

Supplementary Information for the article

Rapid size fractionation of metal species in paired human serum and cerebrospinal fluid samples using ultrafiltration with off-line element selective detection

Volker Nischwitz ^{a,*}, Achim Berthele ^b, Bernhard Michalke ^a

^a Helmholtz Zentrum München, Institute of Ecological Chemistry, 85764 Neuherberg, Germany

^b Department of Neurology, Technische Universität München, Klinikum rechts der Isar, 81675 Munich, Germany

* Corresponding author: volker.nischwitz@helmholtz-muenchen.de

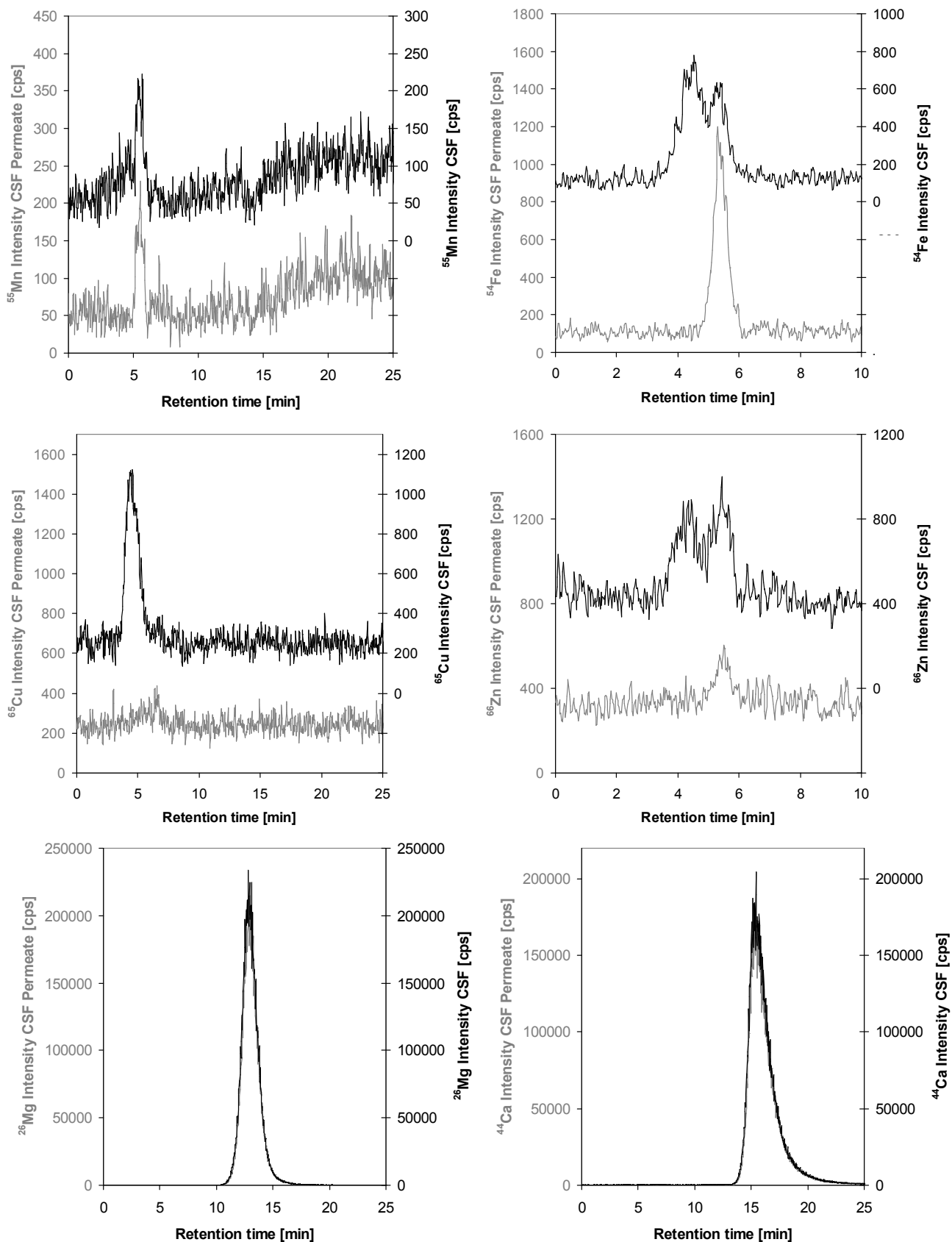


Figure A SEC-ICP-MS chromatograms of a CSF sample (black) and the associated CSF permeate (grey) for Mn, Fe, Cu, Zn, Ca and Mg (3-point average smoothing was applied for Mn, Fe, Cu and Zn; for Fe and Zn only the interesting part of the chromatogram until 10 minutes retention time is shown, no peaks were observed later than 10 minutes).

