

EFFECT OF THE BLOOD PRESSURE IN MORPHOLOGICAL CHANGES IN BRAIN: MRI STUDY IN HAEMODIALYSIS PATIENTS (KIDBRAIN, NCT02827253)

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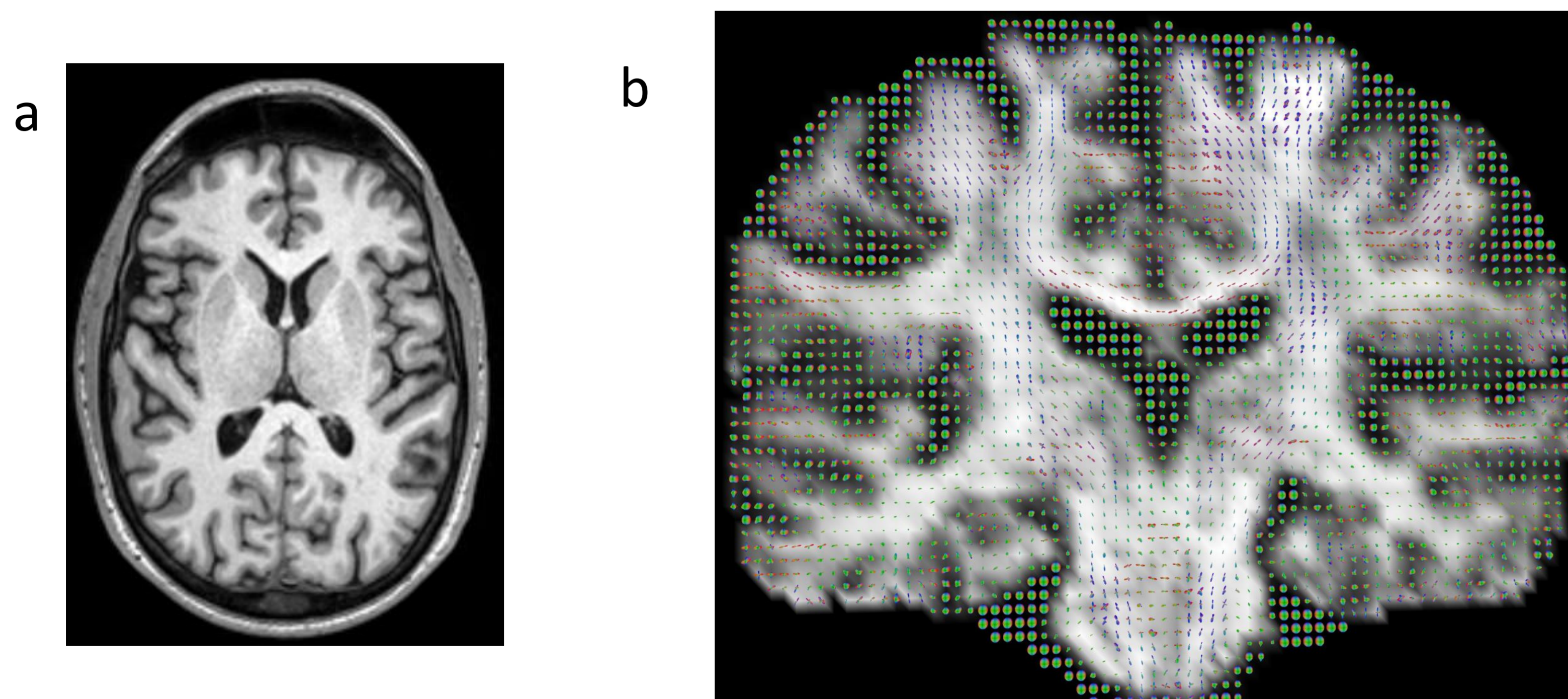
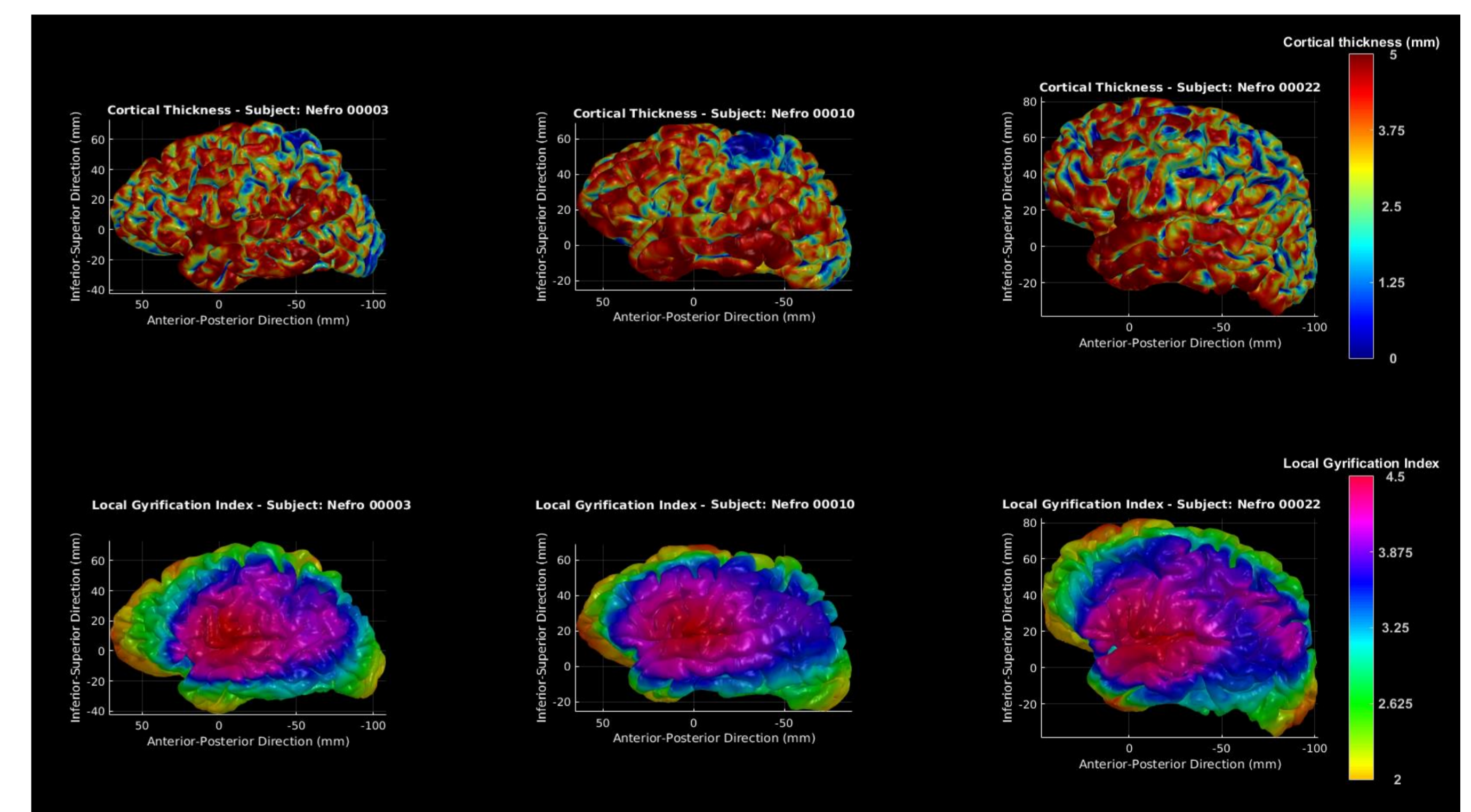
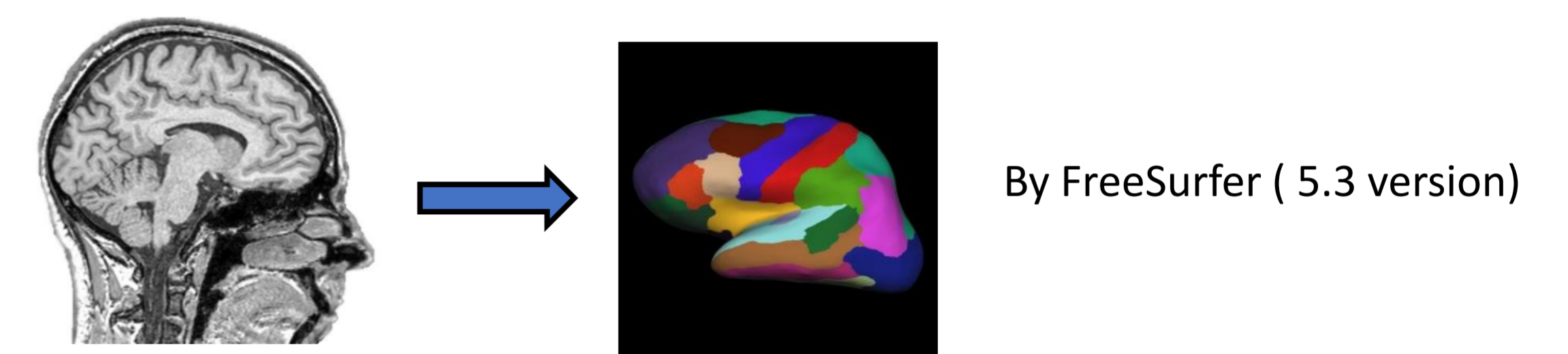
INTRODUCTION AND OBJECTIVES: Intradialytic hypotension (IDH) symptomatic or asymptomatic is a risk factor that may affect the structural integrity of the central nervous system (CNS) and can determine cognitive impairment. Structural changes in brain and its relationship with IDH has not been well described. The objective of the study is to analyze the effect of IDH over the structure of the CNS.

