

Coenzyme Q10: A Biomarker in the Differential Diagnosis of Parkinsonian Syndromes

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Supplementary data

Table S1. The results of plasma and lymphocytes levels of coenzyme Q10 in patients with multiple system atrophy and the clinical scales.

Patient.	Sex	Age [y]	Years of progression	NNIPPS PPS***	UMSARS**	P-Q10 [µg/ml]*	P-chol [mmol/l]	P-Q10/cho l	L-Q10/CS	L-Q10 [pmol/mg]*	L-CS [nmol/min/mg]
P1	M	70	5.5	106	57	0.71	3.9	0.182	1.36	96.97	71.16
P2	F	60	5	134	85	0.54	3.87	0.14	0.74	58.33	79.27
P3	F	63	3	133	52	0.7	4.39	0.159	0.73	45.26	61.81
P4	M	79	7.5	101	56	0.57	3.93	0.145	1.01	68.35	67.52
P5	F	66	5.5	191	87	0.8	nd	nd	0.85	60.66	71.13
P6	M	65	11	240	93	0.37	nd	nd	1.3	50.55	38.92
P7	F	73	5	129	73	0.57	4.66	0.122	1.16	87.87	75.75
P8	M	55	7	94	51	0.66	4.38	0.151	0.97	70.51	72.38
P9	M	61	5	152	95	0.4	3.93	0.102	1.19	60.4	50.91
P10	F	57	2	nd	nd	nd	nd	nd	1.07	80.43	75.5
P11	M	79	3	118	66	0.67	5.27	0.127	0.95	65.85	69.53
P12	F	67	3,5	119	62	0.67	3,82	0.175	1.4	92.36	65.77
P13	F	79	8	88	34	0.46	3.77	nd	1.35	101.9	75.52
P14	M	49	4.5	124	66	0.66	4,3	0.153	1.35	79.75	59.03
P15	F	74	4.5	132	69	0.798	6.14	0.13	1.32	109.64	82.94
P16	M	55	4	119	65	0.394	5.76	0.068	1.13	90.76	80.19
P17	M	55	4.5	103	56	0.572	5.06	0.113	0.88	74.92	85.03
P18	F	53	3.5	38	31	0.874	5.79	0.15	1.18	88.04	74.62
P19	M	54	4	103	56	0.634	4.9	0.13	1.18	89.26	75.44
P20	F	62	5	116	67	0.596	5.37	0.11	0.92	66.38	72.41
N		20	20	19	19	19	17	17	20	20	20
Average		63.8	5,05	123.15	64.26	0.61	4.66	0.13	1.1	76.9	70.24
Median		62.5	4.75	119	65	0.634	4.39	0.135	1.145	77.335	72.395
Q1		55	3.625	103	56	0.54	3.915	0.11525	0.9275	61.9575	66.2075
Q2		62.5	4.75	119	65	0.634	4.39	0.135	1.145	77.335	72.395
Q3		72.25	5.5	133	73	0.7	5.32	0.1525	1.615	90.385	75.6925

*Normal plasma levels of CoQ10 in plasma: 0,5- 2 [µg/ml]; **normal levels of CoQ10 in lymphocytes 70-160 [pmol/mg]; *** range of NNIPSS-PPS is 0-309 points; **** range of UMSARS is 0-109 points; nd (not done), Q10- coenzyme Q10, CS- citrate synthase, chol – plasma cholesterol, L- lymphocytes, P- plasma.

Table S2. The results of plasma and lymphocytes levels of coenzyme Q10 in healthy controls

