

Приложения

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«Анализ взаимодействия генов нейронального апоптоза в ассоциативной генной сети болезни Паркинсона»

Приложение 1

Ген	GenelD	Ранг				Средний ранг для критериев								Наличие ассоциаций с БП в ANDSystem
		центральности CTC	специфичности CTS	ToppGene	Endeavour	CTS, CTS	CTS, ToppGene	CTS, Endeavour	CTS, CTS, ToppGene	CTS, CTS, Endeavour	CTS, Endeavour, ToppGene	CTS, CTS, Endeavour, ToppGene		
<i>TP53</i>	7157	1.00	166.00	7.00	16.00	83.50	4.00	8.50	58.00	61.00	8.00	47.50	-	
<i>JUN</i>	3725	2.00	143.00	58.00	1.00	72.50	30.00	1.50	67.67	48.67	20.33	51.00	-	
<i>BCL2</i>	596	3.00	114.00	34.00	36.00	58.50	18.50	19.50	50.33	51.00	24.33	46.75	-	
<i>CASP3</i>	836	4.00	119.00	52.00	14.00	61.50	28.00	9.00	58.33	45.67	23.33	47.25	+	
<i>SOD1</i>	6647	5.00	120.00	18.00	15.00	62.50	11.50	10.00	47.67	46.67	12.67	39.50	+	
<i>PIK3CA</i>	5290	6.00	109.00	21.00	19.00	57.50	13.50	12.50	45.33	44.67	15.33	38.75	-	
<i>APOE</i>	348	7.00	39.00	11.00	27.00	23.00	9.00	17.00	19.00	24.33	15.00	21.00	+	
<i>APP</i>	351	8.00	76.00	8.00	6.00	42.00	8.00	7.00	30.67	30.00	7.33	24.50	-	
<i>CCL2</i>	6347	9.00	108.00	23.00	51.00	58.50	16.00	30.00	46.67	56.00	27.67	47.75	+	
<i>HMOX1</i>	3162	10.00	38.00	84.00	96.00	24.00	47.00	53.00	44.00	48.00	63.33	57.00	+	
<i>SOD2</i>	6648	11.50	91.00	94.00	133.00	51.25	52.75	72.25	65.50	78.50	79.50	82.38	+	
<i>CTNNB1</i>	1499	11.50	137.00	4.00	23.00	74.25	7.75	17.25	50.83	57.17	12.83	43.88	-	
<i>HIF1A</i>	3091	13.50	78.00	37.00	3.00	45.75	25.25	8.25	42.83	31.50	17.83	32.88	-	
<i>RB1</i>	5925	13.50	146.00	66.00	24.00	79.75	39.75	18.75	75.17	61.17	34.50	62.38	-	
<i>FAS</i>	355	15.50	82.00	50.00	22.00	48.75	32.75	18.75	49.17	39.83	29.17	42.38	+	
<i>GAPDH</i>	2597	15.50	84.00	122.00	48.00	49.75	68.75	31.75	73.83	49.17	61.83	67.38	+	
<i>MCL1</i>	4170	18.50	79.00	83.00	76.00	48.75	50.75	47.25	60.17	57.83	59.17	64.13	-	
<i>BAX</i>	581	18.50	132.00	49.00	112.00	75.25	33.75	65.25	66.50	87.50	59.83	77.88	-	
<i>BDNF</i>	627	20.00	53.00	38.00	67.00	36.50	29.00	43.50	37.00	46.67	41.67	44.50	+	
<i>BCL2L1</i>	598	21.00	70.00	42.00	80.00	45.50	31.50	50.50	44.33	57.00	47.67	53.25	+	
<i>SNCA</i>	6622	22.00	14.00	2.00	12.00	18.00	12.00	17.00	12.67	16.00	12.00	12.50	+	
<i>FASLG</i>	356	23.00	100.00	25.00	49.00	61.50	24.00	36.00	49.33	57.33	32.33	49.25	+	
<i>TERT</i>	7015	24.00	136.00	101.00	107.00	80.00	62.50	65.50	87.00	89.00	77.33	92.00	-	
<i>PSEN1</i>	5663	26.00	45.00	29.00	55.00	35.50	27.50	40.50	33.33	42.00	36.67	38.75	-	

