AUTOFLUORESCENCE IN END-STAGE RENAL DISEASE PATIENTS

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BACKGROUND & AIMS

Cardiovascular disease (CVD), the most common cause of death in end-stage renal disease (ESRD) patients (pts), may progress as a consequence of increased generation and accumulation of advanced glycation end-products (AGEs) and oxidative stress contributing to vascular pathology. Accumulated AGEs in skin tissue can be measured non-invasively by skin autofluorescence (SAF).

Aim: to study if SAF associates with arterial stiffness, as measured by augmentation index (AIx), in two cohorts of ESRD pts.

PATIENTS & METHODS

Patients: 68 prevalent peritoneal dialysis (PD) pts (**Table 1**) and another group of 78 ESRD pts undergoing renal transplantation (**Table 2**).

SAF was measured on the lower dominant arm on healthy skin using autofluorescence reader (AGE-Reader®). AIx was quantified by brachial blood pressure and a sphygmograph (SphygmoCor®).

AGEs: Plasma levels of AGEs carboxymethyl lysine (CML) and pentosidine were measured using ELISA and HPLC, respectively.

RESULTS

Table 1. Baseline characteristics PD patients (n=68)

Age, years	65.0 (56.3 - 76.3)
Female, n (%)	23 (33.8)
Smoking, n (%)	15 (22.1)
Body mass index, kg/m²	24.9 (23.3 - 28.0)
Diabetes, n (%)	19 (27.9)
Mean blood pressure, mmHg	99.5 (90.0 - 108.5)
Skin autofluorescence, AU	3.5 (3.1 - 4.2)
CML, µg/ml	0.8 (0.7 - 1.1)
Pentosidine, pmol/mg albumin	27.3 (16.9 - 39.3)
Albumin, g/l	32.0 (28.0 - 35.0)
Hemoglobin, g/l	120.0 (113.0 - 126.0)
hsCRP, mg/l	4.0 (1.3 - 9.4)
CVD, n (%)	20 (29.4)
Malnutrition[d], n (%)	27 (39.7)
Dialysis vintage, months	11.2 (6.2 - 29.4)
AIx, %	27.0 (20.0 - 32.0)
Residual GFR, ml/min/1.73m²	2.9 (1.4 – 4.7)

Table 2. Baseline characteristics ESRD patients (n=78)

Age, years	45.0 (31.8 – 56.7)
Female, n (%)	32 (41.0)
Body mass index, kg/m²	24 (22 - 26)
Diabetes, n (%)	19 (27)
Mean blood pressure, mmHg	102 (90 - 109)
Skin autofluorescence, AU	3.1 (2.8 - 3.4)
CML, µg/ml	1.6(1.4 – 2.1)
Pentosidine, pmol/mg albumin	20.8 (14.9 - 31.9)
Albumin, g/l	36(33 - 39)
Hemoglobin, g/l	120(113 - 126)
hsCRP, mg/l	0.9(0.44 – 2.42)
CVD, n (%)	13 (17)
Malnutrition[d], n (%)	16 (21)
Dialysis vintage, years	0.12 (0 – 1.7)
AIx, %	17.5 (7.0 - 23.0)

Table 3. Factors associated with AIx (arterial stiffness) in PD patients

	Bivariate		Multivariate model (adj r^2 = 0.32)	
	Rho	p	(β ± SE)	p
Gender (female)	-0.45	<0.01	**-0.37 ± 2.24**	**<0.01**
Skin autofluorescence, AU	0.44	<0.01	**0.24 ± 1.34**	**0.03**
Dialysis vintage, months	0.40	<0.01	**0.22 ± 0.04**	**0.03**
hsCRP, mg/l	0.28	0.02	**0.20 ± 0.08**	**0.06**
Age, years	0.24	<0.05		
Albumin, g/l	-0.38	<0.01		
CML, µg/ml	0.29	0.02		

Table 4. Factors associated with skin autofluorescence in PD patients

	Bivariate		Multivariate model (adj r^2 = 0.21)	
	Rho	p	(β ± SE)	p
Age, years	0.29	0.02	**0.34 ± 0.01**	**<0.01**
Diabetes	0.32	0.01	**0.31 ± 0.20**	**0.01**
Smoking	0.25	0.04	**0.23 ± 0.21**	**0.04**
Triglyceride, mmol/l	-0.24	<0.05		
CML, µg/ml	0.39	<0.01		
hsCRP, mg/l	0.24	<0.05		
Albumin, g/l	-0.42	<0.01		
Dialysis vintage, months	0.28	0.02		
Gender (female)	-0.23	0.06		

Spearman's rank test was used to assess bivariate associations. A multiple linear backward regression analysis was performed to assess independent associations.

PD patients

SAF predicted arterial stiffness (Aix) irrespective of gender, dialysis vintage and high sensitivity C-reactive protein (hsCRP) levels (adjusted r^2 = 0.32); **Table 3**.

SAF associated with age (ρ = 0.29), diabetes (ρ = 0.32), smoking (ρ = 0.25), dialysis vintage (ρ = 0.28), and plasma albumin (ρ = -0.42), hsCRP (ρ = 0.24), triglycerides (ρ = -0.24) and carboxymethyl lysine (ρ = 0.39); **Table 4**.

ESRD patients

Arterial stiffness (Aix) in ESRD pts associated with age (ρ=0.50), CVD (ρ=0.25), and vintage (ρ=0.23).

SAF associated with age (ρ=0.41), pentosidine (ρ=0.27), and arterial stiffness (ρ=0.44).

CONCLUSIONS

Skin autofluorescence (SAF) reflecting skin content of AGEs associates with circulating AGEs as well as with arterial stiffness assessed by applanation tonometry in ESRD patients.

These findings suggest that SAF may have a role both as a marker of tissue AGEs accumulating in ESRD and as a non-traditional CVD risk marker in these patients.

References

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