METHODS: Cross-sectional study that includes 68 patients with at least 6 months on haemodialysis therapy. Gray (cortical and subcortical areas) and white matter volumes were analyzed in addition to the functional integrity of the axons determined by fractional anisotropy (FA) obtained by MRI. We analyzed 18 non-consecutive sessions corresponding to the first week of each month of a 6-month period. We used different IDH criteria (**Nadir90**: minimum intradialytic SBP < 90 mmHg, **Nadir100**: minimum intradialytic SBP < 100 mmHg, **Fall20**: Pre-HD minus SBP minimum intradialytic SBP ≥ 20 mmHg, **Fall30**: Pre-HD minus SBP minimum intradialytic SBP ≥ 30 mmHg, **KDOQI**: Pre-HD minus SBP minimum intradialytic SBP ≥ 20 mmHg and symptoms, **HEMO**: fall in SBP resulting in intervention of UF reduction, blood flow reduction or saline administration) and verified the number of sessions where these criteria were found. The influence of the IDH was studied in models adjusted by age, gender, DM, HD vintage, history of cardiovascular disease, ultrafiltration rate, and corporal composition by BCM-FMC®.

RESULTS: We found negative correlation between the structure of CNS and number of sessions with IDH (table). The multivariate analyses revealed an independent effect of the IDH over the gray matter for Nadir definitions and dependent effect of the number of sessions with high ultrafiltration rate (>12ml/h/Kg: Beta: -0,524, p: 0,007*) for the others definitions, also independent effect of the IDH over the white matter, and dependent effect of ICW/ECW (Beta: -0,558, p: 0,009**) ratio for Fall20 and Fall30 definitions over FA.

Demographic and clinical data (N:68)	
Age (years)	58,6 +/- 14,7
Gender (male[%]/female [%])	64,7/32,3
Diabetes (%)	23,5
Dyslipidemia (%)	70,6
Vascular access (Arteriovenous fistula [%]/ Central Venous Catheter [%])	86,8/13,2
History of cardiovascular disease (%)	50
Time in dialysis (months)	46,5 (24-104)
preHD BSP (mmHg)	139,2 +/- 16,8
Interdialytic weight gain (ml)	1873,1 +/- 685
Total Ultrafiltration (ml)	1866 +/- 717
KtV	2,0 +/- 0,5
Convective volume (L)	27,6 +/- 4,1
Residual renal function, >500ml/24h (%)	26,5

- Inclusion Criteria**
- Prevalent patients of haemodialysis (6 months minimum)
 - Age between 18 and 80 years old
 - Informed consent signed
- Exclusion Criteria:**
- Refuse to participate in the study
 - Contraindications for MRI
 - Clinic neurologic disorders like epilepsy, dementia, cerebrovascular disease



a) Structural analysis of patient on HD, b) Fractional anisotropy of another patient on HD

Gray matter of region of interest	NADIR 90	p
Hemispheric	Coef β -0,516	<0,001
Frontal lobe	Coef β -0,506	<0,01
Parietal lobe	Coef β -0,499	<0,01
Temporal lobe	Coef β -0,559	<0,05
Occipital lobe	Coef β -0,515	<0,005
Nucleus basali	Coef β -0,574	<0,05

Model adjusted by age, gender, HD vintage, diabetes mellitus, Charlson comorbidity index, residual renal function, preHD SBP

CONCLUSIONS:

IDH, even asymptomatic, has a negative and independent effect of other cardiovascular risk factors on the structure of the CNS conditioning a smaller volume of gray matter, white and a worse functional integrity axonal. The negative effect of the IDH (Nadir90 / Nadir100) is independent of a high UF ratio in contrast to the other IDH definitions.

IDH	Gray matter (GM)				White matter (WM)				Fractional anisotropy (FA)			
	R	p	Beta	p	R	p	Beta	p	R	p	Beta	p
Nadir90	-0,404	0,001	-0,291	0,006	-0,339	0,005	-0,273	0,011	-	NS	-	NS
Nadir100	-0,339	0,005	-0,241	0,027	-0,313	0,009	-0,298	0,005	-	NS	-	NS
Fall20	-0,363	0,002	*	*	-0,362	0,002	-0,215	0,049	-0,337	0,005	**	**
Fall30	-0,345	0,003	*	*	-0,340	0,005	-0,271	0,011	-0,272	0,025	**	**
KDOQI	-0,355	0,003	*	*	-	NS	-	NS	-	NS	-	NS
HEMO	-0,331	0,006	*	*	-0,302	0,012	-	NS	-	NS	-	NS

R: correlation coefficient, p: statistical significance, Beta: Beta coefficient. *, **: Not statistically significant in multivariate analysis. NS: Not statistically significant. Gray (GM) /green (WM): independent association in multivariate analysis. Blue: correlation with FA