

Supplementary Information 1

Fisher’s exact test results and the estimation of the false discovery rates for ordering H.

Table A: Fisher’s exact test scheme ($\text{FET}_{fixpscore}$) for mRm_{IL} models.

# unique windows	original windows RNAz	shuffled windows RNAz	
3D module+	A p-score > 0.9 z-score < -2 mRm occurrence $\geq 50\%$ RMDetect score $\geq Q_{0.6}$	C p-score > 0.9 z-score < -2 mRm occurrence $\geq 50\%$ RMDetect score $\geq Q_{0.6}$	A+C
3D module-	B p-score > 0.9 z-score < -2 mRm occurrence < 50% RMDetect score < $Q_{0.6}$	D p-score > 0.9 z-score < -2 mRm occurrence < 50% RMDetect score < $Q_{0.6}$	B+D
	A+B	C+D	n = (A+B+C+D)

Table B: Fisher’s exact test scheme ($\text{FET}_{fixpscore}$) for JAR3D IL and JAR3D HL models. “mied” = mean interior edit distance, “pC” = passed cutoff.

# unique windows	original windows RNAz	shuffled windows RNAz	
3D module+	A p-score > 0.9 z-score < -2 JAR3D mied ≤ 4 JAR3D pC ≥ 50	C p-score > 0.9 z-score < -2 JAR3D mied ≤ 4 JAR3D pC ≥ 50	A+C
3D module-	B p-score > 0.9 z-score < -2 JAR3D mied ≤ 4 JAR3D pC ≥ 50	D p-score > 0.9 z-score < -2 JAR3D mied ≤ 4 JAR3D pC ≥ 50	B+D
	A+B	C+D	n = (A+B+C+D)

Table D: Results of Fisher’s exact test according to scheme shown in Table A for mRm_{IL} module predictions of all mRm_{IL} models together on SISSIz and original data of order H.

Order	Model	A	B	C	D	P-value	Odds Ratio
H	all	24956	87104	11401	41987	1.312117e-05	1.055145

Table E: Results of Fisher’s exact test according to scheme shown in Table B for JAR3D IL models for SISSIz and original data of order H. Red highlighted rows have a significant p-value after multiple testing correction using the Benjamini-Hochberg procedure at a 5% false discovery rate (adjusted p-value) and an average 3D sequence length ≥ 9 . “Nuc/Bp” denotes the total strand length and the number of base pairs.

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
IL_47875.1	548	111512	149	53239	1.119216e-10	1.755906	4/2	1	3.08903616e-08
IL_96206.3	292	111768	63	53325	5.091232e-10	2.211331	5/4	2	7.02590016e-08
IL_73000.2	250	111810	54	53334	8.917314e-09	2.20835	6/4	3	8.20392888e-07
IL_92109.3	517	111543	150	53238	1.509924e-08	1.645044	4/2	4	1.04184756e-06
IL_28947.2	318	111742	83	53305	1.729345e-07	1.827675	4/2	5	9.5459844e-06
IL_97217.11	336	111724	92	53296	5.133559e-07	1.742201	4/2	6	2.36143714e-05
IL_58586.2	289	111771	77	53311	1.232783e-06	1.790166	6/2	7	4.8606872571e-05
IL_56465.4	471	111589	146	53242	1.599942e-06	1.539217	5/2	8	5.5197999e-05
IL_94430.5	347	111713	102	53286	5.125366e-06	1.622697	5/3	9	0.00016
IL_28644.1	152	111908	33	53355	7.520801e-06	2.196047	5/2	10	0.00021
IL_39199.4	260	111800	72	53316	1.301343e-05	1.722088	5/4	11	0.00030
IL_23448.1	85	111975	13	53375	1.31193e-05	3.116649	6/2	12	0.00030
IL_25300.3	280	111780	81	53307	2.419243e-05	1.648511	4/2	13	0.00051
IL_58291.4	121	111939	25	53363	2.799534e-05	2.30729	6/2	14	0.00055
IL_67887.1	205	111855	55	53333	4.760893e-05	1.777176	5/3	15	0.00088
IL_70173.1	173	111887	44	53344	5.876073e-05	1.874553	6/2	16	0.00095
IL_73276.5	173	111887	44	53344	5.876073e-05	1.874553	7/5	17	0.00095
IL_69799.1	115	111945	25	53363	9.534492e-05	2.192762	5/2	18	0.00145
IL_92027.3	150	111910	37	53351	0.0001	1.932687	6/4	19	0.00145
IL_44540.4	199	111861	55	53333	0.0001	1.725068	5/4	20	0.00167
IL_46648.6	216	111844	62	53326	0.0002	1.661067	5/3	21	0.00210
IL_02809.3	232	111828	69	53319	0.0002	1.603131	8/4	22	0.00287
IL_23262.4	440	111620	154	53234	0.0004	1.362666	10/3	23	0.00529
IL_01080.1	203	111857	60	53328	0.0005	1.613005	7/2	24	0.00544
IL_40845.1	170	111890	48	53340	0.0005	1.688372	7/4	25	0.00607
IL_87904.5	1115	110945	444	52944	0.0006	1.198378	10/5	26	0.00682
IL_63133.1	52	112008	8	53380	0.0007	3.0977	6/3	27	0.00691
IL_79083.3	631	111429	236	53152	0.0007	1.275334	11/4	28	0.00691
IL_34628.2	54	112006	9	53379	0.0010	2.859419	12/6	29	0.00920
IL_86357.3	76	111984	16	53372	0.0010	2.263858	6/3	30	0.00943
IL_74876.2	846	111214	332	53056	0.0013	1.215622	10/4	31	0.01163
IL_21333.2	238	111822	77	53311	0.0015	1.473584	8/4	32	0.01259
IL_90459.3	476	111584	176	53212	0.0020	1.289691	6/3	33	0.01642
IL_24982.5	1319	110741	545	52843	0.0025	1.154844	10/5	34	0.01969
IL_87065.1	133	111927	38	53350	0.0025	1.66827	5/3	35	0.01969
IL_43316.1	807	111253	320	53068	0.0027	1.202921	10/4	36	0.02041
IL_83856.1	529	111531	201	53187	0.0031	1.255039	12/6	37	0.02326
IL_47174.11	273	111787	94	53294	0.0033	1.384618	6/3	38	0.02362
IL_91089.1	42	112018	7	53381	0.0036	2.859219	8/2	39	0.02538

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Table E – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
IL_88119.1	187	111873	60	53328	0.0038	1.48566	6/3	40	0.02606
IL_63952.1	502	111558	191	53197	0.0041	1.25327	13/4	41	0.02731
IL_39980.1	100	111960	27	53361	0.0042	1.765208	6/3	42	0.02731
IL_80348.3	177	111883	57	53331	0.0050	1.480175	5/2	43	0.03172
IL_80494.2	478	111582	182	53206	0.0051	1.252307	12/5	44	0.03172
IL_43877.1	87	111973	23	53365	0.0058	1.80274	6/2	45	0.03553
IL_68767.1	100	111960	28	53360	0.0064	1.702133	6/2	46	0.03832
IL_37406.1	83	111977	22	53366	0.0071	1.798	7/2	47	0.04109
IL_42251.1	199	111861	67	53321	0.0071	1.415802	6/3	48	0.04109
IL_63253.1	91	111969	25	53363	0.0074	1.734772	6/2	49	0.04146
IL_12147.1	196	111864	66	53322	0.0076	1.415575	6/3	50	0.04178
IL_17212.2	210	111850	72	53316	0.0082	1.390324	6/3	51	0.04462
IL_26971.1	856	111204	351	53037	0.0090	1.16311	10/3	52	0.04790
IL_98421.4	100	111960	29	53359	0.0096	1.643409	7/2	53	0.04982
IL_21639.1	43	112017	9	53379	0.0122	2.276724	9/3	54	0.06258
IL_82444.1	171	111889	58	53330	0.0134	1.405265	6/3	55	0.06732
IL_86059.1	107	111953	33	53355	0.0155	1.545283	4/2	56	0.07652
IL_41791.1	70	111990	19	53369	0.0158	1.75571	11/8	57	0.07672
IL_09587.1	2706	109354	1199	52189	0.0176	1.07709	11/4	58	0.08378
IL_37104.3	192	111868	68	53320	0.0191	1.345827	6/3	59	0.08933
IL_37197.1	654	111406	268	53120	0.0195	1.163558	11/4	60	0.08973
IL_55649.1	391	111669	153	53235	0.0205	1.218264	8/3	61	0.09085
IL_70237.3	922	111138	388	53000	0.0206	1.133208	10/4	62	0.09085
IL_46721.1	92	111968	28	53360	0.0207	1.565851	10/3	63	0.09085
IL_39585.1	1003	111057	425	52963	0.0218	1.125476	10/6	64	0.09379
IL_39355.1	346	111714	134	53254	0.0221	1.230853	8/3	65	0.09379
IL_18675.1	88	111972	27	53361	0.0253	1.553218	7/2	66	0.10529
IL_37325.1	48	112012	12	53376	0.0256	1.906074	7/4	67	0.10529
IL_31006.1	179	111881	64	53324	0.0265	1.333072	11/5	68	0.10656
IL_55938.4	290	111770	111	53277	0.0266	1.245313	7/4	69	0.10656
IL_15205.1	120	111940	40	53348	0.0279	1.42974	12/5	70	0.10993
IL_31039.1	61	111999	17	53371	0.0286	1.7099	7/3	71	0.11107
IL_13777.1	114	111946	38	53350	0.0315	1.429718	5/2	72	0.12072
IL_56513.1	98	111962	32	53356	0.0358	1.459447	5/2	73	0.13321
IL_16166.4	130	111930	45	53343	0.0360	1.376801	5/2	74	0.13321
IL_80093.1	633	111427	264	53124	0.0362	1.143133	10/5	75	0.13321
IL_06808.1	80	111980	25	53363	0.0375	1.524926	8/4	76	0.13376
IL_98566.1	80	111980	25	53363	0.0375	1.524926	8/2	77	0.13376
IL_69106.1	187	111873	69	53319	0.0382	1.291615	7/3	78	0.13376
IL_95150.6	67	111993	20	53368	0.0383	1.59637	7/3	79	0.13376
IL_06177.1	40	112020	10	53378	0.0401	1.90601	6/2	80	0.13669
IL_31066.3	40	112020	10	53378	0.0401	1.90601	5/2	81	0.13669
IL_69536.1	1089	110971	471	52917	0.0408	1.102532	8/3	82	0.13716
IL_85510.1	684	111376	289	53099	0.0454	1.128367	6/2	83	0.14875
IL_57364.1	25	112035	5	53383	0.0458	2.382414	8/4	84	0.14875
IL_61730.1	25	112035	5	53383	0.0458	2.382414	11/3	85	0.14875
IL_13959.4	154	111906	56	53332	0.0464	1.31064	8/4	86	0.14878
IL_15840.2	694	111366	294	53094	0.0478	1.125389	11/6	87	0.15080
IL_06471.1	477	111583	197	53191	0.0485	1.15422	10/7	88	0.15080
IL_31663.1	93	111967	31	53357	0.0486	1.429637	7/4	89	0.15080
IL_54450.1	41	112019	11	53377	0.0549	1.776038	8/3	90	0.16840
IL_25271.2	27	112033	6	53382	0.0563	2.144171	14/7	91	0.17079
IL_41766.6	336	111724	136	53252	0.0585	1.177564	8/4	92	0.17545
IL_05723.1	473	111587	197	53191	0.0599	1.144501	10/5	93	0.17771
IL_80714.1	463	111597	193	53195	0.0632	1.143507	12/3	94	0.18556
IL_65553.8	107	111953	38	53350	0.0685	1.341875	12/7	95	0.19891
IL_50911.1	34	112026	9	53379	0.0731	1.800058	7/3	96	0.21009
IL_05684.1	223	111837	88	53300	0.0738	1.207692	8/3	97	0.21009
IL_97296.1	209	111851	82	53306	0.0750	1.214676	7/3	98	0.21123

