Composition of Thrombus in Myocardial Infarction complicated or not by Sudden Cardiac Death: the TIDE (Thrombus and Inflammation in sudden DEath) study.

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Abstract

Background

It was hypothesized that the pattern of coronary occlusion (thrombus composition) might contribute to the onset of ventricular arrhythmia and sudden cardiac death (SCD) in myocardial infarction (MI).

Methods

The TIDE (thrombus and inflammation in sudden death) study included patients with angiographically-proven acute coronary occlusion responsible for a ST elevation MI (STEMI) complicated by Sudden Cardiac Death (SCD group) or not (STEMI group).

Thrombus specimens were obtained by thrombo-aspiration before primary percutaneous coronary stenting and analyzed with a semi-quantitative method using scanning electron microscopy (**figure 1**). We compared the composition of the thrombi responsible for the coronary occlusion between the two groups and evaluated factors influencing its composition.

Results

We included 121 patients in the present analysis. Thrombus composition was not different between the SCD group (n=23) and the STEMI group (n=98) as shown in **table 1** and **figure 2**. Thrombus composition did not differ between upstream-use of glycoprotein IIb/IIIa platelet receptor inhibitors (GPI) and patients free of GPI. The only factor found to influence thrombus composition was the ischemic time from symptom onset to primary PCI, with a decreased content in fibrin fibers (57.8±18.5% vs. 71.9±10.1%, p=0.0008) and a higher platelet content (19.2±19.1% vs. 7.9±5.7% p=0.014) in early presenters (< 3 hours of ischemic time) vs. late presenters (>6 hours of ischemic time) as shown in **figure 3**.

Fundings:

ACTION and ANR

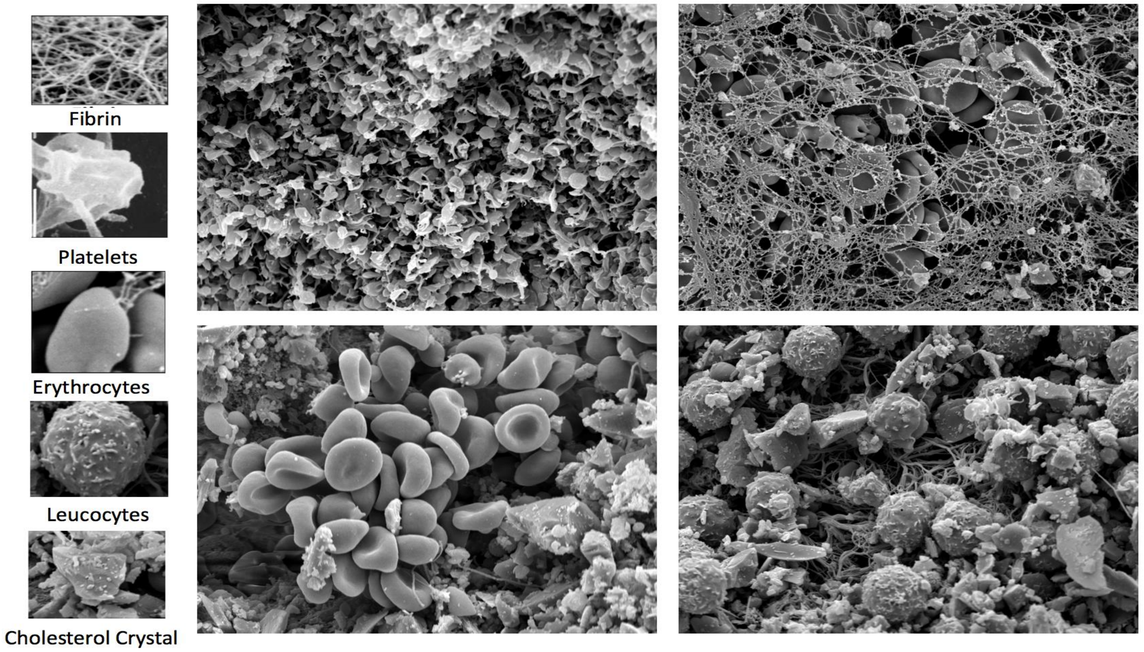

Figure 1. Thrombus analysis with high-definition photographs (x3,000 magnification) obtained using a Philips/FEI XL20 Scanning Electron Microscope with 4-nm resolution (FEI, Hillsboro, Oregon).

	All patients (n=121)	Sudden Cardiac Death (n=23)	Uncomplicated STEMI (n=98)	p value
Fibrin (%)	61.8 ± 18.4	60.3 ± 18.5	62.4 ± 18.4	0.68
Platelet (%)	15.6 ± 17.1	16.3 ± 19.2	15.6 ± 16.7	0.76
Red cells (%)	13.5 ± 12.2	14.6 ± 12.5	13.0 ± 12.1	0.73
White cells (%)	0.8 ± 1.4	0.6 ± 0.9	0.8 ± 1.5	0.93
Mixed Cell-fibrin (%)	1.4 ± 2.2	1.2 ± 2.1	1.4 ± 2.2	0.47
Crystal-like structure	1.8 ± 5.3	2.1 ± 7.9	1.7 ± 4.5	0.87
Empty black space (%)	5.1 ±2.2	4.9 ± 1.5	5.1 ± 2.4	0.96

Table 1. Thrombus composition according to clinical presentation.

