRelapse	-73	F	40.3	Clinically Isolated Syndrome	Copaxone	BW16	TRUE	B6	1

Supplementary Table 5 - Flow Cytometry Samples

Sample_ID	Donor_ID	Condition	Time to relapse (d)	Sex	Age (yrs)	Diagnosis	Treatment	Batch
S002	MS016	PreRelapse	-69	F	44.7	Relapsing-Remitting MS	Copaxone	exp3
S003	MS016	Remission	267	F	45.6	Relapsing-Remitting MS	Copaxone	exp3
S018	MS023	PreRelapse	-41	M	43.4	Relapsing-Remitting MS	Copaxone	exp3
S019	MS023	Remission	338	M	44.5	Relapsing-Remitting MS	Copaxone	exp3
S020	MS024	PreRelapse	-132	F	41.8	Relapsing-Remitting MS	Gilenya	exp2
S021	MS024	Remission	407	F	43.3	Relapsing-Remitting MS	Gilenya	exp2
S040	MS033	PreRelapse	-85	F	42.5	Relapsing-Remitting MS	Copaxone	exp2
S041	MS033	Remission	118	F	43.4	Relapsing-Remitting MS	Cellcept; Copaxone	exp2
S057	MS042	PreRelapse	-145	F	28.3	Relapsing-Remitting MS	Avonex	exp3
S059	MS042	Remission	-338	F	27.8	Relapsing-Remitting MS	Avonex	exp3
S079	MS051	PreRelapse	-43	F	43.5	Relapsing-Remitting MS	Rebif	exp3
S080	MS051	Remission	336	F	44.5	Relapsing-Remitting MS	Rebif	exp3
S084	MS053	PreRelapse	-114	F	47.4	Secondary Progressive MS	Gilenya	exp2
S085	MS053	Remission	-303	F	46.9	Secondary Progressive MS	Gilenya	exp2
S087	MS055	PreRelapse	-68	F	34.2	Relapsing-Remitting MS	Avonex	exp2
S088	MS055	Remission	315	F	35.3	Relapsing-Remitting MS	Avonex	exp2
S094	MS058	PreRelapse	-17	F	48.3	Relapsing-Remitting MS	Avonex	exp1
S095	MS058	Remission	-357	F	47.4	Relapsing-Remitting MS	Avonex	exp1
S100	MS061	PreRelapse	-87	M	23.6	Relapsing-Remitting MS	Avonex	exp3
S101	MS061	Remission	128	M	24.5	Relapsing-Remitting MS	Avonex	exp3
S109	MS066	PreRelapse	-87	F	33.5	Relapsing-Remitting MS	Copaxone	exp3
S110	MS066	Remission	258	F	34.5	Relapsing-Remitting MS	Copaxone	exp3
S115	MS069	PreRelapse	-148	F	36.5	Relapsing-Remitting MS	Gilenya	exp1
S116	MS069	Remission	248	F	37.6	Relapsing-Remitting MS	Gilenya	exp1
S117	MS070	PreRelapse	-43	M	27.8	Relapsing-Remitting MS	Avonex	exp2
S118	MS070	Remission	-342	M	26.9	Relapsing-Remitting MS	Avonex	exp2
S119	MS071	PreRelapse	-112	M	40.8	Relapsing-Remitting MS	Copaxone	exp1
S122	MS071	Remission	141	M	43.3	Relapsing-Remitting MS	Copaxone	exp1
S129	MS074	PreRelapse	-116	F	31.6	Relapsing-Remitting MS	Rebif	exp1

