Evaluation of Drug Exposure and Metabolism in Locust and Zebrafish Brains using Mass Spectrometry Imaging

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Supporting information

At an early stage of the study, standards of the drugs of interest were analysed by MALDI MS/MS. A high-resolution orbitrap mass analyser (FTMS) was used to collect the mass spectrum, which deduced the parent ion mass and a linear ion trap (ITMS) was used for MS/MS experiments in order to identify the fragment ions of the parent ions. FTMS for CLO, Figure 1, reveal the parent ion mass to be m/z 327.138 whilst Figure 2, displays a single fragment at m/z 270.167. For NDMC, Figure 3, exhibits the parent ion to have m/z 313.122 and Figure 4, shows several fragments but with the one at m/z 270.167 to be the most abundant one, hence its selection for the rest of the study. Finally, CNO, examined by FTMS analyser, Figure 5, shows that the parent ion mass is m/z 343.134 and, Figure 6, reveals the major fragment to be m/z 299.167.

CLO – MS (FTMS)

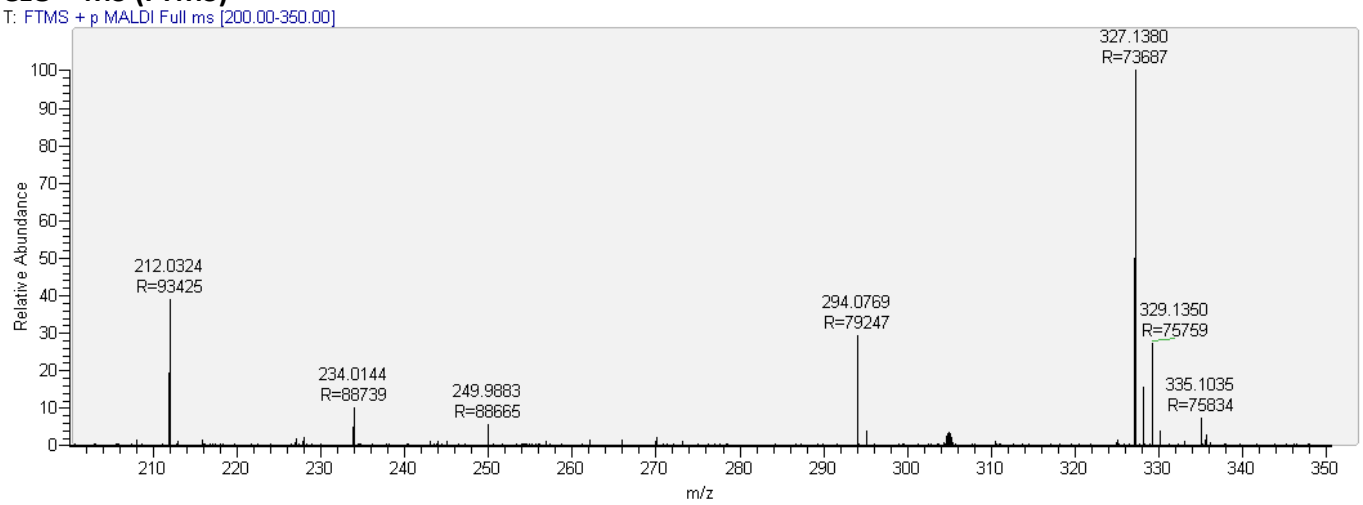

Figure 1: MS spectrum of CLO to identify the parent ion found at m/z 327.138.

CLO – MS/MS (ITMS)

