

Determination of gangliosides in human serum and cerebral organoids

MUNI

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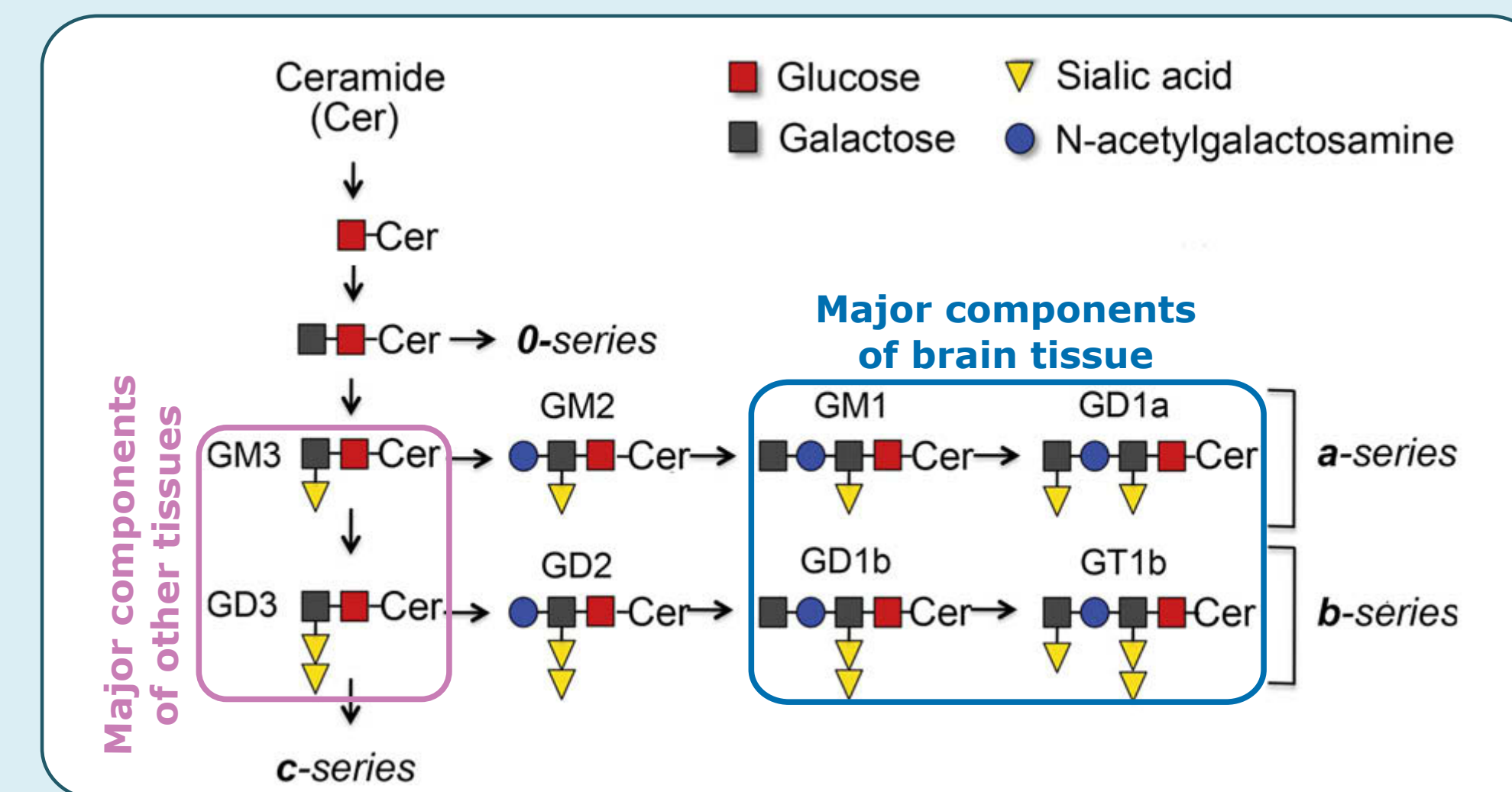
INTRODUCTION

Gangliosides (GSs), sialic acid-containing glycosphingolipids, are essential components of cellular membranes, especially in neuronal cells. Besides affecting the function of the membrane, these amphiphilic lipids modulate a variety of biological functions through transmembrane signalling.¹

The content and composition of GSs change during aging, poses the most important risk factor for several neurodegenerative diseases.²

Cerebral organoids are an emerging model to study changes in the composition of membrane GSs associated with the neurological diseases.