S130	MS074	Remission	196	F	32.5	Relapsing-Remitting MS	Rebif	exp1
S131	MS075	PreRelapse	-88	F	36.2	Relapsing-Remitting MS	Gilenya	exp2
S132	MS075	Remission	-253	F	35.8	Relapsing-Remitting MS	Gilenya	exp2
S139	MS080	PreRelapse	-79	F	28.3	Relapsing-Remitting MS	Rebif	exp1
S140	MS080	Remission	263	F	29.2	Relapsing-Remitting MS	Rebif	exp1
S148	MS084	PreRelapse	-11	M	45.7	Relapsing-Remitting MS	Rebif	exp1
S149	MS084	Remission	-303	M	44.9	Relapsing-Remitting MS	Rebif	exp1
S166	MS094	PreRelapse	-145	F	35.1	Relapsing-Remitting MS	Gilenya	exp2
S167	MS094	Remission	402	F	36.6	Relapsing-Remitting MS	Gilenya	exp2
S172	MS096	PreRelapse	-52	F	33.4	Relapsing-Remitting MS	Gilenya	exp2
S173	MS096	Remission	194	F	34.4	Relapsing-Remitting MS	Gilenya	exp2
S176	MS098	PreRelapse	-22	F	29.3	Relapsing-Remitting MS	Tysabri	exp1
S177	MS098	Relapse	8	F	30.2	Relapsing-Remitting MS	Tysabri	exp1
S193	MS105	PreRelapse	-30	F	26.6	Relapsing-Remitting MS	Gilenya	exp3
S194	MS105	Remission	-226	F	26	Relapsing-Remitting MS	Gilenya	exp3
S205	MS108	PreRelapse	-118	F	50.1	Relapsing-Remitting MS	Gilenya	exp3
S206	MS108	Remission	302	F	49.6	Relapsing-Remitting MS	Gilenya	exp3

Supplementary Table 6 – Antibody Reagent Panels

Laser	Laser_Wavelength_nm	Detect or	Fluorochrome	Marker	Clone	Catalog_Number	Vendor	Application
UV	355	379/28	BUV395	CD3	UCHT1	563548	BD Biosciences	T cell exclusion / lineage
		515/30	BUV496	CD38	HIT2	612947	BD Biosciences	Plasma cell / activation marker
		586/15	BUV563	CD172a/SIRP α	SE5A5	748435	BD Biosciences	Myeloid marker (optimization)
		670/30	BUV661	CD18/ITGB2	L130	750750	BD Biosciences	Integrin / adhesion (optimization)
		740/35	BUV737	CD13/ANPEP	WM15	741828	BD Biosciences	Amino-peptidase (optimization)
Violet	405	450/50	BV421	LRRC32/GARP	7B11	352509	BioLegend	Regulatory T/B cell marker
		530/30	AmCyan	LIVE/DEAD	—	L34957	Life Technologies	Viability dye
		610/20	BV605	CD5	L17F12	364020	BioLegend	B-1 B cell / CLL marker
		670/30	BV650	ICOSLG/B7-H2	2D3/B7-H2	743008	BD Biosciences	Costimulatory ligand
		710/50	BV711	CD21/CR2	B-ly4	563163	BD Biosciences	Complement receptor / naive B cells
		780/60	BV785	CXCR4/CD184	12G5	306529	BioLegend	Chemokine receptor / homing
Blue	488	515/20	FITC	CD20	2H7	564568	BD Biosciences	Pan-B cell marker

		710/50	BB700/PerCP-Cy5	CD19	SJ25C1	566396	BD Biosciences	Pan-B cell marker (primary gate)
Yellow-Green	561	610/20	PE-Texas Red	XCR1	S15046 E	372622	BioLegend	Dendritic cell / cross-presentation
		670/30	PE-Cy5/7-AAD	CD11c/ITGAX	3.9	301610	BioLegend	Dendritic cell / atypical B cell marker
Red	640	647/30	APC- conjugation kit (Abcam, ab201807)	EBV gp350	clone 72A1	MAB10219	Sigma Aldrich	EBV glycoprotein (viral entry)
		710/50	AF700	SEMA7A/CD108	310829	FAB20681N	BioLegend	Semaphorin / immune regulation

Flow Sort Panel:

Marker	Fluorochrome	Clone	Catalog_Number	Vendor	Purpose
CD3	FITC	UCHT1	300406	BioLegend	T cell exclusion (negative gate)
CD19	PE	HIB19	302208	BioLegend	B cell positive selection (sorted population)
CD14	PE-Cy7	M5E2	301814	BioLegend	Monocyte exclusion (negative gate)
7-AAD	—	S17011E	420403	BioLegend	Viability dye (dead cell exclusion)

