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## Development of a method for quantitative profiling of the carnitine family by LC-HRMS

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Justine Bertrand Michel

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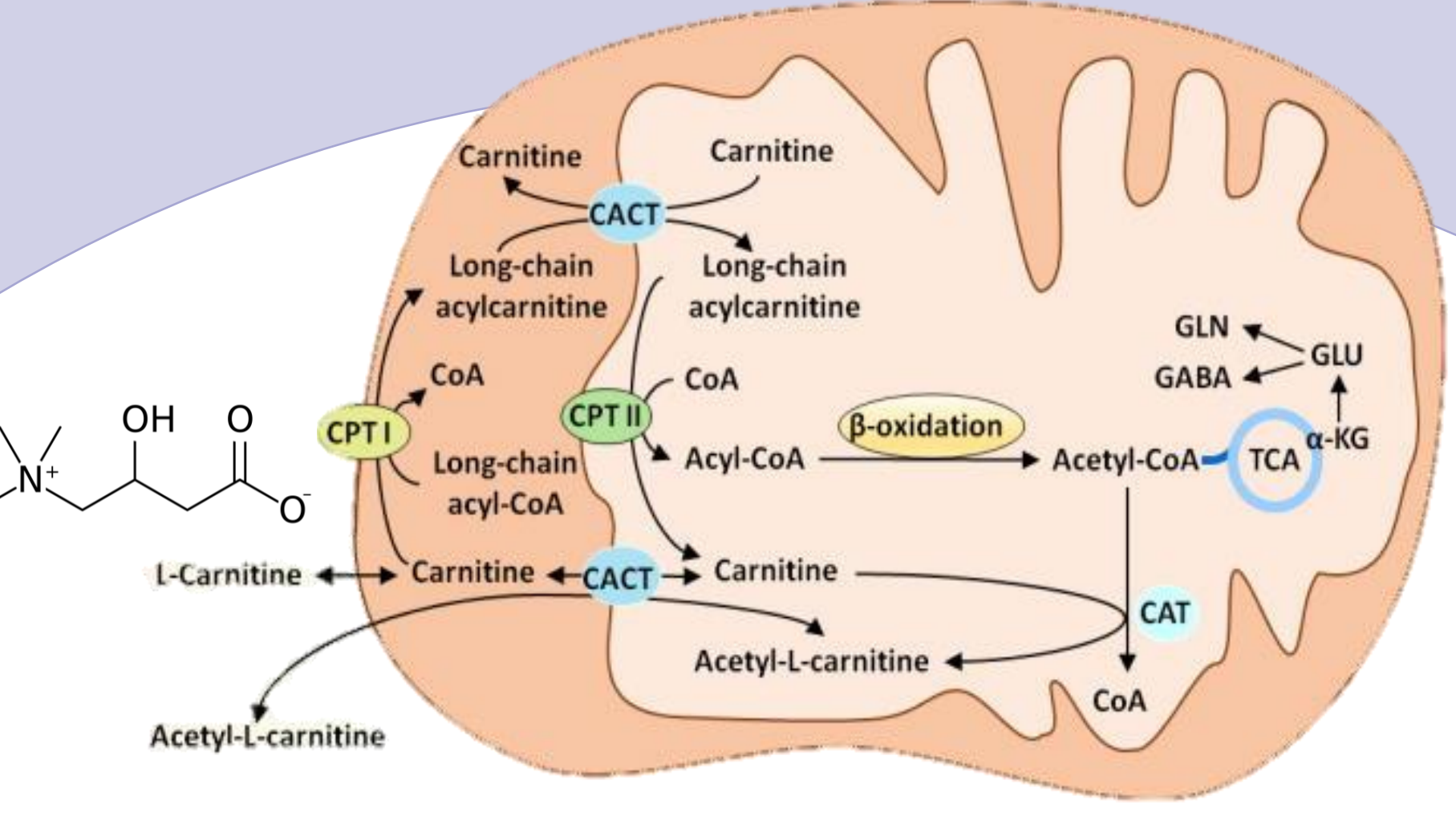
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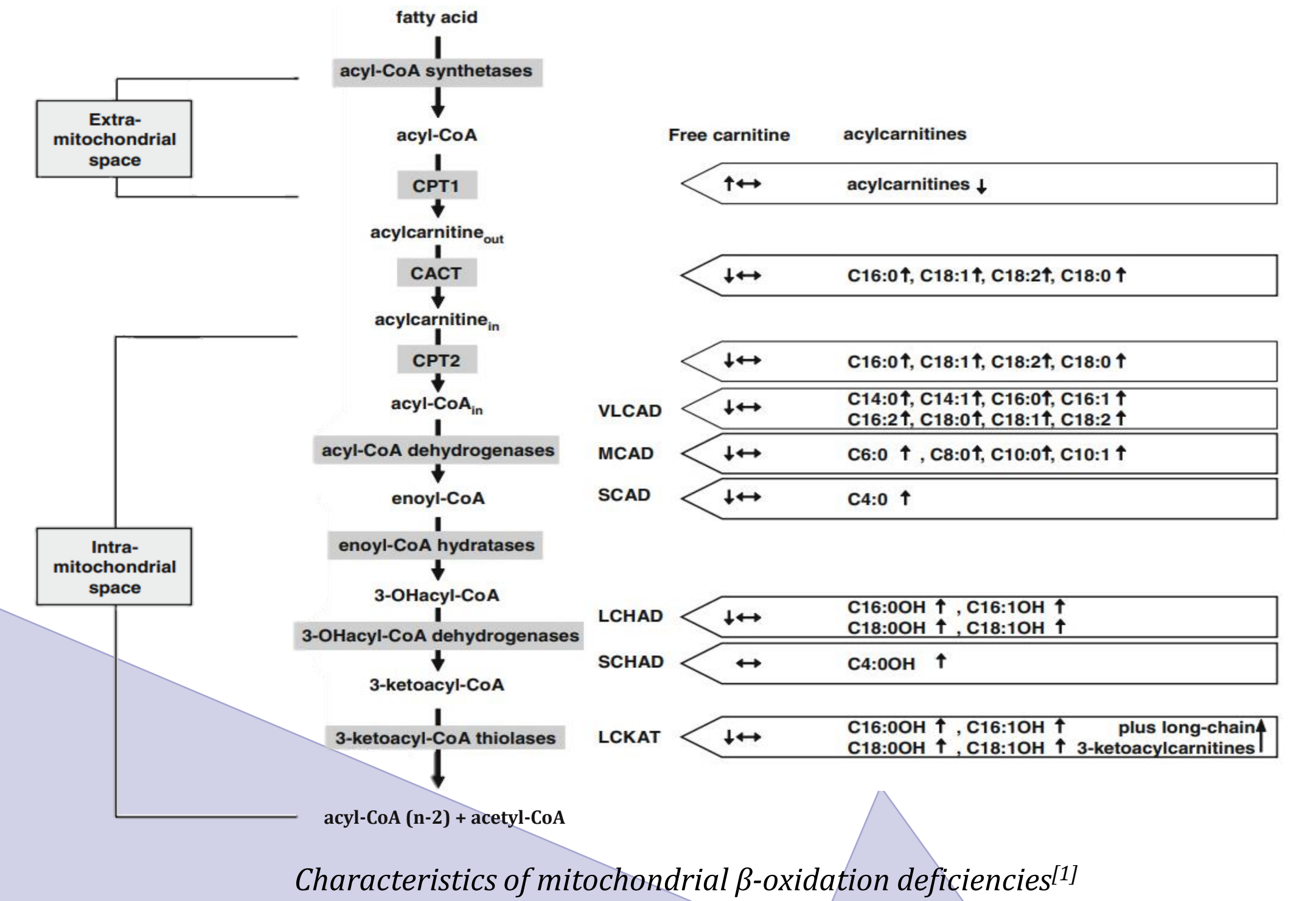
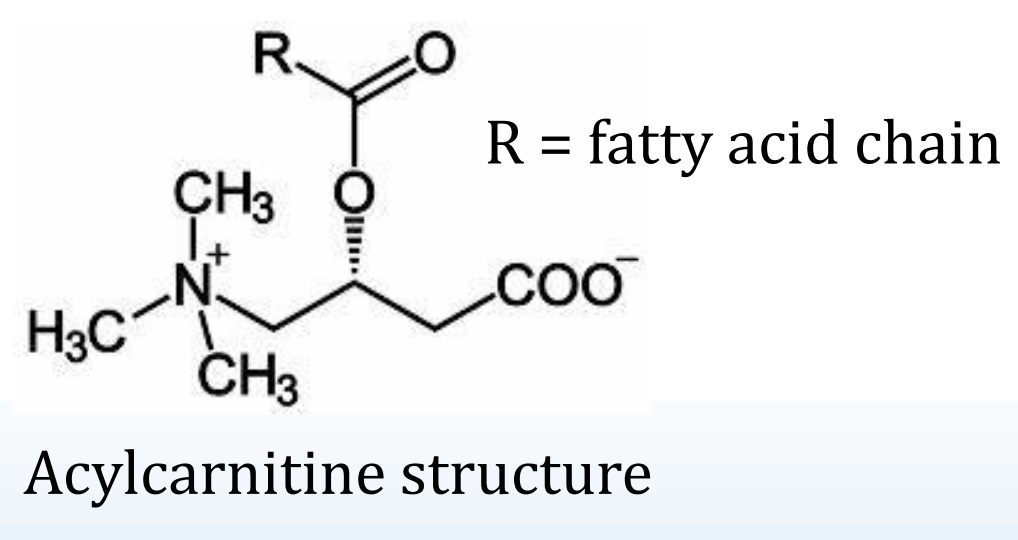
**β-oxidation cycle**