Продолжение таблицы

Ген	Genelid	Ранг				Средний ранг для критериев								Наличие ассоциаций с БП в ANDSystem
		центральности CTC	специфичности CTS	ToppGene	Endeavour	CTS, CTS	CTS, ToppGene	CTS, Endeavour	CTS, CTS, ToppGene	CTS, CTS, Endeavour	CTS, Endeavour, ToppGene	CTS, CTS, Endeavour, ToppGene		
<i>CEBPB</i>	1051	26.00	69.00	72.00	44.00	47.50	49.00	35.00	55.67	46.33	47.33	52.75	-	
<i>TP63</i>	8626	26.00	150.00	69.00	38.00	88.00	47.50	32.00	81.67	71.33	44.33	70.75	-	
<i>PARP1</i>	142	28.00	162.00	87.00	56.00	95.00	57.50	42.00	92.33	82.00	57.00	83.25	+	
<i>ATM</i>	472	29.00	144.00	36.00	35.00	86.50	32.50	32.00	69.67	69.33	33.33	61.00	-	
<i>DDIT3</i>	1649	30.00	41.00	129.00	116.00	35.50	79.50	73.00	66.67	62.33	91.67	79.00	-	
<i>GCLC</i>	2729	31.00	35.00	67.00	120.00	33.00	49.00	75.50	44.33	62.00	72.67	63.25	-	
<i>JAK2</i>	3717	32.00	83.00	1.00	11.00	57.50	16.50	21.50	38.67	42.00	14.67	31.75	-	
<i>BRAF</i>	673	33.00	49.00	14.00	93.00	41.00	23.50	63.00	32.00	58.33	46.67	47.25	-	
<i>HRAS</i>	3265	34.00	117.00	28.00	34.00	75.50	31.00	34.00	59.67	61.67	32.00	53.25	-	
<i>HSPA5</i>	3309	36.50	142.00	45.00	20.00	89.25	40.75	28.25	74.50	66.17	33.83	60.88	+	
<i>PIN1</i>	5300	36.50	42.00	133.00	88.00	39.25	84.75	62.25	70.50	55.50	85.83	74.88	+	
<i>CDC42</i>	998	36.50	118.00	74.00	40.00	77.25	55.25	38.25	76.17	64.83	50.17	67.13	-	
<i>CDK5R1</i>	8851	36.50	139.00	71.00	61.00	87.75	53.75	48.75	82.17	78.83	56.17	76.88	-	
<i>ATF4</i>	468	39.00	26.00	73.00	165.00	32.50	56.00	102.00	46.00	76.67	92.33	75.75	+	
<i>NTRK1</i>	4914	40.00	86.00	9.00	83.00	63.00	24.50	61.50	45.00	69.67	44.00	54.50	-	
<i>FYN</i>	2534	41.00	81.00	15.00	18.00	61.00	28.00	29.50	45.67	46.67	24.67	38.75	-	
<i>F2R</i>	2149	42.50	68.00	63.00	81.00	55.25	52.75	61.75	57.83	63.83	62.17	63.63	+	
<i>MYB</i>	4602	42.50	106.00	119.00	68.00	74.25	80.75	55.25	89.17	72.17	76.50	83.88	-	
<i>PRNP</i>	5621	45.00	126.00	41.00	86.00	85.50	43.00	65.50	70.67	85.67	57.33	74.50	+	
<i>PTK2B</i>	2185	45.00	51.00	10.00	39.00	48.00	27.50	42.00	35.33	45.00	31.33	36.25	-	
<i>TP73</i>	7161	45.00	122.50	118.00	53.00	83.75	81.50	49.00	95.17	73.50	72.00	84.63	-	
<i>PARK7</i>	11315	47.50	18.00	3.00	29.00	32.75	25.25	38.25	22.83	31.50	26.50	24.38	+	
<i>FOXO3</i>	2309	47.50	129.00	91.00	13.00	88.25	69.25	30.25	89.17	63.17	50.50	70.13	+	
<i>MAP2K4</i>	6416	49.00	2.00	32.00	5.00	25.50	40.50	27.00	27.67	18.67	28.67	22.00	-	
<i>NTF3</i>	4908	50.50	23.00	149.00	132.00	36.75	99.75	91.25	74.17	68.50	110.50	88.63	+	
<i>CASP9</i>	842	52.50	115.50	79.00	58.00	84.00	65.75	55.25	82.33	75.33	63.17	76.25	-	
<i>PRKN</i>	5071	54.50	10.50	6.00	41.00	32.50	30.25	47.75	23.67	35.33	33.83	28.00	+	

