

## **Supplementary information**

All data associated with this study are present in the paper or the Supplement materials. Materials will be shared with the scientific community by contacting Li Wenggang (lwgang@xmu.edu.cn).

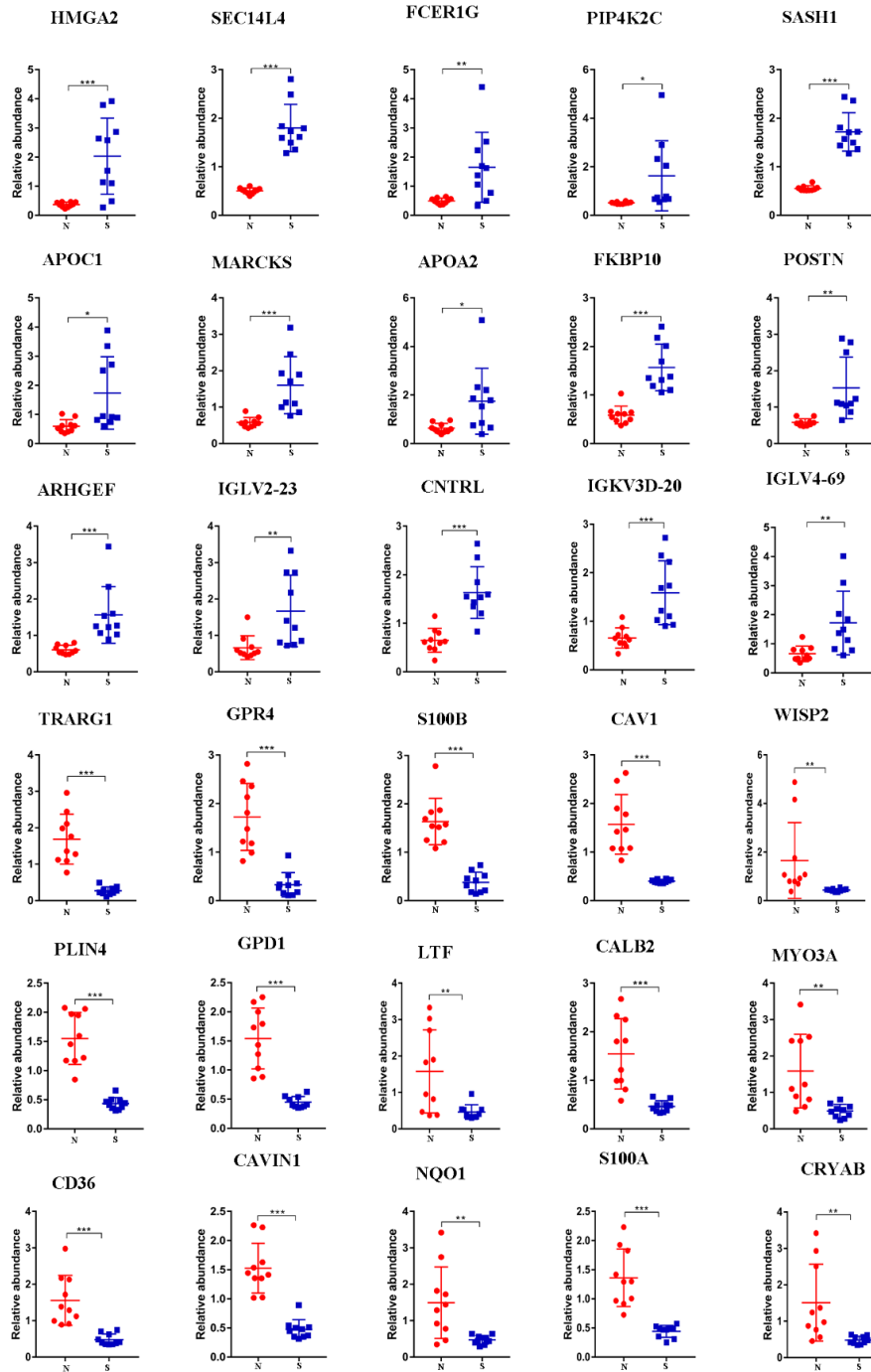
The mass spectrometry data for proteomics, metabolomics, and lipidomics have been deposited to MetaboLights (<https://www.ebi.ac.uk/metabolights/>), which is accessible with the identifier MTBLS7884 for proteomics and lipidomics, MTBLS7885 for metabolomics.