Healthy control	Sex	Age [y]	P-Q10 [µg/ml]*	P-cho[mmol/l]	P-Q10/cho[mmol/l]	L-Q10/CS	L-Q10 [pmol/mg]**	L-CS [nmol/min/mg]
H1	M	51	1.098	5.74	0.191	1.17	88.02	74.98
H2	M	73	1.201	4.23	0.284	1.30	86.74	66.88
H3	F	63	1.102	6.13	0.180	1.00	88.91	88.67
H4	F	60	1.217	5.98	0.204	1.27	112	88.35
H5	F	65	0.997	5.72	0.174	0.95	75.97	80
H6	F	50	0.84	5.4	0.156	1.02	89.91	58.48
H7	F	62	1.015	6.03	0.168	1.03	88.61	85.91
H8	F	53	0.800	4.55	0.181	0.81	69.7	86.56
H9	F	50	0.683	5.46	0.117	0.14	78.43	68.61
H10	M	74	1.04	4.63	0.225	1.27	104.33	82.44
H11	M	58	0.703	6.34	0.111	0.81	63.71	78.87
H12	F	59	1.202	7.62	0.158	0.90	71.21	79.09
H13	F	52	0.896	5.46	0.164	1.33	94.94	71.6
H14	F	66	0.96	6.15	0.156	1.24	80.12	64.84
H15	F	57	0.947	6.55	0.145	1.38	102.77	74.41
H16	F	60	0.822	5.11	0.161	1.08	92.04	85.22
H17	F	55	1.241	6.16	0.201	1.27	92.43	73.02
H18	F	53	0.924	6.1	0.151	1.88	163.65	87.15
H19	M	54	0.864	5.48	0.158	1.13	95.83	84.06
H20	F	54	1.323	6.89	0.192	1.24	97.66	78.49
H21	M	52	0.698	4.82	0.145	0.98	71.2	72.51
H22	M	51	0.389	4.43	0.088	0.76	66	87.25
H23	F	58	0.916	4.91	0.187	1.11	79.27	71.4
N		23	23	23	23	23	23	23
Average		57.82	0.95	5.67	0.169	1.09	89.28	77.77
Median		57	0.947	5.72	0.161	1.11	88.02	78.87
Q1		52	0.822	4.91	0.151	0.95	75.97	71.6
Q2		57	0.947	5.72	0.164	1.11	88.61	78.87
Q3		62	1.102	6.15	0.191	1.27	95.83	85.91

*Normal plasma levels of CoQ10 in plasma: 0,5- 2 [µg/ml]; **normal levels of CoQ10 in lymphocytes 70-160 [pmol/mg]; *** range of NNIPSS-PPS is 0-309 points; **** range of UMSARS is 0-109 points; nd (not done), Q10-coenzyme Q10, CS- citrate synthase, chol – plasma cholesterol, L- lymphocytes, P- plasma.

Table S3. The results of plasma and lymphocytes levels of coenzymeQ10 in patients with progressive supranuclear palsy and the clinical scales.

Patient	Sex	Age	Years of progression	NNIPPS /309	PSP RATING/ 100	P-Q10 [µg/ml]*	P-cho1 [mmol/ l]	P-Q10/ chol	L-Q10/CS	L-Q10 [pmol/mg] **	L-CS [nmol/mi n/ mg]
P1	M	74	4,5	103	39	0.63	2.98	0.211	0.92	60.07	64.96
P2	F	69	2	119	56	0.74	nd	nd	0.92	62.54	68.16
P3	M	67	2	62	23	2.33	nd	nd	1.56	107.17	68.91
P4	F	64	5	120	50	0.64	nd	nd	1.19	86.47	72.53
P5	F	73	5	164	64	1.18	nd	nd	1.34	96.15	71.5
P6	M	62	5.5	142	59	0.48	nd	nd	0.95	52.89	55.44
P7	M	81	4	157	70	0.24	3.04	0.079	1.73	135.72	78.36
P8	F	70	1.5	104	24	0.53	3.2	0.166	1.33	106.91	80.23
P9	M	74	1	153	66	0.4	2.97	0.135	1.51	82.7	54.91
P10	M	53	4	48	18	0.99	4.38	0.226	1.41	96.01	68.3
P11	F	77	4.5	110	49	0.815	6.16	0.132	1.11	85.6	77.01
P12	M	76	6	101	43	0.226	1.66	0.136	1.31	82.7	63
P13	M	76	8	131	69	0.63	4.66	0.135	1.20	91.2	75.73
P14	M	75	2	90	53	0.448	3.07	0.146	0.79	61.73	78.07
P15	M	85	6.5	53	19	0.596	4.31	0.14	1.13	94.92	84.33
P16	M	75	4.5	58	21	0.455	2.61	0.17	1.48	93.55	63.08
P17	F	82	2	73	29	0.822	4.62	0.18	1.28	94.94	74.24
P18	M	66	2	51	28	0,5	4.94	0.1	1.23	98.45	80.25
P19	F	70	4.5	131	58	0.621	4.94	0.126	1.00	67.87	68.2
P20	M	77	9.5	149	63	0.264	3.71	nd	0.84	59.35	70.62
P21	M	68	8.5	157	63	0.386	4.27	nd	1.148613	105.19	91.58
N		21	21	21	21	21	16	14	1	21	21
average		72.09	4.4	108.38	45.9	0.62	3.84	0.148	1.21	86.7	71.8
median		74	4.5	110	49.5	0.596	3.99	0.138	1.2	91.2	71.5
Q1		67.5	2	67.5	26	0.424	2.995	0.1305	0.975	65.205	66.56
Q2		74	4.5	110	50	0.596	3.99	0.138	1.2	91.2	70.5
Q3		76.75	5.75	145.5	63	0.7775	4.65	0.1725	1.375	97.3	78.215

range of PSP RATING scale is 0-100 points

*Normal plasma levels of CoQ10 in plasma: 0,5- 2 [µg/ml]; **normal levels of CoQ10 in lymphocytes 70-160 [pmol/mg]; nd (not done), Q10- coenzyme Q10, CS- citrate synthase, chol – plasma cholesterol, L- lymphocytes, P- plasma

