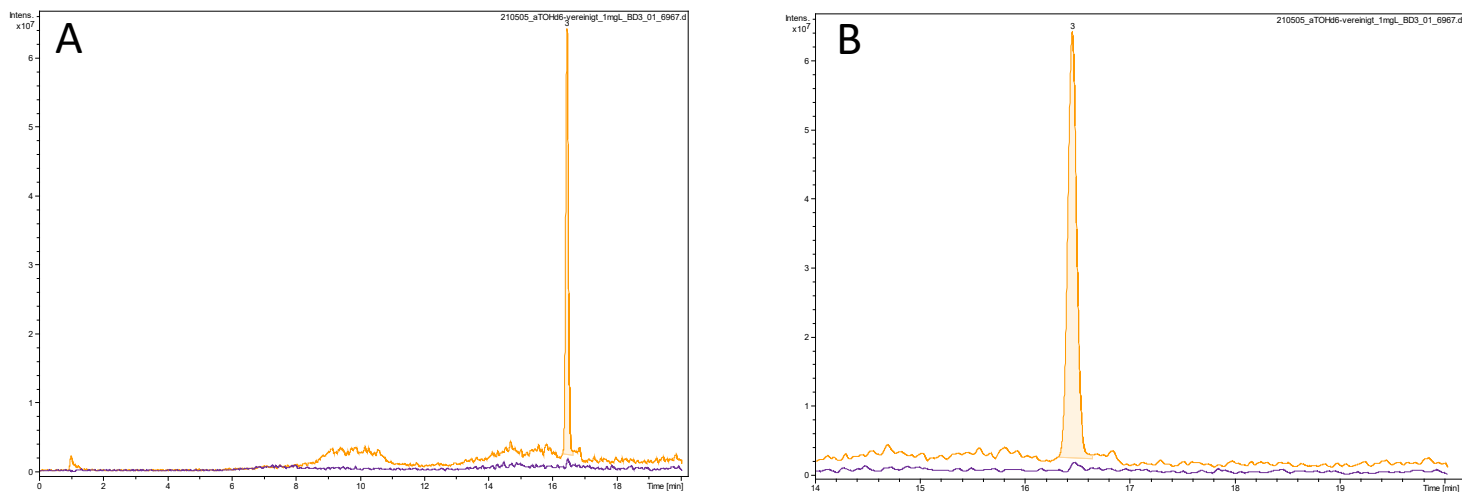
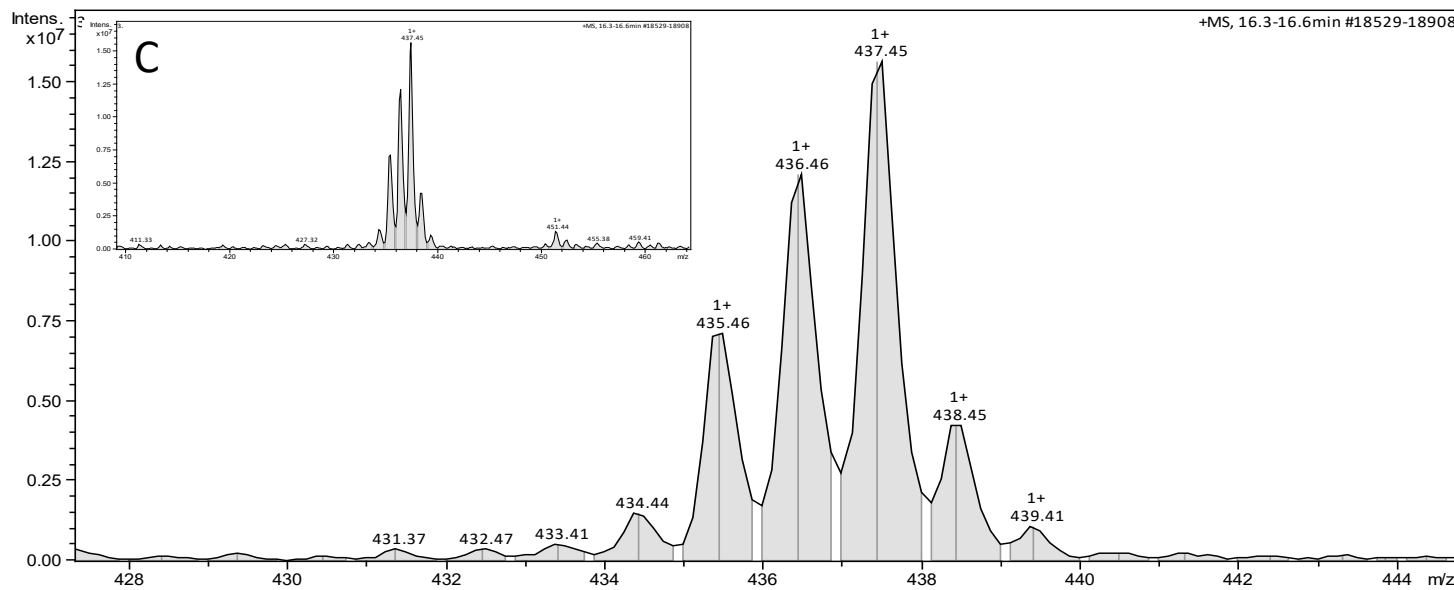