**Pathologies**

Carnitine and its derivatives are key partners in physiology. Deregulations can generate pathologies.

- Free L-carnitine deficiency
- Mitochondrial β-oxidation anomalies
  - Carnitine cycle anomaly
  - β-oxidation cycle anomaly

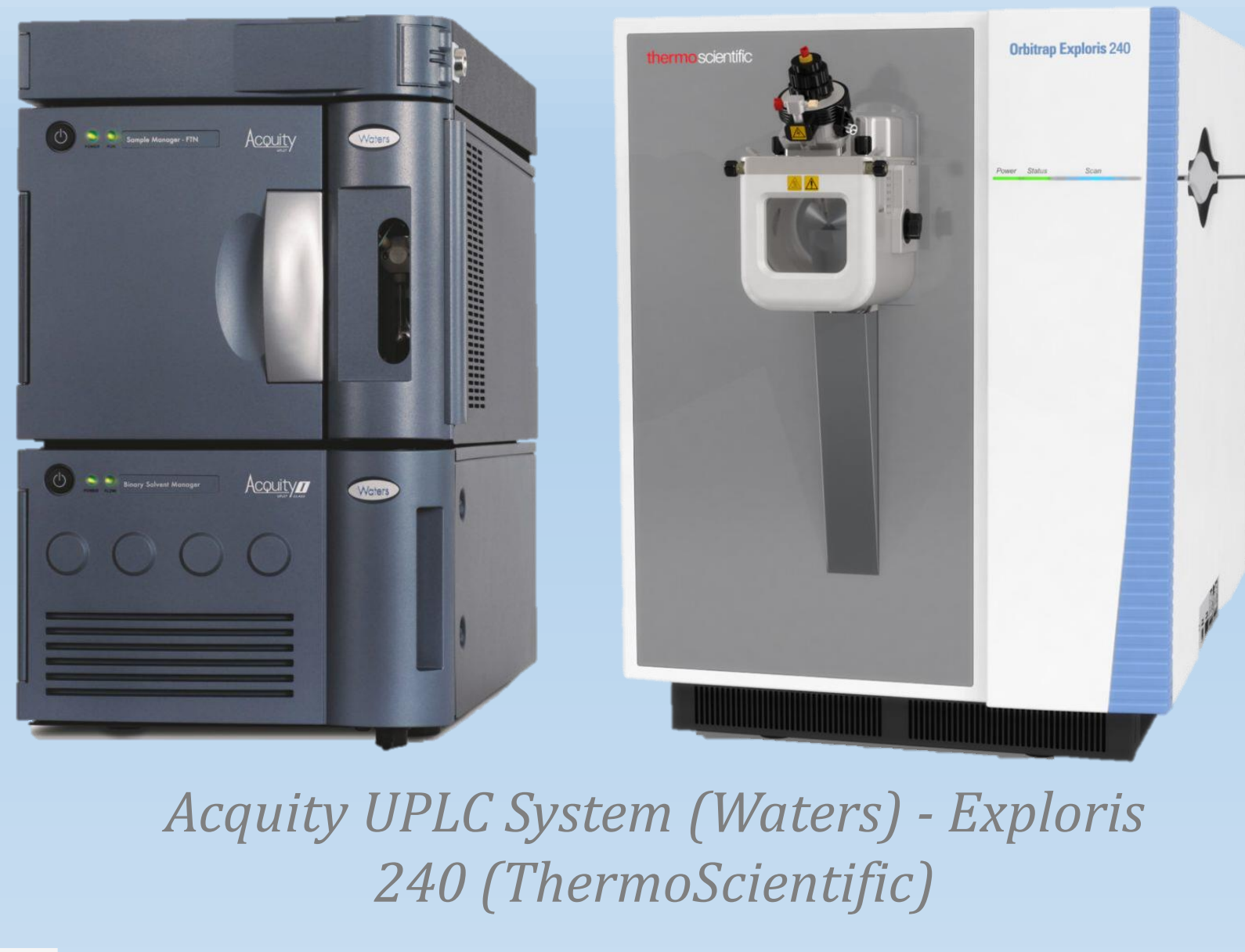
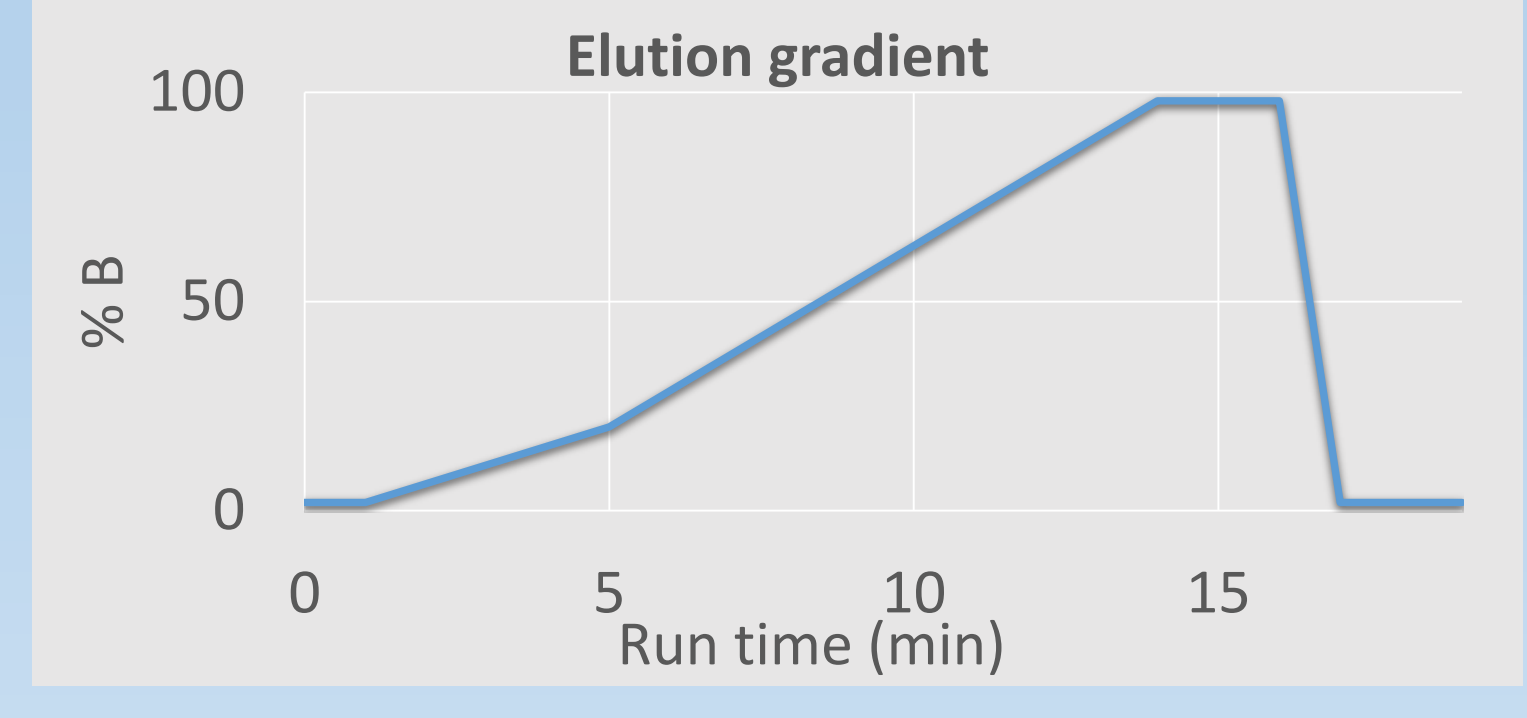


