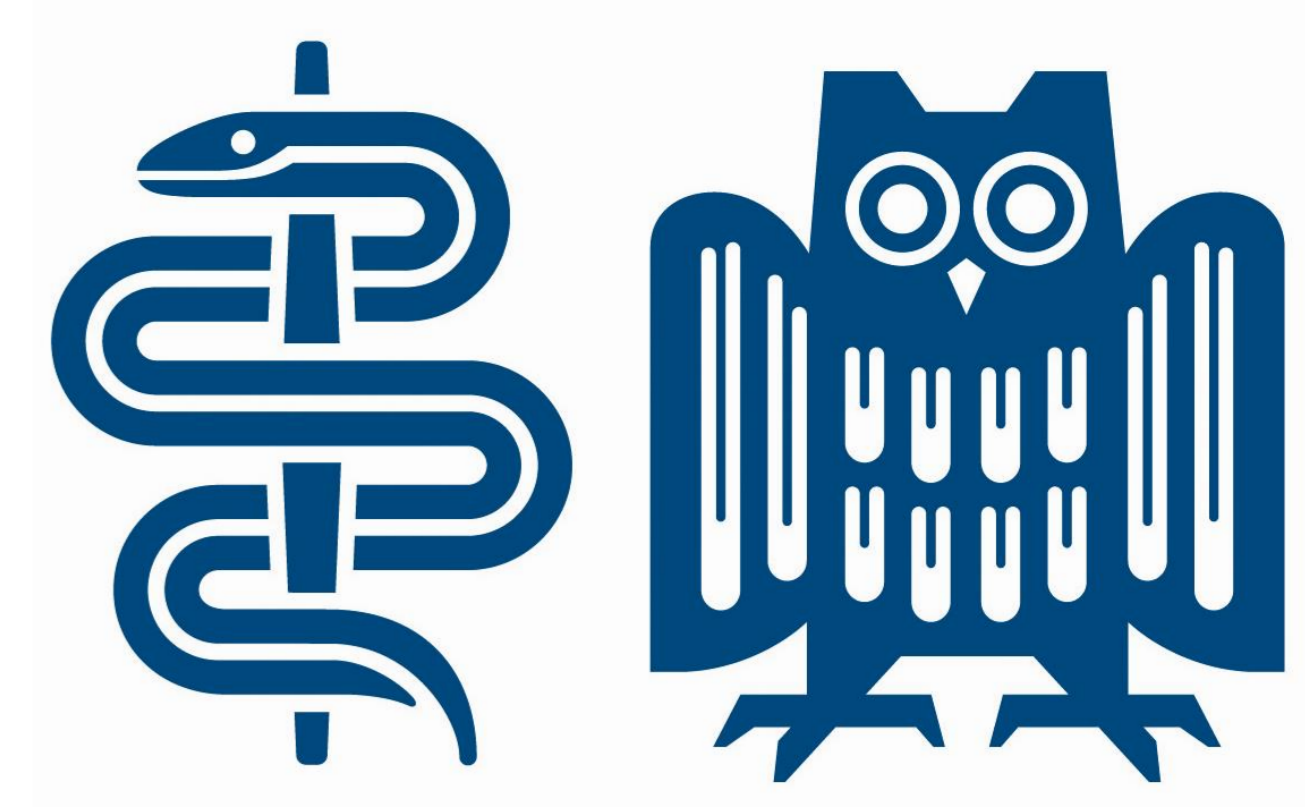


# Online-Hemodiafiltration eliminates S-Adenosylhomocysteine more efficiently than standard Hemodialysis



Adam M. Zawada,<sup>1</sup> Anne I. Michel,<sup>1</sup> Insa E. Emrich,<sup>1</sup> Sarah Seiler-Mußler,<sup>1</sup> Kai van Bentum,<sup>2</sup> Reiner Boßlet,<sup>2</sup> Danilo Fliser,<sup>1</sup> Gunnar H. Heine<sup>1</sup>

