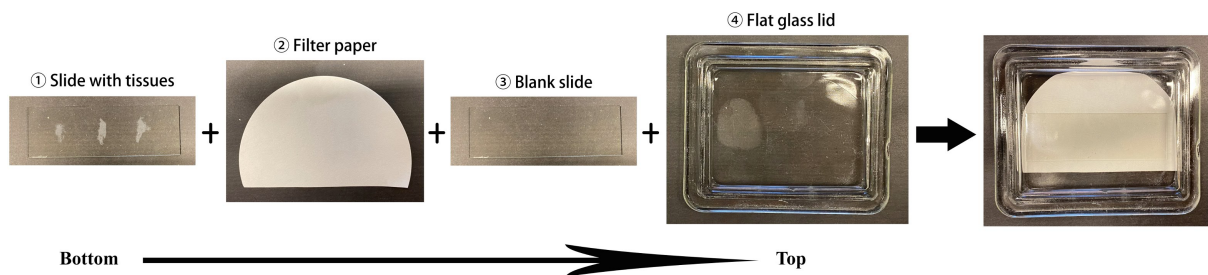


## Supplementary Figures

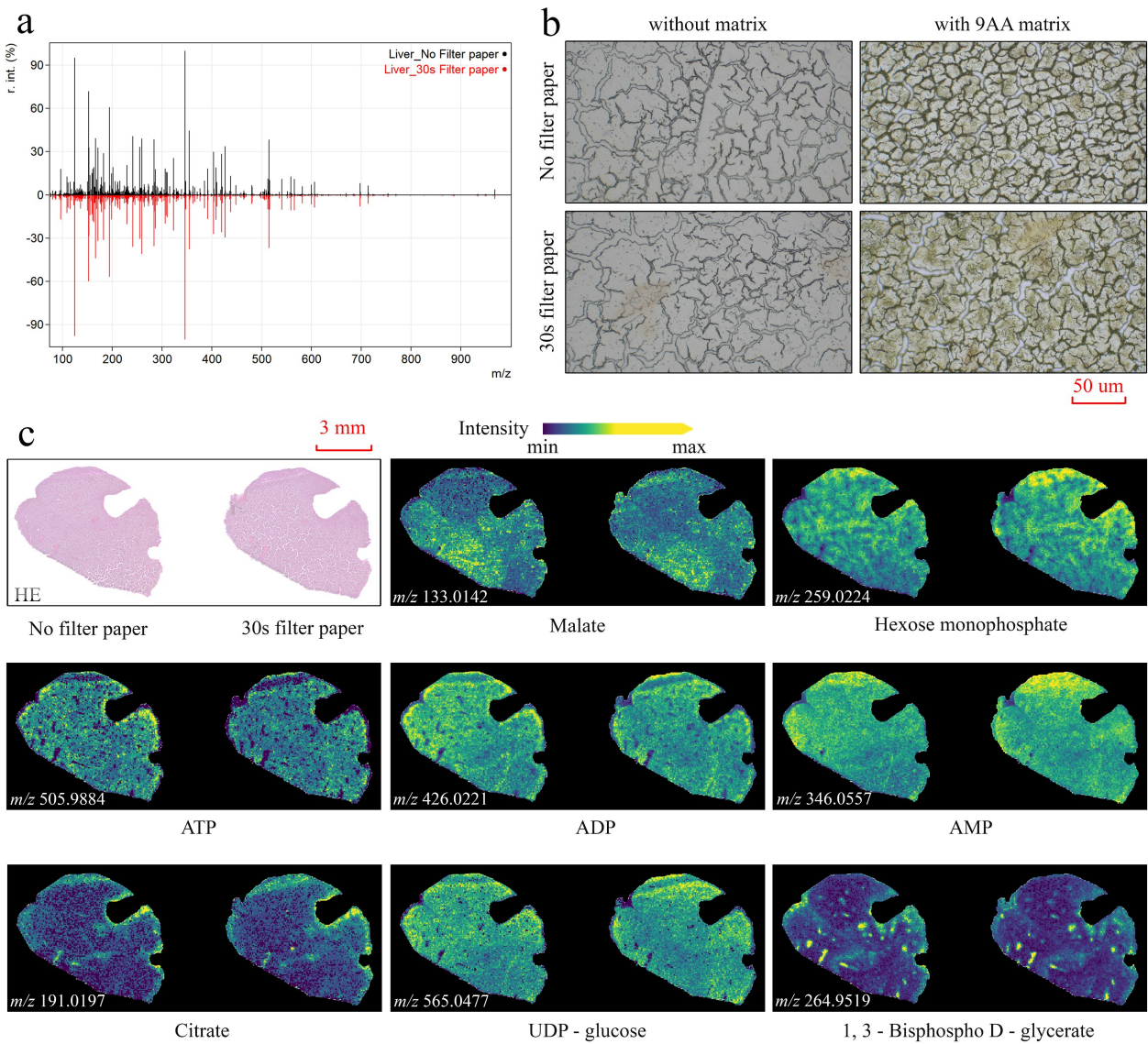
**Supplementary Fig 1** The materials of the filter paper application were placed from bottom to top (corresponding to left to right in the figure)

When the slides with tissues were moved to room temperature, they were immediately covered separately with a piece of filter paper in the center, followed by placing a blank glass slide and a flat glass lid in turn in the vertical direction. The lid and the blank slide were kept in place for 1, 10, 30, 60, and 90 s before being removed one by one.



**Supplementary Fig 2 Comparison of the results from liver tissues without or with 30-s filter paper treatment shows that applying filter paper had no significant effect on the tissue without liquid lipid layer on the surface.**

Overall spectra of tissue without filter paper treatment (black) and tissue with 30-s filter paper treatment (red) are shown in (a). Morphological images of tissues with and without matrix or with and without filter paper treatment are shown in (b). Visualizations of representative endogenous m/z species for two tissue sections are shown in (c). (AMP, adenosine monophosphate; ATP, adenosine triphosphate; ADP, adenosine diphosphate; r. int. (%)–relative intensity threshold).



**Supplementary Fig 3 (a)** The distinctive distributions of molecules are clearly visible in the side-by-side adipocytes, which confirmed that the application of filter paper is effective for using MALDI-FTICR imaging MS to study lipid-rich white adipose tissue. **(b)** Venn diagram of annotated peaks shows the number of peaks shared by the different groups. (FP, filter paper; numbers in brackets, the quantities of peaks) **(c)** The intensities in three areas were compared and validated the reproducibility of our approach applying filter paper. (PE, phosphatidylethanolamine; LPE, lysoPE (lysophosphatidylethanolamine); LPC, lysoPC (lysophosphatidylcholines); AMP, adenosine monophosphate; ADP, adenosine diphosphate).

