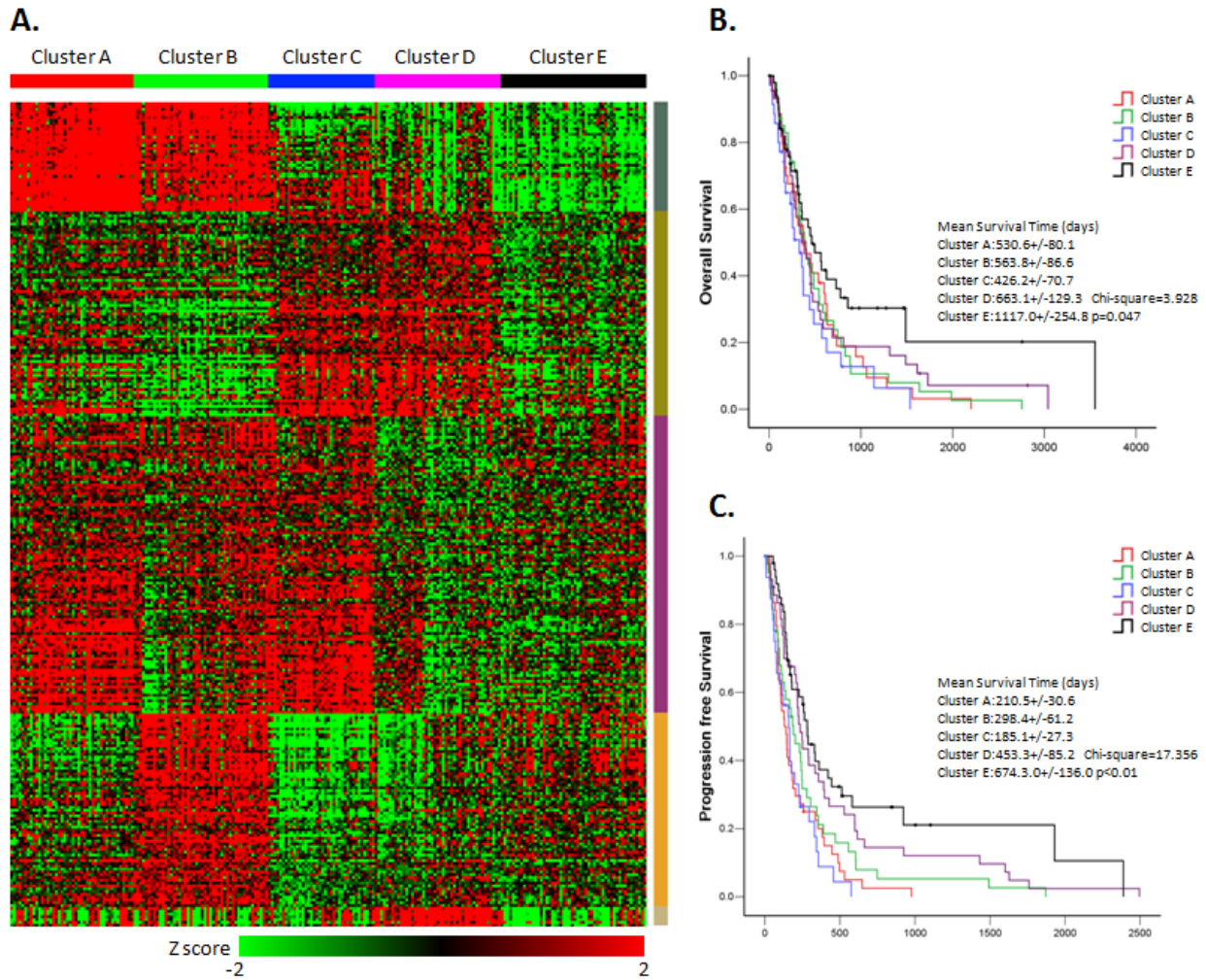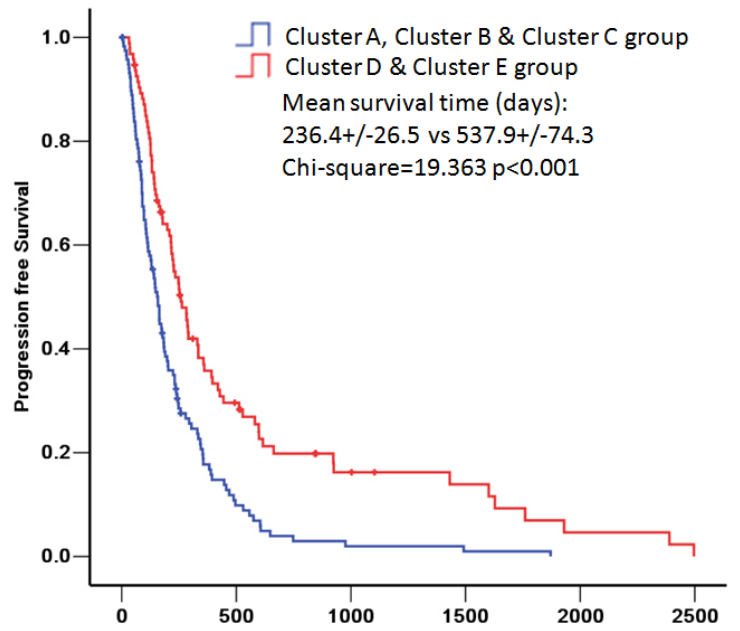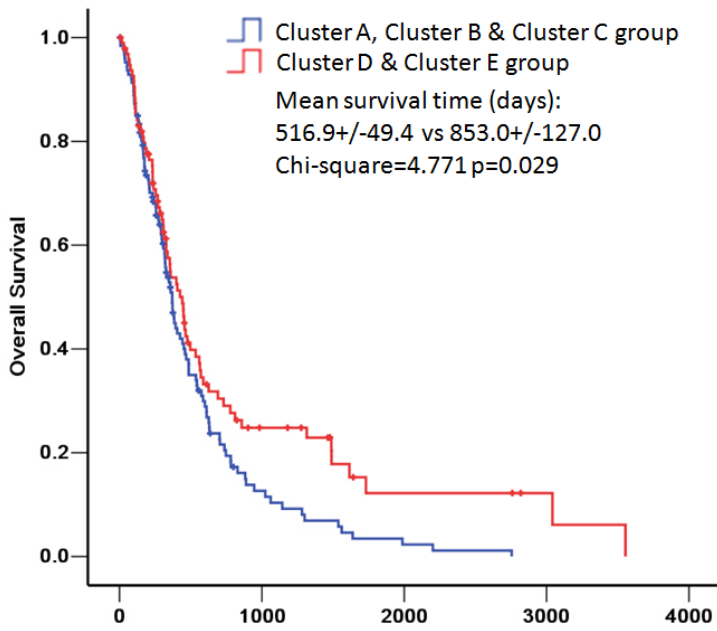Supplementary Figure 1. The top 50 negatively enriched KEGG pathways in glioblastoma.

Supplementary Figure 2. Correlation between positive enrichment rate and negative enrichment rate. Pearson correlation was 0.922, p<0.001.

Supplementary Figure 3. (A) Differently enriched KEGG pathways identify five subtypes in Rembrandt dataset for validation. The same pathway order from TCGA samples was maintained in this validation set (n=228). (B,C) Kaplan-Meier estimates the overall survival and progression-free survival of patients with five subtypes in Rembrandt dataset.

Supplementary Figure 4. Kaplan-Meier estimates of overall survival and progression-free survival in patients with combined pathway enrichment clustering groups in Rembrandt dataset. Left panel: overall survival. Right panel: progression free survival.