

Graphical Abstracts

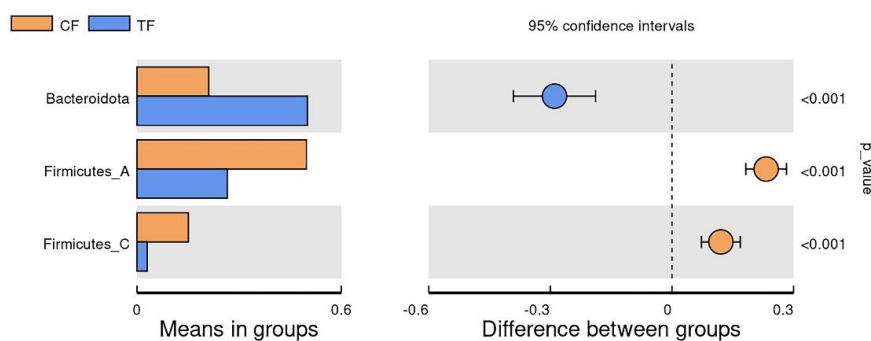


Fig. S1 Changes in the gut bacterial community at the phylum level by T-test. Each bar in the figure represents the mean value for each group of phyla, highlighting significant differences in abundance among the groups. The center of the circle indicates the difference between the means, while the color of the circle corresponds to the P value obtained from the significance test comparing the groups for the respective phylum.

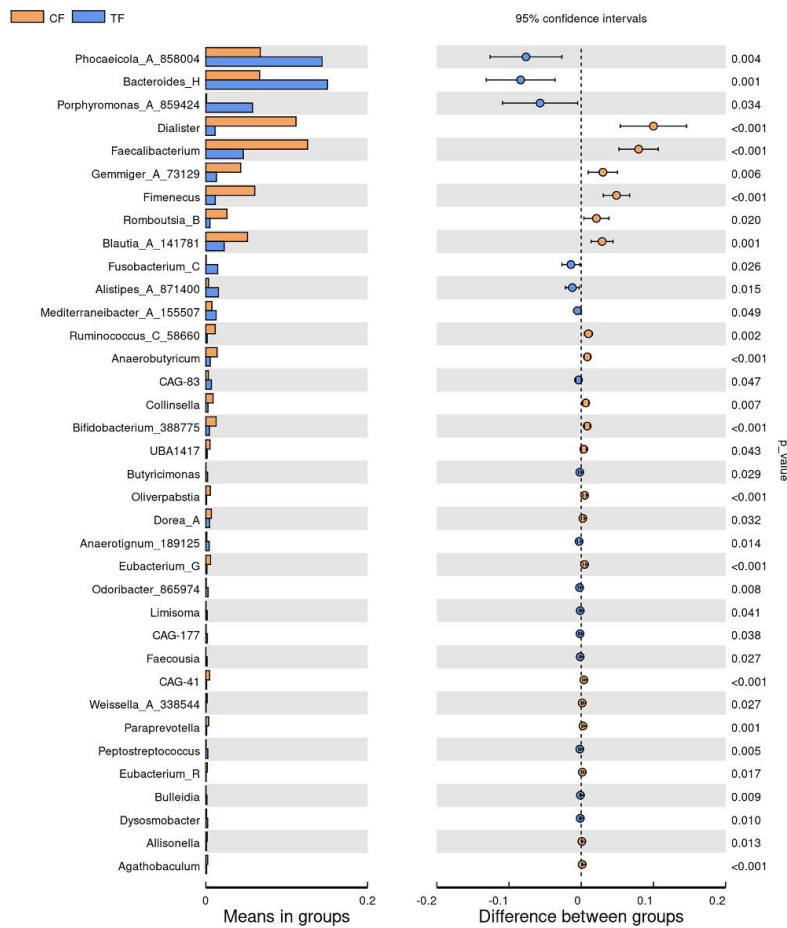


Fig. S2 Changes in the gut bacterial community at the genus level by T-test. Each bar in the figure represents the mean value for each genus group, emphasizing significant differences in abundance among the groups. The center of the circle indicates the difference between the means, while the color of the circle corresponds to the P value obtained from the significance test comparing the groups for each respective genus.