Figure S1

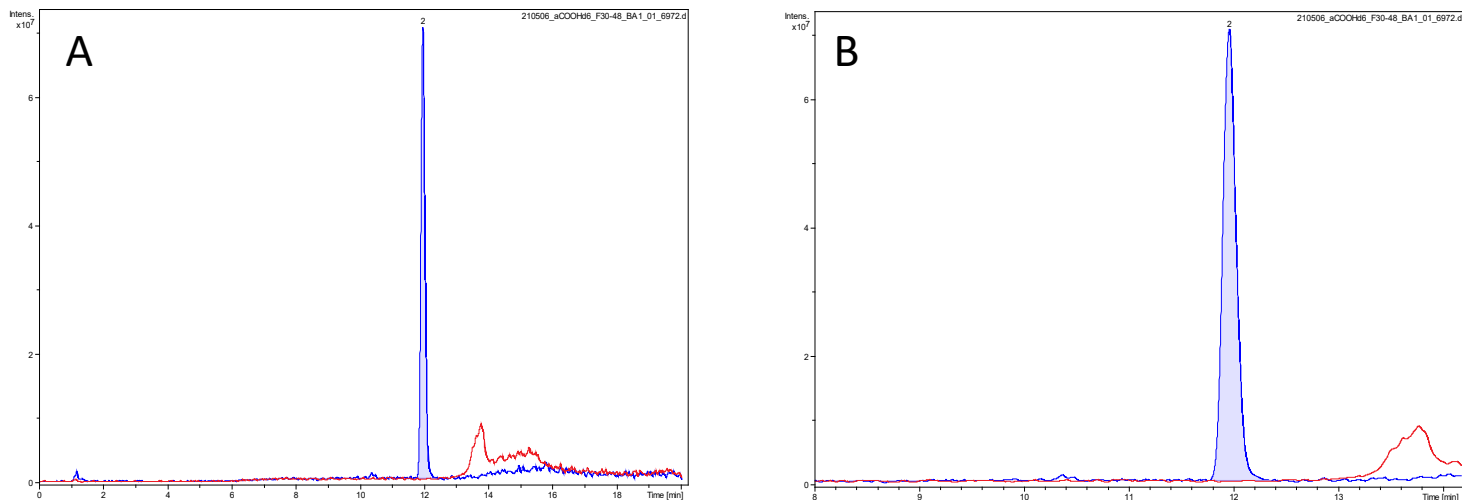
Evaluation of the Purity of D6- α -Tocopherol by LC-MS