<sup>1</sup>Department of Internal Medicine IV, Saarland University Medical Center, Homburg, Germany  
<sup>2</sup>Medizinisches Versorgungszentrum Saarpfalz GmbH, Homburg, Germany

**UKS**  
 Saarland University  
 Medical Center

## Introduction

S-Adenosylhomocysteine (SAH) has been identified as a novel non-traditional cardiovascular risk factor. Patients with chronic kidney disease have dramatically elevated Plasma SAH levels, as the kidneys are the major site of SAH disposal. Until now, no strategies have been characterized which may lower SAH Plasma levels. We hypothesized that SAH may be more efficiently removed by online-hemodiafiltration than by standard hemodialysis, which may contribute to the survival benefit of HDF treatment.

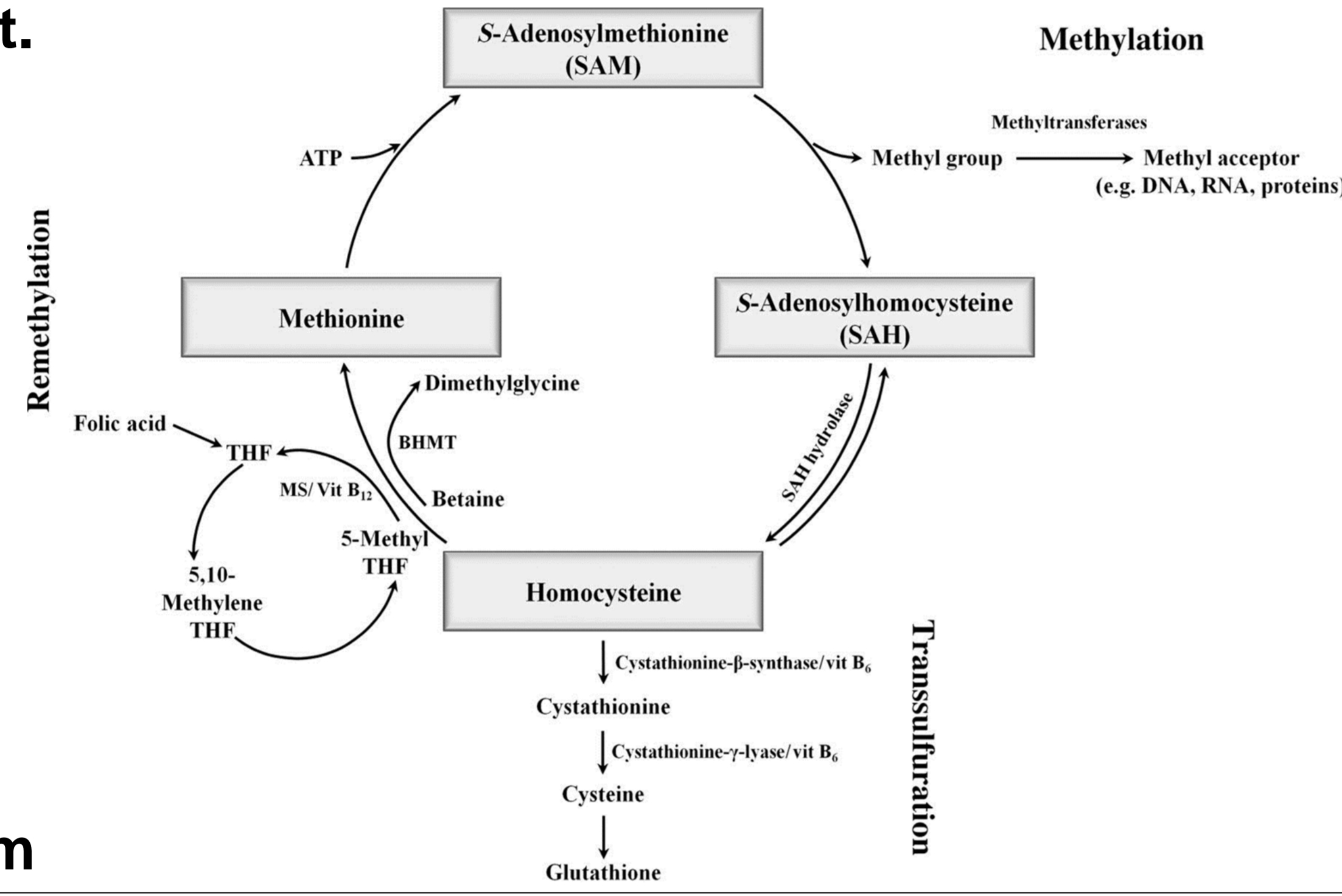


Figure. C1 Metabolism

## Methods

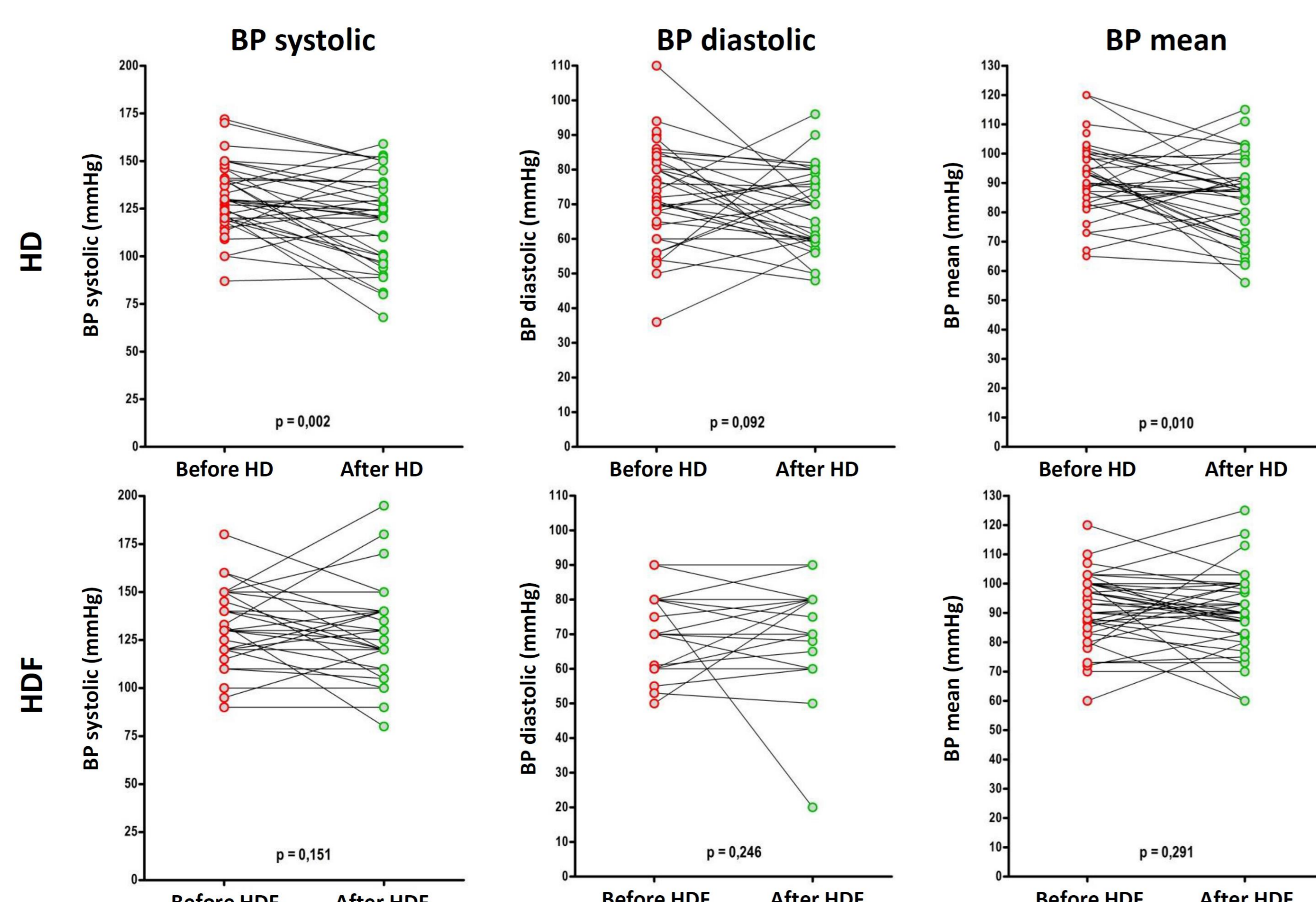
We recruited 88 dialysis patients, of whom 42 patients were treated with HD and 46 with online-HDF. Plasma SAH was measured before and after the dialysis treatment by using a HPLC-MS/MS system (Waters 2795 alliance HAT and Quatro Micro API tandem mass spectrometer).