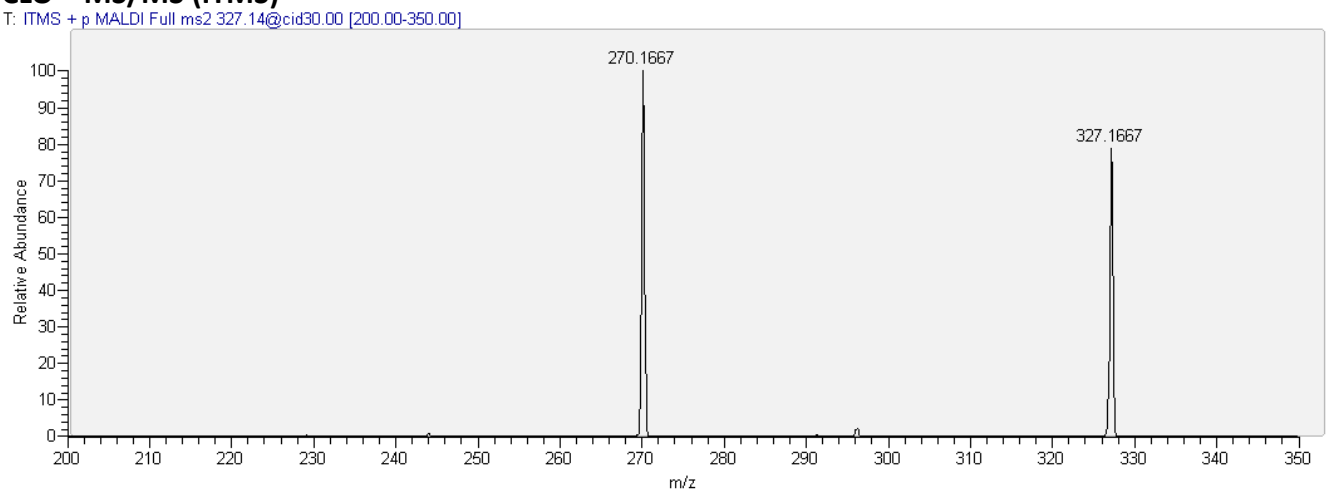

Figure 2: MS/MS spectrum was achieved for CLO and the major fragment was found to be m/z 270.167.

NDMC – MS (FTMS)

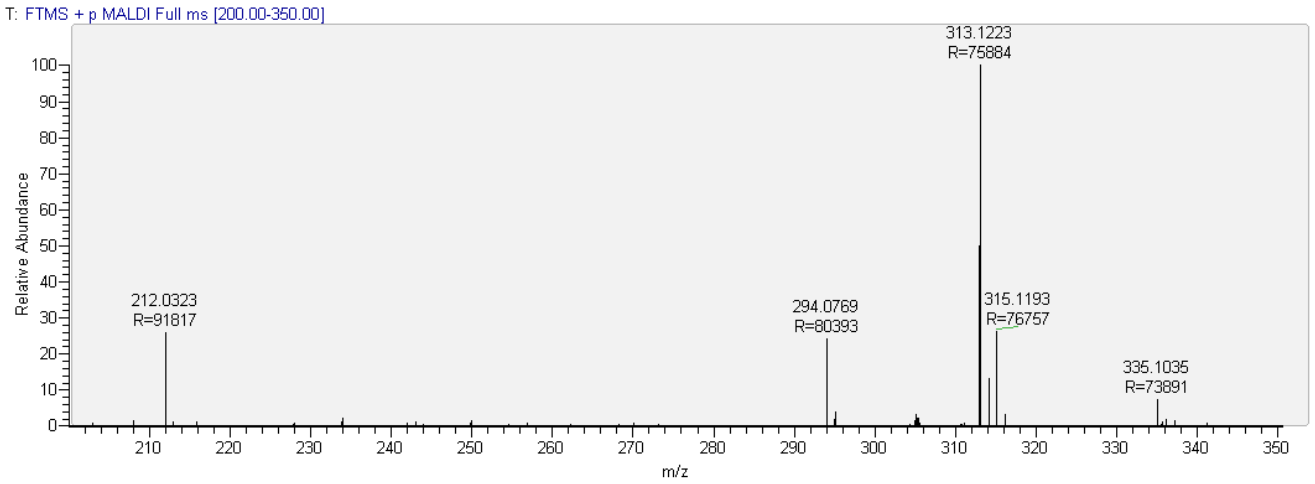

Figure 3: MS spectrum of NDMC to identify the parent ion found at m/z 313.122. ‘

NDMC – MS/MS (ITMS)