**Why study acylcarnitines profile ?**

Acylcarnitines have an important role in metabolism and are markers of several deficiencies : profiles are different depending on the anomaly. Measuring them in blood or plasma is essential to understand metabolism and could be a powerful diagnostic tool.

**Development of the analytical method<sup>[2]</sup>**

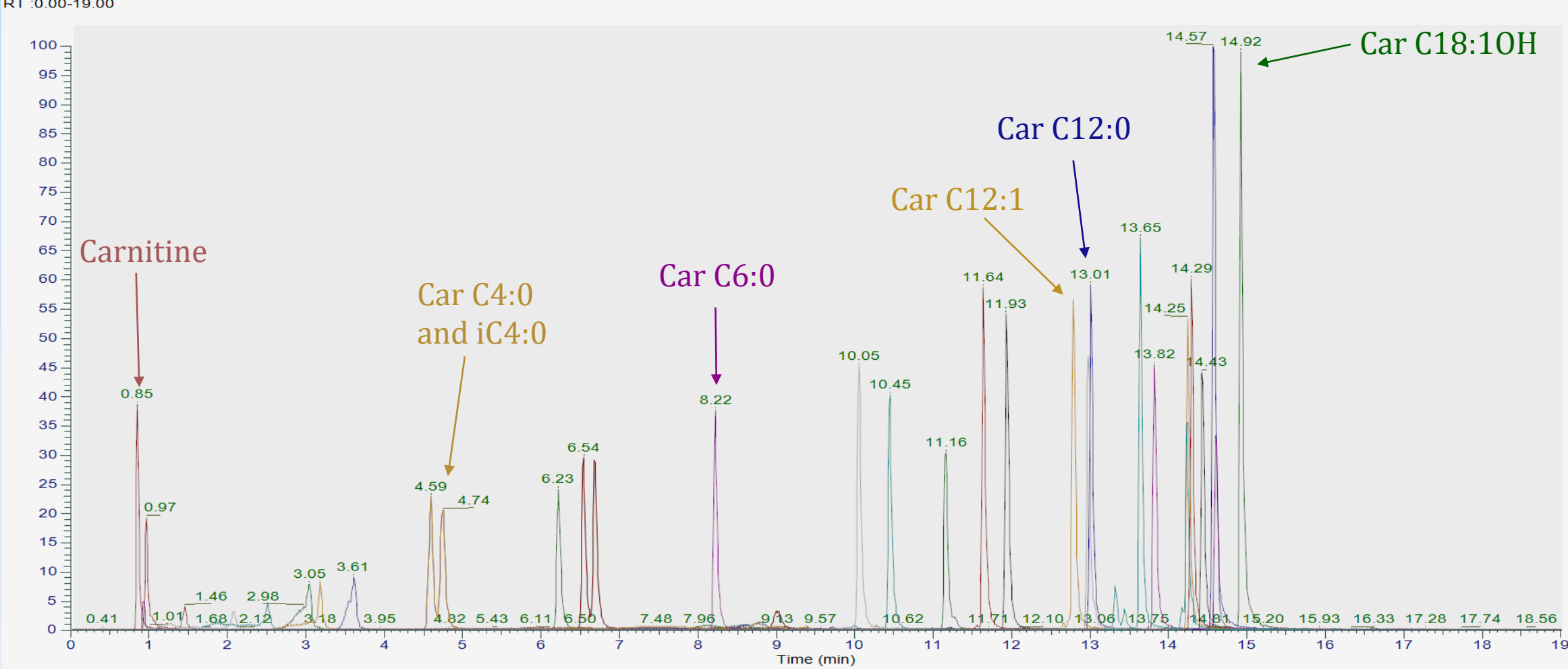
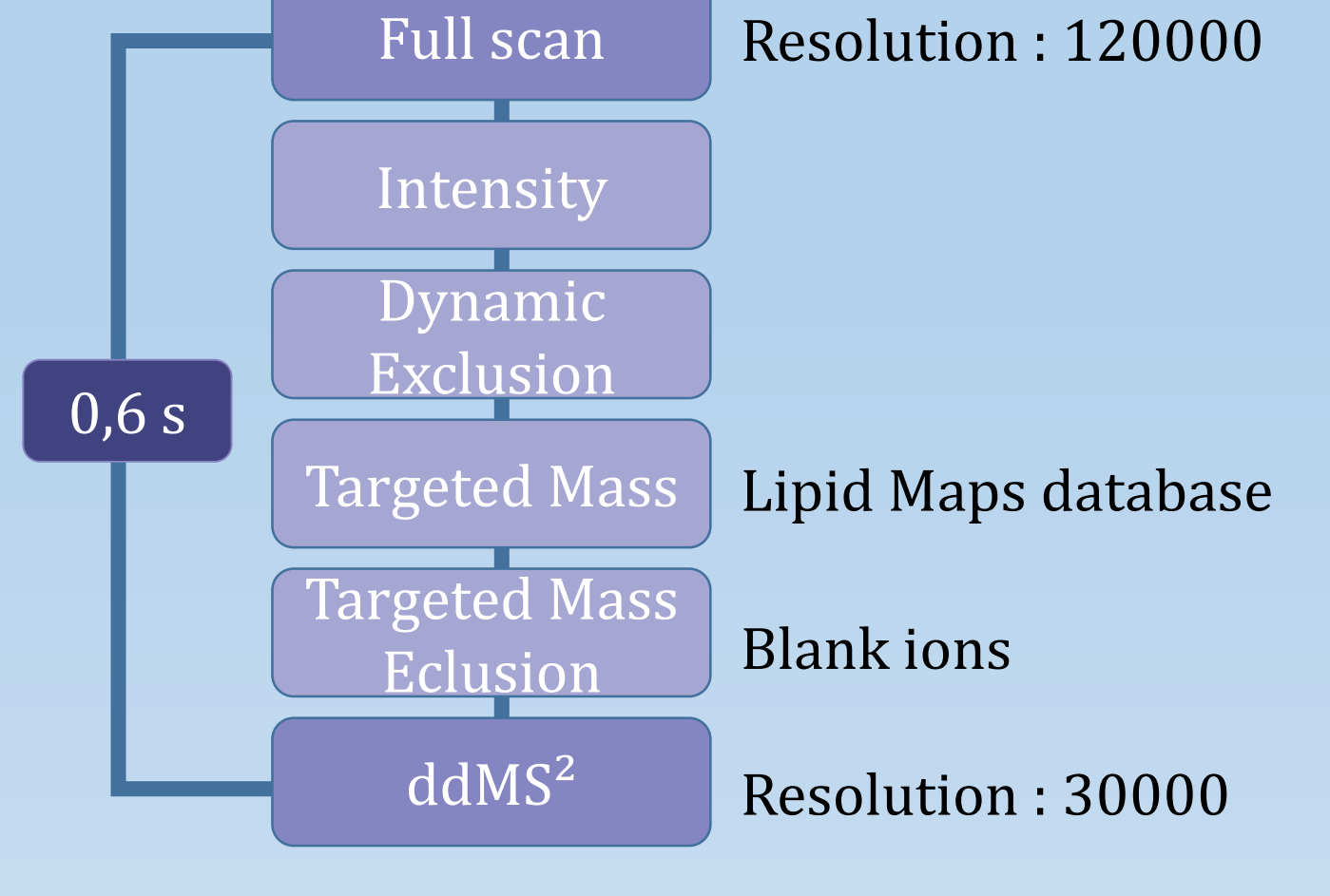
Column : Acquity Premier HSS T3 1,8 μm 2,1\*100 mm  
 A : H<sub>2</sub>O, 5 mM Ammonium acetate, 0,1% formic acid  
 B : MeOH, 5 mM Ammonium acetate, 0,1% formic acid  
 Flow rate : 0.3 mL/min  
 T<sub>oven</sub> : 40°C



