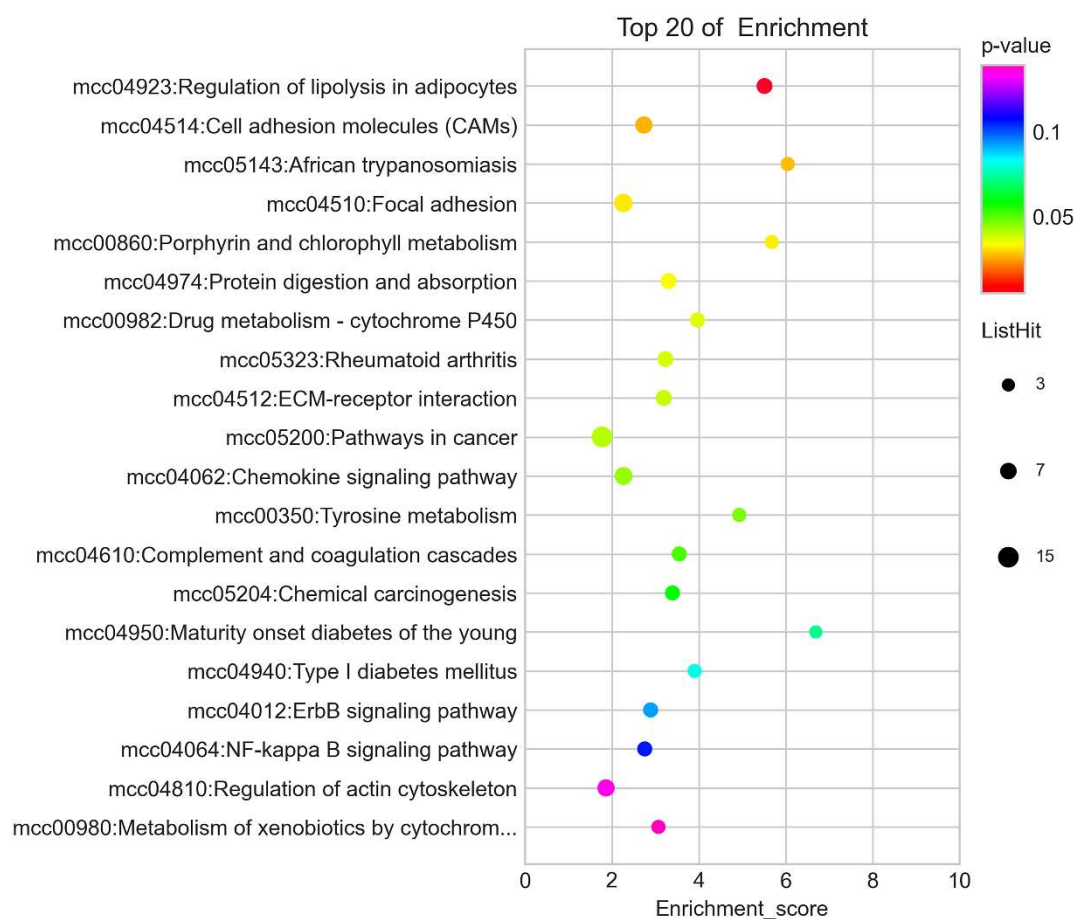
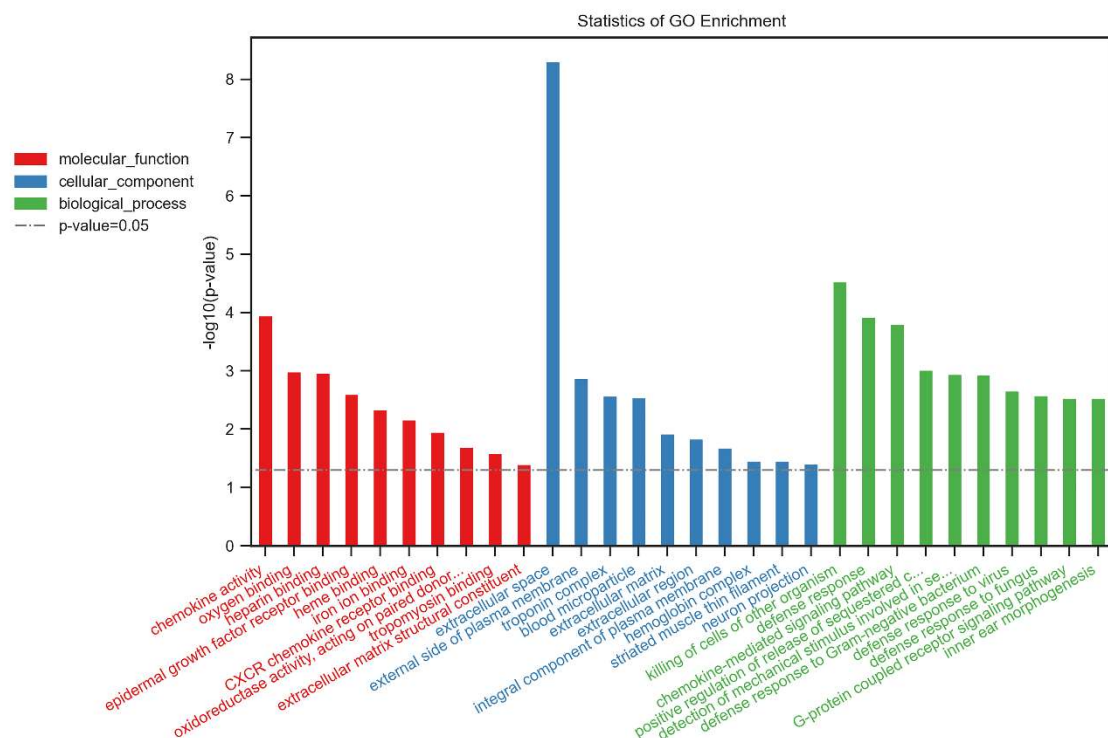