Supplementary Table 7 – B cell bulk RNA seq libraries							
Sample_ID	Donor_ID	Condition	Time to relapse (d)	Sex	Age (yrs)	Diagnosis	Treatment
S008	MS019	PreRelapse	-29	F	47.7	Relapsing-Remitting MS	Copaxone
S009	MS019	Relapse	60	F	48.1	Relapsing-Remitting MS	Copaxone
S010	MS019	Remission	-198	F	47.3	Relapsing-Remitting MS	Copaxone
S011	MS020	Relapse	17	M	48.5	Relapsing-Remitting MS	Untreated
S012	MS020	Remission	-197	M	47.9	Relapsing-Remitting MS	Untreated
S016	MS022	Relapse	32	F	50.5	Relapsing-Remitting MS	Copaxone
S017	MS022	Remission	-212	F	49.5	Relapsing-Remitting MS	Copaxone
S018	MS023	PreRelapse	-41	M	43.4	Relapsing-Remitting MS	Copaxone
S026	MS027	Relapse	33	F	42.1	Relapsing-Remitting MS	Rebif
S027	MS027	Remission	202	F	41.1	Relapsing-Remitting MS	Rebif
S028	MS028	Relapse	58	F	47.3	Relapsing-Remitting MS	Copaxone
S029	MS028	Remission	-355	F	46.2	Relapsing-Remitting MS	Copaxone
S032	MS029	Relapse	72	F	45.4	Relapsing-Remitting MS	Copaxone
S033	MS029	Remission	-300	F	44.4	Relapsing-Remitting MS	Copaxone
S036	MS031	Relapse	74	F	48.6	Relapsing-Remitting MS	Copaxone
S037	MS031	Remission	-325	F	47.5	Relapsing-Remitting MS	Copaxone
S038	MS032	Relapse	82	F	45.7	Relapsing-Remitting MS	Copaxone
S039	MS032	Remission	-289	F	44.7	Relapsing-Remitting MS	Copaxone
S041	MS033	Remission	118	F	43.4	Relapsing-Remitting MS	Cellcept; Copaxone
S042	MS034	Relapse	88	F	46.8	Relapsing-Remitting MS	Rebif
S043	MS034	Remission	-296	F	45.8	Relapsing-Remitting MS	Rebif
S046	MS036	Relapse	25	F	49.3	Relapsing-Remitting MS	Betaseron
S047	MS036	Remission	-281	F	48.4	Relapsing-Remitting MS	Betaseron
S048	MS037	Relapse	49	F	50.8	Relapsing-Remitting MS	Copaxone
S049	MS037	Remission	-344	F	49.8	Relapsing-Remitting MS	Copaxone
S050	MS038	Relapse	70	F	38.7	Relapsing-Remitting MS	Copaxone
S051	MS038	Remission	316	F	39.3	Relapsing-Remitting MS	Copaxone
S052	MS039	PreRelapse	-48	F	46.7	Relapsing-Remitting MS	Betaseron
S053	MS039	Remission	322	F	47.7	Relapsing-Remitting MS	Betaseron

S054	MS040	Relapse	27	M	35.1	Relapsing-Remitting MS	Copaxone
S055	MS040	Remission	-182	M	34.5	Relapsing-Remitting MS	Copaxone
S056	MS041	Remission	-352	F	36.4	Relapsing-Remitting MS	Avonex
S058	MS042	Relapse	63	F	28.8	Relapsing-Remitting MS	Avonex
S060	MS042	Remission	203	F	29.3	Relapsing-Remitting MS	Avonex
S061	MS043	Relapse	39	F	39.4	Relapsing-Remitting MS	Untreated
S062	MS043	Remission	-331	F	38.4	Relapsing-Remitting MS	Untreated
S063	MS044	PreRelapse	-78	F	37	Relapsing-Remitting MS	Tysabri
S068	MS046	Relapse	14	F	49.8	Relapsing-Remitting MS	Rebif
S069	MS046	Remission	-336	F	48.8	Relapsing-Remitting MS	Rebif
S072	MS048	PreRelapse	-75	M	36.6	Relapsing-Remitting MS	Gilenya
S073	MS048	Remission	303	M	37.6	Relapsing-Remitting MS	Gilenya
S074	MS049	PreRelapse	-25	M	34.8	Relapsing-Remitting MS	Rebif
S083	MS052	Relapse	37	F	41.6	Relapsing-Remitting MS	Copaxone
S086	MS054	Relapse	49	M	34.5	Relapsing-Remitting MS	Copaxone
S087	MS055	PreRelapse	-68	F	34.2	Relapsing-Remitting MS	Avonex
S088	MS055	Remission	315	F	35.3	Relapsing-Remitting MS	Avonex
S089	MS056	Relapse	77	F	34.8	Relapsing-Remitting MS	Copaxone
S090	MS056	Remission	-287	F	33.8	Relapsing-Remitting MS	Copaxone
S091	MS057	Relapse	44	M	38.8	Relapsing-Remitting MS	Rebif
S092	MS057	Relapse	28	M	40.8	Relapsing-Remitting MS	Cytosan; Rebif
S093	MS057	Remission	-358	M	37.7	Relapsing-Remitting MS	Rebif
S094	MS058	PreRelapse	-17	F	48.3	Relapsing-Remitting MS	Avonex
S095	MS058	Remission	-357	F	47.4	Relapsing-Remitting MS	Avonex
S096	MS059	Relapse	17	F	36.3	Relapsing-Remitting MS	Betaseron
S097	MS059	Remission	-324	F	35.4	Relapsing-Remitting MS	Betaseron
S100	MS061	PreRelapse	-87	M	23.6	Relapsing-Remitting MS	Avonex
S102	MS062	Relapse	45	F	45.5	Relapsing-Remitting MS	Rebif
S103	MS062	Remission	-333	F	44.5	Relapsing-Remitting MS	Rebif
S104	MS063	PreRelapse	0	F	32.9	Relapsing-Remitting MS	Gilenya
S107	MS065	Relapse	54	M	33.4	Relapsing-Remitting MS	Copaxone
S108	MS065	Remission	-358	M	32.2	Relapsing-Remitting MS	Copaxone