Table S1 Differentially expressed statistics of proteomic

Table S2 Differentially expressed statistics of metabolic

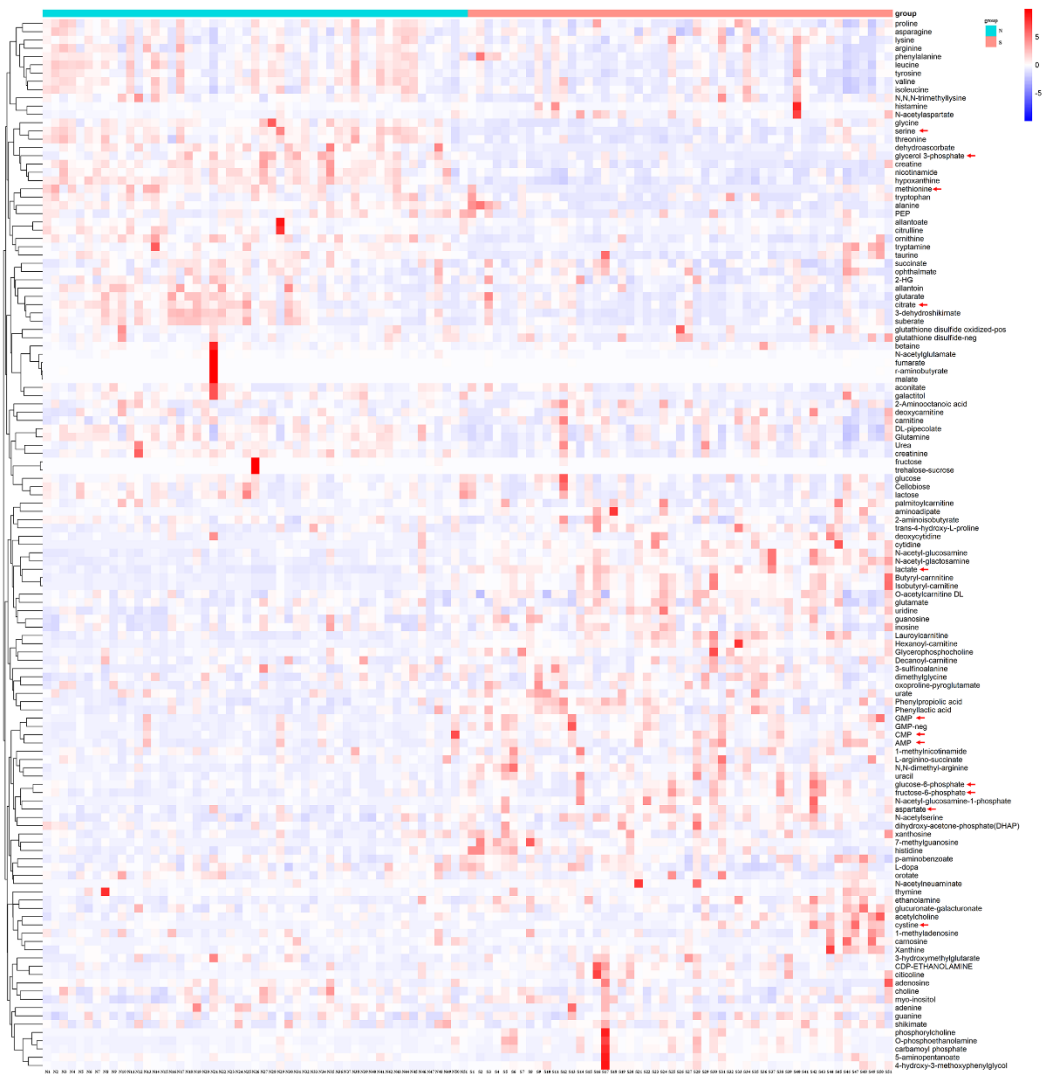
Table S3 Differentially expressed statistics of lipidomics