Brain tissue levels of GSs are correlated with levels in peripheral blood. Thus human serum levels of GSs could serve as a clinically relevant marker.

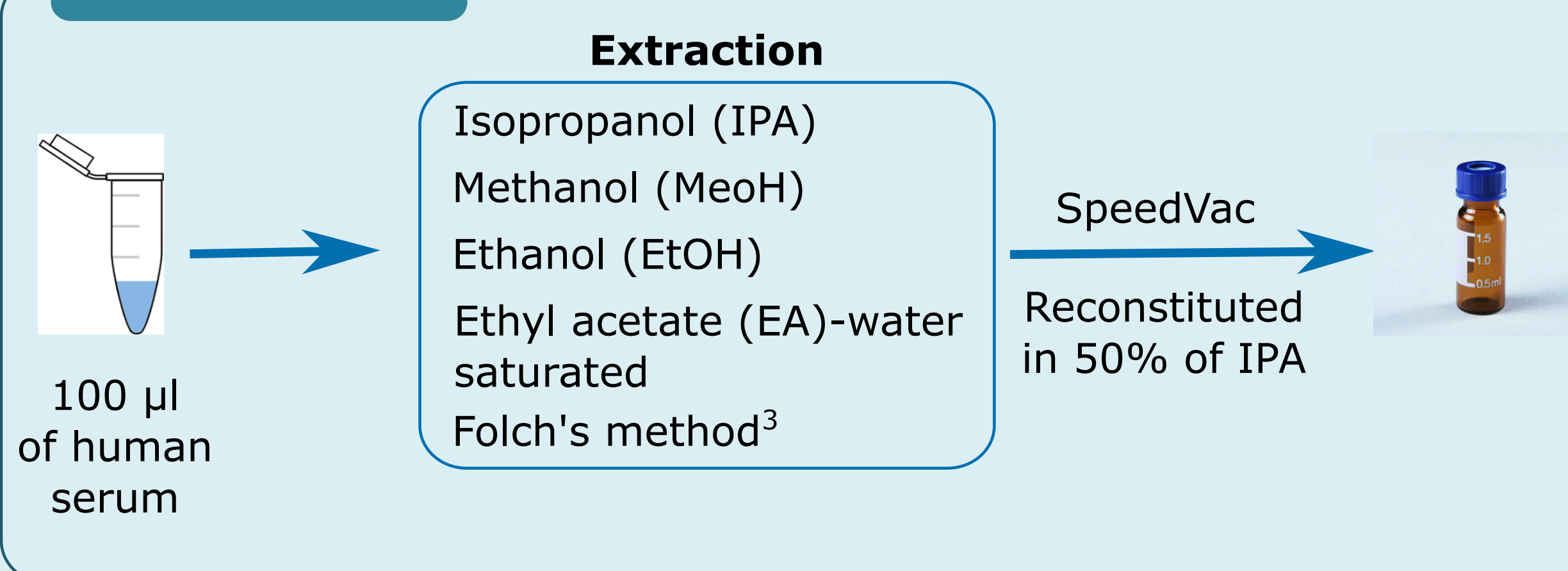


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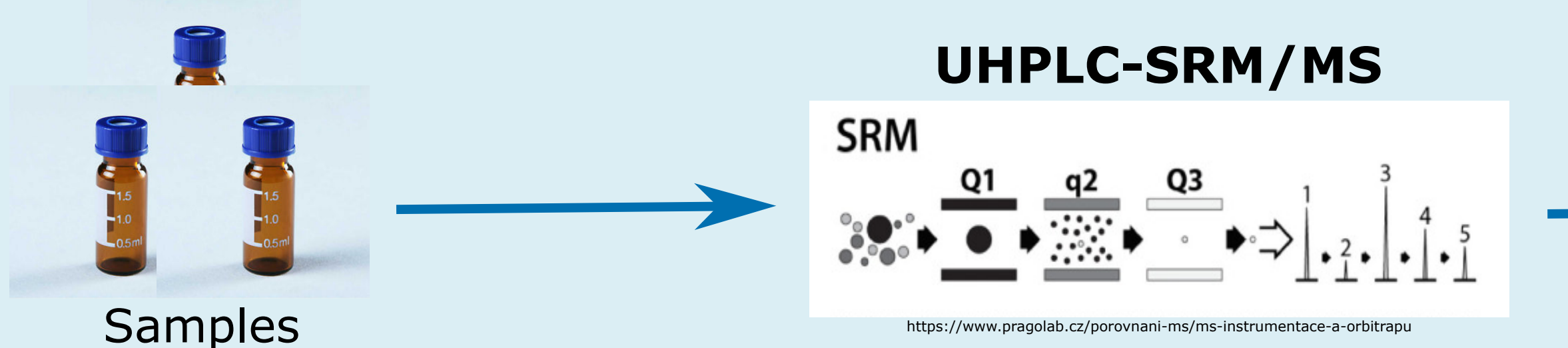