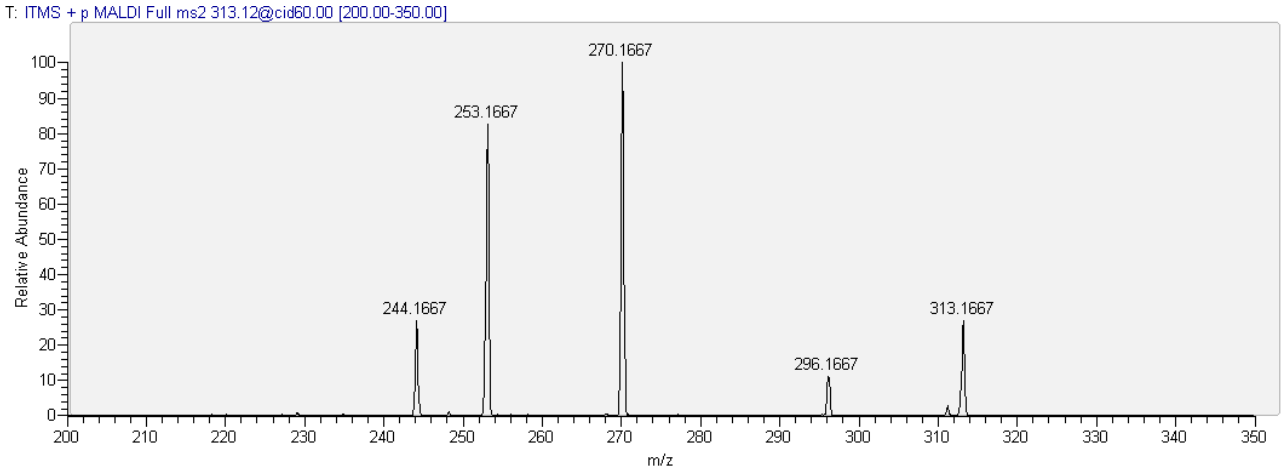

Figure 4: MS/MS spectrum was achieved for NDMC and the major fragment was found to be m/z 270.167.

CNO – MS (FTMS)

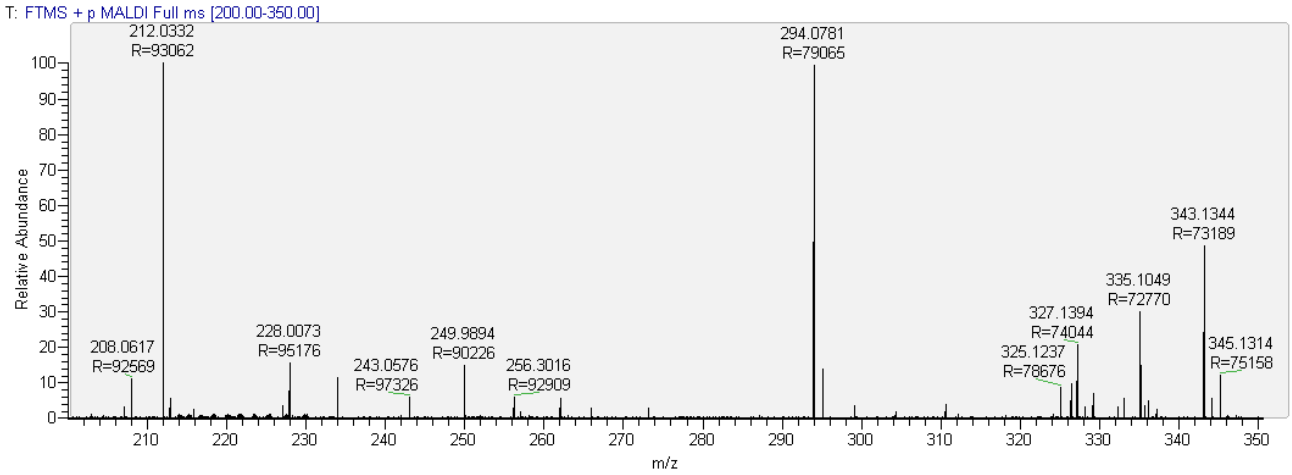

Figure 5: MS spectrum of CNO to identify the parent ion found at m/z 343.134.

