### Table S1. A summary of Software used for data analysis

| Software  | Source                                                                 |
|-----------|------------------------------------------------------------------------|
| R         | https://www.r-project.org                                              |
| Bioconductor | https://www.bioconductor.org                                         |
| Cell Ranger | https://support.10xgenomics.com/single-cell-gene-expression/software |
| Seurat    | https://satijalab.org/seurat                                           |
| COATES    | https://www.gsea-msigdb.org/gsea/msigdb/cards/COATES_MACROPHAGE_M1_VS_M2_DN |

### Table S2. Clinical information of 30 patients related to Figure 8A

| Patients | Gender | Age(years old) | Tumor types | Maximum tumor size(cm) | AJCC stage |
|----------|--------|----------------|-------------|-------------------------|------------|
| C1       | Female | 73             | CRC         | 3.5                     | II         |
| C2       | Male   | 40             | CRC         | 3.5                     | III        |
| C3       | Male   | 57             | CRC         | 3                       | III        |
| C4       | Male   | 55             | CRC         | 4.5                     | III        |
| C5       | Male   | 66             | CRC         | 2.5                     | III        |
| C7       | Female | 37             | CRC         | 4                       | III        |
| C8       | Male   | 34             | CRC         | 3.5                     | III        |
| C9       | Male   | 60             | CRC         | 5                       | III        |
| C10      | Male   | 52             | CRC         | 4.5                     | II         |
| G1       | Female | 55             | GC          | 2.5                     | II         |
| G2       | Male   | 70             | GC          | 6.5                     | III        |
| G3       | Male   | 58             | GC          | 2.7                     | III        |
| G4       | Male   | 66             | GC          | 4                       | III        |
| G5       | Male   | 33             | GC          | 8                       | III        |
| G6       | Male   | 64             | GC          | 2                       | I          |
| G7       | Male   | 40             | GC          | 1                       | III        |
| G8       | Male   | 66             | GC          | 4                       | III        |
| G9       | Female | 67             | GC          | 5                       | III        |
| G10      | Male   | 52             | GC          | 8.5                     | III        |
| H1       | Male   | 75             | HCC         | 6.5                     | II         |
| H2       | Female | 77             | HCC         | 2.3                     | I          |
| H3       | Male   | 54             | HCC         | 5.5                     | III        |
| H4       | Female | 69             | HCC         | 3.5                     | II         |
| H5       | Male   | 60             | HCC         | 17                      | III        |
| H6       | Male   | 75             | HCC         | 6.5                     | II         |
| H7       | Female | 60             | HCC         | 7                       | II         |
| H8       | Male   | 57             | HCC         | 2                       | I          |
| H9       | Male   | 62             | HCC         | 6.5                     | II         |
| H10      | Male   | 47             | HCC         | 4.6                     | I          |
| Patients | Gender | Age (years old) | Tumor types | Maximum tumor size (cm) | AJCC stage | Sensitive (Yes or No) |
|----------|--------|----------------|-------------|------------------------|------------|----------------------|
| PC1      | Male   | 72             | CRC         | 4                      | IV         | Yes                  |
| PC2      | Male   | 61             | CRC         | 5                      | IV         | Yes                  |
| PC3      | Male   | 58             | CRC         | 5.2                    | IV         | Yes                  |
| PC4      | Female | 52             | CRC         | 2.8                    | IV         | Yes                  |
| PC5      | Male   | 47             | CRC         | 7                      | IV         | Yes                  |
| PC6      | Male   | 65             | CRC         | 5                      | IV         | Yes                  |
| PC7      | Male   | 51             | CRC         | 7                      | IV         | No                   |
| PC8      | Male   | 66             | CRC         | 2.6                    | IV         | No                   |
| PC9      | Male   | 58             | CRC         | 4                      | IV         | No                   |
| PC10     | Female | 39             | CRC         | 5.5                    | IV         | No                   |
| PC11     | Male   | 42             | CRC         | 3                      | IV         | No                   |
| PC12     | Female | 61             | CRC         | 4.5                    | IV         | No                   |
| PC13     | Male   | 70             | CRC         | 5                      | IV         | No                   |
| PC14     | Male   | 67             | CRC         | 5.2                    | IV         | No                   |
| PG1      | Female | 65             | GC          | 3                      | IV         | Yes                  |
| PG2      | Female | 72             | GC          | 2                      | IV         | No                   |
| PH1      | Male   | 70             | HCC         | 3.3                    | II         | Yes                  |
| PH2      | Male   | 55             | HCC         | 8                      | III        | Yes                  |
| PH3      | Male   | 45             | HCC         | 10.1                   | III        | No                   |

Table S4. Correlations of Anti-PD-1 response and clinical characteristics of 19 cancer patients

| Variables          | Anti-PD-1 sensitive (n = 9) | Anti-PD-1 resistant (n = 10) | p value  |
|--------------------|-----------------------------|-----------------------------|----------|
| Gender             |                             |                             | 0.40515  |
| Male               | 7                           | 6                           |          |
| Female             | 2                           | 4                           |          |
| Age                |                             |                             | 0.80808  |
| ≤60                | 4                           | 5                           |          |
| >60                | 5                           | 5                           |          |
| Tumor size         |                             |                             | 0.76418  |
| ≤4cm               | 3                           | 4                           |          |
| >4cm               | 6                           | 6                           |          |
| TNM stage          |                             |                             | 0.27879  |
| I/II               | 1                           | 0                           |          |
| III/VI             | 8                           | 10                          |          |
| Distant metastasis |                             |                             | 0.46577  |
| No                 | 2                           | 1                           |          |
| Yes                | 7                           | 9                           |          |
Figure S1: Mass spectrometry flow processing steps.

Figure S2: TSNE diagram showing the marker gene expression in mass spectrometry process.

Figure S3: (A) Immunohistochemistry was used to confirm the expression of C1QC and CCR2 in tissues of the three cancer models with Apoe^{+/+} and Apoe^{-/-} mice. (B) Immunohistochemistry was used to confirm the expression of CD86, CD206, C1QC and CCR2 in spleens of Apoe^{+/+} and Apoe^{-/-} mice without injection of cancer cells.