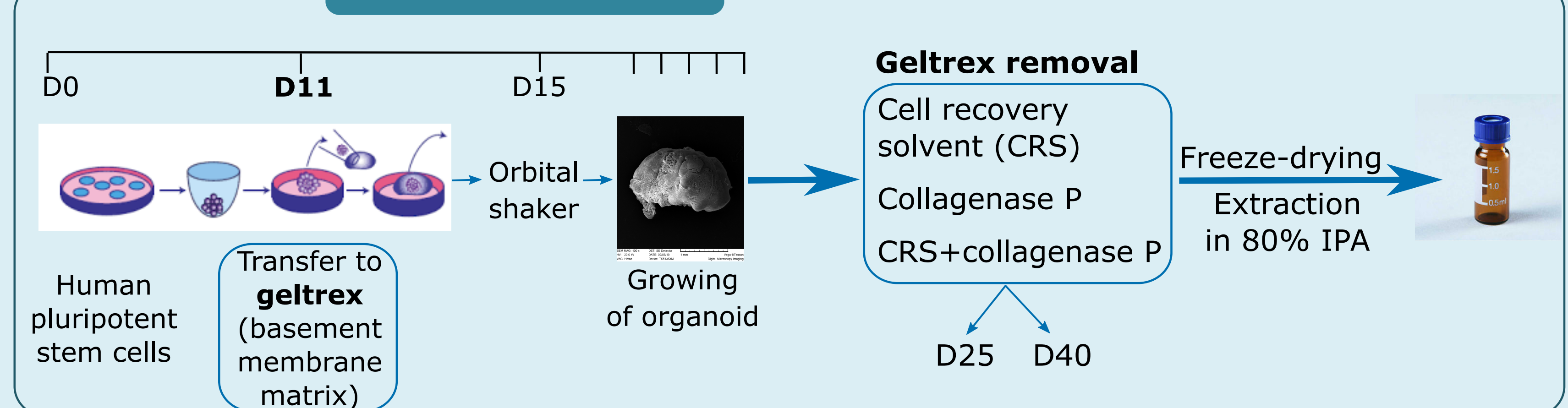
The primary aim of our study was to develop an analytical protocol for extraction and quantification of selected GSs (aGM1, GM1, GM2, GM3, GD1a, GD1b, GT1b, GQ1b, GD2, and GD3; d18:1/18:0) in human serum and tissue from cerebral organoids.

