

## Supplementary Information

### Iron isotopic composition of blood serum in anemia of chronic kidney disease

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#### Tables

**Table S1. Instrument settings and acquisition parameters for MC-ICP-MS Neptune (A) and SF-ICP-MS Element XR (B)**

(A) Neptune MC-ICP-MS	
RF power (W)	1,275
Guard electrode	Connected
Sample and skimmer cones	Thermo jet sampler and X-type skimmer, 1.1 and 0.8 mm of orifice diameter, respectively; Ni
Lens settings	Optimized for maximum Fe <sup>+</sup> signal intensity
Ar flow-rates (L min <sup>-1</sup> ):	
plasma gas	15
auxiliary gas	0.75
nebulizer gas	0.9-1.0
Sample uptake rate (μL min <sup>-1</sup> )	100
Resolution mode	Medium (pseudo)
Acquisition mode	Static; multi-collection
Number of blocks	9
Number of cycles	5
Integration time (s)	4.194
Cup configuration	L4: <sup>54</sup> Fe; L2: <sup>56</sup> Fe; L1: <sup>57</sup> Fe; C: <sup>58</sup> (Fe+Ni); H1: <sup>60</sup> Ni; H3: <sup>62</sup> Ni
(B) Element XR SF-ICP-MS	
RF power (W)	1,250
Guard electrode	Connected
Sample and skimmer cones	Ni, 1.1 mm and 0.8 mm orifice diameter
Lens settings	Optimized for maximum signal intensity
Ar flow-rates (L min <sup>-1</sup> ):	
plasma gas	15
auxiliary gas	0.8-0.9
nebulizer gas	1.0-1.1
Sample uptake rate (μL min <sup>-1</sup> )	200
Resolution mode	Low, medium, high
Acquisition mode	E-scan
Dwell time per point (ms)	10
Points per peak	20
Number of runs	5
Number of passes	5

**Table S2. Iron isotopic composition and clinical parameters in renal insufficiency and Fe disorders patients.** SCr – serum creatinine, eGFR - estimated glomerular filtration rate, Hb – hemoglobin, [Fe] – Fe concentration in serum, Fer– ferritin, Tf – transferrin, TIBC - total iron-binding capability, TSAT - transferrin saturation, sTfR - soluble transferrin receptor, CRP - C-reactive protein. Delta Fe values are expressed as average  $\pm$  2 s.d.

Diagnosis	Sample label	$\delta^{56}\text{Fe}$	SCr mg dL <sup>-1</sup>	eGFR mL min <sup>-1</sup> per 1.73 m <sup>2</sup>	Hb g dL <sup>-1</sup>	[Fe] $\mu\text{g dL}^{-1}$	Fer ng mL <sup>-1</sup>	Tf g L <sup>-1</sup>	TIBC <sup>a</sup> $\mu\text{g dL}^{-1}$	TSAT %	sTfR mg L <sup>-1</sup>	CRP mg dL <sup>-1</sup>
CKD, no anemia, no ID	1	-2.08 $\pm$ 0.03*	1.70	42.9	13.6	90	42	2.39	294	30	1.49	2.4
	2	-2.72 $\pm$ 0.01*	2.72	29.8	15.0	-	-	-	-	37	1.15	0.7
	3	-2.34 $\pm$ 0.04	2.55	36	15.1	93	91	2.39	294	31	1.67	2.8
	4	-2.54 $\pm$ 0.17*	2.05	31.9	14.3	102	95	3	369	27	1.19	5
	5	-2.53 $\pm$ 0.11*	2.35	25.5	13.0	76	253	1.94	238	31	1.2	8.3
	6	-2.34 $\pm$ 0.04	3.14	17.3	12.7	50	177	1.79	220	22	1.8	6
	7	-2.20 $\pm$ 0.08*	2.11	29.7	12.5	86	115	2.21	272	31	1.03	1.1
	8	-2.85 $\pm$ 0.05	1.62	40.9	13.1	88	176	2.16	265	32	1.46	2.1
	9	-2.13 $\pm$ 0.05	1.58	38.2	13.7	-	-	-	-	31	1.03	3.6
	10	-2.20 $\pm$ 0.05*	1.24	53	13.6	91	65	3.06	376	24	1.32	4.2
	11	-2.35 $\pm$ 0.12*	1.51	46	14.4	83	54	2.53	311	26	0.82	2.1
	12	-2.17 $\pm$ 0.04	1.96	36.2	12.7	73	177	2.64	324	22	1.24	<0.6
	13	-1.30 $\pm$ 0.04*	1.89	32.4	12.7	69	125	2.6	319	21	1.89	4.4
	14	-2.56 $\pm$ 0.06*	1.47	40.4	12.8	71	155	2.42	297	23	1.84	<0.6
CKD, no anemia, ID	15	-2.02 $\pm$ 0.02*	1.65	41.9	13.2	101	42	-	-	15	1.92	2.7
	16	-2.35 $\pm$ 0.03*	1.69	36.6	14.9	64	91	2.98	366	17	1.73	3.5
	17	-2.35 $\pm$ 0.14*	1.78	34.7	13.1	59	46	2.38	292	20	1.68	1
	18	-2.14 $\pm$ 0.03	2.19	27	17.7	68	130	3.19	392	17	-	2.5
	19	-1.29 $\pm$ 0.03	1.46	34	13.2	54	72	2.52	310	17	1.61	6.3
	20	-1.87 $\pm$ 0.04*	1.43	43	12.7	28	75	3.55	436	6	3.02	11.1
	21	-1.44 $\pm$ 0.03	1.31	53	14.5	40	53	3.09	380	11	1.43	11.3
	22	-1.80 $\pm$ 0.03	1.31	51	13.1	20	13	3.15	387	5	-	1.8
	23	-1.62 $\pm$ 0.03	1.41	50	15.2	50	95	2.45	301	17	1.65	3.5
CKD, EPO-related anemia, no ID	24	-1.86 $\pm$ 0.04	1.60	39.8	12.1	102	54	2.74	336	30	1.24	3
	25	-2.48 $\pm$ 0.05	1.68	38.9	12.3	56	68	2.26	278	20	1.44	0.7
	26	-2.63 $\pm$ 0.02*	2.87	21.1	11.6	79	260	2.34	288	27	1.58	-
	27	-2.16 $\pm$ 0.03*	1.65	37	10.9	73	-	-	-	28	1.28	0.1
	28	-2.55 $\pm$ 0.13*	1.49	44.5	11.5	119	-	-	-	28	1.10	1.5
	29	-2.13 $\pm$ 0.04	2.19	30.5	11.2	98	220	2.58	317	30	1.05	<0.6
	30	-2.45 $\pm$ 0.04	2.49	28.7	11.1	43	-	-	-	21	2.83	18.5
	31	-2.56 $\pm$ 0.05*	2.48	23.3	11.6	66	60	2.72	334	20	1.37	0.2
	32	-2.24 $\pm$ 0.04	2.99	18.4	11.7	56	173	2.57	316	32	1.51	2