A: Extracted Ion Chromatogram (EIC) showing D6- α -Tocopherol and unlabelled α -Tocopherol. **B** (zoomed section). Extracted Ion Chromatograms (EIC) of D6- α -Tocopherol ($[M+H]^+$, m/z 437.37, orange) and unlabelled α -Tocopherol ($[M+H]^+$, m/z 431.37, purple)

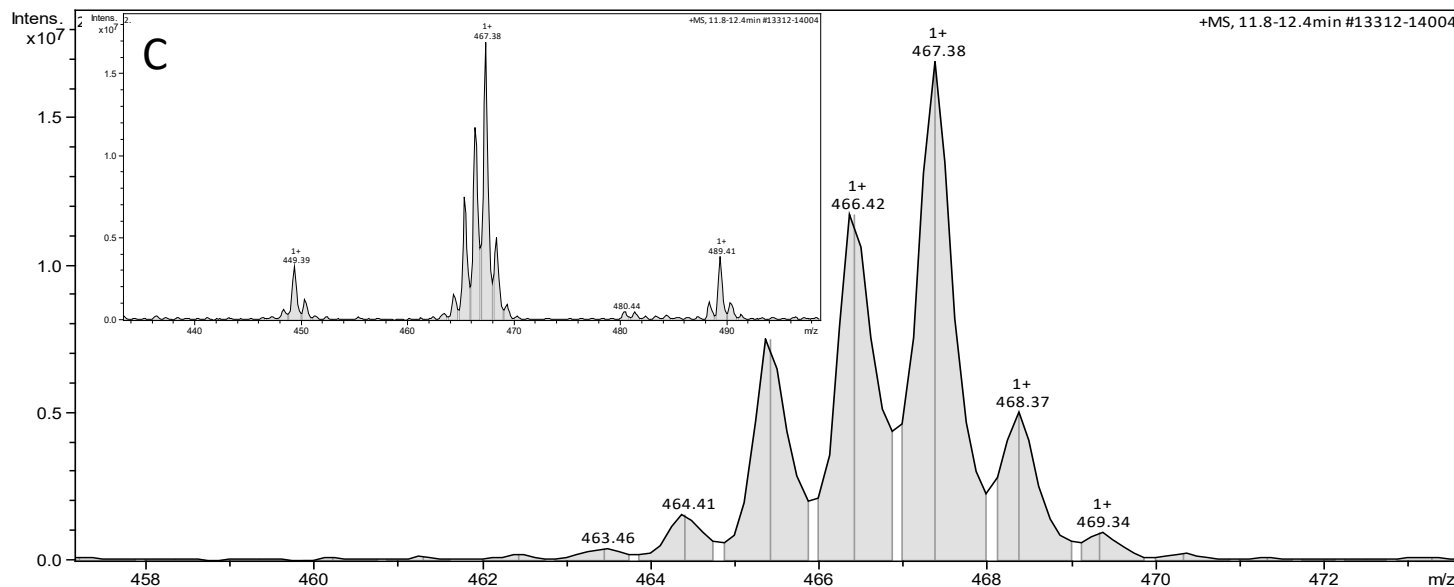


C: Dual Mass Spectrum of D6- α -Tocopherol, with the top left showing the same spectrum over an extended m/z range to display potential adduct ions. The larger spectrum is a highly zoomed-in view aimed at detecting non-labelled α -Tocopherol, which was detected ($[M+H]^+$, m/z 431.37) but is negligible. This confirms the high purity of D6- α -Tocopherol with minimal contamination from non-labelled α -Tocopherol.