S109	MS066	PreRelapse	-87	F	33.5	Relapsing-Remitting MS	Copaxone
S110	MS066	Remission	258	F	34.5	Relapsing-Remitting MS	Copaxone
S111	MS067	Relapse	34	F	50.1	Relapsing-Remitting MS	Copaxone
S112	MS067	Remission	-345	F	49.1	Relapsing-Remitting MS	Copaxone
S113	MS068	Relapse	0	F	32.7	Relapsing-Remitting MS	Copaxone
S114	MS068	Remission	126	F	31.8	Relapsing-Remitting MS	Copaxone
S118	MS070	Remission	-342	M	26.9	Relapsing-Remitting MS	Avonex
S120	MS071	Relapse	65	M	41.3	Relapsing-Remitting MS	Copaxone
S121	MS071	Remission	225	M	42.8	Relapsing-Remitting MS	Copaxone
S122	MS071	Remission	141	M	43.3	Relapsing-Remitting MS	Copaxone
S123	MS071	Remission	-209	M	42.4	Relapsing-Remitting MS	Copaxone
S124	MS071	Remission	266	M	41.9	Relapsing-Remitting MS	Copaxone
S131	MS075	PreRelapse	-88	F	36.2	Relapsing-Remitting MS	Gilenya
S132	MS075	Remission	-253	F	35.8	Relapsing-Remitting MS	Gilenya
S133	MS076	PreRelapse	-49	F	21	Relapsing-Remitting MS	Avonex
S134	MS076	Relapse	7	F	20.1	Relapsing-Remitting MS	Avonex
S137	MS078	Remission	428	F	40.9	Relapsing-Remitting MS	Avonex
S138	MS079	PreRelapse	-82	F	34.7	Relapsing-Remitting MS	Betaseron
S139	MS080	PreRelapse	-79	F	28.3	Relapsing-Remitting MS	Rebif
S140	MS080	Remission	263	F	29.2	Relapsing-Remitting MS	Rebif
S141	MS081	Relapse	41	F	50.5	Relapsing-Remitting MS	Betaseron
S142	MS081	Relapse	44	F	44.4	Relapsing-Remitting MS	Betaseron
S143	MS081	Remission	-358	F	49.4	Relapsing-Remitting MS	Betaseron
S144	MS082	PreRelapse	-13	F	30.3	Relapsing-Remitting MS	Rebif
S145	MS082	Remission	330	F	31.3	Relapsing-Remitting MS	Rebif
S146	MS083	Relapse	1	F	34	Relapsing-Remitting MS	Tysabri
S147	MS083	Remission	322	F	34.9	Relapsing-Remitting MS	Tysabri
S148	MS084	PreRelapse	-11	M	45.7	Relapsing-Remitting MS	Rebif
S149	MS084	Remission	-303	M	44.9	Relapsing-Remitting MS	Rebif
S154	MS087	Relapse	78	F	28	Relapsing-Remitting MS	Rebif
S157	MS089	Relapse	28	F	48.5	Relapsing-Remitting MS	Copaxone
S158	MS089	Remission	-336	F	47.5	Relapsing-Remitting MS	Copaxone