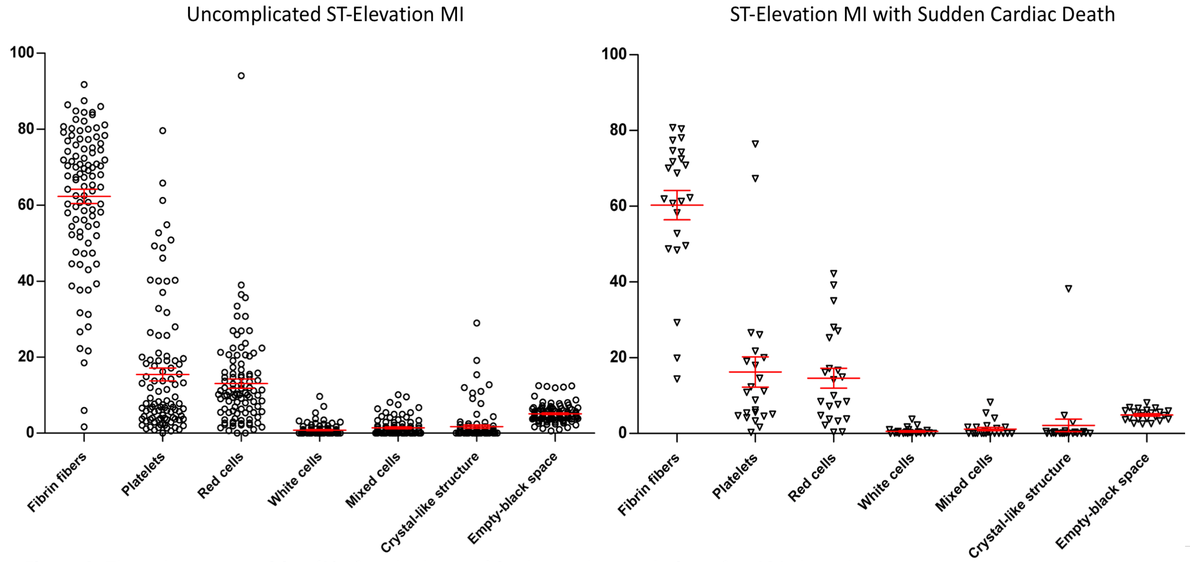

Figure 2. Thrombus composition (% of each element) in the study population of n=121 thrombus

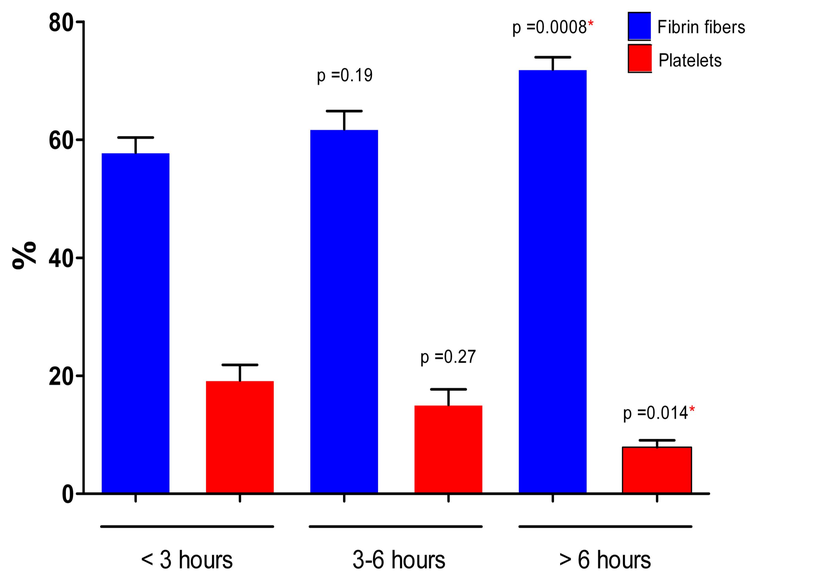

Figure 3. Relation between ischemic time (duration of thrombus formation) and thrombus composition of fibrin fibers and platelets.

P-values are given for comparison with the group <3 hours as a reference with multiple student t-test.

Conclusion

Composition of intracoronary thrombi in STEMI patients does not differ between those presenting with and without SCD. Time from symptom onset to coronary reperfusion seems to be the strongest factor influencing thrombus composition in myocardial infarction.