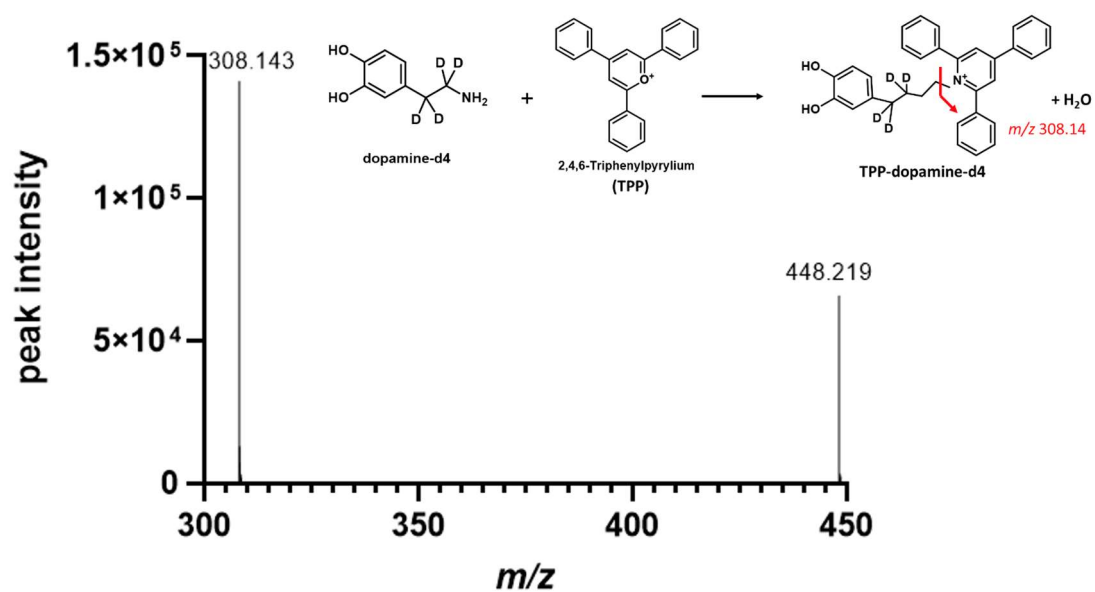
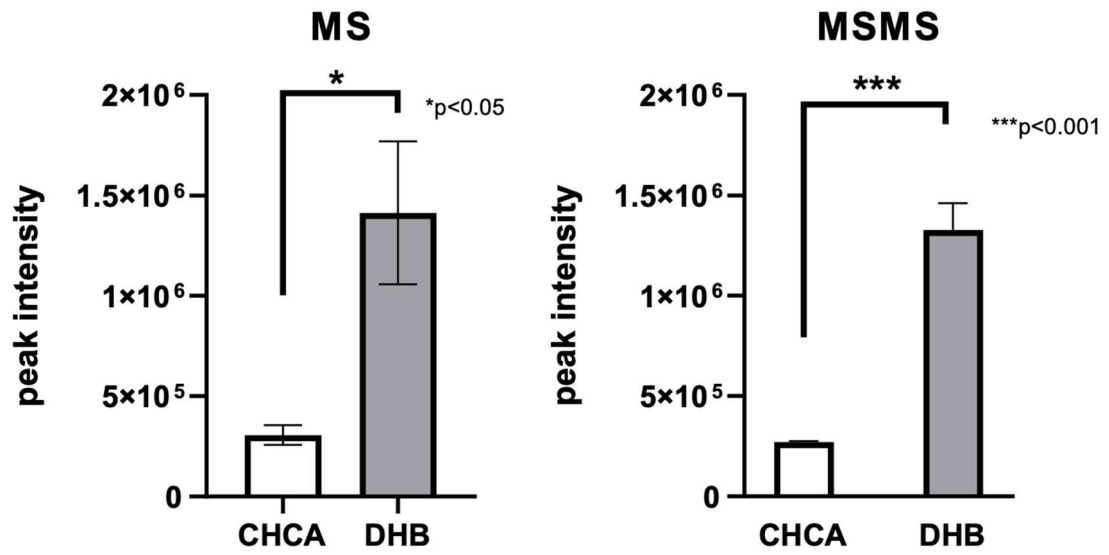