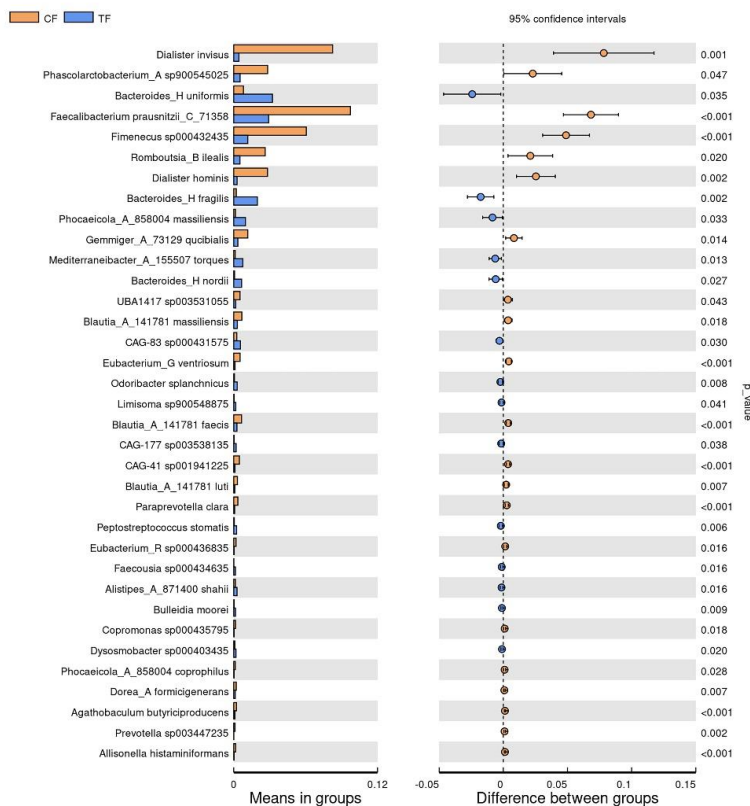


Fig. S3 Changes in the gut bacterial community at the species level by T-test. Each bar in the figure represents the mean value for each species group, highlighting significant differences in abundance among the groups. The center of the circle indicates the difference between the means, while the color of the circle corresponds to the P-value obtained from the significance test comparing the groups for each respective species.

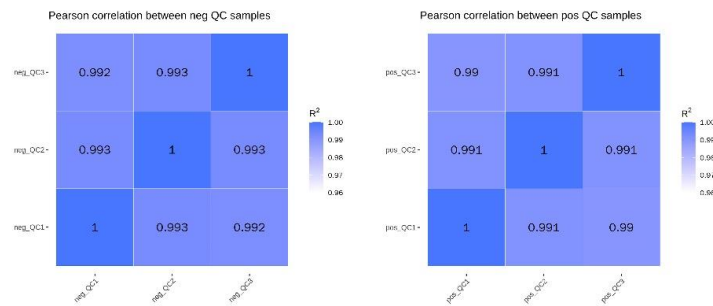


Fig. S4 QC sample correlation analysis. The Pearson correlation coefficient was used to calculate the relationship between QC samples, based on the relative quantitative values of metabolites. A higher correlation among QC samples (indicated by R^2 approaching 1) signifies greater stability in the detection process and higher data quality.