S161	MS091	PreRelapse	-22	F	29.3	Relapsing-Remitting MS	Rebif
S162	MS091	Remission	-253	F	30.2	Relapsing-Remitting MS	Rebif
S163	MS092	Remission	349	M	38.4	Relapsing-Remitting MS	Rebif
S164	MS093	Relapse	79	F	37.5	Relapsing-Remitting MS	Copaxone
S165	MS093	Remission	-300	F	36.5	Relapsing-Remitting MS	Copaxone
S169	MS095	Relapse	85	F	39.5	Relapsing-Remitting MS	Rebif
S170	MS095	Remission	-237	F	38.7	Relapsing-Remitting MS	Rebif
S172	MS096	PreRelapse	-52	F	33.4	Relapsing-Remitting MS	Gilenya
S173	MS096	Remission	194	F	34.4	Relapsing-Remitting MS	Gilenya
S174	MS097	Relapse	52	F	49.8	Relapsing-Remitting MS	Untreated
S175	MS097	Remission	-270	F	49	Relapsing-Remitting MS	Untreated
S176	MS098	PreRelapse	-22	F	29.3	Relapsing-Remitting MS	Tysabri
S178	MS099	PreRelapse	-73	F	34.4	Relapsing-Remitting MS	Copaxone
S179	MS099	Remission	458	F	35.5	Relapsing-Remitting MS	Copaxone
S182	MS100	PreRelapse	-84	M	38.8	Relapsing-Remitting MS	Gilenya
S183	MS100	Remission	192	M	38.1	Relapsing-Remitting MS	Gilenya
S184	MS101	PreRelapse	-70	M	25.4	Relapsing-Remitting MS	Copaxone
S185	MS101	Remission	215	M	26.2	Relapsing-Remitting MS	Copaxone
S186	MS102	PreRelapse	-76	F	45.5	Relapsing-Remitting MS	Gilenya
S187	MS102	Remission	153	F	45	Relapsing-Remitting MS	Gilenya
S188	MS103	PreRelapse	-17	F	30.1	Relapsing-Remitting MS	Tecfidera
S189	MS103	Remission	347	F	31.1	Relapsing-Remitting MS	Tecfidera
S193	MS105	PreRelapse	-30	F	26.6	Relapsing-Remitting MS	Gilenya
S194	MS105	Remission	-226	F	26	Relapsing-Remitting MS	Gilenya
S195	MS106	Relapse	88	F	39.2	Relapsing-Remitting MS	Copaxone
S196	MS106	Remission	284	F	39.7	Relapsing-Remitting MS	Copaxone
S197	MS008	PreRelapse	-48	F	25.2	Clinically Isolated Syndrome	Copaxone
S198	MS008	Relapse	21	F	26.2	Clinically Isolated Syndrome	Copaxone
S202	MS107	Relapse	55	F	30.2	Relapsing-Remitting MS	Avonex
S203	MS107	Remission	355	F	31	Relapsing-Remitting MS	Avonex
S207	MS109	Relapse	37	F	46	Relapsing-Remitting MS	Untreated
S208	MS109	Remission	-251	F	45.2	Relapsing-Remitting MS	Untreated

S211	MS111	Relapse	90	F	27.9	Relapsing-Remitting MS	Copaxone
S212	MS111	Remission	-255	F	27	Relapsing-Remitting MS	Copaxone
S213	MS112	Remission	284	F	33.3	Relapsing-Remitting MS	Gilenya
S218	MS114	PreRelapse	-48	M	32	Relapsing-Remitting MS	Gilenya
S219	MS114	Remission	365	M	33.1	Relapsing-Remitting MS	Gilenya