Continued on next page

Table E – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
IL_12211.1	127	111933	47	53341	0.0788	1.287636	12/6	99	0.21948
IL_90133.3	141	111919	53	53335	0.0795	1.267764	7/3	100	0.21948
IL_34363.2	19	112041	4	53384	0.0920	2.263215	13/9	101	0.25133
IL_06847.1	6	112054	0	53388	0.0965	Inf	11/4	102	0.25869
IL_46435.1	6	112054	0	53388	0.0965	Inf	13/2	103	0.25869
IL_20775.1	62	111998	21	53367	0.1057	1.406828	7/3	104	0.28056
IL_17603.1	338	111722	142	53246	0.1123	1.13442	11/5	105	0.29522
IL_30381.1	66	111994	23	53365	0.1170	1.367377	8/4	106	0.30209
IL_80505.1	9	112051	1	53387	0.1171	4.288512	11/2	107	0.30209
IL_79955.2	357	111703	151	53237	0.1183	1.126776	12/6	108	0.30239
IL_17066.1	65	111995	23	53365	0.1312	1.346655	6/3	109	0.33217
IL_13069.3	79	111981	29	53359	0.1346	1.298003	4/2	110	0.33784
IL_87548.1	407	111653	175	53213	0.1370	1.108414	11/6	111	0.34061
IL_93424.4	606	111454	266	53122	0.1397	1.085847	9/4	112	0.34423
IL_28572.2	5	112055	0	53388	0.1425	Inf	15/5	113	0.34767
IL_00998.1	97	111963	37	53351	0.1439	1.249185	8/4	114	0.34767
IL_97509.1	703	111357	311	53077	0.1449	1.077415	10/5	115	0.34767
IL_77263.2	279	111781	118	53270	0.1508	1.126768	10/5	116	0.35876
IL_41139.1	54	112006	19	53369	0.1547	1.354253	7/2	117	0.36493
IL_50521.1	49	112011	17	53371	0.1586	1.373415	14/7	118	0.37092
IL_22909.1	98	111962	38	53350	0.1616	1.228844	9/3	119	0.37470
IL_11751.1	34	112026	11	53377	0.1680	1.472721	7/2	120	0.38635
IL_06211.3	129	111931	52	53336	0.1740	1.182091	7/2	121	0.39687
IL_57785.5	48	112012	17	53371	0.1789	1.345383	8/4	122	0.40429
IL_53635.3	99	111961	39	53349	0.1802	1.209546	11/5	123	0.40429
IL_09491.1	31	112029	10	53378	0.1818	1.477041	7/2	124	0.40458
IL_43124.2	173	111887	72	53316	0.1853	1.144955	7/4	125	0.40915
IL_64589.1	57	112003	21	53367	0.1878	1.29325	7/2	126	0.41147
IL_41153.1	28	112032	9	53379	0.1971	1.482323	7/3	127	0.42842
IL_08926.3	100	111960	40	53348	0.1997	1.191212	5/3	128	0.43067
IL_93568.2	196	111864	83	53305	0.2020	1.125261	12/5	129	0.43213
IL_77014.1	4	112056	0	53388	0.2104	Inf	11/5	130	0.44657
IL_47758.2	115	111945	47	53341	0.2121	1.165875	8/4	131	0.44657
IL_46306.1	1144	110916	522	52866	0.2136	1.04457	9/3	132	0.44657
IL_85647.3	15	112045	4	53384	0.2154	1.786687	15/8	133	0.44690
IL_88865.1	27	112033	9	53379	0.2283	1.429385	8/3	134	0.47013
IL_24546.4	127	111933	53	53335	0.2337	1.141771	10/3	135	0.47783
IL_87507.1	204	111856	88	53300	0.2378	1.104623	9/4	136	0.48250
IL_23639.1	1153	110907	529	52859	0.2440	1.038788	9/4	137	0.49152
IL_47444.3	718	111342	326	53062	0.2458	1.049618	12/6	138	0.49166
IL_21254.1	38	112022	14	53374	0.2527	1.2932	12/7	139	0.50174
IL_25380.1	165	111895	71	53317	0.2599	1.107335	8/4	140	0.51241
IL_71685.1	74	111986	30	53358	0.2630	1.17528	14/7	141	0.51472
IL_78744.1	21	112039	7	53381	0.2729	1.429362	12/6	142	0.52812
IL_11778.1	35	112025	13	53375	0.2736	1.282722	7/2	143	0.52812
IL_11302.1	842	111218	386	53002	0.2757	1.039527	10/3	144	0.52842
IL_70299.1	82	111978	34	53354	0.2829	1.149121	10/4	145	0.53222
IL_39526.4	6	112054	1	53387	0.2835	2.858622	9/2	146	0.53222
IL_98591.3	6	112054	1	53387	0.2835	2.858622	13/8	147	0.53222
IL_07300.2	125	111935	54	53334	0.3034	1.102943	9/4	148	0.56309
IL_09333.1	307	111753	138	53250	0.3040	1.060033	12/6	149	0.56309
IL_43946.1	13	112047	4	53384	0.3137	1.548436	12/6	150	0.57372
IL_31555.5	593	111467	272	53116	0.3157	1.038862	9/4	151	0.57372
IL_75328.1	20	112040	7	53381	0.3160	1.361309	14/4	152	0.57372
IL_09530.1	656	111404	302	53086	0.3240	1.03506	8/3	153	0.57844
IL_91379.1	8	112052	2	53386	0.3246	1.905751	12/2	154	0.57844
IL_06421.1	102	111958	44	53344	0.3249	1.104527	7/4	155	0.57844
IL_99397.1	15	112045	5	53383	0.3332	1.429339	9/4	156	0.58949
IL_06468.1	244	111816	110	53278	0.3376	1.056917	10/4	157	0.59271

Continued on next page

Table E – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
IL_06306.1	33	112027	13	53375	0.3418	1.209423	13/2	158	0.59271
IL_91044.1	338	111722	154	53234	0.3421	1.045794	8/3	159	0.59271
IL_22732.1	166	111894	74	53314	0.3446	1.068834	9/5	160	0.59271
IL_31224.1	282	111778	128	53260	0.3457	1.049745	7/2	161	0.59271
IL_59529.1	491	111569	226	53162	0.3499	1.035191	10/5	162	0.59612
IL_37347.1	14	112046	5	53383	0.3893	1.334071	15/7	163	0.65923
IL_40892.1	98	111962	44	53344	0.4102	1.061177	8/3	164	0.69026
IL_47732.1	18	112042	7	53381	0.4140	1.225099	6/2	165	0.69089
IL_83920.1	57	112003	25	53363	0.4155	1.086287	7/3	166	0.69089
IL_54966.1	282	111778	131	53257	0.4284	1.025669	9/5	167	0.70799
IL_52958.1	2612	109448	1237	52151	0.4381	1.00614	9/2	168	0.71966
IL_30067.1	268	111792	125	53263	0.4459	1.021518	10/5	169	0.72829
IL_25082.1	2	112058	0	53388	0.4588	Inf	17/6	170	0.73188
IL_82601.1	2	112058	0	53388	0.4588	Inf	8/4	171	0.73188
IL_94403.5	2	112058	0	53388	0.4588	Inf	11/3	172	0.73188
IL_94744.1	2	112058	0	53388	0.4588	Inf	17/8	173	0.73188
IL_45262.4	140	111920	65	53323	0.4647	1.026198	9/3	174	0.73383
IL_58454.1	570	111490	269	53119	0.4653	1.009573	9/3	175	0.73383
IL_86336.1	283	111777	133	53255	0.4716	1.013784	9/2	176	0.73921
IL_06180.1	899	111161	426	52962	0.4764	1.005455	9/4	177	0.73921
IL_38807.3	57	112003	26	53362	0.4791	1.044486	11/6	178	0.73921
IL_09882.1	97	111963	45	53343	0.4812	1.027004	12/6	179	0.73921
IL_02835.1	4	112056	1	53387	0.4821	1.905719	13/4	180	0.73921
IL_28003.1	61	111999	28	53360	0.4856	1.037924	8/4	181	0.74040
IL_35043.1	6	112054	2	53386	0.4946	1.429304	10/3	182	0.74844
IL_52509.1	497	111563	236	53152	0.5009	1.00333	10/4	183	0.74844
IL_21077.1	159	111901	75	53313	0.5028	1.010035	8/2	184	0.74844
IL_71942.1	8	112052	3	53385	0.5032	1.270442	10/2	185	0.74844
IL_97057.3	675	111385	321	53067	0.5044	1.001836	11/5	186	0.74844
IL_70401.1	10	112050	4	53384	0.5100	1.191058	11/3	187	0.75267
IL_97191.1	14	112046	6	53382	0.5203	1.111664	13/7	188	0.76387
IL_33842.1	26	112034	12	53376	0.5410	1.032227	7/4	189	0.78381
IL_87394.1	26	112034	12	53376	0.5410	1.032227	10/2	190	0.78381
IL_83250.1	111	111949	53	53335	0.5424	0.9977901	11/5	191	0.78381
IL_03110.1	361	111699	173	53215	0.5459	0.9941362	13/5	192	0.78468
IL_52173.1	163	111897	79	53309	0.5799	0.9829654	9/2	193	0.82890
IL_80652.1	15	112045	7	53381	0.5826	1.020924	13/6	194	0.82890
IL_54954.1	3	112057	1	53387	0.6115	1.429293	16/7	195	0.86111
IL_86981.1	3	112057	1	53387	0.6115	1.429293	15/8	196	0.86111
IL_46034.3	81	111979	40	53348	0.6154	0.9647518	8/3	197	0.86217
IL_45794.1	40	112020	20	53368	0.6289	0.9528306	11/5	198	0.87662
IL_57977.1	60	112000	30	53358	0.6333	0.9528222	11/4	199	0.87828
IL_91078.1	12	112048	6	53382	0.6458	0.9528424	12/4	200	0.89116
IL_49527.1	742	111318	362	53026	0.6580	0.9763611	10/4	201	0.89224
IL_82563.1	43	112017	22	53366	0.6618	0.9311666	10/3	202	0.89224
IL_48918.3	73	111987	37	53351	0.6623	0.9399326	12/6	203	0.89224
IL_82188.2	221	111839	110	53278	0.6700	0.9570945	14/3	204	0.89224
IL_97833.1	25	112035	13	53375	0.6721	0.9161831	14/8	205	0.89224
IL_05513.1	1	112059	0	53388	0.6773	Inf	12/3	206	0.89224
IL_27668.1	1	112059	0	53388	0.6773	Inf	11/3	207	0.89224
IL_42891.1	1	112059	0	53388	0.6773	Inf	14/3	208	0.89224
IL_46301.1	245	111815	122	53266	0.6774	0.9566577	9/3	209	0.89224
IL_26868.1	388	111672	192	53196	0.6841	0.9626581	10/5	210	0.89224
IL_12507.1	78	111982	40	53348	0.6865	0.9289781	11/4	211	0.89224
IL_24293.1	70	111990	36	53352	0.6866	0.9263349	8/3	212	0.89224
IL_49493.4	104	111956	53	53335	0.6887	0.9348096	13/7	213	0.89224
IL_87523.1	124	111936	63	53325	0.6918	0.9376546	10/3	214	0.89224
IL_75415.1	4	112056	2	53386	0.7012	0.9528458	10/2	215	0.90019
IL_65137.1	89	111971	46	53342	0.7083	0.921716	12/6	216	0.90505