Diagnosis	Sample label	$\delta^{56}\text{Fe}$	SCr mg dL <sup>-1</sup>	eGFR mL min <sup>-1</sup> per 1.73 m <sup>2</sup>	Hb g dL <sup>-1</sup>	[Fe] $\mu\text{g dL}^{-1}$	Fer ng mL <sup>-1</sup>	Tf g L <sup>-1</sup>	TIBC <sup>a</sup> $\mu\text{g dL}^{-1}$	TSAT %	sTfR mg L <sup>-1</sup>	CRP mg dL <sup>-1</sup>
	33	-2.70 ± 0.05	6.44	8.3	9.9	61	243	2.03	249	24	1.26	0.9
CKD, IDA	34	-1.14 ± 0.05	1.73	40.5	10.9	41	33	2.83	348	11	1.76	-
	35	-1.52 ± 0.03	1.95	31	10.8	42	33	3.21	394	10	2.00	14.2
	36	-1.76 ± 0.06	1.67	42.1	11.2	31	-	3.03	372	8	2.74	0.4
	37	-0.73 ± 0.04	2.28	27	8.1	19	23	2.93	360	5	4.00	7.1
	38	-1.79 ± 0.03	2.26	28	10.0	39	10	3.30	405	10	2.23	6.5
	39	-2.09 ± 0.03	1.36	34	11.9	44	177	2.42	297	15	1.37	13
	40	-1.36 ± 0.03*	2.11	28	11.6	47	13	2.95	362	13	-	2
	41	-1.99 ± 0.06	1.44	50	9.4	11	180	1.83	225	5	2.26	31.4
	42	-1.14 ± 0.04	1.41	50	12.4	24	9	3.12	383	6	1.12	-
	43	-1.35 ± 0.04	1.43	49	9.4	39	11	3.83	471	8	2.20	<0.6
	44	-1.27 ± 0.03	0.95	54	11.5	25	111	1.90	233	11	2.69	8.3
ID	45	-2.76 ± 0.04	0.92	>90	13.8	49	446	2.13	262	18	1	0.7
	46	-2.13 ± 0.08*	0.81	>90	14.4	53	130	2.47	303	17	1.97	21
	47	-1.91 ± 0.09*	1.12	70	13.4	60	22	2.88	354	16	1.34	0.7
	48	-2.11 ± 0.05*	0.98	83	12.6	74	87	3.11	382	19	1.21	3.9
	49	-1.93 ± 0.05*	0.84	89	13.1	52	36	3.45	424	12	1.49	2.5
	50	-1.86 ± 0.04	0.69	88	14.2	37	12	3.39	416	9	-	-
IDA	51	-1.29 ± 0.12*	1.26	61	11.9	28	20	3.01	370	7	-	2.8
	52	-1.80 ± 0.06*	0.95	82	11.9	41	10	3.41	419	9	2.66	<0.6
	53	-0.77 ± 0.03	0.88	86	8.6	18	6	3.00	369	4	4.42	4.5
	54	-1.80 ± 0.03	0.76	76	10.3	45	37	3.05	375	12	-	-
	55	-0.32 ± 0.03	0.83	>90	10.3	16	9	2.89	355	5	3.18	2.8
	56	-0.86 ± 0.06	0.98	70	7.5	9	7	3.21	394	2	3.82	<0.6
	57	-1.51 ± 0.04	1.05	67	7.5	18	10	3.36	413	4	3.82	4.5
<i>Normal values</i>			<i>0.6 - 1.2</i>	<i>&gt; 90</i>	<i>&gt; 12.5</i>	<i>65 - 177</i>	<i>15-200</i>	<i>2 - 3.6</i>	<i>280 - 436</i>	<i>20 - 45</i>	<i>1.8 - 4.6</i>	<i>&lt; 0.6</i>

<sup>a</sup> TIBC calculated according to H. Yamanishi *et al.* Clin. Chem. 2003, 49, 175-178.

- No data available

\* Data based on duplicate measurement