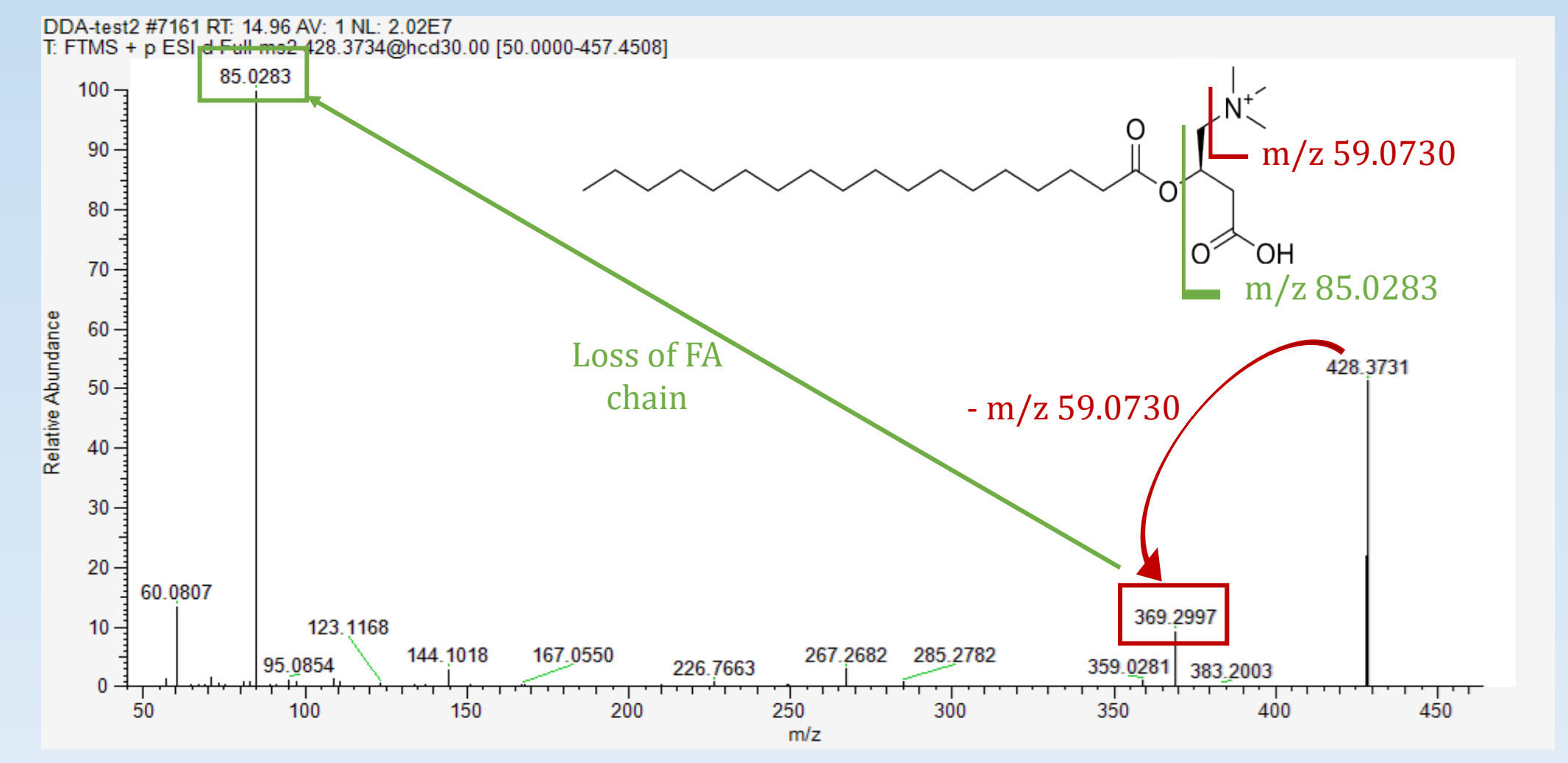
**Source parameters**

Positive ion = 3500 V  
 Sheath gas = 50  
 Auxiliary gas = 10  
 Sweep gas = 1  
 T<sub>ion transfer tube</sub> = 325°C  
 T<sub>vaporizer</sub> = 350°C