CNO – MS/MS (ITMS)

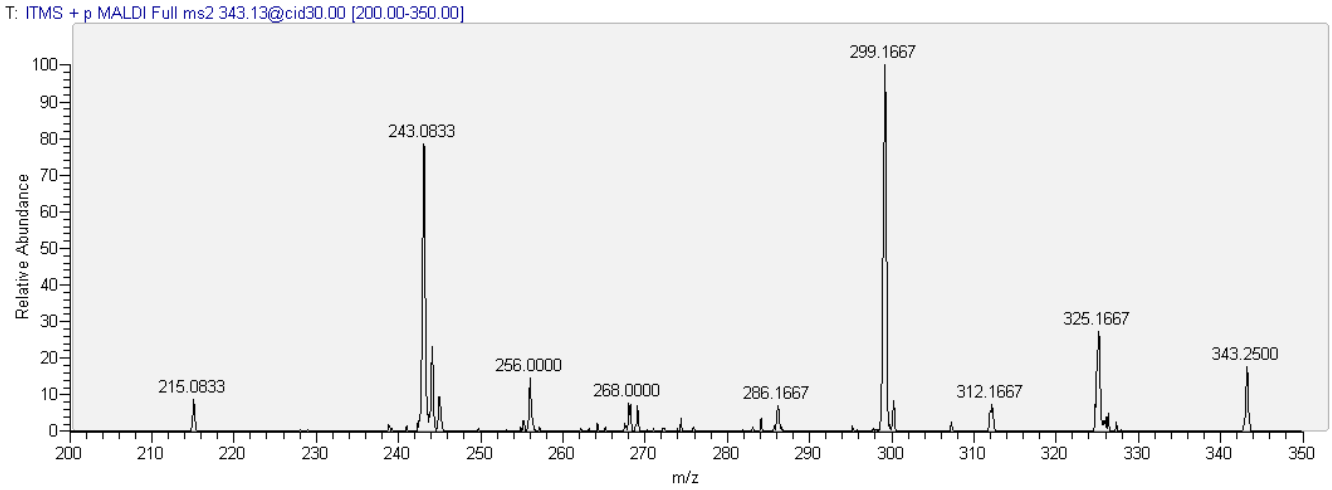

Figure 6: MS/MS spectrum was achieved for CNO and the major fragment was found to be m/z 299.167.

Spectra for CLO 15 min brain tissue experiment. Figure 7 shows CLO fragmentations where m/z 270.167 is present. The conversion from CLO to NDMC is demonstrated in Figure 8 where the fragment m/z 270.167 is found.

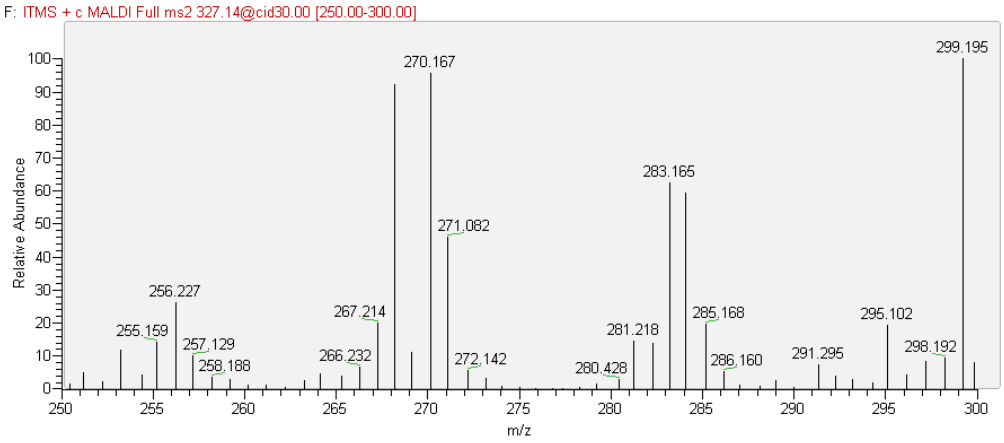

Figure 7: CLO 15 min, parent ion of m/z 327.138 was selected for MS/MS fragmentation and shows a fragment at m/z 270.167.