Supporting Fig. 1



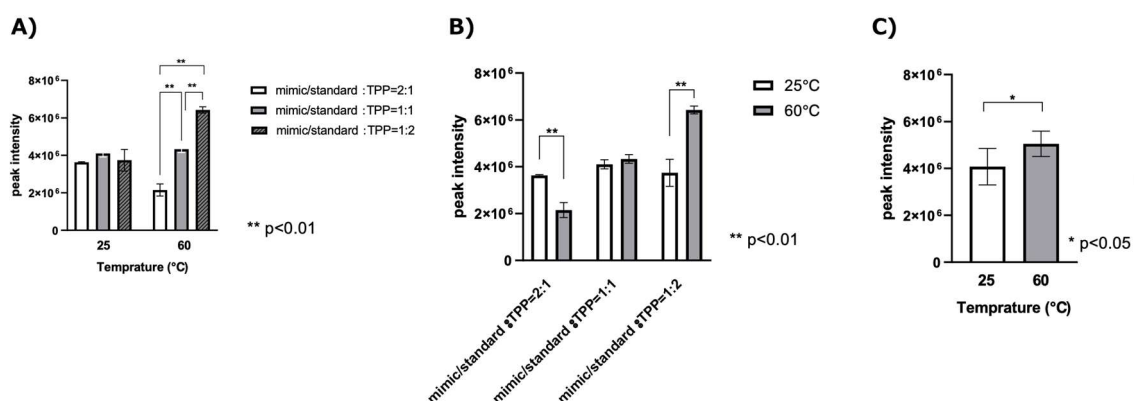
TPP-DA-d4 mass spectrum. The molecular structure of TPP-DA-d4 is formed by the reaction of TPP and DA-d4. m/z 308.14 derived from TPP reagent is detected in the product ion spectrum of TPP-DA-d4.

Supporting Fig.2



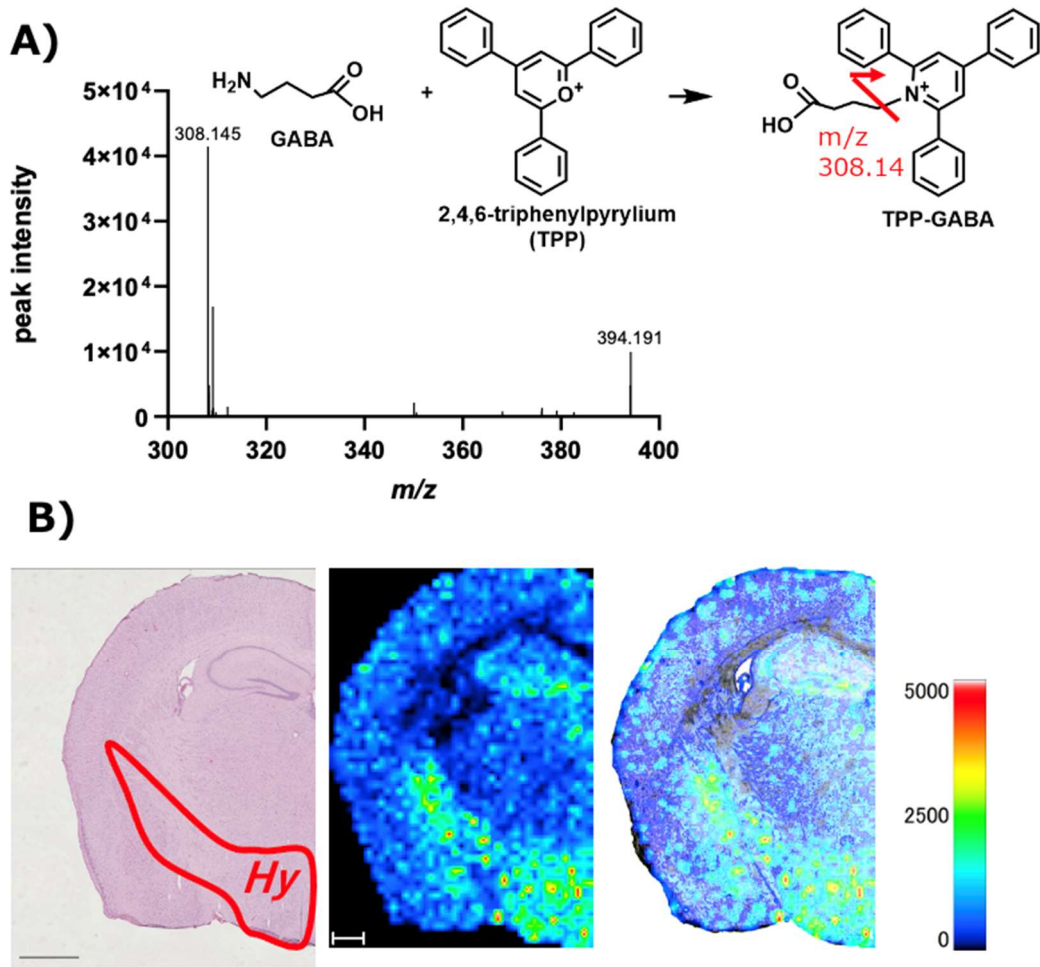
Optimization of matrix conditions. The peak intensity of TPP-DA was significantly increased when DHB was used compared to when CHCA was used as the matrix. A) MS measurement B) MSMS measurement