Table S4. The results of plasma and lymphocytes levels of coenzyme Q10 in patients with Parkinson's disease.

Patient	Sex	Age	Years of progression	P-Q10 [µg/ml]*	P-chol [mmol/L]	P-Q10/ chol	L- Q10/CS	L-Q10 [pmol/mg]**	L-CS [nmol/min/mg]
P1	F	38	4	0.851	4.75	0.179	1.41	115.46	81.88
P2	F	73	10	0.457	3.62	0.126	1.57	116.32	77.2
P3	F	59	4	0.687	6	0.115	1.09	84.62	77.83
P4	M	65	7	0.86	4.5	0.191	1.54	121.32	79.02
P5	M	80	14	0.409	3.12	0.131	1.17	85.27	72.66
P6	M	67	6	0.553	3.68	0.15	1.46	115.74	79.21
P7	M	63	11	0.945	nd	nd	1.30	89.51	68.74
P8	M	47	5	0.48	3.75	0.128	0.85	70.18	82.49
P9	M	60	3	0.628	4.16	0.151	1.22	89.65	73.23
P10	F	53	1	0.677	5.42	0.125	1.09	84.46	77.23
P11	F	56	2	0.215	3.91	nd	0.98	67.74	68.49
P12	M	72	5	0.679	3.55	0.191	0.93	75.76	81.52
P13	M	83	1	0.31	3.41	0.091	0.88	64.93	73.94
P14	F	71	13	0.505	nd	nd	1.39	51.88	37.21
P15	F	55	14	0.52	4.2	0.124	1.31	97.75	74.86
P16	F	64	5	0.76	4.57	0.166	1.68	114.79	68.32
P17	M	50	11	0.93	3.68	0.253	1.51	108.85	72.14
P18	F	69	8	1.13	4.72	0.239	2.49	140.95	56.69
P19	F	73	17	0.66	3.65	0.181	1.68	97.94	58.38
P20	F	67	8	1.09	4.81	0.227	1.21	91.24	75.26
P21	F	65	15	0.39	nd	nd	1.21	84.16	69.44
N		21	21	21	18	17	21	21	21
average		63.3	7.8	0.65	4.19	0.16	1.33	93.73	71.55
median		65	7	0.66	4.04	0.1585	1.3	89.65	73.94
Q1		55.5	4	0.4685	3.65	0.1255	1.09	79.96	68.615
Q2		65	7	0.66	4.16	0.1151	1.3	89.65	73.94
Q3		71.5	12	0.8555	4.75	0.191	1.525	115.125	78.425

*Normal plasma levels of CoQ10 in plasma: 0.5- 2 [µg/ml]; **normal levels of CoQ10 in lymphocytes 70-160 [pmol/mg]; nd (not done), Q10- coenzyme Q10, CS- citrate synthase, chol – plasma cholesterol, L- lymphocytes, P- plasma.

Table S5. P-values for comparison of variables between patients groups and controls and within patient groups. Differences between healthy controls and particular patient groups were analyzed using a two-sample t-test. Differences among patient groups were subject to a one-way ANOVA. P-values less than 5% were considered as statistically significant. Analyses were conducted using an R statistical package version 4.2.2. MSA – multiple system atrophy, PD – Parkinson’s disease, PSP – progressive supranuclear palsy, HC – healthy controls, chol- cholesterol.

	Comparison			
	HC and MSA	HC and PD	HC and PSP	Patient Groups
Q10 plasma	0.0000	0.0002	0.0131	0.8667
Q10 lymphocytes	0.0397	0.4927	0.6864	0.0329
Q10/CS lymphocytes	0.6505	0.0414	0.3176	0.0406
CS lymphocytes	0.0047	0.0098	0.0068	0.8621
Q10/chol plasma	0.0032	0.4003	0.0412	0.2997
Cholesterol	0.0005	0.0000	0.0000	0.0398