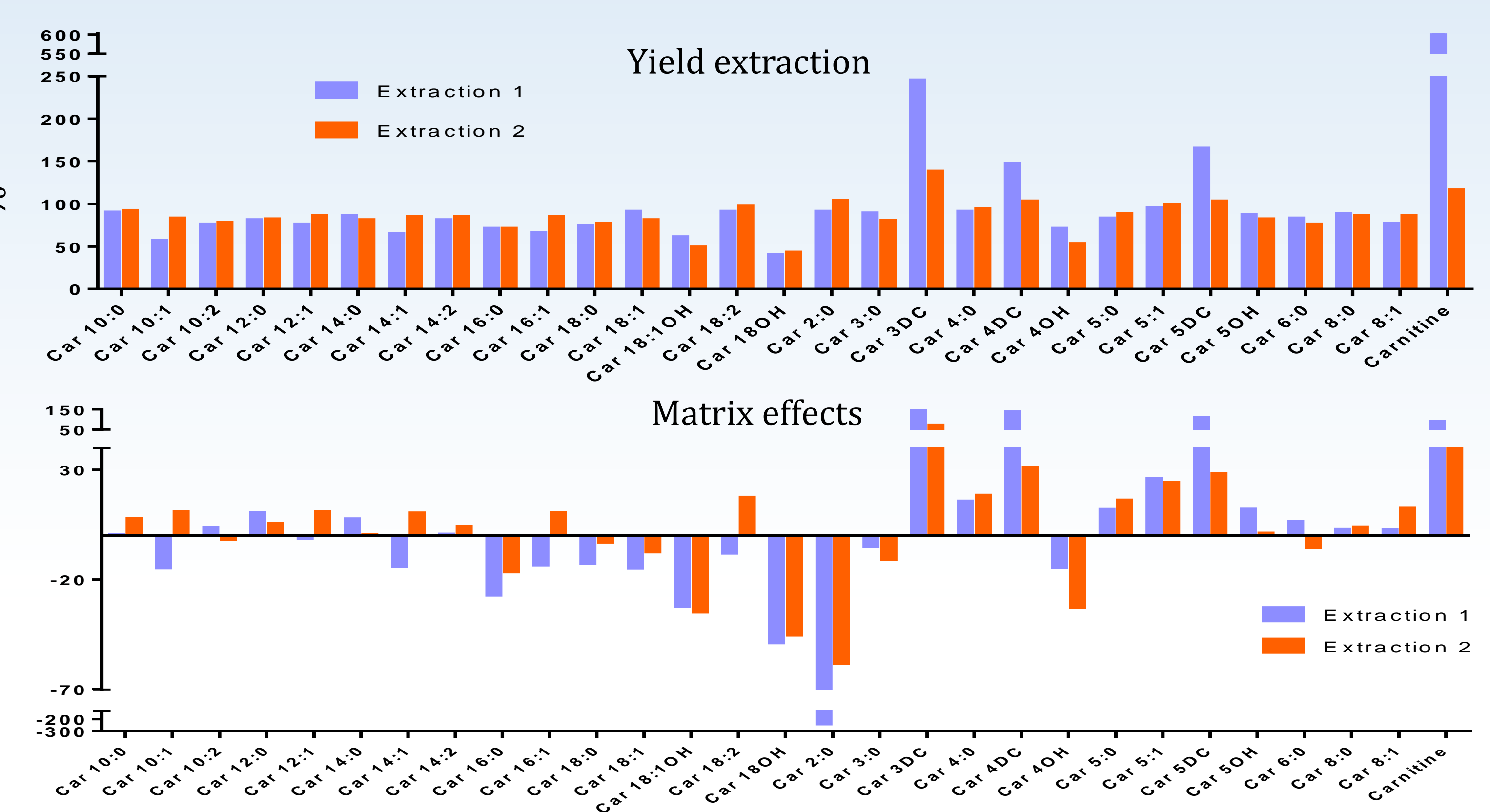
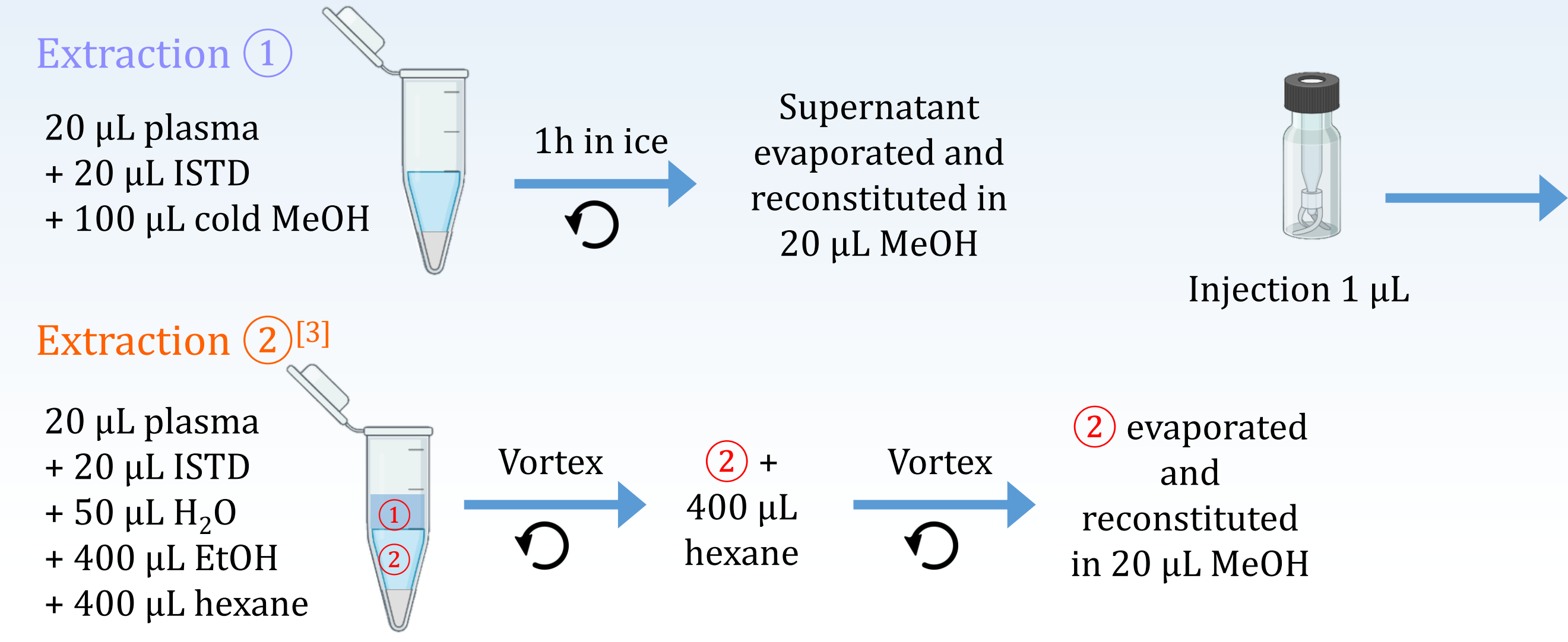
**Scan parameters : DDA acquisition**



