

Systemic inflammation in patients with end-stage renal disease (ESRD) receiving different types of renal replacement therapy

Author Block: L. Solomatina, PhD^{1,2}, Iu. Zhuravleva, PhD¹, E. Panshina², Prof. E. Gusev, MD¹

¹Institute of Immunology and Physiology, Ural Branch of RAS, Ekaterinburg, Russian Federation,

²Sverdlovsk Regional Hospital №1, Ekaterinburg, Russian Federation.

E-mail: e.gusev@iip.uran.ru, slv10@list.ru, jazhur@mail.ru

INTRODUCTION AND OBJECTIVE

ESRD is accompanied by the development of chronic systemic inflammation in most cases. **Systemic inflammation (SI)** is a typical process integrating some phenomena such as systemic inflammatory reaction, microthrombosis, tissue alteration, distress of neuroendocrine system. We have developed the assessment criteria (scores) for both the acute and chronic variants of this typical pathological process.

Objective. To assess the degree of chronic SI (CSI) in patients with ESRD receiving different types of renal replacement therapy.

PATIENTS

1. Patients with ESRD receiving program hemodialysis (12 hours per week, blood samples were taken prior to dialysis session, n=22, initial disease – chronic glomerulonephritis)
2. Renal transplant patients with normal allograft function (n=23, initial disease – chronic glomerulonephritis)
3. Renal transplant patients with chronic allograft dysfunction (CAD, n=24, initial disease – chronic glomerulonephritis)
4. The control group included 50 healthy people

METHODS

I. Levels of interleukins (IL-6, IL-8, IL-10), tumor necrosis factor (TNF) α , C-reactive protein (CRP), cortisol, myoglobin, troponin I, D-dimer were measured in plasma («Immulite», Siemens Medical Solutions Diagnostics, USA).

II. Six concentration ranges of the five studied serum factors (values range 0 to 5, or 0 to 6 for IL-10) were determined and expressed as Reactivity Indices (RI) in accordance with their biological significance (Table 1).

Table 1 - Ranges of absolute parameter values and corresponding Reactivity Indices

Parameters	Norm (RI-0)	Reactivity Index (RI) scores					
		1	2	3	4	5	6
IL-6, pg/ml	<5.0	5-10	10-40	40-200	200-1000	>1000	-
IL-8, pg/ml	<10.0	10-25	25-100	100-500	500-2500	>2500	-
IL-10, pg/ml	<5.0	-	5-10	10-25	25-100	100-500	>500
TNF α , pg/ml	<8.0	8-16	16-40	40-160	160-800	>800	-
CRP, mg/dl	<1.0	1-3	3-15	>15	-	-	-

III. Three highest RI score values were selected out of five. The sum of these is the Coefficient of Reactivity (CR) (value range 0 to 16). Reactivity Levels (RL) were determined within the CR range (Table 2).

Table 2 - CR values and corresponding reactivity levels (RL)

CR	0-1	2-4	5-7	8-10	11-13	14-16
RL	0	1	2	3	4	5

IV. The CSI score takes into account the RL and other phenomena (1 point for the presence of each). Its values range from 0 to 8 points (Table 3). The value of 3 points or more is interpreted as proof of present chronic systemic inflammation.