Figure S2

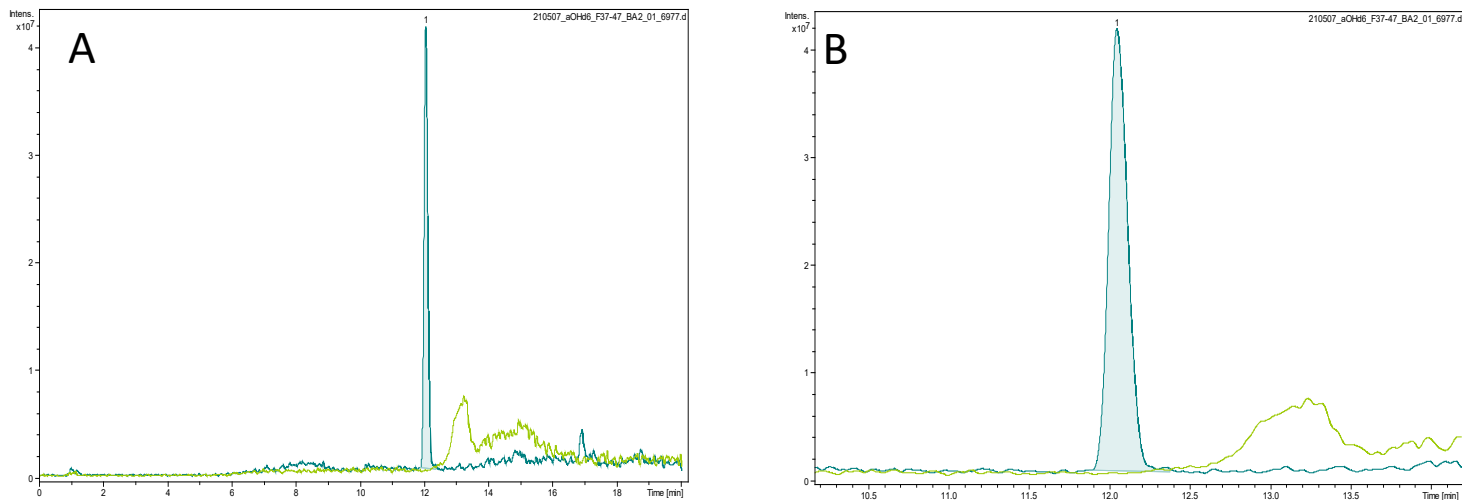
Evaluation of the Purity of D6- α -13'-COOH by LC-MS

A: Extracted Ion Chromatogram (EIC) showing D6- α -13'-COOH and unlabelled α -13'-COOH. **B** (zoomed section). Extracted Ion Chromatograms (EIC) of D6- α -13'-COOH ([M+H]⁺, m/z 467.38, blue) and unlabelled α -13'-COOH ([M+H]⁺, m/z 461.37, red)