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Table E – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
IL_92321.4	469	111591	233	53155	0.7148	0.9588144	12/6	217	0.90910
IL_16415.2	14	112046	8	53380	0.7434	0.8337358	14/7	218	0.93792
IL_03282.1	105	111955	55	53333	0.7455	0.9094543	10/5	219	0.93792
IL_89794.1	25	112035	14	53374	0.7476	0.850735	11/7	220	0.93792
IL_27640.1	2	112058	1	53387	0.7548	0.9528466	15/4	221	0.94267
IL_54470.1	321	111739	163	53225	0.7628	0.9380565	8/4	222	0.94518
IL_53988.1	94	111966	50	53338	0.7655	0.8955935	12/5	223	0.94518
IL_82650.1	10	112050	6	53382	0.7671	0.7940454	13/5	224	0.94518
IL_95652.3	26	112034	15	53373	0.7783	0.8257775	14/7	225	0.95468
IL_37053.1	228	111832	118	53270	0.7855	0.9203875	12/6	226	0.95934
IL_44067.4	13	112047	8	53380	0.7921	0.7741915	14/6	227	0.96127
IL_85805.1	919	111141	458	52930	0.7941	0.955604	8/2	228	0.96127
IL_78513.1	18	112042	11	53377	0.8043	0.7795948	8/2	229	0.96393
IL_76486.1	3	112057	2	53386	0.8056	0.7146099	15/8	230	0.96393
IL_31754.1	6	112054	4	53384	0.8082	0.7146022	13/7	231	0.96393
IL_66744.1	74	111986	41	53347	0.8103	0.8598041	13/3	232	0.96393
IL_96446.1	112	111948	61	53327	0.8225	0.8746273	10/3	233	0.97156
IL_81398.1	3139	108921	1538	51850	0.8237	0.971539	10/4	234	0.97156
IL_92114.3	69	111991	39	53349	0.8311	0.8428199	9/4	235	0.97610
IL_59934.1	82	111978	46	53342	0.8373	0.8491786	12/5	236	0.97646
IL_60649.1	46	112014	27	53361	0.8385	0.8116276	11/5	237	0.97646
IL_72158.3	118	111942	65	53323	0.8461	0.8647589	12/6	238	0.98122
IL_31707.1	8	112052	6	53382	0.8703	0.6351977	11/4	239	1.00000
IL_62499.7	462	111598	242	53146	0.8918	0.9091647	7/4	240	1.00000
IL_05221.1	3	112057	3	53385	0.9100	0.4764001	15/11	241	1.00000
IL_25307.1	55	112005	35	53353	0.9256	0.7485168	9/3	242	1.00000
IL_46990.1	1716	110344	870	52518	0.9363	0.9387677	10/2	243	1.00000
IL_98924.1	398	111662	215	53173	0.9364	0.8815234	9/3	244	1.00000
IL_90735.1	19	112041	15	53373	0.9488	0.6033948	16/3	245	1.00000
IL_52940.1	226	111834	129	53259	0.9542	0.8343456	14/6	246	1.00000
IL_94973.1	12	112048	11	53377	0.9623	0.5196644	14/6	247	1.00000
IL_27243.1	1	112059	2	53386	0.9664	0.2382086	14/7	248	1.00000
IL_47687.1	226	111834	133	53255	0.9760	0.8091979	13/6	249	1.00000
IL_30840.2	2289	109771	1171	52217	0.9781	0.9298526	11/5	250	1.00000
IL_53323.1	989	111071	528	52860	0.9838	0.891439	10/3	251	1.00000
IL_25181.1	1011	111049	540	52848	0.9851	0.8909926	13/5	252	1.00000
IL_68827.1	26	112034	23	53365	0.9890	0.5384348	11/4	253	1.00000
IL_49976.1	1036	111024	589	52799	0.9997	0.8364907	8/5	254	1.00000
IL_02359.3	0	112060	0	53388	1.0000	0	16/9	255	1.00000
IL_16330.1	0	112060	0	53388	1.0000	0	25/5	256	1.00000
IL_17682.1	0	112060	1	53387	1.0000	0	17/8	257	1.00000
IL_21421.1	0	112060	0	53388	1.0000	0	20/7	258	1.00000
IL_21495.1	0	112060	0	53388	1.0000	0	14/5	259	1.00000
IL_23414.1	0	112060	0	53388	1.0000	0	21/5	260	1.00000
IL_25230.3	0	112060	0	53388	1.0000	0	18/8	261	1.00000
IL_33964.1	0	112060	0	53388	1.0000	0	20/6	262	1.00000
IL_39324.1	0	112060	0	53388	1.0000	0	18/10	263	1.00000
IL_40527.1	0	112060	0	53388	1.0000	0	15/5	264	1.00000
IL_52610.1	0	112060	0	53388	1.0000	0	36/9	265	1.00000
IL_57285.1	0	112060	0	53388	1.0000	0	13/4	266	1.00000
IL_76095.3	0	112060	0	53388	1.0000	0	18/8	267	1.00000
IL_76263.1	0	112060	0	53388	1.0000	0	17/3	268	1.00000
IL_77076.1	0	112060	0	53388	1.0000	0	18/8	269	1.00000
IL_77296.1	0	112060	0	53388	1.0000	0	14/2	270	1.00000
IL_88367.1	0	112060	0	53388	1.0000	0	15/7	271	1.00000
IL_89028.6	0	112060	0	53388	1.0000	0	13/5	272	1.00000
IL_90057.1	0	112060	0	53388	1.0000	0	23/17	273	1.00000
IL_91904.1	0	112060	0	53388	1.0000	0	13/4	274	1.00000
IL_97842.1	0	112060	0	53388	1.0000	0	16/5	275	1.00000

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Table E – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
IL_98655.1	0	112060	0	53388	1.0000	0	13/5	276	1.00000

Table F: Results of Fisher’s exact test according to scheme shown in Table B for JAR3D IL module predictions from all JAR3D IL models with mean interior edit distance ≤ 4 , passed cutoff ≥ 50 , and mean sequence length ≥ 9 .

Order	Model	A	B	C	D	P-value	Odds ratio
H	all	20309	88776	9324	43117	2.311515e-05	1.057894

Table G: Results of Fisher’s exact test according to scheme shown in Table B for JAR3D HL models for SISSIz and original data of order H. Brown highlighted rows have a significant p-value after multiple testing correction using the Benjamini-Hochberg procedure at a 5% false discovery rate (adjusted p-value). “Nuc/Bp” denotes the total strand length and the number of base pairs.

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
HL_75759.4	5748	106312	2287	51101	2.237763e-14	1.208056	3/1	1	5.66154039e-12
HL_35865.1	5930	106130	2436	50952	9.595822e-11	1.168675	5/1	2	1.213871483e-08
HL_06643.3	5389	106671	2233	51155	5.498795e-09	1.157326	5/2	3	4.046182195e-07
HL_87554.1	1892	110168	705	52683	6.397126e-09	1.283306	5/1	4	4.046182195e-07
HL_90542.1	1019	111041	358	53030	2.095358e-07	1.359375	7/2	5	1.060251148e-05
HL_74559.1	2813	109247	1138	52250	1.050563e-06	1.182218	4/1	6	4.429873983333333e-05
HL_10378.1	1741	110319	674	52714	1.656569e-06	1.234251	4/1	7	5.98731367142857e-05
HL_42677.2	4580	107480	1935	51453	2.808353e-06	1.133089	3/1	8	8.573619022222222e-05
HL_97499.1	2075	109985	823	52565	3.049904e-06	1.204962	4/1	9	8.573619022222222e-05
HL_30008.1	2025	110035	807	52581	6.625207e-06	1.199062	5/1	10	0.00017
HL_63941.1	4447	107613	1903	51485	3.062551e-05	1.118	4/1	11	0.00070
HL_74505.1	4165	107895	1779	51609	4.100912e-05	1.119852	4/1	12	0.00084
HL_05361.1	557	111503	192	53196	4.302211e-05	1.384057	6/2	13	0.00084
HL_59604.1	2278	109782	940	52448	8.562144e-05	1.157762	3/1	14	0.00155
HL_65071.1	961	111099	366	53022	0.0001	1.253071	4/1	15	0.00193
HL_75850.1	3955	108105	1705	51683	0.0002	1.108976	5/1	16	0.00345
HL_99207.1	1858	110202	764	52624	0.0003	1.161294	7/3	17	0.00397
HL_34027.2	7166	104894	3180	50208	0.0003	1.078635	6/1	18	0.00402
HL_57514.2	9336	102724	4207	49181	0.0009	1.062467	4/1	19	0.01162
HL_86115.1	4107	107953	1795	51593	0.0010	1.09349	4/2	20	0.01162
HL_59225.1	1996	110064	838	52550	0.0010	1.13721	5/1	21	0.01162
HL_17790.1	2159	109901	916	52472	0.0015	1.125332	3/1	22	0.01723
HL_17723.4	1774	110286	745	52643	0.0018	1.136618	7/1	23	0.01977
HL_03785.1	3813	108247	1675	51713	0.0025	1.087514	5/1	24	0.02585
HL_35619.2	1466	110594	615	52773	0.0039	1.13746	5/2	25	0.03638
HL_75579.2	16159	95901	7437	45951	0.0039	1.041093	3/1	26	0.03638
HL_00721.1	1325	110735	552	52836	0.0039	1.145297	2/1	27	0.03638
HL_26579.1	667	111393	262	53126	0.0040	1.21413	5/2	28	0.03638
HL_45018.3	876	111184	358	53030	0.0072	1.167067	10/4	29	0.06227
HL_73465.1	29	112031	4	53384	0.0074	3.454503	11/2	30	0.06227
HL_48116.2	8835	103225	4028	49360	0.0081	1.048838	6/1	31	0.06538
HL_42077.2	15066	96994	6949	46439	0.0083	1.038041	5/2	32	0.06538