Table 3 – The Chronic Systemic Inflammation Score

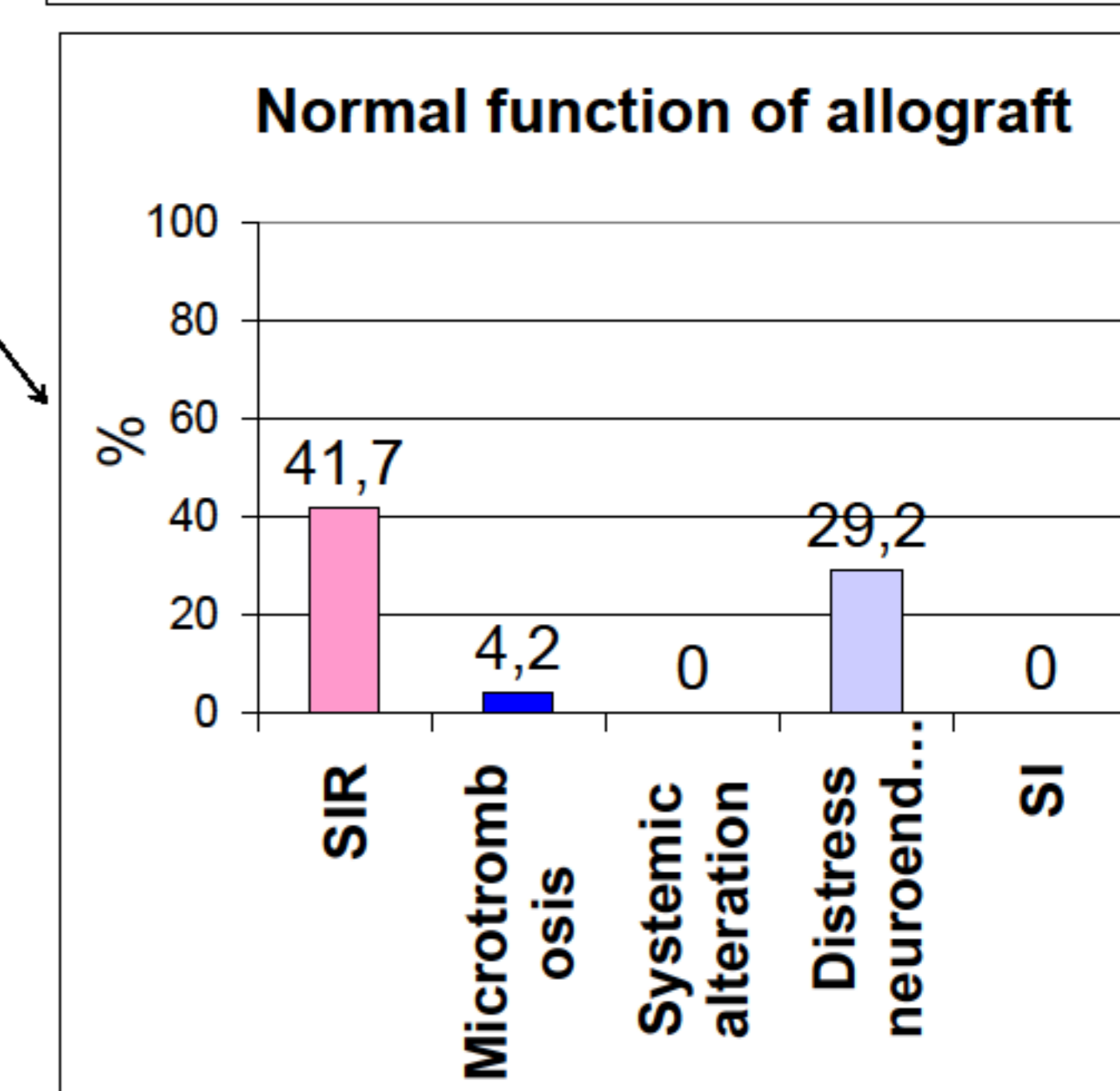
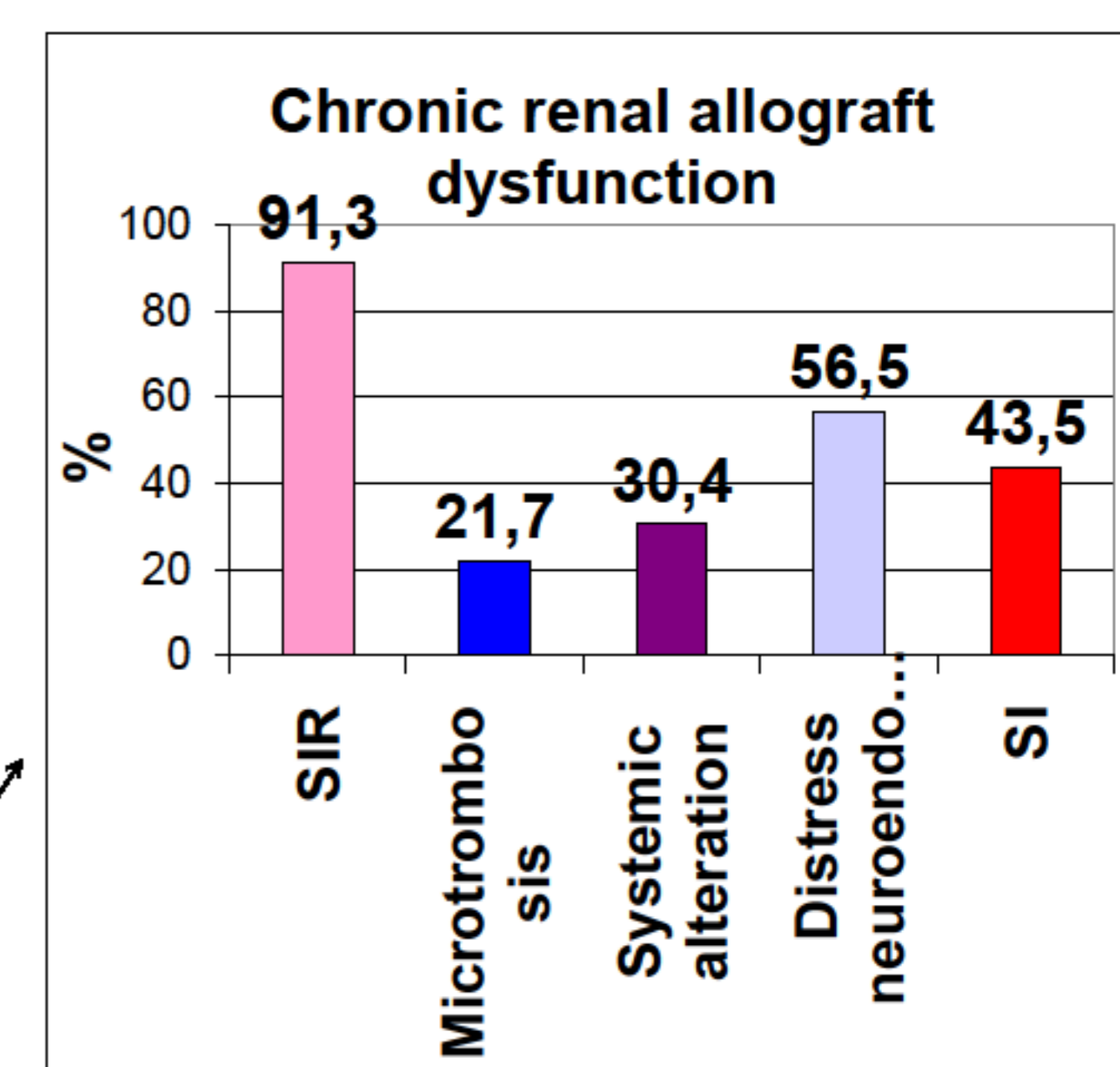
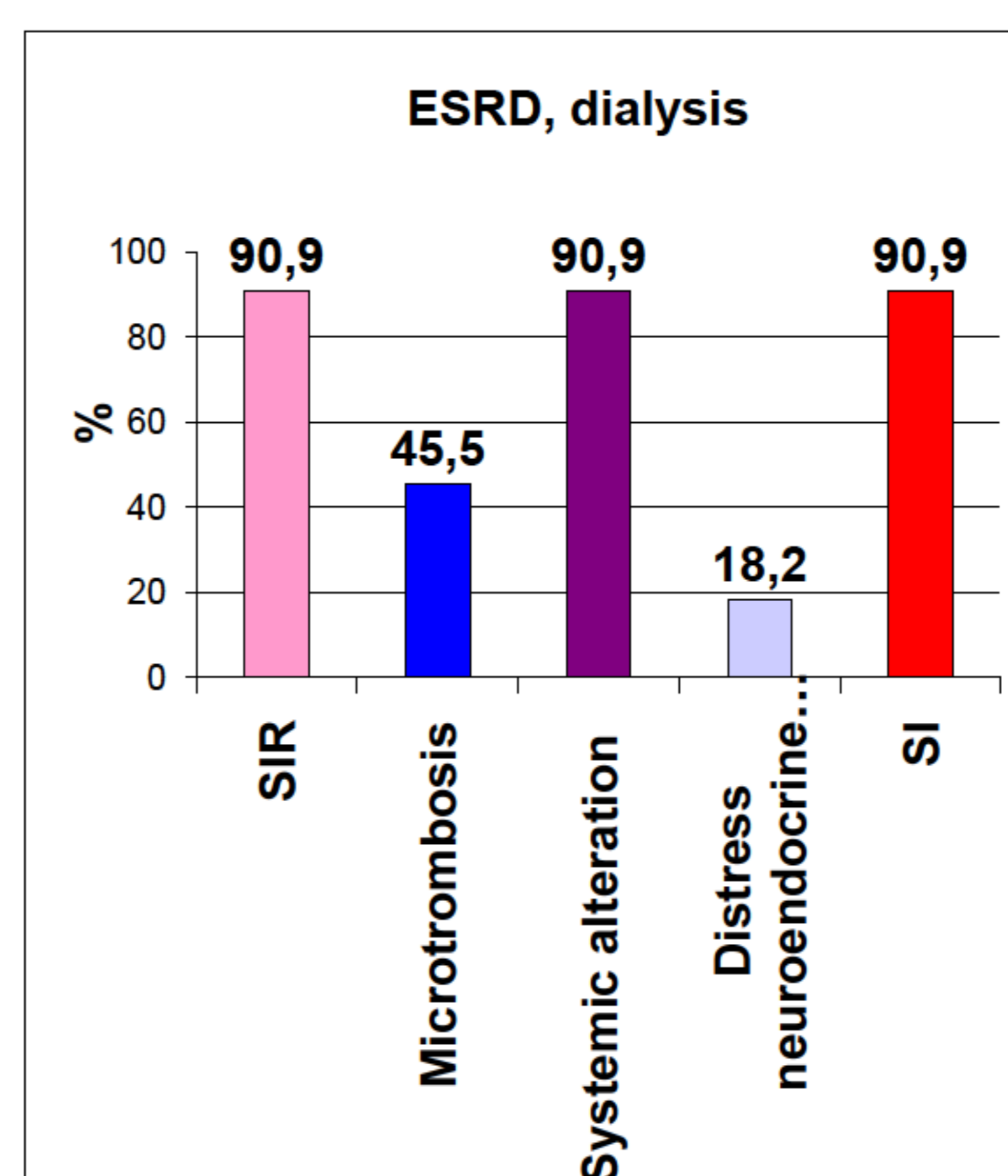
SCI phenomena	Partial CSI criteria	Unit	Norm	CSI score points
SIR- Cytokinemias	RL score	Points (0 to 5)	0	1 RL point = 1 SCI score point
Microthrombosis	D-dimers >500	ng/ml	≤250	1 point
Systemic alteration	Myoglobin >60	ng/ml	≤25	1 point
	Troponin I >0.2	ng/ml	<0.2	
HPA system dysfunction	Cortisol >690	nmol/L	138-690	1 point
	Cortisol <100			

CSI was diagnosed only in hemodialysis patients (90.9%) and in the CAD group (43.5%). The incidence of systemic inflammatory reaction and tissue alteration was the highest (90.9% and 90.9%) in hemodialysis patients. CAD is most often accompanied by systemic inflammation reaction (91.3%) and distress of neuroendocrine system (56.5%).

While elevated levels of proinflammatory cytokines and CRP (41.7%), distress of neuroendocrine system (29.2%), and microthrombosis (4.2%) were recorded in the normal allograft function group, on the whole, there were no cases of CSI.

Conclusion: CSI is a severe ESRD complication in hemodialysis patients. Following the renal transplantation CSI is found only in patients with CAD, proving that CSI is an additional link in the CAD pathogenesis.

RESULTS



TRANSPLANTATION

