

Description of Additional Supplementary Files

File Name: Supplementary Data 1

Description: **Evolutionarily selected pathway (ESP) map for 7 cancer types.**

File Name: Supplementary Data 2

Description: **Protein interactions involved in ESPs from multiple cancer types.**

File Name: Supplementary Data 3

Description: **Statistical association of ESP-based subtypes with known cancer subtypes and clinical measurements provided by TCGA.** P-value for known cancer subtypes was calculated by 2^2 test. P-value for clinical variables was calculated by one-sided Fisher exact test corrected by Bonferroni correction. P-value for additional predicting power for survival predictions is calculated by likelihood ratio test. See attached Excel spreadsheet.

File Name: Supplementary Data 4

Description: **Statistical association of ESP with cellular functions known to be associated with cancer.** P-value was calculated by one tail ranksum test.