Продолжение таблицы

Ген	Genelid	Ранг	Средний ранг для критериев										Наличие ассоциаций с БП в ANDSystem
			центральности CTC	специфичности CTS	ToppGene	Endeavour	CTS, CTS	CTS, ToppGene	CTS, Endeavour	CTS, CTS, ToppGene	CTS, CTS, Endeavour	CTS, Endeavour, ToppGene	
<i>ERBB3</i>	2065	54.50	54.00	5.00	4.00	54.25	29.75	29.25	37.83	37.50	21.17	29.38	-
<i>NQO1</i>	1728	59.00	50.00	117.00	94.00	54.50	88.00	76.50	75.33	67.67	90.00	80.00	+
<i>BID</i>	637	59.00	93.00	93.00	113.00	76.00	76.00	86.00	81.67	88.33	88.33	89.50	+
<i>GPX1</i>	2876	59.00	110.00	99.00	97.00	84.50	79.00	78.00	89.33	88.67	85.00	91.25	+
<i>MSH2</i>	4436	59.00	75.00	80.00	46.00	67.00	69.50	52.50	71.33	60.00	61.67	65.00	-
<i>TFAP2A</i>	7020	59.00	145.00	106.00	64.00	102.00	82.50	61.50	103.33	89.33	76.33	93.50	-
<i>AKT2</i>	208	62.00	72.00	20.00	9.00	67.00	41.00	35.50	51.33	47.67	30.33	40.75	-
<i>NGF</i>	4803	65.00	96.00	65.00	52.00	80.50	65.00	58.50	75.33	71.00	60.67	69.50	+
<i>GPI</i>	2821	65.00	124.00	89.00	65.00	94.50	77.00	65.00	92.67	84.67	73.00	85.75	+
<i>PPARGC1A</i>	10891	65.00	55.00	76.00	42.00	60.00	70.50	53.50	65.33	54.00	61.00	59.50	-
<i>MECP2</i>	4204	69.50	107.00	90.00	28.00	88.25	79.75	48.75	88.83	68.17	62.50	73.63	+
<i>CDK5</i>	1020	69.50	127.00	22.00	37.00	98.25	45.75	53.25	72.83	77.83	42.83	63.88	-
<i>FADD</i>	8772	69.50	65.50	75.00	79.00	67.50	72.25	74.25	70.00	71.33	74.50	72.25	-
<i>TGFB2</i>	7042	73.50	77.00	33.00	60.00	75.25	53.25	66.75	61.17	70.17	55.50	60.88	+
<i>NTRK2</i>	4915	73.50	34.00	35.00	2.00	53.75	54.25	37.75	47.50	36.50	36.83	36.13	-
<i>ILK</i>	3611	73.50	56.00	27.00	121.00	64.75	50.25	97.25	52.17	83.50	73.83	69.38	-
<i>HSP90AB1</i>	3326	77.00	6.00	24.00	71.00	41.50	50.50	74.00	35.67	51.33	57.33	44.50	-
<i>ATF2</i>	1386	77.00	43.00	39.00	32.00	60.00	58.00	54.50	53.00	50.67	49.33	47.75	-
<i>RASA1</i>	5921	79.50	113.00	81.00	26.00	96.25	80.25	52.75	91.17	72.83	62.17	74.88	-
<i>LRP1</i>	4035	79.50	171.00	54.00	7.00	125.25	66.75	43.25	101.50	85.83	46.83	77.88	-
<i>TYRO3</i>	7301	81.00	19.00	111.00	101.00	50.00	96.00	91.00	70.33	67.00	97.67	78.00	-
<i>PINK1</i>	65018	84.50	13.00	12.00	82.00	48.75	48.25	83.25	36.50	59.83	59.50	47.88	+
<i>GDNF</i>	2668	84.50	141.00	55.00	62.00	112.75	69.75	73.25	93.50	95.83	67.17	85.63	+
<i>PDPK1</i>	5170	84.50	44.00	26.00	33.00	64.25	55.25	58.75	51.50	53.83	47.83	46.88	-
<i>NRP1</i>	8829	84.50	65.50	53.00	30.00	75.00	68.75	57.25	67.67	60.00	55.83	58.25	-
<i>AIFM1</i>	9131	88.00	31.50	40.00	74.00	59.75	64.00	81.00	53.17	64.50	67.33	58.38	-
<i>MAP3K11</i>	4296	91.00	8.00	62.00	90.00	49.50	76.50	90.50	53.67	63.00	81.00	62.75	+