Table S4 COG analysis of proteins

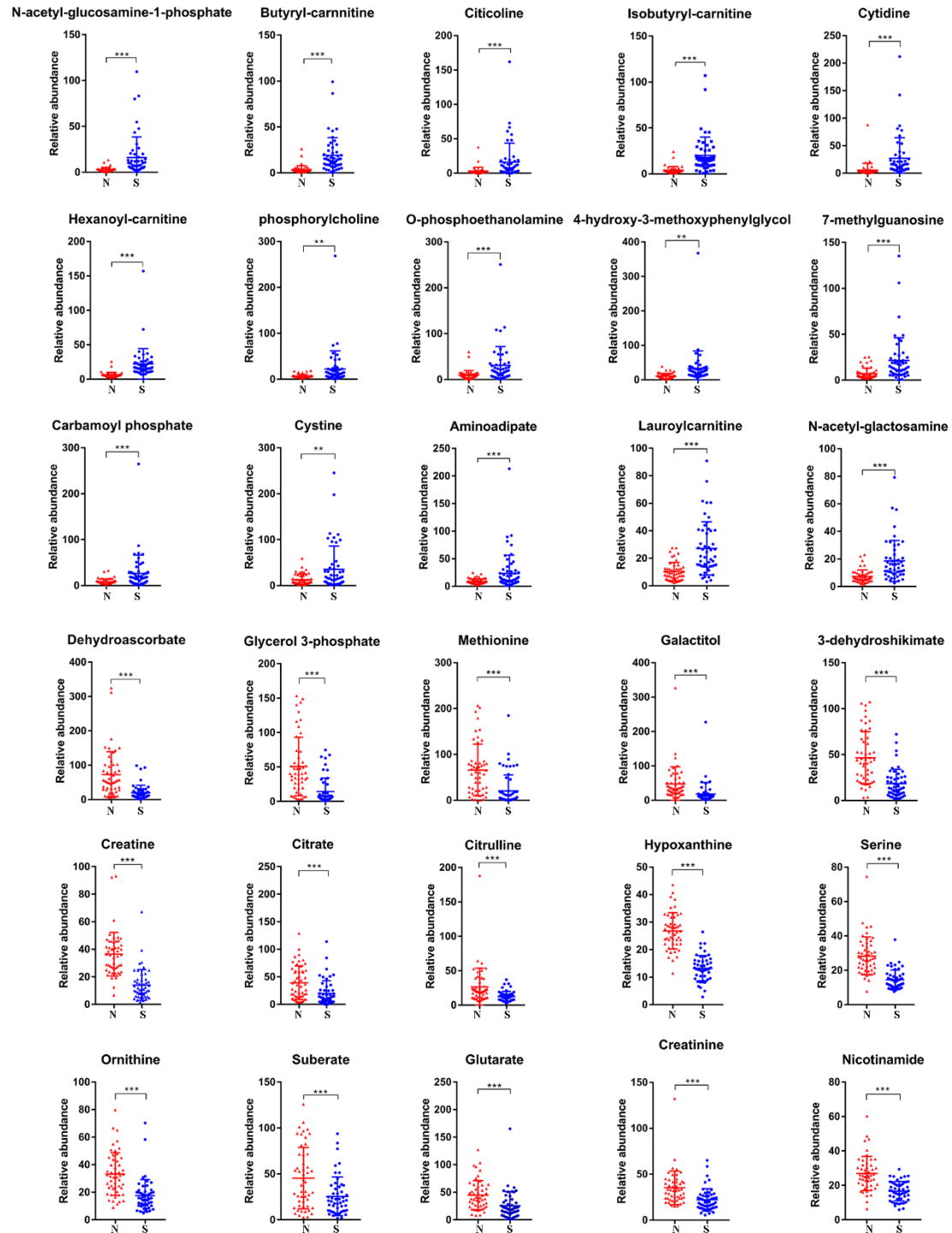


**Fig. S1.** The top 15 upregulated and down regulated proteins of both identified proteins in sarcoma tissues and adjacent adipose tissues. HMGA2 (T/N=5.49, \*\*\* $P$ <0.001), SEC14L4 (T/N=3.561, \*\*\* $P$ <0.001), FCER1G (T/N=3.33, \*\* $P$ <0.01), PIP4K2C (T/N=3.21, \*\* $P$ <0.01), SASH1 (T/N=3.1, \*\*\* $P$ <0.001), APOC1 (T/N=2.89, \*\* $P$ <0.01), MARCKS (T/N=2.75, \*\*\* $P$