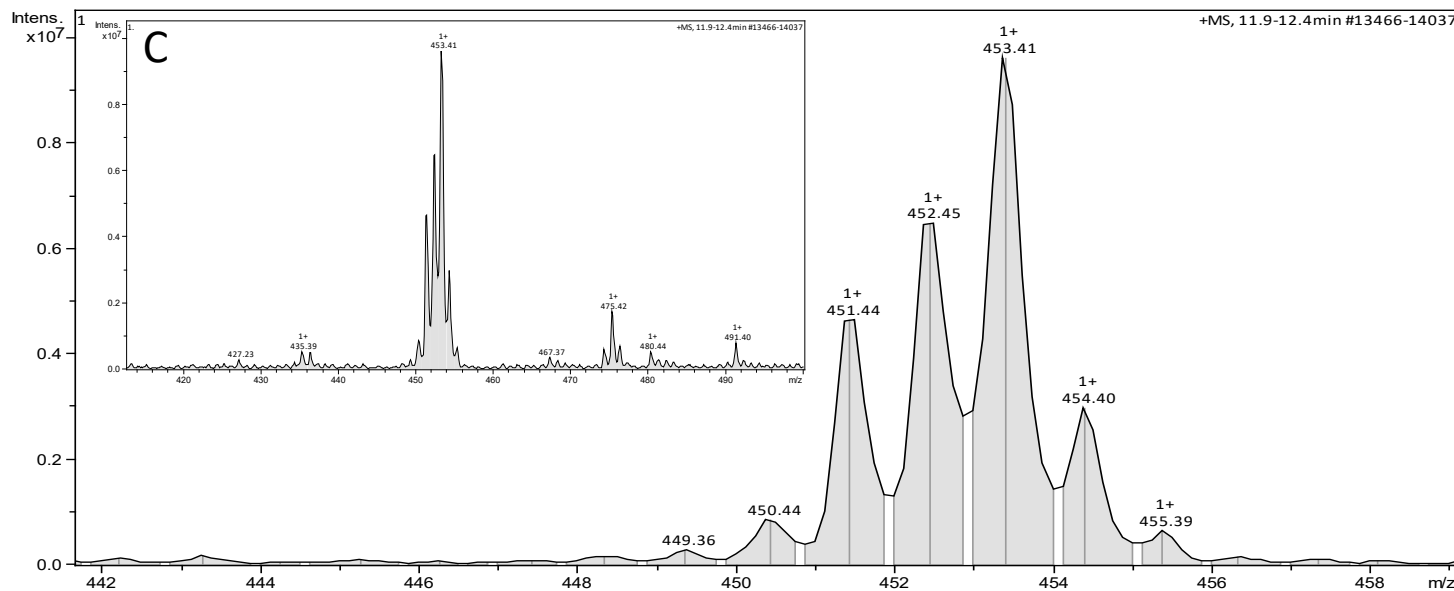


C: Dual Mass Spectrum of D6- α -13'-COOH, with the top left showing the same spectrum over an extended m/z range to display potential adduct ions. The larger spectrum is a highly zoomed-in view aimed at detecting any possible non-labelled α -13'-COOH ([M+H]⁺, m/z 461.37), which was not observed. This confirms the high purity of D6- α -13'-COOH.

Figure S3

Evaluation of the Purity of D6- α -13'-OH by LC-MS

A: Extracted Ion Chromatogram (EIC) showing D6- α -13'-OH and unlabelled α -13'-OH. **B** (zoomed section). Extracted Ion Chromatograms (EIC) of D6- α -13'-OH ([M+H]⁺, m/z 453.37, petrol) and unlabelled α -13'-OH ([M+H]⁺, m/z 447.37, green)



C: Dual Mass Spectrum of D6- α -13'-OH, with the top left showing the same spectrum over an extended m/z range to display potential adduct ions. The larger spectrum is a highly zoomed-in view aimed at detecting any possible non-labelled α -13'-OH ([M+H]⁺, m/z 447.37), which was not observed. This confirms the high purity of D6- α -13'-OH.

Table S1

Purity Results of synthesized labelled Standards

D6- α -TOH

compound	RT [min]	Chromatogram	Area	Area %
D6- α -TOH	16.8	EIC 467.30 +All MS,	365570784	100.00
α -TOH	16.8	EIC 461.30 +All MS,	3666981	1.00
Purity of D6- α -TOH:		99.0 % (impurity with α -TOH 1.00%)		

D6- α -13'-COOH

compound	RT [min]	Chromatogram	Area	Area %
D6- α -13'-COOH	12.0	EIC 467.30 +All MS,	629785344	100.00
α -13'-COOH	12.0	EIC 461.30 +All MS,	1383596	0.22
D6- α -13'-OH	12.8	EIC 453.30 +All MS,	25354578	4.01
α -13'-OH	12.8	not detectable < S/N		
Purity of D6- α -13'-COOH:		95.9 % (minor impurity of D6- α -13'-OH 3.8%)		

D6- α -13'-OH

compound	RT [min]	Chromatogram	Area	Area %
D6- α -13'-OH	12.0	EIC 453.30 +All MS,	629785344	100.00
α -13'-OH	12.0	EIC 447.30 +All MS,	1383596	0.21
D6- α -13'- COOH	11.3	EIC 467.30 +All MS,	not detectable < S/N	
α -13'-COOH	11.3	EIC 461.30 +All MS,	not detectable < S/N	
Purity of D6- α -13'-OH:		99.8 %		