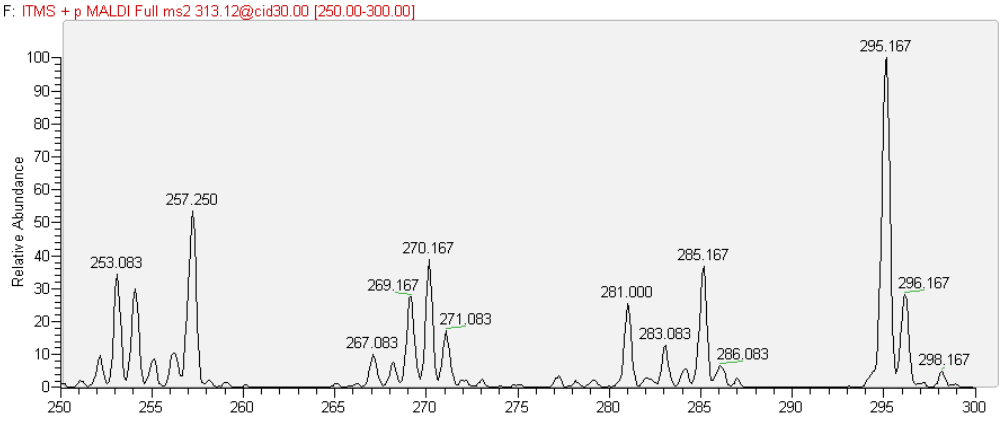

Figure 8: CLO 15 min, parent ion of m/z 313.123 was selected for MS/MS fragmentation and shows a fragment at m/z 270.167.

Spectra for CLO 45 min brain tissue experiment. Figure 9 shows CLO fragmentations where m/z 270.167 is present. The conversion from CLO to NDMC is demonstrated in Figure 10 where the fragment m/z 270.167 is found.

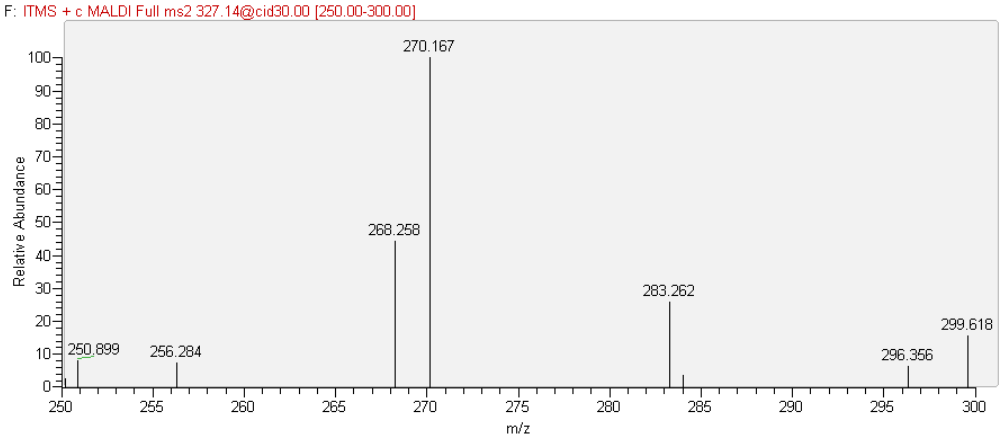

Figure 9: CLO 45 min, parent ion of m/z 313.123 was selected for MS/MS fragmentation and shows a fragment at m/z 270.167.

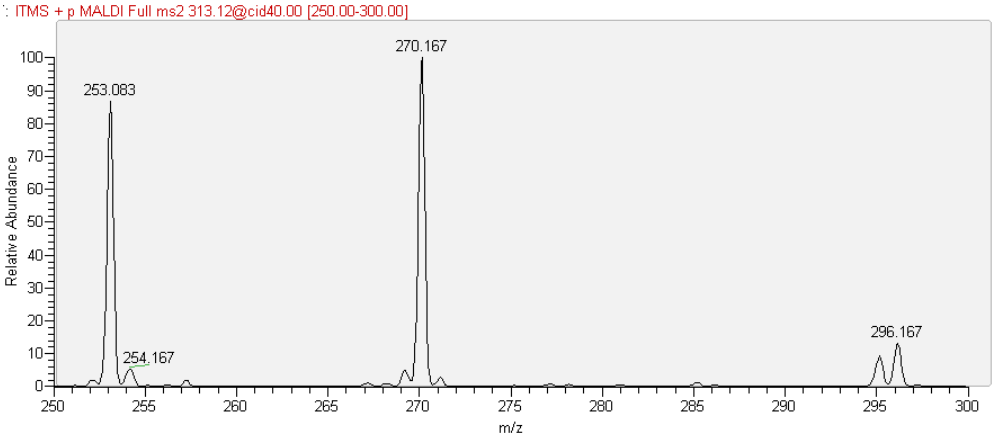

Figure 10: CLO 45 min, parent ion of m/z 313.123 was selected for MS/MS fragmentation and shows a fragment at m/z 270.167.