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Table G – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
HL_68435.1	839	111221	343	53045	0.0085	1.166597	7/2	33	0.06538
HL_99584.1	1330	110730	563	52825	0.0093	1.126977	4/1	34	0.06897
HL_18587.1	842	111218	348	53040	0.0131	1.153871	8/2	35	0.09448
HL_00090.1	757	111303	311	53077	0.0142	1.160729	11/1	36	0.10002
HL_01418.1	1551	110509	671	52717	0.0184	1.102658	5/1	37	0.12570
HL_72273.1	752	111308	312	53076	0.0206	1.149295	6/2	38	0.13603
HL_46489.2	955	111105	403	52985	0.0210	1.130095	9/2	39	0.13603
HL_24707.1	1715	110345	748	52640	0.0218	1.093766	4/2	40	0.13639
HL_19905.3	8008	104052	3670	49718	0.0221	1.04261	4/1	41	0.13639
HL_98523.2	4979	107081	2257	51131	0.0230	1.053376	6/1	42	0.13828
HL_33277.1	1603	110457	701	52687	0.0294	1.090748	7/1	43	0.17270
HL_41827.1	1157	110903	501	52887	0.0378	1.101285	7/2	44	0.21584
HL_98833.3	750	111310	317	53071	0.0384	1.128035	8/2	45	0.21584
HL_34108.2	9755	102305	4515	48873	0.0471	1.032148	4/1	46	0.25911
HL_78420.1	560	111500	234	53154	0.0484	1.140854	9/1	47	0.26057
HL_36842.1	2027	110033	904	52484	0.0494	1.069519	8/2	48	0.26059
HL_44467.1	41	112019	11	53377	0.0549	1.776038	8/1	49	0.28353
HL_24711.1	724	111336	311	53077	0.0662	1.109806	7/2	50	0.33506
HL_56809.1	92	111968	32	53356	0.0724	1.370053	4/1	51	0.35409
HL_95716.1	5882	106178	2711	50677	0.0728	1.035553	5/1	52	0.35409
HL_21675.3	7496	104564	3470	49918	0.0749	1.031277	5/2	53	0.35733
HL_30128.1	939	111121	411	52977	0.0787	1.089216	9/2	54	0.36868
HL_78361.1	648	111412	279	53109	0.0827	1.107147	8/2	55	0.37443
HL_48039.2	18489	93571	8664	44724	0.0832	1.019987	4/1	56	0.37443
HL_50312.1	4336	107724	1991	51397	0.0844	1.039068	6/1	57	0.37443
HL_66877.1	168	111892	65	53323	0.0860	1.231691	11/4	58	0.37496
HL_42345.1	1101	110959	487	52901	0.0890	1.077851	7/1	59	0.38150
HL_38138.1	838	111222	367	53021	0.0930	1.088514	6/1	60	0.39216
HL_48254.1	1398	110662	625	52763	0.0954	1.066492	9/2	61	0.39569
HL_05113.1	89	111971	32	53356	0.1000	1.325357	7/1	62	0.40813
HL_58601.1	3786	108274	1739	51649	0.1021	1.038531	5/2	63	0.40992
HL_91872.1	477	111583	205	53183	0.1154	1.109016	9/3	64	0.45619
HL_73972.1	948	111112	421	52967	0.1195	1.073421	6/3	65	0.46073
HL_27397.1	370	111690	157	53231	0.1202	1.123182	7/2	66	0.46073
HL_44522.1	172	111888	69	53319	0.1266	1.187878	5/2	67	0.47796
HL_23182.1	1189	110871	534	52854	0.1326	1.061451	8/2	68	0.49350
HL_30731.1	1609	110451	730	52658	0.1398	1.050818	4/1	69	0.51248
HL_84888.1	461	111599	200	53188	0.1429	1.098558	9/3	70	0.51637
HL_78507.1	2115	109945	968	52420	0.1528	1.041727	5/1	71	0.54096
HL_97270.3	2762	109298	1271	52117	0.1540	1.036184	7/2	72	0.54096
HL_90579.3	456	111604	199	53189	0.1603	1.092076	10/2	73	0.55558
HL_52116.1	769	111291	344	53044	0.1731	1.065476	7/2	74	0.59125
HL_33875.1	695	111365	310	53078	0.1753	1.068534	11/3	75	0.59125
HL_93530.1	1039	111021	470	52918	0.1818	1.053697	7/1	76	0.60513
HL_55202.1	13	112047	3	53385	0.1891	2.064616	13/2	77	0.62142
HL_66880.1	66	111994	25	53363	0.1940	1.257874	11/1	78	0.62916
HL_18156.2	264	111796	114	53274	0.2057	1.103536	7/2	79	0.65888
HL_24473.3	4	112056	0	53388	0.2104	Inf	13/4	80	0.66555
HL_33451.1	7	112053	1	53387	0.2131	3.334967	11/1	81	0.66559
HL_93567.1	1805	110255	833	52555	0.2284	1.032847	7/1	82	0.70473
HL_53015.1	552	111508	248	53140	0.2329	1.060724	8/3	83	0.70980
HL_17008.1	29	112031	10	53378	0.2410	1.381755	10/2	84	0.71472
HL_66174.1	995	111065	455	52933	0.2427	1.042216	9/4	85	0.71472
HL_53789.1	2093	109967	970	52418	0.2429	1.028555	6/1	86	0.71472
HL_08203.1	54	112006	21	53367	0.2550	1.225172	9/4	87	0.74158
HL_63304.1	14	112046	4	53384	0.2611	1.66756	15/1	88	0.75077
HL_20028.1	169	111891	73	53315	0.2655	1.103104	8/1	89	0.75461
HL_57923.1	247	111813	109	53279	0.2723	1.079775	7/2	90	0.76543
HL_65347.1	539	111521	245	53143	0.2843	1.048363	10/3	91	0.79028

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Table G – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
HL_82294.3	3034	109026	1420	51968	0.2936	1.018435	7/2	92	0.80736
HL_62970.1	248	111812	111	53277	0.3135	1.064583	13/4	93	0.85293
HL_74686.1	254	111806	114	53274	0.3195	1.061643	10/2	94	0.85566
HL_25175.1	8	112052	2	53386	0.3246	1.905751	16/4	95	0.85566
HL_68081.3	1578	110482	736	52652	0.3247	1.021785	8/2	96	0.85566
HL_87223.1	143	111917	63	53325	0.3313	1.081507	7/1	97	0.85770
HL_44390.1	15	112045	5	53383	0.3332	1.429339	11/3	98	0.85770
HL_15603.2	84	111976	36	53352	0.3356	1.111734	12/1	99	0.85770
HL_96915.1	625	111435	289	53099	0.3512	1.030528	9/2	100	0.88174
HL_13707.2	68	111992	29	53359	0.3520	1.117197	8/3	101	0.88174
HL_23195.1	5	112055	1	53387	0.3725	2.382167	17/3	102	0.91943
HL_12706.1	1649	110411	774	52614	0.3743	1.015248	4/2	103	0.91943
HL_42094.1	634	111426	296	53092	0.4016	1.020578	5/2	104	0.97403
HL_82288.1	585	111475	273	53115	0.4042	1.021032	6/1	105	0.97403
HL_33640.1	609	111451	287	53101	0.4552	1.011011	8/1	106	1.00000
HL_42436.1	2	112058	0	53388	0.4588	Inf	15/3	107	1.00000
HL_11547.2	311	111749	146	53242	0.4637	1.014896	8/1	108	1.00000
HL_93263.1	342	111718	161	53227	0.4713	1.012071	2/1	109	1.00000
HL_78731.1	855	111205	405	52983	0.4752	1.005828	9/1	110	1.00000
HL_62967.1	9566	102494	4554	48834	0.4865	1.000836	5/3	111	1.00000
HL_83865.1	5409	106651	2576	50812	0.4990	1.000373	6/1	112	1.00000
HL_20920.1	8	112052	3	53385	0.5032	1.270442	11/3	113	1.00000
HL_79902.1	209	111851	99	53289	0.5083	1.005795	8/3	114	1.00000
HL_93771.1	2827	109233	1347	52041	0.5088	0.9998779	6/1	115	1.00000
HL_74465.5	863	111197	411	52977	0.5109	1.000376	9/1	116	1.00000
HL_66948.1	489	111571	233	53155	0.5184	0.9998779	7/2	117	1.00000
HL_72543.2	313	111747	149	53239	0.5190	1.000811	10/3	118	1.00000
HL_57217.1	434	111626	207	53181	0.5242	0.9988561	8/2	119	1.00000
HL_27429.3	216	111844	103	53285	0.5297	0.9990735	9/1	120	1.00000
HL_11376.1	24425	87635	11647	41741	0.5383	0.9988626	5/1	121	1.00000
HL_65249.1	8829	103231	4214	49174	0.5446	0.9980271	6/2	122	1.00000
HL_28676.1	1344	110716	643	52745	0.5457	0.9957704	6/1	123	1.00000
HL_94578.1	367	111693	176	53212	0.5490	0.9934294	6/3	124	1.00000
HL_86398.1	87	111973	42	53346	0.5696	0.9868666	11/3	125	1.00000
HL_11509.2	423	111637	204	53184	0.5757	0.9878318	10/3	126	1.00000
HL_24108.1	72	111988	35	53353	0.5842	0.9800446	8/2	127	1.00000
HL_42969.1	23	112037	11	53377	0.5849	0.9961571	10/1	128	1.00000
HL_24544.2	2164	109896	1039	52349	0.5904	0.9921291	8/3	129	1.00000
HL_01926.3	1082	110978	521	52867	0.5910	0.9893211	8/3	130	1.00000
HL_55718.1	8303	103757	3973	49415	0.5970	0.9953081	3/1	131	1.00000
HL_21545.1	2198	109862	1056	52332	0.5976	0.9914792	6/1	132	1.00000
HL_62880.1	3043	109017	1461	51927	0.6041	0.9920892	6/1	133	1.00000
HL_50059.1	642	111418	312	53076	0.6282	0.9802061	7/4	134	1.00000
HL_06997.2	16	112044	8	53380	0.6376	0.9528407	12/2	135	1.00000
HL_68733.1	202	111858	100	53288	0.6487	0.9623217	8/1	136	1.00000
HL_38897.1	118	111942	59	53329	0.6523	0.9527978	7/1	137	1.00000
HL_32644.2	359	111701	177	53211	0.6644	0.96622	10/3	138	1.00000
HL_20806.1	1	112059	0	53388	0.6773	Inf	11/2	139	1.00000
HL_45358.1	1	112059	0	53388	0.6773	Inf	13/2	140	1.00000
HL_98577.1	1	112059	0	53388	0.6773	Inf	13/2	141	1.00000
HL_85044.1	21	112039	11	53377	0.6777	0.9095222	11/2	142	1.00000
HL_94697.1	143	111917	72	53316	0.6781	0.9461621	11/2	143	1.00000
HL_46175.2	490	111570	242	53146	0.6922	0.9645232	10/2	144	1.00000
HL_85534.1	340	111720	169	53219	0.6925	0.9583632	7/3	145	1.00000
HL_76585.1	469	111591	232	53156	0.6961	0.9629755	9/2	146	1.00000
HL_13786.1	2736	109324	1325	52063	0.6962	0.9833538	5/1	147	1.00000
HL_84289.1	32	112028	17	53371	0.7015	0.8967725	11/2	148	1.00000
HL_88960.1	405	111655	202	53186	0.7190	0.9550434	8/2	149	1.00000
HL_29196.1	591	111469	293	53095	0.7249	0.9607807	6/1	150	1.00000

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Table G – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
HL_19226.1	515	111545	256	53132	0.7251	0.9582423	5/1	151	1.00000
HL_82538.1	21764	90296	10437	42951	0.7323	0.9918979	5/1	152	1.00000
HL_46570.1	958	111102	473	52915	0.7480	0.9646512	8/1	153	1.00000
HL_59182.1	2	112058	1	53387	0.7548	0.9528466	15/2	154	1.00000
HL_54751.2	61	111999	33	53355	0.7597	0.8806036	11/2	155	1.00000
HL_87844.2	2401	109659	1172	52216	0.7605	0.9754724	6/2	156	1.00000
HL_17537.1	177	111883	92	53296	0.7725	0.9164682	8/1	157	1.00000
HL_60200.1	1102	110958	546	52842	0.7824	0.9612027	8/2	158	1.00000
HL_04194.1	331	111729	170	53218	0.8015	0.927412	7/3	159	1.00000
HL_58223.1	168	111892	89	53299	0.8103	0.8991696	5/1	160	1.00000
HL_23129.1	51	112009	29	53359	0.8118	0.837789	9/2	161	1.00000
HL_19528.1	512	111548	261	53127	0.8240	0.9342944	9/3	162	1.00000
HL_26495.1	368	111692	190	53198	0.8283	0.9225048	8/1	163	1.00000
HL_07915.1	564	111496	287	53101	0.8285	0.9359257	6/1	164	1.00000
HL_76679.1	3591	108469	1758	51630	0.8327	0.9722585	5/2	165	1.00000
HL_96994.1	10	112050	7	53381	0.8518	0.6805647	11/1	166	1.00000
HL_58083.2	254	111806	135	53253	0.8604	0.8961514	9/2	167	1.00000
HL_88311.2	558	111502	287	53101	0.8628	0.9259199	7/3	168	1.00000
HL_85018.1	82	111978	47	53341	0.8653	0.8310994	10/1	169	1.00000
HL_62881.1	503	111557	260	53128	0.8661	0.9213455	10/4	170	1.00000
HL_95049.1	680	111380	348	53040	0.8690	0.9305225	8/1	171	1.00000
HL_64371.2	28	112032	18	53370	0.8746	0.741015	12/2	172	1.00000
HL_47784.2	636	111424	327	53061	0.8763	0.9262049	11/2	173	1.00000
HL_39895.6	5528	106532	2704	50684	0.8777	0.9726158	5/2	174	1.00000
HL_39486.1	4233	107827	2079	51309	0.8793	0.9688868	7/1	175	1.00000
HL_23290.1	1177	110883	594	52794	0.8801	0.943431	7/1	176	1.00000
HL_91613.1	14	112046	10	53378	0.8840	0.6669413	10/3	177	1.00000
HL_45411.1	688	111372	354	53034	0.8873	0.9254748	8/2	178	1.00000
HL_67761.1	4145	107915	2039	51349	0.8886	0.9673181	6/1	179	1.00000
HL_72498.12	801	111259	411	52977	0.8955	0.9279913	7/2	180	1.00000
HL_77692.1	603	111457	314	53074	0.9056	0.9144578	10/4	181	1.00000
HL_25195.1	3	112057	3	53385	0.9100	0.4764001	12/2	182	1.00000
HL_42553.1	16	112044	12	53376	0.9168	0.6351717	10/3	183	1.00000
HL_91226.3	1422	110638	722	52666	0.9226	0.9375385	8/1	184	1.00000
HL_82243.1	1205	110855	616	52772	0.9269	0.9312268	9/1	185	1.00000
HL_70912.1	599	111461	316	53072	0.9334	0.9025772	7/1	186	1.00000
HL_84768.1	514	111546	274	53114	0.9381	0.8932443	4/1	187	1.00000
HL_80492.2	66	111994	42	53346	0.9406	0.7484921	8/4	188	1.00000
HL_69403.1	176	111884	102	53286	0.9486	0.8218022	9/3	189	1.00000
HL_68697.2	12287	99773	5997	47391	0.9488	0.973161	6/1	190	1.00000
HL_18781.4	1906	110154	969	52419	0.9532	0.9360269	8/2	191	1.00000
HL_30366.1	255	111805	144	53244	0.9533	0.8433235	11/5	192	1.00000
HL_38898.1	332	111728	184	53204	0.9542	0.859227	8/1	193	1.00000
HL_33402.3	1623	110437	830	52558	0.9545	0.9306054	7/2	194	1.00000
HL_65924.1	2	112058	3	53385	0.9598	0.3176058	14/4	195	1.00000
HL_49492.1	4	112056	5	53383	0.9638	0.3811177	14/4	196	1.00000
HL_35200.1	1569	110491	808	52580	0.9661	0.9240732	6/1	197	1.00000
HL_39872.2	643	111417	347	53041	0.9714	0.8821556	8/2	198	1.00000
HL_80459.3	15085	96975	7373	46015	0.9739	0.9707987	5/1	199	1.00000
HL_19132.1	318	111742	181	53207	0.9744	0.8365824	8/3	200	1.00000
HL_56775.1	605	111455	329	53059	0.9751	0.8754331	7/2	201	1.00000
HL_16770.1	166	111894	101	53287	0.9767	0.7827382	10/2	202	1.00000
HL_66467.1	2367	109693	1215	52173	0.9841	0.9265949	5/1	203	1.00000
HL_38130.2	24	112036	21	53367	0.9851	0.5443609	11/1	204	1.00000
HL_65802.1	241	111819	144	53244	0.9857	0.7969348	11/3	205	1.00000
HL_78228.1	677	111383	372	53016	0.9874	0.8662406	12/2	206	1.00000
HL_39942.2	879	111181	478	52910	0.9907	0.8751291	7/1	207	1.00000
HL_60203.1	161	111899	103	53285	0.9913	0.7443092	5/2	208	1.00000
HL_86123.2	958	111102	519	52869	0.9914	0.8783773	10/2	209	1.00000

