

Supplementary Information

for

Guanine quadruplex DNA structure restricts methylation of CpG dinucleotides genome-wide

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Supplementary Table 1: All CpG distribution of CpG_{PG4} and CpG_{out-PG4}.

Methylation level (%)	CpG _{out-PG4} ^a	CpG _{PG4} ^a	p-value
0-25%	1067047 (50%)	22634 (56%)	8.36E-182
26-50%	148547 (7%)	3061 (8%)	6.53E-10
51-75%	178885 (8%)	3587 (9%)	3.25E-07
76-100%	742651 (35%)	10976 (27%)	2.91E-188

^a percentage are calculated from total within each category

Supplementary Table 2: Observed and expected CpG_{PG4} dinucleotides number for twelve tissues.

	Observed				Expected				p-value	
	0-25%	26-50%	51-75%	76-100%	0-25%	26-50%	51-75%	76-100%	0-25%	76-100%
cd4_lymphocytes	373	107	59	132	319	47	62	243	5.22E ⁻⁰⁷	1.75E ⁻²⁰
cd8_lymphocytes	384	59	56	143	296	45	54	246	7.40E ⁻¹⁵	9.82E ⁻¹⁸
dermal_fibroblasts	422	47	56	110	274	85	110	166	2.06E ⁻³⁷	1.65E ⁻⁰⁷
dermal_keratinocytes	406	43	36	130	317	41	49	208	5.97E ⁻¹⁶	1.00E ⁻¹¹
dermal_melanocytes	357	67	52	119	281	61	68	185	2.79E ⁻¹²	2.32E ⁻⁰⁹
embryonic_liver	317	39	37	112	237	37	42	188	2.96E ⁻¹⁵	8.33E ⁻¹³
embryonic_skeletal_muscle	299	48	46	101	245	47	46	156	1.62E ⁻⁰⁸	5.48E ⁻⁰⁸
heart_muscle	429	47	63	130	326	54	71	218	5.65E ⁻¹⁹	5.88E ⁻¹⁴
Liver	417	45	68	141	315	51	67	238	2.04E ⁻¹⁸	7.48E ⁻¹⁶
Placenta	389	76	51	118	296	68	84	186	5.24E ⁻¹⁴	8.18E ⁻¹⁰
skeletal_muscle	420	57	60	128	335	62	71	198	4.48E ⁻¹⁴	1.04E ⁻⁰⁹
sperm	303	31	18	116	253	22	19	173	6.12E ⁻⁰⁸	2.82E ⁻⁰⁸

Supplementary Table 3: Whole genome CpG_{PG4} and CpG_{out-PG4} distribution in IMR90 and H1 cell lines.

	IMR90			H1		
Methylation level (%)	CpG _{out-PG4} ^a	CpG _{PG4} ^a	p-value	CpG _{out-PG4} ^a	CpG _{PG4} ^a	p-value
0-25%	1869127 (8%)	10065 (11%)	2.17E ⁻¹⁹⁴	271850 (1%)	3164 (3%)	<1E ⁻³⁰⁰
26-50%	3434536 (15%)	17411 (19%)	5.09E ⁻²³⁶	1268727 (5%)	10196 (11%)	<1E ⁻³⁰⁰
51-75%	4361519 (19%)	15255 (17%)	5.46E ⁻⁷⁹	3366635 (14%)	14673 (16%)	1.92E ⁻⁵²
76-100%	12954637 (57%)	48146 (53%)	5.34E ⁻¹³⁴	18540689 (79%)	63122 (69%)	<1E ⁻³⁰⁰

^a percentage are calculated from total within each category

Supplementary Table 4: Distribution of CpG_{PG4} and CpG_{out-PG4} from blood samples of 18 individuals.

Methylation level (%)	CpG _{out-PG4} ^a	CpG _{PG4} ^a	p-value
0-25%	17702 (65%)	216 (79%)	1.36E ⁻⁰⁸
26-50%	2081 (8%)	15 (6%)	0.12
51-75%	3353 (12%)	19 (7%)	3.6E ⁻⁰³
76-100%	4170 (15%)	22 (8%)	3.4E ⁻⁰⁴

^a percentage are calculated from total within each category