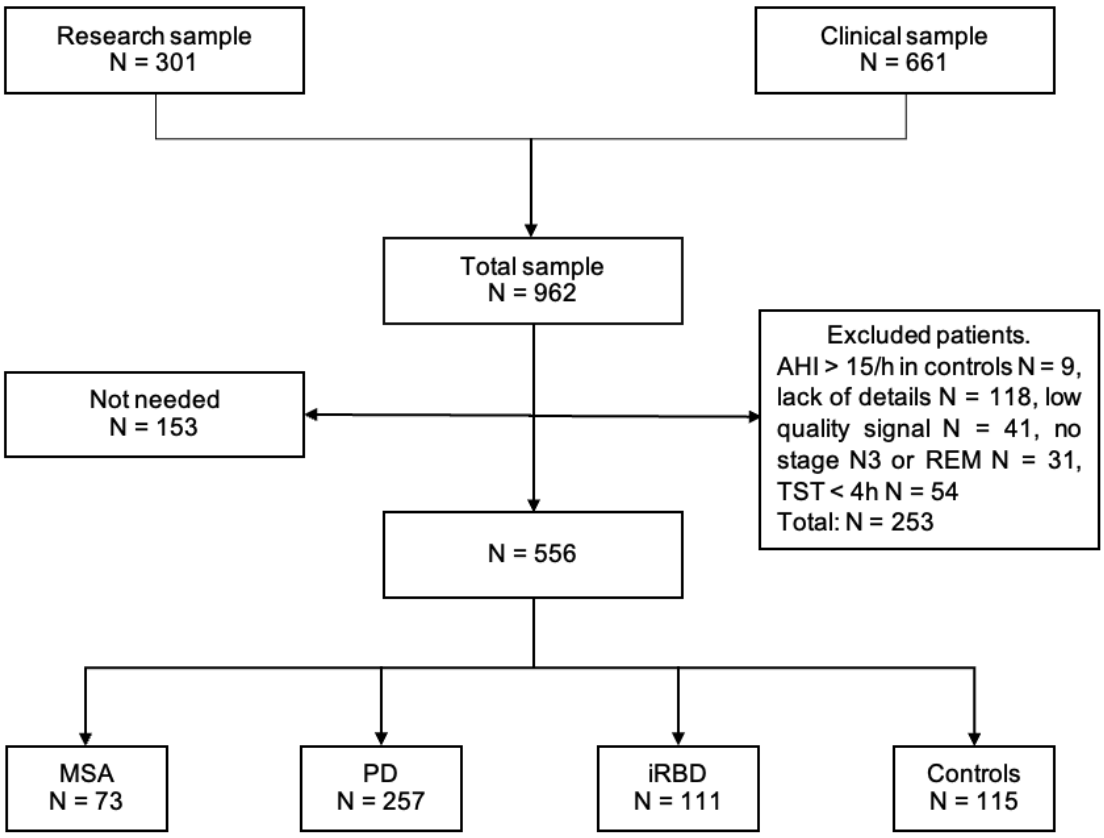
Supplemental Figure A. Flow chart of participants' selection

REM: rapid eye movement sleep; iRBD: isolated REM sleep behavior disorder; PD: Parkinson's disease; MSA: multisystem atrophy; TST: total sleep time; AHI: apnea-hypopnea index



Supplemental Table A. Demographic characteristics and polysomnographic measures of patients with multiple system atrophy (MSA), Parkinson's disease (PD), isolated REM sleep behavior disorder (iRBD) and controls