Окончание таблицы

Ген	Genelid	Ранг		Средний ранг для критериев									Наличие ассоциаций с БП в ANDSystem
		центральности CTC	специфичности CTS	ToppGene	Endeavour	CTS, CTS	CTS, ToppGene	CTS, Endeavour	CTS, CTS, ToppGene	CTS, CTS, Endeavour	CTS, Endeavour, ToppGene	CTS, CTS, Endeavour, ToppGene	
<i>MEF2C</i>	4208	91.00	28.50	59.00	77.00	59.75	75.00	84.00	59.50	65.50	75.67	63.88	-
<i>TGFB3</i>	7043	91.00	17.00	68.00	98.00	54.00	79.50	94.50	58.67	68.67	85.67	68.50	-
<i>ASCL1</i>	429	91.00	20.00	121.00	47.00	55.50	106.00	69.00	77.33	52.67	86.33	69.75	-
<i>NR4A3</i>	8013	96.00	101.50	86.00	57.00	98.75	91.00	76.50	94.50	84.83	79.67	85.13	-
<i>PAK3</i>	5063	96.00	131.00	85.00	43.00	113.50	90.50	69.50	104.00	90.00	74.67	88.75	-
<i>PPT1</i>	5538	98.50	28.50	60.00	104.00	63.50	79.25	101.25	62.33	77.00	87.50	72.75	+
<i>NR4A2</i>	4929	100.50	33.00	30.00	25.00	66.75	65.25	62.75	54.50	52.83	51.83	47.13	+
<i>ANGPT1</i>	284	103.00	64.00	70.00	136.00	83.50	86.50	119.50	79.00	101.00	103.00	93.25	-
<i>PCSK9</i>	255738	103.00	21.00	139.00	111.00	62.00	121.00	107.00	87.67	78.33	117.67	93.50	-
<i>NF1</i>	4763	105.50	170.00	17.00	21.00	137.75	61.25	63.25	97.50	98.83	47.83	78.38	-
<i>PRKCG</i>	5582	108.50	10.50	13.00	66.00	59.50	60.75	87.25	44.00	61.67	62.50	49.50	-
<i>GRIN1</i>	2902	108.50	156.00	19.00	8.00	132.25	63.75	58.25	94.50	90.83	45.17	72.88	-
<i>PRKCI</i>	5584	113.50	138.00	51.00	10.00	125.75	82.25	61.75	100.83	87.17	58.17	78.13	-
<i>ROCK1</i>	6093	113.50	87.00	82.00	72.00	100.25	97.75	92.75	94.17	90.83	89.17	88.63	-
<i>ADORA2A</i>	135	120.00	94.50	46.00	31.00	107.25	83.00	75.50	86.83	81.83	65.67	72.88	+
<i>STXBP1</i>	6812	120.00	94.50	57.00	50.00	107.25	88.50	85.00	90.50	88.17	75.67	80.38	-
<i>EGLN3</i>	112399	120.00	36.50	127.00	102.00	78.25	123.50	111.00	94.50	86.17	116.33	96.38	-
<i>GSK3A</i>	2931	126.50	1.00	97.00	85.00	63.75	111.75	105.75	74.83	70.83	102.83	77.38	-
<i>FGF20</i>	26281	134.00	5.00	48.00	204.00	69.50	91.00	169.00	62.33	114.33	128.67	97.75	+
<i>WFS1</i>	7466	134.00	23.00	108.00	123.00	78.50	121.00	128.50	88.33	93.33	121.67	97.00	-
<i>AKT1S1</i>	84335	142.50	10.50	151.00	78.00	76.50	146.75	110.25	101.33	77.00	123.83	95.50	-
<i>SNCB</i>	6620	162.50	10.50	88.00	70.00	86.50	125.25	116.25	87.00	81.00	106.83	82.75	+

Приложение 2

Средние значения показателей центральностей вершин в ассоциативной генной сети БП

Показатель центральности	Все вершины сети БП	Гены					45 случайно выбранных генов из сети БП
		нейронального апоптоза (GO:0051402 neuron apoptotic process)	старения (GO:0007568 aging)	воспаления (GO:0006954 inflammatory response)	двигательных реакций (GO:0007626 locomotory behavior)	обучения и памяти (GO:0007611 learning or memory)	
По степени	0.0511	0.0668; $p = 0.0056$	0.1146; $p = 0.0001$	0.1171; $p = 10^{-5}$	0.0601; $p = 0.4497$	0.056; $p = 0.958$	0.0414; $p = 0.9818$
По близости	0.4407	0.4415; $p = 0.0216$	0.4638; $p = 0.0015$	0.4766; $p = 10^{-4}$	0.4327; $p = 0.8455$	0.4219; $p = 0.7836$	0.4302; $p = 0.8288$
По посредничеству	483.46	664.90; $p = 0.0052$	1814.76; $p = 10^{-4}$	1603.27; $p = 0.0003$	655.99; $p = 0.236$	515.95; $p = 0.6547$	242.51; $p = 0.6616$