<0.001), APOA2 (T/N=2.75, \*\**P*<0.01), FKBP10 (T/N=2.67, \*\*\**P*<0.001), POSTN  
(T/N=2.63, \*\*\**P*<0.001), IGLV4-69 (T/N=2.61, \*\**P*<0.01), ARHGEF18 (T/N=2.58, \*\*\**P*<  
0.001), IGLV2-23 (T/N=2.522, \*\**P*<0.01), CNTRL (T/N=2.515, \*\*\**P*<0.001), IGKV3D-20  
(T/N=2.42, \*\*\**P*<0.001), TRARG1 (T/N=0.16, \*\*\**P*<0.001), GPR4 (T/N=0.19, \*\*\**P*<  
0.001), S100B (T/N=0.23, \*\*\**P*<0.001), CAV1 (T/N=0.26, \*\*\**P*<0.001), WISP2 (T/N=0.262, ,  
\*\*\**P*<0.01), PLIN4 (T/N=0.28, \*\*\**P*<0.001), GPD1 (T/N=0.29, \*\*\**P*<0.001), LTF  
(T/N=0.293, \*\**P*<0.01 ), CALB2 (T/N=0.29, \*\*\**P*<0.001), MYO3A (T/N=0.31, \*\*\**P*<  
0.001), CD36 (T/N=0.28, \*\**P*<0.01), CAVIN1 (T/N=0.31, \*\*\**P*<0.001), NQO1 (T/N=0.32,  
\*\*\**P*<0.001), CRYAB (T/N=0.318, \*\**P*<0.01), S100A1 (T/N=0.325, \*\*\**P*<0.01). N: normal  
adjacent adipose tissue; S: liposarcoma tissue.