Supporting Fig. 3



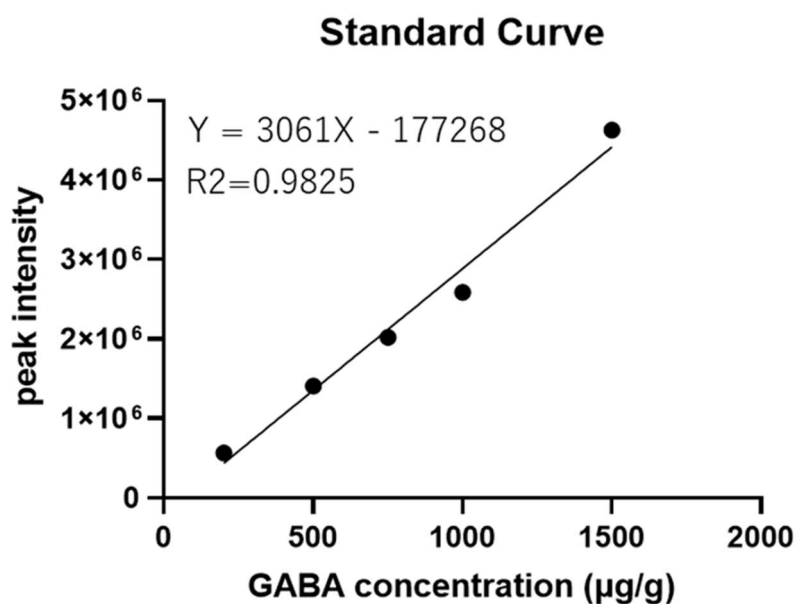
Improvement of DA detection intensity by examining derivatization conditions A) and B) show the reaction of standard solution/mimic sample mixture and TPP solution in a tube, followed by the addition of matrix. C) shows the standard solution/mimic sample mixture was spotted on ITO glass, and the derivatization reagent and matrix were supplied by spraying in the same way as in the TPP-DA determination described in the main text. A) the intensity of TPP-DA detection at different TPP supply rates and derivatization reaction temperatures. At 25°C, the intensity of TPP-DA detection remained unchanged regardless of the TPP supply rate, but at 60°C, the intensity of TPP-DA detection increased with increasing TPP supply rate. B) TPP-DA detection intensity increased under the heated condition when TPP was supplied sufficiently (mimic/standard:TPP=1:1 or higher). C) Compares the derivatization reaction at 25°C and 60°C under the conditions of TPP-DA quantification described in the main text, and shows that the TPP-DA detection intensity significantly increased under the heated condition.

Supporting Fig. 4



Mass spectrum of γ -aminobutyric acid (GABA) and MALDI-MSI results. A) Molecular structure of TPP-GABA formed by the reaction of TPP and GABA. m/z 308.14 derived from TPP reagent is detected in the product ion spectrum of TPP-GABA. Distribution of TPP-DA in coronal sections of mouse brain tissue. B) TPP-DA is localized in the hypothalamus (Hy) when compared to hematoxylin and eosin staining (HE staining) of post-measured sections. Scale bar is $500\mu\text{m}$.

Supporting Fig 5



GABA conc. ($\mu\text{g/g}$)	average peak intensity (n=3)	quantitative value ($\mu\text{g/g}$)	accuracy (%)	RSD (%)
1500	4627386	1569.6	-4.6	16.7
1000	2586142	902.8	9.7	12.7
750	2018752	717.4	4.3	6.5
500	1407784	517.8	-3.6	7.0
200	565192	242.6	-21.3	7.4

Quantitative determination of TPP-GABA in mouse brain thalamus. The coefficient of determination of linearity (R^2) was set to be greater than 0.98, accuracy within $\pm 30\%$, and RSD within $\pm 20\%$ in MALDI-MSI.