Supplementary Table 8 – qPCR Samples							
Sample_ID	Donor_ID	Condition	Time to relapse (d)	Sex	Age (yrs)	Diagnosis	Treatment
S004	MS017	PreRelapse	-35	F	50.4	Relapsing-Remitting MS	Avonex
S005	MS017	Remission	-429	F	49.3	Relapsing-Remitting MS	Avonex
S006	MS018	PreRelapse	-6	F	49.8	Relapsing-Remitting MS	Gilenya
S007	MS018	Remission	-391	F	48.7	Relapsing-Remitting MS	Gilenya
S014	MS021	PreRelapse	-90	F	39.9	Relapsing-Remitting MS	Untreated
S015	MS021	Remission	582	F	41.7	Relapsing-Remitting MS	Untreated
S022	MS025	PreRelapse	-98	F	43.6	Relapsing-Remitting MS	Gilenya
S023	MS025	Remission	314	F	44.8	Relapsing-Remitting MS	Gilenya
S024	MS026	PreRelapse	-111	F	46.9	Relapsing-Remitting MS	Untreated
S025	MS026	Remission	193	F	47.7	Relapsing-Remitting MS	Untreated
S034	MS030	PreRelapse	-28	F	44.9	Relapsing-Remitting MS	Rebif
S035	MS030	Remission	403	F	46.1	Relapsing-Remitting MS	Rebif
S044	MS035	PreRelapse	-11	F	30.8	Relapsing-Remitting MS	Untreated
S045	MS035	Remission	169	F	31.3	Relapsing-Remitting MS	Untreated
S057	MS042	PreRelapse	-145	F	28.3	Relapsing-Remitting MS	Avonex
S060	MS042	Remission	203	F	29.3	Relapsing-Remitting MS	Avonex
S066	MS045	PreRelapse	-42	F	42.1	Relapsing-Remitting MS	Zenapax
S067	MS045	Remission	169	F	42.9	Relapsing-Remitting MS	Zenapax
S070	MS047	PreRelapse	-60	M	29.4	Relapsing-Remitting MS	Cytosan
S071	MS047	Remission	269	M	30.3	Relapsing-Remitting MS	Gilenya
S075	MS050	PreRelapse	-27	F	35.2	Relapsing-Remitting MS	Copaxone
S076	MS050	Remission	185	F	36.2	Relapsing-Remitting MS	Copaxone
S084	MS053	PreRelapse	-114	F	47.4	Secondary Progressive MS	Gilenya
S085	MS053	Remission	-303	F	46.9	Secondary Progressive MS	Gilenya
S098	MS060	PreRelapse	-96	F	37.5	Secondary Progressive MS	Tecfidera (BG-12)
S099	MS060	Remission	-495	F	36.4	Secondary Progressive MS	Tecfidera (BG-12)
S105	MS064	PreRelapse	-4	M	44.9	Relapsing-Remitting MS	Gilenya

S106	MS064	Remission	-187	M	44.4	Relapsing-Remitting MS	Gilenya
S115	MS069	PreRelapse	-148	F	36.5	Relapsing-Remitting MS	Gilenya
S116	MS069	Remission	248	F	37.6	Relapsing-Remitting MS	Gilenya
S119	MS071	PreRelapse	-112	M	40.8	Relapsing-Remitting MS	Copaxone
S124	MS071	Remission	266	M	41.9	Relapsing-Remitting MS	Copaxone
S125	MS072	PreRelapse	-40	F	43.3	Relapsing-Remitting MS	Cellcept
S126	MS072	Remission	247	F	44.1	Relapsing-Remitting MS	Cellcept
S127	MS073	PreRelapse	-53	F	46.1	Secondary Progressive MS	Gilenya
S128	MS073	Remission	-195	F	47.3	Secondary Progressive MS	Gilenya
S129	MS074	PreRelapse	-116	F	31.6	Relapsing-Remitting MS	Rebif
S130	MS074	Remission	196	F	32.5	Relapsing-Remitting MS	Rebif
S135	MS077	PreRelapse	-120	F	43.9	Relapsing-Remitting MS	Gilenya
S136	MS077	Remission	-365	F	43.3	Relapsing-Remitting MS	Gilenya
S144	MS082	PreRelapse	-13	F	30.3	Relapsing-Remitting MS	Rebif
S145	MS082	Remission	330	F	31.3	Relapsing-Remitting MS	Rebif
S150	MS085	PreRelapse	-48	F	34.7	Relapsing-Remitting MS	Avonex
S151	MS085	Remission	343	F	35.8	Relapsing-Remitting MS	Avonex
S152	MS086	PreRelapse	-3	M	37.4	Relapsing-Remitting MS	Gilenya
S153	MS086	Remission	109	M	36.4	Relapsing-Remitting MS	Gilenya
S155	MS088	PreRelapse	-18	M	50	Relapsing-Remitting MS	Gilenya
S156	MS088	Remission	438	M	51.3	Relapsing-Remitting MS	Gilenya
S159	MS090	PreRelapse	-85	F	32.8	Secondary Progressive MS	Cytosan
S160	MS090	Remission	-461	F	31.7	Secondary Progressive MS	Cytosan
S161	MS091	PreRelapse	-22	F	29.3	Relapsing-Remitting MS	Rebif
S162	MS091	Remission	-253	F	30.2	Relapsing-Remitting MS	Rebif
S166	MS094	PreRelapse	-145	F	35.1	Relapsing-Remitting MS	Gilenya
S168	MS094	Remission	-327	F	34.6	Relapsing-Remitting MS	Gilenya
S191	MS104	PreRelapse	-88	F	26.5	Relapsing-Remitting MS	Gilenya
S192	MS104	Relapse	6	F	25.3	Relapsing-Remitting MS	Gilenya
S209	MS110	PreRelapse	-113	M	29.7	Relapsing-Remitting MS	Gilenya
S210	MS110	Remission	-483	M	30.3	Relapsing-Remitting MS	Gilenya
S214	MS113	PreRelapse	-116	F	23.8	Relapsing-Remitting MS	Copaxone