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Table G – continued from previous page

Model	A	B	C	D	P-value	Odds ratio	Nuc/Bp	Rank	Adj. p-value
HL_41833.2	51	112009	40	53348	0.9927	0.6072537	11/4	210	1.00000
HL_64543.2	1488	110572	793	52595	0.9950	0.8925483	9/2	211	1.00000
HL_39422.1	537	111523	308	53080	0.9956	0.8298483	7/1	212	1.00000
HL_08382.2	15585	96475	7681	45707	0.9957	0.9613123	6/1	213	1.00000
HL_52574.3	4511	107549	2298	51090	0.9962	0.9325092	7/1	214	1.00000
HL_61547.5	16828	95232	8292	45096	0.9968	0.9610274	6/1	215	1.00000
HL_49036.3	24351	87709	11922	41466	0.9971	0.9656693	6/2	216	1.00000
HL_06122.1	1678	110382	897	52491	0.9975	0.8895882	7/3	217	1.00000
HL_47337.1	4700	107360	2402	50986	0.9979	0.9292535	5/1	218	1.00000
HL_48480.1	635	111425	365	53023	0.9980	0.8278877	7/1	219	1.00000
HL_68579.1	363	111697	221	53167	0.9981	0.7818626	6/2	220	1.00000
HL_62228.3	6782	105278	3427	49961	0.9981	0.9391561	6/2	221	1.00000
HL_34440.1	2133	109927	1130	52258	0.9982	0.8973528	6/1	222	1.00000
HL_99633.1	530	111530	314	53074	0.9990	0.803246	8/3	223	1.00000
HL_59610.1	1688	110372	916	52472	0.9993	0.8760917	5/1	224	1.00000
HL_98233.1	85	111975	69	53319	0.9996	0.5865761	8/1	225	1.00000
HL_37962.1	237	111823	159	53229	0.9996	0.7095096	8/2	226	1.00000
HL_49210.1	716	111344	420	52968	0.9997	0.8110014	7/2	227	1.00000
HL_99779.1	4649	107411	2444	50944	1.0000	0.9022039	5/1	228	1.00000
HL_27271.2	22948	89112	11421	41967	1.0000	0.9462652	6/1	229	1.00000
HL_55272.1	2318	109742	1283	52105	1.0000	0.8578252	10/4	230	1.00000
HL_67000.1	6568	105492	3426	49962	1.0000	0.9079623	5/2	231	1.00000
HL_52540.1	4859	107201	2575	50813	1.0000	0.8944338	4/2	232	1.00000
HL_56824.2	11825	100235	6029	47359	1.0000	0.9267017	5/1	233	1.00000
HL_91693.1	11389	100671	5826	47562	1.0000	0.9235744	5/1	234	1.00000
HL_95720.1	1057	111003	639	52749	1.0000	0.786083	8/3	235	1.00000
HL_10116.1	0	112060	0	53388	1.0000	0	18/5	236	1.00000
HL_19221.2	6475	105585	3607	49781	1.0000	0.8463725	6/2	237	1.00000
HL_19399.1	0	112060	0	53388	1.0000	0	16/2	238	1.00000
HL_19452.1	0	112060	2	53386	1.0000	0	11/3	239	1.00000
HL_25124.2	4485	107575	2493	50895	1.0000	0.8511577	5/2	240	1.00000
HL_25197.1	0	112060	1	53387	1.0000	0	15/4	241	1.00000
HL_29831.1	7144	104916	3899	49489	1.0000	0.8642908	6/2	242	1.00000
HL_57843.1	3532	108528	1966	51422	1.0000	0.8512369	5/2	243	1.00000
HL_67042.12	14869	97191	7801	45587	1.0000	0.8940232	6/2	244	1.00000
HL_70420.2	0	112060	0	53388	1.0000	0	14/8	245	1.00000
HL_76036.3	12018	100042	6499	46889	1.0000	0.8667196	5/1	246	1.00000
HL_76766.4	8830	103230	4796	48592	1.0000	0.8666522	5/2	247	1.00000
HL_79038.1	10571	101489	5684	47704	1.0000	0.8741815	5/1	248	1.00000
HL_84353.1	9347	102713	5037	48351	1.0000	0.8735429	6/2	249	1.00000
HL_87136.2	1276	110784	821	52567	1.0000	0.7374463	8/1	250	1.00000
HL_90102.1	0	112060	0	53388	1.0000	0	19/3	251	1.00000
HL_97784.1	0	112060	2	53386	1.0000	0	15/1	252	1.00000
HL_97971.1	6645	105415	3721	49667	1.0000	0.8414104	6/1	253	1.00000

Table H: Results of Fisher’s exact test according to scheme shown in Table B for JAR3D HL module predictions from all JAR3D HL models with mean interior edit distance ≤ 4 and passed cutoff ≥ 50 .

order	model	A	B	C	D	p.value	odds.ratio
H	all	94208	17852	44755	8633	0.108449	1.017947

Table I: False discovery rates (FDR) for individual mRm_{IL} models with mean RMDetect score $\geq Q_{0.75}$ in windows with p-score > 0.9 and $0.25 \leq$ GC content ≤ 0.75 of order H. Status “+” denotes models with adjusted p-value ≤ 0.05 and odds ratio ≥ 1.0 whereas “*” denotes models with odds ratio ≥ 1.0 . Models assigned with “-” are neither enriched nor occur at higher rates in the original data. Colored rows have an FDR $\leq \hat{F}_{rnaz}$ and original window count ≥ 6 . The table is sorted in ascending order according to the FDR.

p-score > 0.9 , $0.25 \leq$ GC content ≤ 0.75					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.
\hat{F}_{rnaz}	142 455	66 891	47.0%		
RF00011_1583_1NBS_177_190_209_219	0	0	0.000	0.000	-
RF00177_1133_2VHO_380_389_400_408	0	0	0.000	0.000	-
RF00177_698_2B64_481_491_518_522	0	0	0.000	Inf	*
RF01118_270_2QBC_13_17_35_55	0	0	0.000	0.000	-
RF00177_351_1I95_804_807_829_846	1	0	0.000	Inf	*
RF00177_437_2QBF_488_495_500_509	0	0	0.000	0.000	-
RF00177_551_2UXD_494_500_507_515	0	0	0.000	0.000	-
RF00177_171_1HR0_804_807_829_846	1	0	0.000	Inf	*
RF00177_1470_1XNQ_1103_1111_1121_1128	1	0	0.000	0.476	-
RF00177_1369_2GY9_669_675_686_695	2	0	0.000	Inf	*
RF00177_524_1VOV_400_408_417_424	3	0	0.000	Inf	*
RF00177_857_3BBN_130_136_151_158	12	2	16.667	1.429	*
RF00177_1012_3FIH_120_126_141_148	12	2	16.667	1.143	*
RF00177_942_1N36_137_143_158_165	11	2	18.182	1.310	*
RF00177_243_2QBB_382_389_400_406	5	1	20.000	0.596	-
RF00177_751_1IBL_660_665_676_684	4	1	25.000	3.335	*
RF00177_235_2HHH_1380_1383_1471_1475	172	47	27.326	1.746	+
RF01857_613_1QZW_192_198_207_213	14	4	28.571	1.112	*
RF00177_831_2V48_435_440_463_469	269	86	31.970	1.312	+
RF00177_1312_2HGR_59_65_89_93	55	18	32.727	0.907	-
RF00177_206_2Z4M_419_423_456_461	1507	497	32.979	1.381	+
RF00177_1124_2VHP_419_427_452_461	6	2	33.333	1.270	*
RF00177_1_1J5E_482_490_519_521	9	3	33.333	0.681	-
RF00177_325_1VS5_121_126_141_147	52	18	34.615	0.986	-
RF00177_1595_1N34_1100_1107_1122_1131	8	3	37.500	1.588	*
RF00177_1_2GYB_490_498_527_529	8	3	37.500	0.953	-
RF00177_955_2HHH_436_440_463_468	644	243	37.733	1.278	+
RF00177_874_2F4V_1225_1231_1262_1268	392	149	38.010	1.308	+
RF00167_327_1Y26_26_29_49_56	324	124	38.272	1.217	*
RF00177_145_2QBF_1222_1228_1259_1265	398	153	38.442	1.331	+
RF00001_5_1N8R_75_81_101_106	876	353	40.297	1.135	*
RF00177_32_1VOX_748_752_768_772	487	198	40.657	1.132	*
RF00162_600_2GIS_17_21_32_39	637	259	40.659	1.064	*
RF00177_11_2VHP_752_756_772_776	481	196	40.748	1.107	*
RF00177_35_2B9M_757_761_777_781	516	211	40.891	1.133	*
RF00001_1334_2GYC_21_28_52_58	1327	547	41.221	1.128	*
RF00001_196_2QBE_69_77_95_103	2335	965	41.328	1.097	*
RF00015_758_2OZB_28_34_42_45	1892	791	41.808	1.070	*
RF00177_418_1S1H_661_665_676_683	42	18	42.857	1.132	*
RF00177_231_2GYB_766_770_786_790	519	224	43.160	1.032	*