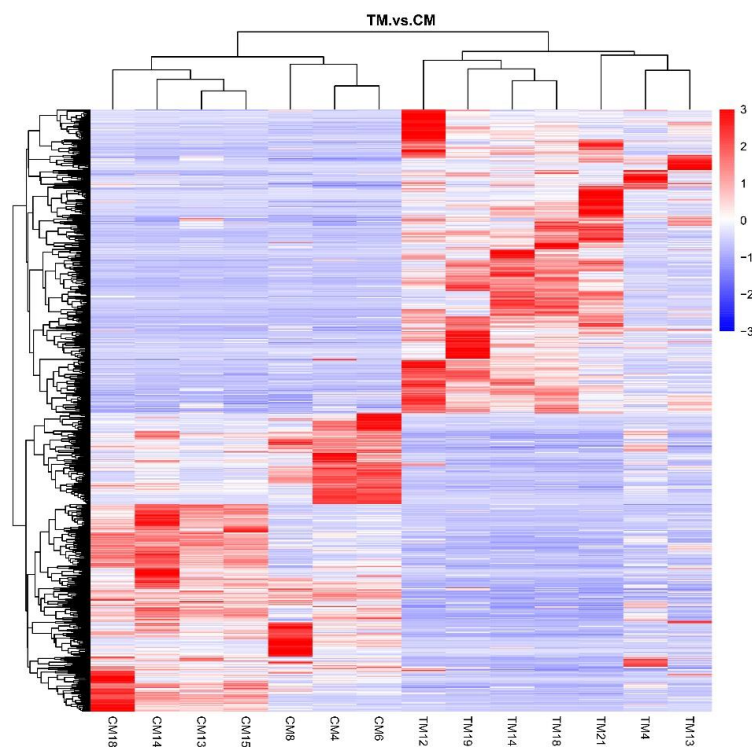


Fig. S5 Differential metabolite cluster analysis. Hierarchical cluster

analysis was conducted to compare metabolic expression patterns within and between two groups. The vertical cluster represents samples, the horizontal cluster represents metabolites, and shorter branches indicate higher similarity. The relationship of metabolite content clustering among groups can be observed through horizontal comparisons.

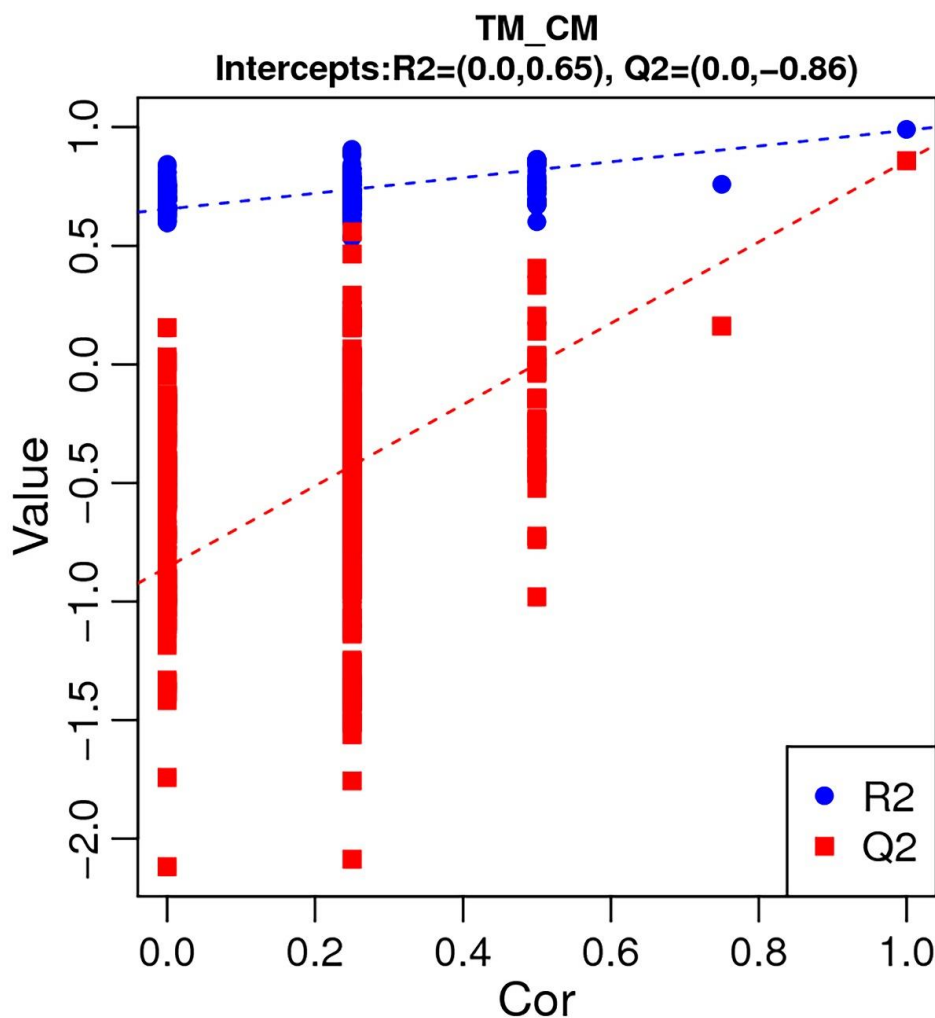


Fig. S6 The PLS-DA sort test diagram. In the score scatter plot, the abscissa represents the scores of the samples on the first principal component, while the ordinate represents the scores of the samples on the

second principal component. R^2Y indicates the proportion of variance explained by the model, and Q^2Y is used to assess the predictive capability of the PLS-DA model. A scenario where R^2Y exceeds Q^2Y suggests that the model is well established.