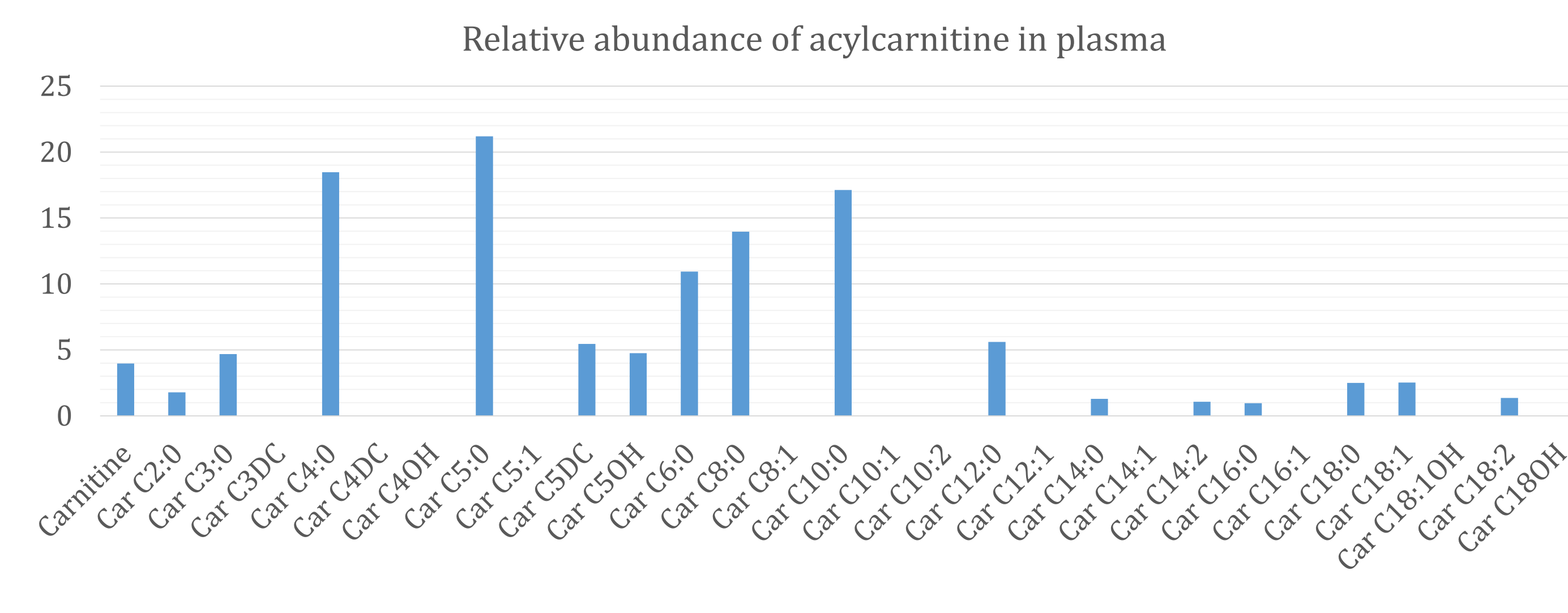
→ Carnitine and 30 acylcarnitines separated in 19 min  
 → Analyse of short and long acylcarnitines: from 2C to 18C, saturated, unsaturated, hydroxylated and dicarboxylated  
 → 3 internal standards : Carnitine-d9, car C2:0-d3, car C18:1-d3



**Samples preparation**



→ Plasmatic composition : relative abundance =  $\frac{\text{Compound area}}{\text{ISTD area}}$



**Conclusion and perspectives**

- The method developed allows a **good separation of the acylcarnitine family**.  
 → LOD, LOQ, linearity still need to be determined to validate the method.
  - **Extraction 2** seems to offer better results than extraction 1.  
 → Extraction steps could be simplified to reduce time extraction.
- This new profiling will be offered as a service on MetaToul. It will also be use to follow the **13C-labelled acylcarnitines in the context of fluxomic experiments**. It will be an important complement to the profile of labelled fatty acids already proposed.

**References**

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 [2] C. Roy et al./J. Chromatogr. B 1027 (2016) 40-49  
 [3] Détermination du profil des acylcarnitines plasmatiques par spectrométrie de masse en tandem : développement de la technique et intérêt pour le diagnostic de maladies héréditaires du métabolisme. Sciences pharmaceutiques. 2011, ddumas-00640975

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