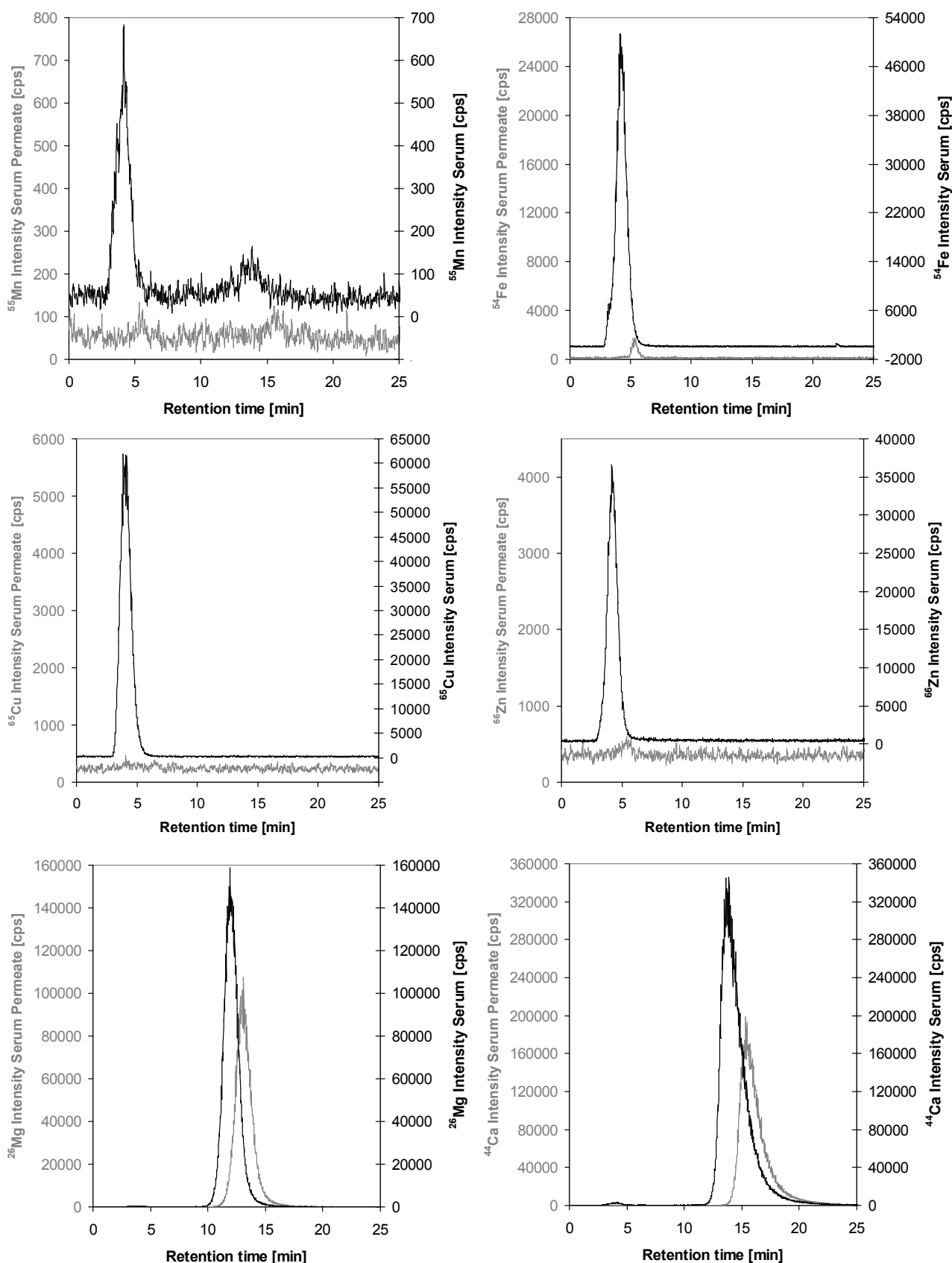


Figure B SEC-ICP-MS chromatograms of a serum sample (black) and the associated serum permeate (grey) (same patient as CSF sample in Figure A) for Mn, Fe, Cu, Zn, Ca and Mg (3-point average smoothing was applied for Mn, for Cu in serum permeate and for Zn in serum permeate).