Spectra for CNO brain tissue experiment. CNO is identified by its fragmentation compound of m/z 299.167, Figure 11. Metabolism from CNO to CLO is identified in Figure 12 where MS/MS experiment revealed m/z 270.167 originating from CLO. NDMC is present in the brain tissue as well, demonstrated in Figure 13.

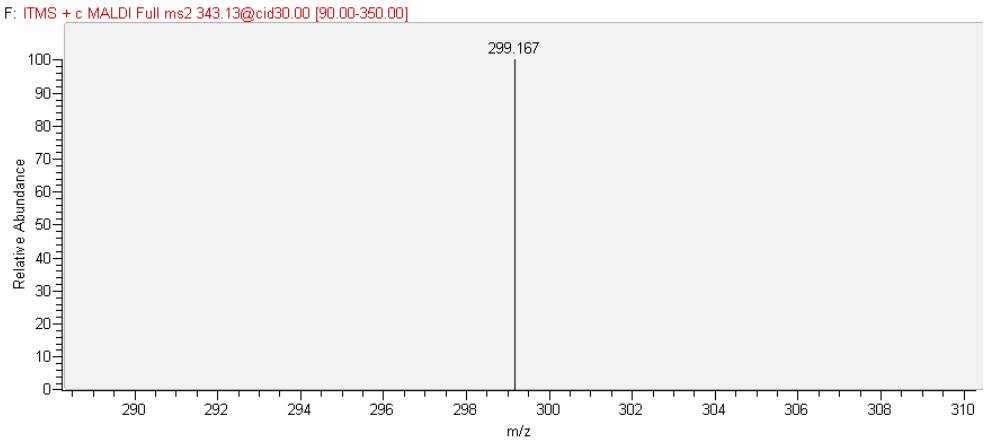

Figure 11: CNO experiment, parent ion of m/z 343.134 was selected for MS/MS fragmentation and shows a fragment at m/z 299.167.

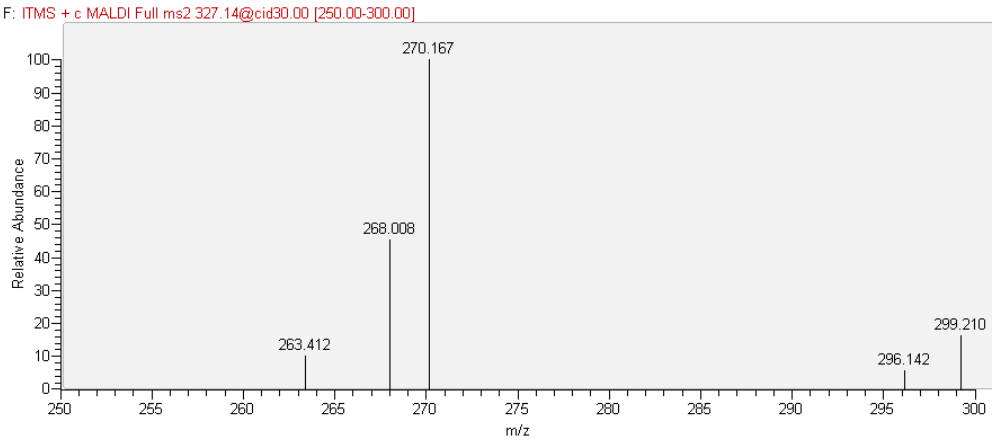

Figure 12: CNO experiment, parent ion of m/z 327.138 was selected for MS/MS fragmentation and shows a fragment at m/z 270.167.