METHODS

Human serum

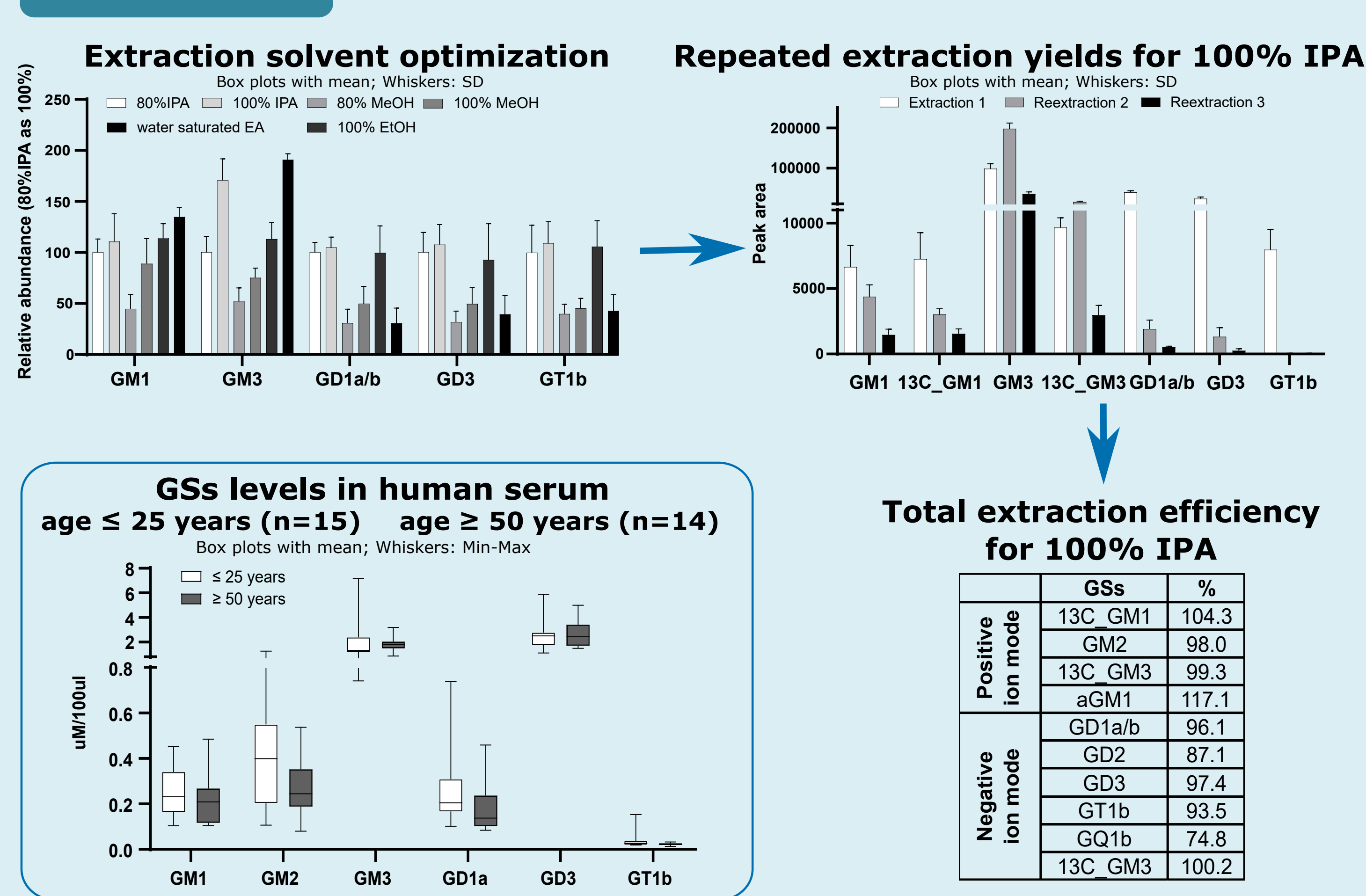


Cerebral organoids

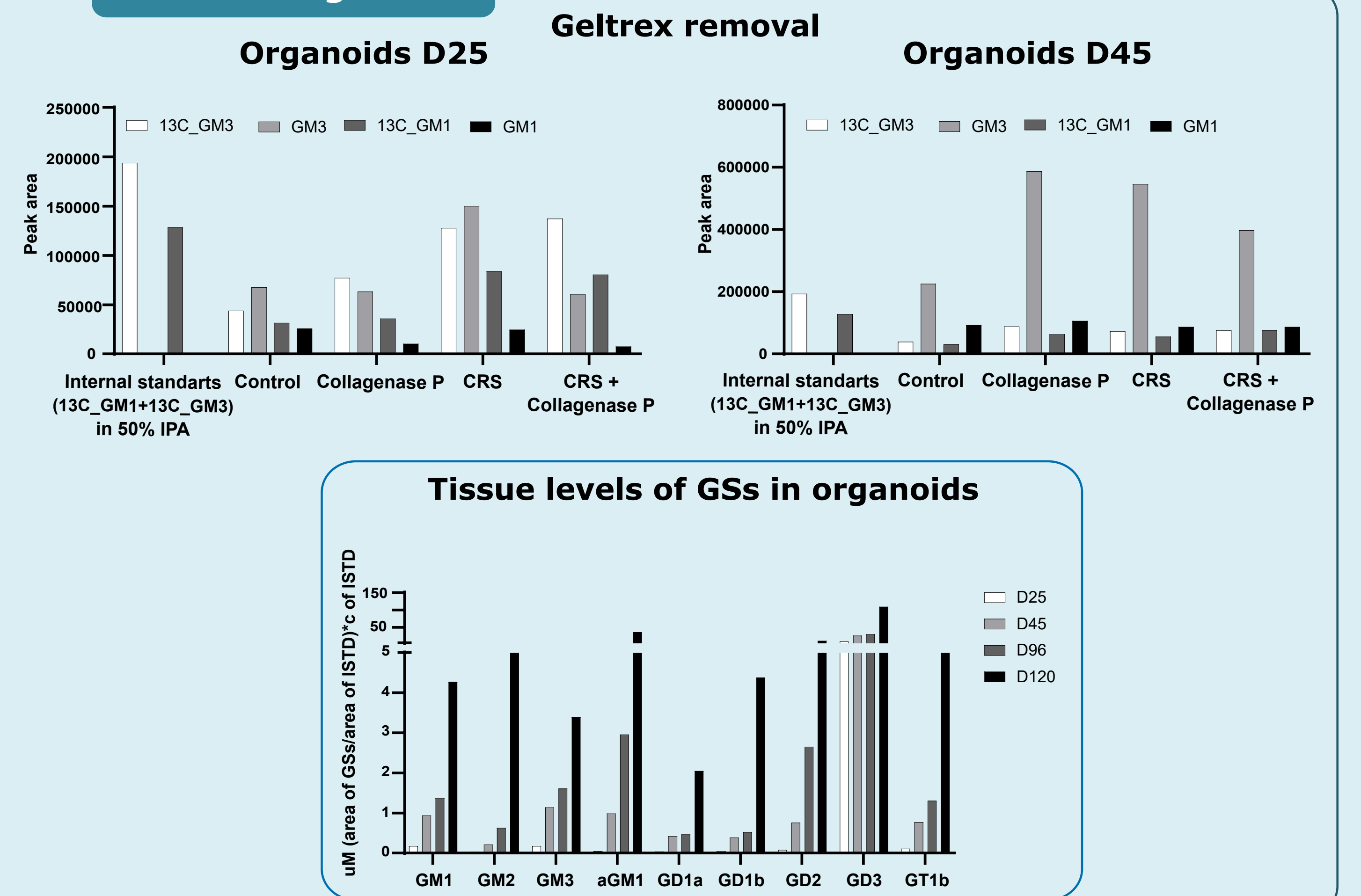


RESULTS

Human serum



Cerebral organoids



CONCLUSIONS

Human serum

- Optimal extraction efficiency of tested GSs achieved in 100% IPA.
- Human serum levels determined in two groups - ≤ 25 years of age and ≥ 50 years of age.
- Preliminary data showed decreasing levels of GSs derived from brain tissue due to aging.

Cerebral organoids

- Removal of geltrex is essential before UHPLC/MS analysis as it negatively affects signal intensity.
- Cell recovery solvent (CRS) resulted in an optimal intensity of all tested GSs.

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