Continued on next page

Table I – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.
\hat{F}_{rnaz}	142 455	66 891	47.0%		
RF00177_1166_2UXD_1224_1231_1262_1269	221	96	43.439	1.082	*
RF00177_90_1HNV_1281_1285_1308_1312	154	67	43.506	1.170	*
RF00001_449_3CCQ_32_37_43_48	3099	1371	44.240	1.071	*
RF00177_1114_2VHP_1404_1410_1441_1446	857	385	44.924	1.052	*
RF00177_284_2QBJ_1099_1104_1118_1124	225	102	45.333	1.112	*
RF00001_1060_3BBO_68_77_96_105	693	318	45.887	1.094	*
RF00177_1303_2HHH_138_143_158_164	53	25	47.170	1.035	*
RF00177_192_2QBD_657_661_672_679	38	18	47.368	1.202	*
RF00017_631_2J37_181_187_212_216	2396	1163	48.539	1.009	*
RF00177_1127_2VHO_1404_1411_1440_1446	205	102	49.756	1.016	*
RF00177_324_1VS5_475_484_513_516	2	1	50.000	1.429	*
RF00177_1592_1N36_436_445_457_468	2	1	50.000	0.715	-
RF00017_1608_1L9A_190_194_205_209	193	97	50.259	0.970	-
RF00177_579_2J02_440_446_456_463	664	343	51.657	0.888	-
RF00059_318_2GDI_55_59_72_76	4740	2558	53.966	0.862	-
RF00177_244_3DF3_1278_1282_1305_1309	112	61	54.464	0.960	-
RF00177_432_2QP0_215_220_250_257	29	18	62.069	0.802	-
RF00177_36_2QB9_862_869_880_885	12	8	66.667	0.953	-
RF00177_334_1HNV_233_238_268_275	23	16	69.565	0.673	-
RF00169_236_1CQ5_37_41_52_56	75	57	76.000	0.786	-
RF00177_87_2QAN_541_548_855_857	7	6	85.714	0.298	-
RF00177_495_2B64_859_866_877_882	10	9	90.000	0.749	-
RF00177_1167_2UXD_399_407_418_425	1	3	300.000	0.159	-

Table J: False discovery rates (FDR) for individual JAR3D IL modules with mean interior edit distance ≤ 4 and passed cutoff ≥ 50 in windows with p-score > 0.9 and $0.25 \leq \text{GC content} \leq 0.75$ of order H. Status “+” denotes models with adjusted p-value ≤ 0.05 and odds ratio ≥ 1.0 whereas “*” denotes models with odds ratio ≥ 1.0 . Models assigned with “-” are neither enriched nor occur at higher rates in the original data. “Msl” = average 3D sequence length. Colored rows have an $\text{FDR} \leq \hat{F}_{rnaz}$, original window count ≥ 6 , and $\text{Msl} \geq 9$. The table is sorted in ascending order according to FDR.

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75						
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.	Msl
\hat{F}_{rnaz}	142 455	66 891	47.0%			
IL_05513.1	2	0	0.000	Inf	*	12
IL_39324.1	0	0	0.000	0.000	-	20
IL_40527.1	0	0	0.000	0.000	-	16
IL_42891.1	1	0	0.000	Inf	*	16
IL_46435.1	7	0	0.000	Inf	*	13
IL_52610.1	0	0	0.000	0.000	-	37
IL_76095.3	0	0	0.000	0.000	-	20

Continued on next page

Table J – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75						
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.	Msl
\hat{F}_{rnaz}	142 455	66 891	47.0%			
IL_76263.1	0	0	0.000	0.000	-	19
IL_77076.1	0	0	0.000	0.000	-	18
IL_77296.1	0	0	0.000	0.000	-	15
IL_06847.1	6	0	0.000	Inf	*	13
IL_88367.1	0	0	0.000	0.000	-	15
IL_89028.6	0	0	0.000	0.000	-	16
IL_90057.1	0	0	0.000	0.000	-	25
IL_94744.1	2	0	0.000	Inf	*	17
IL_97842.1	0	0	0.000	0.000	-	16
IL_98655.1	0	0	0.000	0.000	-	16
IL_02359.3	0	0	0.000	0.000	-	17.6
IL_16330.1	0	0	0.000	0.000	-	28
IL_21421.1	0	0	0.000	0.000	-	20
IL_21495.1	1	0	0.000	0.000	-	15
IL_23414.1	0	0	0.000	0.000	-	21
IL_25082.1	2	0	0.000	Inf	*	18
IL_25230.3	0	0	0.000	0.000	-	18
IL_27668.1	2	0	0.000	Inf	*	12
IL_28572.2	7	0	0.000	Inf	*	16
IL_33964.1	0	0	0.000	0.000	-	23
IL_80505.1	10	1	10.000	4.289	*	11
IL_34628.2	84	11	13.095	2.859	+	13
IL_39526.4	7	1	14.286	2.859	*	9
IL_98591.3	7	1	14.286	2.859	*	16
IL_63133.1	57	9	15.789	3.098	+	6
IL_23448.1	91	16	17.582	3.117	+	6
IL_61730.1	28	5	17.857	2.382	*	11
IL_21639.1	50	10	20.000	2.277	*	9
IL_41791.1	99	20	20.202	1.756	*	12
IL_86357.3	82	17	20.732	2.264	+	6
IL_34363.2	23	5	21.739	2.263	*	14
IL_96206.3	320	72	22.500	2.211	+	6
IL_73000.2	277	63	22.744	2.208	+	6.57
IL_54450.1	48	11	22.917	1.776	*	8
IL_57364.1	26	6	23.077	2.382	*	8
IL_28644.1	164	38	23.171	2.196	+	6
IL_06177.1	43	10	23.256	1.906	*	6
IL_58291.4	131	31	23.664	2.307	+	6
IL_91089.1	50	12	24.000	2.859	+	8

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Table J – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75						
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.	Msl
\hat{F}_{rnaz}	142 455	66 891	47.0%			
IL_69799.1	124	30	24.194	2.193	+	6
IL_43877.1	95	23	24.211	1.803	+	7.5
IL_71942.1	12	3	25.000	1.270	*	10
IL_75415.1	8	2	25.000	0.953	-	10
IL_77014.1	4	1	25.000	Inf	*	11
IL_85647.3	16	4	25.000	1.787	*	15.06
IL_31066.3	44	11	25.000	1.906	*	7
IL_73276.5	212	54	25.472	1.875	+	8.18
IL_70173.1	186	48	25.806	1.875	+	7.5
IL_92027.3	170	44	25.882	1.933	+	6.24
IL_92027.3	170	44	25.882	1.933	+	6.24
IL_37406.1	99	26	26.263	1.798	+	8.5
IL_87065.1	148	39	26.351	1.668	+	7
IL_11751.1	45	12	26.667	1.473	*	7
IL_98421.4	123	33	26.829	1.643	+	7
IL_67887.1	231	62	26.840	1.777	+	6.5
IL_58586.2	334	90	26.946	1.790	+	7
IL_98566.1	100	27	27.000	1.525	*	9
IL_28947.2	344	93	27.035	1.828	+	5.45
IL_41153.1	33	9	27.273	1.482	*	8
IL_39980.1	120	33	27.500	1.765	+	8
IL_40845.1	207	57	27.536	1.688	+	8
IL_97217.11	373	103	27.614	1.742	+	5.14
IL_06808.1	101	28	27.723	1.525	*	9
IL_43946.1	18	5	27.778	1.548	*	12
IL_99397.1	18	5	27.778	1.429	*	9
IL_31039.1	68	19	27.941	1.710	*	7
IL_37325.1	50	14	28.000	1.906	*	7
IL_44540.4	221	62	28.054	1.725	+	5.3
IL_39199.4	284	80	28.169	1.722	+	5.28
IL_47875.1	567	160	28.219	1.756	+	7.67
IL_92109.3	576	166	28.819	1.645	+	6.07
IL_46648.6	239	69	28.870	1.661	+	5.62
IL_25300.3	307	89	28.990	1.649	+	5.29
IL_94430.5	386	113	29.275	1.623	+	5.94
IL_56513.1	116	34	29.310	1.459	*	9
IL_50911.1	37	11	29.730	1.800	*	8
IL_56465.4	514	153	29.767	1.539	+	5.74
IL_50521.1	60	18	30.000	1.373	*	15

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Table J – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75						
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.	Msl
\hat{F}_{rnaz}	142 455	66 891	47.0%			
IL_91379.1	10	3	30.000	1.906	*	12
IL_25271.2	30	9	30.000	2.144	*	15
IL_31663.1	113	34	30.088	1.430	*	7.5
IL_15205.1	149	45	30.201	1.430	*	13
IL_68767.1	109	33	30.275	1.702	+	6
IL_63253.1	102	31	30.392	1.735	+	7
IL_09491.1	36	11	30.556	1.477	*	8
IL_82444.1	193	59	30.570	1.405	*	6.59
IL_01080.1	221	68	30.769	1.613	+	8
IL_13069.3	94	29	30.851	1.298	*	8
IL_17212.2	238	74	31.092	1.390	+	6.73
IL_20775.1	67	21	31.343	1.407	*	8
IL_86059.1	118	37	31.356	1.545	*	7
IL_21254.1	51	16	31.373	1.293	*	14
IL_88119.1	206	65	31.553	1.486	+	8
IL_47732.1	22	7	31.818	1.225	*	9
IL_02809.3	287	92	32.056	1.603	+	9.11
IL_41139.1	62	20	32.258	1.354	*	8
IL_18675.1	102	33	32.353	1.553	*	7
IL_17066.1	70	23	32.857	1.347	*	6
IL_31006.1	219	72	32.877	1.333	*	12
IL_80348.3	191	63	32.984	1.480	+	6.33
IL_47174.11	300	99	33.000	1.385	+	6.2
IL_37104.3	229	76	33.188	1.346	*	7.36
IL_37347.1	18	6	33.333	1.334	*	16
IL_86981.1	3	1	33.333	1.429	*	15
IL_95150.6	78	26	33.333	1.596	*	8.33
IL_35043.1	6	2	33.333	1.429	*	11
IL_13777.1	119	40	33.613	1.430	*	5
IL_12147.1	217	73	33.641	1.416	+	6.5
IL_21333.2	287	97	33.798	1.474	+	9.5
IL_42251.1	213	72	33.803	1.416	+	7
IL_16166.4	138	47	34.058	1.377	*	5
IL_71685.1	93	32	34.409	1.175	*	14
IL_57785.5	55	19	34.545	1.345	*	9
IL_11778.1	40	14	35.000	1.283	*	8
IL_69106.1	207	73	35.266	1.292	*	8.5
IL_87394.1	34	12	35.294	1.032	*	10
IL_90459.3	544	192	35.294	1.290	+	7.56

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Table J – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75						
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.	Msl
\hat{F}_{rnaz}	142 455	66 891	47.0%			
IL_90133.3	161	57	35.404	1.268	*	8
IL_88865.1	31	11	35.484	1.429	*	9
IL_80494.2	596	213	35.738	1.252	+	12.67
IL_13959.4	176	63	35.795	1.311	*	8.23
IL_23262.4	528	189	35.795	1.363	+	11
IL_46721.1	103	37	35.922	1.566	*	11
IL_30381.1	72	26	36.111	1.367	*	8.5
IL_39355.1	412	150	36.408	1.231	*	9
IL_79083.3	793	291	36.696	1.275	+	11
IL_97296.1	241	89	36.929	1.215	*	8.5
IL_63952.1	615	228	37.073	1.253	+	13
IL_06421.1	121	45	37.190	1.105	*	8
IL_65553.8	137	51	37.226	1.342	*	13.3
IL_22909.1	115	43	37.391	1.229	*	9
IL_55649.1	457	171	37.418	1.218	*	9
IL_55938.4	334	126	37.725	1.245	*	7.56
IL_87507.1	254	96	37.795	1.105	*	9.5
IL_43316.1	1002	380	37.924	1.203	*	11
IL_43124.2	195	74	37.949	1.145	*	7.09
IL_47758.2	126	48	38.095	1.166	*	8.5
IL_70401.1	13	5	38.462	1.191	*	11
IL_08926.3	111	43	38.739	1.191	*	5.5
IL_12211.1	152	59	38.816	1.288	*	13.5
IL_83856.1	649	252	38.829	1.255	+	12
IL_64589.1	64	25	39.062	1.293	*	8
IL_87904.5	1373	538	39.184	1.198	*	10
IL_77263.2	362	142	39.227	1.127	*	11
IL_06471.1	598	235	39.298	1.154	*	10
IL_74876.2	1017	401	39.430	1.216	*	10.67
IL_05684.1	256	101	39.453	1.208	*	9
IL_41766.6	375	148	39.467	1.178	*	8.26
IL_00998.1	111	44	39.640	1.249	*	8
IL_85510.1	873	348	39.863	1.128	*	11
IL_82650.1	15	6	40.000	0.794	-	13
IL_37197.1	808	324	40.099	1.164	*	11
IL_26971.1	1019	409	40.137	1.163	*	11
IL_15840.2	868	350	40.323	1.125	*	11
IL_24982.5	1602	650	40.574	1.155	*	10
IL_83920.1	64	26	40.625	1.086	*	7