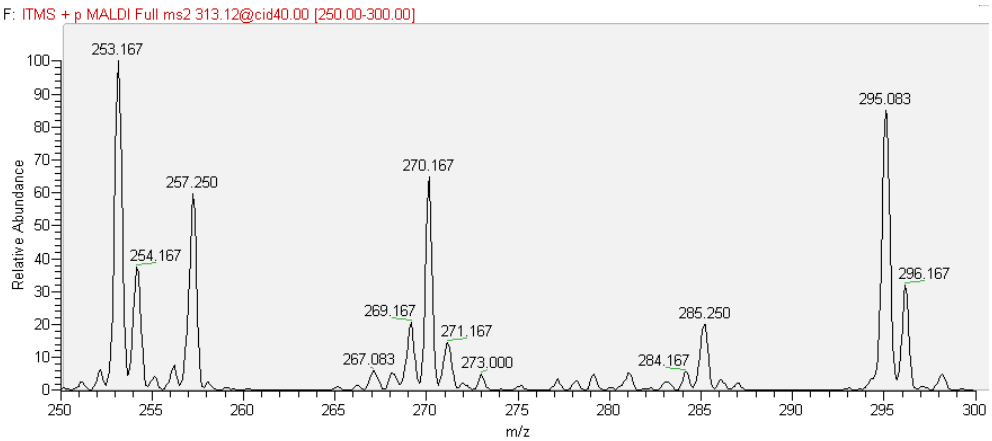

Figure 13: CNO experiment, parent ion of m/z 313.123 was selected for MS/MS fragmentation and shows a fragment at m/z 270.167.

MS/MS spectra for NDMC 15 min experiment is presented in Figure 14 where m/z 270.167 is present.
MS/MS spectra for NDMC 45 min experiment is presented in Figure 15 where m/z 270.167 is present.

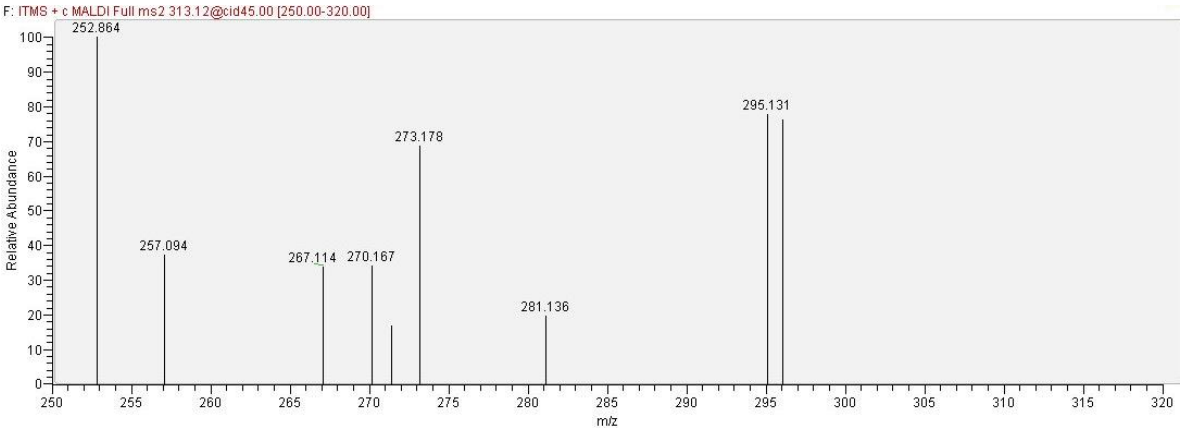

Figure 14: NDMC 15 min experiment, parent ion of m/z 313.123 was selected for MS/MS fragmentation and shows a fragment at m/z 270.167.

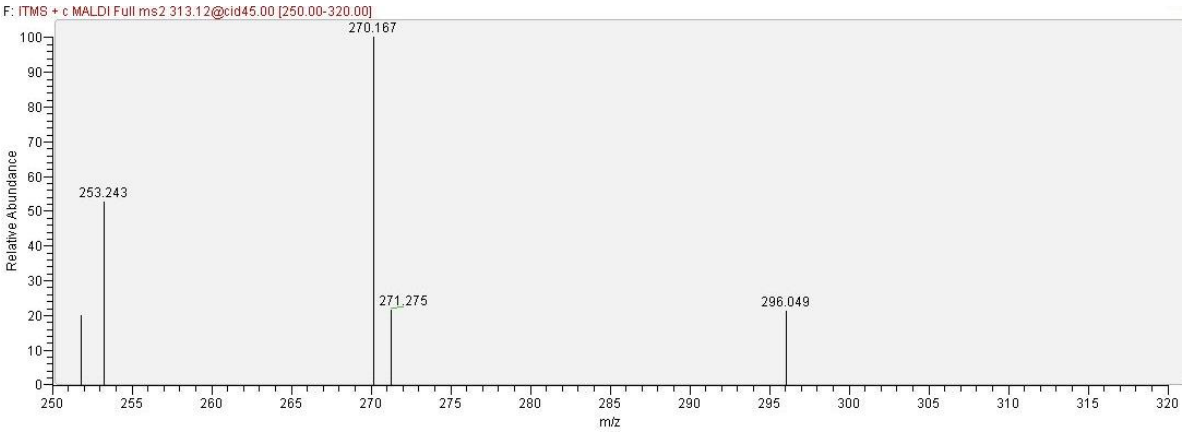

Figure 13: NDMC 45 min experiment, parent ion of m/z 313.123 was selected for MS/MS fragmentation and shows a fragment at m/z 270.167.