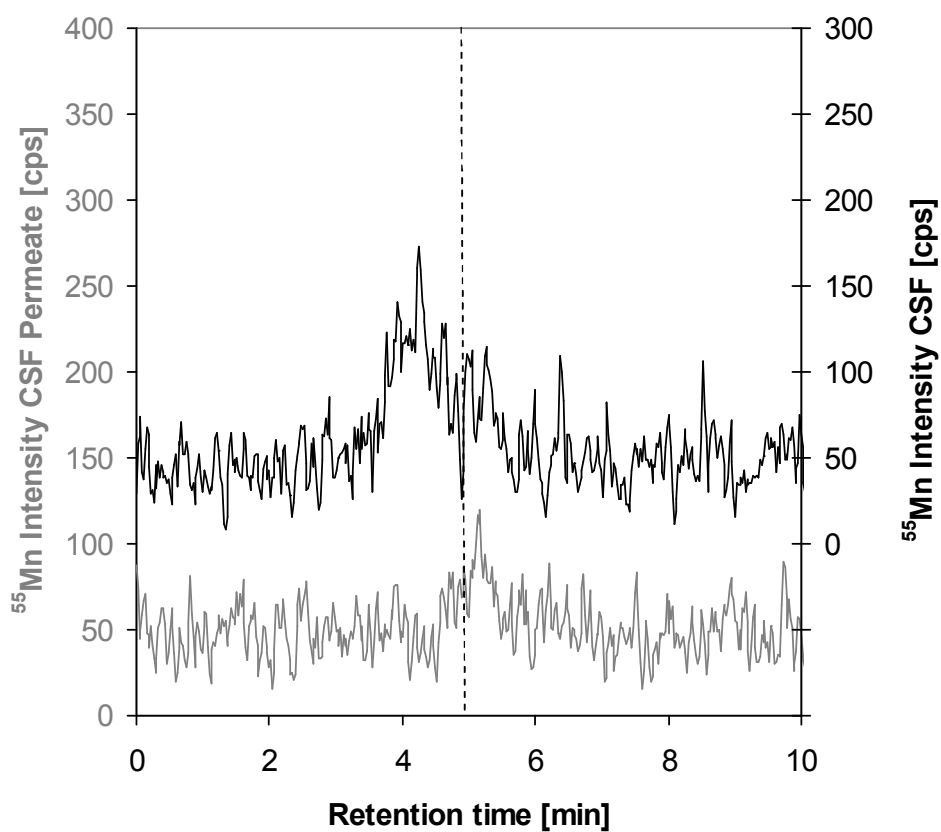


Figure C ⁵⁵Mn SEC-ICP-MS chromatograms of another CSF sample (black) and the corresponding permeate (grey) obtained from ultrafiltration (3-point average smoothing was applied).

Table A Results for reference sera Seronorm™ (a) and ClinChek® (b) determined using various dilutions (1:8 to 1:40) with ICP-DRC-MS (for Mn, Fe, Cu and Zn both Y and Rh were used as internal standards, for Mg and Ca only Y was used as internal standard). The values in bold print are within the control range (Mn in Seronorm™ as well as Fe and Ca in ClinChek® are not certified).

a)	Determined concentrations for Seronorm™ [$\mu\text{g L}^{-1}$]				
	1:8	1:16	1:24	1:32	1:40
Mn	6.8 ± 0.2	7.4 ± 0.3	7.1 ± 0.4	7.5 ± 0.6	7.3 ± 0.8
Fe	930 ± 10	1060 ± 20	960 ± 30	960 ± 40	960 ± 50
Cu	1030 ± 30	1130 ± 50	1150 ± 70	1200 ± 100	1200 ± 100
Zn	1290 ± 10	1460 ± 20	1510 ± 30	1630 ± 40	1600 ± 50
Mg	27*10³ ± 2*10³	27*10³ ± 4*10³	27*10³ ± 6*10³	27*10³ ± 8*10³	26*10³ ± 10*10³
Ca	81.5*10³ ± 0.1*10³	82.0*10³ ± 0.2*10³	80.7*10³ ± 0.2*10³	80.3*10³ ± 0.3*10³	80.6*10³ ± 0.3*10³

b)	Determined concentrations for ClinChek® [$\mu\text{g L}^{-1}$]				
	1:8	1:16	1:24	1:32	1:40
Mn	3.8 ± 0.1	3.8 ± 0.3	4.0 ± 0.5	4.1 ± 0.6	4.5 ± 0.8
Fe	1610 ± 10	1530 ± 20	1570 ± 30	1600 ± 40	1640 ± 50
Cu	1440 ± 30	1500 ± 50	1610 ± 70	1700 ± 100	1700 ± 100
Zn	2120 ± 10	2310 ± 20	2540 ± 30	2720 ± 40	2810 ± 50
Mg	31*10³ ± 2*10³	30*10³ ± 4*10³	30*10³ ± 6*10³	30*10³ ± 8*10³	30*10³ ± 10*10³
Ca	780*10 ³ ± 60*10 ³	720*10 ³ ± 60*10 ³	740*10 ³ ± 70*10 ³	730*10 ³ ± 80*10 ³	730*10 ³ ± 90*10 ³