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Table J – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75						
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.	Msl
\hat{F}_{rnaz}	142 455	66 891	47.0%			
IL_93568.2	243	99	40.741	1.125	*	12.5
IL_06211.3	153	63	41.176	1.182	*	9.33
IL_97191.1	17	7	41.176	1.112	*	13
IL_57977.1	82	34	41.463	0.953	-	11
IL_80093.1	750	311	41.467	1.143	*	11
IL_70237.3	1101	459	41.689	1.133	*	10
IL_80714.1	561	234	41.711	1.144	*	12
IL_31224.1	366	153	41.803	1.050	*	10
IL_39585.1	1219	511	41.920	1.125	*	12
IL_97509.1	876	369	42.123	1.077	*	10.5
IL_93424.4	747	315	42.169	1.086	*	10.19
IL_22732.1	201	85	42.289	1.069	*	9
IL_87548.1	513	217	42.300	1.108	*	11.5
IL_45794.1	52	22	42.308	0.953	-	14
IL_24546.4	163	69	42.331	1.142	*	10
IL_11302.1	1075	457	42.512	1.040	*	10
IL_09587.1	3336	1419	42.536	1.077	*	11.5
IL_07300.2	148	63	42.568	1.103	*	9.33
IL_05723.1	570	243	42.632	1.145	*	10
IL_79955.2	438	187	42.694	1.127	*	12.67
IL_70299.1	96	41	42.708	1.149	*	14
IL_47444.3	934	399	42.719	1.050	*	12
IL_25380.1	194	83	42.784	1.107	*	8.33
IL_53635.3	119	51	42.857	1.210	*	13
IL_78513.1	28	12	42.857	0.780	-	10
IL_52509.1	629	270	42.925	1.003	*	10
IL_21077.1	204	88	43.137	1.010	*	10
IL_86336.1	361	156	43.213	1.014	*	10
IL_46306.1	1422	616	43.319	1.045	*	10
IL_69536.1	1313	569	43.336	1.103	*	10
IL_75328.1	23	10	43.478	1.361	*	14
IL_09333.1	374	164	43.850	1.060	*	13
IL_06468.1	319	140	43.887	1.057	*	11
IL_45262.4	170	75	44.118	1.026	*	9.25
IL_16415.2	18	8	44.444	0.834	-	15
IL_23639.1	1407	626	44.492	1.039	*	10
IL_91044.1	409	182	44.499	1.046	*	11
IL_54966.1	336	150	44.643	1.026	*	9
IL_09530.1	792	354	44.697	1.035	*	11.5

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Table J – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75						
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.	Msl
\hat{F}_{rnaz}	142 455	66 891	47.0%			
IL_46034.3	96	43	44.792	0.965	-	9
IL_31555.5	732	328	44.809	1.039	*	9.23
IL_33842.1	29	13	44.828	1.032	*	9
IL_78744.1	24	11	45.833	1.429	*	12
IL_17603.1	408	187	45.833	1.134	*	12
IL_06180.1	1093	507	46.386	1.005	*	10.67
IL_24293.1	84	39	46.429	0.926	-	8.5
IL_52958.1	3150	1470	46.667	1.006	*	10
IL_82188.2	272	127	46.691	0.957	-	14
IL_54470.1	429	201	46.853	0.938	-	9
IL_58454.1	678	318	46.903	1.010	*	10
IL_59529.1	586	275	46.928	1.035	*	11
IL_49493.4	136	64	47.059	0.935	-	13
IL_03110.1	446	211	47.309	0.994	-	13
IL_82563.1	57	27	47.368	0.931	-	10
IL_52173.1	189	90	47.619	0.983	-	9
IL_30067.1	328	157	47.866	1.022	*	10
IL_26868.1	465	224	48.172	0.963	-	11
IL_92321.4	576	278	48.264	0.959	-	12.14
IL_97057.3	826	399	48.305	1.002	*	11.83
IL_48918.3	93	45	48.387	0.940	-	13
IL_46301.1	287	139	48.432	0.957	-	9.43
IL_81398.1	3827	1861	48.628	0.972	-	10
IL_12507.1	92	45	48.913	0.929	-	13
IL_96446.1	145	71	48.966	0.875	-	11
IL_53988.1	118	58	49.153	0.896	-	13
IL_28003.1	65	32	49.231	1.038	*	8.67
IL_62499.7	562	278	49.466	0.909	-	11
IL_98924.1	491	243	49.491	0.882	-	10
IL_49527.1	897	445	49.610	0.976	-	10
IL_03282.1	141	70	49.645	0.909	-	10
IL_87523.1	161	80	49.689	0.938	-	11
IL_38807.3	70	35	50.000	1.044	*	12.75
IL_06306.1	36	18	50.000	1.209	*	14
IL_65137.1	108	54	50.000	0.922	-	13
IL_80652.1	18	9	50.000	1.021	*	14
IL_82601.1	2	1	50.000	Inf	*	8
IL_94403.5	2	1	50.000	Inf	*	12.75
IL_02835.1	4	2	50.000	1.906	*	13

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Table J – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75						
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.	Msl
\hat{F}_{rnaz}	142 455	66 891	47.0%			
IL_27640.1	2	1	50.000	0.953	-	15
IL_85805.1	1103	555	50.317	0.956	-	9
IL_66744.1	93	47	50.538	0.860	-	14
IL_30840.2	2790	1411	50.573	0.930	-	11.33
IL_53323.1	1176	597	50.765	0.891	-	10
IL_46990.1	2070	1051	50.773	0.939	-	12.5
IL_40892.1	121	62	51.240	1.061	*	11
IL_83250.1	147	76	51.701	0.998	-	11
IL_72158.3	160	83	51.875	0.865	-	13
IL_37053.1	290	151	52.069	0.920	-	13.67
IL_09882.1	124	65	52.419	1.027	*	12
IL_95652.3	38	20	52.632	0.826	-	14
IL_25181.1	1239	673	54.318	0.891	-	13
IL_49976.1	1249	693	55.484	0.836	-	13
IL_25307.1	66	37	56.061	0.749	-	9
IL_91078.1	14	8	57.143	0.953	-	14
IL_31754.1	7	4	57.143	0.715	-	13
IL_59934.1	94	55	58.511	0.849	-	13
IL_89794.1	29	17	58.621	0.851	-	14
IL_92114.3	75	44	58.667	0.843	-	9
IL_60649.1	51	30	58.824	0.812	-	13
IL_47687.1	283	168	59.364	0.809	-	14
IL_52940.1	268	167	62.313	0.834	-	15.5
IL_44067.4	16	10	62.500	0.774	-	14
IL_97833.1	30	19	63.333	0.916	-	14
IL_54954.1	3	2	66.667	1.429	*	17
IL_76486.1	3	2	66.667	0.715	-	15
IL_31707.1	12	8	66.667	0.635	-	11
IL_94973.1	17	12	70.588	0.520	-	14
IL_68827.1	36	27	75.000	0.538	-	11
IL_05221.1	4	3	75.000	0.476	-	17
IL_17682.1	1	1	100.000	0.000	-	17
IL_90735.1	20	21	105.000	0.603	-	17
IL_27243.1	2	3	150.000	0.238	-	15
IL_57285.1	0	1	Inf	0.000	-	13
IL_91904.1	0	1	Inf	0.000	-	17

Table K: False discovery rates (FDR) for individual JAR3D HL models with mean interior edit distance ≤ 4 and passed cutoff ≥ 50 in windows with p-score > 0.9 and $0.25 \leq \text{GC content} \leq 0.75$ of order H. Status “+” denotes models with adjusted p-value ≤ 0.05 and odds ratio ≥ 1.0 whereas “*” denotes models with odds ratio ≥ 1.0 . Models assigned with “-” are neither enriched nor occur at higher rates in the original data. Colored rows have an FDR $\leq \hat{F}_{rnaz}$ and original window count ≥ 6 . The table is sorted in ascending order according to the FDR.

p-score > 0.9, $0.25 \leq \text{GC content} \leq 0.75$					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	Stat.
\hat{F}_{rnaz}	142 455	66 891	47.0%		
HL_45358.1	1	0	0.000	Inf	*
HL_10116.1	0	0	0.000	0.000	-
HL_70420.2	1	0	0.000	0.000	-
HL_90102.1	0	0	0.000	0.000	-
HL_19399.1	0	0	0.000	0.000	-
HL_24473.3	5	0	0.000	Inf	*
HL_42436.1	2	0	0.000	Inf	*
HL_33451.1	10	1	10.000	3.335	*
HL_73465.1	36	5	13.889	3.455	*
HL_44467.1	51	11	21.569	1.776	*
HL_44390.1	26	6	23.077	1.429	*
HL_20920.1	12	3	25.000	1.270	*
HL_25175.1	8	2	25.000	1.906	*
HL_55202.1	15	4	26.667	2.065	*
HL_56809.1	120	36	30.000	1.370	*
HL_87223.1	215	73	33.953	1.082	*
HL_05361.1	732	253	34.563	1.384	+
HL_65071.1	1258	463	36.804	1.253	+
HL_87554.1	2394	888	37.093	1.283	+
HL_90542.1	1225	455	37.143	1.359	+
HL_26579.1	859	320	37.253	1.214	*
HL_66877.1	206	78	37.864	1.232	*
HL_98833.3	1024	388	37.891	1.128	*
HL_68435.1	1136	437	38.468	1.167	*
HL_13707.2	96	37	38.542	1.117	*
HL_75759.4	7308	2838	38.834	1.208	*
HL_05113.1	102	40	39.216	1.325	*
HL_97499.1	2589	1018	39.320	1.205	*
HL_30008.1	2606	1025	39.332	1.199	*
HL_08203.1	61	24	39.344	1.225	*
HL_45018.3	1113	438	39.353	1.167	*

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Table K – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	S.tat
\hat{F}_{rnaz}	142 455	66 891	47.0%		
HL_10378.1	2082	821	39.433	1.234	*
HL_00721.1	1804	713	39.523	1.145	*
HL_74559.1	3507	1392	39.692	1.182	*
HL_35865.1	7475	2972	39.759	1.169	*
HL_23195.1	5	2	40.000	2.382	*
HL_17723.4	2326	937	40.284	1.137	*
HL_06643.3	6967	2807	40.290	1.157	*
HL_44522.1	218	88	40.367	1.188	*
HL_17790.1	2837	1150	40.536	1.125	*
HL_59604.1	2832	1149	40.572	1.158	*
HL_78420.1	693	282	40.693	1.141	*
HL_59225.1	2659	1084	40.767	1.137	*
HL_24711.1	934	381	40.792	1.110	*
HL_15603.2	110	45	40.909	1.112	*
HL_42677.2	5809	2390	41.143	1.133	*
HL_63304.1	17	7	41.176	1.668	*
HL_17008.1	34	14	41.176	1.382	*
HL_46489.2	1197	493	41.186	1.130	*
HL_35619.2	1911	788	41.235	1.137	*
HL_66880.1	80	33	41.250	1.258	*
HL_27429.3	295	122	41.356	0.999	-
HL_01418.1	1951	808	41.415	1.103	*
HL_06997.2	24	10	41.667	0.953	-
HL_74505.1	5475	2283	41.699	1.120	*
HL_72273.1	972	406	41.770	1.149	*
HL_63941.1	5691	2391	42.014	1.118	*
HL_41827.1	1548	657	42.442	1.101	*
HL_24707.1	2190	930	42.466	1.094	*
HL_20028.1	209	89	42.584	1.103	*
HL_33640.1	836	356	42.584	1.011	*
HL_18587.1	1032	440	42.636	1.154	*
HL_33277.1	2043	872	42.682	1.091	*
HL_99584.1	1668	712	42.686	1.127	*
HL_27397.1	459	196	42.702	1.123	*
HL_75850.1	4867	2083	42.798	1.109	*
HL_78361.1	800	343	42.875	1.107	*
HL_99207.1	2250	968	43.022	1.161	*
HL_00090.1	920	397	43.152	1.161	*
HL_65347.1	672	290	43.155	1.048	*