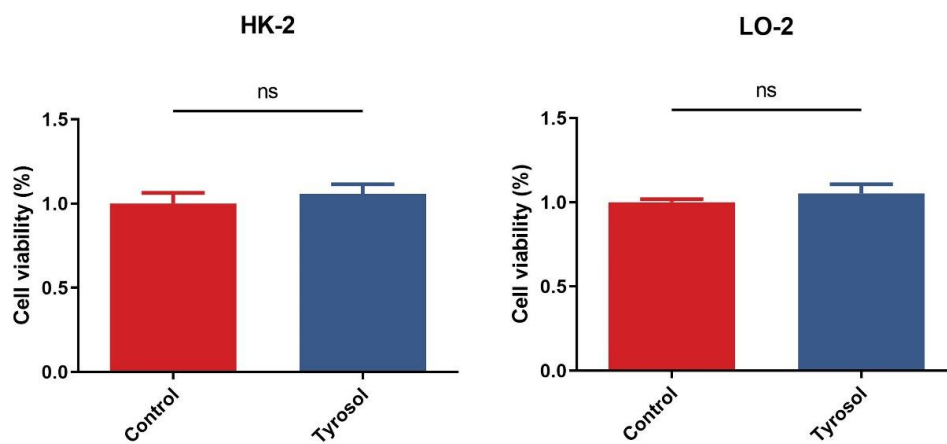


Fig. S7 Tyrosol's effects on various cell types. There was no effect of tyrosol on HK-2 and LO-2 cells.

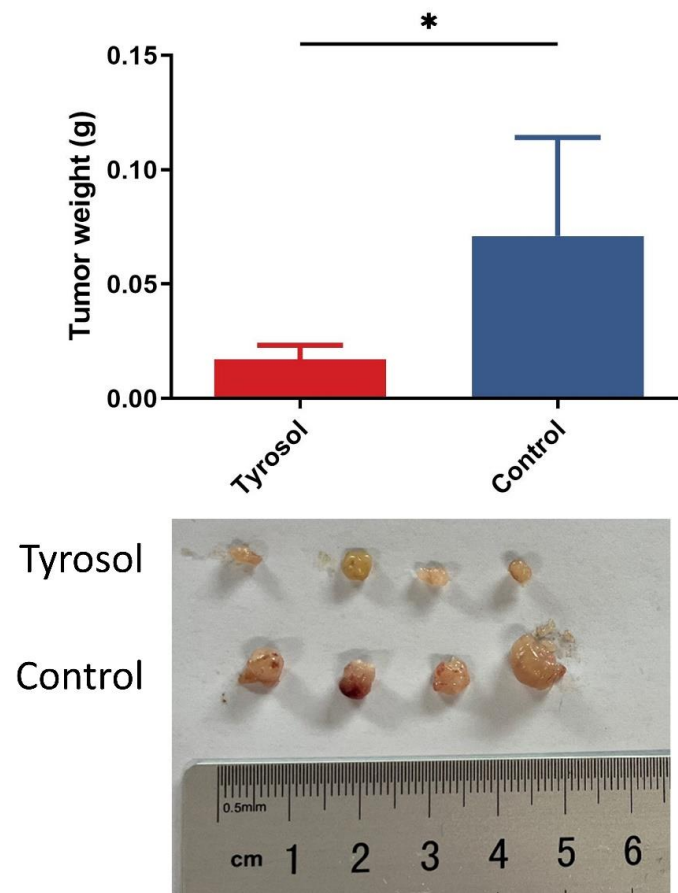


Fig. S8 Antitumor activity of tyrosol in an immunodeficient murine subcutaneous tumor model. Tumor weight represent excised tumor at day 16. The positive-stained areas are shown in brown. In this figure, the data shown is average \pm SEM, An asterisk is placed above differences with a significance exceeding $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.