## Results

### Baseline characteristics

	Total cohort (n = 88)	HD (n = 42)	HDF (n = 46)	P-Value
Age (years)	68 ± 15	70 ± 14	65 ± 16	0.184
Sex (male)	61 (69%)	24 (57%)	37 (80%)	<b>0.022</b>
Diabetes mellitus (Y)	48 (55%)	25 (60%)	23 (50%)	0.399
Smoking (Y)	7 (8%)	3 (7%)	4 (9%)	1.000
Prevalent CVD (Y)	32 (36%)	19 (45%)	13 (28%)	0.123
BMI (kg/m <sup>2</sup> )	28 ± 6	29 ± 6	26 ± 6	0.063
BP systolic (mmHg) [before HD/HDF]	132 ± 17	131 ± 18	132 ± 17	0.762
BP diastolic (mmHg) [before HD/HDF]	73 ± 12	73 ± 14	73 ± 9	0.989
BP mean (mmHg) [before HD/HDF]	92 ± 12	92 ± 12	92 ± 12	0.855
BP systolic (mmHg) [after HD/HDF]	124 ± 23	119 ± 23	128 ± 21	0.072
BP diastolic (mmHg) [after HD/HDF]	69 ± 12	67 ± 12	71 ± 12	0.176
BP mean (mmHg) [after HD/HDF]	87 ± 14	85 ± 14	90 ± 13	0.078
CRP (mg/l)	11.1 ± 14.8	13.2 ± 17.6	9.0 ± 11.3	0.210
Total cholesterol (mg/dl)	157 ± 43	148 ± 39	163 ± 45	0.229
Serum phosphate (mg/dl)	5.4 ± 1.5	5.2 ± 1.3	5.5 ± 1.6	0.230
ESRD (years)	4.4 ± 4.4	3.7 ± 3.0	5.1 ± 5.3	0.123
Blood flow rate (ml/min)	284 ± 52	298 ± 64	271 ± 34	<b>0.016</b>
Kt/V	1.5 ± 0.5	1.6 ± 0.6	1.5 ± 0.3	0.811
Dialysis session length (min)	261 ± 30	252 ± 27	268 ± 31	<b>0.019</b>
Volume removal (l)	2.1 ± 1.4	2.2 ± 1.7	1.9 ± 1.1	0.433
Dialysis center (MVZ/UKS)	48/40	7/35	41/5	<b>&lt;0.001</b>

