

**S1 Fig.** For A) BRCA, B) HNSC, C) KIRC, D) KIRP, E) LIHC, F) LUAD, G) LUSC, H) THCA and I) UCEC, histogram of Z-score normalized log2FC methylation levels. Red curve shows the expected standard normal distribution, and the broken black curve is a smoothed curve for the observed distribution.

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**S2 Fig.** For A) BRCA, B) HNSC, C) KIRC, D) KIRP, E) LIHC, F) LUAD, G) LUSC, H) THCA and I) UCEC, the variance of means of each CpG of primary cancers was significantly higher than that of normal solid tissues.



**S3 Fig.** For A) BRCA, B) HNSC, C) KIRC, D) KIRP, E) LIHC, F) LUAD, G) LUSC, H) THCA and I) UCEC, the extent of DMI in each sample was calculated by combining the percentages of hypermethylated and hypomethylated loci, and most of the individual primary cancers were located in > 25% of hypermethylated and hypomethylated loci.

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**S4 Fig.** For A) BRCA, B) HNSC, C) KIRC, D) KIRP, E) LIHC, F) LUAD, G) LUSC, H) THCA and I) UCEC, the distribution of the number of DMRs included clusters of 1,000 randomized rearrangement, both upregulated and downregulated. The number of hypo-DMRs found in clusters of the real genomes was indicated by a red straight line, which was signiﬁcantly higher than the randomized datasets.

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**S5 Fig.** For A) BRCA, B) HNSC, C) KIRC, D) KIRP, E) LIHC, F) LUAD, G) LUSC, H) THCA and I) UCEC, top 10 CpGs from each cancer cohort are shown in the heatmap.

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**S6 Fig.** For A) BRCA, B) HNSC, C) KIRC, D) KIRP, E) LIHC, F) LUAD, G) LUSC, H) THCA and I) UCEC, scatter plots show a clear boundary between primary cancers and normal solid tissues in t-SNE distributions.

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**S7 Fig.** For A) cg08016257, B) cg08317263, C) cg11783367, D) cg07209244, E) cg17888086, F) cg20668644, G) cg21076680, H) cg13357249, and I) cg10364040, these important DMCs can impact on the survival time during 4,000 days.

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**S8 Fig.** For A) BRCA, B) HNSC, C) KIRC, D) KIRP, E) LIHC, F) LUAD, G) LUSC, H) THCA and I) UCEC, we used CV divided by the median as a measure of stability in 99 DMCs and found that higher stability (< median) in 99 DMCs exhibited significantly longer survival than instability patients.