Impact of T-lymphocyte populations on long-term cardiovascular prognosis in patients with coronary artery disease

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Background and Aims:

It is assumed that activation of the immune system in coronary artery disease (CAD) leads to atherosclerotic plaque destabilization and to development of acute coronary syndrome (ACS). Thus, previous studies showed elevated levels of different T-lymphocyte subsets in the blood of patients with ACS. Moreover, in a univariate analysis, it was shown that cardiovascular (CV) event-free survival decreased in patients with higher percentages of late-differentiated CD4⁺ T cells. The aim of this work was to analyze the effect of different T-cell populations on prognosis in patients with CAD independently from the traditional CV risk factors.

Methods:

We analyzed T-lymphocyte populations in the blood of 70 patients with CAD (50 patients with ACS and 20 patients with stable CAD, mean age 63,7±11,3 years) during the first 24h after admission using multiparametric flow cytometry (Figure 1). We conducted a 3-year follow-up for CV events (Table 1) and performed a logistic regression analysis of risk factors for survival including the traditional CV risk factors and the percentages of T-cell subpopulations.

Table 1. Patients' characteristics

Basic characteristics	
Age, years	63.7±11.3
Gender, m/f	46/24
Hyperlipidemia	75.7% (53)
Hypertension	78.6% (55)
Diabetes	14.3% (10)
Smoking	41.4% (29)
Obesity	8.6% (6)
Prior cardiovascular disease (TIA/ stroke, ACS/angina pectoris)	68.6% (48)
Clinical endpoints at 3 years	
TIA/Stroke	4.8% (2)
ACS hospitalizations	2.4% (1)
Repeated PCI	23.8% (10)
Life-threatening arrhythmia	4.8% (2)
Angina pectoris	14.3% (6)
CV mortality	26.2% (11)
Combined endpoint	71.4% (30)

Figure 1. Gating strategy for flow cytometry

Figure 2. Odds of CV events within 3 years for CD4⁺ T cells.

Figure 3. Odds of CV events within 3 years for CD8⁺ T cells.

Figure 4. Odds of CV events within 3 years for age and prior CV events

Figure 5. CD4⁺ and CD8⁺ naive T cells in patients with/without prior CV events

Figure 6. Correlation of (a) naive CD4⁺ T cells and (b) naive CD8⁺ T cells with age

Figure 7. Multiple regression model for independent risk factors of CV events within 3-years

Factor	OR (±95% CI)	OR (±95% CI)	P
Age	1.11 [1.03-1.21]	1.11 [1.03-1.21]	0.012
% of CD4 Tem ID	1.13 [1.02-1.25]	1.13 [1.02-1.25]	0.023
Prior CVD	12.06 [1.53-94.83]	12.06 [1.53-94.83]	0.018

Conclusions:

We showed that the risk of recurrent cardiovascular events during 3 years after the admission of CAD patients increased with the lower percentage of CD4⁺ and CD8⁺ naive T cells and the higher percentage of CD4⁺ effector memory T cells. However, the amount of subpopulations of naive T cells correlates negatively with patients' age. Therefore, only the differentiation of effector memory T cells in blood was found to be an independent risk factor for cardiovascular prognosis.