Overlays between H&E figures and corresponding ion intensity maps are presented in figure 7.

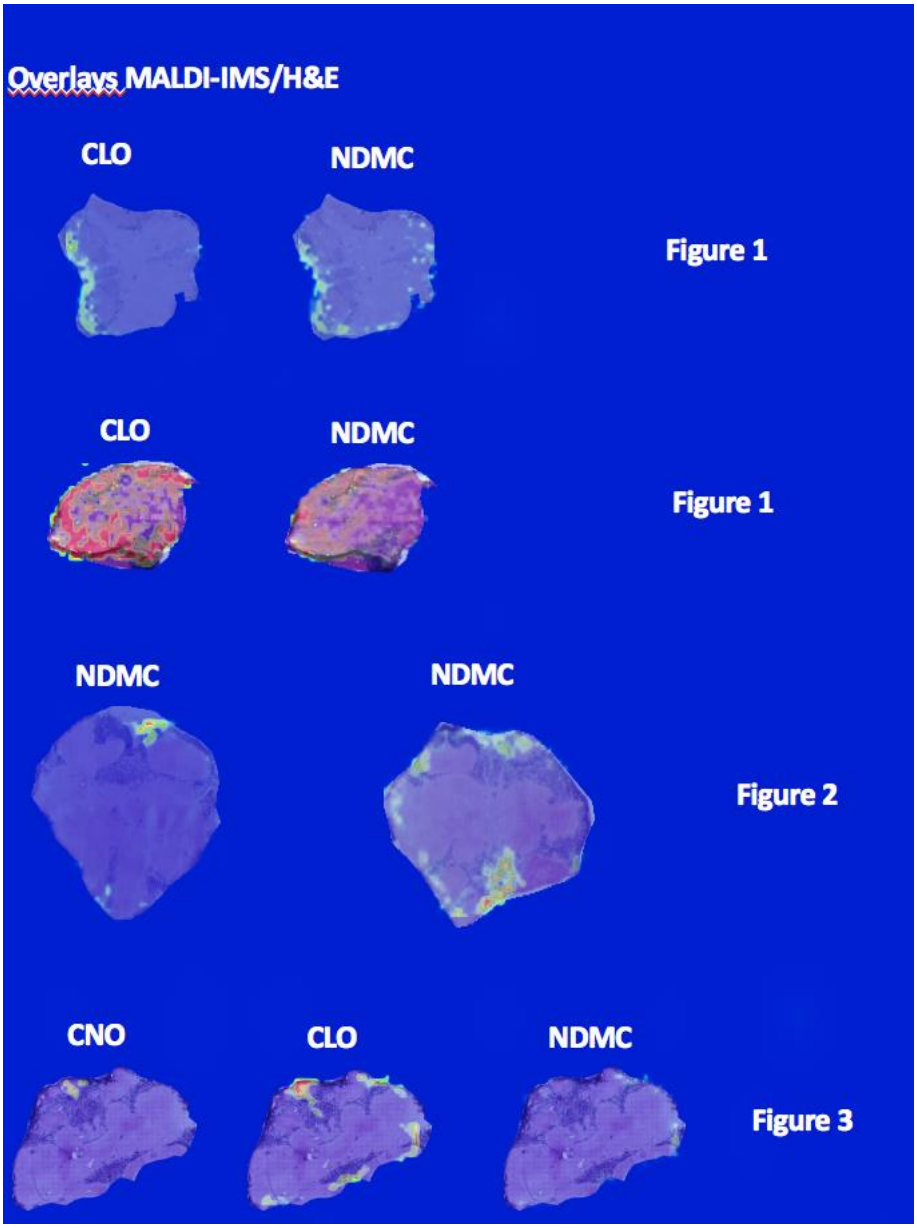

Figure 7: Overlay pictures between ion intensity maps and corresponding H&E pictures.