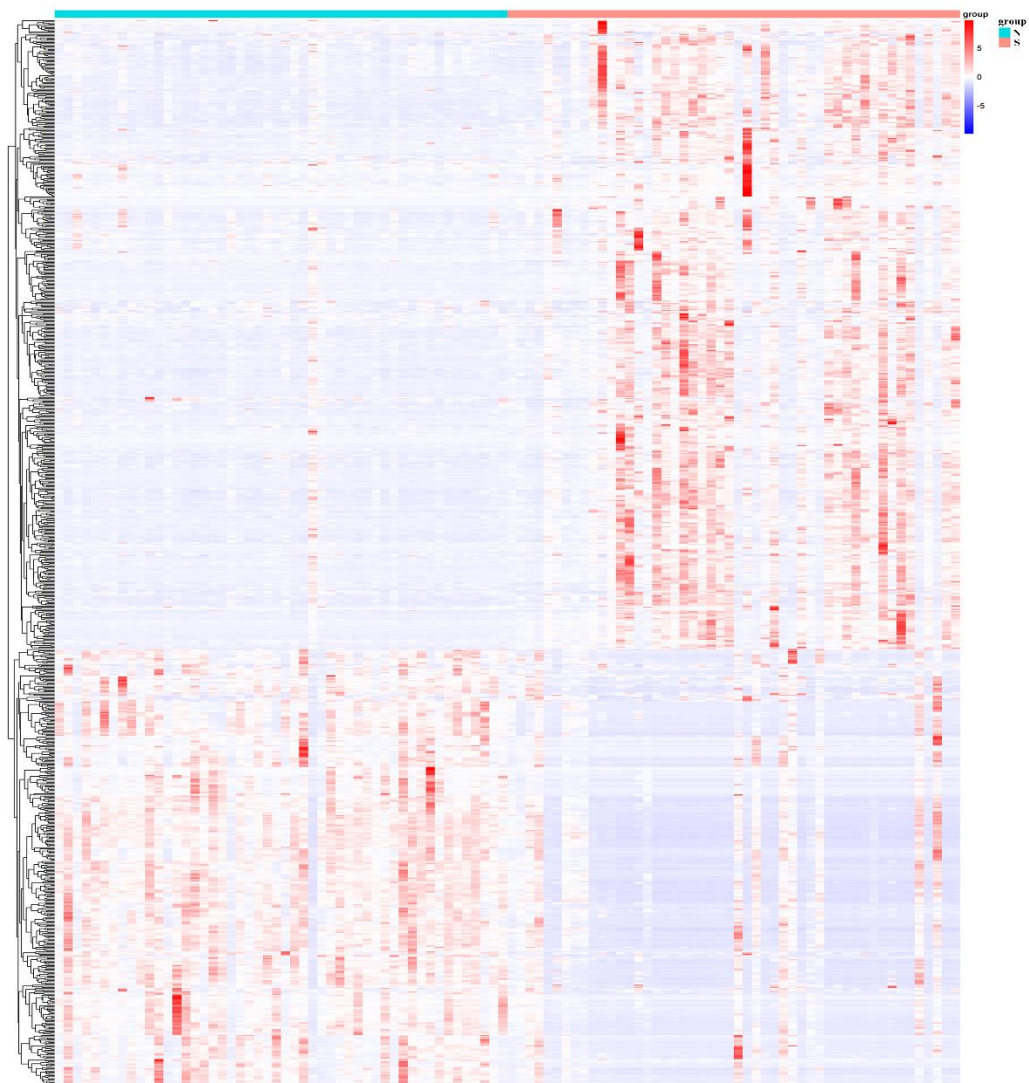


**Fig. S2.** Heatmap of the differential metabolites in sarcoma tissues and adjacent adipose tissues from DDLPS/WDLPS patients. n=51 per group. N: normal adjacent adipose tissue; S: liposarcoma tissue.



**Fig. S3.** The top 15 upregulated and down regulated metabolites of both identified proteins in sarcoma tissues and adjacent adipose tissues (n=51). N-acetyl-glucosamine-1-phosphate (T/N=5.45, \*\*\* $P < 0.001$ ), Butyryl-carnitine (T/N=5.25, \*\*\* $P < 0.001$ ), citicoline (T/N=6.1, \*\*\* $P < 0.001$ ), Isobutyryl-carnitine (T/N=5.05, \*\*\* $P < 0.001$ ), cytidine (T/N=4.83, \*\*\* $P < 0.001$ ),

Hexanoyl-carnitine (T/N=3.76, \*\*\**P*<0.001), phosphorylcholine (T/N=3.43, \*\**P*<0.001), O-phosphoethanolamine (T/N=3.31, \*\*\**P*<0.001), 4-hydroxy-3-methoxyphenylglycol (T/N=3.26, \*\**P*<0.01), 7-methylguanosine (T/N=3.02, \*\*\**P*<0.001), carbamoyl phosphate (T/N=3.01, \*\*\**P*<0.001), cystine (T/N=2.78, \*\**P*<0.01), amino adipate (T/N=2.64, \*\**P*<0.01), Lauroylcarnitine (T/N=2.61, \*\*\**P*<0.001), N-acetyl-galactosamine (T/N=2.53, \*\*\**P*<0.001). The top 15 downregulated metabolites were dehydroascorbate (T/N=0.27, \*\*\**P*<0.001), glycerol 3-phosphate (T/N=0.29, \*\*\**P*<0.001), methionine (T/N=0.32, \*\*\**P*<0.001), galactitol (T/N=0.39, \*\*\**P*<0.001), 3-dehydroshikimate (T/N=0.39, \*\*\**P*<0.001), creatine (T/N=0.39, \*\*\**P*<0.001), citrate (T/N=0.49, \*\*\**P*<0.001), citrulline (T/N=0.50, \*\**P*<0.01), hypoxanthine (T/N=0.50, \*\*\**p*<0.001), serine (T/N=0.52, \*\*\**P*<0.001), ornithine (T/N=0.54, \*\*\**P*<0.001), suberate (T/N=0.56, \*\*\**P*<0.001), glutarate (T/N=0.57, \*\*\**P*<0.001), creatinine (T/N=0.62, \*\*\**P*<0.001), nicotinamide (T/N=0.63, \*\*\**P*<0.001). N: normal adjacent adipose tissue; S: liposarcoma tissue.



**Figure S4.** Heatmap of the differential lipids in sarcoma tissues and adjacent adipose tissues from DDLPS/WDLPS patients. n=50 per group. N: normal adjacent adipose tissue; S: liposarcoma tissue.