### Pre- and postdialytic blood pressure

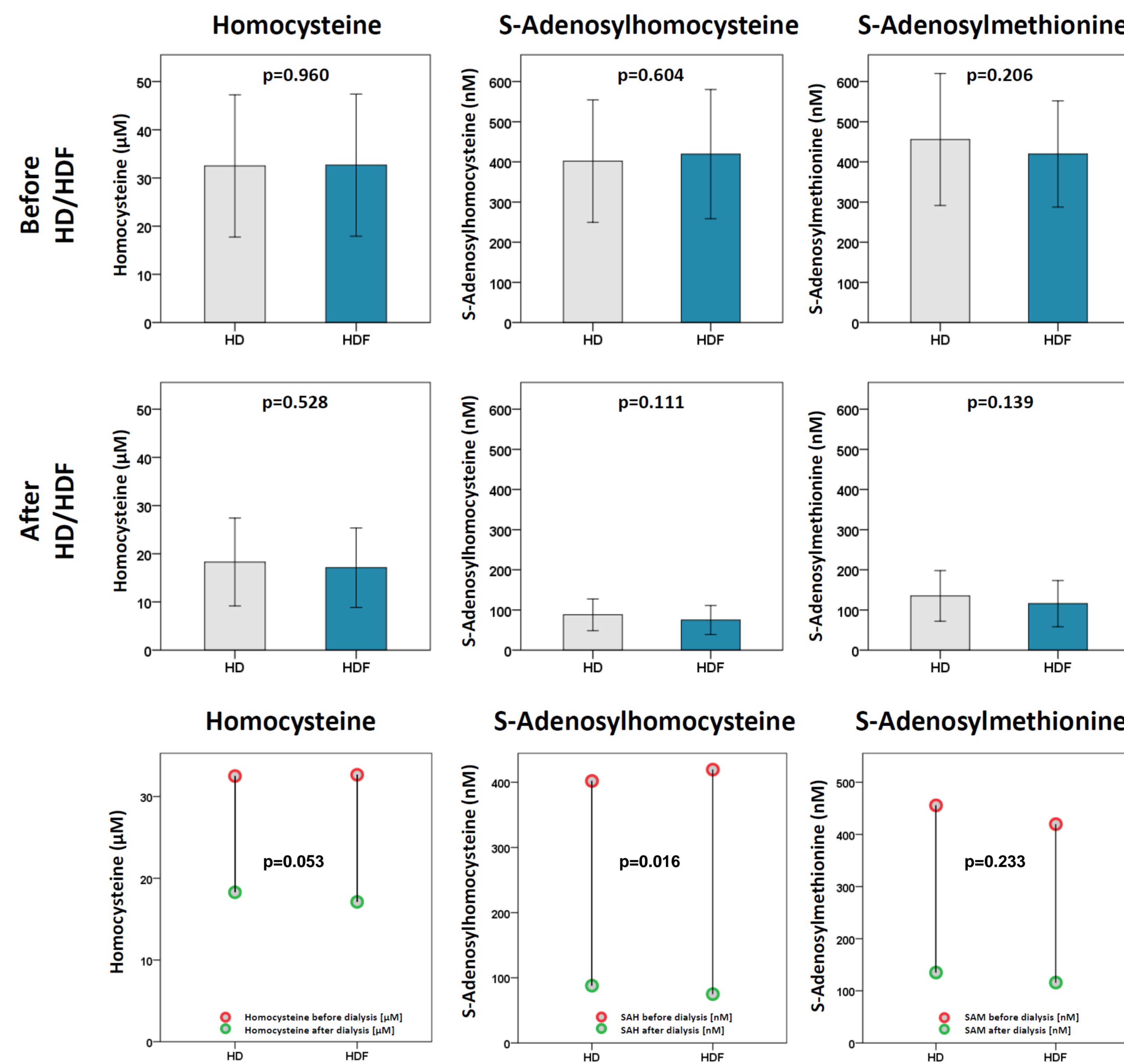


## Results

### Correlation analysis within total cohort

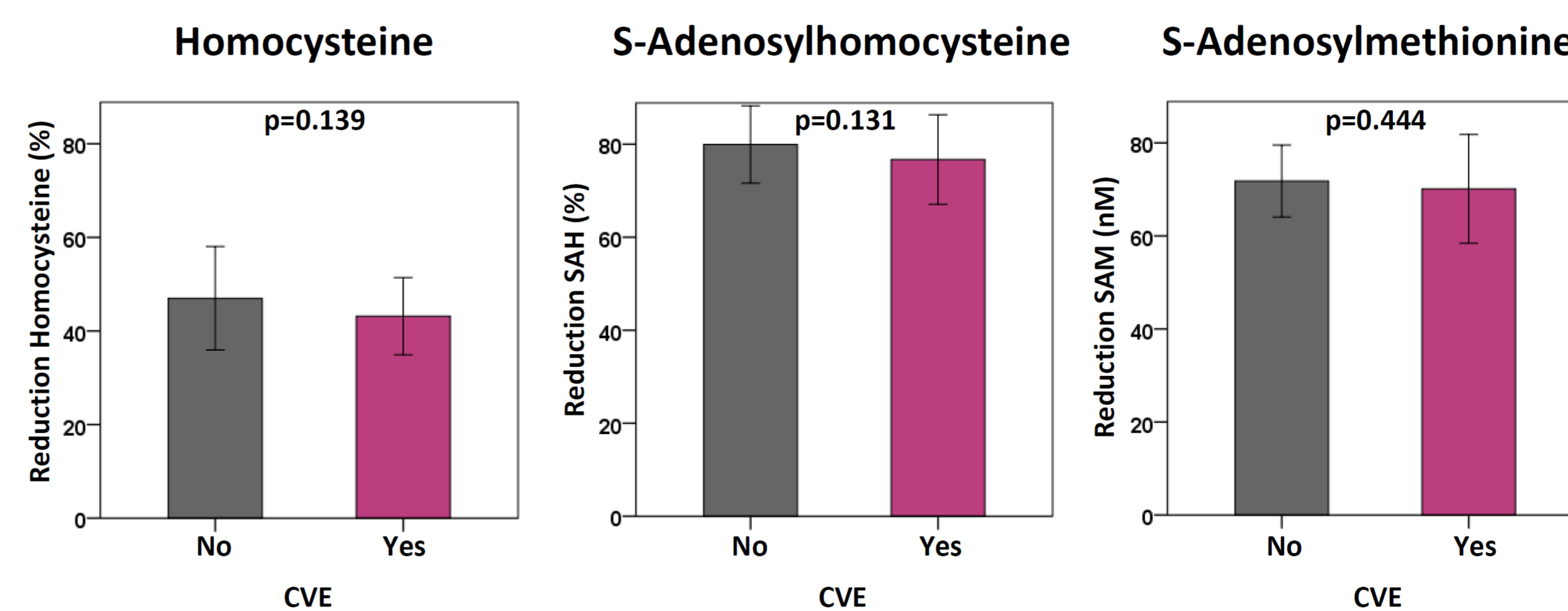
	Homocysteine [μM]		S-Adenosylhomocysteine [μM]		S-Adenosylmethionine [μM]	
	r	p	r	p	r	p
Age (years)	-0.287	0.007	-0.391	<0.001	-0.170	0.113
BMI (kg/m <sup>2</sup> )	0.041	0.730	-0.041	0.726	0.217	0.062
Systolic BP (mmHg)	0.012	0.915	-0.077	0.473	-0.185	0.085
Diastolic BP (mmHg)	0.109	0.313	0.056	0.607	<b>-0.289</b>	<b>0.006</b>
Mean BP (mmHg)	0.100	0.354	0.019	0.859	<b>-0.265</b>	<b>0.013</b>
CRP (mg/l)	<b>-0.247</b>	<b>0.026</b>	-0.042	0.709	0.121	0.281
Total cholesterol (mg/dl)	0.217	0.098	-0.028	0.832	<b>-0.282</b>	<b>0.030</b>
ESRD (years)	0.037	0.736	<b>0.229</b>	<b>0.033</b>	0.066	0.541
Blood flow rate (ml/min)	0.090	0.402	0.000	0.999	-0.006	0.959
Dialysis session length (min)	0.005	0.965	<b>0.314</b>	<b>0.003</b>	0.119	0.276

### Removal of C1 metabolites



### C1 metabolites and cardiovascular outcome

CVE	Homocysteine [μM]	S-Adenosylhomocysteine [nM]	S-Adenosylmethionine [nM]
No (n=66)	33.7 ± 15.7	420.3 ± 164.0	422.0 ± 137.2
Yes (n=22)	29.2 ± 10.7	383.3 ± 130.0	481.5 ± 175.0
P-Value	0.210	0.339	0.104



## Conclusions

Online-HDF eliminates plasma SAH more efficiently than conventional HD treatment. Randomized controlled studies should assess the prognostic implications of these findings. Contact: Adam.Zawada@gmx.de