**Tables**

**Supplementary Table 1: Characteristics of MS patients and controls**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Cohorts** | **Females** | **Age** | **Disease duration** | **EDSS** | **Treatment** |
| Controls (36) | 23  (63.9%) | 33.2 [22.8:  40.1] | none | none | none |
| RRMS (84) | 57  (67.9%) | 42.7 [36.0:  49.3] | 8.7 [3.0: 11.3] | 1.5 [0.0:  2.0] | 63  (75.0%) |
| SPMS (35) | 19  (54.3%) | 54.1 [49.0:  58.0] | 20.8 [13.0:  27.0] | 5.2 [4.0:  6.5] | 21  (60.0%) |
| PPMS (41) | 20  (48.8%) | 49.5 [44.0:  55.8] | 6.5 [3.0: 8.0] | 3.9 [3.0:  4.5] | 9 (22.0%) |

“Females” indicates the absolute number and percentage of females in the group. "Age", "Disease duration" and "EDSS" are shown as mean, with 25% and 75% percentiles indicated in square brackets. “Treatment" indicates the absolute number and percentage of treated patients. No additional relevant comorbidities or pharmaceutical treatments were reported in patients or controls.

# Supplementary Table 2: Characteristics of longitudinal RRMS patients

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Patient** | **Sex** | **Age (y)** | **Diagnose (y)** | **EDSS**  **Start/End** | **Observation duration (y)** | **Relapses** |
| 1 | W | 54 | 2000 | 1/2 | 9 | 1 |
| 2 | W | 38 | 2004 | 2.5/2.5 | 8 | 4 |
| 3 | W | 37 | 2008 | 0/1 | 8 | 1 |
| 4 | M | 41 | 2009 | 2/2.5 | 8 | 0 |
| 5 | W | 47 | 2011 | 1.5/1.5 | 7 | 1 |
| 6 | W | 31 | 2001 | 2/2 | 7 | 0 |
| 7 | M | 48 | 2009 | 1.5/2 | 4 | 1 |
| 8 | M | 25 | 2009 | 0/2 | 10 | 2 |
| 9 | M | 48 | 2003 | 0/3 | 8 | 0 |
| 10 | M | 27 | 2003 | 1.5/1.5 | 6 | 1 |
| 11 | M | 39 | 2006 | 1.5/2 | 8 | 0 |
| 12 | W | 45 | 1999 | 3/3.5 | 8 | 2 |
| 13 | M | 58 | 2011 | 2/2 | 8 | 2 |

“Diagnose” indicates the year of the diagnosis of RRMS.

“EDSS Start/End” describes the EDSS on the beginning of the observation duration and the at the end of the observation period per patient.

“Relapses” indicates the absolute number of relapse occurrence during the whole observation period. There was no conversion to SPMS.

# Supplementary Table 3: Correlation of AHR agonistic activites and MRI parameter per patient

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Patient** | **Relative AHR acitivity** | | **White matter volume** | | **Lesion load**  **volume change in ml** |
| R2 | p | R2 | p |
| 1 | 0.08189 | 0.4554 | 0.002163 | 0.9129 | 0.874 |
| 2 | 0.5396 | 0.00379 | 0.04203 | 0.6262 | -0.427 |
| 3 | 0.3396 | 0.1295 | 0.0002845 | 0.9714 | 0.118 |
| 4 | 0.1883 | 0.2827 | 0.01997 | 0.7385 | -0.205 |
| 5 | 0.5674 | 0.0506 | 0.3890 | 0.1858 | 0.41 |
| 6 | 0.08649 | 0.5220 | 0.5494 | 0.1517 | -2.14 |
| 7 | 0.3569 | 0.4026 | 0.704 | 0.1393 | -1.28 |
| 8 | 0.02266 | 0.6780 | 0.2556 | 0.1361 | 3.07 |
| 9 | 0.1691 | 0.3115 | 0.2626 | 0.1299 | 7.671 |
| 10 | 0.01851 | 0.7972 | 0.2644 | 0.2967 | 3.47 |
| 11 | 0.6768 | 0.0122 | 0.7275 | 0.0071 | 2.537 |
| 12 | 0.7062 | 0.0090 | 0.7879 | 0.0033 | 2.3140 |
| 13 | 0.6922 | 0.0104 | 0.8612 | 0.0009 | 1.21 |

All patients (n=13) from the longitudinal cohort are listed with corresponding R2, P value of linear regression analyzed from the serial measurement of AHR agonistic activity and the white matter volume in serial cerebral MRIs. From the 13 patients, the absolute number of the lesion volume change (in ml) is displayed. *P* <0.05 is considered significant

# Supplementary Figure 1: Patient age, gender and DMTs do not influence AHR agonistic activity.

**(a)** Solid line shows linear regression of correlation between AHR agonistic activity and age in control samples (n=36). Values are means of technical duplicate measurements. **(b)** Comparison of AHR agonist activity between female and male RRMS patients (n=84). n.s. not significant. **(c)** Comparison of AHR agonist activity between treated and non-treated RRMS patients. (n=84). Values are means of technical duplicate measurements. Lines represent mean and error bars standard error of the mean (SEM). Significance levels were determined by Student t-test.

n.s. not significant. **(d)** HEK293 cells were transfected with AHR reporter and control plasmid (pGud-Luc and pTK-Renilla). One day after transfection, cells were incubated with human serum or pooled healthy controls or MS patients in concentration of 1% or 10 %. Luciferase activity was assessed after 24 hours.

# Supplementary Figure 2: Gender and treatment does not influence AHR agonistic activity in SPMS and PPMS patients.

**(a)** Comparison of AHR agonist activity between female and male patients within the cohort of SPMS patients (n=35). **(b)** Comparison of AHR agonist activity between female and male within the cohort of PPMS patients (n=41). **(c)** Comparison of AHR agonist activity between treated (n= 21) and non-treated (n=14) SPMS patients. **(d)** Comparison of AHR agonist activity between treated (n=9) and non-treated (n=32) PPMS patients (n=41). Values are means of

technical duplicate measurements. Lines represent mean and error bars standard error of the mean (SEM). Significance levels were determined by Student’s t-test.

n.s. not significant.

# Supplementary Figure 3: AHR agonistic activity does not correlate with relapse rate.

Linear regression analysis of correlation between AHR agonistic activity and clinical relapses in longitudinal patient cohort.