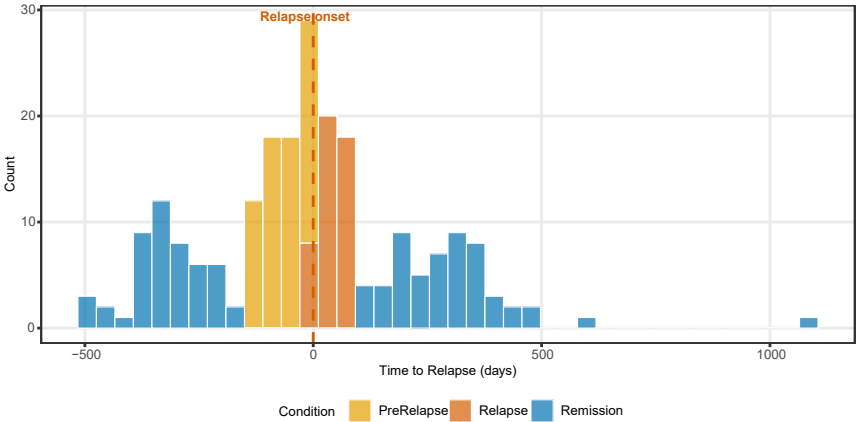
S215	MS113	Remission	-457	F	22.4	Relapsing-Remitting MS	Copaxone
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Supplementary Table 9 – qPCR Primer Probe Panel

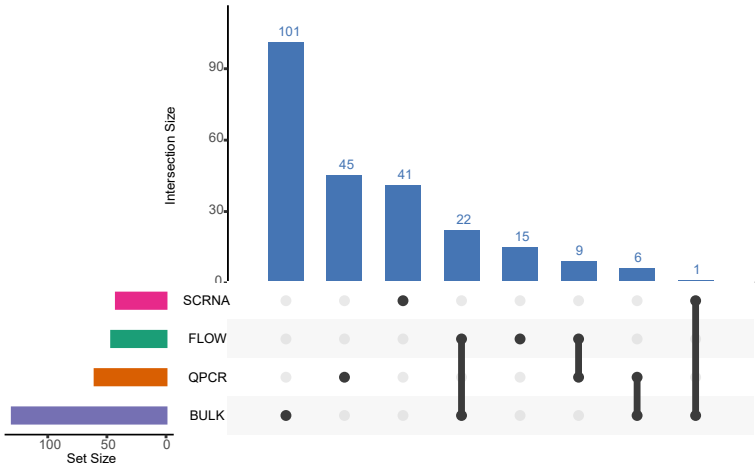
Target	Forward Primer (5'→3')	Reverse Primer (5'→3')	Probe (5'→3')	Fluorophore	Quencher
BALF1	GGGCAAAGACACGCACGTA	GCCGCGACCAGTAGTCGTA	CATCATCAGCGTCCTGCGCGC	FAM	Zen/Black Hole Quencher 1
BGLF5	GCAAGCCCGGGAGAGACT	GAGGCGACCGTTTTCGAA	CGGGTGAACATTGTGACGGCCTTC	ATTO 550	Iowa Black RQ
BNLF2a	TGGAGCGTGCTTTGCTAGAG	GGCCTGGTCTCCGTAGAAGAG	CCTCTGCCTGCGGCCTGCC	Cy5	TAO / Iowa Black RQ
BZLF1	ACTGCTGCTGCTGTTGA	GTTCCAGTCTCCGACATAAC	TTGTCTCCAGGTTGAGGTGCTTCT	FAM	Zen/Black Hole Quencher 1
EBER1	TGCTAGGGAGGAGACGTGTGT	TGACCGAAGACGGCAGAAAG	AGACAACCACAGACACCGTCCTACCA	ATTO 550	Iowa Black RQ
EBER2	AACGCTCAGTGCGGTGCTA	GAATCCTGACTTGCAAATGCTCTA	AGGAGAAGAGAGGCTTCCCG	Cy5	TAO / Iowa Black RQ
EBNA1	CAGAAAGGCCTCGAGCTGT	CAACGATCAGCTCAGACAGAAG	TCCTCGGTGGCGGGCTTAAA	Cy5	TAO / Iowa Black RQ
EBNA2 Type 1	GCTTAGCCAGTAACCCAGCACT	TGCTTAGAAGGTTGTTGGCATG	CCCAACCACAGGTTGAGGCAAACTTT	FAM	Zen/Black Hole Quencher 1
EBNA2 Type 2	GCTTAGCCAGTAACTCAGCGCT	TGCTTAGAAGGTTGTTGGCATG	CCCAACCACAGGTTGAGGCAAACTTT	FAM	Zen/Black Hole Quencher 1
EBNA3A	CCCCTTAACTCAACCCATTAACC	CGGCCCCCTCCATTGGT	ACCCGCAGCCCATTTCTCCA	ATTO 550	Iowa Black RQ
LMP-2B	GTAATCTGCACAAAGAGGCGC	AAAGCACGGCCTCCCG	TGCCGCCAACGACCTCCCAA	FAM	Zen/Black Hole Quencher 1
LMP1	CAAGTAAGCACCCGAAGATGAA	GCTCATCGCTCTCTGGAATTT	TCCAAGGAACAATGCCTGTCCGT	ATTO 550	Iowa Black RQ
gp350	CGGGTGCCTTGGAGAATATAA	CATTACTGTCTCGGGTCTTGG	TTGTGGGTTGTTGTGGTGGCATTG	Cy5	TAO / Iowa Black RQ
gp42	GGTGTCCAATGTGGCAGTT	GGGTACCCAAACCAAATGTAGAG	TCCTGCTCGGCCGTCTTGTTAAAG	FAM	Zen/Black Hole Quencher 1