**Supplementary Figure 1.** Gene Ontology (GO) analysis of differentially expressed genes between pre-immunization and 5 days after the second immunization in the three-dose immunization group. Differential genes with a fold change  $\geq 2.0$  were chosen for GO analysis, including Biological Process, Cellular Component, and Molecular Function analysis.

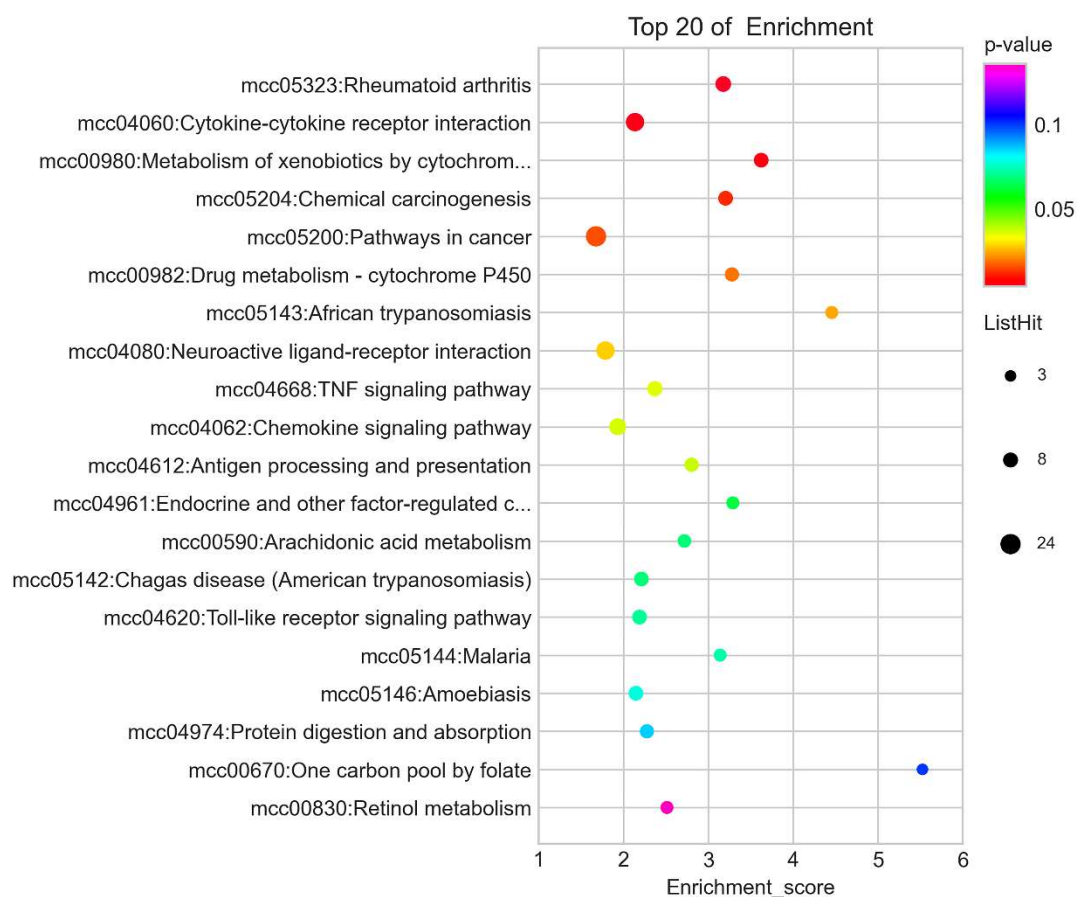


**Supplementary Figure 2.** KEGG analysis of differentially expressed genes between pre-immunization and 5 days after the second immunization in the three-dose immunization group.

Differential genes with a fold change  $\geq 2.0$  were chosen for KEGG analysis.



**Supplementary Figure 3.** Gene Ontology (GO) analysis of differentially expressed genes between pre-immunization and 5 days after the third immunization in the three-dose immunization group. Differential genes with a fold change  $\geq 2.0$  were chosen for GO analysis, including Biological Process, Cellular Component, and Molecular Function analysis.



**Supplementary Figure 4.** KEGG analysis of differentially expressed genes between pre-immunization and 5 days after the third immunization in the three-dose immunization group. Differential genes with a fold change  $\geq 2.0$  were chosen for KEGG analysis.