	MSA A	PD B	iRBD C	Controls D	*P v*alue	Post-hoc test
Number	73	257	111	115	—	—
Sex, female N (%)	42 (57.5)	78 (30.4)	23 (20.7)	68 (59.1)	<.001	A = D > B = C
Age, y	63.0 (9.0)	65.4 (10.2)	67.2 (9.0)	62.6 (7.7)	<.001	A < C , B = C > D
Benzodiazepine N (%)	6 (8.22)	21 (8.2)	13 (11.61)	10 (8.7)	0.754	
Antidepressants N (%)	34 (46.58)	59 (23.05)	13 (11.61)	16 (13.91)	<.001	A > B > C = D
Total sleep time, min	385.4 (75.0)	389 (79.2)	432.9 (84.8)	402.3 (71)	<.001	A = B < C , C > D
Sleep efficiency, %	77.1 (10.4)	79.2 (11.8)	80.9 (9.4)	81.5 (11)	0.022	A < D
Latency to, min						
Sleep	28.6 (27.3)	19.3 (23.8)	25.1 (20.5)	21.9 (19.8)	0.009	A > B
REM sleep	168.7 (116.2)	147.5 (91.8)	115.9 (79)	105.2 (63.3)	<.001	A = B > C = D
Sleep stages, % of total sleep time						
N1	4.7 (3.8)	4.9 (4.9)	5.4 (4.4)	3.7 (3)	0.024	C > D
N2	52.4 (14)	52.8 (13.3)	51.8 (9.8)	52.3 (9.2)	0.894	
N3	25.9 (9.6)	25.2 (12.3)	23.4 (9.5)	21.3 (11.6)	0.01	A = B > D
REM	17.4 (9.2)	17.2 (8.2)	19.8 (7)	19.2 (5.4)	0.005	B < C
Apnea-hypopnea index, /h	14.0 (17.3)	8.8 (11.2)	10 (13.7)	4.8 (4.2)	<.001	A > B, A > D, B = C > D
Obstructive	9.7 (17.4)	13.2 (31)	14.3 (28.5)	4.2 (8.6)	0.009	B = C > D
Mixed	1.7 (6.7)	1.4 (9.6)	0.7 (4.1)	0 (0)	0.291	
Central	9.6 (20.7)	4.8 (21.4)	2.8 (6.7)	0.7 (1.1)	0.003	A > C = D
Minimal oxygen saturation, %	85.7 (5.9)	85.9 (8.2)	86.6 (6.5)	87.9 (4.5)	0.009	NA
Periodic leg movement index, /h	45.4 (56.7)	13.5 (26.5)	18.7 (24.3)	8.8 (17)	<.001	A > B = C = D
Arousal index, /h	10.1 (7.9)	9.2 (7.4)	13.1 (9.8)	9 (5.9)	0.001	B = D < C

Data are mean (SD) or N (%)

Supplemental Table B. The Bayes Factor of the model (BFm) or the probability of the model knowing the data (p(M|data)) indicates that the model including the groups far outweighs the null model of which one is a certainty.

Models comparison	P(M)	P(M|data)	BF_M	BF_{10}	Error %
Group	0.500	1.000	$3.237\times10^{+8}$	1.000	
Null model	0.500	3.089×10^{-9}	3.089×10^{-9}	3.089×10^{-9}	1.318×10^{-4}

Supplemental Table C. The group with MSA are different from the other groups with extreme evidence (BF>100). There are no differences between the subjects suffering from PD compared to the group of subjects iRBD and VS (BF<3) as well as the subjects iRBD compared to the control.

Post Hoc Tests Comparisons - Groups

Group 1	Group 2	Prior Odds	Posterior Odds	BF_{10}	Error %
MSA	**PD**	1.000	$1.813\times10^{+6}$	$1.813\times10^{+6}$	8.276×10^{-13}
	iRBD	1.000	111792.289	111792.289	7.473×10^{-12}
	Control	1.000	797.114	797.114	2.518×10^{-9}
PD	**iRBD**	1.000	0.205	0.205	0.073
	Control	1.000	0.198	0.198	0.076
iRBD	**Control**	1.000	1.044	1.044	0.017

Supplemental Table D. Autonomic measures (orthostatic hypotension, number of stools/week,) smell performances

RBD patients	Threshold > 3.4	Threshold < 3.4	P-Value
	n = 11	n = 100	
Orthostatic hypotension			
N	6/11	75/100	
N (%)	1 (9.1)	7 (6.9)	0.473
Constipation			
N	6/11	75 / 100	
N (%)	2 (18.2)	27 (26.7)	0.569
Number of stools/week	4.5 (2.3)	3.1 (2.4)	0.166
Smell performances			
N	4/11	61 / 100	
Normal > 8 / 12	1 (25)	20 (32.7)	0.6374

Legend of the Supplementary video-clips

Supplementary video clip 1

Video, sound and cardiorespiratory monitoring during N3 sleep in an MSA participant with sighs in ambient air (epoch of 5 min). The visible sigh is silent; however, chest movement and shoulders lifting are visible during the sigh. This is the most common case.

Supplementary video clip 2

Video, sound and cardiorespiratory monitoring during N3 sleep in an MSA participant with stridor (epoch of 5 min) in ambient air. When a sigh occurs during a stridorous respiration, a sharp noise can be heard during the sigh, which first manifests as an increase in stridor during the inspiratory phase of the sigh and later as a short moaning during the expiratory phase. During the central apnea following the sigh, there is no sound or catathrenia.