a Time to Relapse Distribution

Negative = before relapse, positive = after relapse



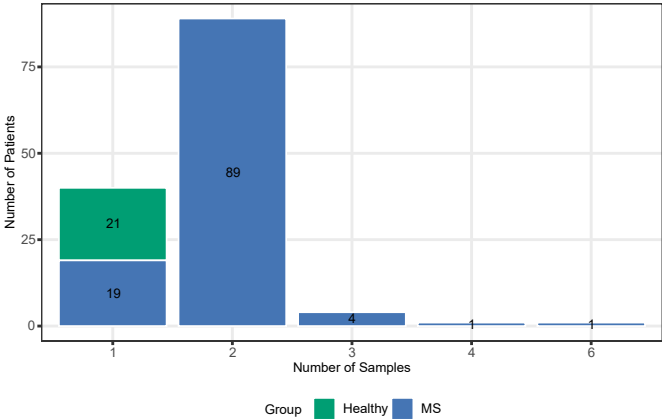
b



c

Samples per Patient

135 patients with a total of 240 samples



Supplementary Fig. 1: Cohort, samples, and assays.

a, Timing of PBMC collection relative to the nearest verified relapse for 219 samples from participants with MS (pre-relapse, n=69; relapse, n = 46; remission, n = 104). The 21 healthy control samples are not displayed because they lack a relapse reference point. The xaxis denotes days relative to relapse, with negative values indicating samples collected before relapse and positive values indicating samples collected after relapse. Bars are colored according to neurologist-confirmed disease status. **b**, UpSet plot showing assay coverage across all 240 PBMC samples from 135 participants. Vertical bars denote the number of samples represented in each combination of the four assays: scRNA-seq, bulk RNA-seq, flow cytometry, and RT-qPCR. Connected dots indicate the assays included in each combination, and horizontal bars at left show the total number of samples profiled by each assay. Eight unique assay combinations were observed, with 38 samples profiled using more than one assay. **c**, Number of PBMC samples contributed by each participant, stratified by cohort (MS or healthy control). Bar labels indicate the number of participants in each category. Among the 135 participants contributing 240 samples, 129 (96%) contributed one or two samples, and the maximum number contributed by any individual was six longitudinal timepoints. Note, all panels are descriptive, and no statistical tests were performed.