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Table K – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	S.tat
\hat{F}_{rnaz}	142 455	66 891	47.0%		
HL_86115.1	5087	2202	43.287	1.093	*
HL_52116.1	1002	434	43.313	1.065	*
HL_34027.2	9093	3939	43.319	1.079	*
HL_03785.1	4699	2036	43.328	1.088	*
HL_42969.1	30	13	43.333	0.996	-
HL_57923.1	323	140	43.344	1.080	*
HL_73972.1	1164	505	43.385	1.073	*
HL_90579.3	578	252	43.599	1.092	*
HL_91872.1	588	257	43.707	1.109	*
HL_48254.1	1727	755	43.717	1.066	*
HL_53789.1	2725	1195	43.853	1.029	*
HL_53015.1	724	318	43.923	1.061	*
HL_94578.1	505	222	43.960	0.993	-
HL_30731.1	2002	885	44.206	1.051	*
HL_30128.1	1100	490	44.545	1.089	*
HL_50312.1	5418	2414	44.555	1.039	*
HL_94697.1	193	86	44.560	0.946	-
HL_82288.1	726	324	44.628	1.021	*
HL_36842.1	2508	1123	44.777	1.070	*
HL_12706.1	2056	923	44.893	1.015	*
HL_21675.3	9386	4214	44.897	1.031	*
HL_93567.1	2345	1053	44.904	1.033	*
HL_33875.1	844	379	44.905	1.069	*
HL_96915.1	786	353	44.911	1.031	*
HL_68081.3	1985	892	44.937	1.022	*
HL_38138.1	1099	494	44.950	1.089	*
HL_42345.1	1335	601	45.019	1.078	*
HL_97270.3	3457	1558	45.068	1.036	*
HL_74686.1	335	151	45.075	1.062	*
HL_66174.1	1231	556	45.167	1.042	*
HL_42077.2	18422	8321	45.169	1.038	*
HL_75579.2	19690	8899	45.196	1.041	*
HL_34108.2	12294	5559	45.217	1.032	*
HL_23182.1	1476	668	45.257	1.061	*
HL_58601.1	4700	2132	45.362	1.039	*
HL_57514.2	11499	5219	45.387	1.062	*
HL_62970.1	304	138	45.395	1.065	*
HL_18156.2	337	153	45.401	1.104	*
HL_48116.2	11115	5047	45.407	1.049	*

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Table K – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	S.tat
\hat{F}_{rnaz}	142 455	66 891	47.0%		
HL_74465.5	1109	504	45.446	1.000	*
HL_93530.1	1234	561	45.462	1.054	*
HL_29196.1	782	356	45.524	0.961	-
HL_78507.1	2552	1163	45.572	1.042	*
HL_57217.1	555	253	45.586	0.999	-
HL_84888.1	565	258	45.664	1.099	*
HL_98523.2	5979	2731	45.677	1.053	*
HL_42094.1	817	376	46.022	1.021	*
HL_85044.1	26	12	46.154	0.910	-
HL_19905.3	9824	4537	46.183	1.043	*
HL_13786.1	3577	1652	46.184	0.983	-
HL_65249.1	11035	5100	46.217	0.998	-
HL_48039.2	22713	10524	46.335	1.020	*
HL_95716.1	7014	3269	46.607	1.036	*
HL_11509.2	541	253	46.765	0.988	-
HL_82538.1	26668	12472	46.768	0.992	-
HL_11376.1	29990	14026	46.769	0.999	-
HL_62967.1	11945	5598	46.865	1.001	*
HL_86398.1	98	46	46.939	0.987	-
HL_62880.1	3920	1849	47.168	0.992	-
HL_87844.2	2954	1399	47.360	0.975	-
HL_68697.2	15236	7222	47.401	0.973	-
HL_76679.1	4542	2163	47.622	0.972	-
HL_78731.1	1098	523	47.632	1.006	*
HL_72543.2	384	183	47.656	1.001	*
HL_93771.1	3562	1699	47.698	1.000	-
HL_82294.3	3650	1741	47.699	1.018	*
HL_58083.2	354	169	47.740	0.896	-
HL_28676.1	1732	828	47.806	0.996	-
HL_21545.1	2785	1334	47.899	0.991	-
HL_80459.3	18599	8913	47.922	0.971	-
HL_50059.1	824	395	47.937	0.980	-
HL_79902.1	256	123	48.047	1.006	*
HL_49036.3	29777	14309	48.054	0.966	-
HL_08382.2	19060	9160	48.059	0.961	-
HL_55718.1	10309	4960	48.113	0.995	-
HL_39895.6	7029	3382	48.115	0.973	-
HL_01926.3	1321	636	48.145	0.989	-
HL_34440.1	2884	1389	48.162	0.897	-

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Table K – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	S.tat
\hat{F}_{rna}	142 455	66 891	47.0%		
HL_23290.1	1474	711	48.236	0.943	-
HL_83865.1	6524	3147	48.237	1.000	*
HL_66467.1	3055	1480	48.445	0.927	-
HL_39486.1	5420	2627	48.469	0.969	-
HL_45411.1	885	429	48.475	0.925	-
HL_19226.1	649	315	48.536	0.958	-
HL_61547.5	20371	9907	48.633	0.961	-
HL_77692.1	777	378	48.649	0.914	-
HL_66948.1	600	292	48.667	1.000	-
HL_27271.2	28295	13779	48.698	0.946	-
HL_67761.1	5165	2523	48.848	0.967	-
HL_95049.1	863	422	48.899	0.931	-
HL_32644.2	433	212	48.961	0.966	-
HL_56824.2	14649	7184	49.041	0.927	-
HL_46570.1	1204	591	49.086	0.965	-
HL_62228.3	8208	4033	49.135	0.939	-
HL_91693.1	14009	6889	49.176	0.924	-
HL_07915.1	679	334	49.190	0.936	-
HL_58223.1	241	119	49.378	0.899	-
HL_19528.1	654	325	49.694	0.934	-
HL_35200.1	1974	981	49.696	0.924	-
HL_24544.2	2593	1289	49.711	0.992	-
HL_46175.2	599	298	49.750	0.965	-
HL_30366.1	337	168	49.852	0.843	-
HL_11547.2	399	199	49.875	1.015	*
HL_18781.4	2361	1179	49.936	0.936	-
HL_47337.1	5527	2763	49.991	0.929	-
HL_62881.1	626	313	50.000	0.921	-
HL_64371.2	36	18	50.000	0.741	-
HL_98577.1	2	1	50.000	Inf	*
HL_91226.3	1757	881	50.142	0.938	-
HL_68733.1	251	126	50.199	0.962	-
HL_88311.2	699	352	50.358	0.926	-
HL_59610.1	2179	1098	50.390	0.876	-
HL_60200.1	1344	681	50.670	0.961	-
HL_47784.2	792	402	50.758	0.926	-
HL_52574.3	5577	2834	50.816	0.933	-
HL_72498.12	972	494	50.823	0.928	-
HL_76585.1	598	304	50.836	0.963	-

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Table K – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	S.tat
\hat{F}_{rna}	142 455	66 891	47.0%		
HL_70912.1	777	395	50.837	0.903	-
HL_67042.12	18345	9327	50.842	0.894	-
HL_67000.1	7829	3988	50.939	0.908	-
HL_82243.1	1436	732	50.975	0.931	-
HL_33402.3	2019	1033	51.164	0.931	-
HL_84289.1	37	19	51.351	0.897	-
HL_93263.1	406	209	51.478	1.012	*
HL_64543.2	1886	971	51.485	0.893	-
HL_85534.1	402	207	51.493	0.958	-
HL_84353.1	11504	5938	51.617	0.874	-
HL_26495.1	455	235	51.648	0.923	-
HL_04194.1	385	199	51.688	0.927	-
HL_84768.1	729	377	51.715	0.893	-
HL_39872.2	810	419	51.728	0.882	-
HL_88960.1	491	254	51.731	0.955	-
HL_06122.1	2125	1103	51.906	0.890	-
HL_52540.1	5754	2989	51.946	0.894	-
HL_17537.1	221	115	52.036	0.916	-
HL_23129.1	69	36	52.174	0.838	-
HL_39942.2	1105	577	52.217	0.875	-
HL_86123.2	1247	654	52.446	0.878	-
HL_76766.4	10801	5666	52.458	0.867	-
HL_38898.1	436	229	52.523	0.859	-
HL_76036.3	14634	7690	52.549	0.867	-
HL_79038.1	12725	6687	52.550	0.874	-
HL_25124.2	5637	2977	52.812	0.851	-
HL_56775.1	744	393	52.823	0.875	-
HL_29831.1	8663	4586	52.938	0.864	-
HL_38897.1	166	88	53.012	0.953	-
HL_99779.1	5553	2949	53.106	0.902	-
HL_96994.1	13	7	53.846	0.681	-
HL_19221.2	8063	4344	53.876	0.846	-
HL_97971.1	8064	4363	54.105	0.841	-
HL_39422.1	667	366	54.873	0.830	-
HL_60203.1	225	124	55.111	0.744	-
HL_48480.1	788	435	55.203	0.828	-
HL_24108.1	81	45	55.556	0.980	-
HL_49210.1	938	522	55.650	0.811	-
HL_65802.1	312	174	55.769	0.797	-

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Table K – continued from previous page

p-score > 0.9, 0.25 ≤ GC content ≤ 0.75					
ModelID	# original	# shuffled	FDR (%)	Odds ratio	S.tat
\hat{F}_{rna}	142 455	66 891	47.0%		
HL_57843.1	4213	2356	55.922	0.851	-
HL_55272.1	2800	1579	56.393	0.858	-
HL_78228.1	820	465	56.707	0.866	-
HL_95720.1	1316	764	58.055	0.786	-
HL_80492.2	93	54	58.065	0.748	-
HL_68579.1	467	275	58.887	0.782	-
HL_54751.2	77	46	59.740	0.881	-
HL_85018.1	97	58	59.794	0.831	-
HL_16770.1	214	128	59.813	0.783	-
HL_69403.1	207	125	60.386	0.822	-
HL_37962.1	298	180	60.403	0.710	-
HL_99633.1	646	391	60.526	0.803	-
HL_19132.1	367	229	62.398	0.837	-
HL_87136.2	1574	990	62.897	0.737	-
HL_38130.2	36	23	63.889	0.544	-
HL_91613.1	15	10	66.667	0.667	-
HL_41833.2	66	45	68.182	0.607	-
HL_42553.1	19	14	73.684	0.635	-
HL_98233.1	122	91	74.590	0.587	-
HL_65924.1	4	3	75.000	0.318	-
HL_59182.1	3	3	100.000	0.953	-
HL_20806.1	1	1	100.000	Inf	*
HL_25195.1	3	3	100.000	0.476	-
HL_49492.1	4	5	125.000	0.381	-
HL_97784.1	0	3	Inf	0.000	-
HL_25197.1	0	1	Inf	0.000	-
HL_19452.1	0	2	Inf	0.000	-